Research note

A compact econometric model of tourism demand for Turkey

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This study examines the relationship between tourism demand for Turkey and national income of the tourist generating country at constant prices, and relative prices (prices in the host country divided by prices in tourist generating country). In determining the relationship, a double-logarithmic functional form of the regression model is used. Taking the period 1980–1993 as the base of the study, 18 countries which constitute an important percentage of tourism demand in Turkey have been chosen. In general, the results indicate a positive relationship between tourists arrivals and national income of tourist generating countries, and a negative relationship between tourist arrivals and relative prices. © 1998 Elsevier Science Ltd. All rights reserved

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Introduction

Econometric methods have been widely used to study tourism demand in various countries. The aim of these studies has been to determine the factors affecting demand and to forecast tourist arrivals in order to develop appropriate policies for the tourism sector.

There are various articles surveying the approaches used for this purpose.[1-5] In most of these studies, tourist arrivals are expressed as a function of certain explanatory variables. The most important ones are per capita income in the tourist generating country, exchange rate, population of the tourist generating country, prices in the host country, cost of travel, distance between the countries, and the attractiveness of the host country. Most of the econometric studies use time-series data on a yearly basis.

In many cases, the empirical results obtained are not very satisfactory, especially in cases where exchange rate, travel expenses and prices in the host country are included as explanatory variables. As examples, see refer-

ences 4, 6–12. The main explanations for these unsatisfactory results are:

(1) Yearly time-series data do not cover enough years. Small sample size is one factor leading to large standard errors of the parameters estimated.

(2) Instead of working with small, compact models, most researchers use models with many explanatory variables which generally lead to the problem of multicollinearity and thereby unsatisfactory t-tests.

Unfortunately, in most of these articles the unsatisfactory results are not analyzed in terms of multicollinearity. In a model which includes population, per capita income, exchange rate and consumer price index, the chances are high that the issue of multicollinearity will arise. Because population and per capita income, as well as exchange rate and consumer price index, may be linearly correlated with each other, leading to high standard errors, low t-statistics and consequently unsatisfactory t-test results will follow. One approach may be to have a single national income variable, instead of per capita income

and population variables, and a single relative price variable, instead of exchange rate and consumer price indexes. Also, the fewer the explanatory variables, the higher will the degrees of freedom which is very important in estimation and t-tests. See for example, Ertek.[13] The article by Smeral *et al.*[14] adopts such an approach to the problem and takes GDP and relative price as explanatory variables. For some countries they add a dummy or trend variable to represent special events. The results are quite satisfactory and in conformity with economic theory. Following the same approach, the factors which affect tourism demand in Turkey will be analyzed. However, demand will be disaggregated with respect to individual tourist-generating countries and a double-logarithmic functional form used instead of a linear form as explained as follows.

Tourism demand model

This approach, parallel to that of Smeral *et al.*,[14] will apply the basic theoretical tools of micro-economics and international trade. The most

important variables explaining demand for a product are price of the product, prices of the related goods and income. In the case of international trade, the most important variables affecting imports are level of national income and relative prices (foreign price index divided by domestic price index). In the case of tourism, a country's demand for tourism services of another country depends on the income of the tourist generating country and the relative price index. As a country's income increases, more people can afford to visit other countries as tourists. Also, if prices in a host country decrease in relation to prices in the tourist generating country, this will increase the probability of tourist flow.

Based on this theoretical explanation, the model can be written as:

$$\ln T = \beta_1 + \beta_2 \ln Y + \beta_3 \ln P + \varepsilon$$

where T is the number of tourist arrivals; Y is the national income of tourist generating country at constant prices; and P is the relative prices (prices in host country divided by prices in tourist generating country).

