Chapter 8

The Effects of Ecoairnomic Growth, Inflation, Urbanization and Interpersonal Social Globalization Index on the Number of Airline Passengers in Türkiye 🔓

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Abstract

The aim of the study is to analyze some economic indicators that are thought to have an impact on airline passenger transfer (the number of passengers carried) in Türkiye in the period 1988-2022. As airline transportation has become more widely used than other types of transportation today, and as a result of the opening of new airports and large investments made in airline transportation, the economic contributions of these investments have recently found a place in academic studies. In light of these developments, this study aims to analyze the effects of economic growth, inflation, urbanization and interpersonal social globalization index on the number of passengers carried by airline in Türkiye. The ARDL method was used in the model and it was determined that urbanization had a positive effect on the number of passengers carried by airline. In addition, when the results of the model were examined, it was determined that inflation had a negative effect on the number of passengers carried by airline. Again, according to the ARDL results, it was determined that there was no significant relationship between the number of passengers carried by airline and economic growth and interpersonal social globalization index.

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1. INTRODUCTION

Airline transportation in Türkiye has entered a rapid development and transformation process, especially since 1983. In order to provide a more competitive and liberal structure to the airline transportation sector, the Civil Aviation Law No. 2920 was adopted, which will encourage the private sector in this process. With the entry into force of this law, the liberalization process in the field of airline transportation in Türkiye has been initiated. As part of the process, standards and regulations such as SHY-6A and SHY-6B have been introduced so that the Turkish civil aviation sector can compete internationally and continue its activities in a safe, reliable, high-quality and transparent manner. Thus, competition and security-oriented policies have been adopted in airline transportation services, competitiveness has been increased and the country's economic and social development has accelerated (Kiracı and Battal, 2018: 1537). This process is an important breaking point in terms of comprehensive reforms and structural transformations in the field of airline transportation. In addition, airlines are one of the most important transportation modes among various transportation modes (Uçar et al., 2024). Therefore, airline transportation is closely related to various macroeconomic factors such as economic growth, inflation, urbanization and interpersonal social globalization index.

First of all, one of the most important factors affecting airline transportation is the existence of a relationship between GDP and the number of passengers carried by airline. GDP is a basic measure of the overall economic performance of a country. As expected, when a country's GDP increases, economic activities and travel demand will also increase. As expected, higher incomes make it easier for people to travel internationally for various purposes. In this context, GDP increases positively affect passenger flows (Chang and Lin, 2010). At the same time, a country's economic growth can have significant effects on airline transportation expansion. This includes the development of hard infrastructures such as airports. A growing country has to integrate into the global economy; firms need to be connected to potential sales markets. Reciprocally, airport infrastructures offer the opportunity to promote export activities, especially tourism, and to increase business operations and productivity (Halpern and Bråthen, 2011). According to Hakim and Merkert (2016), the relationship between economic growth and airline transportation primarily emphasizes the need for the timely establishment of aviation support infrastructure. This process emphasizes the need for a meticulous examination of spatial dimensions, considering the growth rates projected for the aviation sector, and the need

to make significant early investments, taking into account the risks and uncertainties associated with this growth.

The CPI for air travel measures the change in prices paid by consumers for air travel. This index includes taxes and distribution costs not collected by airline carriers (Bureau of Transportation Statistics, 2006: 6). Chang and Lin (2010) concluded in their study that the CPI variable has a negative effect on air passenger flows. A high CPI represents relatively high prices of most goods in the destination country, which makes it difficult to attract more tourists to the country. As a result, if the CPI is high in the destination countries, the demand for travel between the two countries will decrease.

The population of cities with limited resources increases due to the urbanization process (Ülger et al., 2024). Therefore, another factor affecting airline transportation is urbanization. Therefore, airline transportation can have different economic effects on the host urban area or region. An expanding airport can directly or indirectly increase the number of employees. In addition, air traffic can facilitate face-to-face contact, thus improving the provision of tradable services, increasing tourism and information flows, and the attractiveness for business investment. These last effects can be most appropriately captured by referring to bilateral air traffic data (Bernardoa and Fageda, 2019: 2).

