Determinants of Market Structure and Demand: A Panel Data Study on Turkish Airports

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ABSTRACT

The aim of this research is to reveal the factors that determine the number of airlines at the airport and the demand for the market. In addition, another objective of the research is to reveal the market structure and the changes in the market structure using concentration measurement tools is another research purpose. The twenty-eight airports in Turkey were examined by panel data analysis between the years 2007-2018. Regarding the market structure in general, decreases have been observed in the concentration values over time. In other words, airports have become more competitive over time. The panel data results show that the number of airlines at airports is strongly influenced by the number of passengers in the relevant market, the city's GDP, the number of university students, the number of visitors, and the hub airport. On the other hand, it is evident that the number of airline carriers operating in the relevant market, the city's GDP, its population, the number of university students, the presence of a hub airport, and the number of tourists have a substantial impact on the demand at airports. Results obtained in this research will contribute to the literature by providing new models of market structure and demand. It is thought that the research will guide airline companies and airport managers in terms of predicting demand.

Key Words: *Airports, Panel Data, Air Travel Demand, Market Structure, Competition.*

JEL Classification: *L11, L93, R41.*

Piyasa Yapısı ve Talebin Belirleyicileri: Türkiye Havalimanları Üzerine Bir Panel Veri Analizi

ÖZ

Bu araştırmanın amacı, havalimanındaki havayolu şirketi sayısını ve pazara olan talebi belirleyen faktörleri ortaya koymaktır. Ayrıca yoğunlaşma ölçüm araçları ile pazar yapısını ve pazar yapısındaki değişimi ortaya çıkarmak da bir diğer araştırma amacıdır. Türkiye'deki yirmi sekiz havalimanı, 2007-2018 yılları arasında panel veri analizi ile incelenmiştir. Genel olarak piyasa yapısına bakıldığında, yoğunlaşma değerlerinde zaman içinde düşüşler gözlenmiştir. Diğer bir deyişle, havalimanları zamanla daha rekabetçi hale gelmiştir. Panel veri sonuçları ilgili pazardaki yolcu sayısının, şehrin GSYH'sinin, üniversite öğrencisi sayısının, turist sayısının ve Hub Havalimanı'nın, havalimanlarındaki havayolu sayısını anlamlı bir biçimde etkilediğini göstermektedir. Diğer taraftan ilgili pazardaki havayolu işletmesi sayısının, şehrin GSYH'sinin, havalimanının bulunduğu şehirde yaşayan nüfusun, üniversite öğrencisi sayısının, Hub Havalimanı'nın varlığının ve turist sayısının havalimanlarındaki talep üzerinde anlamlı etkiye sahip olduğu görülmektedir. Bu araştırmadan elde edilen sonuçların, pazarın yapısı ve talebe ilişkin sunduğu yeni modeller ile yazına katkı sağlayacağı düşünülmektedir. Araştırmanın talebi tahmin etme konusunda havayolu şirketlerine ve havalimanı yöneticilerine yol göstereceği düşünülmektedir.

Anahtar Kelimeler: *Havaalanları, Panel Veri, Havayolu Talebi, Pazar Yapısı, Rekabet.*

JEL Sınıflandırması: *L11, L93, R41.*

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INTRODUCTION

The importance of airports in air transport can be explained in more than one dimension. First, the airport is a meeting point in the airline-airport contact. Every flight begins and ends at an airport. In addition, the airline's representative offices, ticket sales offices and station offices of the airlines are located at the airports to represent the airline (Doganis, 2005, pp. 6-9). Airports also appear as places where competition between airlines takes place. In this context, airports can be treated in different dimensions, both as a competitive marketplace where the competition takes place and as an opportunity to provide technical facilities (Graham, 2008, p.2).

The volumetric increases seen in air transport have resulted from some revisions made by the countries in economic regulations (Hanlon, 2007, p.113). Firstly, the revision of the air transport regulations in the United States of America (USA) and then in Europe and the reorganization of some rules that prevent competition have played a key role in the growth and development of the airline industry (Doganis, 2002, p. 65; Doganis, 2006, p. 32). These regulations, which are called deregulation in the US and liberalization in Europe, have been implemented to make the market more competitive and to establish new airlines, to open new routes and to increase the number of passengers carried out (Orhan and Gerede, 2013, p. 36).

The two most important developments in Turkish civil aviation have come to the fore because the airports have affected the level of competition and, therefore the market structures. These are the liberalizations of 1983 and 2003 (Gerede and Orhan, 2015, p. 167). Undoubtedly, the most important result of liberalization is the removal of barriers to market access and entry, and paving of the way for airlines to move freely in the desired market. Evaluated in this context, the first liberalization movement paved the way for the establishment of airlines and increased the number of airlines (Gerede, 2010, p. 88). This development, which at first sight appears to be positive for the industry,, has also laid the foundations for the emergence of some problems. Airlines that entered the market soon withdrew after going bankrupt (Gerede, 2010, p. 86). Considering the prestige of air transport for the countries, it is a negative situation for the industry to cease operations shortly after the establishment of airlines. This fluctuating process continued for a long time and the airlines other than Turkish Airlines went bankrupt or operated as charter airlines. In this context, it can be said that a general evaluation of the first liberalization movement did not achieve the desired results. It can seen that the technical details of the economic regulations as well as the fault of the airlines play a role in the formation of such a situation. Although it is seen that some arrangements have been made in the name of liberalization, it is seen that the regulations of that time contain some elements that restrict the activities of airlines (Gerede and Orhan, 2015, p. 171).

1983 is a turning point for the Turkish air transportat industry but there is another important development that shapes the current structure of the industry. The liberal policies that came to the fore in the early 2000s, were met with the

regulations of 2003. In this context, in September 2003, the General Directorate of Civil Aviation, which had previously restricted the entry of private airlines into the market, was abolished and the barriers to the entry of these airlines into the domestic market were completely removed, and this development significantly changed the market structure (Gerede, 2011, p. 536).

It can be said that there were two important events that influenced the change of the market structure in Turkey. In 1983, the first of these events, the way was opened for the establishment of private airlines and new players entered the market. For this reason, it can be said that in the general framework, the market structure has escaped from the previous monopoly. However, as a result of subsequent developments, it can also be observed that the market is returning to monopolistic characteristics, although it is not complete monopoly. The other development is the domestic liberalization of 2003, which has contributed to the evolution of the market structure to its current form. The results of the 2003 domestic liberalization changed the previous situation of the market structure and ensured a country-wide leap in numerical values such as the number of passengers, the number of flights and the number of cargo carried.

There are many studies on market structure and demand in different contexts. However, in these studies on air transport, the factors that determine the market structure have not been emphasized very much. Undoubtedly, it is important to find out whether the relevant market is in a monopoly-duopoly-oligopoly or fully competitive structure, but the existence of factors that pave the way for the formation of such situations is also important. In line with this information, in this study, unlike previous studies, has emphasized the factors that determine the market structure and has developed a model to identify these factors. In addition, unlike previous studies, the factors influencing demand were examined by taking into account the factors affecting the competitive structure of the market.. In this context, the aim of this research is to reveal the factors that are thought to influence the market structure and demand of the civil air transport market. In this context, 28 airports in Turkey between 2007 and 2018 have been analyzed and the market structure and the factors that were thought to have an impact on demand have been evaluated.

