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THE LONG-RUN RELATIONSHIP BETWEEN AIRLINE TRANSPORT, EXPORT VOLUME AND ECONOMIC GROWTH: EVIDENCE FROM USA

Funda YAĞAR EĞİLMEZ[1]

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ABSTRACT

The major goal of this manuscript is to determine the overtime changes in series and to examine the long-run stable linkage among air transportation, export volume and economic growth (GPD) for USA from 1980 to 2017 as annual data by using Johansen co-integration test, VAR analysis, variance de-composition and impulse response. Stationary tests of entire variable indicate that air transportation, export volume and economic growth are stationary at the first differences I(1) which are determined through ADF unit root test. According to empirical results of this manuscript, Johansen co-integration test determine the long-term stable relationship among air transportation, export volume and economic growth (GPD). On the other hand, according to the findings of multivariate regression analysis of three variables at Table 5, the impact of export capacity have considerably important on economic growth which is coincide with variance de-composition analysis at Table 4. The findings of this study suggest that appropriate policy should be applied to increase trade volume, air transportation including civil aviation and air freighter would boost considerably the economic growth (GDP) of USA. The government should exercise influence over imports of goods and services in order to provide the maximum benefit from trade in terms of increasing the export volume. In this context, the government should apply import restrictions through legislative regulations.

Keywords

Economic Growth,
Airline Transport,
Export Volume,
Co-integration Test

HAVAYOLU TAŞIMACILIĞI, İHRACAT HACMİ VE EKONOMİK BÜYÜME ARASINDAKİ UZUN-VADELİ İLİŞKİ: ABD'DEN KANITLAR

ÖZ

Bu yazının temel amacı, yıllık veriler halinde 1980'den 2017 dönemine kadar ABD için hava taşımacılığı, ihracat hacmi ve ekonomik büyüme (GPD) arasındaki uzun dönemli istikrarlı ilişkiyi, Johansen eş-bütünleşme, VAR, etki-tepki ve varyans ayrıştırması analizlerini kullanarak incelemektir. Tüm değişkenlerin ADF birim kök testi neticesinde birinci dereceden farklarının alındığı I(1) düzeyinde durağanlaştığı görülmüştür. Bu makalenin Johansen eş-bütünleşme testi uygulanarak elde edilmiş olan ampirik sonuçlarına göre, hava taşımacılığı, ihracat hacmi ve ekonomik büyüme (GPD) arasında uzun vadeli istikrarlı bir ilişki tespit edilmiştir. Ayrıca, Tablo 5'teki üç değişkenin çoklu regresyon analizi bulgularına göre, ihracat kapasitesinin ekonomik büyüme üzerindeki etkisi oldukça anlamlıdır ve Tablo 4'teki varyans ayrıştırması analizi ile örtüşmektedir. Bu çalışmanın bulguları, ticaret hacmini arttırmak için uygun politikaların uygulanması gerektiği, sivil havacılık ve hava kargo uçağı dahil hava taşımacılığının ABD'nin ekonomik büyümesini (GSYİH) önemli ölçüde tetikleyeceğini ortaya koymaktadır. İhracat hacminin arttırılması konusunda ticaretten maksimum fayda sağlamak için devlet mal ve hizmet ithalatı üzerinde etkili olmalıdır. Bu bağlamda, hükümet yasal düzenlemeler yoluyla ithalat kısıtlamaları uygulamalıdır.

Anahtar Kelimeler

Ekonomik Büyüme
Havayolu Taşımacılığı
İhracat Hacmi
Eş-bütünleşme Testi

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[1] *Dr., Beykent Üniversitesi, fundayagar@gmail.com*

