THE MEASUREMENT OF THE RELATIONSHIP BETWEEN THE CIVIL AVIATION SECTOR AND ECONOMIC GROWTH THROUGH CO-INTEGRATION AND CAUSALITY ANALYSIS

[Měření vztahu mezi sektorem civilní letecké dopravy a ekonomickým růstem prostřednictvím kointegrační a kauzální analýzy]

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Abstract: Civil aviation services have become serious demand generating tools for all geographic locations. Understanding the economic conditions which make this demand increase possible, knowledge on external benefits and costs of the growth of international aviation sector plays critical role for the companies and countries which are keen on being competitive and economic growth. Improvements in aviation sector create base for analysing the legal context of air transport deeper and therefore companies in aviation sector analyse the market behaviour and take their position accordingly. Liberalisation of the aviation sector is another factor which triggers the demand increase. Liberalisation of the aviation sector in Turkey dates back to 2003. Since then with the help of increasing competition and decreasing costs together with increasing gross domestic product per capita gave rise to incrase in number of passengers. Domestic and international passengers carried in 2000 was approximately 35 million in Turkey however this number is almost increased to 174 milllion by the end of 2016. Therefore this study is aimed to investigate the underlying dynamics of that rapid increase and 1960-2016 annual data of number of passangers carrried both domestic and internationally together with gross domestic product. Within the scope of econometric analysis, stagnation of data is tested through ADF (Augmented Dickey-Fuller) unit root test. Variables are investigated whether they are cointegrated with Granger method and it is found that variables are cointegrated and long-run balanced relationship found between each other. After conducting Granger causality analysis it is found that there is a bi-directional causality relationship exist from gross domestic product per capita to number of passengers carried. Morever through regression analysis it is found that 1 dollar increase in gross domestic product per capita results 11873 increase in number of passengers carried with %5 significance level.

Keywords: causality test, civil aviation, co-integration analysis, economic growth.

JEL classification: C22, F43, J11, O47

Introduction
Globalization has given privilege to the ability of countries to create opportunities for their local businesses to compete successfully in the international arena (Peoples 2014). Easy access to low-cost transportation plays a vital role in enhancing the international competitiveness of companies.

Transportation is derivative service request which is recognized as an important sector of the economy, and its main role is to provide access to spatially separated locations for the business and household sectors, both for goods and for people's movements (Rodrigue 2012, 1; New Zealand Government 2014, 7).

Transportation infrastructure is an integral part of the transport system of any region, city and state (Skorobogatova and Merlino 2017; 319). The provision of transport infrastructure increases accessibility to resources, goods and markets, thus increasing the competitiveness of a region (Dodgson 1974; 80).

"Aviation'' is one of the most important discoveries made by human beings as a result of the correct use of force, time and space. It is defined as en aerospace, where the three elements of the strategy are brought together in the most perfect form and served to the service of humanity Strate (SHGM 2013-2017: 2). Aviation activities have become an important actor in global development with all aspects.

Civil aviation is one of the key contributors to a successful economic system (Baaj 2002;p7). Therefore the relationship between the development of civil aviation and economic growth has become the focus of research in the field of research and industry. A more competitive and efficient airline industry not only leads to increased employment and economic output of the aviation industry, but also benefits other sectors such as tourism, logistics and trade. In addition, the importance of international air transportation as a facilitator of international trade is increasing day by day (Fu and Oum 2014).

Recent cost-effectiveness gains and technological advances in air transport services offer carriers an alternative mode for traditional transport services. For example, fuel efficiency improvements of aircraft, flexible operation rules and the formation of carrier alliances contribute to the increase of the use of air transport to transport export goods. In addition, increased global demand for high-value, low-volume products, such as electronic devices, contribute to the applicability of air transport services as an alternative to a lower cost, shorter delivery time (Peoples 2014:1).

