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The ARDL approach to cointegration analysis of tourism demand in Turkey with Greece as the substitution destination

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Abstract

This paper estimates tourism demand model for Turkey from 13 countries: Austria, Belgium, Bulgaria, Denmark, France, Germany, Holland, Italy, Russia, Sweden, Switzerland, United Kingdom and United States. The aim of this paper is to investigate the determinants of demand for Turkey's tourism and to examine cointegration relationships in the considered model, over the period from 1996 to 2006 year on the monthly basis. This paper uses the autoregressive distributive lag (ARDL) approach advocated by Pesaran and Pesaran (1997), which is more appropriate for studies with small samples. From our results we found evidence at the high significance level of a long-run cointegration relationships among the variables. The study shows that the most significant impact on the tourism demand in the long-run as well as in the short-run has income of tourist arrivals. In addition, the applied CUSUM and CUSUMSQ stability tests confirm the stability of the tourism demand model in most of considered countries.

Keywords: Demand elasticity, cointegration, ARDL, vector error correction, stability test.

JEL classification: C32, C52, F14, F41.

1. Introduction

The purpose of this study is to investigate the long-run relationships between variables of Turkey's tourism demand model by examining the determinants of these relationships and factors affecting it. This study employs an autoregressive distributed lag (ARDL) model in order to measure elasticities of income and relative prices in demand for Turkey from considered countries. It attempts as well to examine the stability of tourism demand in Turkey.

Tourism plays an important role for Turkey. The share of tourism in total exports increased from 6 percent in 1984 to 13 percent in 2007 with a peak of 19 percent in 2003. However, in real terms, the income from tourism exports (in million dollars) continuously increased through these years, thus it increased by more than 3 times for the considered period between 1996 and 2007, or by 33 times from 1984 to 2007. The number of tourist arrivals increased by 132 percent for the previous 10 years[1], from 8.5 million to 19.8 million. According to the World Travel and Tourism Council (2008) travel, the tourism economy in Turkey directly and indirectly accounts for 11.3 percent of the GDP. It is expected that in the forthcoming 10 years the travel and tourism economy will grow by 4.8 percent annually.

Taking into account that tourism is one of the primary sources of foreign currency earning and employment generation, with its growing role in economy of Turkey it is necessary to pay more attention to the economic determinants of tourism for Turkey.

In the past several decades at the international level there has been a growing interest in tourism demand among researchers. In tourism demand modelling, several variables are used as a demand proxy, for example, the number of tourist arrivals, tourists' expenditures, or lodging guest arrivals. Factors influencing tourism demand are selected usually from income of tourist generating country, price indexes, exchange rate, transportation costs, the price indexes of substitution destinations and various dummies. Studies on tourism demand mainly are divided into two groups in terms of methodology. One group uses time-series models, where tourism demand as a dependant variable are explored and forecasted according to historical trends and without finding the causes of the patterns. The estimation and forecasting method which is used in these types of studies mainly is based on the integrated autoregressive moving-average model (ARIMAs) first proposed by Box and Jenkins (1970). See, for example, Kulendran (1996), Kim and Song (1998), Martin and Witt (1989), Song et al. (2003a) and Turner et al. (1997). Another group concentrates on econometric approaches, which explain the causal relationships between dependent and independent variables. At the same time econometric techniques can be useful for policy recommendation by examining the estimated elasticities of tourism demand. Examples of studies based on econometric techniques are Dritsakis (2004), Song and Witt (2000), Song and Witt (2006), Witt et al. (2004), Kulendran and Wilson (2000).

Substitution destinations play an important part in tourism demand modelling. Thus some studies that investigate tourism demand, using various methodologies such as econometric analysis, seek the factors which influence the level of tourists' visits, where the selected substitution destination, domestically as well as internationally, in many cases is found to be the main competitor, as an individual country. See Patsouratis et Al.

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[1] This information is calculated using statistics from the Turkish Statistical Institute, TurkStat, and the Central Bank of the Republic of Turkey.

(2005), Song and Witt (2006), Allen et al. (2008). In some cases, substitution destination is selected as the average (weighted calculation) of possible competitor countries see for example, Song et al. (2003b), and Querfelli (2008).

In the literature there is growing interest in the tourism demand of Turkey as well. For example, Icoz et al. (1998) in their research used multivariable regression model where variables such as the number of ministry-licensed hotel beds, the number of incoming travel agencies in Turkey, the consumer price index and exchange rates explain the number of visitors who came to Turkey from 10 selected European countries for the period between 1982 and 1993. The results of their research showed that the considered independent variables had a slight effect on the number of tourists from selected European countries. The elasticities of the price index were found negative for most of the countries with high coefficient, while the elasticity of coefficients of the foreign exchange rate variable displayed positive sign for most of the selected European countries.

A time period very close to the previous paper is analyzed by Akis (1998), which is 1980 to 1993. Akis focuses only on the most important variables explaining tourism demand for Turkey using an approach similar to that of Smeral et al. (1992) in order to minimize some econometric problems such as multicollinearity and small degrees of freedoms. The national income of tourist-generating country and the relative prices variables explain tourism demand for Turkey in terms of the number of tourist arrivals from 18 selected countries. The findings of this research are similar to those of other studies on tourism demand. National income was found to be related positively to the number of tourist arrivals while relative prices presented negative sign in relation to the number of tourist arrivals.

Halicioglu (2004) focuses on a recent cointegration technique for the international tourism demand for Turkey in order to examine the main determinants that affect demand, and to analyse the importance of a stable tourism demand equation. This paper's findings do not contradict the previous empirical studies in the tourism economics literature. In addition, using stability tests it was found that a stable tourism demand function exists for the case of Turkey. As he writes, this finding can be useful in tourism policy implementation, as the "stability of a tourism demand function will reduce the uncertainty associated with the world economic environment".

