THE IMPACTS OF DEFENSE, HEALTH AND EDUCATION EXPENDITURES ON ECONOMIC GROWTH IN TURKEY[1]

TÜRKİYE'DE SAVUNMA, SAĞLIK VE EĞİTİM HARCAMALARININ EKONOMİK BÜYÜME ÜZERİNE ETKİLERİ

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ABSTRACT

The controversial relationship between public expenditures and economic growth has become one of the famous matters of interest, especially following the Great Depression that began in the US in 1929. As well as other economic variables, an increase in the public expenditure of the countries is expected to have significant impacts on those countries' economic growth performance. Therefore, an annual data set covering the period between the years 1981-2016 is used to determine the relationship of defense, health and education expenditures in the Turkish economy with economic growth. The Fourier unit root test results of the series indicate that economic growth and education expenditure series are stationary in the level, and defense and health expenditure series are stationary in the first difference. The estimation results of ARDL bound test, which is conducted to detect the long-term relationships, indicate that defense, health, and education expenditures are positively related to economic growth at the values of 0.33, 0.17 and 1.33, respectively. In other words, it is determined that economic growth be mostly affected by education expenditures followed by defense and health expenditures, respectively.

Keywords: *Public Expenditure, Economic Growth, ARDL.*
JEL Classification: *H50, C20, E60.*

ÖZ

Kamu harcamaları ile ekonomik büyüme arasındaki tartışmalı ilişki özellikle ABD'de 1929 yılında başlayan büyük buhrandan sonra çok merak edilen bir konu haline gelmiştir. Ülkelerin kamu harcamalarındaki bir artışın diğer ekonomik değişkenlerin yanı sıra o ülkelerin ekonomik büyüme performansı üzerinde de önemli etkilere sahip olması beklenmektedir. Bu amaçla çalışmada Türkiye ekonomisine ilişkin savunma, sağlık ve eğitim harcamaları ile ekonomik büyüme arasındaki ilişkinin tespit edilmesi için 1981-2016 dönemini kapsayan yıllık verilerden oluşan bir veri seti kullanılmıştır. Serilerin Fourier birim kök test sonuçları ekonomik büyüme ve eğitim harcaması serilerinin seviyede durağan, savunma ve sağlık harcaması serilerinin ise fark durağan olduğunu göstermiştir. Uzun dönem ilişkileri tespit etmek amacıyla yapılan ARDL sınır testi tahmin sonuçları savunma, sağlık ve eğitim harcamaları ile ekonomik büyüme arasında pozitif yönde ilişki olduğunu ve sırasıyla 0.33, 0.17 ve 1.33 değerlerini aldığını ortaya koymaktadır. Diğer bir ifadeyle ele alınan kamu harcama çeşitlerinden ekonomik büyümeyi en fazla eğitim harcamalarının daha sonra ise sırasıyla savunma ve sağlık harcamalarının etkilediği tespit edilmiştir.

Anahtar Kelimeler: *Kamu Harcamaları, Ekonomik Büyüme, ARDL.*
**JEL Sınıflandırması:** *H50, C20, E60.*

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1. INTRODUCTION

The economic theory contains different notions about the share of government in the economy. While the Classical economists assume minimal or no state intervention since they expect the economy to reach its full employment level in the long-run through its internal dynamics along with an existing economic organization dominated by market economics; the Keynesian economists emphasize the necessity of the state's economic intervention and that especially public expenditures should be utilized to overcome the inefficiency of effective demand.

This controversial relationship between public expenditures and economic growth has become an intriguing matter, especially after the Great Depression that began in 1929 in the United States. The main reason for the transition from Classical to Keynesian thought is the fact that the crisis could not be explained by the basic principles of the Classical economics and the economic problems could not be resolved. The Keynesian (or the demand-side economic thought) emphasized that the views of Classical economics should be criticized in many ways and the state should play an active role in the economy.

The understanding of "social state intervention" in demand-side economics has gained importance especially in the 1950s and 1960s and has been applied in many developed and developing countries. As a result, it has been observed that public expenditures tend to increase over time in many countries.

