Factors Affecting International Tourism Demand For Türkiye: Gravity Model-Fuzzy Regression

Türkiye için Uluslararası Turizm Talebini Etkileyen Faktörler: Gravity Model-Bulanık Regresyon

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Abstract

In this study, it is aimed to analyze the factors that may stimulate international tourism demand for Turkey. In empirical analyses, the fuzzy logic approach to gravity model with data from 83 countries that sent tourists to Turkey in 2019 are used. GDP per capita (GDP_{pp}), population (POP), distance (DIST), inflation (INF), exchange rate (EXCR), tourism expenditure (EXPD) and tourist departure (DEP) variables are used in the analysis. As a result of the study, only population, distance, expenditure and departure variables were found to be significant and only population variable was found to be fuzzy. According to this finding, the effect of the population variable on the number of tourists appears to be positive in all cases. However, the unit effect of change in population is not clear-cut and can be expressed by values varying within a range.

Keywords: Tourism demand, Gravity model, Fuzzy regression, Linear programming

Öz

Bu çalışmada, Türkiye'ye yönelik uluslararası turizm talebini teşvik edebilecek faktörlerin analiz edilmesi amaçlanmaktadır. Ampirik analizlerde, 2019 yılında Türkiye'ye turist gönderen 83 ülkenin verileri ile çekim modeline bulanık mantık yaklaşımı kullanılmıştır. Analizlerde kişi başına GSYH (GDPpp), nüfus (POP), mesafe (DIST), enflasyon (INF), döviz kuru (EXCR), turizm harcaması (EXPD) ve turistik amaçlı yolcu çıkışı (DEP) değişkenleri kullanılmıştır. Çalışma sonucunda sadece nüfus, mesafe, harcama ve çıkış değişkenleri anlamlı bulunmuş ve sadece nüfus değişkeninin bulanık olduğu tespit edilmiştir. Bu bulguya göre, nüfus değişkeninin turist sayısı üzerindeki etkisinin tüm durumlarda pozitif olduğu görülmektedir. Ancak, nüfustaki değişimin birim etkisi net değildir, dolayısı ile bir aralık içinde değişen değerlerle ifade edilebilir.

Anahtar Kelimeler: Turizm talebi, Gravity model, Bulanık regresyon, Doğrusal programlama

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Introduction

According to the United Nations World Tourism Organization (UNWTO) reports, tourism, as one of the most exported and fastest growing sectors in the world, has an important place in the economies of countries due to its contribution to closing the balance of payments deficit by providing foreign currency inflows, providing employment and stimulating the economy (UNWTO;2018,2019). According to 2019 data from the World Tourism Organization of the United Nations, Turkey is an important tourism country, ranking sixth in terms of the number of tourists and thirteenth in terms of tourism revenues. For Turkey, which has a high current account deficit as one of its most important structural economic problems, tourism is a strategic sector that can make a significant contribution to the elimination of this deficit, since tourism revenues account for approximately 4.6% of its Gross Domestic Product. Based on this fact, in this study, it is aimed to analyze the factors that may stimulate international tourism demand for Turkey. In this way, it will be possible to increase the tourism demand for Turkey by revealing Turkey's current situation and focusing on the ones that can be improved among these factors.

In the study, GDP per capita according to purchasing power parity, population, distance between countries, exchange rate, inflation rate, expenditure, departure, climate similarity and direct flight variables are determined based on the literature and theory. In order to create a fuzzy gravity model for international tourism demand, data from 83 countries that sent tourists to Turkey in 2019 were used[3][1] (figure 1). The gravity model, which is generally used to study the reciprocal movement of goods, capital or people between two or more places, is handled with the fuzzy logic approach to take into account the uncertainty and variability of real life.