This paper presents a cointegration analysis of multivariate time series. This study differs from the previous empirical tourism studies on Turkey in that it employs the special case of a substitute country, Greece, which is very good example of a competitor case in the tourism sector. Greece and Turkey are very similar in terms of culture terms and location. Empirical studies on tourism demand for Turkey have illustrated little attention in considering other tourism destinations as possible competitors. The majority of studies focus on investigations of tourism demand determinants without taking into account such external factors as cross-price elasticity. The determination of the cross-price elasticity significance may play an important role in the formation of price policy in the tourism sector of Turkey. In this case the price policy formation has to follow the current and forthcoming price strategies and campaigns of the competitor.

Evidently it is necessary to take into account that cross-price elasticity is not only an important determinant of the tourism demand. Another important factor that could be considered and that is popularly used in the tourism modeling is the factor of transportation costs. However, transportation cost is very tricky factor. As a proxy some studies use average economy airfare prices, such as Dritsakis (2004), while others use international oil prices. See Wang (2009), and Halicioglu (2004). However, both of these measures can give misleading results in the case of Turkey because these measures do not always reflect the real relations between tourism demand and transportation costs. In the case of Turkey many travel agencies provide seasonal charter flights, the prices of which are several times lower than those of the national airlines. In many cases the price of a seasonal charter flights does not reflect changes in the price of oil, but depends on the number of tourists. In many cases as well travel agencies provide charter flights as a bonus to foreign tourists. Therefore it was decided not to include transportation costs in the tourism demand model of Turkey. As a result, economic variables such as income, relative prices of living and price of living in a substitute country are used to explain tourist arrivals to Turkey from 13 considered countries, where Greece is considered as a substitute country. Monthly data are used in this paper covering the period from 1996 to 2006.

The organisation of the rest of this paper is as follows. In Section 2 the theoretical approach is examined with the focus on the tourism demand and its determinants. Section 3 describes the data used in the research. Section 4 presents the empirical results and the final section summarises the conclusions.

2. The theoretical approach

The aim of this study is to analyse empirically the long-run and short-run relationships among variables of interest. In this research a VAR model is used in order to measure elasticities of income and relative prices in demand for Turkey from 13 countries. The number of tourists from these countries consists of 65-70 (Table 1) percent of all tourist arrivals to Turkey every year.

The tourist demand function was taken as follows:

$$TA_{it} = (Y_{it}, RP_{it}, SP_t) \quad (1)$$

where TA_{it} is the number of tourist arrivals to Turkey from i country in t period. Y_{it} is the real income at i country origin in t period, measured, as a proxy, by monthly industrial production index. RP_{it} is the relative price of Turkey compared to the tourists' origin i at the period t and measured by CPI, with 2000 as a base year. SP_t is the relative price of living for tourists in the substitute destination, which is Greece, to the price of living in Turkey and adjusted by the exchange rate. In the tourism-related literature it was found that variables such as tourists' income, relative cost of living, relative price of substitute destination and exchange rates are the most important variables of tourism demand modelling (see Lim, 1999, and Li et al., 2005). At the same time, the variable of tourist arrivals is still the most popular measure of tourism demand (Song and Li, 2008). The majority of studies use the real exchange rate to measure the effect of exchange rate on tourism demand; for example, see Witt et al. (1987), Dritsakis (2004), Seo et al. (2009). The real exchange rate in turn measures the evolution of overall domestic prices relative to the overall foreign prices of the particular country.

Table 1

Analysis of Key Tourist Origin Countries for Turkey and Greece

Country	Turkey		Greece
	1996[1]	2006[1]	2006[2]
Austria	232 436	429 708	492 921
Belgium	110 568	451 426	400 219
Bulgaria	139 648	1 177 903	677 368
Denmark	144 059	235 755	325 472
France	251 158	657 859	712 131
Germany	2 119 082	3 762 469	2 267 961
Holland	210 245	997 466	782 154
Italy	158 551	402 573	1 187 598
Russia	1 235 290	1 853 442	261 253
Sweden	162 056	326 255	428 334
Swetzerland	70 608	210 276	280 335
United Kingdom	716 978	1 678 845	2 615 836
United States	344 619	532 404	358 624
Total of chosen countries	5 895 298	12 716 381	10 790 206
Total of all tourists arrivals	8 538 864	19 819 833	17 283 910
Share of chosen countries in total tourist arrivals	69	64	62

Source: 1. Turkish Statistical Institute and 2. General Secretariat of National Statistical Service of Greece.

Relative price of Turkey P_{it} is calculated by the following formula:

$$RP_{it} = \frac{CPI_T}{CPI_i x ER_i}$$

where CPI_i and ER_i denote the consumer price index and the exchange rate, respectively, at the tourists' origin i, CPI_T is the consumer price index of Turkey.

The relative price of the substitute destination is calculated by the following formula, Song and Witt (2006):

$$SP = \frac{CPI_G x ER_G}{CPI_T}$$

where CPI_G and ER_G denote the consumer price index and the exchange rate respectively at the substitute destination, Greece. CPI_T is the consumer price index of Turkey.

Transforming the variables of the equation (1) to the logarithmic form we get the following equation:

$$\ln TA_{it} = \alpha_0 + \alpha_1 \ln Y_{it} + \alpha_2 \ln RP_{it} + \alpha_3 \ln SP + \varepsilon_{it} \quad (2)$$

where ε is a stochastic disturbance term.

