The Long-term Impact of Military Spendings on Economic Growth: The Case of Turkiye

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Abstract: This study conducts a long-term analysis to investigate the long-term nexus between military spendings and economic growth in Turkiye by employing a data set spanning the years of 1961-2018. Analyses were implemented by employing two different indicators of economic growth in order to control the soundness of the findings. The findings of co-integration analyses obtained from Autoregressive Distributed Lag (ARDL) approach disclosed that two variables are co-integrated; hence, it means that the long-term movements of the variables are similar in Turkiye. In this sense, for the long-term estimation findings, military expenditure possesses a negative and statistically significant impact on economic growth. More specifically, one unit increase in the military expenditure causes to a decline in economic growth by either 1.379% or 1.279% in two different models in Turkiye. Meanwhile none of the models involves autocorrelation, heteroscedasticity, non-normality, model specification, and parameter instability problems. Finally, we found a unidirectional causality association running from military expenditure to economic growth.

Key Words: Military Expenditures, Economic growth, Turkiye, ARDL Approach

1. INTRODUCTION

The channels in which military expenditures affect economic growth may include various meanings. Following Keynesian type aggregate demand approach, it can be explained that military expenditures may raise economic growth. It implies that higher military expenditures are responsible for increased demand and lead to more employment due to the higher capital stock usage. In this regard, this channel is a contribution approach for economic growth since it is supposed to influence the basic process in which increased capital stock usage may increase the profit rates, the military expenditures may stimulate higher investments thus generating a rise in the economic growth through short-term multiplier mechanism. On the other hand, another channel of the relationship between two variables is classical approach. It can be explained that economic growth may have such expenditures' retarding effects. In the literature, this approach is very important because higher levels of military expenditures in countries may create crowding-out effect of investments, inflationist pressures, and decreases in effective utilization of obtainable public assets. Moreover, economic growth may be very important for the military expenditures because higher military expenditures require higher economic growth rates to allocate more funds to defense industry. (Kollias, Manolas and Paleologou, 2004). In addition, Alptekin and Levine (2012) followed important hypotheses from literature to test interactions about the impact of military expenditures on economic growth. In this regard, they examined this relationship in four main alternative hypotheses. The first hypothesis focuses on the crowding out effects. The literature has conservatively considered that there may exist a trade-off relation between productive expenditures, such as investment and education, and unproductive military public expenditures. In other words, they test whether military expenditures lead to decrease in economic growth. The second form of the relationship indicates that differences between regions and countries is a substantial factor in determining the impacts of military expenditures on economic growth, especially for least developed and developing countries. Thus, their other hypothesis's aim is to examine whether there is the negative impact on economic growth of military expenditures in underdeveloped economies. The third hypothesis to be examined is that the effect of military expenditure on economic growth is a positive. Thus, the researchers aim to explore about total demand and supply-side external economies. The final one covers the first three one. This association focuses on whether the association between two variables is non-linear.

The papers in the existing empirical literature on military expenditures and economic growth discusses have comprehensively investigated the association between two variables (Gerace, 2002; Kentor and Kick, 2008). More specifically, there are several papers investigating the relationship between military expenditures and economic growth for different group economies. For example, Chang, Huang, and Yang (2011) try to empirically test possible relationship between two variables for the classified panels of three different income (e.g., high, middle, and low) and four different regional groups (e.g., Africa, Europe, the Middle East-South Asia, and Pacific regions) for 90 countries for the time period 1992-2006. The results suggest that military expenditures have negative and statistically significant impact in case of low-income countries. According to the results of regional groups, statistically significant and negatively one-way causalities are found from military expenditures to economic growth in Europe and the Middle East-South Asia while other regions are statistically insignificant.

There are also several papers for the adverse impact of military expenditures on economic growth (Hou and Chen, 2013; Dunne and Tian, 2015; Laniran and Ajala, 2021). Using the data of 61 countries for the period of 1988-2015, Arshad, Syed and Shabbir (2017) endeavor to reconsider the relationship between military expenditure and economic growth by taking advantage of Solow growth model. Their results indicated that military expenditure is negatively linked with economic growth, and it is statistically significant. In addition, Greece economy may be a case study of negative economic effects of military expenditures. For example, although Greece has poor economic performance, it is continuing excessive military expenditures due to the unstable ambiance in the Balkans and its aggressive actions to Turkiye. In this regard, Dunne and Nikolaidou (2001) attempts to test the impacts of dependence spending on economic growth over the period 1960-1996. The result from both single-equation methods (OLS, 2OLS) and system-equation methods (3SLS) demonstrated an impact of the military expenditures on economic growth which is statistically significant and negative.