The classical gravity model used in international trade studies can be summarized as the volume of trade between countries is directly proportional to their economic size and inversely proportional to the distance between countries. International tourism can also be modeled with the gravity approach as a type of international trade. Gravity model, which has been widely used in the literature, is handled in this study with the fuzzy logic approach unlike its counterparts. This logical approach is very effective to take into account the uncertainty both in the data and the phenomenon itself. Thanks to this approach, it is also possible that the model coefficients estimated as a result of the analyses may be fuzzy in size and/or direction of effect.
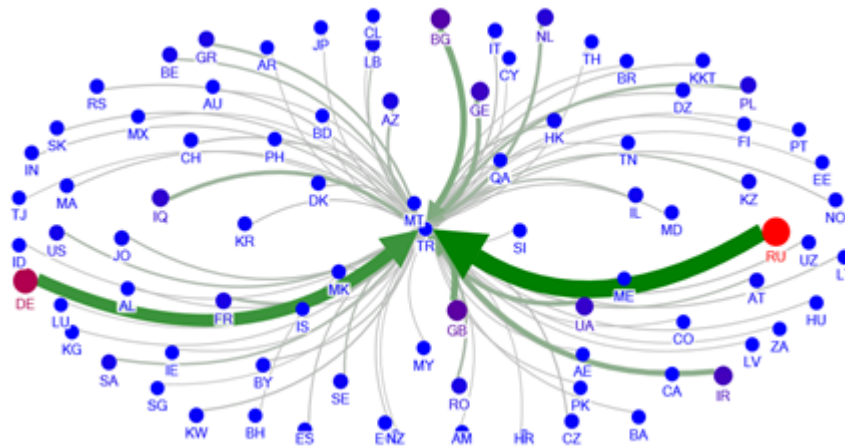
Figure 1: International Tourist Arrivals to Turkey by Countries

Source: Formed by the authors.

*Line thickness show tourist densities.

In the study, firstly, the main studies in the field are mentioned. Then, after providing information on the data set and methodology, the study is completed with findings, conclusions, and recommendations.

1.Tourism Literature

When the studies conducted to determine the determinants of tourism demand are examined, the abundance of empirical studies and the variety of methods, most of which are econometric and statistical, draw attention. However, there is no

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3 [1] The reason for using 2019 data is that international tourism movements have completely stopped due to the Covid-19 pandemic that engulfed the whole world between 2020-2021, and sufficient data has not yet been compiled for the post-pandemic period.

study in the literature that addresses this issue with the fuzzy logic approach used in our study here. The following are some of the main studies on tourism demand factors. One of these studies belongs to Wang (2009). Wang (2009) analyzed the effects of various economic variables and crisis events on international tourism demand for Taiwan, using ARDL and bounds test approaches. He concluded that there is a long-run equilibrium among all economic variables, that income and exchange rates are the most important variables, and that various disasters, especially September 11, earthquake and SARS outbreak, have significantly reduced the number of tourists. In addition, the impact of financial crises on tourism demand is more limited than that of disasters, emphasizing that ensuring the safety and health of tourists is a crucial element of maintaining international tourism demand. In another study, Jintranun et al. (2011) examined the international tourism demand for Thailand through the behavior of foreign tourists to Thailand. In that study, a panel cointegration model with the variables of income, transportation cost, tourism price, and exchange rate for the ten countries that send the most visitors to Thailand confirmed a long-run relationship between the variables and tourism demand. Zortuk and Bayrak (2013) tried to determine Turkey's tourism demand through HEGY seasonal unit root test by using income, tourism price, transportation cost and exchange rate macroeconomic variables. According to the findings, seasonal fluctuations in international tourism demand are found to be stochastic rather than deterministic. Culiuc, A. (2014) analyzed reciprocal tourism flows among 204 countries for the period of 1999-2009 using panel fixed effects method. According to the findings of the study, while the coefficients of many variables were found to be in line with expectations, only the effect of the population of the country of origin was found to be negative.