We assume that the coefficient a_1 of income of tourists' origin country i - will be positively related to tourism demand in terms of tourist arrivals to Turkey. Generally income elasticities are found positively related to the international tourism demand with relatively high value (Crouch, 1994). However, the coefficients of relative prices a_2 should be negatively related to the variable of tourism demand. The relative price of the substitute destination a_3 was included in the model as well and it is supposed that it would be related positively to the tourist arrivals variables. Higher relative prices in the substitute destination will attract more tourists to Turkey, while the lower relative prices of Greece will attract more tourists to the substitute country and consequently fewer tourists to Turkey. Therefore, the expected signs for parameters are as follows: $a_1>0$, $a_2<0$ and $a_3>0$.

The model in equation 2 is used to analyse the long-run relationships and dynamic interactions among the variables of trade empirically. To incorporate the short-run dynamics, the model has been estimated by the using the bounds testing (or autoregressive distributed Lag, ARDL) approach to cointegration, developed by Pesaran et al. (2001). The procedure is adopted for the following reasons. Firstly, the procedure is simple, and allows cointegration relationships to be estimated by an ordinary least squares (OLS) test once the lag order of the model is identified. A dynamic error correction model (ECM) can be derived from ARDL through a simple linear transformation (Banerjee et al., 1993). Secondly, it does not require a unit root test, therefore it is applicable irrespective of whether the regressors in the model are purely stationary $I(0)$, purely non-stationary $I(1)$ or mutually cointegrated. Using this procedure, the uncertainty illuminated with pre-testing the order of integration is illuminated. And lastly, the test is relatively more efficient in small samples or finite sample data sizes. The ARDL approach has better small size properties than the widely used Johansen (1988), Johansen and Juselius (1990) and Engel and Granger (1987) methods of cointegration. The ARDL procedure will however crush in the presence of I(2) series (integrated of order 2).

The ARDL approach involves two steps for estimating the long-run relationship (Pesaran et al., 2001). The first step is to examine the existence of long-run relationships among all variables in an equation and the second step is to estimate the long-run and short-run coefficients of the same equation. We run the second step only in the case if cointegration relationship was found in the first step. The ARDL representation of the tourism demand for Turkey can be written as follows:

$$\Delta \ln TA_{it} = c_0 + c_1 \ln TA_{i(t-1)} + c_2 \ln Y_{i(t-1)} + c_3 \ln RP_{i(t-1)} + c_4 \ln SP_{t-1} + \sum_{j=1}^{m} d_{1j} \Delta \ln TA_{i(t-j)} + + \sum_{j=0}^{m} d_{2j} \Delta \ln Y_{i(t-j)} + \sum_{j=0}^{m} d_{3j} \Delta \ln RP_{i(t-j)} + \sum_{j=0}^{m} d_{4j} \Delta \ln SP_{t-1} + \varepsilon_{it} \quad (3)$$

where c_1, c_2, c_3 and c_4 are long run multipliers, m is the number of lags, c_0 is the drift and ε_i are white noise errors, i = 1-13, which are individual estimated countries.

The first step in the bounds testing is to establish whether the dependent and independent variables in each model are cointegrated. The null of no cointegration, i.e. $H_0 : c_1 = c_2 = c_3 = c_4 = 0$ is tested against the alternative of $H_1 : c_1 \neq c_2 \neq c_3 \neq c_4 \neq 0$ for each country. So, we are using the ARDL bounds testing approach to estimate these equations by the OLS test in order to test for the existence of long-run relationships among the variables.

We have to conduct a Walt-type (F-test) coefficient restriction test for the joint significance of the coefficients of the lagged variables to test the above null hypotheses H_0. Pesaran et al. (2001) computed two sets of asymptotic critical values for testing cointegration. The first set assumes variables to be I(0), the lower bound critical value (LCB) and the other I(1), the upper bound critical value (UCB). If the F-statistic is above the UCB, the null hypothesis of no cointegration can be rejected irrespective of the orders of integration for the time series. Conversely, if the test falls below the LCB the null hypothesis cannot be rejected. Finally, if the statistic falls between these two sets of critical values, the result is inconclusive.

As Pesaran and Pesaran (1997, 305) argue, variables in regression that are ‘in first differences are of no direct interest’ to the bounds cointegration test. Thus, a result that supports cointegration at least at one lag structure provides evidence for the existence of a long-run relationship. Alternatively, Kremers et al. (1992) and Banerjee et al. (1998) have demonstrated that in an ECM, significant lagged error-correction term is a relatively more efficient way of establishing cointegration. Therefore, the error correction term can be used when the F-test is inconclusive.

The second step is to estimate the long-run coefficients c_1, c_2, c_3 and c_4 of the equation (3) and to select the orders of the ARDL model in 4 variables of interest using the Akaike Information Criterion (AIC) or the Schwartz Bayesian Criterion (SBC). Finally, the short-run dynamic parameters have to be obtained by estimating an error correction model associated with the long-run estimates. The general error correction model is specified as follows:

$$\Delta \ln TA_{it} = d_0 + \sum_{j=1}^{m} d_{1j} \Delta \ln TA_{i(t-j)} + \sum_{j=0}^{m} d_{2j} \Delta \ln Y_{i(t-j)}$$
$$+ \sum_{j=0}^{m} d_{3j} \Delta \ln RP_{i(t-j)} + \sum_{j=0}^{m} d_{4j} \Delta \ln SP_{t-1} + \lambda_i EC_{i(t-1)} + u_{it} \quad (4)$$

where, d_1, d_2, d_3 and d_4 are the short-run dynamic coefficients of the model’s adjustment to equilibrium, λ is the speed of adjustment and EC_i are the residuals obtained from the estimated cointegration equation (3). Finally, to ensure that our models pass the stability test we apply the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) tests proposed by Brown et al. (1975) to the residuals of the error-correction model (4). These tests are based on the recursive residuals and squared recursive residuals, respectively, of the evaluated model and are plotted against break points. If plots of CUSUM or CUSUMSQ statistics stay within critical bounds of the 5 percent significance level, the null hypothesis of coefficients’ stability in the error correction model can not be rejected.