1. INTRODUCTION

Airline, which is indispensable for the world economy although the transportation sector is interrupted from time to time due to economic crises, epidemics and terrorist events, it continues to grow in the long-term. Factors such as the increase in world trade volume, economic growth, development in the tourism sector, increasing city population, globalization, and the opportunity of a faster and more comfortable travel by air transport are the main factors that support the growth of the sector in the world. Nowadays, economic plans and projects manage the transportation, investments, trade activities and logistics channels which are indispensable consequence of expedited globalization process and natural impacts of the growth on lots of economies. In this sense, high demand in the global logistics market enhances economic growth and speeding up the globalization process day by day. Transportation channels for freight and civil aviation have been developed in the 20. Century in consequence of the developments in terms of technology but, notably development process entered a new phase since World War II. Besides, air transportation has been developed since Chicago Convention through higher passenger and freight volumes which have been shaping air transportation in the international arena but it was also a key start point how to manage the complicated aspect of the global economies. Therefore, the developed economies do not only act in the local markets but integration of those economies has linked strictly to each other via transport channels and mostly the transportation had a key role with the liberalization which has pervasive influences among countries during globalization period as well. The one of the most significant key issue is connected to the contradictory effect of air transport on the economic influence of passenger capacity and socio-economic impacts at domestic and global level. The major goal of this manuscript is to reveal the effect of export volume and air transport on the sustainable development of the region in terms of economic affairs. In this context, the following tasks have been determined: to follow the course of development of the aviation market, to review the literature regarding the air transport, economic growth and export volume, to examine the effect of passenger flow, freight capacity and export volume on the economic growth from 1980 to 2017 by implementing several econometrical models involving ADF unit root test, co-integration test, VAR analysis, variance de-composition test and impulse

ARHUSS

response analysis for USA in methodology part. Finally in conclusion part, the results of empirical analysis and findings are interpreted in conclusion part by providing some evidence.

2. LITERATURE REVIEW

A significant body of academic literature has examined various features of the effect of civil aviation on economic growth. For instance, recent works relating to the effects of air transport and infrastructure (e.g. Fu, Oum, and Zhang (2010); Kalayci and Koksal (2015); Kalayci and Yazici (2016); Baker and Merkert, Kamruzzaman (2015); Brida, Rodríguez-Collazo, Lanzilotta and Rodríguez-Brindis (2016); Coppio, Caetano, Alves, Cividanes and de Lima (2017); Profillidis and Botzoris (2015); Yao and Yang (2012) have recommended that the existence of air transport is crucial to domestic economic development, the enhancement of social interests and employment growth.

Zhang and Graham (2020) state that developed domestic endowment influenced by the operation of logistics could generate so many economic impacts: Much more investments, developed sectors, better economic growth, more production capacity and further effect the interaction of both short-term and long-term positive influence at the macroeconomic level. In this sense, congener results have been confirmed by several works on the economic effects of other transport types, including those of aviation activities. Allroggen & Malina (2014) use panel data analysis considering the variables as civil aviation, economic growth, labour force, capital stock, production costs, and aircraft movements. According to their findings there is a significant contribution of air transport to regional economic development in Germany. Baker, Merkert and Kamruzzaman (2015) analyze the considerable impact of domestic civil aviation on GDP and they discuss the short-run and long-run nexus among domestic civil aviation and GDP in Australia from 1985-86 to 2010-2011. Their findings reveal that the domestic civil aviation influences regional economic growth. Baltaci, Sekmen, and Akbulut (2015) investigate the relationship between active airports and its traffic frequency in terms of the impact on macroeconomic variables. In this work, two stage least square is used through panel data for 26 sub-regions at NUTS 2 level in Turkey from 2004 to 2011. The findings of this paper indicate that increasing in volume of airports and its traffic capacity has a substantial impact on regional economic development in Turkey. Brida, Rodríguez-Collazo, Lanzilotta and Rodríguez-Brindis (2016) discuss about the long-term linkage GDP and civil aviation

in Mexico, and find that there is two-sided causality among the relevant variables. In addition, Granger causality test indicates the positive and substantial effect of gross capital formation and telecommunication infrastructure on GDP for all individual economies. The same effect is obtained for the two sub-groups as well. Brida, Bukstein and Zapata-Aguirre (2016) implement time series analysis from 1970 to 2012 to investigate the nexus among civil aviation and GDP by using co-integration and Granger causality test. Their findings confirmed the existence of co-integrated relationship among the civil aviation and GDP**.** Chi and Baek (2013) concentrate more on the substantial data for civil aviation capacity for the USA air transport sector. In this context, the paper determines that both freight capacity and aggregate passengers tend to increase with economic growth. Besides, they reveal the long-term influences of GDP and market shocks on freight capacity and aggregate passengers. The findings of ARDL model indicate positive impact of freight capacity and aggregate passengers on GDP in the long-term. Coppio, Caetano, Alves, Cividanes and de Lima (2017) state that relationship among civil aviation and GDP is very significant. For this reason, the target of their work is to clarify the effect of economic growth and Inflation on civil aviation which implemented linear regression in between 2013 and 2015 involving seven air centers in Brazil. Findings reveal that there is a substantial effect of economic growth and Inflation on civil aviation. Hakim and Merkert (2016) investigate causal linkage among air transport and GDP for South Asia. Their findings demonstrate long-term one way causality running from economic growth to civil aviation. Country specific Time Series Cross Section tests verify their findings. They examine the causal linkage among civil aviation and GDP in South Asia, implementing panel data of 1973-2014. The findings demonstrate the existence of long-run one-way Granger causality running from economic growth to civil aviation both of passenger activities and freight.