The globalization index is another indicator that affects airline transportation. With the widespread use of the concept of globalization, countries have also started to participate in this process (Ertürkmen and Çelik, 2023). The literature on economic globalization discusses the networks of firms, workers, and consumers; the flow of both people and goods across international borders, and the resulting imbalances in economic development. Globalization contributes to the world economy (Ertürkmen, 2023). All globalization processes depend on transportation to some extent to move goods and people from one place to another. However, there has been little discussion of the connections between transportation and globalization. Even less attention has been paid to airline transportation, especially despite the fact that this mode is of vital importance in the continuous growth of global transfers of people and materials. As Smith points out, the fluidity of globalization processes ironically depends on infrastructure located in fixed locations. As the demand for this infrastructure increases, existing airports, highways, ports, etc. As cities come under pressure to provide more capacity, there is also pressure on other locations that can host facilities in the future (Cidell, 2006).

The course of domestic, international and overflight aircraft traffic in Türkiye, with the investments in the aviation sector in recent years, is shown in Table-1.

Table-1: Landings/Takeoffs and Overflight Aircraft Traffic Served in Türkiye*

Years	2016	2017	2018	2019	2020	2021	2022
Domestic	886.228	909.332	892.405	839.894	572.994	738.352	786.150
International	566.767	591.125	651.764	716.523	280.756	466.266	702.476
Overflight	376.913	413.560	473.051	478.013	201.418	262.242	394.845
Total	1.829.908	1.914.017	2.017.220	2.034.430	1.055.168	1.466.860	1.883.471

*It was prepared by us using the data in the SAA 2022 Sector report.

The data in Table-1 show that total aircraft traffic has increased over the years. There is a high level of decrease in domestic passenger traffic in 2020, while there is an increase in international traffic over the years, and there was also a high level of decrease in 2020. Due to the COVID-19 pandemic, there has been a decrease in both domestic, international and overflight figures, as in the whole world. As can be understood from this table, Türkiye has an increasingly dense air traffic every day in terms of both Overflight and Landing/Takeoff due to its geographical location.

Türkiye has important opportunities for the use of all kinds of transportation systems in terms of both its geographical location and its characteristics. Especially being at the connection point of the Asian and European continents and being in a central position in terms of regional power with some country groups, it provides important opportunities for the development of the country's transportation activities (Bakırcı, 2012).

The passenger traffic, which was 34.4 million (domestic and international) in 2003, reached 161 million in November 2022. Aviation continues to develop rapidly in the world and plays a major role in both international and intercontinental integration and integration. In today's world, the most important sectors that direct and add volume to the world economy, such as foreign trade and tourism, come to life thanks to the aviation sector and build their future under the wings of the aviation sector.

Airline transportation, which has an important place among the basic transportation systems, is preferred more and more every day due to its advantages compared to other types of transportation. The increase in the

effectiveness of airline transportation in both international transportation and domestic transportation continues to increase every year.

The change in the proportional shares of the highway, airline, railway and maritime sectors in the ongoing domestic passenger transportation in Türkiye is presented in graph-1.

Graph-1: Domestic Passenger Transportation Rates (% Rate per Passenger-Km)*
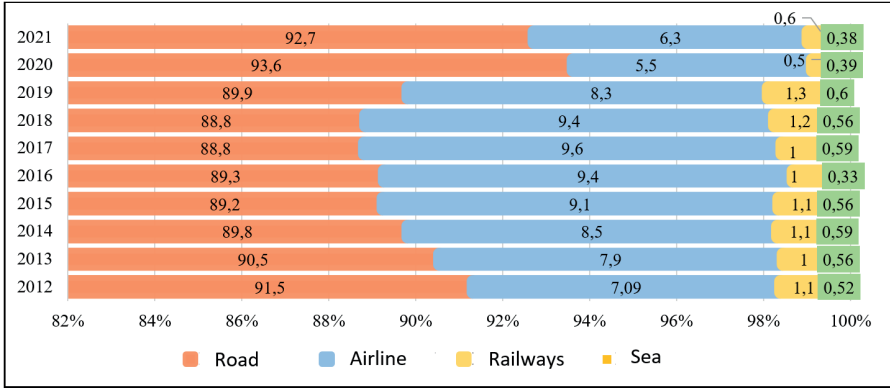
*Prepared by us using the data in the MEU 2022 Environmental Indicators report.