The superior features of air transport, such as higher speed, safety and reliability over alternative modes, have positive economic impacts on both the expenditure and transportation effects of air transportation (Özcan 2014; Alshammary 2017). Economists and policymakers focused more on transport effects, including the benefits that have been promoted, when transport costs and services are improved, travel time is reduced, increased reliability and safety, and reduced transport costs as a result of reduced emissions (Taylor and Samples 2002). The reduction in transport costs not only reduces the total production costs of firms, but also attracts new businesses that aim to benefit from reduced costs (Alshammary 2017;22).

Despite all political and economic adversities in the world, air transportation is increasing its importance every year as well as other modes of transport and passenger and cargo transportation continues to grow steadily. Developing countries have begun to come to the forefront as a result of the interest of the middle class on air transportation in the context of population increases and economic developments (TOBB 2017).

The causal relationship between economic growth and civil aviation attracts researches' attention. On one hand, economic development can create the requirements of civil aviation. On the other hand, civil aviation transportation services can drag the development of national economy. In terms of Turkish civil aviation, the role of the two varies inside is not only a theoretical issue but also related to the country's future policy orientation of the industry. If the economic development is dominated, the state should use market-based policy guidance on the civil aviation industry.

In recent years, air transport service has been recognized as a global phenomenon that creates a serious demand for all geographical regions. Having a better understanding of the economic conditions facilitating this growing demand and gaining more knowledge of the external benefits and costs associated with the growth of international air transport is critical to countries and companies planning to compete economically or to grow in the twenty-first century (Peoples 2014).

Related research in recent years has focused mainly on the evaluation of air transport demand or civil aviation and economic growth or regional economic growth (Hakim and Merkert 2016; Brindis et al. 2016; Brida et al. 2016; Saheed et al. 2015; Yao and Yang 2012; Hui-yun and Mei-gui 2011; Xiao-Jin and Xin 2010).

This study examines the relationship between the number of passengers transported in the civil aviation sector and the per capita income in order to investigate the underlying dynamics of development in the civil aviation sector. The paper structured as follows. In the first section information related with the civil aviation sector in both Turkey and the World is given. Literature about relationship between the development of civil aviation and economic growth is given in the second section. In the third section the metedology and emprical results will be given. The results of the analysis will be given in the last section.

1 General Overview of Civil Aviation Sector

In recent years, air transport service has been recognized as a global phenomenon that creates a serious demand for all geographical regions. Having a better understanding of the economic conditions facilitating this growing demand and gaining more knowledge of the external benefits and costs associated with the growth of international air transport is critical to countries and companies planning to compete economically or to grow in the twenty-first century. By providing in-depth analysis of the changes in the air transport sector, the changes in the legal environment of international air transport, analyzing the market behaviors of airline companies in this new environment, it is important to change the behavior of trade in the airline market in international airline transportation and to examine the benefits of external costs and growth.

Although the first aviation efforts began in 1912 in Turkey, institutionalization could be achieved in 1925 by establishment of "Turkish Aeronautical Association". First civil air transportation was initiated by establishment of " State Airline Adminisration" which then transformed to so called Turkish Airlines. In 1933 and in 1954 "General Directorate of State Airports Authority" and "General Directorate of Civil Aviation" was established respectively due to the response to the need of regulatory and inspectory authorities in the sector through which important steps taken for the procurement of infrastructure, facilities and equipments. Civil aviation sector which took its legal background by the announcement of civil aviation law in 1983 was able to increase service quality, and reliability through enchanced airports. Turkey was the side of "International Civil Aviation Agreement-Chicago Contract" in 1945 which is the root of international civil aviation at the same time Turkey was one of the founder members of "International Civil Aviation Organization (ICAO)". Morever Turkey Became founder member of "European Civil Aviation Conference (ECAC)".

International air transportation has grown with two digit numbers until petrolium crise in 1973. Technical improvements were the key factors for this growth. These improvements while providing high speed, bigger dimension and reduced costs at the same time caused less flight prices naturally. Rise of households real income and increase in the time that they are willingness to spend for holiday also increased the demand on air transportation.