Figure 1. Economic Growth - Public Expenditure Relationship (1981-2016)
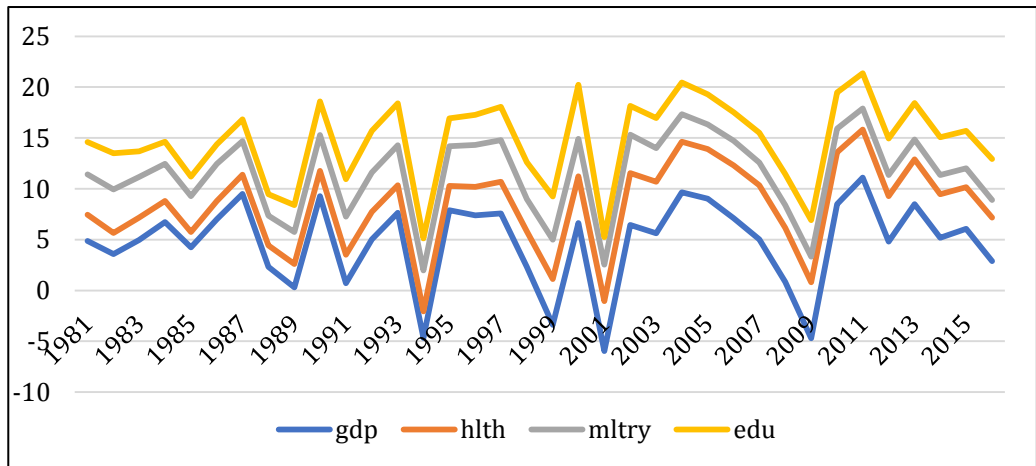
The existence of a positive relationship of economic growth with health, education and defense expenditures in Turkey between the period of 1981-2016 can be seen in Figure 1. Public expenditures appear to increase during the periods of flourishing economic growth, and vice versa.

Therefore, it is aimed to determine the relationship of economic growth with defense, health and education expenditures in Turkey. Following the second part of the study where the theoretical background is explained, the third part includes the recent developments in the related literature. The fourth part provides information about the

dataset, econometric methodology and the obtained findings, and the study is completed with conclusions and policy recommendations.

2. THEORETICAL FRAMEWORK

An increase in public expenditures of the countries is expected to have significant impacts on economic growth performance of those countries as well as other economic variables. There are two basic views on the direction of the causality relationship between the increase in public expenditures and the national income. According to the first view, namely Wagner's law, while the increase in public expenditures would be explained by a national income increase as an internal factor; while the second one, namely the Keynesian view considers public expenditure as an external factor and argues that public expenditures used as financial instruments would affect growth in the short-term (Tang, 2010: 4).

Wagner obtained his findings on the growth of public expenditure as a result of a long-term analysis. Nonetheless, fluctuations in public expenditures in the short- term have also been the research topic. A survey study involving the first half of the late 19th and the early 20th centuries on the evolution of public expenditures is also conducted by Alan Peacock and Jack Wiseman who argued that public expenditures exhibit a dramatic increase. According to this view defined as "displacement effect hypothesis" in the finance literature, war and similar events are considered as the main reason for the increase in public expenditures (Pehlivan, 2008: 65-66).

Another view in the literature is the Monetarist view. Monetarists point out that pure financial expansion without monetary harmony may affect the short-term national income by approaching the relationship of economic growth and public expenditures in a different way, however certain elements of public expenditures would take up or exclude private expenditures in the long-term, and thus the real income would remain unchanged (Bakırtaş, 2003: 46-47).

3. LITERATURE REVIEW

Since the relationship between public expenditure and economic growth depends mainly on the structural, social, economic factors of the countries, economists tend to explain the relationship between variables in different ways.