Jin, Wang and Liu (2004) use a longitudinal analysis of Chinese civil aviation patterns from 1980 to 1998. They empirically reveal that volume of civil aviation triggers economic growth and the civil aviation centroid from the point of passenger capacity was located in Hubei and migrated southeast, coincide with the general trend of economic centroid migration as coastal and south regions developed faster than other regions. The pioneering work regarding air transport-growth nexus is conducted by

ARHUSS

Marazzo Scherre and Fernandes (2010) analyze the linkage among aviation demand and economic growth for Brazil. Passenger-kilometer is considered as a proxy of aviation demand and determined a long-term stable relationship among the variables implementing vector autoregressive model. The results demonstrate substantial positive causality from economic growth to civil aviation demand but relatively weaker causality other way around. Profillidis and Botzoris (2015) investigate correlation among civil aviation and GDP from the point of geographical orientation. Findings indicate a stable demand for air travel in future, as compared to the past three decades and demonstrating that economic growth empirically affects civil aviation. Yao and Yang (2012) demonstrate the linkage among air transport and regional economic growth of the regions for China from 1995 to 2006 annalistically. Panel data analysis method is implemented in the work where production function approach is considered. As a result of the work, air transport is positively correlated with economic growth. Erdem, Tsiotas and Cubukcu (2019) investigate the dynamics impact of air transport network on regional and urban development. According to their results, the effect of cargo transportation is relatively more than civil aviation on economic growth. Kalayci and Yanginlar (2016) investigate the impact of air transport on economic growth from 1974 to 2014 by using multiple linear regression (MLR), Johansen co-integration test. They find that there is a long-run relationship between economic growth, FDI and air transportation. The results are consistent with this paper's findings.

There is lack of study regarding the relationship air transport, export volume and economic growth which is involved in this study. However, those variables are taken into account separately in academic literature. The thing that makes this study different is that these three variables (air transport, export volume and economic growth) are used together. Cahyadin and Sarmidi find out the long-run relationship between export volume labour force, external debt and economic growth by using ARDL model from 1980-2016. According to their results, the CUSUM findings verify that ARDL estimation technique for both Indonesia and Malaysia are remained constant. The government should encourage the domestic sector to synergize their policy formulation in achieving their economic growth target in the short-term. Industries play a crucial role in managing FDI exactingly and promote increased productivity and market capacity. Fu, Supriyadi, and Wang (2018) demonstrate that China's OFDI in Indonesia was examined

to be characterized by fluctuations in investment volume and amount of projects were locationally scattered. The evolution of China's OFDI in Indonesia was determined to be characterized by specific patterns, including "west higher than the east, and south higher than the north" patterns. Finally, the direction of the investment gravity center was found to be obviously distinct throughout different terms. Gherghina, Simionescu and Hudea (2019) indicate that the level of export volume and FDI generated by changes associated with its level of economic growth. Besides, foreign direct investment outflows have a very low level in undeveloped countries due to less production and its lack of essential factors. Gokmenoglu, Kirikkaleli and Eren (2019) underlined that the causal linkage among economic risk, export volume and foreign direct investment inflows in terms of Turkey from 2005Q1 to 2015Q2 by using Toda-Yamamoto test. According to their results, economic risk does not Granger cause FDI inflow, recommending that changes in the economic risk environment of Turkey lead to changes in FDI inflow. These results indicate the significance of economic risk in predicting the FDI inflows for Turkey. The Toda-Yamamoto causality test verifies the one-way causality which acts from economic risk to FDI at the 5% level of significance. At this point, it is significant to demonstrate that both Toda-Yamamoto and Granger causality tests are considered not to have structural breaks between the series by the presupposition that the intercept parameters are stable in the long run. Hee and Lee (2018) reveal that export volume in terms of export-based trade could increase current account surplus of an economy which will influence the economic growth. Furthermore, export stimulates an economic growth for less developed economy whilst high volume of import potentially influences current account deficit. Jenkins and Katircioglu (2010) implement the bounds test to Granger causality and co-integration tests to examine the linkage among international trade, economic growth and financial development in Cyprus. They determine that money supply and export volume are stimulated by growth in the long-term; however, they do not specify any long-term equilibrium linkage among international trade and financial development except the linkage among money supply and export volume in the case of Cyprus. In addition, the findings of Jenkins and Katircioglu (2010) do not suggest any direction of causality among international trade and financial development in Cyprus. Katircioglu, Kahyalar and Benar (2007) also examine the linkage among international trade, GDP and financial development in India. They find that long-term equilibrium linkage appear among relevant variables. Their further findings from causality tests demonstrate that (1)