Similarly, Deluna, R, and Jeon, N. (2014) investigated the determinants of tourism demand for the Philippines from 24 countries using the panel random effects method and found that the effect of country of origin population was negative. De Vita (2014) conducted a panel data analysis on 27 countries for the period between 1980 and 2011 and found that exchange rate regime has long-run effect on international tourism flows. Using the same methodology as De Vita (2014), Aydın et al. (2015) tried to determine the economic factors affecting international tourism demand for Turkey. The results show that there is a negative relationship between tourism prices and travel costs and tourism demand, while there is a positive and strong relationship between exchange rates and tourism demand. Karacuka and Çelik (2015) also used Panel Model to determine the spatial determinants of tourism demand. The findings show that the income levels of tourist-sending countries and the real exchange rate have a significant and positive effect on tourism demand, while public fixed capital investments in the tourism sector have a low but statistically significant and positive effect. However, it is also noteworthy that terrorist activities, which have been going on in the Southeastern Anatolia region of Turkey for nearly 30 years, do not have any diversionary effect on tourism demand for Turkey. Oh and Zhong (2016) investigated the effects of GDP, inflation, distance and border neighborhood variables on the number of tourists for China and South Korea and found that the variables that affect the number of tourists the most are income and border neighborhood with a positive effect for China and distance and inflation with a negative effect for South Korea. Çelik and Karacuka (2017), in their study examining the sensitivity of tourism demand for Turkey from OECD countries to terrorist incidents, found that, contrary to the general view, the diversionary effects of terrorist incidents on tourism demand were not significant during the analysis period. Martins et al. (2017) examined the relationship between macroeconomic factors and tourism demand in their study on panel data for 218 countries. The findings show that tourism demand for a country is positively related to per capita income in the world and negatively related to the value of the national currency and domestic relative price levels. Tavares, J. M. and Leitao, N. C. (2017) analyzed the determinants of international tourism to Brazil from 20 countries using 2004-2013 data and panel dynamic data method. In accordance with the expectations in the study, the effect of the origin country's per capita gsyh and the exchange rate of the country reached was found positive. However, it is noteworthy that the distance variable was also found to be positive effective. Agiomirgianakis et al. (2018) examined the factors affecting tourism demand with a different perspective and variables using the GMM method on Turkey. GDP, purchasing power parity, real exchange rate, trade openness, human capital and information-communication-technology were used as variables in the analysis between the first quarter of 1996 and the last quarter of 2014. In this 65-country panel data study, an inverse relationship was found between GDP and tourist demand, and it was concluded that the most striking variable affecting Turkey's tourism demand was human capital. Samitas et al. (2018) examined the relationship between tourism demand and terrorism for Greece. In the study covering the period between 1977 and 2012, co-integration and long-run causality methods were applied and the direction of causality was found to be from terrorism to tourism. Chaisumpunsakul and Pholphirul (2018) examined the impact of international trade on the tourism sector in Thailand. In the study involving 207 trading partners of Thailand, panel data method was applied, and the impact of per capita income, inflation, net trade, population and distance variables on the tourism sector between 1998-2010 was investigated. As a result, it was determined that trade openness is positively correlated with tourism demand. Gül and Yerdelen Tatoğlu (2019) estimated the determinants of tourism demand of the top 11 countries which receive tourists in the world with the help of panel gravity model. The findings revealed that distance between countries and transportation costs as an indicator of countries' economic power has a significant impact on tourism demand. In addition, for some countries, the exchange rate, the temperature difference between countries and the language spoken also affect tourism demand. In another study, Yerdelen-Tatoglu, F. & Gul, H. (2019) examined tourism flows from 30 origins to 14 destinations with data for the period

of 2008-2016. In this study, in which the multidimensional gravity model was estimated through the maximum likelihood method, the GDP per capita of the origin country and the exchange rate had a positive effect on tourism demand, while the GDP per capita of the destination country was found to have a negative effect.