The relationship between public expenditures and growth has been the main subject of many empirical studies. The use of different methods, variables and periods for the estimations for the same countries, besides the structural differences among the countries, led to different results in these studies. The relevant studies on public expenditures and growth are based on two main methodologies. Ordinary Least Squares (OLS) regression estimates have been made with stationary series until the mid-1990s (Ram, 1986; Romer, 1986; Barro, 1988). At the end of the 1990s, those studies have been directed toward causality analyses, as the specific characteristics of the countries were ignored in those studies and there was no knowledge of the direction of the relationship among the variables used (Abu-Bader, 2003: 568).

Landou (1983) reported a negative relationship between public sector size and economic growth in his work covering approximately 100 countries and the period of 1960-1970.

The recent studies examining the relationship between public expenditures and economic growth are summarized in Table 1.

Table 1. Selected Literature Review

Author(s)/(Year)	Country Sample	Period	Methodology	Results
Uzay (2002)	Turkey	1971-1999	OLS	Government size has negative impacts on growth, while public expenditure positively affects growth.
Gül and Yavuz (2010)	EU Countries and Turkey	1996-2008	Pedroni Cointegration	A long-term relationship between economic growth and public expenditure is detected.
Aytaç and Güran (2010)	Turkey	1987-2005	VAR	An increase in economic growth results in a rise in public expenditure.
Kanca (2011)	Turkey	1980-2008	Engle-Granger Cointegration	A causality from public expenditures to GNP in the short-run; and a reverse causality in the long-run.
Aksoğan and Elveren (2012)	Turkey	1970-2008	Johansen Cointegration	Growth and social transfers have impacts on income inequality.
Pamuk and Pektaş (2014)	Turkey	1998:01-2013:02	ARDL	No significant long-term relationship between education

				expenditures and economic growth.
Tülümce and Zeren (2017)	Turkey	1975-2014	Hacker and Hatemi-J Asymmetric Causality Test	A bilateral causality exists between total public expenditure, transfer payments and economic growth regarding positive shocks.
Topal et al. (2017)	Turkish Republics	2002-2015	Panel SUR	Size of the public sector has a positive impact on growth in Turkish Republics except for Turkey.

4. DATA SET, METHODOLOGY AND EMPIRICAL RESULTS

The annual data sets utilized in this study which aims to detect the relationship of economic growth with defense, health and education expenditures in Turkey are obtained for the period 1981-2016 regarding the ratio to GDP as follows:

Defense expenditures (MLTRY) and economic growth (GDP) data from the World Bank database, health expenditure (HLTH) data from the OECD data base, education expenditures (EDU) data from the World Bank and the General Directorate of Budget and Financial Control (BUMKO) databases. The model to be used for the analysis is given as follows:

$$GDP_t = \alpha_0 + \alpha_1 MLTRY_t + \alpha_2 HLTH_t + \alpha_3 EDU_t + \varepsilon_t \qquad (1)$$

In the first phase of the econometric analysis, the Fourier KPSS (FKPSS) unit root test which allows structural breaks be performed to determine the orders of integration of the series. The Fourier unit root test results in level for the variables are shown in Table 2.

Table 2. The Fourier Unit Root Test Results in Level

| Variables	Freq. Value	F(k)	FKPSS
GDP	4	5.7308	0.1275*
MLTRY	1	23.8204	0.3059
HLTH	1	16.6025	0.2373
EDU	2	8.2640	0.2802*

*indicates stationarity at 10% significance level.