ARHUSS

financial development is stimulated by export volume while imports are stimulated by money supply, (2) GDP in India stimulates a growth in international trade and (3) there is feedback linkage among economic growth and financial development in terms of India. Katircioglu (2009) use the bounds test for Granger causality and co-integration tests to examine the long-term equilibrium linkage among trade, tourism and real income growth and the direction of causality between themselves in terms of Cyprus by using annual data from 1960 to 2005. The findings of the work ascertain that trade volume, economic growth and tourism activities are co-integrated; thus, a long-term equilibrium linkage can be inferred among these three variables. In addition, the Granger causality test findings reveal that real income growth triggers growth in international trade including exports & imports and international tourist arrivals to the Cyprus.

Katircioglu (2009) determines a one-way causality running from trade capacity to tourism activities. In addition, Katircioglu (2010) examines the connection among trade volume and GDP of Northern Cyprus. According to results of this study, Northern Cyprus has export oriented development but its GDP is not influenced by its import volume. Katircioglu (2012) empirically finds that financial development and international trade are significant parts of development strategy of economies to stimulate growth and reduce poverty. Mahadika, Kalayci and Altun (2017) implement multivariate regression analysis and Johansen co-integration test from 1981 to 2013. They determine the long-term linkage export volume, GDP and FDI of Indonesia. The effects of Indonesian export volume and FDI on Indonesian economic growth are considered in their work. They find that FDI and export volume have crucial impact on GDP of Indonesia. Besides, according to co-integration test, there is a long-term linkage among GDP, export volume and FDI of Indonesia. Tabash and Khan (2018) verify the existence of long-run and short-run nexus among export volume and GDP in UAE from 1990 to 2015. They express that oil price shocks and export volume have a large effect on economic growth in the emerging economy such as UAE as well. Tampubolon and Nababan (2019) examine the connection among export volume, FDI and economic growth in North Sumatra, Indonesia. According to their results foreign direct investment and export volume and there is no crucial impact on GDP. In addition, economic growth has an important impact on export volume. Zaimsyah and Herianingrum (2019)

examine the relationship between export volume, FDI and Economic Growth by implementing panel data analysis from 2009 to 2017 for 10 countries. According to their findings export volume and FDI simultaneously and positively has a considerable impact on GDP in the OIC countries. Zand, Mirzaie, Mehrabi and Nabieian (2019) elaborate the economic growth and development in terms of agricultural sector. They also state that closed impact of the aforementioned scenarios on the industries, services, and commerce were more than the agricultural sector itself and its sub-sectors, demonstrating a considerable relationship among these sectors and the agricultural sector and its sub-sectors. Finally, Kalayci and Özden (2020) investigate the connection among GDP, international trade and financial development for South Korea from 1977 to 2018 by using ARDL bound test and FMOLS, DOLS, CCR. According to their empirical findings there is a long-term stable relationship between economic growth, domestic credit to private sector and the total of exports and imports of products and services.

3. METHODOLOGY AND DATA ANALYSIS

The linkage among air transportation, export volume and economic growth (GPD) were examined through Johansen co-integration test, variance de-composition test and impulse response analysis for USA. In this sense, the number of passengers and volume of freight carried by air were used as indicators of air transport while GDP was considered as an indicator of economic growth in the analysis of the work. Data is obtained from World Bank's database (2020) for the work in between 1980 to 2017.