There are also few papers for the positive impact of military expenditures on economic growth (Klein, 2004; Yildirim, Sezgin and Öcal, 2005; Dimitraki and Menla Ali, 2015; Yıldırım and Öcal, 2016). In the paper of Abdel-Khalek, Mazloum and El Zeiny (2019), times series and Hendry General-to-Specific modeling analyses are employed to investigate the association between the variables in India from 1980 to 2016. The findings indicated that military expenditure has contributed Indian economic growth and development via technological spillover by raising productivity. Apanisile and Okunlola (2014) examined the effect of military expenditure on output in Nigeria for the period 1989 to 2013 with ARDL approach to co-integration in the short-term and in long-term period. The findings suggested that the effect of military expenditure on output in the short-term is statistically significant and negative but positive and statistically significant effect in the long-term.

Maher and Zhao (2021) studied the association between military expenditures and economic growth. The paper used ARDL approach, with a sample of the Egyptian economy spanning 1982-2018. The findings concluded that there has been an insignificant impact of military expenditures on economic growth, especially in the long-term.

However, it cannot be forgotten that the reviewed body of literature on the non-linear association between the variables is also available (Pieroni, 2009; Alptekin and Levine, 2012; Dunne and Tian, 2015). For instance, Yolcu Karadam, Yildirim and Öcal (2017) investigated the association between the military expenditures and economic growth to fill the gap by employing non-linear panel data models for Middle Eastern Countries and Turkiye over data from 1988 to 2012. The empirical findings indicate that the economic growth effects of military expenditures are non-linear.

In the literature, the existing papers have shown a debate in the causality association between military expenditure and economic growth (Hatemi-J, Chang, Chen, Lin and Gupta, 2018; Raju and Ahmed, 2019; Shaaba Saba and Ngepah, 2019). Hirnissa, Habibullah and Baharom (2009) investigate the causal and long-term association between the variables for the time series of ASEAN-5 over the period 1965-2006. For Indonesia, Thailand and Singapore, the main results show that there is long-term association between two variables. The finding also provide evidence that one-way causal association runs from military expenditure to economic growth in Indonesia and Thailand and in Singapore, two-way causality exists between military expenditure and economic growth. However, the results from Malaysia and Philippines do not indicate the direction of causal association between military expenditures and economic growth. Topal, Unver and Turedi (2022) examine whether there is causal linkage between two variables in 27 NATO countries, divided member countries to Panel A and Panel B. Panel A covers 15 NATO member countries for the period 1960-2019 while Panel B includes 12 NATO member countries for the period 1996-2019. They also investigate possible relationship between the variables for both the symmetric and the asymmetric Granger causality under cross-sectional dependence and panel heterogeneity by employing the bootstrap panel Granger causality testing approach. Their findings from Granger causality tests for the Panel A and Panel B report that there is both the symmetric and the asymmetric causality between the variables. Considering the neutrality hypothesis in case of only Italy and United States, the findings show that the symmetric and the asymmetric causality are not found. The results for the direction of causality suggests unidirectional and robust the symmetric and the asymmetric causality from military expenditures to economic growth in case of Denmark, France, and Netherlands while unidirectional and the symmetric and the asymmetric causality runs from economic growth to military expenditures in case of Latvia. In addition, their findings report that bidirectional causality exists in Belgium, Bulgaria, Canada, Germany, Greece, Latvia, Norway, Poland, Romania, Slovak Republic, Spain, and the United Kingdom. The results also validate the empirical existence of the neutrality, the conservatives, the feedback, the military expenditure-led growth hypotheses. Furuoka, Oishi and Karim (2016) argued the causal relationship among the economic development and military expenditures for China. Using the Granger causality test, they find a one-way causal association running from economic development to the military expenditures.