Civil aviation activities which are milestones of economic and social developments of countries, despite the wars and economic crises etc. have shown increasing trend around %4-%5 annual growth on average in 1980's. After 1990s new companies entered into market and that created intense competition among rivals ın this context in 2003 liberalisation decision was the breakthrough for Turkish civil aviation sector (İlarslan et. Al. 2014). According to the data of civil aviation authorities by the end of 2016 there were 156 aviation businesses, with 540 aircraft and 231 air taxi , 347 aircraft for general aviation businesses, 237 baloons and 62 agricultural spraying firms with 1417 air vehicle exist in Turkey. Furthermore the number of bileteral air transportation agreements which allows Turkey for international operations, reached 168 countries and expanded its international flight network to 286 destinations in 118 by the end of 2016 (DHMİ 2017). With these agreements Turkey has been the fastest developed country in terms of number of flight network. After adopting regional aviation policy in 2003 sector has shown rapid growth. The development of the aviation sector between 2003-2017 can be seen in table 1.

Table 1: Development of Aviation Sector in Turkey

	2003	2017
Number of Plane	162	517
Income (Billion TL)	3,1	70,2
Number of Passenger (Million)	30	138
Number of Airport	26	55

Source: SGHM, 2017

When we look at the global picture of civil aviation in the world today; more than 920 air carriers in the world, more than 4,200 airports, approximately 170 air navigation providers 62 thousand aircraft with an average of 3 billion passengers a year is served (Aksoy and Dursun 2018: 1063).

In air transportation, Turkey is among the one of the fastest growing countries in the world and Europe. It has been observed that the growth rates have continuously increased except for the small fluctuation in 2016 according to table two. Nevertheless the number of passengers increased from 174 million in 2016 to 193.3 million in 2017 and increased by 11 percent in a single year (Aksoy and Dursun 2018:1066). In the table two below detailed information about number of passenger increase is given.

Table 2: Turkey's annaul air transport passenger numbers (in Thousand)

Years	Domestic	International	Transit	Total
2017	109.599	83.443	287	193.319
2016	102.499	71.244	410	174.153
2015	97.041	84.033	363	181.437
2014	85.416	80.304	461	166.181
2013	76.148	73.282	566	149.996
2012	64.721	65.630	678	131.029
2011	58.258	59.362	672	118.292
2010	50.575	52.225	736	103.536
2009	41.227	44.281	616	86.124
2008	35.833	43.605	527	79.965
2007	31.949	38.347	418	70.715
2006	28.774	32.880	616	62.271
2005	20.529	35.042	547	56.271
2004	14.460	30.596	-	45.057
2003	9.147	25.296	-	34.443

Source: www.dhmi.gov.tr

GDP is critical parameter which shows us the development of the countries. It is expected that as the GDP increases, the welfare of the individuals also increases as well. Therefore in the following table we can have a clear look at the development of the GDP per capita in Turkey.

Figure 1: Development of Gross Domestic Product Per Capita in Turkey between 1960 - 2017

