REMODELING TOURISM DEMAND USING OPTIMAL PREDICTORS: THE CASE OF MUĞLA

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Abstract

Although there have been many studies that have approached the tourism phenomenon from an economic perspective, most of these studies ignore environmental, historical and infrastructural factors. The study aims to create the optimal regression that can be created by including all the factors that play a role to some extent in the realization of tourism demand in the model. In the empirical process, algorithms of statistical package programs are used in accordance with the econometric methodology. While the sample is a panel dataset, the time period extends from 2014 to 2021. The focal region is the districts of Muğla. First, the variables most related to tourism are determined, then the existence of unobserved heterogeneity is investigated. The variables with the most significant coefficients are added to the model with the forward-stepwise method. The econometric findings of the study are not very surprising, but they also reject some hypotheses that can be considered hypothetically correct. Empirical findings indicate that environmental factors exert the greatest influence on tourism demand. Number of blue flag beaches, tree cover area (km2) that belong to the environmental variables' explanatory power are significant. The significance level of the road inventory (km) also emphasizes the importance of the transportation parameter in tourism demand. Following these environmental and infrastructural independent variables, the coefficient of the room capacity variable in the accommodation sector, which is a tourism input, is high. Having a great historical and cultural depth, it hosted the Carian Civilization, Lelegians, Persians, Hellenistic Period, Romans and Byzantines from 2000 BC to 1280 BC. It is a historically and culturally rich destination that came under Turkish sovereignty with the establishment of Menteşe Principality. However, historical elements do not have an important place among the demand factors of tourists. The reason may be the ineffective marketing of the existing historical assets.

Keywords: Tourism demand, environmental factors, cultural factors, optimal variables, optimal regression.

Jel Codes: Q50, R10, R11, Z30, Z31.

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TURİZM TALEBİNİN OPTİMAL TAHMİNCİLER KULLANARAK YENİDEN MODELLENMESİ: MUĞLA ÖRNEĞİ

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Özet

Turizm olgusuna ekonomik açıdan yaklaşan birçok çalışma olmasına rağmen, bu çalışmaların çoğu çevresel, tarihsel ve altyapısal faktörleri göz ardı etmektedir. Çalışma, turizm talebinin gerçekleşmesinde belli ölçülerde rol oynayan tüm faktörlerin modele dahil edilmesiyle oluşturulabilecek optimal regresyonu tahminlemeyi amaçlamaktadır. Ampirik süreçte ekonometrik metodolojiye uygun olarak istatistiksel paket programların algoritmaları kullanılmaktadır. Örneklemi panel veri seti oluşturmakla birlikte zaman aralığı 2014-2021 yıllarını kapsamaktadır. Odak bölge Muğla ili ilçeleridir. Öncelikle turizmle en fazla ilişkili olan değişkenler belirlenmekte, ardından gözlemlenemeyen heterojenliğin varlığı araştırılmaktadır. En anlamlı katsayılara sahip değişkenler ileri adım yöntemi ile modele eklenmektedir. Çalışmanın ekonometrik bulguları çok şaşırtıcı olmamakla birlikte, varsayımsal olarak doğru kabul edilebilecek bazı hipotezleri de reddetmektedir. Ampirik bulgular, çevresel faktörlerin turizm talebi üzerinde en fazla etkiye sahip olduğunu göstermektedir. Çevresel değişkenlerin arasında mavi bayraklı plaj sayısı, ağaçla kaplı alan (km2) anlamlıdır. Yol envanterinin (km) anlamlılık düzeyi de ulaşım parametresinin turizm talebindeki önemini vurgulamaktadır. Bu çevresel ve altyapısal bağımsız değişkenlerden sonra turizm girdisi olan konaklama sektöründeki oda kapasitesi değişkeninin katsayısı yüksektir. Büyük bir tarihi ve kültürel derinliğe sahip olan bölge, MÖ 2000'den MÖ 1280'e kadar Karia Uygarlığı, Lelegler, Persler, Helenistik Dönem, Romalılar ve Bizanslılara ev sahipliği yapmıştır. Menteşe Beyliği'nin kurulmasıyla Türk egemenliğine giren tarihi ve kültürel açıdan zengin bir destinasyondur. Ancak tarihi unsurlar turistlerin talep faktörleri arasında önemli bir yere sahip değildir. Bunun nedeni mevcut tarihi varlıkların etkin bir şekilde pazarlanamaması olabilir.

Anahtar Kelimeler: Turizm talebi, çevresel faktörler, kültürel faktörler, optimal değişkenler, optimal regresyon.

Jel Kodları: Q50, R10, R11, Z30, Z31.

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INTRODUCTION

Undoubtedly, the travel practices that became popular after the 80s caused the concept of tourism to gain an industrial dimension. The spread of the internet, the intense competition environment in the business world, the desire of individuals and communities to explore cause individual and mass tourism to become an important driving factor in the economies of countries. There are many studies in the literature that provide empirical findings regarding the demand factors and motivations of tourism (see Dwyer et al., 2020; Yerdelen-Tatoğlu & Gül, 2020; Carvache-Franco et al., 2018; Liu et al., 2020; Aslan et al., 2008). Studies in the neo-classical perspective, as outlined in microeconomics books (see Pyndick & Rubinfeld, 2001; Dwyer et al., 2004), demonstrate that the demand for a service or good is influenced by various factors. These factors include the price of the product (P_x), the consumer's income (Y), the number of consumers in the market (N), the prices of substitute and complementary products (P_s and P_c), consumer preferences (T), and marketing expenses (M). There are undoubtedly many non-economic factors affecting demand in the tourism industry, including environmental, sociological, cultural, historical and infrastructural variables.

This study has two main purposes. Firstly, it aims to examine how dependent variable response to the group of environmental, historical, infrastructural variables in regression analysis. Afterwards, to develop an optimal regression model that incorporates economic and non-economic factors that influence tourism in Muğla, a significant tourism destination in the Eastern Mediterranean basin. The second rationale behind writing the paper is to assist decision-makers in resource allocation by providing insights in the light of wide set of variables.

This work distinguishes itself from previous studies in the literature by its unique content, data, and methodology. Most of the studies in the literature included economic dynamics in the model, but did not include non-economic factors such as environmental, cultural, historical and infrastructural variables in the model (see Brida & Risso, 2009; Gonzalez & Moral, 1995; Liu et al., 2020). As for the methodology, it is very important for the reliability of the findings that the empirical study should be based on a reasonable theoretical basis. In this study, panel macro data is used in the light of microeconomic theory. With the help of the algorithm of the statistical package program (Stata 18), the optimal model is determined from the tourism demand factors in multiple regression models. Then, the effects of the independent variables on the dependent variable are analyzed through step-by-step forward selection.

