An Econometric Model of Tourist Demand:
The Case of Greece

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Abstract

Tourism today includes a wide array of economic and social activities on an international scale and covers all social classes. It is directly related with the development of every modern society and aims at meeting human needs in a developed culture so as to create the conditions for advancing understanding and brotherhood among the different peoples in order to achieve a better future for mankind.

The tourist sector does not constitute a specific sector in an economy, but includes goods and services from various sectors. The present study focuses on foreign tourism due to its primary influence on changes made in the social and economic structure of the tourist-host country.

This study employs an econometric model of tourist demand in a developed tourist market like the Greek one which aims to improve its tourist product. The model is estimated using the method of Ordinary Least Squares (OLS), employing data for the period 1960-1993, and using the econometric package of Microfit 3.11.

1. Introduction

Tourism as an economic activity of primary value and importance for many countries is an accepted fact by all. Developing countries especially saw in tourism a sector that could potentially cover their needs in foreign currency. The contribution of the tourist sector is beneficial for a country's economy due to its influence on sectors other than the foreign exchange sector, like:

(a) The employment sector and especially in the tourist periphery, with the direct consequence of restraining the propensity to immigrate and keeping the population in its place.

(b) The business sector, through the expansion of the industrial and agricultural production so as to meet the increasing tourist wave, as well as the mobilization of the international and domestic trade and the activities of

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various service-related industries like transportation, telecommunications, banking, travel agencies, etc.

(c) The incomes sector; The tourist income, in addition to contributing to the country's aggregate income, seems to be distributed throughout a wide population stratum; this constitutes a factor of primary importance towards strengthening the development of the periphery.

(d) The cultural sector; In addition to the improvement of the living standards of populations in areas with increased tourism, there is also significant improvement in their cultural standards.

(e) The fiscal sector; It must finally be emphasized that the tourist activity exerts beneficial results on public economics and especially at the local level.

2.   An Analysis of Tourist Demand

The growth potential of international tourist movements depends on a number of variables that include economic, demographic, technological, psychological, socio-political, etc. It is impossible to quantify the inter-relationships among all these variables so as to be able to carry out a complete analysis of trends in international tourism.

The main variable that definitely influences tourist movements positively is growth in Gross National Product (GNP). GNP growth increases disposable income and hence the willingness and ability to consume various goods and services, including an increase in tourist demand, whether such a demand refers to number of arrivals and number of nights spent or to sums of tourist foreign exchange.

Using as a yardstick tourism's appeal as a qualitative social practice, and if current trends continue and come to be realized, then one should expect a bigger increase in demand, both in the near and in the more-distant future. In the analysis that follows an effort is made to identify those variables that influence tourist demand.

Model Specifics

The relationship among the model's variables takes a log-linear (or double-log) form. This log-linear demand function is a popular form of an econometric model in such analyses for two main reasons:

(a) It is practical to employ logarithmic transformations for non-linear functions in order to provide a linear fit so that the OLS method can be employed, and

(b) The parameters (slope coefficients) of this log-linear form measure the elasticities of the respective explanatory variables of the tourist demand function.

The model takes the following specific form:

$$\ln \frac{AR_{jt}}{P_{jt}} = a_{1j} + a_{2j} \ln \frac{Yd_{jt}}{P_{jt}} + a_{3j} \ln C_{jt} + a_{4j} \ln CON_{jt} + a_{5j} \ln N_{jt}$$

$$+ a_{6j} \ln INV_{t-2}\; a_{7j} \ln AD_{jt} + a_{8j} D_t + a_9 T + U_{jt}$$

j = 1, 2,............,15 (country of origin)

t = 1, 2,..........34 (1 = 1960, 2 = 1961, ..., 1993 = 34)

where:

AR_{jt} = Number of tourists in Greece from country j in year t.

P_{jt} = Population of country j in year t.

Yd_{jt} = Disposable national income (in constant 1980 prices) of country j in year t.

C_{jt} = Average total cost for a 10-day stay in Greece including travel expenses from country of origin j (in constant 1980 prices) in year t.

CON_{jt} = Average cost for a 10-day stay in other competitive Mediterranean countries, including travel expenses from country of origin j in year t (in constant 1980 prices).

N_{jt} = The exchange rate of the currency (in current prices) of the country of origin j vis-a-vis the Greek drachma in year t.