I.COMPETITION AND MARKET STRUCTURE

Market structures are a tool to classify the degree of dominance of the market supplier. In this classification, market structures are assessed in four different sections, which are between monopoly and perfect competition market (Celebi and Fuller, 2012, p. 1176). If firms that are between monopoly and perfect competition market show characteristics close to monopoly, the market is likely to be monopoly. On the other hand, if there is dominance of a few firms with a decisive power in the market, it is considered to be an oligopoly (Gwartney et. All, 2008, p. 244). In today's conditions, markets are considered to be somewhere between these two extremes (monopoly-perfect competition), with exceptions. In particular, air transport is said to have oligopolistic market characteristics (Hanlon, 2007, p. 67). Knowledge of market structures provides important clues about the

degree of competition. For example, there is no competition in a monopoly market, but there is a high level of competition in perfectly competitive markets. Therefore, the structure of the market can be crucial for many variables such as price, market entry and exit decisions, supply and demand (Graham et al., 1983; Hurdle et al., 1989).

Another factor to consider in relation to market structures is the concept of market or market concentration. Concentration means that a small number of firms dominate the entire market (McConnell, 2018, p. 258). Therefore, there is an inverse relationship between concentration and competition. While highly concentrated markets represent the markets formed by a small number of firms with one or a high market share, medium or less concentrated markets indicate markets where competition is relatively high (Parkin, 2011, p. 238). Measuring concentration is important for understanding market structures. For this reason, researchers have developed a number of measurement tools. A review of the literature reveals many measurement tools, but some stand out because they are easy to calculate and often preferred (Pan, 2005, p. 847). One of the most frequently referenced ones is the N firm concentration ratio, expressed as CR_n, which gives the market share of the first firm in the relevant market (Parkin, 2011, p.238).

The market share of the first four or eight companies, referred to asCR4 and CR8, has been criticized because it does not take the whole market into account and only considers the market share of the first four or eight firms. Another measurement tool is the Herfindahl-Hirscman Index (HHI), which is obtained by taking the squares of the market shares of all firms in the relevant market (Hannan, 1997, p. 23; McConnell et al., 2018, p. 258). Unlike CR4-CR8, the HHI considers all firms and provides more reliable results on market structure (Shen and Li, 2010, p. 221). Due to these characteristics, the market structure is measured by HHI. Detailed information on the HHI is given in the following sections.

II. LITERATURE REVIEW

In the literature, it is possible to find many studies in different industries regarding the above-mentioned situations (market structure, demand, number of firms, etc.). Rhoades (1995), Hannan (1997), Kumar et al. (2011) and Akomea and Adusei (2013) in the banking sector, Tatlı (2018) in the white goods sector, Akan (2012) in the manufacturing industry, Borenstein et al. (1999), Pehlivanoğlu and Tekçe (2013) in energy industry, Blažková (2016) in food industry, Kaynak (2016) in clothing industry and Robinson (2011) in health industry, using concentration indices, they examined the relationship between market structure and variables such as price and profitability. Looking at the studies related to airline industry, one can also find studies investigating the market structure as well as studies on the relationship between market structure and price differentiation, entry and impact on competition (Abramowitz and Brown, 1993; Zhang and Round, 2009).Belobaba and Acker (1994) evaluated the structure of the origin-destination markets in the US to show the changes after deregulation. Lijesen et al. (2002) examined market concentration in city pairs and found that market concentration and airline mergers as well as airline network structures affected concentration. Lijesen (2004)

emphasised the level of concentration and competition in the civil aviation industry by regulating the HHI. Stavins (2001) examined the effect of market concentration on price differentiation and found that price cuts were lower in intensive markets. Giaume and Guillou (2004) conducted Stavins' study in the context of the European domestic market and focused on the relationship between price differentiation and concentration. Dai et al. (2014) focused on the relationship between price diversification and market concentration in the US air transport industry. Yang (2016) finds that the level of concentration and the entry of low-cost carriers have affected the demand. Yasar and Kiraci (2018) examined market structures in the world markets and analyzed the market structures of seven regions around the world with HHI, CRn, Entropy and CCI indices. Sarıbaş and Thompson (2015) in Turkey, Kiraci and his colleagues (2017) at the largest airports in Turkey, Yasar and Gerede (2018) have conducted research on city-pair markets in domestic and have concluded that the industry has not reached perfect competition market structure.

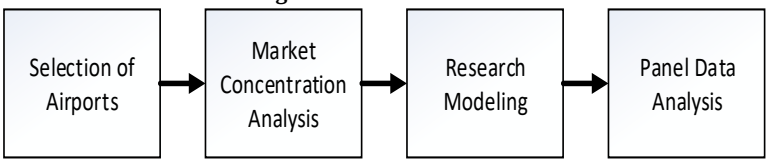
Among the studies on demand forecasting, Ippolito (1981) measured the success of service quality components in forecasting demand. It was found that components such as flight frequency and the number of seats, which are among the fare-related components, have a positive effect on the price. In addition, the price elasticity of demand is directly related to the flight distance. Jorge-Calderón (1997) focused on the factors affecting demand on international city-pair markets in Europe, and found that frequency is more effective than aircraft size on short-haul routes, but the opposite was observed for long routes. In addition, discounted tickets increase demand on short-haul routes. Abed et al. (2001) studied the demand for international air transport in Saudi Arabia. In the research, it has been revealed that total expenditures and population are the most appropriate variables explaining the demand. Bhadra (2002) examined the demand in the US city-pair markets and stated that as a result of the research, income, ticket price, and hub airports affect demand. Fare inelasticity also occurs when the flight distance is shorter. Sivrikaya and Tunç (2013) conducted a demand forecast in the Turkish domestic city-pair market. Their findings show that offering direct flights on the route significantly increases demand. In addition, variables such as population and number of beds also have a positive impact on demand. Wei and Hansen (2016) examined the factors that determine the passenger demand in a hub-and-spoke network and found that airlines can attract more passengers by increasing the frequency rather than using larger aircraft, and thereby increasing demand. Dantas et al. (2017) used a new forecasting method in demand forecasting. The researchers compared the old forecasting models with the method they used and stated that the new model they used produced findings that are more accurate. Aderamo (2017) examined the determinants of demand in the Nigerian context with a multiple regression model and revealed that agricultural production, manufactory production, GDP, Inflation and Consumer Price Index had a significant effect on demand. Wang et al. (2018) investigated the key determinants of demand and pricing in China and India. It has been revealed that having an LCC on the flight route increases demand by lowering

prices. The research also indicates that market concentration is positively related to demand.