Karaoğlu (2019) analyzed the factors affecting international tourism demand for Turkey. According to the results of the analysis, it was found that a period previous tourism demand, per capita income, supply capacity and political stability in Turkey positively affected tourism demand; relative price, terrorist incidents and coup attempt in 2016 negatively affected tourism demand; and relative exchange rates did not affect tourism demand. Şengel and Zengin (2020) determined the factors affecting the tourism demand for Turkey from OECD countries through Panel Data analysis. Economic, socio-demographic, tourism-travel and technological variables that may affect tourism demand for Turkey were used in the analysis. The findings of the study show that these variables affect tourism demand for Turkey in different directions and with different intensities. Ibragimov, K. et al. (2021) also found that the per capita GDP of the destination country has a negative effect on tourism demand for the country. In this study, in order to examine the determinants of tourism demand in Central Asia, data for the period of 2008-2018 for 4 Central Asian countries out of 108 countries and panel random effects method were used. Öcal et al. (2021) tried to determine the variables affecting the tourist demand for Turkey between 1990 and 2017 using VAR model. GDP growth, net exports and inflation variables were used as variables affecting demand. According to the results of the analysis, the internal dynamic that affects the number of tourists the most is determined as inflation. Inflation and domestic product also affect the number of tourists significantly. In addition, a bidirectional causality relationship was found between growth and the number of tourists. Selim et al. (2022) examined the impact of incentives provided to the tourism sector on tourism demand in Turkey between 2004 and 2018 by cointegration test and causality analysis. According to the results obtained, it is revealed that the series move together in the long run and according to the causality analysis, there is a bidirectional causality relationship between fixed investments, number of certificates and employment. Tütüncü (2022) analyzed the macroeconomic variables affecting tourism activities in Turkey for the period of 1996-2016 using Structural VAR Analysis and Impulse-Response Functions. According to the findings, the number of international tourist arrivals affects national income, carbon dioxide emissions, political stability, and geopolitical risk index. Another finding reveals that the number of international tourist arrivals is affected by national income, political stability, carbon dioxide emissions, but not by the geopolitical risk index. In the short run, no significant relationship was found between inflation and exchange rate with the number of international tourist arrivals. Nadal and Gallego (2022), as a result of a literature review of 143 important articles on tourism demand and its determinants, stated that although there are a wide variety of variables used in this field, the most dominant ones are GDP, population, and distance. Çetin et al. (2023) examined the effects of Real Effective Exchange Rate (REER) and security conditions on tourism demand for 73 countries included in the tourism ranking list from UNWTO reports for the period of 2003-2018 using panel data methods. As a result of the analysis, the effect of REER on tourism demand was found to be negative, while the effect of security conditions was found to be positive. In addition to these findings, fixed effects panel quantile regression analysis reveals that the effect of the change in REER on tourism demand increases at higher demand percentiles. However, the effect of security on tourism demand decreases as demand percentiles increase. Darıcı etc. (2023) used income level, general price levels, exchange rate, transportation costs, and the COVID-19 pandemic effect as determinants of tourism demand in Turkey. The Panel data analysis that cover the period 2000-2021 revealed that income and prices have a positive effect on tourism demand. However, the effects of transportation costs and exchange rates were found to be negative.

To summarize, the findings of most studies in the literature suggest that foreign tourism demand for any country is positively affected by the income of the country of origin. In a few studies where the income of the destination country is also found to be effective, the direction of the effect is generally positive, but there are also studies with negative findings. In the majority of studies on tourism demand, distance between countries has been found to have a significant and negative effect on tourism demand. In addition, many studies have also found that the population of the country of origin is an important determinant of tourism demand. Also, there are also several studies that show that a country's exchange rate has a positive effect while inflation rate has a negative effect on international tourism demand for it. In addition, in some studies, variables such as temperature difference between countries, language spoken, transportation facilities are found among the significant variables.

2. Methodology

In this study, a fuzzy solution approach to the gravity model is preferred to investigate the factors affecting the tourism demand for Turkey. According to this purpose, the study considers Turkey as a single destination point and all countries as origin points. The variables used in the study were determined based on this fact. Initially, based on the literature and theory, it was deemed appropriate to use climate similarity and direct flight dummy variables as dummy variables in addition to GDP per capita according to purchasing power parity, population, distance between countries, exchange rate, inflation

rate, expenditure and departure variables. However, as preliminary analyses supported the high correlation between purchasing power parity (GDP) and inflation rate and exchange rate variables, inflation rate and exchange rate variables were excluded from the analysis in order to avoid duplication. Such exclusions are supported by some studies (for example, Hiemstra and Wong, 2008:47). In addition, in the preliminary analysis of the number of tourist arrivals to Turkey, it was deemed appropriate not to use the climate similarity variable since the countries with the highest number of tourist arrivals are in the same hemisphere as Turkey and have similar climatic characteristics, and most of them are coastal countries (Table 1). In addition, although the direct flight variable has been used in some studies, the use of this variable has been abandoned as there is no distinctive feature since direct flights to each country are available.