Note: Passenger-Km: It is the traffic measurement unit obtained by transporting a passenger one kilometer.

According to the data in the graph; in domestic passenger transportation; the share of airlines, which was 1.8% in 2000, increased to 6.3% in 2021, while the share of roads, which was 95.9% in the same period, decreased to 92.7% and the share of railways, which was 2.2%, decreased to 0.6%. When we look at domestic freight transportation rates, it is seen that the share of airline passenger transportation increased over the years until the COVID-19 pandemic, while there was a proportional decrease during and after the pandemic.

The decline in airline transportation due to the COVID-19 pandemic that started at the end of 2019 in the world and in Türkiye continued until the discovery of the COVID-19 vaccine in 2020. During this process, various restriction decisions implemented by countries were reduced with the discovery of the vaccine and the upward trend in airline transportation began.

The numerical information on the separation of domestic and international passengers in airline passenger transfers in Türkiye from 1988 to 2022 is as in Table-2.

Table-2: The Number of Airline Passengers in the Period 1988-2022*

Years	Total Number of Passengers	Proportional Share of International Passenger Number (%)	Proportional Share of Domestic Passenger Number (%)	Years	Total Number of Passengers	Proportional Share of Domestic Passenger Number (%)	Proportional Share of International Passenger Number (%)
1988	10.840.179	0,40	0,60	2006	61.684.203	0,47	0,53
1989	11.843.563	0,40	0,60	2007	70.352.867	0,45	0,55
1990	13.629.965	0,39	0,61	2008	79.438.289	0,45	0,55
1991	11.019.464	0,36	0,64	2009	85.508.508	0,48	0,52
1992	16.495.118	0,33	0,67	2010	102.800.392	0,49	0,51
1993	20.674.531	0,36	0,64	2011	117.620.469	0,50	0,50
1994	22.334.286	0,39	0,61	2012	130.351.620	0,50	0,50
1995	27.767.379	0,37	0,63	2013	149.430.421	0,51	0,49
1996	30.780.662	0,35	0,65	2014	165.720.234	0,52	0,48
1997	34.396.334	0,36	0,64	2015	181.074.531	0,54	0,46
1998	34.199.679	0,39	0,61	2016	173.743.537	0,59	0,41
1999	30.011.658	0,43	0,57	2017	193.045.343	0,57	0,43
2000	34.972.534	0,38	0,62	2018	210.498.164	0,54	0,46
2001	33.620.448	0,30	0,70	2019	208.373.696	0,48	0,52
2002	33.755.452	0,26	0,74	2020	81.616.140	0,61	0,39
2003	34.424.340	0,27	0,73	2021	128.155.762	0,53	0,47
2004	45.034.589	0,32	0,68	2022	181.789.339	0,43	0,57
2005	55.545.473	0,37	0,63				

* The table was prepared by us using the data in the SAA 2022 report.

In Table-2, it can be seen that passenger transfers (numbers) in Türkiye increased between 1988-2018. In addition, the proportional shares of domestic and international lines in total passenger transfers can also be seen. According to the data in the table, as of 2010, the proportional share of domestic lines in total passenger transfers in Türkiye is over 50%. This proportional share increased from 49% to 59% in the 2010-2016 period. Due to the restriction decisions and measures implemented due to the COVID-19 pandemic, it caused a decrease in both the total number of passengers and the number of domestic passengers in 2020.

The Graph-2 shows the course of Türkiye's airline domestic and total passenger numbers in the 1988-2022 period.