While the sample consists of the districts of Muğla, the time period covers the years 2014-2021. First, a large panel dataset consisting of environmental, cultural and infrastructural variables that can be related to tourism demand is created. Then, this raw dataset is made suitable for econometrical approaches with preliminary treatments. With the help of algorithms of package programs (Stata 18), the best model that can be created with 23 independent variables that may affect tourism demand (according to statistical information criteria) is estimated. Independent variables include economic, environmental, infrastructural and social variables.

1. Literature Review

Tourism is a practice that encompasses all travel for leisure, education, business, health and sports purposes, and is also the subject of scientific studies in different fields. The motivation for its implementation is quite personal, tourists are mostly motivated by the desire to discover diverse destinations and acquire unforeseen encounters. In contemporary times, nearly everyone engages in various sorts of tourism. While a tourist may travel to Istanbul to experience the architectural and cultural heritage of the Istanbul Historical Peninsula, another may come to Istanbul to get dental treatment or a hair transplant. Similarly, a traveler may engage in touristic activities because they are curious about the unique geological structure of Cappadocia and its importance in Christian history, while another may visit Akyaka, one of the most popular kitesurfing centers in the world, to go kitesurfing.

Carvache-Franco et al. (2018) in their inspiring studies, come across valuable findings on the motivation of touristic activities without doing any economic modeling. They gathered data with questionnaire, then applied variant and bivariate statistical techniques to achieve the study objectives. The findings show that the main motivations of tourists are resting, enjoying beach and sun, and delight with local typical gastronomy. The most valued aspects of the visit were residents' hospitality, sun and beach, and restaurant service. The destination's potential for this form of tourism is demonstrated by the high level of satisfaction. The variables that have a greater influence on overall satisfaction are security, information and signage, restaurant services and places of recreation.

Liu et al. (2020), in contrast to many other research in the literature, uses micro data rather than macro data that was gathered using the questionnaire method. It creates the VAR model and the 6-dimensional Baidu index using the data acquired. The results are unexpected. The demand for tourism is influenced by dining, attractions, and shopping; the demand is hampered by travel, tours, and lodging.

In a different panel analysis, Aslan et al. (2008) attempt to use the GMM-Diff model to estimate the factors influencing tourist demand over a 10-year period at an annual frequency for the nine most common countries visiting Türkiye. They make estimations based on nationality, in contrast to other studies. They come to the conclusion that tourists' income elasticity is negligible. Therefore, it is argued that tourism-related activities in Türkiye do not qualify as luxury goods. It is also stressed tourists' tastes are slightly sensitive to the cost of living in the host nation. Contrary to predictions, it appears that the Marmara Earthquake had a beneficial impact and infrastructure investments have a negative one. The September 11 Attack has had a negative impact.

When it comes to applying panel data econometric approaches, the research Croes & Vanegas (2005), Garin-Munoz (2006, 2007), Garin-Munoz & Montero-Martin (2007), and Brida & Risso (2009) on the factors influencing tourism demand are pioneers. All of the studies are utilized dynamic models. Croes & Vanegas (2005) concentrate their analysis on the elements influencing the demand for tourism in Aruba. The study's unique component is that it separated visitors to Aruba based on their nationality and concentrated on the variables influencing each group's appetite for travel. Their results suggest that income levels, relative pricing, and lagged arrivals all influence US people' desire to travel to Aruba. Risso & Brida (2009) Travel to South Tyrol, Italy, is considered a luxury by German visitors, who are also very price conscious. Over an extended period, sensitivity increases even more. Simultaneously, as anticipated, travel expenses also adversely affect the demand for tourism.

The seminal study by Yerdelen-Tatoğlu & Gül (2020) differs significantly from previous studies in the literature since it employed a three-dimensional panel gravity model and dealt with various destinations. Economic considerations, the distance between the country of origin and the country of destination, and dummy variables such political stability, border, visa requirements, direct flights, etc. are the main independent variables influencing demand in the study. The study's conclusions demonstrate that economic variables significantly affect the flow of foreign tourists. Simultaneously, it is observed that air temperatures positively influence visitor demand, while distance between countries has a negative impact.

Agiomirgianakis et al. (2018) use the error-correction time series model in a different study to assess the short-term effects of the factors influencing Turkey's demand for tourism. He enumerates the following variables influencing demand for tourism: (1) The opinions of travelers and tour operators on Turkey as a travel destination are influenced by increases in the volatility of the real exchange rate and shifts in comparable prices. (2) The demand for Turkish tourism is influenced by human capital. It is anticipated that Turkey's demand for tourism will benefit from investments in human resources. (3) Our research indicates that information, communication, and technology (ICT) play a favorable effect in driving demand for travel. Turkey may become the preferred destination for tourists if bilateral trade is developed with the host countries.

Unur et al. (2018) use panel data spanning 19 years and 12 Mediterranean countries to examine the demand factors. Dynamic econometric approaches were used with a small data set, similar to many other studies. On the other hand, life expectancy is additionally included as an independent variable. It is clarified as one of the factors influencing the quantity of visitors. The study also found that the per capita income of the host country and foreign exchange reserves have a beneficial impact on the demand for tourism.

Cevik (2022) in his study on Caribbean countries, offer insightful information to decision-makers dealing with intricate environmental issues that cut across national borders. Policy priorities must promote sustainable and inclusive economic development, financial resilience, and environmental quality in order to maximize welfare-enhancing economic growth. As a result, in order to manage tourism responsibly, it is necessary to lessen its adverse effects on the environment and to reduce the region's over-reliance on energy derived from fossil fuels, which is the primary source of CO^2 emissions. In order to achieve this, nations could: (i) provide incentives for decarbonization across the board; (ii) create a low-carbon energy sector; (iii) electrify mobility and transportation; (iv) improve land-use practices and smarter urbanization through stricter building codes; and (v) decarbonize the tourism sector. However, these actions would not be the only ones. Restoring natural capital can help nations become more robust to extreme weather events and gradual changes like sea level rise and desertification. This is especially true for forests and coastal ecosystems. In order to transition to a low-carbon economy, wiser urbanization is thus needed, particularly in tourist-dependent areas. These strategies include expanding green spaces, strengthening CO^2 emission management in new projects, improving building energy efficiency, and reducing vulnerability to climate change. In order to do this, governments can impose levies and feebates to encourage energy conservation in the stock of residential and commercial buildings and lessen deforestation in the land-use and forestry sectors.

Schbert & Brida (2009) emphasize that the increase in income in the country of origin creates a boom in tourism demand in a small island country with a tourism-based economy. On the other hand, in order to meet this increase in tourism demand, there is an increase in the rate of capital accumulation and the price of tourism services. The increasing price of tourism services makes investments into tourism production more attractive, speeding thus up its growth rate. Hence, as time passes, the island economy experiences a phase of increasing growth. Eventually, it reaches its new balanced growth path, where prices remain constant and the economy's growth rate is proportional to the growth rate in foreign.