Table 1. Top 15 Countries Sending the Most Tourists to Turkey in 2019

Countries	Number of Tourist
Russian Federation	6694453
Germany	4649494
England (United Kingdom)	2442375
Bulgaria	2254444
Iranian	1825386
Georgia	1667602
Ukraine	1462269
Iraq	1203603
Netherlands	1051908
Poland	848640
France	793865
Azerbaijan	780107
Greece	709462
Romania	697840
Saudi Arabia	519947

Source: https://www.tursab.org.tr/istatistikler/milliyetlerine-gore-gelen-yabanci

Finally, population, distance, GDPppp, expenditure and departure variables are used in the analysis. As the population increases, which is used as an indicator of the size of the country sending tourists to Turkey, it is expected that the number of potential tourists and therefore the number of tourists they will send to Turkey will also increase. However, although the increase in the population of the country has also increased the number of potential tourists, a decrease in per capita income with population growth may have the opposite effect. Although the effect of distance on tourism demand is generally seen to be negative, sometimes the opposite can be encountered. In general, as the distance between countries increases, the number of tourists is expected to decrease due to cost, comfort and psychological effects. However, from another point of view, an increase in distance can create an attraction due to characteristics of the host country such as geographical, cultural, architectural differences. In this case, the effect of distance on tourism demand may be positive.

Simply put, an increase in the level of income (disposable income) is expected to have a positive impact on tourism demand. However, it would not be surprising to see the opposite effect, as an increase in income level may provide tourists with alternative destinations outside Turkey that may be more attractive for various reasons. Expenditures and departures variables can also be explained in the same way as income level. Based on these considerations, it was deemed appropriate to analyze the effects of the variables considered in the study on tourism demand for Turkey using fuzzy logic. It should be noted that, since the data used here are crisp, only in the fuziness of the coefficients, i.e. of the effects are considered, not the fuzziness of the data. As a result of the reviews, two separate models, one using expenditure and the other using departure variables, were found to be appropriate for the available data. At this stage, GDP was removed from the gravity models because it was found to have no significant relationship with the dependent variable.

The gravity model, which is based on Newton's law of gravitation, has been widely used, especially in the field of international trade. The simplest form of this model is based on the theory that the volume of trade between countries is directly proportional to the economic size of the countries and inversely proportional to the distance between the countries, but of course, extended gravity models have emerged with the inclusion of other factors. Similar to the movement of goods between countries in international trade, to construct a gravity model for the movement of people for touristic purposes, the population of countries is used instead of GDP to represent the economic size of countries (Morley et al., 2014:2). The model is as follows. In model 1, NT is the number of tourists traveling between two countries, POPi and POPj are the populations of these two countries, and DISTij is the distance between them.

$$NT = \beta_0 \frac{POP_i^{\beta_1} POP_j^{\beta_2}}{DIST_{ij}^{\beta_3}} \tag{1}$$

After model 1 is linearly expressed in logarithmic form, various extended models are obtained by adding other factors that are thought to affect the number of tourists moving between countries. In this study, two different models are considered, one including the total number of tourists leaving the country (DEP_i) and the other including the total foreign tourism expenditure of the country ($EXPD_i$).

$$logNT = log\beta_0 + \beta_1 logPOP_i + \beta_2 logPOP_j + \beta_3 logDIST_{ij} + \beta_4 logDEP_i \tag{2}$$

$$logNT = log\beta_0 + \beta_1 logPOP_i + \beta_2 logPOP_j + \beta_3 logDIST_{ij} + \beta_4 logEXPD_i \tag{3}$$

The common dependent variable of model 2 and model 3 is the number of people from two countries making reciprocal touristic travels to each other. However, the main question of this study is to what extent and in what direction the variables included in the analysis affect the number of tourists to Turkey. For this reason, after changing the dependent variable in the model 1 and 2 to the number of tourists to Turkey (NT_T) and deleting the POPj variable since Turkey's population will remain constant in the cross-sectional analysis, the final models are as follows.

$$logNT_T = log\beta_0 + \beta_1 logPOP_i + \beta_3 logDIST_{ij} + \beta_4 logDEP_i \tag{4}$$

$$logNT_T = log\beta_0 + \beta_1 logPOP_i + \beta_3 logDIST_{ij} + \beta_4 logEXPD_i \tag{5}$$

Fuzzy logic approach was preferred in estimating the above models because it is usual to have more or less fuzziness in phenomena based on human estimation. The word estimation already contains some deviation. In the traditional approach, these deviations are generally accepted to be caused by measurement errors, while in fuzzy logic, it is accepted that they may be caused by uncertainty in the phenomenon itself. According to this assumption, for the above models, fuzziness may be present in the signs as well as in the magnitudes of the model coefficients. In studies with full confidence in the accuracy of the data used, such fuzziness may be due to the heterogeneity of the measurement values or the absence of a truly significant relationship. The fuzziness of the magnitude is more easily interpreted by practitioners, whereas the fuzziness of the sign is often quite confusing. In fact, both fuzzinesses indicate uncertainty, which is an important advantage of the fuzzy logic approach since the causes of this uncertainty can be analyzed and conclusions supported by theory can be drawn.