Graph-2: Airline Passenger Traffic in Türkiye in the Period 1988-2022*
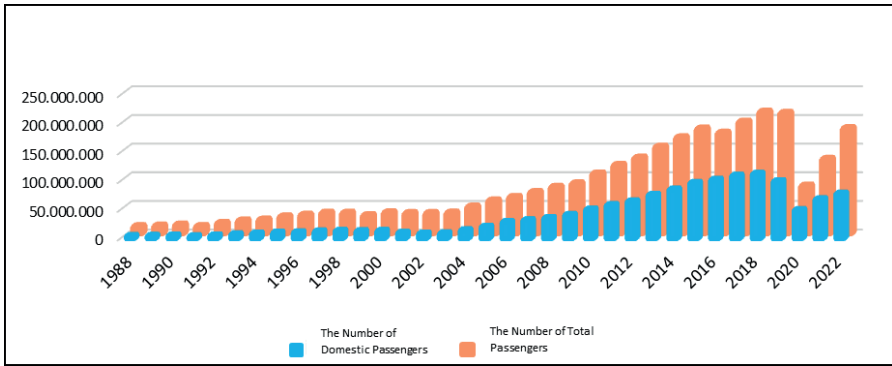
Years	1988	1989	1990	1991	1992	1993	1994	1995	1996
The Number of Domestic Passengers	4.329.890	4.696.520	5.347.723	4.009.724	5.445.081	7.403.941	8.784.310	10.347.528	10.862.539
Years	1997	1998	1999	2000	2001	2002	2003	2004	2005
The Number of Domestic Passengers	12.413.720	13.238.832	12.931.771	13.339.039	10.057.808	8.700.839	9.128.124	14.438.292	20.502.516
Years	2006	2007	2008	2009	2010	2011	2012	2013	2014
The Number of Domestic Passengers	28.799.878	31.970.874	35.832.776	41.226.959	50.575.426	58.258.324	64.721.316	76.148.526	85.416.166
Years	2015	2016	2017	2018	2019	2020	2021	2022	
The Number of Domestic Passengers	97.041.210	102.499.358	109.511.390	112.911.108	99.946.572	49.740.303	68.466.177	78.323.824	

*The graph was prepared by us using the data in the SAA 2022 report.

As can be seen in Chart-2, the total number of passengers in Türkiye decreased in 1991, 1999, 2001, 2016, 2019 and 2020 and increased again in the following years. These periods are the periods when Türkiye was under the influence of negative political and economic events, natural disasters and global epidemics. It can also be seen in the table that the number of domestic passengers within the total number of passengers continued to increase in the period 1988-2022, except for 2019-2020, compared to the previous year. Türkiye is in a position to make significant contributions to the development of the civil aviation sector in both the world and the region with its growth level in the civil aviation sector. In many reports published

by international aviation organizations, it is seen that Türkiye has been ranked at the top of the world aviation sector in recent years. According to the 2018 Administrative Activity Report of the General Directorate of Turkish Civil Aviation; While the world average for passenger accessibility to aircraft is 74.41%, this rate is 91.34% for Türkiye. (SHGM, 2018 Activity Report, pp. 27-27). It can be said that this situation positively affects both the income of airports and the personnel employment numbers of airline companies and DHMI.

In this study, the effects of these factors on the number of passengers carried by airline in Türkiye were empirically examined. While economic growth can directly affect the purchasing power of the consumer and therefore the demand for airline transportation, cost indices such as CPI and inflation play a key role in determining airline ticket prices. While the urbanization process increases the demand for airport infrastructure and access, the interpersonal social globalization index can strengthen the need for travel together with international mobility and cultural interactions.

This study is structured to consist of four parts. Following the introduction, the second part includes a review of the relevant literature. In this section, some studies examining the effects of these factors on the number of passengers carried by airline and some studies evaluating the effects of Türkiye's economic growth, CPI, inflation, urbanization and interpersonal social globalization index on the number of passengers carried by airline using ARDL and ECM methods are included. The third section provides information about the methodology of this study and the data used. Finally, the findings are brought together and a comprehensive evaluation is made.

2. LITERATURE REVIEW

The air transport sector in Türkiye is directly affected by various macroeconomic factors such as economic growth, urbanization, inflation, CPI and social globalization. The relationship between the number of passengers carried by airline and these variables has gained importance as an indicator of economic and social development. There are many studies in the literature examining the effects of these factors on air transport demand. In this context, the literature on the relationship between economic growth, CPI, inflation, urbanization and interpersonal social globalization index and the number of passengers carried by airline is summarized in Table 3.