3. Data description

The data set of this research includes 13 countries: Austria, Belgium, Bulgaria, Denmark, France, Germany, Holland, Italy, Russia, Sweden, Switzerland, the United Kingdom and the United States. These countries were chosen on the basis of tourism demand for Turkey. Only countries with the highest number of tourist arrivals who entered Turkey were chosen. Countries for the research were chosen on the basis of a minimum 200 thousands tourist arrivals in 2006. Thus the total number of tourists from chosen countries consisted of total about 6 million in 1996 and increased to about 13 million in 2006, composing around 65-70 percent of all tourist arrivals to Turkey (see Table 1). The number of tourists from countries like Georgia, Iran and Israel every year exceeds 200 thousand as well; however, these countries were not included in the research due to the difficulty the acquisition of secondary data from these countries posed.

Monthly data were used covering the period from the January of 1996 to the December of 2006. The monthly statistics on the tourist flow to Turkey were obtained from the Turkish Statistical Institute (TURKSTAT). The data for the Industrial Production Index (IPI) were obtained from the official site of the Organisation for Economic Co-operation and Development (OECD). In the literature, usually Gross Domestic Product (GDP) is used to measure income; however, due to the absence of monthly reports of GDP for many countries, the IPI is used to proxy income. It is quite common to use IPI as the proxy of income in studies based on monthly data (example, Gonzalez and Moral, 1995; Goh et al., 2008; Seo et al., 2009). The IPI data are used for the income variables of the demand model, where 2000 is the based year. The Consumer Price Indexes (CPI) of selected countries are used in the calculation of foreign relative price variables and obtained from the OECD site as well. The IPI and CPI data for Bulgaria were obtained from the National Statistical Institute and from the Central Bank of Bulgaria. The nominal exchange rates are the national currencies per new Turkish lira, which are used in the calculation of foreign relative price variables as well and are obtained from the Central Bank of Turkey.

Greece was chosen as the substitute destination. Greece is one of the best proxies for the substitution destination to Turkey due to its cultural and natural similarities to Turkey. At the same time from Table 1 it can be seen that in 2006 year many of the chosen countries had similar numbers of tourists to both countries. However, some of countries from the list are vary greatly in the number of tourist arrivals. Therefore, this is one of our intentions, to try to explain why tourists choose a particular country as their arrival destination. All variables used in the model are measured in log levels.

5. Results and discussion

In this section we report the estimation results of the bounds tests for cointegration between Turkey and 13 countries, the share of tourist arrivals which comprised 65 percent of all tourist arrivals in 2006. In the first step equation (3) was estimated to test for the presence of the long-run relationships in the model. The order of the lag distribution on the dependent variables and regressors can be selected by using the AIC or SBC. However, Pesaran and Shin (1999) found that SBC is preferable to AIC due to the difference in the lag selection. SBC selects the smallest possible lag length, while AIC selects the maximum relevant lag length. Therefore, in this study SBC is preferred for the lag selection. Equations (3) was estimated using the ARDL approach to determine whether the dependent and independent variables in each model are cointegrated. Bahmani-Oskooee and Brooks (1999), Bahmani-Oskooee and Bohl (2000) and Bahmani-Oskooee and Ng (2002) showed in their studies that the results of the F-test are sensitive to lag tests at this stage. Therefore F- tests were applied for each first differenced variable by changing the lag lengths from 0 to 4. The results of these estimations are reported in Table 2.

Table 2

F-statistics for Testing Cointegration Relationship

Country	Lags	F-statistic	Probability
Austria	4	F(4, 103) = 13.11	0.000**
Belgium	4	F(4, 103) = 18.04	0.000**
Bulgaria	1	F(4, 118) = 2.73	0.042*
Denmark	4	F(4, 103) = 26.09	0.000**
France	4	F(4, 103) = 19.91	0.000**
Germany	4	F(4, 103) = 7.19	0.000**
Holland	4	F(4, 103) = 7.41	0.000**
Italy	4	F(4, 103) = 6.73	0.000**
Russia	4	F(4, 103) = 3.43	0.011**
Sweden	4	F(4, 103) = 25.71	0.000**
Swetzerland	4	F(4, 103) = 5.78	0.000**
United Kingdom	4	F(4, 103) = 30.44	0.000**
United States	4	F(4, 103) = 14.39	0.000**

Notes: Asymptotic critical value bounds are obtained from Table CI case III: unrestricted intercept and no trend for k=3 from Pesaran et al. (2001). They are 2.72-3.77 at 90%, and 3.23-4.35 at 95%. ** and * denote a significance level of 1 percent and 5 percent.
Source: Calculated by the authors.