INV_{t-2} = Gross investment in fixed assets in Greece (in constant 1980 prices) with a 2-year lag.

Ad_{jt} = Advertising expenditures in the country of origin j in year t (in constant 1980 prices).

D_t = A dummy variable that measures political stability in Greece (1 if year is 1967, 1974, 1980, 1982, 1983, 1989 and 0 if otherwise).

T = Time trend.

U_{jt} = Disturbance (error) term.

$a_{1j}, a_{2j},.....,a_{9j}$ = Parameters to be estimated.

Data and Predictions

The number of tourist arrivals in Greece, AR_{jt}, that constitutes the model's dependent variable was supplied by the *National Statistical Service of Greece* (NSSG), while the population values for each country were supplied by the *European Economy.*

Values for disposable income, Yd_{jt}, which is the model's main explanatory variable and which has been used by many researchers in other models (see Artus 1972, Kwack 1972, Dritsakis 1995, Geyikdagi 1995) were supplied by OECD's national accounts.

The average total cost of a 10-day tourist stay was calculated as the sum of the average cost of a furnished room, of two-meals plus breakfast at a restaurant, as well as of the cost of a plane ticket, since the great majority of tourists (about 75.62%) use the plane as a means of transportation to reach the destination country. The air-plane cost was estimated by the World Airline Guide (RTG), while the exchange rates were supplied by the International Monetary Fund.

Another variable that has also been used by other analysts is the average stay cost in competitive destinations, including countries like Spain and Turkey (Jud and Joseph 1974, Uysal and Grompton 1985, Witt and Witt 1990), even though many analysts also regard domestic tourism as competitive destinations (Loeb 1982).

Gross investment in fixed assets is another important variable of the model which was used with a two-year lag. Gross investment in fixed assets includes

spending on both construction and equipment incurred in all sectors and not just in the tourist sector (Dritsakis 1998).

Finally, the variable for advertising expenditures constitutes a portion of total tourist foreign exchange at the disposal of the Greek Tourist Organization to promote the tourist product in every country of tourist origin.

The method of OLS was employed in order to estimate the separate demand functions for each country of origin like Austria, Benelux, France, Germany, Denmark, Italy, Great Britain, Holland, Sweden, Finland, Yugoslavia, Switzerland, Norway, USA and Japan. The Durbin-Watson d-statistic was employed to test for autocorrelation of residuals. When autocorrelation was found to be a problem in a specific function it was remedied using the Cochrane-Orcutt (CO) method.

Empirical Results

Regressions were run on each equation by country to estimate all the parameters of the explanatory variables. The following table presents the most satisfactory regression results. The criteria used for the regression results presented in that table are:
(a) The signs of the coefficients of the explanatory variables.
(b) The value of the F-ratio which shows whether all the slope coefficients of the explanatory variables used in the model are statistically significant (and different than zero) at the 5% level of significance.

A D-W d-statistic between 1.6 and 2.4, which tests for the presence of first-order autocorrelation in the disturbance terms.

According to the theoretical model, we expect a priori a positive sign for the estimated slope coefficients for disposable income, the currency's exchange rate, investment in fixed assets, average cost in competitive destinations, and advertising expenditures, while we expect a negative sign for the ones for average stay cost in the country of origin and the dummy variable.

When the estimated slope coefficients of the explanatory variables had the opposite signs compared to the ones predicted in the theoretical model, these variables were dropped from the model's equation and regressions were run without these variables. Countries for which the estimated regression equations resulted in slope coefficients that were in total disagreement with the theoretical model were also dropped from the model.

The most satisfactory results were chosen based on the values for the multiple coefficient of determination R^2 (corrected for degrees of freedom) and the t-statistic. When the slope coefficients of the explanatory variables were not statistically significant (different than zero), but had the correct sign according to the theoretical model, they were kept in the model despite their weakness.

The disposable income coefficients were used in ten (10) countries because they had the expected sign regardless of statistical significance. The disposable income coefficients range between 0.371 for Denmark and 2.181 for Holland. This means that an increase in disposable income by 1% in Holland will bring a 2.181% increase in tourist arrivals in Greece, keeping other variables constant (ceteris paribus).

