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The Turkey Tourism Demand: A Gravity Model

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Abstract: Two significant points are usually overlooked when tourism demand is estimated through gravity models. First, international tourism activity is examined without the aid of economic theory. Consequently, this study uses a utility function to evaluate the tourism demand model. Secondly, gravity model estimations are not done via the appropriate estimation methods. This is because estimations give rise to problem of heteroscedasticity. Therefore, this study utilizes the Poisson Pseudo Maximum Likelihood (PPML) method, which accounts for the heteroscedasticity problem. Although our results are similar to the findings in prior literature, it is possible to get different results in terms of tourism demand.

Keywords: Turkey, Tourism Demand, Gravity Model

JEL Classification Number: C23, C40, Z30, Z39

I. Introduction

As in Turkey, studies on tourism demand gained global popularity in the 1960s and the 1970s. In time, several studies were conducted on Turkish tourism demand. Some studies rendered similar results while others had different results. It is possible that this diversity was due to the use of different variables. The studies that try to explain tourism demand with supply-side factors draw attention. Icoz, Var and Kozak (1998), thought that tourism demand was affected by supply-side factors, and used "total number of beds in licensed hotels" and "licensed agencies in Turkey" as variables, Aslan, Kula and Kaplan (2009) used "accommodation capacity of Turkey" as variable in their model. When model estimation is conducted by including supply-side factors of tourism demand to the study, it is observed that either these variables are unrelated to tourism demand or they point to results that are opposite to expectations. Many different dummy variables were created.

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The following dummy variables were created; economic stability, earthquakes and natural disasters, wars and crisis in neighboring countries, historical-linguistic and religious connections of neighboring countries, union membership and country visits by VIP politicians (Uysal and Crompton, 1984; Aslan et al., 2009; Gormus and Gocer, 2010; Gunes and Kabadayi, 2015). Most such variables gave statistically meaningful results that are expected.

On the other hand, transportation cost is a significant variable in terms of its impact on tourism demand. For transportation costs, "distance between countries" or "ratio of this distance to oil prices" variables are used. When transportation costs are included in the model (Halicioglu, 2004), even though transportation cost usually has a negative directional relation with tourism demand, Saray and Karagoz (2010) found a statistically meaningless relation. In addition, Uysal and Crompton (1984) stated that although transportation cost is a significant factor, it must not be included in the model due to challenges and statistical problems regarding the calculation of transportation costs. Exchange rates and relative prices were used in the tourism demand model as a significant variable regarding Turkey's competitive edge (Akis, 1998; Kucukaltan and Terzioglu, 2013). Relative prices were used by Aslan et al. (2009) and Ketenci, (2010) to denote other countries' substitution of inbound tourists to Turkey.

This study aims to reestimate Turkey's tourism demand gravity model. It is expected that this study will make contribution to the literature in terms of the following points: First, estimations were made with the largest panel data set for Turkey. Second, this study uses an advanced approach PPML to provide consistent estimations in case of problems resulting from dependent variables with quantitatively low values. This study differentiates itself from prior literature by also accounting for the changing variance arising from the logarithmic form of gravity models. Third, this study uses current dummy variables created by considering global economic and political conjuncture.

This study is divided into the following sections: In Section 2, we present the model and the data. Section 3 contains the method of model estimation and the empirical results. Section 4 presents a summary and conclusions.

2. Data and Model

The yearly data used in this study covers the international visitor arrivals (T) to Turkey from 92 countries over the period 1996-2014 and the data was obtained from the website of the Turkish Statistical Institute (http://www.tuik.gov.tr) (2015).The gross domestic product per capita (GDP) is gross domestic product divided by the midyear population (the

data are in constant 2005 U.S. dollars) and this data was obtained from the website of the World Development Indicators (http://data.worldbank.org) (2015).The distance (DIST) data is obtained from (http://www.distancefromto.net) (2015).

According to a core gravity model, the international visitor arrivals are predicted to be a positive function of income and a negative function of distance. The basic form of the gravity model for the tourism demand function is given below.

$$T_{ij} = \beta_0 \frac{(GDP_i)*(GDP_j)}{Dist_{ij}} u_{ij} \quad (1)$$

Equation (1), where T_{ij} is the international tourism flow between country i and j; GDP refers to economic size of the country i and j; Dist is the distance between countries; β_0 is the constant term; and u_{ij} is the error term.[1] However, the flow of merchandise and flow of tourism will be different because the flow of tourism is a movement of humans while merchandise flow is a movement of goods. Therefore, studies in tourism demand modeling in applied literature lack theoretical background. In the theoretical background of the tourism demand gravity model developed by Morley, Rosselló and Santana-Gallego (2014), the hypothesis states that the theoretical foundation of consumer theory applies to tourism demand and it is possible to construct a gravity model from the individual utility theory. In consumer theory, a consumer maximizes his/her utility subject to the constraints of his/her budget. The individual utility function may be written as follows:

$$U_{ijt} = f(F_{ijt}, Q_{it}, {GDP_{it}}^s, {GDP_{jt}}^p) \quad (2)$$

Equation (2), where U_{ijt} is the utility that an individual from the origin I, visiting a destination j, during the period t; F_{ijt} are the number of visits by an individual from the origin i to destination j during period t, Q_{it} is a vector of substitute-in-consumption${GDP_{it}}^s$ and , ${GDP_{jt}}^p$ are vectors of income referring to the origin and destination. The choices of a particular destination can be expressed as follows;

$$\pi_{ijt} T_{ijt} + p_{it} Q_{it} \leq M_{it} \quad (3)$$

Equation (3), where π_{ijt} is the cost of visiting destination j for an individual from the origin i during to t period; p_{it} is the price vector of the consumption goods and M_{it} is the personal income of the individual. In other words, their disposable income for international tourism should be sufficient to meet these trips. Considering these factors, the utility function is specified as follows:

[1]The gross domestic product uses the economic size of a county in some studies. However, per capita GDP is better than GDP that includes the effect on tourism demand. Therefore, per capita GDP series was used in this study.

$$\text{Max}U_{ijt} = f(T_{ijt}, Q_{it}, {GDP_{it}}^{s}, {GDP_{jt}}^{p}) \quad (4)$$

$$\pi_{ijt} T_{ijt} + p_{it} Q_{it} = M_{it} \quad (5)$$

Equation (3), under the assumptions that a per individual consumption maximum as his/her budgets, where $T_{ijt} \geq 0$, and $Q_{it} \geq 0$ are as if the function is under the Lagrange functional constraints and T_{ijt} and Q_i derived from the function could be written as follows:

$$U_{ijt} = f\left(T_{ijt}, Q_{it}, {GDP_{it}}^{s}, {GDP_{jt}}^{p}\right) + \lambda(\pi_{ijt} T_{ijt} + p_{it} Q_{it} - M_{it}) \quad (6)$$

$$T^{*}_{KKt} = n(\pi_{K(K-1)t}, p_{Kt}, M_{Kt,} {GDP_{Kt}}^{s'}, {GDP_{Kt}}^{p'}) \quad (7)$$

$$Q^{*}_{it} = q(\pi_{ijt}, p_{it}, M_{it,} {GDP_{it}}^{s'}, {GDP_{jt}}^{p'}) \quad (8)$$

Under the assumptions, the tourism demand for an individual can be written as follows:

$$T'_{IJT} = f(\pi_{IJT}, p_{IT}, M_{IT}, {GDP_{IT}}^{s'}, {GDP_{JT}}^{p'}) \quad (9)$$

In equation (9), where p_{IT} is the price vector of the consumption goods in the origin country, M_{it}, is the income level in the origin country. The p_{IT} and M_{it} can be captured by the GDP. Where π_{IJT} can be interpreted as a cost of visiting. The π_{IJT} can be captured by the distance variable. As a result, $p_{IT} \cup M_{IT} \cup T'_{IJT} \cup {GDP_{IT}}^{s'} \equiv GDP_{it} \pi_{IJT} \equiv Dist_{ij}$ ve ${GDP_{JT}}^{p'} \equiv GDP_{jt}$ can be interpreted. The equivalent expression to equation (10) derived from the initial equations.

$$lnF_{ijt} = ln\alpha_0 + \alpha_1 lnGDP_{it} + \alpha_2 lnGDP_{jt} + \alpha_3 lnDist_{ij} + \varepsilon_{ijt} \quad (10)$$

In estimating Equation (10), a number of dummy variables are also included to capture the effect of social political and economic causes on the tourism demand of Turkey. Dummy variables included in the model follow as;

$$lnT_{ijt} = ln\alpha_0 + \alpha_1 lnGDP_{it} + \alpha_2 lnGDP_{jt} + \alpha_3 lnDist_{ij} + \theta_i \sum_{i=1}^{11} D + \varepsilon_{ijt} \quad (11)$$

Equation (11), where D represents dummy variables (Table 1) that equals one, zero otherwise; i represents Turkey, j represents other countries (j=1,2,…,92), and t is time period (t=1996-2014).

3. Empirical Results

In applied studies in literature, the gravity equation has been traditionally used to study the log-linear panel data form. However, several problems are observed in empirical application. The parameters of log-linearized models estimated by the Ordinary Least Squares (OLS) method lead to biased estimates because of heteroskedasticity. According to Westerlund and Wilhelmsson (2011), being based on the gravity model in its original

nonlinear form, the Poisson Maximum Likelihood estimator does not suffer from these weaknesses and is therefore expected to yield results that are more accurate. According to Silva and Tenreyro (2006), the log-linearization of the empirical model in the presence of heteroscedasticity leads to inconsistent estimates because the expected value of the logarithm of a random variable depends on higher-order moments of its distribution. Actually, Jensen's inequality problem creates heteroscedasticity. Therefore, PPML estimation is preferred for the purposes of this study. The results of the regression are summarized in Table 2.