III. METHODOLOGY

In this part of the research, information about the path followed in the research is given. This research was designed to determine market structures in airport markets and to identify factors determining market structure. In this context, the airports that are the subject of the research have been selected. The selection of airports is based on the suitability of the data set. Once the airports had been selected, the market structures of each airport between the years determined were revealed using the HHI, one of the concentration measurement tools. Then it was followed by modelling. Finally, the research was completed with panel data analysis. Figure 1 shows the research process.

Figure 1. Research Pattern



This research was designed based on two main findings. The first one is to reveal market competition at selected airports and the other is to determine the factors that are thought to be effective in determining the market structure and demand. In this context, 28 Turkish airports which data were obtained between the years 2007 and 2018 were included in sample data. In order to carry out the concentration analyses in the research, the required market shares were obtained from the Official Airline Guide database, the number of passengers from the DGCA, the population and GDP values from the Turkish Statistical Institute, the number of students from the Council of Higher Education and the number of tourists from the Ministry of Culture and Tourism. In the research, the various findings mentioned above were obtained through different methods. The first one is to reveal market competition. Market competition was calculated using Herfindahl-Hirschman Index (HHI), which is often used in this field. The HHI is obtained by summing the squares of the market shares of the companies in the market. The HHI is calculated as follows (Rhoades, 1993, p. 188; Parkin, 2011, 238; McConnell *et al*., 2018, p. 258).

$$HHI = \sum (S_i)^2 \quad (1)$$

S_i = market share of firms (airlines)

i =1……n

After the acquisition of HHI values, the endpoints of the relevant market are set in a place where there is a perfect competition market and a monopoly market. The index value is between 0 and 10000. If the HHI value of the relevant market is the highest value of 10000, there is only one firm in the market and this market is a monopoly. Although a value of 0 indicates perfect competition in theory, it is very difficult to find this value in real market conditions. It has been reported that an HHI between 0-2000 indicates low concentration, between 2000-

4000 moderate concentration, between 4000-10000 high concentration (Su, 2003, p. 12). Contrary to this classification, the US Department of Justice's horizontal merger updates use the ranges 0-1500, 1500-2500 and 2500-10000 (DOJ, 2010, p. 19). In some studies, the 0-1000, 1000-1800 and 1800-10000 range is used as the criterion (Pehlivanoğlu and Tekçe, 2013, p. 375).

Panel data analysis was used to identify the factors that are likely to be effective in determining market structure and demand. Panel data refers to data containing observations from several units over time. For this reason, the observations in the panel data have two dimensions. The first is the size of the section indicated by the subscript i, and the other is the time series dimension indicated by the subscript t (Hsiao, 2007, p.1). It is called panel data analysis to estimate the economic or financial relationships by means of the panel data models created by using the panel data, in other words, by the cross-sectional data with time dimension. Panel data analysis is a commonly used method for testing theories and revealing relationships in the social sciences (Finkel, 1995, p.1). The panel data equations can be presented as follows (Hsiao, 2007, p. 2):

$$Y_{it} = \alpha_{it} + \beta_{it}X_{it} + \varepsilon_{it}$$

Here, Y_{it} shows dependent variable, α_{it} shows constant, $\beta_{it}X_{it}$ shows independent variable and ε_{it} shows error terms.

A. Econometric Model

The models examined in the study are the number of firms and the demand for the market. Two models have been developed to determine the number of firms in a market and the factors affecting demand. The first model examines the factors that are likely to affect the number of firms in the competitive market. The second model examines the determinants of market demand.

There were 10 independent variables, which are thought to be determinants of the number of firms and demand, used in the research. In this context, the province-based GDP value of the relevant market, the population of the city, the number of university students in the city, the number of domestic, foreign, and total tourists, the distance of the market to the nearest hub airport, whether the airport is a hub and whether there is a high-speed train connection in the city are the independent variables. The information about the variables in the study, their abbreviations and data sources in the model are given in Table 1.

Table 1. Variable Definitions

Variable Type	Variable Name	Data Used	Data Source	Abv.
D	Number of Firms*	Number of Airlines in the Airport	DGCA	FIRM
D	Demand*	Total Number of Airport's Passenger	Eurostata Database	PAX
I	City GDP	GDP of the City	Turkish Statistical Institute	GDP
I	Population	Number of People Living in the City	Turkish Statistical Institute	POP
I	Student	Number of University Students	Council of Higher Education	STD
I	Foreign Tourist	Number of Foreign Tourists by City	Ministry of Culture and Tourism	FTR
I	Citizen Tourist	Number of Citizen Tourists by City		CTR
I	Total Tourist	Number of Total Tourists by City		TTR

I	Hub Distance	Distance between Airport and Nearest Hub	Own Calculation	DIST
DM	Airport Hub	Airport Network Structure	Own Calculation	HUB
DM	HSR Existence	High Speed Train Locations	Own Calculation	HSR
*Variables are also used for independent variable in the Model 1 and 2 respectively. D: Dependent; I: Independent; DM: Dummy Variable				

The econometric models developed within the scope of the study are as follows.

Model1: $FIRM_{it} = \beta_0 + \beta_1 PAX_{it} + \beta_2 GDP_{it} + \beta_3 POP_{it} + \beta_4 STD_{it} + \beta_5 FTR_{it} + \beta_6 CTR_{it} + \beta_7 TTR_{it} + \beta_8 DIST_{it} + \beta_9 HUB_{it} + \beta_{10} HSR_{it} + \varepsilon_{it}$ (2)

Model2: $PAX_{it} = \beta_0 + \beta_1 FIRM_{it} + \beta_2 GDP_{it} + \beta_3 POP_{it} + \beta_4 STD_{it} + \beta_5 FTR_{it} + \beta_6 CTR_{it} + \beta_7 TTR_{it} + \beta_8 DIST_{it} + \beta_9 HUB_{it} + \beta_{10} HSR_{it} + \varepsilon_{it}$ (3)

$FIRM_{it}$ = Number of airlines in airport i at year t

PAX_{it} = Number of passengers in airport *i* at year *t*

GDP_{it} = GDP value of the city where the airport i is located at year *t*

POP_{it} = Population of the city where the airport *i* is located at year *t*

STD_{it} = Number of students of the city where the airport *i* is located at year *t*

FTR_{it} = Number of foreign tourists of the city where the airport *i* is located at year *t*

CTR_{it} = Number of domestic tourists of the city where the airport *i* is located at year *t*

TTR_{it} = Number of total tourists of the city where the airport *i* is located at year *t*

HUB_{it} = Dummy variable: If the market is a hub the value is 1 otherwise 0.

HSR_{it} = Dummy variable: If the market has a HSR connection, the value is 1 otherwise 0.

$DIST_{it}$= Distance between relevant market and nearest hub airport

Models developed to determine the number of firms and the factors affecting the demand are shown in equations (2) and (3) above. Model 1 and Model 2 aim to reveal the factors that determine the number of firms (FIRM) and demand (PAX), respectively. The explanations of the variables are given below.