For the estimation of the models in this study, the fuzzy linear programming approach developed by Tanaka et al. (1989) for fuzzy models, which is still widely and effectively used, is preferred. For this purpose, the linear programming model to be solved is as follows.

$$MinJ = \sum_{i=1}^{n} \sum_{j=0}^{m} c_j |x_{ij}| \tag{6}$$

$$\sum_{j=0}^{m} \beta_j x_{ij} + (1-H) \sum_{j=0}^{m} c_j |x_{ij}| \geq y_i + (1-H)e_i$$

$$\sum_{j=0}^{m} \beta_j x_{ij} - (1-H) \sum_{j=0}^{m} c_j |x_{ij}| \leq y_i - (1-H)e_i$$

$$c_j \geq 0, \beta_j \ free$$

i = 1,...,m j = 0,...,n

Here, m is the number of observations and n is the number of variables. H, which indicates the level of fit of the fuzzy linear model, is called the degree of belief, and although a value of 0.50 is generally used, different values between 0 and 1 can also be tried. Even if the model is not very large, since the number of constraints is usually quite large, there are

different solutions for determining the symmetric triangular fuzzy coefficients in the form of (β_j, c_j). One of them is to solve the dual of the above model. However, this reduces the number of constraints but unfortunately increases the number of variables at the same rate. For this reason, another proposed method is to first solve the regression as crisp and then fuzzify the coefficients. Another method, which is also preferred in this study, is to obtain the solution of the primal model 6, and the fuzzy coefficient estimates simultaneously.

3. Findings

Model parameter estimates obtained as a result of fuzzy regression analyses are shown in the table below. While making these estimates, the differences of the independent variables from their averages were used.

Table 2. Fuzzy Regression Analysis Results (Model 4 and 5)

Model 4			Model 5		
Variable	Coefficient	Coefficient type	Variable	Coefficient	Coefficient type
Constant	(13.2438, 3.3269)**	Fuzzy	Constant	(13.2438, 3.3269)**	Fuzzy
LogPOP	(0.7840, 0.7020)**	Fuzzy	lnPopulation	(0.6097, 0.3827)**	Fuzzy
LogDIST	-1.2228**	Crisp	lnDistance	-1.3374**	Crisp
LogDEPT	0.3195**	Crisp	lnExpenditure	0.3653**	Crisp

**: statistical significance at 1% level

The number on the left in parentheses is the middle value of the fuzzy number and the other one is the expansion of this value.

According to Table 2, the model constant (13.2438, 3.3269) that has been found fuzzy shows the fuzzy average value of the logarithmic number of tourists coming to Turkey. In other words, the fuzzy average number of tourists coming to Turkey is 564536.32, 27.85. In this case, the fuzziness of the number of tourists coming to Turkey can be expressed by the fuzziness of the constant parameter and the population variable. In the study, the fuzziness of the effects of independent variables is considered rather than the fuzziness of the data. This fuzziness can be explained by the fuzziness in the parameters. The effect of the population variable on the number of inbound tourists is found fuzzy in magnitude but positive in sign. Both the magnitudes and signs of the other variable coefficients are found to be crisp. Based on this findings, it can be said the distance of any country to Turkey has a negative effect on the tourism demand for Turkey, while the country's tourism expenditures and the number of tourists leaving the country have a positive effect.

At this stage of the study, in order to verify the validity and generalizability of the fuzzy regression model, a classical regression analysis was subsequently performed. The results of the analysis are presented in Appendix 1, Appendix 2 and Appendix 3, together with multicollinearity indicators and normality tests.