This paper attempted to examine the long-term nexus between military spending and economic growth in Turkiye by employing an annual data set of the period 1961-2018. It also checked the presence of cointegration between military expenditure and economic growth by employing the ARDL boundary test approach. In addition, we used VAR Granger Causality/Block Exogeneity Wald Test in the framework of Toda-Yamamoto method to see causality association between the variables. The results suggest that the impact of military expenditures on economic growth is statistically significant and negative while there is a one-way causality association running from military expenditure to economic growth in Turkiye.

The rest of this study is organized as follows. The second section is presented. In the third section, the analysis results of our empirical data are given. Finally, the fourth section includes some concluding remarks.

2. DATA AND METHODOLOGY

This study investigates how military spending is associated with economic growth in the long-term in Turkiye. For that purpose, we employed a data set covering the years between 1961 and 2018 and conducted our long-term analyses via ARDL method. Economic growth is measured by two distinct indicators to check the soundness of the findings. The effect of military expenditures on economic growth is expected to be negative owing to the inefficiency of military spending relative to health expenditure and education expenditure where they promote economic growth by creating healthy and well-educated society. The two indicators of economic growth are GROWTH1 and GROWTH2, measured by annual percent growth rate of GDP and annual percent growth rate of GDP per capita respectively. Military spending (MILEXP) is given by military expenditure (% of GDP). All data collected is from WDI of the World Bank.

We opted to use ARDL method to conduct co-integration approach; hence, the models supposed for ARDL boundary test are:

$$\Delta GROWTH1_t = \beta_0 + \sum_{i=1}^{p} \delta_i \Delta GROWTH1_{t-i} + \sum_{i=0}^{q} \phi_i \Delta MILEXP_{t-i} + \gamma_0 GROWTH1_{t-1} + \gamma_1 MILEXP_{t-1} + \varepsilon_t \quad (1)$$

$$\Delta GROWTH2_t = \beta_0 + \sum_{i=1}^{p} \delta_i \Delta GROWTH2_{t-i} + \sum_{i=0}^{q} \phi_i \Delta MILEXP_{t-i} + \gamma_0 GROWTH2_{t-1} + \gamma_1 MILEXP_{t-1} + \varepsilon_t \quad (2)$$

In Equations 1 and 2, while short-term coefficients are δ_i and ϕ_i, long-term coefficients are γ_0 and γ_1. Δ symbol used here stands for first degree difference operator. The intercept coefficient is β_0, and white noise disturbance term is indicated by ε_t symbol in the models.

The null hypothesis of no co-integration ($H_0 : \gamma_0 = \gamma_1 = 0$) based on ARDL boundary test is examined towards the alternative hypothesis of ARDL boundary test ($H_1 : \gamma_0 \neq \gamma_1 \neq 0$). Also, the null hypothesis is rejected if F-statistic value is upper than the upper critical bounds level. On the contrary, if the computed F-statistic value of ARDL approach is lower than the upper critical bounds value, the null hypothesis is valid. Lastly, any F-statistic value within the range the lower and upper limits leave us indecisive.

After testing co-integration between the two series, we implemented the error correction model (ECM) and the model is defined to gather short-term and long-term coefficients as:

$$GROWTH1_t = \beta_0 + \sum_{i=1}^{p} \delta_i \Delta GROWTH1_{t-i} + \sum_{i=0}^{q} \phi_i \Delta MILEXP_{t-i} + \eta ECM_{t-1} + \varepsilon_t \quad (3)$$

$$GROWTH2_t = \beta_0 + \sum_{i=1}^{p} \delta_i \Delta GROWTH2_{t-i} + \sum_{i=0}^{q} \phi_i \Delta MILEXP_{t-i} + \eta ECM_{t-1} + \varepsilon_t \quad (4)$$

In Equations 3 and 4, where δ_i and ϕ_i symbols are dynamic parameters providing the model to the long-term equilibrium; ECM shows term for error correction model; η symbols represents the adjustment velocity at which the model returns back to long-term balance after a short-term shock. It is anticipated that the findings must have statistically significant and negative for the adjustment velocity term.

We finally performed causality analysis to find out if there is a causality association between the variables by using VAR Granger Causality/Block Exogeneity Wald Test based on Toda-Yamamoto approach.

