PANEL COINTEGRATION ANALYSIS OF INTERNATIONAL TOURISM DEMAND: SAMPLE OF ANTALYA

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Abstract: This paper aimed to find the short-run and long-run relationships between international tourism demand to Antalya with economic variables such as income (GDP) and tourism price. Seasonally adjusted quarterly tourist arrivals data were used for 36 countries over the period 1996Q1 – 2014Q4. Firstly, panel unit root test such as Levin, Lin and Chu (LLC) (2002) panel unit root test, Maddala and Wu (1999) and Choi (2001) panel unit root test were used. Then the panel cointegration test based on Kao (1999) panel cointegration test and Pedroni (1999) panel cointegration test were used to test cointegration relationship among the variables in the long-run. Also we used a new technique of estimating dynamic heterogeneous panels, which is developed by Pesaran, Shin and Smith (1999), for the international tourism demand model. Pooled Mean Group (PMG) estimator is particularly convenient for panels with large T and N. The PMG estimator allows the intercepts, short-run coefficients and error variances to differ across groups while constrains the long run coefficients to be identical. The long-run results of this study show that growth in income (GDP) of the countries concerned has positive effect on international visitor arrivals to Antalya. However, tourism price was not found as determinants of international tourism demand in Antalya since the tourism price parameter is not statistically significant. Also error correction coefficient is negative and statistically significant. This findings show an existence of long-run relationship.

Keywords: Panel cointegration analysis, Pooled Mean Group Estimator, Antalya, international tourism demand

Introduction

With its rapid growth, tourism has become one of the most important industries in the world, and thus tourism incomes have begun to take an important role in the economy. The number of tourists in the worldwide have been a continuous increase from the 1950s until the nowadays. As regards The United Nations World Tourism Organization (UNWTO)'s long-run estimate *Tourism Towards 2030*, international tourist arrivals worldwide are expected to increase by 3.3% a year between 2010 and 2030 to achieve 1.4 billion by 2020 and 1.8 billion by 2030. In 2014 the number of international tourists increased to 1133 million. Besides, international tourism incomes reached 1245 billion dollars worldwide in 2014, up from 1197 billion dollars in 2013, equalled to an enhance of 3.7% in real terms (WTO, 2015, p.2-3).

With the enactment of the Law for the Encouragement of Tourism in 1982, tourism sector has developed rapidly in Turkey as well as in the world and has made great contributions to economic development of Turkey. According to the Ministry of Culture and Tourism, the number of international tourists visiting Turkey was ranked 20th in the world in 2000 followed by 6th in 2014. Also tourism income of Turkey achieved 34 billion in 2014, up from 32 billion in 2013, corresponding to an increase of 6.2%. Thus the share of tourism income in GDP has been 4.3% (TURSAB, 2015).

Table 1 International Tourist Arrivals

	Million		Change (%)	
Rank	**2013**	**2014**	**13\12**	**14\13**
1 France	83.6	83.7	2.0	0.1
2 United States	70.0	74.8	5.0	6.8
3 Spain	60.7	65.0	5.6	7.1
4 China	55.7	55.6	-3.5	-0.1
5 Italy	47.7	48.6	2.9	1.8
6 Turkey	37.8	39.8	5.9	5.3
7 Germany	31.5	33.0	3.7	4.6
8 United Kingdom	31.1	32.6	6.1	5.0
9 Russian Federation	28.4	29.8	10.2	5.3
10 Mexico	24.2	29.1	3.2	20.5

Source: World Tourism Organization (UNWTO)

Table 2 International Tourism Receipts

	Billion (US$)		Change US$ (%)	
Rank	**2013**	**2014**	**13\12**	**14\13**
1 United States	172.9	177.2	7.0	2.5
2 Spain	62.6	65.2	7.6	4.2
3 China	51.7	56.9	3.3	10.2
4 France	56.7	55.4	5.6	-2.3
5 Macao (China)	51.8	50.8	18.1	-1.9
6 Italy	43.9	45.5	6.6	3.7
7 United Kingdom	41.0	45.3	12.1	10.3
8 Germany	41.3	43.3	8.2	5.0
9 Thailand	41.8	38.4	23.4	-8.0
10 Hong-Kong (China)	38.9	38.4	17.7	-1.4