Market Structure: The number of firms has an important place in the market structure to be one of the monopoly, monopolistic or oligopoly or perfect competition markets because the number of firms involved in the market is of primary importance for the market to be included in one of these forms. Market structure variable is the dependent variable in the study and is represented by the number of airlines in the airport.

Demand: Demand is one of the dependent variables in the study. The number of passengers is expressed on an annual basis as the total number of passengers arriving at the airport or departing from the airport.

City GDP: GDP represents the total output of all final goods and services produced in a country over a given period of time (McConnell et al., 2018, p. 532). Therefore, GDP affects the income, consumption, and preferences of the residents in that country or region and indirectly affects the structure of the market. In the study, for each year, the GDP of the city where the airport is located is considered as another independent variable.

Population: Population is one of the key determinants of air transport demand. It is possible to find research showing that the population has a direct or indirect effect on airline passenger demand (Marin, 1995; Suryani et al., 2010). It is very likely that airline supply will be shifted to areas where the population is very high or dense. Population, which has an impact on supply, demand, and production amounts, is also expected to have an impact on the structure of the relevant market. For this reason, the independent variable of the study is the population, which indicates the number of inhabitants within the provincial boundaries of the relevant airport or region.

Student: Another variable used in the research is the number of students living in the city where the airport is located. This is thought to influence demand and the number of companies, especially considering the mobility created by the students living outside the city where they are studying.

Tourist Numbers: One of the most important catalysts of air transport is tourism (Duval, 2013). In line with this information, the number of tourists included in the research was examined under three different headings as domestic tourists, foreign tourists, and total tourists.

Hub Distance: It gives the distance of the airport to the nearest hub airport.

Airport Hub: This is a dummy variable. If the airport in the current market is an airport used as a center, it takes the value 1, otherwise 0.

HSR Existence: This is a dummy variable. If there is a high-speed train connection in the city where the airport is located, it takes the value 1, otherwise 0.

IV. FINDINGS AND COMMENTS

The findings of the study are given in two parts. The first one is the findings related to the market competition in the airports. This is followed by the models that are considered to be effective in determining the market structure and the findings related to the model obtained.

A. Airport Market Competition

In this section, the market competition results obtained by using HHI in the selected airports of the period 2007-2018 are included. The index value is between 0 and 10000 and the value of 10000 shows that there is only one firm in the market, and we can say there is no competition.

Table 2. HHI Results

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
IST	5090	5357	5649	5742	5653	5585	5784	5811	5825	5901	6000	6501
SAW	4887	2560	2966	3951	4522	5516	5231	5099	4922	4921	5169	4981
AYT	1359	1532	1221	1081	925	932	947	901	954	1154	1145	1070
ADB	3267	3439	2712	2436	2329	2535	2809	2730	2655	2924	2878	2872
ESB	6558	7404	7040	6775	6286	5788	6417	6318	6134	5945	5699	5746
DLM	1920	2431	1696	1451	1344	1116	1153	1098	1133	1479	1562	1614
BJV	3586	4201	2565	1949	1497	1684	1779	1773	1877	2190	2657	2513
ADA	5722	4763	3542	4308	3577	3418	3372	3347	3065	2922	3238	3211
DIY	6388	5516	4794	5960	4153	3980	4613	4779	5277	4370	4587	3847
EZS	10000	10000	6760	5769	4845	4743	3853	3827	4050	3948	4848	4982
ERZ	6270	5590	6038	9880	8251	6917	7553	6153	7125	6695	5962	5558
GZT	6380	6147	5502	4264	4271	3803	3600	3531	3677	3942	3873	3686
KYA	10000	10000	7884	4706	4919	4935	4811	4867	4916	4470	4162	4363
ASR	7691	7863	5327	4174	4011	4269	3595	3694	3663	3418	3518	3736
SZF	9608	7206	5150	5062	3967	3626	4107	4186	3861	3881	4407	3958
TZX	5579	5032	4161	5030	3714	3851	4153	4162	3869	3729	3575	4149
VAN	5704	5648	5126	6436	5089	5875	5423	6750	6054	5808	5407	4079
AJI	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	9155
KSY	8798	6551	6557	9757	10000	10000	7161	10000	9102	6157	5959	5092
MSR	10000	10000	10000	10000	10000	10000	6843	5936	5796	5594	5443	5244
BAL	10000	10000	10000	10000	10000	6582	7284	6976	6713	6177	5946	6234
DNZ	10000	10000	10000	10000	10000	9928	6547	5039	5140	5204	4704	4850
ERC	10000	10000	10000	10000	10000	8981	5917	5096	5217	5126	5307	6387
MLX	7588	7216	6561	5571	4357	3903	4306	4079	4108	4205	4389	4218
MQM	10000	10000	8112	6968	6263	7543	7520	5943	5584	5447	5436	5621
VAS	6690	5590	6740	6142	5593	5108	5034	5240	5187	5197	5151	5121
YEI	8214	7469	10000	6429	4681	5229	10000	6032	9387	9890	9563	9552
EDO	10000	10000	10000	7927	10000	10000	4869	6864	3305	3418	4263	4939

Market Structure	Competitive	Nearly Competitive	Moderate	Almost Monopoly	Monopoly
HHI Range	0-2000	2001-4000	4001-8200	8201-9999	10000
Biggest Market Share	%1-15	%16-35	% 36-89	%90-99	%100

Table 2 shows that concentration values decrease over time. This means that these airports are becoming more competitive over time. For some airports, the monopoly status has not changed in all the selected years, while for others, the monopoly status has changed over time and has become increasingly competitive. Looking at the evolution of concentration levels at airports, there are many different situations. For example, the concentration values at Istanbul Atatürk Airport have increased in recent years, while at the Sabiha Gökçen Airport there have been increases and decreases in some years. However, both airports have had a stable outlook in terms of concentration changes in recent years. In addition, it is possible to say that airports in holiday regions are more competitive than others. Antalya International Airport is the most competitive airport. Dalaman and Bodrum-Milas airports follow Antalya. The concentration level of Izmir Adnan Menderes Airport in terms of market structure has decreased over time. After the presentation of the market competition, the study continues with the analysis of the factors that are considered to be effective in the market structure.

B. Panel Data Analysis for Determinants of Airport Market Structure and Demand

In this part of the study, which is determined in the context of the factors that determine the market structure and demand, firstly descriptive statistics are given. Table 3 show the descriptive statistics of the variables used in the research.

Table 3. Descriptive Statistics

Variable	Obs	Mean	Std,	Min	Max
FIRM	336	11	16	1	81
GDP	336	8.929	4.024	2766,7	20882,71
POP	336	1700506	1928392	31318	9769000
PAX	336	4813362	1,05E+07	12992	6,80E+07
STD	336	80691,65	140139,6	1083	773740
FTR	336	219175,3	490163	0	2465276
CTR	336	376845,5	478701,1	30	3097497
TTR	336	596928,7	865714,7	1942	3642438
DIST	336	610	348	0	1156
HUB	336	0,107143	0,309756	0	1
HSR	336	0,107143	0,309756	0	1

The number of airlines operating at the airports in the selected years ranged from 1 to 81. The concentration values also range from 303 to 10000. The average is 5792. The number of passengers is between 12992 and 68.1 million and the population is between 31318 and 9.76 million.