The "frequency value" column in Table 2 denotes the number of frequencies selected based on the sum of squared residuals (SSR); "F(k)" is the value of the F- statistic value calculated for the significance of the trigonometric terms; and "FKPSS" represents the unit root test statistic value.
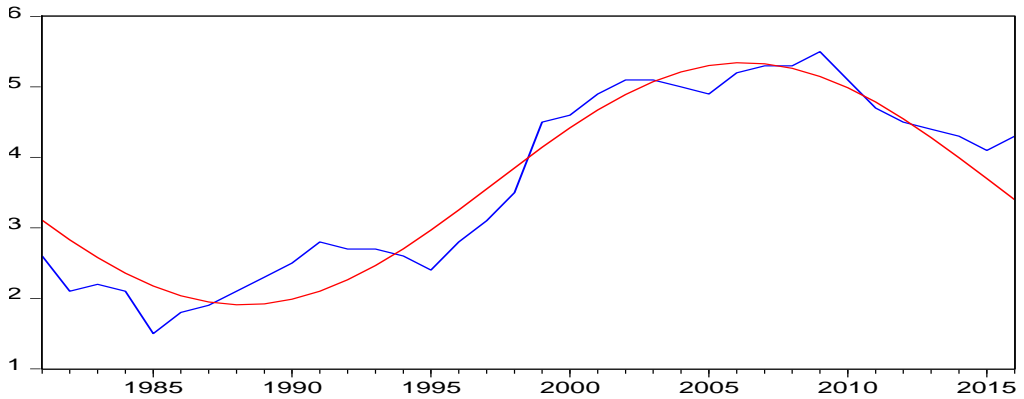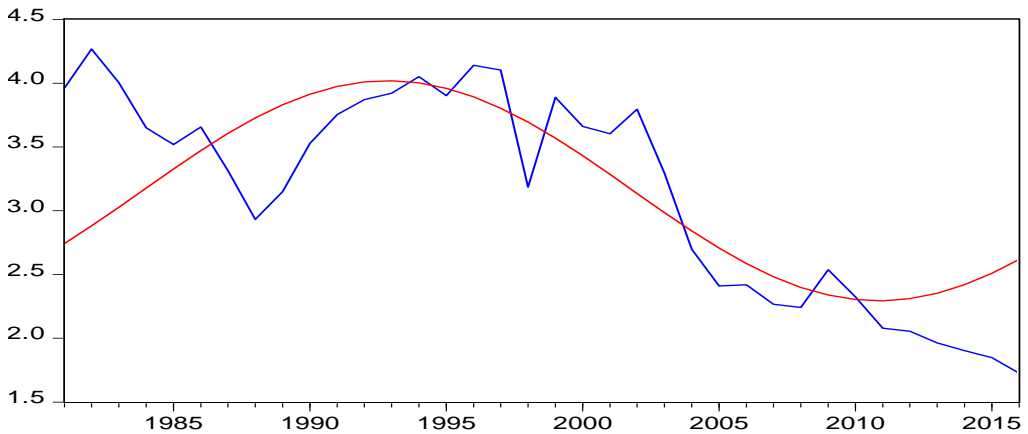
Figure 2. Fourier Function of EDU
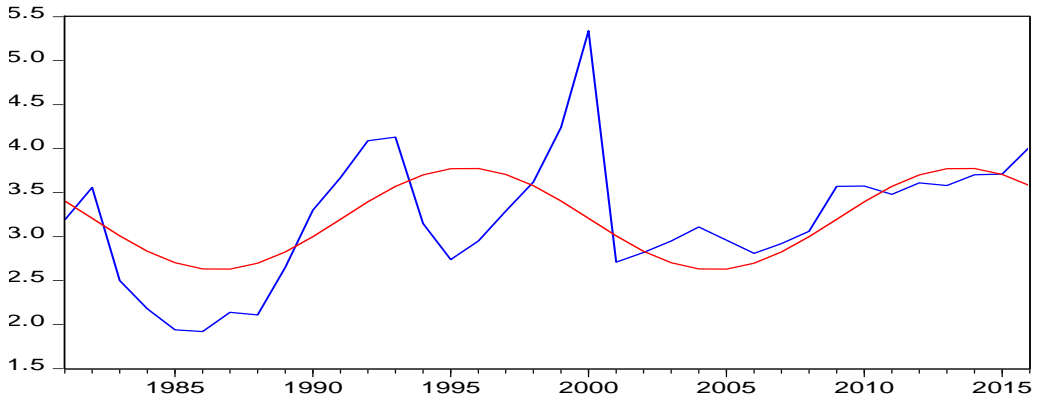
Figure 3. Fourier Function of GDP
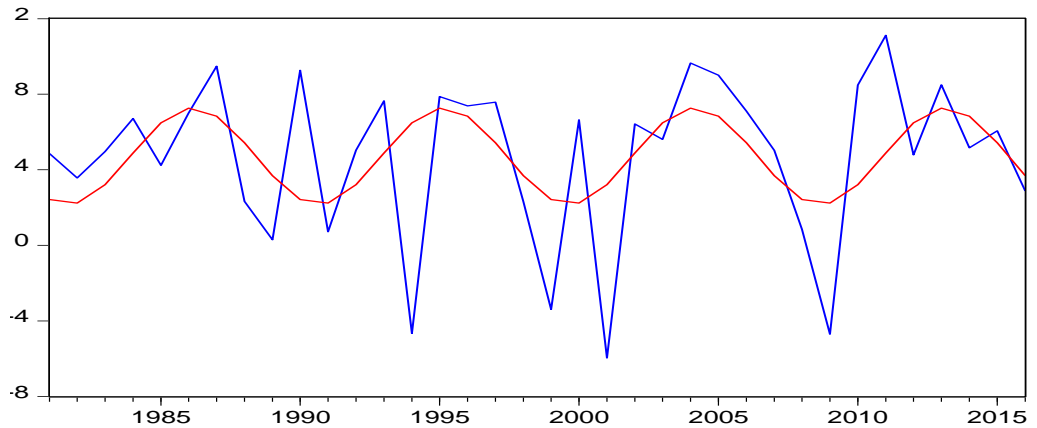
Figure 4. Fourier Function of HLTH