Source: World Tourism Organization (UNWTO)

The one of the world's most tourist attracting brand city, Antalya, with the number of visitors exceeding 12 million in 2014 without a doubt has largest share in Turkey's tourism. Besides, according to the data of Antalya Provincial Directorate of Culture and Tourism and The Ministry of Culture and Tourism; approximately 34% of foreign visitors coming to Turkey in 2014 consisted of foreign visitors coming to Antalya, and thus Antalya has been able to provide a large part of the total tourism income of Turkey with its tourism income alone and proven its role as a locomotive in the Turkish tourism. To increase international tourism demand to Antalya, factors affecting this demand should be taken into consideration. In this study, the international tourism demand for Antalya, the major contributor to Turkish tourism, is modelled with the aim of increasing tourism incomes, aligning supply and demand and shaping future investments in the sector. In this context, we estimated the short-run and long-run relationships between international tourism demand to Antalya with economic variables such as GDP and tourism price. Seasonally adjusted quarterly tourist arrivals data were used for 36 countries with available data over the period 1996Q1 – 2014Q4. In addition, we used a new technique of estimating dynamic heterogeneous panels (PMG estimator), developed by Pesaran, Shin and Smith (1999), for the international tourism demand model of Antalya because this estimator is particularly convenient for panels with large T and N.

The remaining of the paper is organized as follows. Firstly, the literature on modelling tourism demand was reviewed. Afterwards, Section 2 gives details on data and the model specification, and also this part explains methodology. Section 3 presents the empirical results from the panel cointegration estimations of the international tourism demand to Antalya. Finally, Section 4 provides concluding remarks.

There are a lot of studies related to international tourism demand in the literature and some of studies were presented Table 3. In the literature, time series data or cross sectional data generally were used though there are a lot of advantages in using panel data, such as giving more effective estimation results compared to time series data and cross sectional data.

Table 3 Literature Review

Author(s)/Year	Country	Model	Methodology	Results
Garin-Munoz and Amaral (2000)	Spain (1985-1995)	Number of Tourist, income per capita, exchange rate and real price	Panel Data Analysis	The estimated elasticises are 1.40 for income, 0.50 for exchange rate, and -0.30 for real prices. The negative effect of the Gulf War is also detected, with a coefficient of -0.15.
Aktürk and Küçüközmen (2006)	Turkey (1980-2004)	Number of Tourist, tourism price, substitute tourism price, income, dummy variables	Autoregressive Distributed Lag Model (ARDL)	This study analysis the tourism demand of Turkey from the arrivals of twenty OECD countries for the period of 1980-2004.
Salleh, Othman and Ramachandron (2007)	Malaysia	Number of Tourist, tourism price, substitute tourism price, transportation cost., income, exchange rate, dummy variables	ARDL Bound Test	Most of the variables are significant for tourism demand for Malaysia in the long-run as well as in the short-run.
Chaitip, Chaiboonsri, Rangaswamy (2008)	India (2002-2007)	Number of Tourist, income, transportation cost., exchange rate	Panel Unit Root and Panel Cointegration Test	Positive relationship between tourist arrivals and national income of tourist generating countries and a negative relationship between tourist arrivals and exchange rate
Seetaram (2010)	Australia (1991–2007)	Number of Tourist, income, transportation cost., exchange rate	Arellano-Bond Dynamic Panel Model	Demand is inelastic with respect to its determinants in the short run and elastic in the long run.
Chaiboonsri, Sriboonjit, Sriwichailamphan, Chaitip and Sriboonchitta (2010)	Thailand (1986-2007)	Number of Tourist, income, transportation cost., exchange rate	Ordinary Least Square (OLS), Dynamic OLS (DOLS) and Full Modified OLS (FMOLS) Estimators	Positive relationship between tourist arrivals and national income of tourist generating countries and a negative relationship between tourist arrivals and exchange rate and transportation cost.
Jintranun, Sriboonchitta Calkins and Chaiboonsri (2011)	Thailand (1997Q1-2010Q3)	Number of Tourist, GDP, Consumer Price Index (CPI), Exchange Rate (ER), transportation cost., seasonal dummies	Generalized Method of Moment (GMM)	In the long-run, positive relationship between tourist arrivals and In(GDP), In(CPI) and In(Cost) and a negative relationship between tourist arrivals and In(ER).
Aksakal and Arıcıgil Çilan (2015)	Turkey (1990-2010)	Number of Tourist, income, transportation cost., exchange rate, lagged tourist numbers	OLS and Seemingly Unrelated Regression (SUR)	Parameter estimates of SUR model are more efficient than classical regression model parameter estimates.