2. Stylized Facts of Muğla, The Intersect of Mediterranean - Aegean Zone

Before moving on to the methodology and empirical results, it is useful to briefly mention the characteristics of the districts so that the reader can have an insight about districts. At first glance, it seems that Bodrum, Fethiye and Marmaris are more touristic districts than other districts, considering the capacity of their accommodation facilities and the number of foreign visitors they receive annually. It is seen that the districts with the highest agricultural density (rural area) are Milas, Ortaca and Yatağan. It is possible to have an insight of the districts from the selected metrics in the table below.

Table 3.1: Geographical, Economic and Sociological Overview of the Districts of Muğla (2021)

	Acreage (km^2)	Coastal Length (km)	Forest Density	UNESCO Heritages	Population Density (person/km^2)	Intellectuality Rate Per Capita[5]	Farmland Density	Accommodation Bed Capacity	No. of International Arrivals	Number of Business Per Capita
Bodrum	681,013	174	0,2108	1	275,008	1,553101173	0,18309	74.057	1.816.573	0,05047
Dalaman	606,099	90,06	0,28329	0	73,2323	1,405803632	0,19798	666	46.382	0,01807
Datça	416,817	235	0,21189	0	58,8244	1,611362617	0,06647	8.959	205.559	0,03185
Fethiye	1.135,21	167	0,49313	2	150,086	1,379195793	0,10541	28.248	2.020.036	0,03547
Kavaklıdere	365,446	0	0,62688	0	29,6679	0,788230954	0,08364	-	-	0,02121
Köyceğiz	1.372,49	4,5	0,41205	1	27,9965	1,179882889	0,07483	1.984	5.8245	0,01564
Marmaris	918,695	451	0,33298	0	104,332	1,585379086	0,01874	51.901	1.390.118	0,04468
Menteşe	1.586,18	17,09	0,29292	0	74,672	1,705824743	0,14666	1.969	113.632	0,02957
Milas	2.071,55	197,4	0,23804	2	70,1288	1,119951816	0,32561	5.053	88.111	0,02344
Ortaca	295,281	32	0,18989	1	179,25	1,351697557	0,23259	6.521	218.222	0,0256
Seydikemer	1.861,25	10		2	33,0031	0,681736044	0,17058	129	13.126	0,00427
Ula	481,485	33	0,35613	0	54,6351	1,316429712	0,11683	2.485	24.712	0,02102
Yatağan	768,615	0	0,25058	1	58,647	1,084388934	0,27401	59	5.235	0,02389

Source: Dalaman District Governorship, 2023; Datca Municipality, 2021; Fethiye Chamber of Commerce and Industry, 2007; Köyceğiz Provincial Directorate of Environment, Urbanization and Climate Change, 2024; Marmaris District Governorship, 2022; Menteşe District Governorship, 2022; Milas District Governorship, 2024; Muğla Provincial Directorate of Culture and Tourism, 2022; Ula District Governorship, 2024; Global Forest Watch, 2021; UNESCO World Heritage Convention, 2023; TURKSTAT, 2021; Republic of Türkiye Ministry of Culture and Tourism, 2021; Muğla Social Security Institution Directorate, 2021.

[5] $Intellectuality\ rate\ per\ capita = \frac{\sum_{i=1}^{n} y_i.k_i}{Total\ population\ of\ district}$ where T represents the total years of schooling in the society, n is the number of people receiving post-compulsory education, y_i is the duration of education of the i-th person (in years), k_i represents the education received by the i-th person (indicates the person, usually represented by 1, or considered as 1 if this person is receiving education, 0 if not).

It is seen that Fethiye and Seydikemer are the largest districts in terms of surface area; Ortaca and Kavaklıdere are the smallest. It is seen that the population density of Bodrum and Ortaca is higher than other districts. Although a significant part of the economic activities in Muğla take place in Fethiye and Marmaris districts, Bodrum is the economic locomotive of Muğla. Bodrum is ahead of Marmaris and Fethiye in terms of accommodation capacity and the number of businesses per capita. All districts except Kavaklıdere and Yatağan have coasts to the sea. Fethiye has a large forest density along with its surface area. Kavaklıdere, which has no coast to the sea and whose most important sources of income are marble and forestry productions, ranks 1st in terms of forest density. Çakar et al. (2011) investigate the position of Muğla in Turkey in terms of olive production in their study. It is seen that Muğla is the 5th city that produces the most olives with 96.935 tons. Milas district of Muğla is the 4th district in Turkey where the most olives are produced. In fact, Milas is the district with the most agricultural land in Muğla.

3. Methodology

In most studies analyzing tourism demand factors, economic variables are emphasized while social, environmental, cultural and infrastructural variables are neglected. The main reasons for this may be the difficulties in accessing data that will proxy non-economic variables and/or the problems encountered in normalizing the obtained data. In this study, these difficulties are overcome with the data obtained from local government institutions; in the light of studies conducted with international data, the aim is to provide policy makers with intuitions on resource allocation.

First of all, the mathematical form of the tourism demand function, which we define in accordance with theory, is illustrated in equation (1):

$$Q_D = f(ECO, ENV, HIS, INF, SOC) \tag{1}$$

Q_D represents tourism demand for the destination, ECO represents economic, ENV represents environmental and sustainability-related, HIS represents cultural and historical, INF represents infrastructural, and SOC represents sociological variables.

The first practice of the study is to create a wide set of independent variables that can be related to tourism demand, to create a compatible model by using the algorithm of selecting optimal estimators of the package program (Stata 18). Among all the simple pooled OLS regression combinations that can be created with the independent variables in the dataset, it is to determine the set of independent variables that is most compatible with the dependent variable according to the BIC, AIC, AICC, C information criteria.

After determining the optimal estimators, it is aimed to create a model with reliable coefficients and high significance. There are many theoretical and practical studies on the roadmap to be followed in panel data econometric approaches (e.g. Park, 2011; Baltagi, 2021; Wooldridge, 2010). However, Yerdelen-Tatoglu (2024) practical guidance is used in the econometric process of modeling demand. After estimating the simple OLS model roughly, it is determined whether there are unobserved characteristics. If unit or time effects are found, it is tested whether they are correlated with the independent variables and the appropriate model is decided. For the consistency and effectiveness of the estimator, deviations from the assumption are tested and deviations (if any) are corrected and the estimation is made.

In order to detect the existence of unobserved heterogeneity (and its cause if any), pooled OLS is first estimated. If individual effect ρ_i (cross-sectional) or time specific effect does not exist (ρ_i=0 and τ_i=0), ordinary least squares (OLS) produces efficient and consistent parameter estimates:

$$Y_{it} = \alpha + X'_{it}\beta + \varepsilon_{it} \; (\rho_i = 0 \, \cap \, \tau_i = 0) \tag{2}$$

In cases where time and group variables affect the dependent variable systematically or not, the pooled OLS model estimators lose their effectiveness. In order to analyze time and unit effects separately, two different least square dummy variable (LSDV) regression (OLS with a set of dummy variables) models are estimated. Then, a time-specific dummy variable is added to the linear OLS:

$$Y_{it} = \tau_i + X'_{it}\beta + \varepsilon_{it} \tag{3}$$

where I denotes origin district and t is time. τ is time specific dummy, X' is matrix of the independent variables, β is the vector of coefficients, ε is identically dependent error term.