The correlation matrix, cross-section dependence, and unit root test results for the variables utilized in the study are all given in the remaining parts of this section of the study. The results of the tests to choose the appropriate model, the preliminary test, and the resistant standard error test are also included in this part. Table 4 first provides details of the regarding correlation matrix.

Table 4. Correlation Matrix

	FIRM	GDP	POP	PAX	STD	FTR	CTR	TTR	HUB
FIRM	1,000	0,725	0,724	0,588	0,640	0,026	0,011	0,023	-0,520
GDP	0,725	1,000	0,735	0,544	0,738	0,020	0,022	0,029	-0,844
POP	0,724	0,735	1,000	0,619	0,858	0,061	0,008	0,043	-0,675
PAX	0,588	0,544	0,619	1,000	0,608	0,238	-0,067	0,100	-0,400
STD	0,640	0,738	0,858	0,608	1,000	0,092	-0,013	0,047	-0,632
FTR	0,026	0,020	0,061	0,238	0,092	1,000	0,139	0,718	-0,030
CTR	0,011	0,022	0,008	-0,067	-0,013	0,139	1,000	0,786	-0,020
TTR	0,023	0,029	0,043	0,100	0,047	0,718	0,786	1,000	-0,033
HUB	-0,520	-0,844	-0,675	-0,400	-0,632	-0,030	-0,020	-0,033	1,000

The correlation matrix between the independent variables is shown in Table 4. Multicollinearity is a problem when there is a high correlation (above 0.80) between the independent variables included in the regression model. The correlation coefficients between the variables are well below the critical value when the correlation matrix of the independent variables is analyzed. After the correlation matrix is given, the results of the analysis regarding the cross-section dependence will be given in Table 5.

Table 5. Cross-Sectional Dependence Test Results

	Breusch-Pagan LM		Pesaran scaled LM		Bias-corrected scaled LM		Pesaran CD	
Variables	**Stat**	**Prob**	**Stat**	**Prob**	**Stat**	**Prob**	**Stat**	**Prob**
FIRM	1606,892	0,0000	43,67602	0,0000	42,40329	0,0000	28,00143	0,0000
GDP	3357,178	0,0000	107,3333	0,0000	106,0606	0,0000	57,45878	0,0000
POP	3289,114	0,0000	104,8578	0,0000	103,5851	0,0000	37,0904	0,0000
PAX	3492,9	0,0000	112,2695	0,0000	110,9967	0,0000	58,40797	0,0000
STD	4091,889	0,0000	134,0545	0,0000	132,7818	0,0000	63,82772	0,0000
FTR	528,2857	0,0000	4,447489	0,0000	3,174762	0,0015	3,631231	0,0013
CTR	702,0269	0,0000	10,76639	0,0000	9,493667	0,0000	3,102347	0,0019
TTR	704,06	0,0000	10,84034	0,0000	9,567609	0,0000	4,496704	0,0000

Table 5 shows cross-sectional dependence test results of the variables. The hypotheses H_0"no cross-sectional dependency exists" is rejected for all variables. Therefore, stationarity levels must be determined by applying second generation unit root tests to the series. The results of the second generation unit root analysis will be presented after the information on the cross-section dependency is provided in Table 5.

Table 5. CADF Unit Root Test Results

			Critical Values		
Variables	**Model**	**Stat.**	**1%**	**5%**	**10%**
FIRM	Constant	-11,4	-2,85	-2,47	-2,28
	Constant and Trend	-1,94	-6,40	-4,89	-4,00
GDP	Constant	-3,183	-2,85	-2,47	-2,28
	Constant and Trend	-1,72	-6,40	-4,89	-4,00
POP	Constant	-21,03	-2,85	-2,47	-2,28
	Constant and Trend	-1,309	-6,40	-4,89	-4,00
PAX	Constant	-2,099	-2,85	-2,47	-2,28
	Constant and Trend	-2,252	-6,40	-4,89	-4,00
STD	Constant	-3,627	-2,85	-2,47	-2,28
	Constant and Trend	-1,133	-6,40	-4,89	-4,00
FTR	Constant	-1,571	-2,85	-2,47	-2,28
	Constant and Trend	-0,773	-6,40	-4,89	-4,00
CTR	Constant	-1,538	-2,85	-2,47	-2,28
	Constant and Trend	-0,758	-6,40	-4,89	-4,00
TTR	Constant	-2,025	-2,85	-2,47	-2,28
	Constant and Trend	-0,667	-6,40	-4,89	-4,00
DIST	Constant	-	-2,85	-2,47	-2,28
	Constant and Trend	-0,173	-6,40	-4,89	-4,00

Table 5 shows unit root test results of the variables. According to this, all variables except PAX, FTR, CTR, TTR and DIST are stationary at level. In this case, variables, other than PAX, FTR, CTR, TTR and DIST, can be used in the analysis with level values. The variables mentioned above are included in the model after performing the first difference.

In the panel data, it should be decided which of the classical models, fixed effects model and random effects models are appropriate. In this context, the F-test was used to test the validity of the classical model against the fixed effects, the Breusch-Pagan LM test was used to test the suitability of the classical model against the random effects model and the Hausman test was applied to make a suitable choice between fixed effects and random effects models.

Table 6. Model Determination Results

	F Test		**LM Test**		**Hausman**	
	Stat.	**Prob.**	**Stat.**	**Prob.**	**Stat.**	**Prob.**
Model 1	92,183328	0,0000	906,3541	0,0000	580.76	0,0000
Model 2	1,27252	0,1721	3,454764	-0,0631	2792.23	0,0000

The test results show that (see Table 6) the fixed effects model is appropriate for all models. After the model determination results, Table 7 gives information about variance (heteroscedasticity) and autocorrelation results.

Table 7. Heteroscedasticity and Autocorrelation Results

	Modified Wald		**Durbin Watson**	**Baltagi-Wu**
	Stat.	**Prob.**	**Stat.**	**Stat.**
Model 1	1.5e+05	0,0000	.60726018	1.0585528
Model 2	6.3e+05	0,0000	1.0586404	1.2742544

As predicted by the fixed effects model, Table 7 shows the variance (heteroscedasticity) and autocorrelation test findings for Models 1 and Model 2. The Modified Wald test is used to check for heteroscedasticity in the fixed effects model (Models 1 and 2). The H_0"hypothesis was rejected for both models, according to the results of the Modified Wald test. This demonstrates that there is a heteroscedasticity issue and that the variance is not constant in Models 1 and 2. The DW autocorrelation test of Bhargava, Franzini and Narendranathan, and Baltagi and Wu's LBI autocorrelation tests, are used to examine if autocorrelation exists in the fixed effects models. The presence of autocorrelation is indicated by a statistical value less than 2, although the literature does not provide a critical value for the DW and LBI autocorrelation tests. Both models can be stated to have autocorrelation because the statistical values obtained for each model are fewer than 2.