The Study

Data and Model

The selection of variable was determined by a review of previous empirical studies on international tourism demand analysis. Over 50 studies on the demand for tourism by Crouch (1994), Lim (1997) and Li et al. (2005) total tourist arrivals as a representative for tourism demand were used (Song et al., 2010, p.65). In this study, international tourism demand was measured in terms of the number of tourist arrivals. The number of tourists arriving to Antalya was obtained from Turkey Statistical Institute (TSI) website. Crouch (1994) has revealed that income and tourism price is most important variable explaining the demand for tourism. In this context, international tourism demand of Antalya relationship with Gross Domestic Product (GDP) of the countries concerned and the price of Turkey (TP) in comparison with the country concerned were analysed. These variables were obtained from Organisation for Economic Co-operation and Development (OECD) Statistic website. Tourism price variable was calculated as follows (Song et al., 2010, p.71).

$TP = \frac{CPI_{Turt}/EX_{Turt}}{CPI_{it}/EX_{it}}$
CPI_{Tur}: Consumer price index of Turkey (setting year 2010=100)
CPI_i: Consumer price index of origin country (setting year 2010=100)
EX_{Tur}: Exchange rate of Turkey
EX_i: Exchange rate of origin country
i: Countries
t: Time

Since variance of series was found higher due to seasonality, the seasonality should be neglected. Otherwise we could obtain incorrect results (Kutlar, 2000, s.49). For this reason we used seasonally adjusted quarterly tourist arrivals data for 36 countries over the period 1996Q1 – 2014Q4. For international tourism demand, the origin countries' income and tourism price have been considered as explanatory factors.
The international tourism demand model can be explained as follows

$$TA_{it} = f(GDP_{it}, TP_{it})$$

where:
TA_{it} = a measure of tourism demand at time t for country i,
GDP_{it} = a measure of income of the tourist-generating country at time t;
TP_{it} = a measure of tourism price of goods and services at time t for country i.
$i = 1, 2, \dots, 36$ (the number of country arrival to Antalya)
$t = 1, 2, \dots, 76$ (time series data)

This study focused on the PMG (1999) estimation of dynamic heterogeneous panels. The PMG estimator for estimated international tourism demand function has not been used in the earlier studies. The cointegration analysis of panel data consisted of three steps: First, a panel unit root was tested according to LLC (2002) panel unit root test and Maddala and Wu (1999) and Choi (2001) panel unit root test. Second, we checked whether there was a cointegration relationship using the heterogeneous panel cointegration test developed by Pedroni (1999) and Kao (1999). Finally, short-run and long-run relationship between international tourism demand of Antalya and economic variables were estimated using the PMG (1999) estimator for heterogeneous cointegrated panels for large T and N.