Figure 5. Fourier Function of MLTRY

The Fourier functions of the variables included in the analysis are shown in Figures 2, 3, 4 and 5 The Fourier function of each variable is characterized by corresponding the breaks.

The frequency value results indicate that the frequency value at which the minimum SSR is obtained varies; the value of F(k) shows the F-statistics value by which the significance of the trigonometric terms is tested. Accordingly, the FKPSS value for all variables in the analysis can be calculated, since the analytical GDP and EDU variables are stationary at 10% significance level and the F-test values are statistically significant. Since MLTRY and HLTH variables are found to have unit roots in level by a significance level of 10%, FKPSS unit root test is performed on the 1st differences and the obtained values are shown in Table 3.

Table 3. The 1st Difference FKPSS Unit Root Test Results

Variables	Freq. Value	F(k)	FKPSS
MLTRY	4	11.9375	0.1459*
HLTH	1	15.6442	0.0543*

*indicates stationarity at 10% significance level.

According to the FKPSS test results, the GDP and EDU variables are stationary at the level [I (0)]; while the MLTRY and HLTH variables are found to be stationary at the 1st difference [I (1)].

ARDL (Autoregressive Distributed Lag) method developed by Pesaran *et al.* (2001) is utilized in order to examine the relationship of economic growth with defense, health, and education in Turkey. The ARDL boundary testing approach has several advantages. The first advantage involves the applicability of the ARDL method regardless of whether or not the series is either I(0) or I(1). More importantly, a dynamic unrestricted error correction model (UECM) can be obtained. With the short-term dynamics, UECM can integrate the long-run equations without any long-term information loss (Shahbaz, Lean, 2012: 475). Two asymptotic critical bounds are utilized in the ARDL method. If the obtained F-statistic value exceeds the critical upper bound, the null hypothesis claiming no long-run relationship between the variables is rejected. If the F-statistic value is below the critical lower bound, the null hypothesis cannot be rejected, and there is no long-run relationship between the variables. If the F-statistic value is between two critical bounds, no comments can be made.