The results of the bounds tests for cointegration show that the calculated F-statistics of all countries except Bulgaria and Russia are higher than the upper-bound critical value 5.61 at the 1 percent significance level. Thus the null hypothesis of no cointegration can not be accepted in cases of 11 countries with the lag length of 4, implying that there are indeed long-run cointegration relationships amongst the variables. In the case of Russia the null hypothesis of no cointegration can be rejected at the 5 percent significance level. In the case of Bulgaria, the F-statistics fall between the lower and upper critical values at 90 percent. Therefore we can not reject the null hypothesis, but neither can we accept it. The result in the case of Bulgaria is inconclusive at the order of 1 distributed lag. Therefore following Kremers et al. (1992), the significant lagged error-correction term will be the most efficient way to establish cointegration in the case of Bulgaria. Based on the results represented in Table 2, we can conclude that there is strong support for long-run tourist demand relationships in the model of Turkey.

Following the establishment of the existence of cointegration, equation (3) was estimated using individual ARDL specifications for every country selected by SBC. The long-run results are presented in Table 3 where the number of tourist arrivals to Turkey *TA* is the dependent variable. The estimated coefficients show that tourists' income proxied by the industrial production index has a highly significant impact on tourism demand for Turkey in most of the considered countries with the expected positive sign, which confirms positive relations between tourists' income and their demand for Turkey.

Table 3

Long Run Coefficients using the ARDL Approach

Country	C	lnY	lnRP	lnSP	ARDL model
Austria	5.84 (0.66)	2.25*** (4.16)	-0.55 (0.23)	0.75 (0.32)	ARDL(4,0,0,0)
Belgium	-30.54*** (4.47)	8.04*** (7.97)	-3.55* (1.72)	-2.87 (1.48)	ARDL(4,2,0,0)
Bulgaria	-13.63*** (2.68)	2.43*** (4.74)	-2.47*** (3.32)	-1.10 (1.34)	ARDL(1,0,0,0)
Denmark	32.16*** (3.62)	1.31 (1.09)	7.50*** (4.90)	7.68*** (5.32)	ARDL(4,0,0,0)
France	1.88 (0.14)	4.66*** (2.84)	2.61 (1.13)	3.04 (1.36)	ARDL(4,0,1,1)
Germany	-12.08 (0.69)	5.87*** (3.58)	-1.51 (0.61)	0.18 (0.08)	ARDL(4,0,0,0)
Holland	-62.88*** (4.49)	17.81*** (8.19)	0.52 (0.19)	1.48 (0.54)	ARDL(4,1,0,0)
Italy	-29.64 (1.18)	9.67 (1.54)	0.87 (0.14)	1.28 (0.21)	ARDL(3,0,0,0)
Russia	-8.29** (2.23)	4.32*** (9.77)	-0.55*** (5.83)	-0.19 (0.43)	ARDL(4,0,0,0)
Sweden	10.64 (0.77)	2.54 (0.99)	1.92 (1.13)	2.93** (2.23)	ARDL(4,0,0,0)
Swetzerland	30.82** (2.37)	3.28 (1.62)	5.46*** (3.32)	6.71*** (4.07)	ARDL(4,1,0,0)
United Kingdom	25.94 (0.92)	-2.78 (0.36)	1.97 (1.55)	0.39 (0.25)	ARDL(4,0,0,0)
United States	-7.34 (1.44)	2.89** (2.11)	-0.53 (1.07)	-0.71 (0.89)	ARDL(3,0,0,0)

Notes: Figures in parentheses represent absolute values of t-statistic.
***, ** denote 1 percent and 5 percent significance level.
Source: Calculated by the authors.

Considering the impact of relative prices on tourism demand, only in the cases of five countries were relative prices found to be significant in the tourism demand for Turkey. In the cases of Belgium, Bulgaria and Russia with the expected negative sign while in the cases of Denmark and Switzerland the impact of relative prices were found to be highly elastic at the 1 percent significance level, but with a opposite positive sign. The positive relative price elasticity in these countries can be explained by the "all inclusive" type of tourism which has become quite popular in last decade where in the case of advanced payment for the forthcoming holiday the effect of price change on the tourism demand can be significantly decreased. It is difficult to examine the price elasticity of tourists in the rest of the countries as there is not enough evidence on the estimates' significance. This means that relative prices in Turkey do not play an important role in decision-making about holidays for the tourists of these countries.

The long-run cross-price elasticities of the substitution destination Greece were found significant only in the cases of Denmark, Sweden and Switzerland, with the expected positive sign. The estimated cross-price elasticities in these countries appeared to have significant impact on the tourism demand, implying that tourists are aware of the differences in the prices of Turkey and Greece and these differences play an important role in the selection of holiday destination. The short-run diagnostic statistics from the estimation of equation (3) are reported in Table 4. These are tests for serial correlation, functional form, normality and heterosckedasticity. The results show that short-run model in most of the cases passes through all diagnostic tests.