Average stay and travel cost appears in nine (9) countries out of the model's fifteen (15), even if not all the coefficients are statistically significant. The estimated equation for Germany has the largest coefficient in absolute value, followed by Yugoslavia and Finland. This means that a reduction in the stay and travel cost by 1% will increase arrivals from Germany by 0.822% and from Finland by 0.314%.

The coefficients for average stay cost in other competitive to Greece Mediterranean countries ranges between 0.465 for Denmark and 2.273 for Austria. This variable is not that simple as there are other factors in addition to average stay cost in competitive countries that cannot be easily separated.

The exchange rate of the currency of the country of origin vis-a-vis the Greek drachma has a positive effect on tourist demand. For example, a depreciation of the drachma by 1% will increase tourist demand from Germany by 2.96%, from Italy by 1.85%, from Great Britain by 1.52%, from France by 1.41%, and from Austria by 0.98%.

The coefficient for gross investment in fixed capital seems to exert the biggest influence on tourist demand in most of the countries at the 5% level of significance. Since 1974 there has been observed an improvement in stay accommodations, in transportation and in various services, a result of public and private investment in the tourist sector. These investments result not only in increasing the number of tourist arrivals but in the tourist quality as well. The highway improvements and especially of the airports will improve further the qualitative tourist arrivals. A 1% increase in gross investment in fixed capital will bring two years henceforth a 0.67% increase in tourist demand from Germany, 0.69% from Denmark, 0.45% from Great Britain, and 0.51% from Holland.

The advertising expenditures influence most of the countries under study. The biggest increase in tourist arrivals following an increase in advertising expenditures by 1% will come from Great Britain and Germany, by 1.31% and 1.29% respectively.

The dummy for political stability in Greece exhibits a negative coefficient and appears in all the estimated equations of the model. Political events in Greece during 1967, 1974, 1980, 1982, 1983, and 1989 had a negative influence on tourist arrivals. Many tourists stayed away from Greece after certain periods, like the one after 1967 with the military junta in Greece.

The time trend variable appears on in the estimated equations for Germany and Great Britain and is statistically significant. This shows the preference of German and British tourists for Greece.

While most of the countries of origin have a high coefficient of determination R^2, the U.S. coefficient takes on the lowest value of 0.687. This means that this estimated regression equation explains only 68.7% of the dependent variable for the case of the U.S. A probable explanation for this result might be the U.S. Department of State's travel advisory notes during the periods of political instability in Greece.

Conclusions

The aim of this paper was to study some of the variables influencing tourist demand. In the econometric model used, disposable income was not found to exert as an important influence on tourist demand as one might expect, since it does not appear in five (5) estimated equations. This means that Greece continued to attract tourists even when their incomes fell during periods of economic recession.

Average total cost along with travel cost was found to have a minimum impact on tourist demand. Certainly, a reduced air-travel cost would make overseas travel especially more attractive, even the small-duration ones when the visitor participates in conferences and exhibitions, since the expenses are usually paid by the employer.

Average stay cost in other competitive destinations seems to be of greater importance since this variable appears in ten (10) out of the fifteen (15) estimated country-equations.

The exchange rate of the currency of the country of origin vis-a-vis the Greek drachma does not appear to play an important role. The fall in foreign exchange revenues from the tourist sector, especially between 1982-1985, despite the devaluation and gradual depreciation of the drachma that continued until 1988, did not bring the expected results because this policy attracted more tourists of lower income levels.

Gross investment in fixed assets with a two-year lag which contributes to the improvement in the level of the tourist product in Greece had a big influence on tourist demand. The continuously increasing amounts for investments in works of tourist infrastructure (e.g. marinas, airports, modern hotel complexes, entertainment structures, telecommunications), have resulted into increases in the number of tourist arrivals. Of course, much more is left to be done for a better quality in services and in infrastructure. The report of tourist Greece receives a grade of «good» by 50-60% of travel agents. Those that grade us «very good» don't exceed 20%, a percentage that should raise concerns on whether travel salesmen are willing to promote the Greek destination as a product appropriate for customers of high incomes and great demands.

Advertising expenditures play an important role in tourist demand since it appears in eleven (11) out of the fifteen (15) estimated country-equations. A successful promotion of Greece should be based on a plan that must include:
(a) Identifying market sectors of interest.
(b) Planning the strategy for which promotional means should be used.
(c) Composing a specific advertising program.
(d) Measuring advertising's degree of efficiency.