Table 8 gives the results of model 1, where we used the market structure (FIRM) as the dependent variable.

Table 8. Model 1 Panel Regression Results

Variable	**Coef.**	**Std.Err.**	**z**	**P>z**
PAX	1.60e-06	6.00e-08	26.68	0.000
GDP	.0014287	.000249	5,74	0.000
POP	-3.06e-07	7.73e-07	-0.40	0.695
STD	-.0000716	.0000121	-5.94	0.000
FTR	7.34e-06	3.96e-06	1,86	0.074
CTR	.0000101	2.63e-06	3,85	0.001
TTR	-.0000107	4.36e-06	-2.45	0.021
DIST		(omitted)		
HUB	10,5013	3,06	3,42	0,002
HSR	0	(omitted)		
C	-4,08	.5888109	-6.94	0.000
R^2		0.8689 (Overall)		
N		308		

According to the results of the fixed effects model, it can be seen that the number of passengers in the relevant market (PAX), the GDP of the city, the number of university student (STD), the number of tourists (foreign (FTR), citizens (CTR) and total (TTR)) and the presence of a hub airport (HUB) significantly affect the number of airlines at airports. Looking at the coefficients, PAX, GDP, FTR, CTR and HUB have a positive effect on the number of airlines. STD has a negative effect on the number of airlines. Looking at the other variables,, POP, distance between the relevant market and nearest the hub (DIST) and the presence of HSR do not have a significant effect on the number of airlines competing at the airport.

To increase their market share and earn above-average profits, airline companies make the markets with a high number of passengers their primary target when making their market choices. The number of firms is expected to increase in such markets. In the research, the positive and significant relationship between the number of passengers and the number of airlines in the market confirms the above statements. Another component that affects the number of firms in the market is GDP. GDP is one of the indicators of the level of welfare. If the welfare level is high in a region, the demand for airlines will increase (Fleurbaey and Blanchet,

2013). If the demand is high in the market, the number of firms seeking to benefit from this high demand will increase accordingly. The positive relationship between GDP andthe number of firms found in the research confirms the above statements. Tourism is one of the most important drivers of air travel. The high density of visitors to a region will result in more travel, particularly by air. A region with high demand is expected to have several airlines ready to meet that demand. This effect is confirmed by the strong correlation between the number of tourists and the number of airlines operating in the market. When an airport is designated as a hub airport, such airports are known as central airports and the passenger flow here is quite high (Doganis, 2006). Research has shown that hub airports increase the number of companies. Another component of the number of firms is the population. Population has been linked to demand in many studies, and positive relationships have been found in these studies (Steiner, 1967; Abed et al., 2011; Bhadra and Wells, 2005; Dobruzskes et al., 2011). As mentioned above, the high number of passengers will encourage companies to enter this market. Contrary to predictions, the study did not find a significant relationship between demand and population.. The fact that students travel from the cities where they live to the universities where they will study creates a passenger flow.. On this basis the number of students included in the model was expected to have a positive effect, but a negative relationship was obtained in the research. Table 9 gives the results of model 2, where we used demand (PAX) as the dependent variable.

Table 9. Model 2 Panel Regression Results

Variable	**Coef.**	**Std.Err.**	**z**	**P>z**
FIRM	416680.2	24756.32	16.83	0.000
GDP	-517,395	128,853	-4.02	0.000
POP	1,095	.3739609	2,93	0.007
STD	45,073	4,852	9,29	0.000
FTR	-2,365	2,456	-0.96	0.344
CTR	-3,908	1,131	-3.45	0.002
TTR	4,315	2,307	1,87	0.072
DIST	0	(omitted)		
HUB	-8393440	1335508	-6.28	0.000
HSR	0	(omitted)		
C	167019.3	342611.3	0.49	0.630
R^2 =		0.9225 (Overall)		
N		308		

According to the results of the fixed effects model, the number of firms in the relevant market (FIRM), the GDP of the city, the number of people living in the city where the airport located (POP), the number of university students (STD), the existence of a hub airport (HUB), and the number of tourists (CTR and TTR) have a significant effect on the demand at airports. Looking at the coefficients,, FIRM, POP, STD and TTR have a positive effect on the demand. On the other hand, GDP, CTR and HUB have a negative effect on the demand. Looking at the other variables, the number of foreign tourists (FTR), DIST and the existence of HSR do not have a significant effect on the demand.

The first factor affecting demand is the number of airlines in the market. As the number of airlines increases, the flights offered from that market to other

destinations will increase. In addition, as more airlines enter the market, the variety of destinations offered will increase. In this way, passengers who want to fly to different destinations from that market will be more likely to find a flight for any time and place they wish. This situation is expected to increase the demand. The positive and significant relationship obtained in the study confirms this situation. As recalled in the previous section, population has been associated with demand in many studies and positive relationships have been found between these two factors (Steiner, 1967; Abed et al., 2011; Bhadra and Wells, 2005; Dobruzskes et al., 2011). In this study, as in previous studies, a positive relationship was found between demand and population. As in the model where the number of firms is the dependent variable, it is thought that the relationship between the number of students and the demand will be positive. When the coefficients of the model are examined, there is a positive relationship between the number of university students residing in the city and the demand for airlines. This is probably due to the mobility created by students studying at universities outside the city.. The number of tourists is another factor that has been found to affect demand. As mentioned in the previous section, tourism plays an important role in promoting air travel. This evidence is consistent with positive impact of tourist numbers on demand. However, it is a point that needs to be stressed once more in subsequent studies because similar impacts were not shown on the number of local and foreign tourists.

Hub airports are home to network airlines, which generally operate a hub-and-spoke network strategy. These airlines, with their large and extensive networks, aim to get passengers to their desired destinations at all times.. When the targets are realized, the revenue passenger-km and load factor will increase (Hanlon, 2007, p. 77). Thus, the demand in this market will increase. However, it can be seen that the dummy effect of the hub airport is in the opposite direction. One measure of the welfare state is the GDP. In a region with a high level of welfare, the demand for airlines will increase (Fleurbaey and Blanchet, 2013). Contrary to what was expected in this research, the effect of GDP on demand is found to be negative. It is believed that the unique features of airports played an important role in the emergence of this situation.

Another variable that is likely to affect demand is the distance from the airport to the nearest hub. As the distance increases, it makes more sense for the airlines to use the hub-and-spoke network structure. This is because someone living in a city very close to the airport is likely to travel to the hub airport by other means of transport rather than by air (Philips et al., 2005). However, as the distance to the central airport increases, passengers will prefer connecting flights to reach their main destination, and this will require the people living in these regions to prefer to air transport. However, in this study, the distance of the airport from the nearest hub did not have a significant effect. It is expected that if a high-speed train is located close to an airport, it will have a negative effect on demand because it is a significant substitute. The study does not indicate the dummy effect of the high-speed train on demand.