Table 3: The Relationship between Macroeconomic Indicators and Number of Passengers Carried by airline

Researchers	Sample Group	Time Period	Method(s)	Results
Button and Taylor (2000)	41 Metropolitan Standard Areas (MSA) within the United States	1977-1978	Regression analysis	It highlights that wider and more comprehensive international airline services can play a critical role in stimulating economic growth.
Honcu et al. (2013)	European countries	2010-2012	Data analysis based on trends	Fuel costs and economic recessions are important factors affecting airline transportation demand.
Hakim and Merkert (2016)	South Asian country	1973-2014	Panel data, Granger causality tests, Pedroni/ Johansen cointegration test	In low-income, large-population regions, the relationship between air transport and economic growth is complex and diverse.
Kiboi et al. (2017)	10 airline companies	2005-2014	Panel data regression model	Local and global GDP growth rates as well as GDP per capita have a positive and significant impact on airline passenger demand.
Olaniyi et al. (2017)	Nigeria	2010-2015	Pearson correlation coefficient and regression analyses	It has been shown that Consumer Price Index (CPI) and exchange rate changes do not have a statistically significant impact on air passenger demand.
Kiracı and Battal (2018)	Türkiye	1983-2015	VAR (Vector Autoregressive) model	It has been determined that per capita income, GDP and CPI have significant effects on domestic and international passenger demand.
Wei et al. (2022)	China	2006-2019	Time Series Data	The growth of primary industry and per capita income has led to a long-term decline in passenger flow at Tianjin Airport.

Yones (2023)	Egypt	1982-2019	VECM (Vector Error Correction Model)	It has been observed that decreases in exchange rates increase passenger demand by making local prices more attractive compared to other countries, while CPI affects demand positively. No significant effect of GDP per capita on passenger demand has been found.

In this study, the factors affecting airline transportation in the literature on the relationship between economic growth, CPI, inflation, urbanization and interpersonal social globalization index with the number of passengers carried by airline are classified as positive or negative by the authors;

Positive effects on the relationship between economic growth, CPI, inflation, urbanization and interpersonal social globalization index and the number of passengers carried by airline; Kiboi et al. (2017), in their study on 10 airline companies, determined that local and global GDP growth rates and GDP per capita had a positive and significant effect on air passenger demand. This result shows that airline transportation is also positively affected as economic growth increases. Wei et al. (2022), in a study in China, found that changes in exchange rates positively affected air passenger demand. When the exchange rate decreases, local prices become more attractive, which increases passenger demand. Kiracı and Battal (2018), in their analysis on Türkiye, revealed that domestic and international passenger demand is positively related to per capita income and GDP. This finding supports the conclusion that increasing income levels increase airline transportation demand.

The positive effects of economic growth, CPI, inflation, urbanization and interpersonal social globalization index on the relationship between the number of passengers carried by airline; Honcu et al. (2013), in this study conducted in European countries, determined that economic recession and fuel costs negatively affected airline transportation demand. It was observed that demand decreased especially during economic recession periods. Olaniyi et al. (2017), in the Nigerian example, determined that Consumer Price Index (CPI) and exchange rate changes did not have a significant effect on air passenger demand and could not affect demand negatively. This situation shows that airline transportation acts relatively independently of economic changes. Yones (2023), in his study in Egypt, reached the conclusion that

CPI negatively affected demand. The increase in inflation has a decreasing effect on passenger demand.

This literature review shows that the demand for airline transportation has a positive relationship with macroeconomic factors such as economic growth and income growth, but factors such as inflation, economic recession and high fuel costs can negatively affect the demand. Therefore, the increase or decrease in the demand for airline transportation is directly linked to the economic dynamics and market conditions of the countries.