Table 2: Result of PPML Estimation

Variables	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IV**	**X**
B_o	-1.24*	-1.32*	-1.24*	-1.22*	-1.24 *	-1.03*	-1.22*	-0.70**	-1.49*	-1.16*
GDP	0.87*	0.86*	0.87*	0.87*	0.80*	0.89*	0.86*	0.75*	0.88*	0.86*
Inc	0.10*	0.11*	0.08*	0.10*	0.13*	0.08*	0.10*	0.11*	0.09*	0.11*
Dist	-0.29*	-0.26*	-0.27*	-0.30*	-0.35*	-0.35*	-0.28*	-0.32*	-0.21*	-0.31*
2008	0.01*	0.01***	0.01**	0.01	0.02**	0.01**	0.01***	0.02*	0.01***	0.01***
2010	-0.06*	-0.06*	-0.04*	-0.07*	-0.02**	-0.06*	-0.05*	0.04	-0.06*	-0.05
Border		0.09*								
EUoecd			0.04*							
OtherEU				-0.06*						
EasternBloc					0.12*					
Otheroecd						0.21*				
African							-0.02*			
WestAsian								-0.19*		
American									-0.17*	
Asia										0.06*

Note: *, ** and *** denotes statistical significance at 1%, 5%, and 10% levels respectively.

In Table 2, it is observed that GDP and Inc variables affect the number of inbound tourists to Turkey positively, whereas the Dist variable affects this number negatively in all of the estimations. All of the variables are statistically significant in almost all of the regressions conducted. It is observed that variables found to be statistically insignificant appear when the crisis dummy variables are introduced simultaneously. This might be attributed to a statistical problem. The 2008 financial crisis affected Turkish tourism demand in a positive manner. Turkey increased its competitive advantage during the crisis through improvement in the exchange rates and this boosted tourism. The 2010 crisis dummy variable has a positive effect on tourism demand only when the Border and West Asian

dummy variables are introduced into the same model. Regarding the estimations, it is suggested that some tourists from Arab countries visited in response to Turkey's increasing popularity in the Middle East and that the people who escaped to Turkey due to political turmoil entered Turkey on tourist visas. It is observed that dummy variables introduced into the model have a positive impact on transportation costs of countries, which have borders with Turkey. For EUoecd countries and other Otheroecd countries this effect is on income; on EasternBloc countries that favor Turkey as their holiday destination; and on Asian countries in terms of increasing bilateral trade and Turkey's popularity. OtherEU countries and Africa have a negative impact in terms of income.

4. Conclusion

This study researches Turkish tourism demand utilizing a gravity model. We conclude that income growth in Turkey and in countries where tourist comes, affect tourism demand positively; however, as the distance between two countries increases, this effect becomes negative. Further, it is observed that the 2008 global financial crisis, the 2010 Arab Spring crisis, and country group variables have had impact on tourism demand.

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http://www.tuik.gov.tr/

Appendix - Table 1: Dummy Variables

Name	Definition	
Border	The dummy variable which is equal to one if the other country j is	being a border country
EUoecd		a part of OECD country in EU
OtherEU		a non-part of OECD country in EU.
EasternBloc		an eastern bloc country.
Otheroecd		a other part of OECD country.
African		an african country.
WestAsian		a west asian country.
American		a west american country.
Asia		an asian country.
2008	The global financial economic crisis that	a dummy variable which is equal to one if other time t is an non crisis term.
2010	The Arab Spring crisis that	

Appendix - Table 2: Regions and Countries

EUoecd		Otheroecd	OtherEU	Border
France	Portugal	U.S.A.	Estonian	Greece
Holland	Spain	Canada	Latonya	Armenia
Germany	Luxemburg	Mexico	Lithuania	Azerbaijan
England	Iceland	Korea	Romania	Iran
Ireland	Norway	Japan	Bulgaria	Iraq
Denmark	Sweden	Australia	Albania	Bulgaria
Belgium	Switzerland	New Zeeland	Slovenia	
Finland	Poland		Croatia	
Austria	Hungary		Bosnia	
Check Rep.	Greece		Macedonia	
Italy	Slovakia		Serbia	
WestAsia	Asia	EasternBloc	Africa	America
Lebanon	China	Belarus	Morocco	Panama
Iraq	Hon Kong	Moldova	Algeria	Dominick
Israel	Iran	Russia	Tonus	Colombia
Jordan	Afghanistan	Georgia	Egypt	Venezuela
Saudi Arabia	Pakistan	Armenia	Sudan	Equator
Kuwait	India	Azerbaijan	Senegal	Peru
Bahrain	Bangladesh	Kazakhstan	Nigeria	Brazils
B.A.E	Thailand	Uzbekistan	Kenya	Chili
Oman	Indonesia	Tajikistan	S. Africa	Paraguay
Yemen	Malaysia	Kyrgyzstan		Uruguay
	Singapore	Ukraine		Argentina
	Philippines	Turkmenistan		