In the third regression, the individual specific variable is added to the model to detect the unit specific effect:

$$Y_{it} = \rho_i + X'_{it}\beta + \varepsilon_{it} \quad (4)$$

In this functional form, there is a term ρ unlike the previous one, which proxy the individual effect.

The correct model is constructed by analyzing whether the time and unit effects are systematic. Then, a classical linear regression is created by adding systematic time and unit specific effects. Tests which diagnose if there are multicollinearity, heteroskedasticity, autocorrelation, cross-section dependence are applied to diagnose whether the regression assumptions that ensure the impartiality and effectiveness of the regression estimators are violated. The model is modified according to the test results. In the last stage of the empirical applications, the significant independent variables are added to the regression in order according to the magnitude of their coefficients with the forward-stepwise method and the results are discussed. In the last stage, it is aimed to provide a different perspective on resource transfer to policy makers.

4. Data Description

The study utilizes panel data, which is a combination of cross and vertical sections. While the units in the cross section are the districts of Muğla; the vertical section consists of the years 2014-2021. The motivation of most tourists visiting Muğla, which is an important attraction center of the Aegean geography and a very important part of its economy is undoubtedly coastal tourism. However, while the number of blue flag beaches representing the quality of sea water is included in the dataset used, there is no data on the number of sunny days and the structure of the sand. Because the number of sunny days is almost the same in all districts. There is no data on the structure of the beach sand.

In the literature, the dependent variables that proxy tourism demand are numbers of tourist arrivals, overnight stays or travel exports/imports, while the economic independent variables are origin country income, relative prices of home country competing to destination and transport costs to arrive (see Dwyer et al., 2020; Yerdelen-Tatoglu & Gül, 2020; Song et al., 2009). Inspiration is taken from the 'Travel & Tourism Competitiveness Report' created by the World Economic Forum (2013) and the 'Environmental Performance Index' studies created by Yale University (2022) regarding the environmental data to be used in the empirical part of the study.

The number of foreign tourists visiting the districts is employed as the dependent variable. The number of observations is 96. In addition, Kavaklıdere district is excluded from the sample in econometric applications because it does not have an accommodation sector and is not visited by foreign tourists. The dataset is also different from the others in the literature in several ways. First, the scope of the dataset. In a large part of the literature, the attempt to explain the demand function with economic variables are striking. In other words, it is seen that tourists visiting a Mediterranean destination ignore many environmental, historical, cultural and infrastructural factors other than economic parameters. There are very few variables to proxy historical and infrastructural assets. Second, there is no panel study in the literature on districts under the same bureaucratic auspices (provincial governance) but with different characteristics.

Table 5.1. Variable Set Construction

Variable Description	*Frequency*	*Source*	*Variable Construction*	*Acronym*
Foreign Arrivals	Annual data	Republic of Türkiye Ministry of Culture and Tourism, 2023	$AR_{i,t} = \ln(Plus\ number\ of\ foreign\ arrivals)$	lnAR
GPD per capita of Europe & Central Asia, adjusted for host price level	Annual data end-of-period values	OECD, 2024; TURKSTAT, 2024	$GDP_{i,t} = \ln(\text{GPD per capita of Europe \& Central Asia}/CPI\ of\ \text{Türkiye})$	lnGDP
Greece inbound arrivals	Annual data	OECD, 2024	$GRT_{i,t} = \ln(Total\ number\ of\ Greece\ international\ arrivals)$	lnGRT
Employment in Tourism	Annual data end-of-period values	Muğla Social Security Institution Provincial Directorate, 2022	$LB_{i,t} = \ln(Number\ of\ employees\ in\ accomadation\ industry)$	lnLB
Nightlife	Annual data end-of-period values	Muğla Social Security Institution Provincial Directorate, 2022	$NL_{i,t} = \ln(Number\ of\ alcohol\ licensed\ entertainment\ establishments)$	lnNL
Room capacity	Annual data (reported in June)	Republic of Türkiye Ministry of Culture and Tourism, 2023	$RC_{i,t} = \ln(Room\ capacity\ of\ accommodation\ establishments\ )$	lnRC
Number of Blue Flag Beaches*	Annual data	Republic of Türkiye Ministry of Culture and Tourism, 2023	$BF_{i,t} = \ln(1 + Total\ number\ of\ blue\ flagged\ beaches)$	lnBF
Intellectuality Level	Annual data	TURKSTAT, 2023	$HC_{i,t} = \ln(Total\ number\ of\ years\ of\ education\ after\ basic\ education\ according\ to\ graduation\ status\ /Population)$	lnHC
Terrestrial biome protection area (km2)	Annual data	Republic of Türkiye Ministry of Environment, Urbanization and Climate Change, 2023	$TBP_{i,t} = \ln[Total\ terrestrial\ biome\ protection\ are\ (km2)]$	lnTBP
Archeological site areas (km2)	Annual data	Muğla Metropolitan Municipality, 2023	$ASA_{i,t} = \ln[Total\ archeological\ site\ area\ (km2)]$	lnASA

Ruins & ancient cities	Annual data	Republic of Türkiye Ministry of Culture and Tourism, 2023	$AC_{i,t} = \ln(Total\ number\ of\ ruins\ and\ ancient\ cities)$	lnAC
Sewer line length (km)	Annual data	MUSKİ* Reports, 2022	$DRA_{i,t} = \ln(Total\ length\ of\ sewer\ lines\ (km))$	lnDRA
UNESCO heritage	Annual data	UNESCO Official Website, 2022	$UH_{i,t} = \ln(1 + Total\ number\ of\ places\ listed\ in\ UNESCO\ heritage)$	lnUH
Agricultural landscape (km2)	Annual data end-of-period values	Republic of Türkiye Ministry of Agriculture and Forestry, 2023	$AL_{i,t} = \ln[Total\ agricultural\ field\ (km2)]$	lnAL
Tree cover area (km2)	Annual data end-of-period values	www.globalforestwatch.org	$TC_{i,t} = \ln[Total\ tree\ covered\ area\ (km2)]$	lnTC
Purified water (m3)	Annual data end-of-period values	MUSKİ Reports, 2022	$PW_{i,t} = \ln[Total\ amount\ of\ water\ treated\ by\ government\ agencies(m3)])$	lnPW
Sheep and cattle livestock	Annual data end-of-period values	TURKSTAT, 2023	$GL_{i,t} = \ln(Total\ number\ of\ sheep\ and\ cattle\ livestock)$	lnGL
Maritime enterprises capacity	Annual data	Republic of Türkiye Ministry of Culture and Tourism, 2023	$MC_{i,t} = \ln(1 +\ Total\ number\ of\ maritime\ enterprises\ boat\ capacity)$	lnMC
Airport capacity & distance to airport	Annual data		$DTA_{i,t} = \ln[Number\ of\ parked\ aircraft\ capacity(ranked) \times Distance\ of\ districts\ to\ the\ nearest\ airport(ranked)]$	lnDTA
Gravel or asphalt road length	Annual data	Muğla Metropolitan Municipality, 2023	$PL_{i,t} = \ln[Total\ road\ length\ within\ the\ district\ borders(km)]$	lnPL
Licensed construction area	Annual data	TURKSTAT, 2023	$LC_{i,t} = \ln[Licensed\ construction\ area(km2)]$	lnLC
Power Plant Emissions (m3)	Annual data	www.enerjiatlasi.com	$PPE_{i,t} = \ln[1 + (Electricity\ produced\ by\ thermal\ power\ plants\ (kWh) * 0{,}3712(lbs\ CO2))]$	lnPPE