The problem is how to measure relative prices. Considering the available data, relative prices can be measured by the following formula:

$$P = \frac{\text{consumer price index of the host country}}{\begin{array}{c}\text{(consumer price index of the}\\\text{tourist generating country)}\\\times\text{(exchange rate)}\end{array}}$$

The numerator represents prices in the host country and the denominator represents prices in the tourist generating country. Here, the exchange rate is equal to the price of the tourist generating country's currency in terms of host country's currency. For example, if tourists coming to Turkey from the USA are considered, the exchange rate indicates the amount of TL per $.

Estimation and evaluation of tourism demand curves

In this study of tourism demand in Turkey, only the demand from Western countries (including USA,

Canada and also Japan) is considered, because of the availability of data. These 18 countries will be presented according to the number of tourists visiting Turkey in the year 1993 (the most recent year for which there is relevant data), rather than in alphabetical order *Table 1*.

The study was designed to cover the years between 1970 and 1993, but, unfortunately, the continuous series of data on all relevant variables for the countries under consideration are available only for the period 1980–1993. Figures showing the number of tourists coming from these individual countries for the years 1977, 1978 and 1979 have not been not published by the State Institute of Statistics.

Tourist arrival figures are taken from the *Statistical Yearbook of Turkey 1995*[15] and *Tourism Statistics* for the years 1980, 1981 and 1991.[16–18] Data on national income of tourist generating countries are taken from *World Tables 1995*.[19] Consumer price indices and exchange rate figures which are used in the calculation relative prices are taken again from *World Tables 1995*[19] for the tourist generating countries; and from the *1994 Economic Report*,[20] *Statistical Indicators 1923–1989*,[21] and *Capital*[22] for Turkey.

The statistical results obtained are given in *Table 2*. The evaluation of

Table 1 Number of tourists who visited Turkey in 1993

Germany	1119801
UK	440374
France	302062
USA	276901
Netherlands	216010
Austria	211832
Greece	148185
Italy	134764
Finland	95592
Belgium	88107
Sweden	86987
Switzerland	82659
Denmark	72850
Spain	63127
Norway	53839
Japan	47309
Canada	35305
Portugal	10350
Total	3486054
Rest of the world	3039148
Grand total	6525202

Source: Ref. 15

these in *Table 2* are as follows:

(1) The sign of the coefficient of $\ln Y$ is correct (positive) for all countries examined. The *t*-statistics given in parenthesis indicate that all coefficients are significant at the 5% level, with the exception of Portugal and Greece. For all countries the coefficient, which indicates elasticity of demand in this model, is > 1 (i.e. demand is income elastic). This is in conformity with economic theory which indicates that for luxurious goods and services demand is elastic with respect to income. Tourism is considered to be a luxurious product (service).

(2) The sign of the coefficient of $\ln P$ is correct (negative) for 15 countries and incorrect for only three countries (Finland, Sweden and Denmark). For these three countries it is not significant even at the 5% level. In other words, there is not a statistically significant positive relationship between tourism demand and relative price for these three countries. When the other 15 countries are considered, there is a statistically significant negative relationship between tourism demand and relative price for seven countries at the 5% level, a negative relationship for another three countries at the 10% level, and no significant relationship for the other five countries. Of course, the small sample size has effected the standard errors and has been one reason for receiving relatively small *t*-statistics for some of these countries. On the other hand, obtaining correct signs for 15 out of 18 countries is an acceptable percentage, and indicates that relative price, together with income, are important variables which affect the demand for tourism. Exchange rate in the relative price formula is of utmost importance in policy formulation. *Ceteris paribus*, a real depreciation in the value of the local currency will encourage more tourists to come to Turkey. In fact, the