Table 4. ARDL Bound Test Results

Estimated Equation	GDP = f (MLTRY, HLTH, EDU)	
F-statistics	4.77	
Optimal Lag Length	[4, 3, 4, 4]	
Asymptotic Critical Values	Lower Bound, I(0)	Upper Bound, I(1)
1%	3.65	4.66
5%	2.79	3.67
10%	2.37	3.20
Diagnostic Tests R^2 Adjusted R^2 F-statistics Breusch-Godfrey Test ARCH LM Test Jarque-Bera Normality Test Ramsey Reset Test	0.879 0.779 226.552 (0.000) 2.720 (0.4215) 0.154 (0.545) 1.031 (0.124) 1.104 (0.146)	

Note: Lag length is determined in accordance with the AIC. The critical values for bounds testing are abstracted from Narayan (2005, p. 1987, Case II). The numbers in parenthesis show the probability values.

The diagnostic test results presented in Table 4 indicate no auto-correlation, time-varying variance and functional form problems in the ARDL model in such a way that errors exhibit a normal distribution. Since F-test value is above the upper bound at the 10% significance level, the existence of a long-run relationship among the variables

included in the analysis is determined. After determining the long-term relationship, the long-run coefficients are given in Table 5.

Table 5. The Long-term Coefficients

Variables	Dependent Variable: GDP	
	Coefficient	p- value
MLTRY	0.3314	0.0057
HLTH	0.1717	0.0077
EDU	1.3314	0.0028
C	-1.8098	0.0075

The results of Error Correction Model are shown in Table 6. In order to comprehend the short-term adaptation process, the sign and magnitude of the Error Correction coefficient (ECM-1) are considered. If the ECM (-1) coefficient is between 0 and -1, then the adaptation process is monotonic in adjusting to its long-term equilibrium value. When the ECM (-1) coefficient is positive or less than -2, it means that the model oscillatory diverges from its equilibrium. If the ECM (-1) is between -1 and -2, the model would become eventually oscillatory converge towards its long-term equilibrium value. ECM (-1) coefficient is found negative and statistically significant in the analysis. This proves the existence of a long-term relationship between the variables from another aspect. Since the error correction coefficient is between -1 and -2, the model is oscillatory convergent towards the long-term equilibrium in the error correction process (Alam, Quazi, 2003: 97).

Table 6. Error Correction Model

Variables	Coefficient	P- Value
ΔGDP(-1)	1.2113	0.0065
ΔGDP(-2)	0.7077	0.0268
ΔGDP(-3)	0.3559	0.0617
ΔEDU	5.7980	0.0021
ΔEDU(-1)	1.6714	0.2373
ΔEDU(-2)	2.5925	0.0588
ΔHLTH	6.4949	0.0523
ΔHLTH(-1)	3.4183	0.2923
ΔHLTH(-2)	1.3040	0.0067
ΔHLTH(-3)	1.2353	0.0087
ΔMLTRY	0.5226	0.0872
ΔMLTRY(-1)	0.6737	0.0073
ΔMLTRY(-2)	2.0155	0.1439
ΔMLTRY(-3)	1.7468	0.0125
ECM(-1)	-1.5089	0.0001

5. CONCLUSION AND RECOMMENDATIONS

In this study, the relationships of economic growth with defense, health, and education expenditures are examined within the framework of cointegration methodology which has an important place in the time series analysis. For this purpose, data sets with 36 observations which consist of annual data obtained for the Turkish economy covering the period 1981-2016 are prepared. The unit root test results of the series indicate that the economic growth and education expenditure series are stationary in level [I(0)] and the defense and health expenditure series are stationary at the 1st difference [I(1)]. Thus, the model is estimated using the boundary test approach known as the ARDL method. Since the calculated F-statistics value is higher than the upper critical bound value, the existence of a long-term equilibrium relationship among the variables included in the analysis is determined.

Estimation results of the ARDL model indicate a positive correlation between defense, health and education expenditures and economic growth with values of 0.33, 0.17 and 1.33, respectively. In other words, it is determined that education expenditures have the most impact on economic growth followed by defense and health expenditures, respectively.

A 1.33% increase in economic growth, caused by a 1% increase in education expenditures, also reflects the importance of the state's task in this regard. People tend to invest in their education less than the optimum social requirement without a proper state intervention. To close this gap, in countries with younger populations like Turkey, policies that would contribute to the accumulation of human capital may positively affect economic growth.

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