3. DATASET AND EMPIRICAL MODEL

The aim of the study is to empirically analyze the effects of gross domestic product, urbanization, social globalization and consumer price index (CPI) on air passenger transfer (number of passengers carried) for Türkiye using annual data for the period 1988-2022. In this direction, the Autoregressive Distributed Lag Model (ARDL) method was used in the application phase. For this purpose, explanatory information about the variables of the model established in the study is as follows in Table 4:

Table-4: Variables and Data Resource Information

Variables Descriptions Data source	Descriptions	Data Resource
HYY	Number of domestic passengers carried by airline (Türkiye)	The Statistics of General Directorate of State Airports Authority
GDP	Gross domestic product	World bank data
PU	Urbanization	World bank data
KOFS	Interpersonal Social Globalization Index	KOF Swiss Economic Institute
INF	Inflation Rate	TURKSTAT

The purpose of this study is to investigate how the number of passengers carried by airline for Türkiye, which is determined as the dependent variable, is affected by the gross domestic product, interpersonal social globalization index, inflation and urbanization variables. In the study, as the independent variables; Türkiye's gross domestic product, representing economic growth; interpersonal social globalization index (KOF-social-interpersonal index) representing social globalization; consumer price index, representing

changes in the prices of goods and services; and urbanization indicator, as the demographic factor, were included in the analysis.

The empirical model was established to investigate the relationship between the number of passengers carried by airline (HYY) for Türkiye and gross domestic product (GSYH), urbanization (PU), interpersonal social globalization index (KOFS) and consumer price index (CPI).

All variables used in the model were log transformed. The empirical model established is as follows:

$$HYY_t = \alpha_1 + \beta_1 GSYH_t + \beta_2 PU_t + \beta_3 KOFS_t + \beta_4 TÜFE_t + \mu_t \qquad (1)$$

In the established model, α_1 represents the constant term, β symbol represents the estimated coefficients for the variables used in the analysis, and μ_τ represents the error term.

In the application phase of the study, it is important to first test the stationarity of the time series. If the series are not stationary (there is a unit root), spurious regression may occur. Therefore, in order to obtain healthy results, a unit root test must be applied to the series (Gujarati, 2016, 320). In this study, the Augmented Dickey Fuller (ADF) unit root test was used. The null hypothesis of the ADF test is "there is a unit root" (Sevüktekin and Çınar, 2017, 374-378). The results of the unit root test for the variables are as in Table 6.

Table-5: ADF Unit Root Test Results

Variables	Level		First Difference	
	Constant	Trend & Constant	Constant	Trend & Constant
HYY	0.277490 (0.9730)	-1.882041 (0.6387)	-5.882964 (0.0000)	-5.863317 (0.0002)
GDP	0.491165 (0.9835)	-2.305522 (0.4184)	-5.954476 (0.0000)	-5.913759 (0.0002)
PU	-1.443482 (0.5381)	-11.55040 (0.0000)	-6.461099 (0.0001)	-4.268217 (0.0187)
KOFS	-0.391728 (0.8984)	-3.015502 (0.1459)	-4.552232 (0.0011)	-4.480205 (0.0067)
CPI	-3.083382 (0.0395)	-3.762328 (0.0441)	-3.089161 (0.0467)	-4.579990 (0.0155)
Note: Values in parentheses are probability values.				

According to the results obtained from the unit root tests of the series with differences in Table 6, it is seen that the dependent and independent variables are stationary in I(0) and I(1) structures. According to this result, the applicability conditions of the ARDL Method are provided in this study.

The ARDL method used in the study was developed by Pesaran and Shin (1999) and Pesaran et al. (2001). This method can provide reliable results without causing loss of information in the sample when the series used are stationary at the level or first difference level. It also provides reliable results in small sample situations. In this direction, the ARDL estimate was made as follows in this study, which investigated the relationship between the number of passengers carried by airline (HYY) and gross domestic product (GSYH), urbanization (UP), social globalization index (COFS) and consumer price index (CPI) for Türkiye.