The dummy variable measuring the effect of political stability was found to be an important factor in tourist demand in all countries of the model. While the probability of terrorist acts and violent crimes is low, their possible occurrence would have significant consequences on a sensitive travelling public, with the result that governments have adopted special restrictive measures when entering the country by applying strict passenger and baggage checks.

The general conclusion is that the tourist host-countries have to face a more demanding, more competitive, and an intensely differentiated tourist market which forces policy-makers in Greece to draw and apply a tourist policy employing diligence, timely planning, responsibility, and realism.

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TOURISM DEMAND - REGRESSION RESULTS

COUNTRIES	CONS	Yd	C	CON	N	INV_{t-2}	AD	D	T	R^2	F	D-W	METHOD
AUSTRIA	-17.214* (-5.317)	0.592 (1.043)		2.273* (3.102)	0.981* (3.015)	0.387* (3.912)	0.576 (0.179)	-0.103 (-1.673)		0.845	15.07	1.904	OLS
BENELUX	-3.978 (-1.234)	1.432 (0.529)		0.765 (0.618)		0.358* (2.663)		-0.318 (-1.524)		0.882	8.207	1.898	OLS
FRANCE	0.672 (1.729)	1.026* (2.945)	-0.231 (-0.607)		1.415* (2.482)	0.317* (5.851)	0.237 (1.123)	-0.215* (-2.282)		0.924	16.84	1.889	OLS
GERMANY	-11.761* (-2.781)	0.942 (1.178)	-0.822 (-1.302)	1.712* (4.041)	2.965* (7.431)	0.671* (7.612)	1.297* (2.017)	-0.516* (-2.728)	0.089* (1.967)	0.973	47.50	1.679	OLS
DENMARK	-12.11* (-3.671)	0.371 (0.193)		0.465 (0.392)		0.691* (4.612)	0.147 (0.327)	-0.132 (-0.546)		0.881	16.07	2.213	CO
ITALY	-2.065 (-1.176)		-0.192 (-0.599)	1.172 (0.742)	1.851* (3.451)	0.294* (2.845)		-0.242* (-2.011)		0.876	11.90	2.331	CO
GREAT BRITAIN	-16.012* (-3.015)	1.014* (2.745)	-0.134 (-1.763)	1.714* (3.017)	1.526* (2.018)	0.452* (4.913)	1.317* (4.018)	-0.143 (-1.116)	0.102* (3.129)	0.954	44.97	2.127	OLS
HOLLAND	-32.75* (-2.137)	2.181* (2.551)		1.309* (2.114)		0.512* (3.413)	0.167 (0.276)	-0.357 (-1.917)		0.883	11.57	1.931	OLS
SWEDEN	-7.014* (-2.018)	0.814 (1.176)	-0.119 (-1.913)		1.018 (1.012)	0.314 (1.735)	0.273 (0.941)	-0.217 (-1.010)		0.791	16.04	1.857	OLS
FINLAND	2.017 (0.815)		-0.314 (-0.349)			0.216 (1.042)	1.022* (2.517)	-0.064 (-0.113)		0.917	22.47	2.043	OLS
YUGO-SLANIA	-2.324 (-1.172)		-0.478 (-1.891)		0.780* (6.157)			-1.123* (-2.177)		0.951	40.28	2.268	CO
SWITZERLAND	0.178 (0.944)	0.815 (0.541)	-0.017 (-0.013)	0.612 (0.815)		0.313 (1.187)	0.219 (1.165)	-0.932 (-0.328)		0.882	17.19	1.842	OLS
NORWAY	0.389 (0.043)		-0.123 (-0.214)	0.617 (0.744)		0.347 (1.492)		-0.521 (-1.818)		0.703	5.201	2.142	OLS
U.S.A	2.117* (3.231)	0.657* (3.178)			0.317* (2.291)	0.041 (0.188)	0.785* (3.173)	-0.310 (-1.712)		0.687	7.184	1.648	OLS
JAPAN	-12.54 (-1.783)			0.587* (2.519)	0.027 (0.107)	0.567 (1.769)	0.645* (4.017)	-0.245 (-1.087)		0.714	7.798	1.689	OLS

* Significant at 5% level.
t values in parentheses.