Methodology
While econometric analysis is being carried out to achieve the correct result, one of the most important issues to be considered is that the time series is stationary. Panel unit root tests should be performed to verify whether the data are stationary. Otherwise problem with spurious regression could be faced. Panel unit root tests statistically have higher power than time series unit root tests (Im, Pesaran and Shin, 1997; Maddala and Wu, 1999; Hadri, 2000; Levin, Lin and Chu, 2002). In the present study, we used LLC (2002), Maddala and Wu (1999) and Choi (2001) panel unit root test. In these tests, establishment of hypothesis test and calculation of the test statistics are based on the Dickey-Fuller (1979) and Augmented Dickey- Fuller unit root test (Şak, 2006, s.42). Levin, Lin and Chu (2002) have improved a procedure using panel data to test the null hypothesis that each individual time series contains a unit root against the alternative hypothesis that each time series is stationary. Maddala and Wu (1999) recommended the use of the Fisher test depending upon combining the P-values of the test statistics for unit root in cross-sectional unit. Fisher-Type Augmented Dickey-Fuller (ADF) and Philips-Perron (PP) statistics panel unit root test (Maddala and Wu (1999) and Choi (2001)) have non-stationary as null hypothesis that panel data has unit root (Chaitip, Chaiboonsri and Rangaswamy, 2008, s.103-104).

If time series variables are non-stationary in their levels and their first differences are stationary, they are cointegrated in the long-run. Then if they are cointegrated in long-run, cointegration relationship between international tourism demand and economic variables should be found according to panel cointegration test such as proposed by Pedroni (1999) and Kao (1999). Pedroni (1999) panel cointegration test is based on the null hypothesis of no cointegration. Moreover, this test allows not only the dynamics and fixed effects to differ across groups of the panel, but also that they allow the co-integrating vector to differ across. Pedroni (1999) has proposed seven different tests. Of these seven statistics, four are based on pooling along what is commonly referred to as the within-dimension, and three are based on pooling along what is commonly referred to as the between-dimension (Pedroni, 1999, p.655-657). Kao (1999) panel cointegration test is based on the null hypothesis of no cointegration and he uses both DF and ADF to test for cointegration in panel (Kao, 1999, p.6).

If there is a cointegration relationship among the variables, short-run and long-run parameters can be find by using three different approaches used in panels with large T and N. First approach is Dynamic Fixed Effect (DFE) that allows the intercepts to differ across groups while constrains the other coefficients to be identical. If the slope coefficients are in fact not identical, however, the DFE approach could give inconsistent and potentially misleading results. Another approach is Mean Group (MG) Estimator (proposed by Pesaran and Smith (1995)) that allows the all coefficients to differ across groups and averages estimation results of each group. The recent approach is the PMG Estimator (proposed by Pesaran, Shin and Smith (1999)) that allows the intercepts, short-run coefficients and error variances to differ across groups while constrains the long run coefficients to be identical. Also to make a selection between the two estimators Hausman test is used. The Hausman test is testing the homogeneity of the long-run coefficient. In this study, the PMG (1999) estimator was preferred according to Hausman test (Blackburne, Frank, 2007, p.1999). The PMG (1999) approach explained as follows.

The international tourism demand model of Antalya is estimated on the base of quarterly data using panel data series. We assume that the long-run the international tourism demand model is

$$lnTS_{it} = \gamma_{0i} + \gamma_{1i} lnGSYIH_{it} + \gamma_{2i} lnGF_{it} + \mu_i + u_{it} \quad i = 1,2,\dots,N, \;\; t = 1,2,\dots,T \tag{1}$$

where $lnTS_{it}$, is logarithm of number of tourists arriving to Antalya; $lnGSYIH_{it}$ is logarithm of income (GDP) of the countries concerned; $lnGF_{it}$ ise is logarithm of the price of Turkey (TP) in comparison with the country concerned; μ_i is an individual effect and u_{it} is an error term. We will assume that all these variables are I(1) and cointegrated for individual countries, making the error term an I(0) process for all i. Taking the maximum lag equal to one, the ARDL(1,1,1) equation is given by

$$lnTS_{it} = \alpha_{10i} lnGSYIH_{it} + \alpha_{11i} lnGSYIH_{it-1} + \alpha_{20i} lnGF_{it} + \alpha_{21i} lnGF_{it-1} + \lambda_i lnTS_{it-1} + \mu_i + \varepsilon_{it} \tag{2}$$