ADF test, lag values of the series are regressing the lag difference. Test equation is defined in below (1):

$$\Delta Y_t = \beta_0 + \beta_{1t} + \delta Y_t + a_1 \sum_{i=1}^{m} \Delta Y_{t-1} + \varepsilon_{it} \qquad (1)$$

According to equation (1), Yt represents the first difference of the series being tested; t is the trend series, δYt-1 is the difference term, εt is the error term which is stationary.

Table 1. ADF Unit Root Test of Air Transport, Export Volume and GDP for USA at I(0)

Null Hypothesis: AIR_TRANS has a unit root, Exogenous: Constant			
		t-Stat	**Prob.***
ADF test statistic		-0.538907	**0.8720**
Critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	
Null Hypothesis: EXPORT_VOLUME has a unit root, Exogenous: Constant			
		t-Stat	**Prob.***
ADF test statistic		2.941322	**1.0000**
Critical values:	1% level	-3.689194	
	5% level	-2.971853	
	10% level	-2.625121	
Null Hypothesis: GDP has a unit root, Exogenous: Constant			
		t-Stat	**Prob.***
ADF test statistic		2.009911	**0.9998**
Critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

In order to implement Johansen co-integration test, entire series should be stationary at I(0). However, after implementing ADF test, the p-value of entire series including air transportation, export volume and economic growth are more than 0.05 for both USA and China which are non-stationary at I(0) (see Table 1). After taking first difference of entire series, variables of air transportation, export volume and economic growth become stationary according to ADF test which obtained the p-value as less than 0.05 (See Table 2). The ADF augmented dickey fuller unit root test (which has determined as Akaike Information Criterion [AIC]) is implemented to air transportation, export volume and economic growth (GPD) variables to test for stability. In this context, the maximum lag length is selected to be 2 as per Serena and Perron's (2001) suggestions. There is no autocorrelation and heteroscedasticity problem in the lag-interval.

Table 2. ADF Unit Root Test of Air Transport, Export Volume and GDP for USA at I(1)

Null Hypothesis: AIR_TRANS1 has a unit root, Exogenous: Constant		
	t-Stat	**Prob.***
ADF test statistic	-4.883478	**0.0003**
Critical values: 1% level	-3.626784	
5% level	-2.945842	
10% level	-2.611531	
Null Hypothesis: EXPORT_VOLUME1 has a unit root, Exogenous: Constant		
	t-Stat	**Prob.***
ADF test statistic	-6.737226	**0.0000**
Critical values: 1% level	-3.626784	
5% level	-2.945842	
10% level	-2.611531	
Null Hypothesis: GDP1 has a unit root, Exogenous: Constant		
	t-Stat	**Prob.***
ADF test statistic	-3.162021	**0.0308**
Critical values: 1% level	-3.626784	
5% level	-2.945842	
10% level	-2.611531	

Johansen co-integration equation is indicated as econometric symbols, where the determinants of long-term economic growth, air transport and export volume are investigated in equation which is developed by (Sürekçi Yamaçlı, 2016) (2) below:

$$Dx_t = -\sum_{i=1}^{P-1} \pi i Dx_{t-i} + \pi x_{t-i} + c + t + dQ + \mathcal{E}_{it}$$

$$\pi_i = \left(I_N + \sum_{j=1}^{i} A_j \right), \pi$$

$$= -\left(I_N + \sum_{j=1}^{i} A_j \right) \qquad (2)$$

Table 3. Johansen Co-Integration Test for USA from 1980 to 2017

Sample: 1983 2017 Observations: 35 after adjustments Trend assumption - Linear deterministic trend Series: AIR_TRANS1 EXPORT_VOLUME1 GDP1				
UCR Test				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Crit Val	Prob.**
r=0 *	0.504195	41.44763	29.79707	**0.0015**
r=1, r≥1 *	0.309056	16.89256	15.49471	**0.0306**
r=2, r≥2 *	0.106803	3.953176	3.841466	**0.0468**
Trace test indicates 3 cointegrating eqn(s) at the 0.05 level				

According to empirical results of co-integration test for USA from 1980 to 2017, there is a long-run stable relationship between air transportation, export volume and GDP. The p-values of all variables are less than 0.05 which indicates that it is considerably significant (see Table 3). Annual data is obtained from Woldbank's official website in order to make parametric test.