GDP Per Capita between 1960-2017
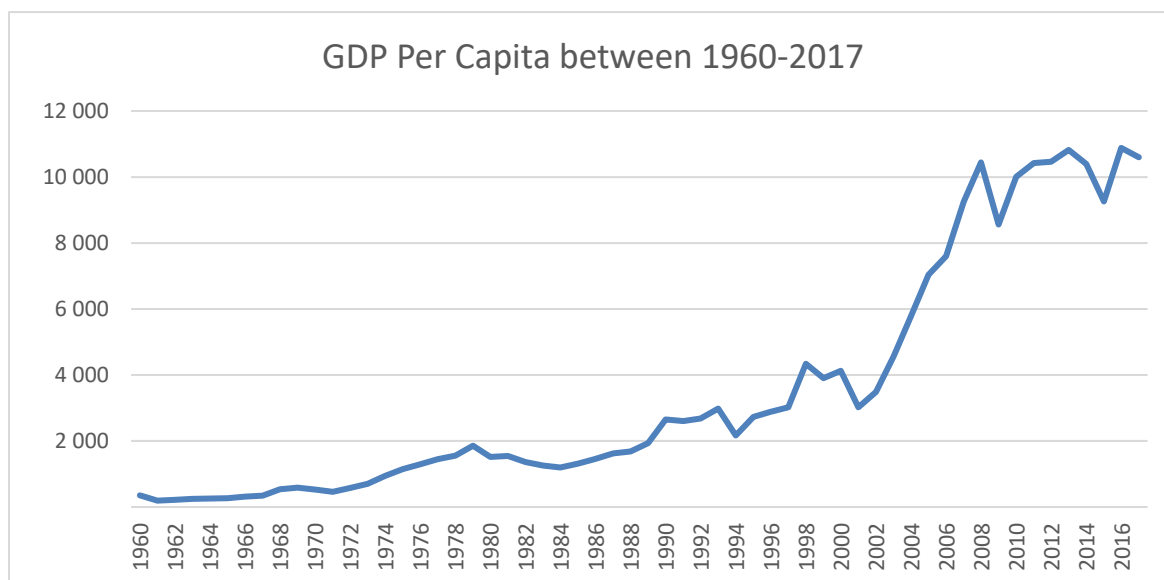
Source: www.tuik.gov.tr

In the figure above it can be seen that GDP per capita in Turkey increased from 4000 Dollars level in 2002 to 11000 Dollars in 2017. Increasing GDP has given rise to alternative transportation modes like airline industry. It is no surprise that structural changes in the national economy like liberalisation decision taken by market regulators in airline industry in Turkey also influenced the sectoral growth.

In order to make right comparision of the airline industry, we should also emphasize on the number of passengers worldwide. In Figure 2 the development of the number of passengers carried by airline industry is given.

Figure 2: Number of Passenger Carried Worldwide
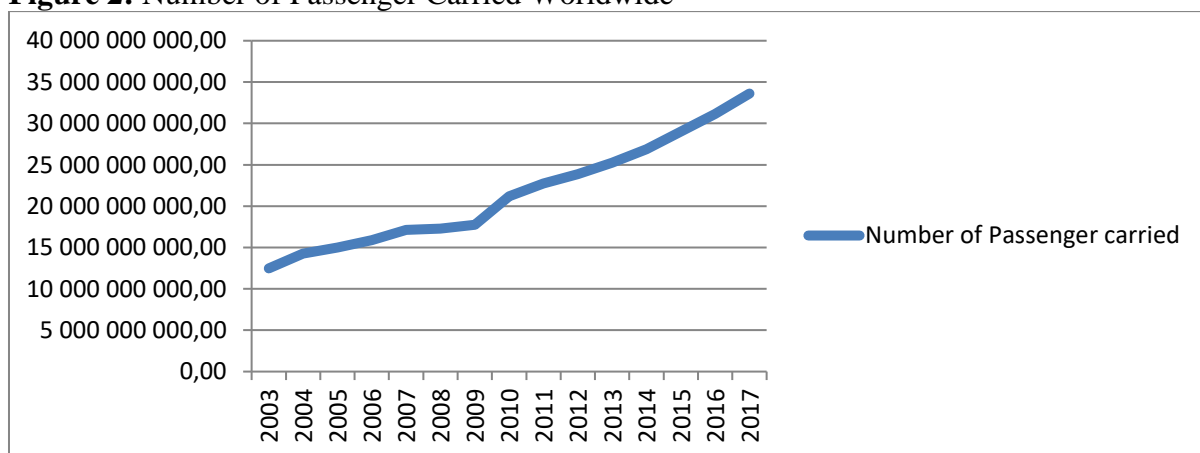
Source: www.data.worldbank.org

When we look at the numbers above, it can be clearly seen that number of passenger carried worldwide is almost tripled from 12 Billion passengers in 2003 to 34 billion in 2017. However we can say that passenger number growth in Turkey (from 34 million to 193 million) is more steady than world average.