3. EMPIRICAL RESULTS

We try to examine stationarity of time series of the variables, using Phillips-Perron (PP) stationarity test. The rejection of the alternative hypothesis through the PP test implies non-stationarity of time series of the variables while the alternative hypothesis asserts stationarity of time series. In this regard, we provided unit root test results using the PP test in Table1.

Table 1: The PP Unit Root Test Results

Variable	Model	Test Stat. / Prob.
GROWTH1	Constant and Linear Trend	*-7.457635 (0.0000)*
GROWTH2	Constant and Linear Trend	*-7.496577 (0.0000)*
MILEXP	Constant and Linear Trend	*-2.630279 (0.2690)*
Δ MILEXP	Constant and Linear Trend	*-8.511865 (0.0000)*

When we look at the Table 1, the finding indicates stationarity at level for GROWTH1 and GROWTH2 and thus these variables are forecasted to be integrated of order 0 while MILEXP is found to be integrated of order 1 in which the first difference of the variable is stationary. The findings of unit root tests demonstrate that our variables do not possesses two or more the order of integration. Thus, ARDL boundary test, which is not applicable to series with integration order two or more, may be used.

To investigate the optimal leg lengths of the variables in each model given in Equation 1 and 2, the AIC criterion is performed. Table 2 and 3 state that the finest model is ARDL (4,2) for the models in Equation 1 and 2.

Table 2: Optimal Lag Length Selection for the Model in Equation 1 (GROWTH1)

Model	LogL	**AIC***	BIC	HQ	Adj. R-sq	Specification
3	-141.279706	**5.565915**	5.897412	5.693761	0.172209	**ARDL(4, 2)**
18	-145.120885	5.597070	5.818068	5.682300	0.105300	ARDL(1, 2)
2	-141.177381	5.599162	5.967493	5.741213	0.156598	ARDL(4, 3)
17	-145.014500	5.630167	5.887998	5.729602	0.089857	ARDL(1, 3)
1	-141.033855	5.630884	6.036047	5.787139	0.141559	ARDL(4, 4)
13	-145.104692	5.633507	5.891338	5.732943	0.086812	ARDL(2, 2)
8	-144.882704	5.662322	5.956987	5.775963	0.074600	ARDL(3, 2)
16	-144.896000	5.662815	5.957479	5.776455	0.074144	ARDL(1, 4)
12	-144.986589	5.666170	5.960834	5.779810	0.071032	ARDL(2, 3)
7	-144.758209	5.694748	6.026246	5.822594	0.058387	ARDL(3, 3)
11	-144.784527	5.695723	6.027221	5.823569	0.057469	ARDL(2, 4)
5	-147.287825	5.714364	5.972195	5.813799	0.009907	ARDL(4, 0)
20	-150.302175	5.714895	5.862228	5.771716	-0.040614	ARDL(1, 0)
6	-144.597698	5.725841	6.094171	5.867891	0.042695	ARDL(3, 4)
19	-149.883578	5.736429	5.920594	5.807454	-0.045515	ARDL(1, 1)
15	-150.265048	5.750557	5.934723	5.821583	-0.060392	ARDL(2, 0)
4	-147.276290	5.750974	6.045638	5.864614	-0.011185	ARDL(4, 1)
14	-149.844094	5.772003	5.993002	5.857234	-0.065737	ARDL(2, 1)
10	-150.003200	5.777896	5.998895	5.863127	-0.072036	ARDL(3, 0)
9	-149.642122	5.801560	6.059391	5.900995	-0.080301	ARDL(3, 1)

Table 3: Optimal Lag Length Selection for the Model in Equation 2 (GROWTH2)