Notes: Authors’ calculations. Dataset is balanced, cross-section is composed of districts of Muğla (Bodrum, Dalaman, Datça, Fethiye, Kavaklıdere, Köyceğiz, Marmaris, Menteşe, Milas, Ortaca, Seydikemer, Ula, Yatağan). Time range spans 2014-2021, frequency is yearly and N (cross-section) is larger than t (time). *i* denotes host district and *t* periods.
*(1) Determined by ‘International Foundation of Environment and Education’.
*(2) MUSKİ is the abbreviation of Muğla Water and Sewerage Administration General Directorate.

5. Empirical Results

In the empirical process, firstly the determination of optimal variables is employed. Then, the existence of unobserved heterogeneity (if any, its source) is determined, and diagnostic tests are applied for possible violations of the assumptions required for the estimators to be BLUE. Then, after making the model selection, the coefficients of the variables are interpreted.

After all the data that can be associated with the dependent variable and are accessible are collected, the preliminary treatments detailed in the previous section are applied. Among this potential independent variable set, the ones most related to tourism demand are defined by using the optimal predictors algorithm of the packaged programs (Stata 18). It scans all possible combinations with the variables with the classical pooled OLS model; It offers the best models according to the information criteria. While determining the best set of predictors, AIC, BIC, CIC, Adjusted R2 and C selection criteria are used:

Table 6.1: Determining Optimal Predictors via Stata 18

Models	Independent Variables	Adj. R^2	C	Akaike Information Criterion	AICC	Bayesian Information Criterion
1	lnRC lnGL lnBF lnNL lnPW lnMC lnTC	0,952443	9,67496	86.64265	88,98031	**106,3699**
2	lnRC lnGDP lnGL lnBF lnPL lnGRT lnNL lnPW lnMC lnTC lnDTA	0,956867	6,465404	**81,62749**	**86,6138**	111,2184
3	lnRC lnGDP lnGL lnBF lnPL lnGRT lnNL lnPW lnUH lnMC lnTBP lnTC lnDTA	**0,957439**	7,715864	82,11391	88,87447	116,6366

*lnAR responses to lnRC lnLB lnHC lnBF lnTBP lnASA lnAC lnUH lnPPE lnAL lnGL lnPW lnTC lnLC lnMC lnDRA lnDTA lnPL lnNL lnGRT lnGDP.

It is seen that R-squared, AIC and BIC, which are used as model selection information criteria, are used in panel data model selection analyses and give reliable results (e.g. Hsiao and Sun, 2000; Hsiao, 2014). Looking at the information criteria scores, it is seen that all of the models are close to each other in terms of significance according to the information criteria. However, the second ranked model was chosen because it appears to be the most significant model with more information criteria than the others.

We see that the optimal estimators are room capacity of accommodation sector, GDP of Central Europe, number of small and large cattle, asphalt and gravel road length (km), number of inbound tourists visiting Greece, number of restaurants/nightclubs serving alcoholic beverages and/or food (proxy for nightlife), amount of purified water (m3), marina capacity, tree cover area (km2) and airport score (see Table 6.2) respond to number of inbound arrivals.

The main question is the structure of the model. In the table below, firstly the existence of time and/or unit specific effects is investigated. If there is, it is examined whether it is one-way or two-way. The necessary tests for fixed and random effects are performed respectively.

Table 6.2: Panel Data Unobserved Heterogeneity Specification Results

Tests	Null Hypothesis	Model 1	Model 2

F-test for Time Effects (LSDV 1)	H_0: Time specific terms do not significantly affect the responses.	2,32**(0,042)	1,80(0,117)
F-test for Individual Effects (LSDV 2)	H_0: Individual specific terms do not significantly affect the responses.	1,06(0,40)	2,48**(0,013)
F-test for One-way Fixed Effects Model	H_0: Fixed factor term does not significantly affect the response.	2,17**(0,047)	2,22**(0,042)
F-test for Two-way Fixed Effects Model	H_0: Fixed factor term does not significantly affect the response.	1,65(10,52)	2,93***(0,003)
B-P Lagrangian multiplier test for random effects	H_0: Variance of the individual specific error is zero.	0,00(1,00)	1,22(0,135)
Hausman Test for fixed versus random	H_0: Difference in coefficients is not systematic.	9(0,109)	19,95(0,1895)
Robust Hausman Test for clustered fixed and random effects	H_0: Difference in coefficients is not systematic	7,48(0,68)	7,54(0,581)
Maximum-Likelihood LR Test for Fixed Effects	H_0: Fixed factor term does not significantly affect the response.	0,29(0,295)	0(1,00)

Note 1: The first model consists of the optimal variables determined by the package program. The second model is the model created after excluding the 'nightlife' variable, which was found to prevent the normal distribution of the error term.
2: The first value represents the test value, and the value in parentheses represents the probability and where *** p<0,01; ** p<0,05; * p<0,1.

The presence of unobserved heterogeneity is crucial for the consistency and significance of our model's estimators throughout the implementation phase of panel modeling. In this context, the tests appearing in the table were run in order.

In the first model, the results of the time and individual specific effect tests performed with LSDV indicate that there is no systematic or unsystematic individual specific effect in the model, but there is time specific effect. The fixed effect estimation results also confirm the same hypothesis. However, the fact that the value is at the border raises suspicions. Afterwards, the existence of random effect is tested by applying the Breusch-Pagan LM test. However, it is seen that the model is not a random effect. According to the results of the 'Hausman' and 'Robust Hausman' tests, it is decided that the fixed effect is more suitable among random and fixed effects. However, the maximum-likelihood test applied for the precision of the fixed effect concludes that there is no unobserved heterogeneity originating from time and individual variables. It is concluded that the variables are poolable.