Table 2 Regression results of tourism demand for Turkey

Tourist generating country	Constant	ln Y	ln P	R²	DW
Germany	−6.3174 (−0.7985)	3.7556 (4.8029)	−2.1855 (−3.2766)	0.86	1.860
UK	−27.7792 (−5.5332)	6.9476 (9.0475)	−0.4964 (−2.1625)	0.92	1.895
France	−13.0026 (−1.0958)	3.3945 (2.7601)	−1.0223 (−2.1757)	0.76	2.3015
USA	−4.7534 (−0.4743)	2.5728 (2.3627)	−1.1964 (−1.9146)	0.52	1.749
The Netherlands	−38.2627 (−5.04673)	8.7831 (9.0291)	−0.9862 (−1.6179)	0.92	1.851
Austria	−17.8362 (−1.6922)	4.6224 (3.8891)	−1.0476 (−1.7401)	0.80	1.514
Greece	14.4218 (0.3995)	2.6104 (0.7410)	−5.9510 (−3.5828)	0.74	1.714
Italy	−9.4534 (−0.8300)	3.3633 (2.4346)	−0.5286 (−0.9386)	0.67	2.339
Finland	−98.1748 (−3.6918)	16.4089 (4.6746)	2.7414 (1.7702)	0.79	0.852
Belgium	−38.5678 (−3.1104)	6.1596 (5.1438)	−0.8726 (−1.2218)	0.83	1.841
Sweden	−146.4466 (−4.2975)	21.0236 (5.2654)	2.7235 (1.6032)	0.84	1.493
Switzerland	−11.5861 (−1.0580)	4.8794 (3.1262)	−1.1250 (−1.6944)	0.80	1.487
Denmark	−71.7553 (−3.5311)	12.5467 (13.5021)	0.0641 (0.1582)	0.98	2.087
Spain	−30.7348 (−1.7441)	4.1855 (3.0667)	−0.6771 (−0.78157)	0.82	1.366
Norway	−45.6175 (−4.8049)	8.9557 (8.1378)	−0.2213 (−0.2822)	0.32	1.584
Japan	0.2159 (0.0401)	2.4200 (3.5174)	−1.1108 (−2.7156)	0.87	2.138
Canada	−12.0738 (−1.6636)	4.3673 (4.6121)	−1.2845 (−2.2766)	0.80	2.340
Portugal	−8.5896 (−0.4383)	2.6295 (1.5544)	−1.4340 (−1.1057)	0.68	1.724

consumer price index in Turkey has increased much faster than the consumer price indices in tourist generating countries. At the same time, the nominal exchange rate in Turkey also decreases rapidly. Therefore, for the relative price ratio to decrease and stimulate more tourist arrivals, increases in the denominator should be larger than increases in the numerator of the formula.

(3) If the most important tourist generating countries are considered (the first eight countries, each of which has sent more than 100 000 tourists to Turkey in 1993), the results are much better. The signs of coefficients of ln Y and ln P are correct for all of them and they are all significant at the 5% level (except for Greece in the case of the ln Y coefficient, and the Netherlands and Italy in the case of the ln P coefficient).

(4) R² values are high and DW-statistics are satisfactory. For all countries, there is no positive or negative autocorrelation at the 1% level of significance, except for Finland, whose DW positive autocorrelation test is inconclusive.

The findings were not tried to be improved by adding a dummy or trend variable to represent irregular factors.

However, the stationarity of the demand series was examined. In most cases, the ln T and ln P series are integrated to degree 1, and the ln Y series are integrated to degree 2. The detailed results are not given since they are not integrated to the same degree, which is very important for co-integration. Additionally, the sample data cover 14 years, which is very small for a meaningful time-series analysis.

Conclusion

In this study a small, compact econometric model of tourism demand for Turkey is developed on a sound theoretical basis; tourism demand is a function of income and relative price (foreign prices divided by domestic prices). The double-logarithmic functional form is used, the coefficients being income and price elasticities, respectively. In general, the results indicate a positive relationship between tourist arrivals and national income of tourist generating countries, and a negative relationship between tourist arrivals and relative prices, and are therefore satisfactory. Similarly, income and price elasticities of tourism demand are mostly high in the majority of studies by different researchers for different countries.[2,3]

The main strengths of this model are: to look at the problem from a pure microeconomic point of view; focusing on only the most important variables explaining demand; and thereby minimizing certain econometric problems such as multicollinearity, and small degrees of freedom.