The error correction equation is

$$\Delta lnTS_{it} = \phi_i (lnTS_{it-1} - \gamma_{0i} - \gamma_{1i} lnGSYIH_{it} - \gamma_{2i} lnGF_{it}) - \alpha_{11i} \Delta lnGSYIH_{it-1} + \alpha_{21i} \Delta lnGF_{it-1} + \varepsilon_{it} \tag{3}$$

where:

$$\phi_i = -(1-\lambda_i), \gamma_{0i} = \frac{\mu_i}{1-\lambda_i}, \gamma_{1i} = \frac{\alpha_{10i}+\alpha_{11i}}{1-\lambda_i}, \gamma_{2i} = \frac{\alpha_{20i}+\alpha_{21i}}{1-\lambda_i} .$$

The parameter ϕ_i is error correcting speed of adjustment term. One would expect this parameter to be significantly negative if the variables show a return to a long-run equilibrium. We are first of all interested in the nature of the long-run relationship between the international tourism demand and economic variables, the long-run coefficients (γ_{1i} and γ_{2i}) (Blackburne, Frank, 2007, p.202).

Findings

Panel Unit Root Test Results (The empirical results of panel unit root test)

This study estimated Eq. (1-3) using the Pooled Mean Group Estimator for 36 countries over the period 1996Q1 – 2014Q4. In this study, we used firstly the panel unit root test of the variables by Levin, Lin and Chu (2002), Maddala and Wu (1999) and Choi (2001). Table 4 presents the results of the panel unit root test based on Levin, Lin and Chu (2002), Maddala and Wu (1999) and Choi (2001) (Fisher ADP and Fisher PP) panel unit root test for all variables used in modelling international tourism demand of Antalya.

Table 4: Panel unit root tets

Fisher ADF Test			*H_0: All panels contain unit roots* *H_A: At least one panel is stationary*		
Seris LnTA	Statistic	*P*-value	Series ΔLnTA	Statistic	*P*-value
P	13.21	1.000	P	6464.94	0.000
Z	6.72	1.000	Z	-75.16	0.000
Series LnGDP	Statistic	*P*-value	Series ΔLnGDP	Statistic	*P*-value
P	1.73	1.000	P	1077.93	0.000
Z	14.29	1.000	Z	-24.41	0.000
Series LnTP	Statistic	*P*-value	Series ΔLnTP	Statistic	*P*-value
P	62.39	0.783	P	2697.57	0.000
Z	0.077	0.531	Z	-49.49	0.000
Fisher, Philips & Perron Test			*H_0: All panels contain unit roots* *H_A: At least one panel is stationary*		
Series LnTA	Statistic	*P*-value	Series ΔLnTA	Statistic	*P*-value
P	15.98	1.000	P	9482.07	0.000
Z	6.42	1.000	Z	-96.00	0.000
Series LnGDP	Statistic	*P*-value	Series ΔLnGDP	Statistic	*P*-value
P	0.87	1.000	P	1436.57	0.000
Z	17.66	1.000	Z	-30.73	0.000
Series LnTP	Statistic	*P*-value	Series ΔLnTP	Statistic	*P*-value
P	78.69	0.276	P	3742.99	0.000
Z	-0.34	0.369	Z	-58.06	0.000
P: Fisher chi-squared statistic, Z: Choi normal statistic, Automatic lag length selection based on SIC					
Levin, Lin & Chu unit root test			*H_0: Panels contain unit roots* *H_A: Panels are stationary*		
Series	*t*	*P*-value	Series	*t*	*P*-value
LnTA	4.34	1.000	ΔLnTA	-56.89	0.000
LnGDP	15.58	1.000	ΔLnGDP	-20.44	0.000
LnTP	0.27	0.607	ΔLnTP	-44.86	0.000

*: Rejected null at .10 level
**: Rejected null at .05 level
***: Rejected null at .01 level