CONCLUSIONS

This study examines the determinants of demand and market structure at airports, first discusses concentration levels and changes in the concentration levels in the 12-year time series of the airports. In general, decreases have been observed in the concentration values over time. In other words, airports have become more competitive over time. Some airports have remained monopolies in all years, some of which have changed in recent years. With the domestic liberalization in 2003, airlines except for Turkish Airlines entered the market. Concentration values are examined in the early years, especially only at the airports of the concentration of high-level concentration is still observed in the continuation of the monopoly form is observed, but over time with the introduction of other airlines in the market by providing access to monopoly and monopoly markets close to an increasingly competitive structure has been observed. At airports where flights to international markets were available, there was no sharp increase or decrease in the concentration values, especially in the pre-2003 period. Undoubtedly this situation is not directly observed in the data set, but it is possible to make such a comment as the current flights of the airports continue in this direction.

In the research, variables that are effective on demand and market structure have been revealed. Firstly, the number of passengers in the relevant market, the GDP of the city, the number of university students, the number of tourists and the existence of a hub airport have a significant effect on the number of airlines at the airport. The number of passengers, the GDP, the number of tourists and the presence of a hub airport have a positive effect on the number of airlines in the market, on the other hand, the number of students has a negative effect. In addition, the number of firms in the relevant market, the GDP of the city, the number of living people in the city where the airport is located, the number of university students, the existence of a hub airport, the number of tourists (local and total) have a significant effect on the demand at airports. The number of airlines in the market, the population, the number of students and the total number of tourists have a positive effect on the demand. On the other hand, the GDP of the city, local tourists and the presenceof a hub airport have a negative effect on the demand.

In the hub-and-spoke network structure, hub airports are responsible for collecting passengers arriving from nearby airports and transferring them to their final destinations. For this reason, the distance to the surrounding airports is important when selecting the location of an airport. In particular, if one of the surrounding airports is the central airport, a location may be chosen taking into account that this situation will affect the demand. This situation, which also emerged from the research, will guide the decision-makers.

The research is expected to help airlines and airport managers forecast demand.. In future research, the market and the number of years observed can be increased. In addition, more comprehensive models can be obtained by adding new variables. The high-speed train option is included in the research models as it is expected to affect demand. However, due to the nature of the data set, this effect

could not be identified in the study. It would be useful to re-examine this situation in future research.

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Yazarların Makaleye Katkı Oranları

Makalenin tamamı yazar tarafından kaleme alınmıştır.

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REFERENCES

Abed, S. Y., Ba-Fail, A. O., & Jasimuddin, S. M. (2001). An econometric analysis of international air travel demand in Saudi Arabia. *Journal of air transport management*, 7(3), 143-148.

Abramowitz, A. D., & Brown, S. M. (1993). Market share and price determination in the contemporary airline industry. *Review of Industrial Organization*, 8(4), 419-433.

Aderamo, A. J. (2010). Demand for air transport in Nigeria. *Journal of Economics*, 1(1), 23-31.

Akan, Y. (2002). Türk İmalat Sanayinde Yoğunlaşma: 1980-86. *Iktisat Isletme ve Finans*, 17(198), 91-97.

Akomea, S. Y., & Adusei, M. (2013). Bank recapitalization and market concentration in Ghana's banking industry: A Herfindahl-Hirschman Index analysis. *Global Journal of Business Research*, 7(3). 31-45.

Belobaba, P. P., & Van Acker, J. (1994). Airline market concentration: an analysis of US origin-destination markets. *Journal of Air Transport Management*, 1(1), 5-14.

Bhadra, D. (2002). Demand for air travel in the United States: Bottom-up econometric estimation and implications for forecasts by origin-destination pairs. *In AIAA's Aircraft Technology, Integration, and Operations (ATIO) 2002 Technical Forum* (p. 5861).

Bhadra, D., and Wells, M. (2005). Air travel by state: Its determinants and contributions in the United States. *Public Works Management & Policy*, Vol. 10 No. 2, pp. 119-137.

Blažková, I. (2016). Convergence of Market Concentration: Evidence from Czech Food Processing Sectors. *Convergence*, 8(4).

Borenstein, S., Bushnell, J., & Knittel, C. R. (1999). Market power in electricity markets: Beyond concentration measures. *The Energy Journal*, 65-88.

Celebi, E., & Fuller, J. D. (2012). Time-of-use pricing in electricity markets under different market structures. *IEEE Transactions on Power Systems*, 27(3), 1170-1181.

Dai, M., Liu, Q., & Serfes, K. (2014). Is the Effect of Competition on Price Dispersion Nonmonotonic? Evidence from the U.S. Airline Industry. *The Review of Econonomics and Statistics*, 96(1), 161-170.

Dantas, T. M., Oliveira, F. L. C., & Repolho, H. M. V. (2017). Air transportation demand forecast through Bagging Holt Winters methods. *Journal of Air Transport Management*, 59, 116-123.

Dobruszkes, F., Lennert, M., and Hamme, G. V. (2011). An analysis of the determinants of air traffic volume for European metropolitan areas. *Journal of Transport Geography*, Vol. 19 No. 4, pp. 755-762, doi:10.1016/j.jtrangeo.2010.09.003.

Doganis, R. (2002), *Flying off course: The economics of international airlines*, Routledge.

Doganis, R. (2005), *The airport business*, Routledge.

Doganis, R. (2006), *Airline business 2nd edition*, Routledge.

Duval, D. T. (2013). Critical issues in air transport and tourism. *Tourism Geographies*, Vol. 15 No. 3, pp. 494–510, doi:10.1080/14616688.2012.675581.

Field, A. (2009), *Discovering statistics using SPSS*, Sage publications.

Finkel, S. E. (1995). Causal analysis with panel data (No. 105). Sage.

Fleurbaey, M., and Blanchet, D. (2013). *Beyond GDP: Measuring welfare and assessing sustainability*, Oxford University Press.

Gerede, E. (2010). The Evolution of Turkish Air Transport Industry: Significant Developments and the Impacts of 1983 Liberalization. *Journal of Management & Economics*, 17(2).

Gerede, E. (2011). Türkiye'deki Havayolu Taşımacılığına İlişkin Ekonomik Düzenlemelerin Havayolu İşletmelerine Etkisinin Değerlendirilmesi. *Celal Bayar Üniversitesi Sosyal Bilimler Dergisi*, 9(2), 505-537.

Gerede, E., & Orhan, G. (2015). Türk havayolu taşımacılığındaki ekonomik düzenlemelerin gelişim süreci. E. Gerede içinde, *Havayolu taşımacılığı ve ekonomik düzenlemeler teori ve Türkiye uygulaması*, 163-208.

Giaume, S., & Guillou, S. (2004). Price discrimination and concentration in European airline markets. *Journal of Air Transport Management*, 10(5), 305-310.

Graham, A. (2008). *Managing Airports 3rd edition: An international perspective*. Butterworth-Heinemann.