Table 4

The Short-run Diagnostic Statistics

Country	LM SC	RESET	Normality	HS
Austria	χ^2 (1)=0.008[0.930]	χ^2 (1)=0.195[0.659]	χ^2 (2)=1.605[0.448]	χ^2 (1)=0.864[0.353]
Belgium	χ^2 (1)=0.399[0.527]	χ^2 (1)=0.289[0.591]	χ^2 (2)=1.038[0.595]	χ^2 (1)=1.440[0.230]
Bulgaria	χ^2 (1)=2.066[0.151]	χ2 (1)=5.783[0.016]	χ2 (2)=2202.0[.000]	χ^2 (1)=2.027[0.155]
Denmark	χ^2 (1)=8.359[0.004]	χ^2 (1)=1.822[0.177]	χ^2 (2)= 19.393[0.000]	χ^2 (1)=0.254[0.614]
France	χ^2 (1)=6.929[0.008]	χ^2 (1)=1.099[0.295]	χ^2 (2)=0.589[0.745]	χ^2 (1)=0.493[0.483]
Germany	χ^2 (1)=0.246[0.620]	χ^2 (1)=0.009[0.923]	χ^2 (2)=4.779[0.092]	χ^2 (1)=0.058[0.810]
Holland	χ^2 (1)=1.406[0.236]	χ^2 (1)=0.210[0.647]	χ^2 (2)=3.985[0.136]	χ^2 (1)=0.534[0.465]
Italy	χ^2 (1)=0.256[0.613]	χ^2 (1)=0.055[0.814]	χ^2 (2)=0.431[0.806]	χ^2 (1)=1.589[0.207]
Russia	χ^2 (1)=12.650 [0.000]	χ^2 (1)=3.471[0.062]	χ^2 (2)=1.071[0.585]	χ^2 (1)=0.131[0.718]
Sweden	χ^2 (1)=11.398[0.001]	χ^2 (1)=0.012[0.913]	χ^2 (2)=5.803[0.055]	χ^2 (1)=0.695[0.404]
Swetzerland	χ^2 (1)=0.551[0.458]	χ^2 (1)=0.192[0.989]	χ^2 (2)=2.606[0.272]	χ^2 (1)=0.005[0.943]
United Kingdom	χ^2 (1)=25.114[0.000]	χ^2 (1)=0.082[0.775]	χ^2 (2)=7.574[0.023]	χ^2 (1)=0.761[0.383]
United States	χ^2 (1)=4.618[0.032]	χ^2 (1)=1.189[0.275]	χ^2 (2)=0.727[0.695]	χ^2 (1)=0.071[0.790]

Notes: Figures in parentheses represent probabilities. LM is Lagrange multiplier test of residual serial correlation for lag 4 with the null of no serial correlation; RESET is Ramsey's RESET test using the square of the fitted values; Normality is Jarque-Bera statistic used for testing normality; and HS is White's test which is used with the null hypothesis of no heterosckedasticity. All statistics distributed as X^2 with degrees of freedom in parentheses.

Source: Calculated by the authors.

The results of the short-run coefficient estimates associated with the long-run relationships obtained from the ECM version of the ARDL model equation (4) are presented in Table 5. The ECM coefficient shows the speed

Table 5
Error Correction Representations of ARDL Model
The Independent Variable is **ΔTA*i***

Country	ΔTA1	ΔTA2	ΔTA3	ΔY	ΔY1	ΔRP	ΔSP	C	EC(-1)	$\overline{R}^2$	F	DW	RSS	CUS	CUS^2
Austria	0.38*** (5.74)	0.48*** (6.30)	0.36*** (4.21)	1.28*** (3.78)		-0.32 (0.23)	0.43 (0.66)	3.33 (0.66)	-0.57*** (10.25)	0.56	24.03	1.98	12.73	S	S
Belgium	0.39*** (6.56)	0.52*** (7.51)	0.47*** (5.84)	-0.58 (0.35)	-3.65** (2.42)	-2.34* (1.69)	-1.89 (1.46)	-20.10*** (4.13)	-0.67*** (12.33)	0.66	31.62	2.05	11.04	S	S
Bulgaria				0.53*** (2.95)		-0.54*** (2.86)	-0.24 (1.25)	-2.96** (2.18)	-0.22*** (0.05)	0.09	4.51	2.22	5.35	S	U
Denmark	0.52*** (8.77)	0.34*** (4.60)	0.51*** (6.62)	0.79 (1.09)		4.49*** (4.67)	4.59*** (4.99)	19.23*** (3.53)	-0.59*** (12.56)	0.67	38.08	2.27	16.67	S	S
France	0.29*** (4.31)	0.52*** (7.12)	0.28*** (3.33)	2.53*** (2.60)		-8.26*** (3.24)	-7.51*** (3.06)	1.02 (0.14)	-0.54*** (8.40)	0.48	17.81	2.20	11.74	S	S
Germany	0.39*** (5.28)	0.39*** (5.12)	0.18** (2.28)	3.08*** (3.41)		-0.79 (0.62)	0.09 (0.08)	-6.34 (0.69)	-0.53*** (7.89)	0.39	12.44	1.97	11.93	S	S
Holland	0.23*** (3.37)	0.53*** (7.43)	0.43*** (5.02)	4.41* (1.83)		0.31 (0.19)	0.89 (0.54)	-38.11*** (4.20)	-0.61*** (9.99)	0.48	17.82	1.90	23.61	U	S
Italy	0.24*** (3.04)	0.39*** (4.81)		3.05 (1.49)		0.27 (0.14)	0.40 (0.21)	-9.33 (1.18)	-0.32*** (6.24)	0.27	8.72	2.03	20.04	U	S
Russia	0.48*** (7.77)	0.35*** (4.86)	0.51*** (6.50)	2.73*** (7.65)		-0.35*** (5.26)	-0.12 (0.43)	-5.25** (2.20)	-0.63*** (12.01)	0.61	29.63	2.32	9.33	U	S
Sweden	0.57*** (8.59)	0.28*** (3.39)	0.38*** (4.44)	1.37 (0.98)		1.04 (1.12)	1.58** (2.18)	5.73 (0.77)	-0.53*** (10.25)	0.61	29.78	2.23	19.62	S	S
Swetzerland	0.23** (2.61)	0.19** (2.13)	0.24*** (2.70)	-8.09** (2.21)		2.49*** (3.03)	3.06*** (3.46)	14.06** (2.26)	-0.45*** (6.27)	0.22	6.14	1.95	27.84	S	S
United Kingdom	0.49*** (7.29)	0.32*** (3.96)	0.39*** (4.55)	-1.57 (0.36)		1.11 (1.53)	0.22 (0.25)	14.61 (0.92)	-0.56*** (9.56)	0.51	19.74	2.34	31.15	S	S
United States	0.44*** (5.55)	0.25*** (2.77)		1.12* (1.95)		-0.20 (1.05)	-0.28 (0.89)	-2.83 (1.39)	-0.39*** (6.68)	0.31	10.48	2.07	10.88	S	S