Conclusion

Although the gravity model has been used effectively in many studies on tourism, this study uses a fuzzy logic approach together with the model to take uncertainty into account. Here, the factors affecting the tourism demand for Turkey just before the Covid-19 pandemic are analyzed using the fuzzy gravity approach. As a result of two different models, it was determined that the population of the country of origin, the distance to Turkey, the number of people subject to international tourism and international tourism expenditure are important factors. Among the variables, only the population variable was found to be fuzzy. In fact, the constant term was also found to be fuzzy in both models. This means that the data on the number of tourist arrivals to Turkey is fuzzy, that is, it contains some uncertainty. The signs of the model coefficients are

as expected. In sum, only the distance variable has a negative effect on the number of tourists coming to Turkey, while all other variables have a positive effect.

While the effect of source country population on tourism demand is found to be positive in this study, there are studies in the literature such as Culiuc, A. (2014), Deluna, R. and Jeon, N. (2014) that found negative effect.

Unlike this study, Tavares and Leitao (2017) find that the effect of distance variable on tourism demand is positive, while Eilat and Einav (2004), Seetanah et al. (2010), Eryigit et al. (2010), Velasquez and Oh (2013) support the positive effect finding in this study.

Among the studies that consider the impact of tourism expenditures on tourism demand (Lee and Chang, 2008), Doru (2017) and Martins et al. (2017) have found that tourism expenditures have a positive impact on tourism demand, as in this study.

A review of the literature reveals that there is mostly a direct correlation between the GDP per capita of the country of origin and the number of tourists in the destination country. Although a few studies have shown a negative relationship (Aydın et al, 2015), no relationship was found between GDP and the number of tourists in this study. Among the top 15 countries that send the most tourists to Turkey (Table 1), the 5 countries with the highest GDP per capita have an average GDP per capita of $53014, while the rest have an average GDP per capita of $21657, which can be presented as an indicator confirming this finding.

For the Turkish economy, where foreign tourism revenues are known to make a significant contribution, the factors found to be effective in this study should be emphasized. It would be appropriate to focus more on countries with high population and international tourism expenditures and to make improvements to meet their cultural and personal expectations.

Let's say once again that in this study, Covid 19 pre-pandem data was used. The reason for this can be explained as the fact that tourism stopped completely during the pandemic period and that sufficient data could not be collected for the post-pandemic.

Repeating this study with new data in future studies will reveal new and different information. In addition, for future research, it may be recommended to include factors such as infrastructure, transportation, accommodation, tourism price index in the research and to address them with a fuzzy logic approach.

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Appendix 1. Results of OLS Regression Analysis of Model 4

	Unstandardized Coefficients		Standardized Coefficients				Adjusted R Square
	β	Std. Error	Beta	t	Sig.	VIF	
(Constant)	8.544	1.563		5.465	0.000		
LogPOP	0.484	0.099	0.569	4.867	0.000	2.076	0.552
LogDIST	-1.153	0.170	-0.654	-6.797	0.000	1.408	
LogDEP	0.299	0.101	0.303	2.971	0.004	1.577	

Appendix 2. Results of OLS Regression Analysis of Model 5

	Unstandardized Coefficients		Standardized Coefficients				Adjusted R Square
	β	Std. Error	Beta	t	Sig.	VIF	
(Constant)	7.778	1.579		4.926	0.000		
LogPOP	0.430	0.083	0.518	5.157	0.000	1.782	0.536
LogDIST	-1.269	0.155	-0.725	-8.214	0.000	1.378	
LogEXPD	0.322	0.085	0.361	3.803	0.000	1.596	

Appendix 3. Normality Tests of Variables

Null Hypothesis	Test	Sig.	Decision
The distribution of LogNT is normal with mean 12.047 and standart deviation 1.52	One-Sample Kolmogorow-Smirnov Test	0.984	Retain the null hypothesis
The distribution of LogPOP is normal with mean 16.506 and standart deviation 1.64	One-Sample Kolmogorow-Smirnov Test	0.166	Retain the null hypothesis
The distribution of LogDIST is normal with mean 8.015 and standart deviation 0.85	One-Sample Kolmogorow-Smirnov Test	0.392	Retain the null hypothesis
The distribution of LogDEP is normal with mean 15.954 and standart deviation 1.49	One-Sample Kolmogorow-Smirnov Test	0.914	Retain the null hypothesis
The distribution of LogEXPD is normal with mean 22.454 and standart deviation 1.62	One-Sample Kolmogorow-Smirnov Test	0.923	Retain the null hypothesis
Asymptotic significances are displayed. The significance level is 0.05			