Although there are more signs of individual-specific effects in the second model, the results of subsequent robust tests indicate that the variables are poolable.

When we applied diagnostic tests to this model with 10 independent variables, the reset test and normality tests showed results that would disrupt the BLUE estimator. Some tests showed that the variable affecting the normal distribution of the error terms was 'nightlife'. Therefore, this variable was excluded in the second model and all of the tests and tests were re-applied. Firstly, the collinearity between the estimators was tested by VIF. It is seen in Appendix A, Table A1 that the VIF number is well below 10. There is no perfect multicollinearity. The reset test results highlight the possibility of misspecification in the first model, while the second model shows that there is no omitted variable. White's and Breusch Pagan tests show that the error terms have constant variance in both models. However, Wooldridge and Bias-corrected Born and Breitung Q(p) serial correlation tests indicates the existence of an autocorrelation problem in the error terms. Error terms are corrected with Liang-Zeger (1986) clustered-standard errors method. There is no cross-sectional dependence in either model.

Liang-Zeger (1986) clustered standard errors are measurements that estimate the standard error of a regression parameter in settings where observations may be subdivided into smaller-sized groups ("clusters") and where the sampling and/or treatment assignment is correlated within each group. These errors account for intra-cluster dependencies, enabling more reliable inference even in the presence of these challenges. They allow for arbitrary correlation patterns within clusters while assuming independence across clusters. The key insight is that standard errors are adjusted to reflect variation within clusters, providing a more accurate estimate of uncertainty. They can be applied across various regression frameworks, such as simple pooled ordinary least squares, difference-in-differences. However, their accuracy depends on the number of clusters and the independence assumption across clusters.

We adjust the standard errors to account for within-time correlation, providing robust standard errors that are valid in the presence of autocorrelation within clusters. Districts are clustered. The resulting bias corrected estimator follows the form:

$$\hat{V}(\hat{\beta}) = (X'X)^{-1} \sum_{c=1}^{C} X'_c \widehat{\Omega_c} X_c (X'X)^{-1} \frac{C}{C-1} \frac{n-1}{n-k} \tag{5}$$

The term $\frac{C}{C-1}\frac{n-1}{n-k}$ is added to the classical 'sandwich' estimator. Finite-sample modifications are used, to reduce downwards bias due to finite C. Where X is the matrix of independent variables, C is the number of clusters, X_c is the matrix of independent variables for cluster c and $\widehat{\Omega_c}$ is the variance-covariance matrix of residuals for cluster c. The rationale behind clustering standard errors by IDs in panel data analysis is to account for potential correlations within clusters (typically individual units or groups). This approach is especially important when error terms are not independently and identically distributed (i.i.d.) across observations but may be correlated within clusters.

$$Y_{it} = \beta 0 + \beta 1 \ln \mathrm{RC}_{it} + \beta 2 \ln \mathrm{MC}_{it} + \beta 3 \ln \mathrm{BF}_{it} + \beta 4 \ln \mathrm{GL}_{it} + \beta 5 \ln \mathrm{PL}_{it} + \beta 6 \ln \mathrm{DTA}_{it} + \beta 7 \ln \mathrm{PW}_{it} + \beta 8 \ln \mathrm{TC}_{it} + \beta 9 \ln \mathrm{GRT}_{it} + \beta 10 \ln GDP_{it} \tag{6}$$

where $\beta 0 - \beta 10$ are parameters of the estimation. The acronyms of the variables are shown in Table 5.1.

Table 6.4: Liang-Zeger Clustered-Standard Errors Pooled OLS: Dependent Variable: ln(Foreign Arrivals)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
lnRC	0.827***	0.881***	0.735***	0.727***	0.662***	0.564***	0.487***	0.465***	0.462***	0.457***
	(0.0687)	(0.116)	(0.152)	(0.164)	(0.0791)	(0.0569)	(0.0656)	(0.0521)	(0.0575)	(0.0474)
lnMC		-0.0433	-0.0594	-0.0560	-0.0706	-0.0447	-0.0478	-0.132***	-0.137***	-0.129***
		(0.0794)	(0.0712)	(0.0738)	(0.0426)	(0.0296)	(0.0286)	(0.0173)	(0.0161)	(0.0152)
lnBF			0.294	0.286	0.412***	0.440***	0.384***	0.581***	0.607***	0.591***
			(0.166)	(0.162)	(0.105)	(0.0705)	(0.0917)	(0.0816)	(0.0872)	(0.0901)
lnGL				-0.0324	-0.566***	-0.795***	-0.588***	-0.453***	-0.459***	-0.492***
				(0.168)	(0.170)	(0.150)	(0.134)	(0.0859)	(0.0877)	(0.0762)
lnPL					1.265***	1.479***	1.054***	0.589***	0.616***	0.670***
					(0.278)	(0.236)	(0.235)	(0.189)	(0.189)	(0.174)
lnDTA						0.432***	0.205**	0.205***	0.215***	0.229***
						(0.0617)	(0.0920)	(0.0585)	(0.0646)	(0.0614)
lnPW							0.314**	0.355***	0.335***	0.334***
							(0.113)	(0.0905)	(0.0963)	(0.0938)
lnTC								0.473***	0.492***	0.465***
								(0.136)	(0.129)	(0.135)
lnGRT									0.184**	0.261***
									(0.0659)	(0.0829)
lnGDP										0.397
										(0.332)
Constant	5.526***	5.287***	6.019***	6.376**	4.219**	5.122***	1.923	0.322	-2.706	-6.389*
	(0.528)	(0.691)	(0.805)	(2.110)	(1.551)	(0.832)	(1.331)	(1.207)	(1.526)	(3.280)
Observations	96	96	96	96	96	96	87	87	87	87
R-squared	0.871	0.874	0.886	0.886	0.929	0.946	0.943	0.951	0.953	0.955
F-stat	145	66	81	78	138	468	152	478	538	3789
F-prob	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Number of clusters	12	12	12	12	12	12	12	12	12	12

Note: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

The variables are added to the model hierarchically according to the t-value. The last regression of the table (10) is interpreted. Since the values are natural logarithmic, the coefficients can be interpreted as elasticity. When the regression (10) is examined, it is seen that the highest t-value belongs to room capacity, showing that a 1% increase in this input increases the output by approximately 0,46%. In other words, the classical paradigm hypothesis "supply creates its own demand" (Say, 1803) show itself. The negative effect of the marina capacity is noticeable. Since the arrival number is obtained from the records of the accommodation companies, the negative relationship between the total capacity in the marinas and the number of arrivals to the hotels is normal. Since traditional coastal tourism activities are quite common in general, the elasticity of inbound arrivals 'blue flag beach' seems to be quite high. So much so that a 1% increase creates a 0,59% increase in the number of tourists. The negative relationship between the number of farm animals and the number of tourists is obvious. As expected, livestock and tourism are sectors with an inverse relationship in the districts of Muğla. On the other hand, the positive effect of the road lengths and airport scores of the districts on the number of inbound tourists is quite clear. The variables of the amount of treated water (m3) and the area covered with trees (km2), which were added as an environmental sustainability proxy, also appear to be significant and have high coefficients. On the other hand, one of the surprising results is the positive relationship between the number of visitors to Greece and the number of inbound arrivals in the districts of Muğla. In fact, the islands of Rhodes, Simi, Kos, Kalymnos, Patmos, Meis are quite close to Muğla (2-25 km). It would not be wrong to say that tourists see these islands as complementary products to Muğla. It can be interpreted that tourists visiting these islands also go to the districts of Muğla by ferry. However, surprisingly, the relationship between the change in the GDP level of Central Europe and the dependent variable is not significant. This may be because the small changes in the welfare of Europeans between 2014 and 2021 were not at a level that would affect their decision to go on holiday to Türkiye.