Note: ΔTA = TA-TA(-1); ΔTA1 = TA(-1) – TA(-2); ΔTA2 = TA(-2) – TA(-3); ΔTA3 = TA(-3) – TA(-4); ΔY = Y – Y(-1); ΔY1 = Y(-1) – Y(-2); ΔRP = RP – RP(-1); ΔSP = SP – SP(-1)
Figures in parentheses represent absolute values of t-statistic. ***, ** denote 1% and 5% significance level. F column present F-statistics; DW – Durbin Watson statistics; RSS – Residual Sum of Squares, CUS – CUSUM stability test, CUS^2 – CUSUMSQ stability test.
Source: Calculated by the authors.

of the adjustment of the variables to long-run equilibrium and should be significant with negative sign. In all 13 cases of countries under investigation, the error correction coefficient EC(-1) is highly significant at 1 percent with negative sign. These results ensure once more that stable long-run relationships among variables in the tourism demand model exist in all of the considered countries, Kremers, et al. (1992) and Bannerjee et al. (1998). The magnitude of the error correction coefficient is between -0.22 and -0.67, respectively, to the individual country. Therefore it implies that disequilibria in the tourism demand model is corrected by approximately 22-67 percent every month (respectively to country). This means that the steady state equilibrium in the tourism demand model of Turkey can be reached in from two to five months, depending on the tourists' origin.

The most significant impact on the tourism demand in the short run has income, Table 5, as well as in the long run, Table 3. The relative price elasticities of Turkey and cross-price elasticities were found significant only in a few countries for the short run, however the signs are compatible with long-run coefficients. In the short run as well as in the long run, Denmark and Switzerland have highly significant positive elasticities of the relative Turkish prices and substitution prices of Greece.

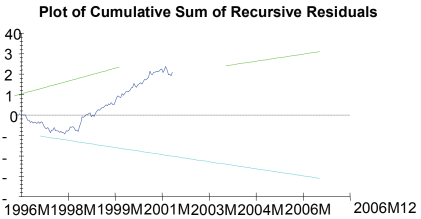
In other words, when deviations from the long-run equilibrium occur in the tourism demand for Turkey, it is primarily the income than relative prices of Turkey and the substitution prices of Greece that corrects tourism demand equilibrium in Turkey each month.

Finally, to ensure that our models pass the stability test, we apply the CUSUM and CUSUMSQ tests proposed by Brown et al. (1975) to the residuals of the error-correction model (4). The graphical results of these tests for the cases of Austria and Holland are illustrated in Figure 1. The graphical results for the other countries are not presented here for considerations of space. The results of the stability tests are summarized in Table 5 in columns CUS and CUS^2. In most cases, the plots of the CUSUM and CUSUMSQ statistics stay within the critical bounds indicating the stability of the estimated coefficients. Thus the tourism demand function remains stable with no regard to the specific lag selection criterion in the cases of Austria, Belgium, Denmark, the United Kingdom, the United States, France, Germany, Sweden and Switzerland. However, in some cases it appears that stability is not confirmed by both plots of CUSUM and CUSUMSQ statistics. The plots of both CUSUM and CUSUMSQ statistics are within the critical bounds indicating stability in 9 out of 13 cases. In the cases of Bulgaria, Holland, Italy and Russia, stability tests appear to be inconclusive.

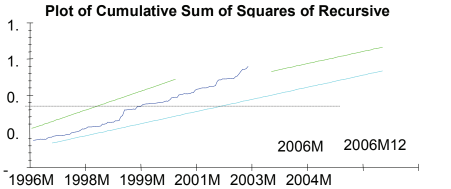
Figure 1

Plots of CUSUM and CUSUMSQ statistics for coefficient stability

a. Austria

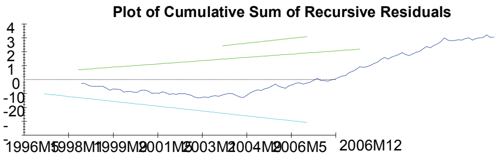


The straight lines represent critical bounds at 5% significance level

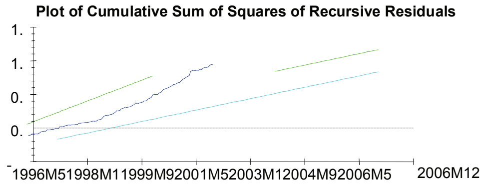


The straight lines represent critical bounds at 5% significance

b. Holland



The straight lines represent critical bounds at 5% significance



The straight lines represent critical bounds at 5% significance level

Source: Calculated by the authors.

6. Conclusion

This paper sought to ascertain the long-run economic relationships in the tourism demand model for Turkey among variables such as tourist arrivals, income of tourist generating country, proxied by industrial production index, relative prices of Turkey and relative prices of the substitution destination, Greece. The tourism demand for Turkey is measured by tourist arrivals from 13 different countries, which accounts for about 65-70 percent of the total tourist arrivals in Turkey. In this research the ARDL model is used in order to measure elasticities of income and relative prices in demand for Turkey from the considered countries. Independent variables for the demand model for Turkey were chosen on the basis of previous studies (see Lim, 1999; Li et al., 2005), where variables such as the income of the tourist generating country, the relative cost of living and the relative price of substitute destination were found to be the most important variables of tourism demand modelling.