Graham, D. R., Kaplan, D. P., & Sibley, D. S. (1983). Efficiency and competition in the airline industry. *The Bell Journal of Economics*, 118-138.

Gwartney, J., Stroup, R., & Sobel, R. Macpherson, D. (2008). *Microeconomics: Private and Public Choice*. South-Western, Cengage Learning.

Hanlon, P. (2007). *Global airlines 3rd edition*. Butterworth-Heinemann.

Hannan, T. H. (1997). Market share inequality, the number of competitors, and the HHI: An examination of bank pricing. *Review of Industrial Organization*, 12(1), 23-35.

Hsiao, C. (2007). Panel data analysis—advantages and challenges. *Test*, 16(1), 1-22.

Hurdle, G. J., Johnson, R. L., Joskow, A. S., Werden, G. J., & Williams, M. A. (1989). Concentration, potential entry, and performance in the airline industry. *The Journal of Industrial Economics*, 119-139.

Ippolito, R. A. (1981). Estimating airline demand with quality of service variables. *Journal of Transport Economics and Policy*, 7-15.

Jorge-Calderón, J. D. (1997). A demand model for scheduled airline services on international European routes. *Journal of Air Transport Management*, 3(1), 23-35.

Kaynak, S. (2016). Giyim Eşyası İmalatı Piyasa Yapısı ve Yoğunlaşma Oranı: Türkiye'nin İlk 500 Sanayi Kuruluşu Üzerine Bir Uygulama. *Bülent Ecevit Üniversitesi Uluslararası Yönetim İktisat ve İşletme Dergisi*, 12(30), 21-37.

Kiracı, K , Yaşar, M , Kayhan, S , Ustaömer, T . (2017). A Concentration Analysis In The Turkish Domestic Air Transportation Industry using with CRm and Herfindahl-Hirschman Indexes. *Gaziantep University Journal of Social Sciences*, 16 (3), 687-704. DOI: 10.21547/jss.287910

Kumar, M., Arora, A., & Lahille, J. P. (2011). Construct of credit risk management index for commercial banks. *Banks and Bank Systems*, 6(1).

Lijesen, M. G., Nijkamp, P., & Rietveld, P. (2002). Measuring competition in civil aviation. *Journal of Air Transport Management*, 8(3), 189-197

Lijesen, M. G. (2004). Adjusting the Herfindahl index for close substitutes: an application to pricing in civil aviation. *Transportation Research Part E: Logistics and Transportation Review*, 40(2), 123-134.

Marin, P. L. (1995). Competition in European aviation: Pricing policy and market structure. *The Journal of Industrial Economics*, 141-159.

McConnell, C. R., Brue, S. L., & Flynn, S. M. (2018). *Economics: Principles, Problems and Policies*. McGraw-Hill Education.

Orhan, G., & Gerede, E. (2013). A study of the strategic responses of Turkish airline companies to the deregulation in Turkey. *Journal of Management Research*, 5(4), 34-63.

Pan, C. M. (2005). Market structure and profitability in the international tourist hotel industry. *Tourism Management*, 26(6), 845-850.

Parkin, M. (2011). *Economics*. Addison-Wesley.

Pehlivanoğlu, F., & Tekçe, E. (2013). Türkiye elektrik enerjisi piyasasında Herfindahl-Hirschman ve CRm endeksleri ile yoğunlaşma analizi. *Abant İzzet Baysal Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 28(28), 363-386.

Phillips, O. R., Weatherford, L. R., Mason, C. F., and Kunce, M. (2005). Passenger leaks and the fate of small community air service. *Economic Inquiry*, Vol. 43 No. 4, pp. 785-794.

Rhoades, S. A. (1993). The herfindahl-hirschman index. *Fed. Res. Bull*., 79, 188.

Rhoades, S. A. (1995). Market share inequality, the HHI, and other measures of the firm-composition of a market. *Review of industrial organization*, 10(6), 657-674.

Robinson, J. C. (2011). Hospital market concentration, pricing, and profitability in orthopedic surgery and interventional cardiology.

Saribas, H., & Tekiner, I. (2015). Türkiye Sivil Havacilik Sektöründe Yogunlasma/Concentration in Turkish Civil Aviation Market. *Finans Politik & Ekonomik Yorumlar*, 52(610), 21.

Shen, J., & Li, H. (2010). An Empirical Analysis on Industrial Organization Structure of Chinese Software Service Outsourcing. *Journal of Service Science and Management*, 3(02), 218.

Sivrikaya, O., & Tunç, E. (2013). Demand forecasting for domestic air transportation in Turkey. *The Open Transportation Journal*, 7(1).

Stavins, J. (2001). Price discrimination in the airline market: The effect of market concentration. *Review of Economics and Statistics*, 83(1), 200-202.

Steiner, S., Bozicevic, A., and Mihitec, T. (2008). Determinants of European air traffic development. *Transport Problems*, Vol. 3, pp. 73-84.

Suryani, E., Chou, S. Y., & Chen, C. H. (2010). Air passenger demand forecasting and passenger terminal capacity expansion: A system dynamics framework. *Expert Systems with Applications*, 37(3), 2324-2339.

Su, K. T. (2003). Rekabet hukukunda teşebbüslerin hâkim durumunun belirlenmesinde pazar gücünün ölçülmesi. *Rekabet Kurumu.*

Tatlı, H. Piyasa Yoğunluğunun Ölçülmesi: Beyaz Eşya Sektörü Üzerine Bir Uygulama. *Yönetim ve Ekonomi Araştırmaları Dergisi,* 16(Özel Sayı 1), 64-84.

The U.S. Department of Justice (DOJ), *Horizontal Merger Guidelines*, 2010.

Wang, K., Zhang, A., & Zhang, Y. (2018). Key determinants of airline pricing and air travel demand in China and India: Policy, ownership, and LCC competition. *Transport Policy*, 63, 80-89.

Wei, W., & Hansen, M. (2006). An aggregate demand model for air passenger traffic in the hub-and-spoke network. *Transportation Research Part A: Policy and Practice*, 40(10), 841-851.

Yang, C. W. (2016). Entry effect of low-cost carriers on airport-pairs demand model using market concentration approach. *Journal of Air Transport Management*, 57, 291-297.

Yaşar, M., & Gerede, E. (2018). Türkiye havayolu iç hat şehir çiftlerindeki pazar yapılarının piyasa yoğunlaşması ölçütleri ile belirlenmesi. *Yönetim ve Ekonomi: Celal Bayar Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 25(1), 171-197.

Yaşar, M., & Kiracı, K. (2018). Dünya Pazarlarında Piyasa Yapısı: Havayolu Sektöründe Rekabetin Ampirik Olarak Analizi. *Uluslararası Yönetim İktisat ve İşletme Dergisi*, 14(3), 731-744.

Zhang, Y., & Round, D. K. (2009). Policy implications of the effects of concentration and multimarket contact in China's airline market. *Review of Industrial Organization*, 34(4), 307-326.