2 Literature Review

The relationship between the development of civil aviation and economic growth has become the focus of research both for researchers and industry. Literature on the civil aviation sector will be given in this section.

Chang and Chang (2009) used the Granger causality test in their study to examine the relationship between expansion and economic growth in air cargo transportation in Taiwan through GDP and air cargo volume data between 1974-2006. According to the results of the cointegration tests, the variables are cointegrated, air cargo transportation expansion and long-run equilibrium and bi-directional causality between Taiwan's economic growth and air cargo width play an important role in supporting the economic growth of Taiwan.

Marazzo et al. (2010) investigated the relationship between economic growth and air transportation in Brazil. GDP and air cargo volume data for the period of 1966-2006 were used in the sturd. Unit root tests, Johansen cointegration test, Error Correction Model, and Granger causality test showed that the variables were cointegrated, and that a positive change in GDP gave a greater response to the number of airline passengers. They have concluded that there is an equilibrium relationship between the them in the long-run.

Fernandes and Pacheco (2010) investigated the causality relationship between economic growth and domestic passenger demand in Brazil. In the study, passenger demand was represented by total domestic passenger-kilometer and economic growth represented by GDP. Cointegration test and VECM Granger causality tests were applied by using the data of 1966-2006 period. As a result, they stated that there is bi-directional causality from economic growth to domestic passenger demand in the short run.

Xiao-Jin and Xin (2010) analyzed the relationship between civil aviation and economics in China by using cointegration and Granger causality test. Data for the period 1985-2008 were used in the study. According to the results of the study, there is a stable relationship between the development of civil aviation and the economy in the long-run and besides that Granger causality test showed that total aviation revenue of civil aviation is Granger cause of GDP and civil aviation plays a stronger role in the relationship.

Hui-yun and Mei-gui (2011) investigated the relationship between air transportation and economic growth. In the study, annual data of GDP and the total turnover of air transport were used. Long-run equilibrium equation and ECM (error correction model) model was established and cointegration test was performed. As a result of the study, it was revealed that economic growth can support the development of civil aviation significantly, on the contrary, they revealed that the development of civil aviation played a powerful catalyst role on economic growth.

Yao and Yang (2012) studied the relationship between air transport and regional economic growth by using the annual data of the regions in China in 1995-2006 period. Panel data analysis method was used in the study where production function approach was used. As a result of the study, air transport was positively associated with economic growth.

Chi and Baek (2013), examined the long and short-run effects of economic growth and market shocks on airline passenger and freight transport services in the USA through ARDL cointegration test by the monthly data of January-1996-March-2011. As a result of the study, it was concluded that passenger and freight services tend to increase with economic growth in the long-run, and that only passenger services in the short-run respond to economic growth.

Baker et al. (2015) examined the relationship between regional aviation and economic growth in Australia in the context of cointegration causality analyzes. They stated that there is a bidirectional causality relationship between variables through Johansen cointegration test, VECM analysis, unit root tests, panel causality tests.

Hu et al. (2015) investigated the relationship between domestic airway passenger transport and economic growth in China using quarterly data for the period 2006-2013. Panel unit root test, panel cointegration and panel causality tests were used in econometric analysis stage. As a result of the analyzes, it was stated that there is a long-run equilibrium relationship between the variables, and a 1% increase in airway passenger traffic leads to an increase of 0,9% in GDP. In addition, it was stated that there was a long-run and strong bidirectional Granger causality relationship between these two series.

Saheed et al. (2015) investigated the impact of the development of air transport in Nigeria on economic growth between the period of 1980-2012. According to the results derived from the analysis using dynamic least squares (DOLS) cointegration, Granger causality and error correction model (ECM), they stated that air transport has a positive effect on economic growth.