6. Conclusion

The results are as expected on the one hand, but surprising on the other. So much so that it is quite clear how determinative the variables that can be associated with environmental sustainability are. Base specifications prove the importance of sea, forest and sustainability elements in the decision-making mechanism of tourists. The amount of treated water (m3) variable used as an environmental sustainability proxy also has a positive effect on tourism demand. On the other hand, it is clear that tourism and animal husbandry sectors are negatively related sectors. Both sad and surprising aspect of the research is that none of the variables that are proxies of Muğla's cultural heritage were among the optimal predictors. However, many of its historical locations are included in UNESCO's temporary or permanent heritage lists. There are dozens of ancient cities and ruins. There are historical castles in many of the districts that are coastal to the sea. In line with new findings, many areas are included in archaeological sites. However, it is surprising that none of the historical-cultural variables are among the optimal variables of tourism demand. It can be concluded that the marketing of Muğla's cultural assets is not/cannot be done correctly. It is an element that policy makers should think about. On the other hand, it is obvious how effective the infrastructural variables are on tourism demand. As such, asphalt and gravel road inventory and airport score are among the most important variables. As transportation becomes easier, tourism output increases. Greece's tourism destinations and Muğla districts also seem to be complementary goods. The results show that visitors to the Greek islands also travel to Muğla for tourism. This indicates bilateral commercial gains can be increased with international cooperation.

REFERENCE

Agiomirgianakis, G., Bertsatos, G. and Tsounis, N. (2018). Asymmetric responses in the tourism demand function, The Journal of Economic Asymmetries, Elsevier, vol. 18(C).

Aslan, A., Kaplan, M. and Kula, F. (2008). International Tourism Demand for Turkey: A Dynamic Panel Data Approach, MPRA Paper 10601, University Library of Munich, Germany.

Baltagi, B., H. (2021). Econometric Analysis of Panel Data, Springer Texts in Business and Economics, Springer, edition 6, number 978-3-030-53953-5, April.

Carvache-Franco, M., Carvache-Franco, O. D., Carvache-Franco, W., Villagomez-Buele, C. & Penafiel, M. A. (2018). The Tourist Demand From The Perspective Of The Motivation, Assessment And Satisfaction In A Sun And Beach Destination: The Manta Case, Ecuador. GeoJournal of Tourism and Geosites. 22(2), 561–572. https://doi.org/10.30892/gtg.22224-311

Cevik, S. (2022). Dirty Dance: Tourism and Environment. IMF Working Paper No. 2022/178, Available at SSRN: https://ssrn.com/abstract=4224066 Access date: 17.05.2023.

Croes, R. and Vanegas, M. (2005). An econometric study of tourist arrivals in Aruba and its Implications. Tourism Management, 26(6), 879-890.

Çakar, Ö., Durmuş, E., & Arslan, H. (2011). Muğla Zeytin Üretiminde Milas Ilçesi'nin Yeri. Fırat Üniversitesi Sosyal Bilimler Dergisi, 21(1).

Dalaman District Governorship. (2023). District Directorate of Agriculture and Forestry report. Access date: 19.12.2023. http://www.dalaman.gov.tr/ilce-gida-tarim-ve-hayvancilik-mudurlugu#:~:text=%C4%B0l%C3%A7e%20merkezi%20y%C3%BCkseltisi%2014%20metredir,%2C06%20km.'dir.

Datca Municipality. (2021). About the District. https://www.mugla.bel.tr/sayfa/datca-hakkinda. Access date: 17.05.2021.

Dwyer, L., Forsyth, P., & Dwyer, W. (2020). Tourism Economics and Policy. Channel View Publications, 2nd Edition.

Eicker, F. (1967) Limit Theorems for Regressions with Unequal and Dependent Errors. Proceedings of Fifth Berkeley Symposium on Mathematical Statistics and Probability, Vol. 1, No. 1, 59-82.

Fethiye Chamber of Commerce and Industry. (2007). Annual Economic Report 2007. https://www.ftso.org.tr/assets/upload/dosyalar/2007.pdf Access date: 24.01.2024.

Garin-Munoz, T. (2006). Inbound International Tourism to Canary Islands: A Dynamic Panel Data Model. Tourism Management, 27 (2), 281 – 291.

Garin-Munoz, T. (2007). German Demand for Tourism in Spain. Tourism Management 28 (1), 12-22.

Garin-Munoz, T. & Montero-Martin L. F. (2007) Tourism in the Balearic Islands: A dynamic model for international demand using panel data. Tourism Management 28 (5), 1224-1235.

Global Forest Watch. (2021). Annual Dashboards 2021. https://www.globalforestwatch.org/dashboards/country/TUR/?map=eyJjYW5Cb3VuZCI6dHJ1ZX0%3D Access date: 01.12.2022.

Gonzalez, P. and Moral, P. (1995). An analysis of the international tourism demand in Spain, International Journal of Forecasting, Elsevier, vol. 11 (2), 233-251.

Hsiao, C. (2014), Analysis of Panel Data, 3rd edition. Cambridge, University Press.

Hsiao, C., and B. Sun (2000) To Pool or Not to Pool Panel Data, in J. Krishnakumar and E. Ronchetti, eds., Panel Data Econometrics: Future Directions. Amsterdam: North Holland Publishing Company, pp. 181–198.

Huber, P.J. (1967) The Behavior of Maximum Likelihood Estimates under Nonstandard Conditions. 5th Berkeley Symposium on Mathematical Statistics and Probability, University of California Press, Berkeley, Vol. 1, 221-223.

Köyceğiz Provincial Directorate of Environment, Urbanization and Climate Change. (2024). About Köyceğiz. https://mugla.csb.gov.tr/koycegiz-dalyan-i-5223#:~:text=K%C3%B6yce%C4%9Fiz%20G%C3%B6l%C3%BC%20ile%20deniz%20aras%C4%B1ndaki,uzunlu%C4%9Funda%20bir%20k%C4%B1y%C4%B1%20okundan%20olu%C5%9Fmaktad%C4%B1r Access date: 17.09.2024.