Model	LogL	**AIC***	BIC	HQ	Adj. R-sq	Specification
3	-140.495992	**5.536889**	5.868386	5.664734	0.168326	**ARDL(4, 2)**
18	-144.172315	5.561938	5.782936	5.647168	0.106575	ARDL(1, 2)
2	-140.353451	5.568646	5.936977	5.710697	0.153903	ARDL(4, 3)
17	-144.034794	5.593881	5.851713	5.693317	0.092201	ARDL(1, 3)
13	-144.159178	5.598488	5.856319	5.697923	0.088010	ARDL(2, 2)
1	-140.255170	5.602043	6.007207	5.758299	0.137372	ARDL(4, 4)
16	-143.945755	5.627621	5.922285	5.741261	0.075520	ARDL(1, 4)
8	-143.962891	5.628255	5.922920	5.741896	0.074934	ARDL(3, 2)
12	-144.008691	5.629952	5.924616	5.743592	0.073363	ARDL(2, 3)
7	-143.803558	5.659391	5.990888	5.787237	0.059940	ARDL(3, 3)
11	-143.852929	5.661220	5.992717	5.789065	0.058220	ARDL(2, 4)
20	-149.217188	5.674711	5.822043	5.731531	-0.033894	ARDL(1, 0)
5	-146.221144	5.674857	5.932688	5.774293	0.015633	ARDL(4, 0)
6	-143.683572	5.691984	6.060315	5.834035	0.042838	ARDL(3, 4)
19	-148.735954	5.693924	5.878089	5.764950	-0.036357	ARDL(1, 1)
15	-149.182168	5.710451	5.894616	5.781476	-0.053626	ARDL(2, 0)
4	-146.192354	5.710828	6.005492	5.824468	-0.004694	ARDL(4, 1)
14	-148.696865	5.729514	5.950512	5.814744	-0.056417	ARDL(2, 1)
10	-148.936559	5.738391	5.959389	5.823621	-0.065837	ARDL(3, 0)
9	-148.510081	5.759633	6.017464	5.859068	-0.071456	ARDL(3, 1)

As pointed out in the co-integration test findings in Table 4 and 5, the F-statistic values are above upper limit critical bounds (i.e., the series is I(1)) in both table and thus we deduce that the variables are co-integrated. In this sense, economic growth and military expenditure move together in the long-term in Turkiye.

Table 4: ARDL Bound Test for the Model in Equation 1(GROWTH1)

F-statistic:	9.475105	*Critical Values*	
	Significance	$I(0)$ *Bound*	$I(1)$ *Bound*
	10%	4.05	4.49
	5%	4.68	5.15
	2.5%	5.3	5.83
	1%	6.1	6.73

Table 5: ARDL Bound Test for the Model in Equation 2 (GROWTH2)

F-statistic:	9.202248	*Critical Values*
Significance	$I(0)$ *Bound*	$I(1)$ *Bound*
10%	4.05	4.49
5%	4.68	5.15
2.5%	5.3	5.83
1%	6.1	6.73

Table 6 below depicts long-term coefficients of the models of Equation 1 and 2 and the estimation findings disclose that the sign of military spending is negative and statistically significant displaying that one unit rising in the percentage share of military expenditure in GDP leads to a drop in economic growth by 1.379% and 1.279% for GROWTH1 and GROWTH2 models respectively in Turkiye.

Table 6: Long-term Coefficients of ARDL (4,2) Models

Dependent Variable: GROWTH1			
Variable	*Coefficient*	*t-statistic*	*Prob.*
MILEXP	-1.379913	-2.324408	0.0247
TREND	-0.038252	-1.368310	0.1780
Dependent Variable: GROWTH2			
Variable	*Coefficient*	*t-statistic*	*Prob.*
MILEXP	-1.279168	-2.173579	0.0350
TREND	-0.011506	-0.415205	0.6800

As pointed out Table 7, all signs of short-term coefficients of GROWTH1 are positive and statistically significant whereas only one short-term coefficient of MILEXP is statistically significant and, unlike long-term coefficient, gets a positive sign for the model given by Equation 1.

Meanwhile the EC coefficient is negative and statistically significant. At the bottom of the table, we notified several diagnostic test results and the model presented in Equation 1 do not suffer from an extra problem in the sense of autocorrelation, heteroscedasticity, normality, and model specification error.

Table 7. Error Correction Estimation (ECM) Results of ARDL (4,2) Model of Equation 1

	Dependent Variable: GROWTH1		
	Coefficient	*t-Statistic*	*Prob.*
$\Delta GROWTH1_{t-1}$	0.477591	2.058557	0.0454
$\Delta GROWTH1_{t-2}$	0.434113	2.345709	0.0235
$\Delta GROWTH1_{t-3}$	0.332717	2.592167	0.0128
$\Delta MILEXP$	-1.250144	-1.003304	0.3211
$\Delta MILEXP_{t-1}$	4.349277	3.594199	0.0008
C	15.74094	5.380698	0.0000
EC_{t-1}	-1.496379	-5.448730	0.0000

$$\mathrm{EC = GROWTH1 \; - \; (-1.3799*MILEXP - 0.0383*TREND)}$$

Diagnostic Tests	
Tests	Test Value (Prob.)
Breusch-Godfrey Serial Correlation LM Test	1.685988 *(*0.1973*)*
ARCH Heteroskedasticity Test	0.694828 *(*0.4084*)*
Ramsey RESET Test	1.954819 *(*0.1691*)*
Jarque-Bera Test	*1.213551 (0.545106)*