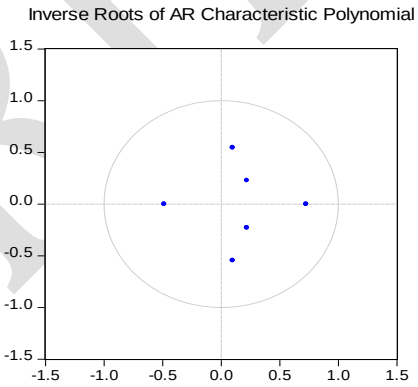

Figure 1. *Var Analysis for USA*

Table 4. Variance De-Composition of USA

Period	AIR_TRANS1	EXPORT_VOLUME1	GDP1
1	20.85992	37.79305	41.34703
2	22.03525	21.97218	55.99257
3	19.85734	21.77567	58.36699
4	19.36948	22.07640	58.55412
5	19.28286	21.86567	58.85147
6	19.30583	21.65008	59.04409
7	19.22285	21.58275	59.19439
8	19.17822	21.57090	59.25088
9	19.16185	21.55806	59.28010
10	**19.15564**	**21.54795**	**59.29641**

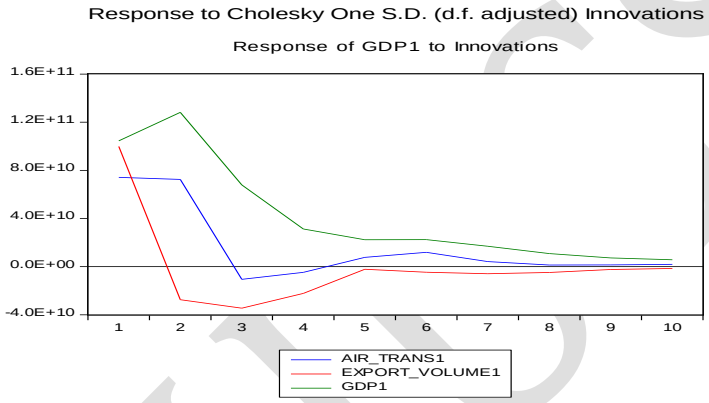

Figure 2. *Impulse Response Analysis of USA*

In this paper the VAR analysis is implemented to make appropriate test for the trend of three relevant variables. The trade volume, air transport and economic growth are selected as endogenous variables, lag order starts from lag 1 to the end of lag 2,

which demonstrates the VAR. Besides, after using inverse roots of characteristic polynomial, entire the features of root mean falls among the ring width. In this sense, the model is a stationary VAR at Figure 1, which allows for implementing the impulse response analysis and variance decomposition test. After that period, impulse response model is used to examine the tenor of the connections among signified variables. The findings indicate that the influence of export volume is comparatively more than air transport on economic growth (See Table 4 and Figure 2). The findings are consistent with the multivariate regression analysis below (See Table 5). The findings of impulse response are consistent with the variance decomposition analysis (See Figure. 2 and Table 5).

Table 5. The Results of Multivariate Regression for USA (1980-2017)

Dependent Variable: GDP Sample: 1980 2017 Observations: 38				
Variable	Coef	Std Er	t-Stat	Probability
AIR_TRANS	0.581400	0.233864	2.486055	**0.0182**
EXPORT_VOLUME	0.742794	0.167647	4.430698	**0.0001**
C	14.84818	3.989243	3.722054	0.0007
AR(1)	0.593780	0.129870	4.572110	0.0001
SIGMASQ	0.002017	0.000477	4.230628	0.0002
R-squ	0.953533	MD Var		29.79308
Adj R-squared	0.942749	S.D. dpd Var		0.565956
S.E. of reg	0.048194	Ai criter		-3.093662
Ssr	0.076646	Schw criter		-2.878191
Log-likelihd	63.77959	H-Q criter.		-3.016999
F-stat	1267.393	D-W stat		1.743989
Prob(F-statistic)	0.000000	@trend		0.5986

$$LN(GDP)t = ß0 + ß1LN(Air\_Trans) + ß2LN(Export\_Volume)\ t + ut \quad (3)$$

According to the findings of multivariate regression analysis of three variables at Table 5, the impact of export volume have considerably important on economic growth which is consistent with variance de-composition analysis at Table 4. Furthermore, there is no autocorrelation issue because according to Figure 3 residuals are distributed randomly. Logarithm was applied for the variables in order to control the variance explosion and expressed as equation (2) above. The sample size is specified as 38 which is more than 30 to arrange whole series as a parametric test. Economic growth (GDP) is selected as dependent variable and export volume and air transportation are employed as the independent variable. In order to answer the research questions regarding both their long-term linkage and effects of the independent variables (air transportation and export volume) on economic growth (GDP), the multivariate regression and co-integration tests are performed attentively.