Since it is beyond the scope of this paper to suggest appropriate policies for the tourism sector, the study has concentrated only on tourism demand and ignored the impact of relative price changes on tourism income. It is clear that an increase in the number of tourist arrivals owing to a decrease in the relative price ratio does not necessarily lead to a rise in tourism income.

Acknowledgements

References

1. Uysal, M. and Crompton, J. L., An overview of the approaches used to forecast tourism demand. *Journal of Travel Research* 1985, **23**(4), 7–15.
2. Calantone, R. J., Di Benedetto, C. A. and Bojanic, D., A comprehensive review of the tourism forecasting literature. *Journal of Travel Research* 1987, **26**(2), 28–39.
3. Calantone, R. J., Di Benedetto, C. A. and Bojanic, D., Multimethod forecasts for tourism analysis. *Annals of Tourism Research* 1988, **15**(3), 387–406.

4. Var, T., Mohammad, G. and İçöz, O., Factors affecting international tourism demand for Turkey. *Annals of Tourism Research* 1990, **17**(4), 606–610.

5. Var, T. and Lee, C., Tourism forecasting: state-of-the art techniques. Paper submitted for *Outdoor Recreation Trends Symposium III*, 29–31 March 1990.

6. Witt, S. F. and Martin, C. A., Econometric models for forecasting international tourism demand. *Journal of Travel Research* 1987, **25**(3), 23–30.

7. Martin, C. A. and Witt, S. F., Accuracy of econometric forecasts of tourism. *Annals of Tourism Research* 1989, **16**(3), 407–428.

8. Witt, C. A. and Witt, S. F., Appraising an econometric forecasting model. *Journal of Travel Research* 1990, **28**(3), 30–34.

9. Geyikdaği, N., Investments in tourism development and the demand for travel. *Rivista Internazionale di Scienze Economiche e Commerciali* 1995, **42**(5), 391–403.

10. Ülengin, B., Factors affecting demand for international tourist flows to Turkey. Paper submitted for the *15th Annual Symposium on Forecasting*, 4–7 June, Toronto, Canada, 1995.

11. Witt, S. F. and Martin, C. A., Forecasting future trends in European tourist demand. *The Tourist Review* 1985, **40**(4), 12–20.

12. Cinemre, N., *Türkiye'de Diş* Turizm Hareketleri ve Diş Turist Tahminlemesi. T.C. Turizm Bankasi, *Turizm Yilliği*, 1987, pp. 8–17.

13. Ertek, T., *Ekonometriye Giriş*. Beta Publications, İstanbul, 1996.

14. Smeral, E., Witt, S. F. and Witt, C. A., Econometric forecasts: tourism trends to 2000. *Annals of Tourism Research* 1992, **19**(3), 450–466.

15. SIS (State Institute of Statistics) *Statistical Yearbook of Turkey*, Publication No. 1945. SIS, Ankara, 1995, pp. 499–500.

16. SIS (State Institute of Statistics), *Tourism Statistics*, Publication No. 989. SIS, Ankara, 1980, p. 40.

17. SIS (State Institute of Statistics), *Tourism Statistics*, Publication No. 1088. SIS, Ankara, p. 410.

18. SIS (State Institute of Statistics), *Tourism Statistics*, Publication No. 1734. SIS, Ankara, 1991, pp. 5–6.

19. World Bank, *World Tables*. The John Hopkins University Press, 1995.

20. UCCET (Union of Chambers and Commodity Exchanges of Turkey), *Economic Report of the Year 1994*. UCCET, 1995, p. 118.

21. SPO (State Planning Organization), *Statistical Indicators 1923–1989*. Publication No. 1472. SPO, 1993, p. 357.

22. *CAPITAL Dergisi*, Hurriyet Publications, Instanbul, Turkey October, 1995.

23. Crouch, G. J., The study of international tourism demand: a review of findings. *Journal of Travel Research* 1994, **33**(1), 12–23.