Brida et al. (2016) examined the relationship between long-run air transport demand and economic growth for Mexico. They investigated the causality relations between real GDP and the number of airline passengers by Johansen cointegration test, VECM Granger causality test with the quarterly data for the period 1995-2013. The results of the study indicated that the causality relationship between the variables was positive and bidirectional, and that the increase in air transport width of the effect-response analysis showed a positive effect on economic growth in the country.

Brindis et al. (2016) investigated the long-run effects of air transport demand and economic growth in Chile. Johansen cointegration analysis was used in the study in which the data for the period 1986-2014 were used. As a result of the study, they showed that the causality relation was positive and bidirectional. Furthermore, according to the impulse response analysis, an increase in the size of air transport expansion in Chile has a positive effect on economic growth in the country.

A similar study was conducted by Hakim and Merkert (2016). In this study, the relationship between air transport and economic growth has been evaluated in the context of South Asian countries. They used Pedroni / Johansen cointegration test and Granger causality tests through the annual data of 1973-2014. As a result of the analyzes, they stated that there is a long-run and bi-directional causality from GDP to air passenger traffic and air transport volumes.

Bal et al. (2017), examined the relationship between the passenger and cargo transport in the aviation sector and economic growth in Turkey. In the study the annual data of 1967-2015 period was used. Unit root tests, cointegration test, and VECM Granger causality tests were conducted. As a result of the econometric analyzes, it has been stated that the aviation sector has affected economic growth in a single direction and positively in the long-run.

3 Econometric Metodology and Emprical Results

3.1 Aim
Total number of both domestic and international passenger carried by aviation sector was approximately about 35 million in 2000 however this number has reached to 174 million by the end of 2016 almost five times higher than the year 2000. In this study it is aimed to find out the dynamics which lies under this rapid development in the sector hence it is aimed to investigate whether there is a causality relationship exist between gross domestic product and number of passengers carried by aviation sector in Turkey.

3.2 Data
In the study annual data of 1960-2016 period is used. Total number of airline passenger is collected from the offical website of Civil Aviation General Directorate and gross domestic product numbers are collected from the official website of Central Bank of Turkey.

3.3 Method
In this phase we can have a general overview toward recognizing the variables with the help summarized statistical informations.

Table 3: Descriptive Statistics

Variables	Mean	Median	Max.	Min.	Std.Dev.	Skewness	Kurtosis	Obs.
Passenger	33782819	10840179	181000000	713217	47915197	1.817096	5.289672	57
GDP P.share	3665.311	2021.861	12542.93	285.0127	3812.146	1.185134	2.951769	57

Source: own

In table 3 statistical results of dependent and independent variables which are used in empirical analysis indicated. While number of passengers carried is (33.782.819∓47.915.197), GDP per capita is (3.665$∓3.812$) for the given period. For both variables skewness and kurtosis values are far from 0 and in addition as the mean and median values have tremendous difference between each other it can be said that variables are not normally distributed.

In the study, data are tested by ADF unit root test whether they are stable or not. In the next phase variables are investigated whether they are cointegrated or not through Engle- Granger method and at the last phase it is aimed to find out whether if there is any relationship exist between variables through Granger causality test and if so direction of the relationship will be determined.

3.3.1 Unit Root Test
Stationarity of data plays crutial role in the econometric analysis of time series. If the data are not stable, the results of the econometric tests will be fallacious. In other words stationarity is important because if data are not stable the results of the classical regression analysis will be invalid. Regression analysis which are conducted with non-stationary data might be unmeaningful and therefore that situation is called spurious (Asteriou and Hall 2007: 231). If a time series have average and stable variance in time, it can be said that it is stationary. A stable series flactuates around constant average (long term average) and it tends to turn average (Hill et. Al. 2011: 476-477). In this scope unit root test is the most common and valid method for measuring whether the varibles are stationary or determining the order of stationarity (Gujarati, 2005: 718). In the study Augmented Dickey- Fuller (ADF) root test is used which is the most common unit root test in testing the stationarity of the variables (Kennedy 2003: 351 ; Hill et. Al. 2011:488).