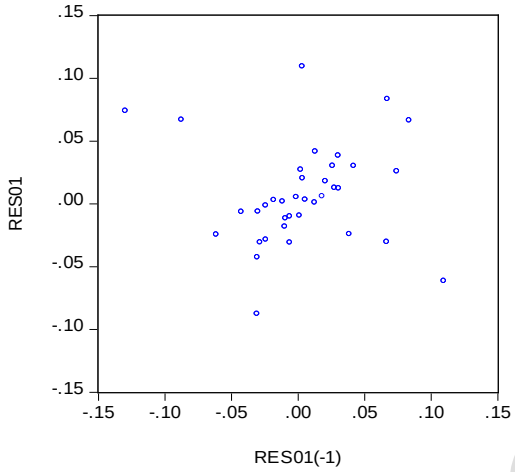

Figure 3. *Resid Graph of USA*

Moreover, multivariate model is applied from 1980 to 2017 for USA to find the impact of air transportation and export volume on economic growth. AR(1) is applied to multivariate regression to determine that there is an autocorrelation problem or not. According to result of AR(1), it is less than 0.05 and residuals are distributed randomly which indicated that there is no autocorrelation problem (See Figure 3). Air transport and export volume are determined as independent variable to obtain the impact on GDP and the results show that there is substantial impact on USA's economic growth which is founded as 0.0182 and 0.0001. Besides, the code of @trend is added to the multivariate regression to obtain that there is spurious regression or not. The finding of the @trend is more than 0.05 which indicates that there is no spurious linkage between air transport, export volume and economic growth (See Table 5).

5. CONCLUSION

The aim of this paper is to determine the overtime changes in series and to show the long-term connection among air transportation, export volume and economic growth for USA from 1980 to 2017 (annual data) by using Johansen co-integration test, VAR analysis, variance de-composition and impulse response. Stationary tests of entire variable indicate that air transportation, export volume and economic growth are stationary at the first differences I(1) which are performed through ADF unit root test. According to empirical results of this manuscript, Johansen co-integration test determine the long-term stable linkage among air transportation, export volume and economic growth (GPD). On the other hand, according to the findings of multivariate

regression of three variables at Table 5, the impact of export capacity have considerably important on economic growth which is coincide with variance de-composition analysis at Table 4.

Civil aviation and freight traffic is assumed as a very crucial element on selected countries' economic growth. Especially, there are considerably increases in air transportation in the developing economies. In this sense, the aim of this work is to examine the impact of airport activities in a domestic line on the GDP of USA. Findings are acquired after a detailed skim through academic works and its literature that civil aviation and freight traffic are crucial when taking economic activities decisions. Consequently, results are derived from econometrical model such as ADF unit root test, Johansen co-integration test, VAR analysis, variance de-composition test and impulse response analysis for USA. It is very important to state the general opinion that civil aviation is a crucial factor which positively influences the regions' economic growth (GDP). This finding is a significant indicator of economic growth notably in USA.

To sum up, in further studies the connection among air transport and economic growth will be analyzed with a case of new airports, including in Mexico, UAE and India. In addition, the results of this study suggest that appropriate policy should be applied to increase trade volume, air transportation including civil aviation and air freighter would boost considerably the economic growth (GDP) of USA. The government should exercise influence over imports of goods and services in order to provide the maximum benefit from trade in terms of increasing the export volume. In this context, the USA government should apply import restrictions through legislative regulations. The economic growth (GDP) allows government to invest in the public infrastructure which is critical to increase the welfare level and individual earnings in terms of purchasing power parity as well. If micro reflections of macroeconomic development are taken into account, the extension of social programs in terms of microfinance and lowering of interest rates on pre-departure loan schemes could ensure an important contribution to households' economic well-being. Majority of researches could attempt to incorporate other time-dependent covariates including FDI, export volume and civil aviation in the analysis by implementing the multivariate econometric model to reveal the long-term connection among variables.

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