$$\Delta HYY_t = \alpha_0 + \sum_{i=1}^{k_1} \theta_{it} \Delta HYY_{t-i} + \sum_{i=0}^{k_2} \delta_{it} \Delta GSYH_{i,t-i} + \sum_{i=0}^{k_3} \vartheta_{it} \Delta UP_{i,t-i} + \sum_{i=0}^{k_4} \sigma_{it} \Delta KOFS_{i,t-i}$$
$$+ \sum_{i=0}^{k_5} Q_{it} \Delta T\ddot{U}FE_{i,t-i} + \beta_{1i} HYY_{t-1} + \beta_{2i} GSYH_{t-1} + \beta_{3i} UP_{t-1} + \beta_{4i} KOFS_{t-1}$$
$$+ \beta_{5i} T\ddot{U}FE_{t-1} + \varepsilon_{it} \tag{2}$$

The significance of the β_i . coefficients in the model is investigated with the F statistic (Wald Test). The procedure applied here is called the bounds test. The hypothesis of the test is as in equation (3);

Modelde yer alan β_i katsayılarının bir arada anlamlılık durumları F istatistiği (Wald Test) ile araştırılmaktadır. Burada uygulanan işlem, sınır testi olarak adlandırılmaktadır. Testin hipotezi (3) nolu denklemdeki gibidir;

$H_0 : \beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$

$(There\ is\ no\ cointegration)$

$H_1 : \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq 0$

$At\ least\ one\ of\ the\ \beta_i\ 's\ is\ not\ zero. There\ is\ cointegration)$

If the bounds test is rejected, it is concluded that there is a cointegration relationship. As a result of the test, if the F statistic value is less than the lower critical value, it is understood that there is no long-term relationship (cointegration) between the series, and if it is between the lower critical value and the upper critical value, it is understood that there is no sufficient evidence for a cointegration relationship. If the F statistic value obtained is greater than the upper critical value, the H_0 hypothesis is rejected. Accordingly, it is understood that there is a cointegration relationship.

The ARDL bounds test results, which were conducted to decide whether there is a cointegration relationship between the variables of the model, are presented in Table 7:

Table-6: ARDL Bound Test Results

F-Statistics	8.333808	
K	4	
Level of Significance	Critical Value	
	Lower Limit	Upper Limit
%1	3.29	4.37
%5	2.56	3.49
%10	2.2	3.09
Diagnostic Tests	Statistics	
R²	0.999432	
Adjusted R2	0.998359	
Breusch-Pagan-Godfrey VaryansTest	0.689442 (0.7568)	
Breusch-Pagan-Godfrey LM Testi	4.566123 (0.0634)	
Jarque- Bera Normality Testi	0.554464(0.757879)	

Note: Critical values are taken from table CI(iv) in Peseran et al. (2001). Numbers in parentheses show probability values.

According to the results in the table, the term k indicates that the number of explanatory (independent) variables is 4. According to the ARDL bounds test result, since the F statistic value calculated at 1%, 5% and 10% significance levels is greater than the upper bound values, the H0 hypothesis is rejected. Therefore, it is concluded that there is a cointegration relationship. The existence of a cointegration relationship indicates that there is a long-term relationship between the variables. However, according to the diagnostic test results in the table, it is understood that there is no autocorrelation (Breusch-Pagan-Godfrey LM Test), heteroscedasticity (Breusch-Pagan-Godfrey Test) problem, and the error term has a normal distribution (Jarque-Bera Normality Test).

After the existence of a cointegration relationship is determined with the ARDL bounds test, the long-term relationships between the variables will be examined. The estimated long-term ARDL results are given in Table 7.

Table-7: ARDL Long-Term Forecast Results

Variables	Coefficient	t-statistics	Probability
GDP	0.320104	0.428657	0.4743
KOFS	0.574376	0.670738	0.4140
PU	5.498514	1.194762	0.0013
CPI	-0.150813	0.040780	0.0049
C	-37.57897	4.001045	0.0000

According to the long-term results in Table 8, a statistically insignificant relationship was found between GDP and interpersonal social globalization index (COFS) on the number of passengers carried by airline in Türkiye (HYY). In addition, a statistically significant and positive relationship was found between the number of passengers carried by airline in Türkiye (HYY) and urbanization (PU) variable. In addition, another result obtained is that the consumer price index (CPI) has a statistically significant and negative effect on the number of passengers carried by airline in Türkiye (HYY). According to these results, when the urbanization (PU) variable increases by 1 percent, the number of passengers carried (HYY) will increase by 5.49 percent. In addition, when the consumer price index (CPI) increases by 1 percent, the number of passengers carried (HYY) will decrease by 0.15 percent.