Table 4: ADF Unit Root Test Results

Variables	Level			First Difference		
	Model 1: Intercept	Model 2: Trend and Intercept	Model 3: None	Model 1: Intercept	Model 2: Trend and Intercept	Model 3: None
Total Number of passengers	5,9629	-0,2378	7,9517	-3.0371	-3.6726	-2.6919
GDP per Capita	0.5557	-1.5446	1.8752	-7.1091	-7.2865	-6.6175
Critical Values						
%1	-3.5526	-4.1338	-2.6069	-3.5550	-4.1338	-2.6076
%5	-2.9145	-3.4936	-1.9467	-2.9155	-3.4936	-1.9468
%10	-2.5950	-3.1756	-1.6130	-2.5955	-3.1756	-1.6129

Source: own

As t- statistics of the all three models for both variables are found to be bigger than critical values at %1, %5 and %10 significance levels, null hyphothesis (H_0= Series are non-stationary, unit root exist) can't be rejected which represent series are non-stationary. Hence this series are non-stationary and include unit root. In the next phase the first difference of variables are taken and first varible (Total number of passenger) is statistically significant at %5 and %10 for first and second model and second variable (GDP per capita) in all three model found to be smaller in critical test values in terms of t-statistics. Therefore the null hyphothesis is rejected.   The series of total number of passenger and GDP per capita are stationary and don't include unit root. Thus these two variables are stationary at the same level.

3.3.2 Cointegration Analysis

Cointegration means that while on one hand two or more time series which are not stationary individually, their linear combination becomes stationary on the other hand. In other words if two or more time series are cointegrated then these two series have long term balanced relationship between each other (Gujarati 2005:730). This situation indicates that cointegration refer to mutual dependence and balanced relationship for two or more variables in the model (Marazzo et. Al. 2010: 262). In this phase of the study as the variables are stationary at the same level (first difference) cointegration analysis conducted. In this scope VAR model is created in order to find out approppriate number of lag and in table four calculated length of lagged values can be seen over that model.

Table 5: Determination of the Optimal Length of Lag

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1466.680	NA	4.02e+21	55.42188	55.49623	55.45047
1	-1290.307	**332.7788***	6.02e+18	48.91724	**49.14029***	**49.00302***
2	-1286.212	7.417536	6.00e+18*	48.91365*	49.28541	49.05661
3	-1285.438	1.343251	6.80e+18	49.03540	49.55585	49.23554
4	-1281.286	6.893745	6.78e+18	49.02966	49.69882	49.28699

Source: own

As it can be seen in table five above approopriate lenght of lag is determined as one. After determining approopriate lenght of lag, Enger-Granger cointegration test will be applied in order to find out long term balance relationship of variables. Enger-Granger cointegration method is used only when there is a single cointegration relationship exist and its inclusions are grounded to unit root analysis (Yavuz 2014: 402). In Enger-Granger (E-G) test first variables regress to level values through least square method. Then error term is obtained for unit root testing of it. If error term turns out to be stationary then cointegration could be meantioned (Ata and Yucel 2003: 103).

Table 6: Regression Results of the Variables

Dependent Variable: Total number of passengers				
Variable	Coefficient	Standard Error	t-statistics	Probability
C	-9736419.	2927320.	-3.326053	0.0016*
GDP per Capita	11873.27	556.0785	21.35179	0.0000*
R²: 0.8923	F statistics: 455.8991			
Adj. R²: 0.8903	Probability (F-statistics):0.0000			

* statistically significant at %5.
Source: own

Regression analysis results of the level values of variables can be seen in table six. According to that constant and GDP per capita variables are both found to be significant at %5. Morever the model is statistically significant overall and %89 of change in dependent variable is explained by independent variables. According to that result 1 dollar increase in GDP results 11873 people increase in the number of passengers carried. In regression analysis if there is a omitted variable bia exist which effects the relationship between dependent variable and descriptive variables then the most important problem of the regression analysis come into existence (Leighter and Inoue 2012:1). Therefore inflation rates and Dollar/Turkish Lira Exchange rates are also added to the model in order to test whether there is an omitted variable bia exist or not and test results are showed in table below.