The bounds tests suggest that the variables of the interest of the tourism demand model are bound together in the long run. The error correction coefficient appeared to be highly significant with the expected sign in all cases, which confirms the existence of long-run relationships once more. The equilibrium correction is fairly fast and is restored from two to five months in the cases of the different studied countries.

The results also indicate that the income of tourist generating countries has the most significant impact on the tourism demand in the short run as well as in the long run, which is in line with the literature. See, for example, Uysal and Crompton (1984), Halicioglu (2004), Akis (1998). Aslan et al. (2009) found that the income variable for the panel study is significant but not elastic. The relative prices of the tourism demand appeared to be significant only in the cases of five countries out of thirteen. In the cases of Belgium, Bulgaria and Russia, the relative prices of tourist demand produced the expected negative sign. In the case of Belgium and Bulgaria, the elasticity of relative prices appeared elastic, while in the case of Russia relative prices were found inelastic. For example, Dritsakis (2004) found that the relative price is inelastic for tourists coming from Germany to Greece, while it was found to be elastic for tourists coming from Great Britain. Additionally, in our cases of Denmark and Switzerland, the impact of relative prices was found to be highly elastic, but with opposite positive sign. Travel agencies in Turkey provide deep discounts for long-term advanced payments for hotel and flight packages. In this case effect of current price changes on tourism demand is not significant. However, deep discounts for tourists who are able to plan and make payment in long in advance play a highly significant role. The positive relative price elasticity in these countries can be explained by the "all inclusive" type of tourism, which has become quite popular in the last decade, where in the case of advanced payment for the forthcoming holiday, the effect of price change on tourism demand can be significantly decreased. The relative prices of substitution destination were found significant in the long run with the expected positive sign only in Denmark, Sweden and Switzerland. In the short run, France joined the above list as well. However, the elasticity of relative prices for the substitute destination in the case of France appeared with negative sign. It can provide evidence that tourists from France do not come to Turkey for its natural environment favourable for holidays (extensive sea coast, sun), but for the historical heritage. These types of holidays can be chosen in the complex with visits to other neighbouring countries. For example, Salleh et al. (2008) in their studies found that most of the times the considered alternative tourism destinations behave as substitute destinations for Malaysia; in other words, the relative prices of substitution destinations appear with positive sign. Querfelly (2008) found as well that the destination choice decision particularly for French and Italian tourists was influenced by the cost of tourism in rival countries, while English tourists are not influenced by the price of competing destinations.

Finally, CUSUM and CUSUMSQ tests confirmed the stability of coefficients in the tourism demand model in 9 out of 13 of the studied countries, indicating no evidence of any structural instability in the tourism demand model.

This study assessed the long-run elasticities of the tourism demand model and measured the speed of adjustment to restore the long-run equilibrium of the considered model. The empirical results indicate that the values of the long-run elasticities of a tourist generating county's income, relative prices and the substitution destination's prices exceed those elasticities in the short run. These results are in match with those of previous studies on the tourism demand of Turkey. See, for example, Aslan et al. (2009). The results imply that tourists from considered countries in the long run are more sensitive to changes in their income, relative prices and the relative prices of substitution destination than in the short run. The policy implications of the findings suggest that in creating price policies, the government should take into account the price strategies of substitution destinations in order to be able to attract more tourists. Tourists' income appeared to have highly significant impact on the tourism demand for Turkey in most of considered countries with much higher elasticity level in the long run than in the short run. It implies that the government has to pay close attention to the continuous improvement of services, generating by this the positive word-of-mouth effect, which plays an extremely important role in the tourism sector in the long run. Therefore the government should create advertising campaigns that would inform as many tourists as possible about the improvements in the tourism sector of Turkey. In 2001, Turkey experienced a large devaluation; however, the tourism sector did not take an advantage of this opportunity, where one of reasons was the lack of information of such benefits on the international market (Demir, 2004).

Additionally, further research on this model would be useful. For example it is planned to generate forecasts for the time-series data considered in this paper.

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Özet

Türkiye'deki Turizm talebinin ARDL yaklaşımıyla eşbütünleşik analizi: İkame edilecek istikamet olarak Yunanistan

Bu çalışma, Türkiye'nin 13 ülke ile turizm talebi modelini incelemektedir. Bu ülkeler Avusturya, Belçika, Bulgaristan, Danimarka, Fransa, Almanya, Hollanda, İtalya, Rusya, İsveç, İsviçre, İngiltere ve Amerika'dır. Çalışmanın amacı Türkiye'nin turizm talebini belirleyen faktörlerle, kullanılan modeldeki eşbütünleşik ilişkisini incelenmektir. Bunun için Pesaran ve Pesaran (1997)'nin ARDL modeli, özellikle kısa zaman serilerine daha uygun olduğu için kullanılacaktır. Çalışmanın sonucu olarak modeldeki değişkenler arasında uzun vadede istatistiksel açıdan anlamlı eşbütünleşik ilişki bulunmuştur. Sonuçlarda, hem kısa zamanda hem de uzun zamanda, turizm talebini etkileyen en belirgin faktör olarak turist gelişi bulunmuştur. Ayrıca CUSUM ve CUSUMSQ testleri modelin birçok ülkede istikrarlı olduğunu göstermektedir.

Anahtar kelimeler: Talep esnekliği, eşbütünleşme, ARDL, vektör hata düzeltmesi, kararlılık sınaması.

JEL kodları: C32, C52, F14, F41.