The results of the CUSUM and CUSUMQ tests applied to examine whether the model estimated with the ARDL method contains a structural break within the scope of the considered period and the stability status of the model are as follows:

Table-8: The Results of CUSUM and CUSUMQ Tests
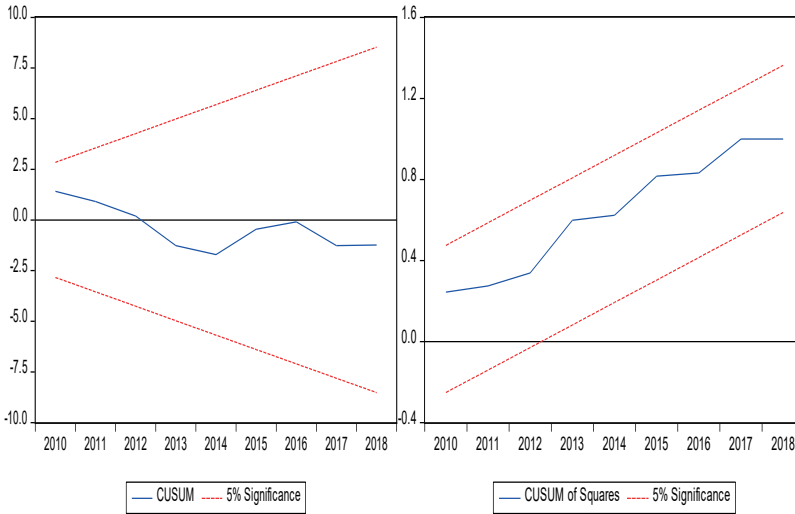
CUSUM and CUSUMQ tests were developed by Brown et al. (1975). The results of these tests show that the test values remain within critical limits. According to this result, it can be said that the model established for the analysis is stable and does not contain any structural breaks.

4. CONCLUSION

In the study, Autoregressive Distributed Lag Model (ARDL) and Error Correction Model (ECM) were used to analyze the relationship between the number of passengers carried by airline and GDP, urbanization, interpersonal social globalization index and consumer price index indicators in Türkiye during the period 1988-2022. According to the results of the ARDL analysis, while the urbanization (PU) indicator has a statistically significant and positive effect on the number of passengers carried by airline (HYY) in Türkiye, it was determined that the consumer price index (CPI) has a statistically significant and negative effect. In addition, it was determined that GDP and interpersonal social globalization index have no statistical effect on the number of passengers carried by airline (HYY). Considering the growth of civil aviation in Türkiye to date, it can be predicted that the aviation sector will exceed the world average in terms of size in the coming periods and achieve significant gains in bo macroeconomic and social terms.

4.1. Policy Implications

Policy recommendations regarding the relationship between GDP, urbanization, interpersonal social globalization index and consumer price index indicators and the number of passengers carried by airline can be listed as follows;

- Considering the positive impact of urbanization on airline transportation, it is important to irease airport capacities in large cities and rapidly developing regions. The construction of new airports or the expansion of existing airports will support economic mobility by meeting passenger demand in these regions.

- The negative impact of CPI on passenger demand reveals the importance of price stability in the airline sector. Airlines should take efficiency-enhancing measures to reduce their costs, and public authorities should develop policies that will reduce price fluctuations in the sector.

- The equal spread of transportation infrastructure throughout the country can reduce economic imbalances between regions. Investments in airline transportation, especially in developing cities, can revitalize local economies and accelerate regional development.

- Considering the potential impact of the interpersonal social globalization index, increasing international connections can support passenger demand. Opening new international flights by taking advantage of the advantages offered by Türkiye's geographical location will contribute to the country both economically and socially.

These suggestions can help Türkiye develop strategies to increase airline transportation demand and maximize the sector's contribution to economic growth.

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