Table 7: Omitted Variable Test

Omitted Variable Test	Inflation		Dolar/TL	
	Value	Probability	Value	Probability
t-statistic	0.8408	0.4041	0.9727	0.3350*
F-statistic	0.7071	0.4041	0.9462	0.3350*
Likelihood Ratio	0.7154	0.3892	0.9901	0.3197*

*: statistically significant at %5.
Source: own

According to test results as p values are bigger than 0.05 H0 hyhotesis is rejected which represent Dollar/Turkish Lira exchange rate is not meaningfull at %5 significance level. Consequently it is found that there is no omitted variable bia in the model.

ADF unit root test results of the error terms obtained by this model is given in table eight below.

Table 8: ADF Unit Root Test Results of Regression Error Terms

		Model 1: Intercept		Model 2: Trend and Intercept		Model 3: None	
		t- statistics	probability	t- statistics	probability	t- statistics	probability
ADF test statistics		-3.1957	0.0261	-4.3420	0.0062	-3.3083	0.0014
Critical Test Values	%1	-3.568308		-4.165756		-2.612033	
	%5	-2.921175		-3.508508		-1.947520	
	%10	-2.598551		-3.184230		-1.612650	

Source: own

According to the unit root test results for error term while model 1 is stationary at %5 and %10 significance, model 2 and model 3 are statistically significant at all three significance level. To put it in another way when ADF test and critical values are compared null hyphothesis is rejected, error term is stationary at all three significance level (%1, %5 and %10) and no unit root exist. Within this framework variables are cointegrated and there is a long term balanced

relationship exist between each other. More clearly as Yıldırtan et. Al. (2011:266) stated that even though total number of passengers and GDP per capita series are not stationary at level, there is no inconvenience of involvement in regression equation with non-stationary extent (with level values).

3.3.3 Granger Causality Test

In previous phase long term relationship between total number of passengers and GDP per capita variables were found through Enger-Granger cointegration analysis. However that analysis is insufficient of giving information about the direction of interaction between variables. Therefore the direction of the interaction between variables tried to be determined within the framework of granger causality test. Within the scope of length of lag which was determined early on Granger causality test results between number of passengers and GDP per capita variables are showed in table nine below.

Table 9: Pairwise Granger Causality Test

Null Hyphothesis	F-statistics	Probability	Decision	Result
GNP per capita is not a reason of total number of passenger in terms of granger causality	22.9852	0.0000*	Rejected	GNP per capita is Granger causal for total number of passenger
Total number of passenger is not a reason of GNP per capita in terms of granger causality.	1.80422	0.1849	Accepted	Total number of passenger is not Granger causal for GNP per capita

* Statistically significant at %5.
Source: own

According to the table nine there is a one way causality relationship from GDP per capita to total number of passengers found at %5 significance level. In other words there is a cointegrated structure exist between variables in the long term and it is particularly observed that GDP per capita feeds total number of passengers.

Conclusion

Civil aviation sector which is one of the fundamental dynamics of modern life and at the same time is the one of the basic indicator of economic and social development of countries, has been adversely influenced by wars, economic crisis, high oil prices, globalisation of competition and such other macro factors. With the help of increasing competition and the wealth of individuals made aviation sector more accessible for all layer of society.

The aim of this study is to investigate the relationship between GDP per capita and total number of airline passengers for the period which scopes 1960-2016 in Turkey. Our findings show that total number of passengers and GDP per capita series are stationary at first diffrifence and cointegrated nominately there is a long term balanced relationship between series (variables). In addition to this according to granger causality test results GDP is found to be one of the reason of the total number of passenger. Furthermore according to regression result it is found that 1 dollar increase in GDP results 11873 people increase in the number of passengers carried. The emprical findings of our study also supports the local and international literature as well.

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