The LLC (2002), Fisher ADF and Fisher PP panel unit root test results indicate that LnTA, LnGDP and LnTP series are at the level of insignificance for accepting the null of a unit root (p-value>0.05). Since the series are not stationary at level (I(0)), the effects of the shock occurring is permanent. To resolve this problem, the first difference of the series should be taken and the panel unit root test should be performed again. The results from this panel unit root test all significantly reject the null hypothesis ($p = 0.000 < 0.05$) for all series (LnGDP, LnGDP and LnTP). After the first difference had been taken in all series the series had become stationary. Then we used panel cointegration test to determine if there is a long-run relationship.

Panel Cointegration Results (The empirical results of panel cointegration test)
Table 5 present the results of panel cointegration test of the modelling international tourism demand of Antalya based on Pedroni (1999) and Kao (1999) panel cointegration test.

Table 5: Panel cointegration tests

Pedroni Test			*H_0: No cointegration*	
	Statistic	*P*-value	Weighted statistic	*P*-value
Panel v	0.082	0.467	-3.045	0.998
Panel rho	-27.10***	0.000	-26.789	0.000
Panel PP	-26.85***	0.000	-26.637	0.000
Panel ADF	-25.89***	0.000	-26.384	0.000
	Statistic	*P*-value		
Group rho	-25.848***	0.000		
Group PP	-29.542***	0.000		
Group ADF	-27.051***	0.000		
Trend assumption: Deterministic intercept and trend				
Automatic lag length selection based on SIC				
Newey-West automatic bandwidth selection and Bartlett kernel				

Kao Test		*H_0: No cointegration*
	t-Statistic	*P*-value
ADF	3.843**	0.001
Automatic lag length selection based on SIC		
Newey-West automatic bandwidth selection and Bartlett kernel		

*: Rejected null at .10 level
**: Rejected null at .05 level
***: Rejected null at .01 level

In Table 5 firstly we consider Pedroni (1999) panel cointegration test results. Six of seven tests (except panel-v statistic) reject the null hypothesis (no cointegration). Hence, it can be found out that the international tourism demand of Antalya and economic variables move together in the long run. Also Kao (1999) panel cointegration test result indicate that all variables used in this model are significant at the reject of the null hypothesis (no cointegration) at %1 level of significance (p-value=0.00). The empirical results of panel cointegration test show that all variables were used in the modelling international tourism demand of Antalya has cointegration (relationship) with each other. Finally, the coefficients of Antalya international tourism demand will be estimated to find short-run and long-run relationship.

Long run and Short Run Estimation Results
To estimate the coefficient of the short-run and long-run, the MG (1995) and the PMG (1999) estimators were used. These estimators are particularly convenient for panels with large T and N. The error correction speed of adjustment parameter and the long-run coefficients are of essential interest. Table 6 shows the results of the short-run and long-run relationship for the modelling international tourism demand of Antalya based on the MG (1995) and the PMG (1999) estimators. The Hausman test is used to decide which estimator will be used.

Table 6: PMG and MG Estimation Results ARDL(1,1,1)

N=36			Obs.= 2700	
T=72			Average T= 75	
			Log Likelihood= -1501.22	
Long-run Estimation for full sample				
	Coef.(PMG)	*P*-value	Coef.(MG)	*P*-value
LnGDP	3.3732***	0.000	3.1543***	0.000
LnTP	-0.0043	0.963	0.1968	0.352
Short-run Estimation for full sample				
	Coef.(PMG)	*P*-value	Coef.(MG)	*P*-value
ECM	-0.4955***	0.000	-0.6506***	0.000
Δ LnGDP	-1.6549	0.296	-2.0125	0.198
Δ LnTP	0.0656	0.663	-0.0253	0.876
Cons.	-18.0766***	0.000	-19.0291***	0.000

*: Rejected null at .10 level
**: Rejected null at .05 level
***: Rejected null at .01 level

According to both the MG (1995) and the PMG (1999) estimators, the coefficient of LnGDP is statistically significant at the 1% significance level, and the effect is positive as expected by the tourism demand theory. When GDP of the countries concerned increased %1, the international tourism demand to Antalya increased about %3-3.5. However, the coefficient of LnTP is statistically insignificant at the 10% significance level. In addition the speed of adjustment parameters are consistently negative and significant (-0.4955 for the PMG estimator and -0.6506 for the MG estimator). This findings show an existence of long-run relationship. Short-run coefficients of this model are statistically insignificant at the 10% significance level.