Liang, K. and Zeger, S. (1986) Longitudinal Data Analysis Using Generalized Linear Models. Biometrika, 73, 13-22.

Liu, A. and Wu D., C. (2019) Tourism productivity and economic growth. Annals of Tourism Research, vol. 76, issue C, 253-265.

Marmaris District Governorship. (2022). History of Marmaris. https://www.marmaris.gov.tr/kaymakamligimizin-tarihcesi#:~:text=Daha%20sonra%20MARMAR%C4%B0S%20ad%C4%B1n%C4%B1%20alm%C4%B1%C5%9Ft%C4%B1r,72%20km%20k%C4%B1y%C4%B1%20uzunlu%C4%9Fu%20vard%C4%B1r. Access date: 10.07.2022.

Menteşe District Governorship. (2022). About Menteşe. http://mentese.gov.tr/ilcemiz-hakkinda. Access date: 03.10.2022.

Milas District Governorship. (2024). History of Milas. http://www.milas.gov.tr/milasin-tarihcesi. Access date: 03.04.2024.

Ministry of Culture and Tourism of Türkiye. (2021). Capacities of accommodation establishments 2014-2021. Obtained via personal communication.

Muğla Provincial Directorate of Culture and Tourism. (2022). Geography of Ortaca. https://mugla.ktb.gov.tr/TR-270793/cografya-konum-iklim-ulasim.html Access date: 03.04.2022.

Muğla Social Security Institution Directorate. (2021). Number of registered workers and businesses in districts 2014-2021. Obtained via personal communication.

MUSKİ. (2015-2021). Yıllık Faaliyet Raporları. https://www.muski.gov.tr/faaliyet-raporu Access date: 01.05.2023.

Park, H.M. (2011) Practical Guides to Panel Data Modeling: A Step-by-Step Analysis Using Stata. Tutorial Working Paper. International University of Japan, Minami Uonuma.

Pindyck, R.S. and Rubinfeld, D.L. (2014) Microeconomics. 8th Edition, Pearson Education, New Jersey.

Say, J.-B. (1803). Traité d'économie politique: ou, Simple exposition de la manière dont se forment, se distribuent et se composent les richesses. Paris: Deterville.

Schubert, S. F. and Brida, J. G. (2009). A Dynamic Model of Economic Growth in a Small Tourism Driven Economy, MPRA Paper 16737, University Library of Munich, Germany.

Song, H., and Witt, S.F., and Li, G. (2008). The Advanced Econometrics of Tourism Demand (1st ed.). Routledge.

UNESCO World Heritage Convention. (2023). World Heritage List, https://whc.unesco.org/en/statesparties/tr Access date: 01.03.2023.

TURKSTAT. (2021). Population statistics by districts. https://data.tuik.gov.tr/Kategori/GetKategori?p=nufus-ve-demografi-109&dil=1 Access date: 12.02.2023.

TURKSTAT. (2021). Education statistics by districts. https://data.tuik.gov.tr/Kategori/GetKategori?p=egitim-kultur-spor-ve-turizm-105&dil=1 Access date: 08.11.2023.

TURKSTAT. (2021). Geographic Statistics Portal. https://cip.tuik.gov.tr/ Access date: 08.11.2023.

Unur, K., İskenderoğlu, Ö., and Şeker, F. (2019). The Analyze of The Factors Affecting Tourism Demand: A Research on The Mediterranean Basin Countries. Social Mentality and Researcher Thinkers Journal 5(20):1054-1063 DOI:10.31576/smryj.311.

White, H. (1980). A Heteroscedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroscedasticity. Econometrica, 48, 817-838.

Witt, S.F. and Witt, C.A. (1995). Forecasting Tourism Demand: A Review of Empirical Research. International Journal of Forecasting, 11, 447-475.

Wolf, M. J., Emerson, J. W., Esty, D. C., de Sherbinin, A., & Wendling, Z. A., et al. (2022). Environmental Performance Index. New Haven, CT: Yale Center for Environmental Law & Policy. https://epi.yale.edu/

Wooldridge, J.M. (2010). Econometric Analysis of Cross Section and Panel Data. 2nd Edition, MIT Press, Cambridge.

World Economic Forum. (2013). The Travel and Tourism Competitiveness Report 2013, 6th issue. https://www3.weforum.org/docs/WEF_TT_Competitiveness_Report_2013.pdf

Yerdelen-Tatoğlu, F. and Gül, H. (2020) Analysis of tourism demand using a multi-dimensional panel gravity model. Tourism Review 75 (2), 433-447, 2020.

Appendix A

Table A1: Diagnostic Tests of First Model (including the variable 'Nightlife') and Second Model (Liang-Zeger Clustered-Standard Errors Pooled OLS without 'Nightlife' tenth regression, p. 17)

MULTICOLLINEARITY			
	Model 1 (mean VIF)	**Model 2 (mean VIF)**	
VIF Test (If bigger than 10, there is perfect collinearity: In Stata 18, variables with high correlation values are excluded from the model.)	6,13	5,43	
MODEL SEPCIFICATION TEST			
	Null Hypothesis	**Model 1**	**Model 2**
Ramsey Reset Test for $\widehat{y^2}$ (Prob>F)	No omitted variables	2,86** (0,044)	2,714 (0,11)
NORMALITY and SKEWNESS/KURTOSIS TESTs of Error Terms			
	Null Hypothesis	**Model 1**	**Model 2**
Jarque-Bera Normality	Normal distribution	11,28***(0,003)	1,01(0,606)
Tests for skewness and kurtosis in the one-way error-components model	Normal distribution	8,34***(0,015)	2,48 (0,289)
	No skewed	2,88***(0,004)	0,87 (0,386)
	No kurtosis	-0,17(0,862)	1,32 (0,188)

HETEROSKEDASTICITY TEST RESULTS			
	Null Hypothesis	**Model 1**	**Model 2**
White's Test chi2 (Prob>Chi2)	Homoskedasticity	84,26(0,267)	77,34(0,145)
Breusch–Pagan/Cook–Weisberg test for heteroskedasticity (Prob>Chi2)	Homoskedasticity	0,26(0,61)	0,17(0,678)
AUTOCORRELATION TEST RESULTS			
	Null Hypothesis	**Model 1**	**Model 2**
Wooldridge Test	No autocorrelation	202***(0,00)	5,77**(0,047)
Bias-corrected Born and Breitung (2016) Q(p)-test	No autocorrelation	7,4***(0,007)	6,98***(0,008)
CROSS SECTIONAL DEPENDENCE TEST RESULTS			
	Null Hypothesis		
Friedman's Test of cross-sectional Dependence (Pr)	There is no cross-sectional dependence	3,00(0,9907)	5,33(0,912)