Table 7: Hausman test for long-run homogeneity

	Coefficients			
	(b) MG	(B) PMG	(b-B) Differ.	sqrt[diag(V_b-V_B)] S.E.
LnGDP	3.1543	3.3732	-0.218	0.394
LnTP	0.1968	-0.0043	0.201	0.190

b: consistent under H_0 and H_A; obtained from MG estimation
B: inconsistent under H_A, efficient under H_0; obtained from PMG estimation

H_0: difference in coefficients not systematic
Chi2(5)=(b-B)'[(V_b-V_B)^(-1)](b-B)=1.20
Prob>Chi2=0.5485

Hausman test is applied for testing the differences (long-run homogeneity) between the MG (1995) and the PMG (1999) estimators. The Hausman test statistic is 1.20 ($p = 0.5485 > 0.05$) that PMG (1999) estimator, the efficient and consistent estimator under the null hypothesis, is preferred. Estimation results obtained by the PMG (1999) estimator are given in Table 8.

Table 8: PMG Estimation Results ARDL(1,1,1)

N=36			Obs.=2700	
T=76			Average T=75	
			Log Likelihood=-1501.21	
Long-run Estimation for full sample				
	Coef.	Std. Error	z	*P*-value
LnGDP	3.373***	0.139	24.53	0.000
LnTP	-0.0042	0.093	0.27	0.784
Short-run Estimation for full sample				
	Coef.	Std. Error	z	*P*-value
ECM	-0.4955***	0.037	-13.34	0.000
Δ LnGDP	-1.6548	1.585	-1.04	0.296
Δ LnTP	0.0655	0.150	0.44	0.663
Cons.	-18.077	1.490	-12.13	0.000
Error correction coefficients for each country				

	Coef.	Std. Error	z	*P*-value
Russia	-0.932	0.115	-8.09	0.000
Iceland	-0.844	0.111	-7.56	0.000
Japan	-0.831	0.118	-7.00	0.000
United Kingdom	-0.739	0.102	-7.23	0.000
Mexico	-0.736	0.112	-6.54	0.000
Slovenia	-0.734	0.106	-6.94	0.000
Sweden	-0.707	0.064	-2.89	0.000
Australia	-0.699	0.109	-6.41	0.000
Ireland	-0.688	0.115	-5.98	0.000
Brazil	-0.687	0.108	-6.35	0.000
Hungary	-0.651	0.107	-6.06	0.000
Germany	-0.641	0.108	-5.92	0.000
Spain	-0.638	0.106	-5.99	0.000
Canada	-0.631	0.111	-5.66	0.000
Luxemburg	-0.583	0.097	-5.96	0.000
Poland	-0.580	0.103	-5.62	0.000
New Zealand	-0.571	0.108	-5.27	0.000
Italy	-0.568	0.093	-6.07	0.000
Error correction coefficients for each country				
	Coef.	Std. Error	z	*P*-value
ABD	-0.520	0.096	-5.41	0.000
Slovak Republic	-0.414	0.093	-4.42	0.000
Norway	-0.389	0.089	-4.39	0.000
France	-0.387	0.088	-4.38	0.000
Korea	-0.361	0.083	-4.30	0.000
Czech Republic	-0.350	0.080	-4.36	0.000
Chile	-0.349	0.091	-3.81	0.000
Indonesia	-0.334	0.082	-4.07	0.000
Finland	-0.295	0.066	-4.47	0.000
South Africa	-0.295	0.082	-3.58	0.000
Austria	-0.283	0.084	-3.38	0.000
Belgium	-0.277	0.072	-3.81	0.000
Switzerland	-0.226	0.069	-3.25	0.000
Greece	-0.205	0.069	-2.97	0.000
Holland	-0.204	0.059	-3.44	0.000
Portugal	-0.191	0.75	-2.55	0.000
Denmark	-0.159	0.064	-2.49	0.000
Israel	-0.132	0.056	-2.35	0.000

*: Rejected null at .10 level
**: Rejected null at .05 level
***: Rejected null at .01 level

According to PMG (1999) estimation results in Table 8, error correction coefficient (-0.4955) is negative and statistically significant (p-value 0.000) at the 1% significance level. This findings show an existence of long-run relationship. The error correction coefficient corresponds to speed of reaching equilibrium in the long run. Since error correction coefficient -0.4955 was found; the emerging imbalances will be corrected after two seasons. Also error correction coefficients are statistically significant at the %1 significance level for all countries and error correction coefficients of Russia, Iceland, Japan, United Kingdom, Mexico, Slovenia, Sweden, Australia, Ireland, Brazil, Hungary, Germany, Spain and Canada were found quite high. This case indicates that the speed of reaching equilibrium is very high in the long-run. However, short-run coefficients of this model are statistically insignificant at the 10% significance level. In the long run, PMG (1999) estimation results show that the coefficient of LnGDP is statistically significant at the 1% significance level, and the effect is positive as expected by the tourism demand theory. When GDP of the countries concerned increased %1, the international tourism demand to Antalya increased about %3.5. However, the coefficient of LnTP is statistically insignificant at the 10% significance level.

Conclusions

In this study, we used seasonally adjusted quarterly tourist arrivals data were used for 36 countries over the period 1996Q1 – 2014Q4 and we estimated the short-run and long-run relationships between international tourism demand to Antalya with economic variables such as GDP and tourism price using panel cointegration analysis.

The cointegration analysis of panel data consisted of three steps: First, a panel unit root was tested according to LLC (2002) panel unit root test and Maddala and Wu (1999) and Choi (2001) panel unit root test. Second, we checked whether there was a cointegration relationship using the heterogeneous panel cointegration test developed by Pedroni (1999) and Kao (1999) because all series were found stationary at first difference I(1). The PMG (1999) estimator, the efficient and consistent estimator under the null hypothesis, was preferred according to Hausman test. Finally, since the series were cointegrated in the long run, short-run and long-run relationship between international tourism demand of Antalya and economic variables were estimated using the PMG (1999) estimator for heterogeneous cointegrated panels for large T and N. The PMG (1999) estimator allows the intercepts, short-run coefficients and error variances to differ across groups while constrains the long run coefficients to be identical.

According to PMG (1999) estimator, the long-run results of this study show that growth in income (GDP) of the countries concerned has positive effect on international visitor arrivals to Antalya. However, tourism price was not found as determinants of international tourism demand in Antalya because the tourism price parameter is not statistically significant. Also error correction coefficient (-0.4955) is negative and statistically significant (p-value 0.000) at the 1% significance level. This findings show an existence of long-run relationship. The error correction coefficient corresponds to speed of reaching equilibrium in the long run. Since error correction coefficient -0.4955 was found; the emerging imbalances will be corrected after two seasons. In addition to, error correction coefficients are statistically significant at the %1 significance level for all countries and error correction coefficients of Russia, Iceland, Japan, United Kingdom, Mexico, Slovenia, Sweden, Australia, Ireland, Brazil, Hungary, Germany, Spain and Canada were found quite high. This case indicates that the speed of reaching equilibrium is very high in the long-run. However, short-run coefficients of this model are statistically insignificant at the 10% significance level.

The predictive results are thought to contribute to the strategies that will be developed for sustainability of tourism demand towards Antalya the brand in the international tourism. Moreover, the analysis and results, which were obtained in this study, can be used by travel planners to draw the future tourism road-map of Antalya for their specific purposes.

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