Table 8 below displays error correction estimation findings for the model given in Equation 2. All short-term coefficients of GROWTH2 variable are positive and statistically significant. On the other hand, for only one short-term coefficient of MILEXP, the finding is statistically significant and, in contrast to long-term coefficient, has a positive sign. Meantime the EC coefficient, in parallel to our prior expectation, is negative and statistically significant. Moreover, as concluded from the results of diagnostic tests in Table 8, the model given in Equation 2 does not include autocorrelation, heteroscedasticity, non-normality, and model specification problems.

Table 8: Error Correction Estimation (ECM) Results of ARDL (4,2) Model of Equation 2

	Dependent Variable: GROWTH2		
	Coefficient	*t-Statistic*	*Prob.*
$\Delta GROWTH1_{t-1}$	0.466563	1.994923	0.0521
$\Delta GROWTH1_{t-2}$	0.425623	2.281666	0.0273
$\Delta GROWTH1_{t-3}$	0.327741	2.538452	0.0147
$\Delta MILEXP$	-1.245516	-1.013853	0.3161
$\Delta MILEXP_{t-1}$	4.169681	3.494123	0.0011

C	11.05188	5.254522	0.0000
EC_{t-1}	-1.488339	-5.369703	0.0000

$$EC = GROWTH1 - (-1.2792*MILEXP - 0.0115*TREND)$$

Diagnostic Tests

Tests	Test Value (Prob.)
Breusch-Godfrey Serial Correlation LM Test	1.470543 *(0.2411)*
ARCH Heteroskedasticity Test	0.605612 *(0.4400)*
Ramsey RESET Test	1.805337 *(0.1860)*
Jarque-Bera Test	*0.649292 (0.722783)*

Lastly CUSUM test findings in Figures 1 and 2 below reveal that none of the model has parameter instability problem.

Figure 1: CUSUM Test for Parameter Stability of the Model in Equation 1

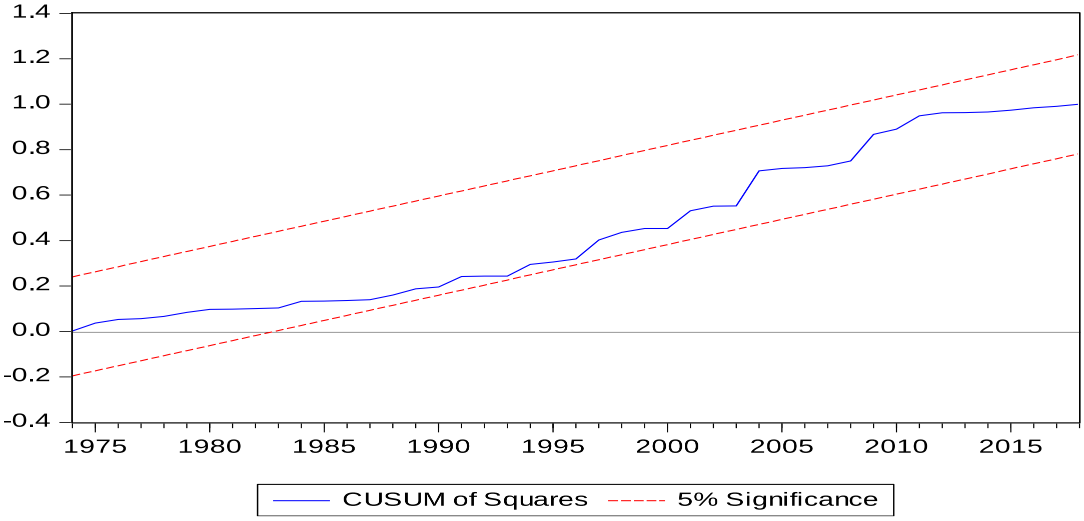
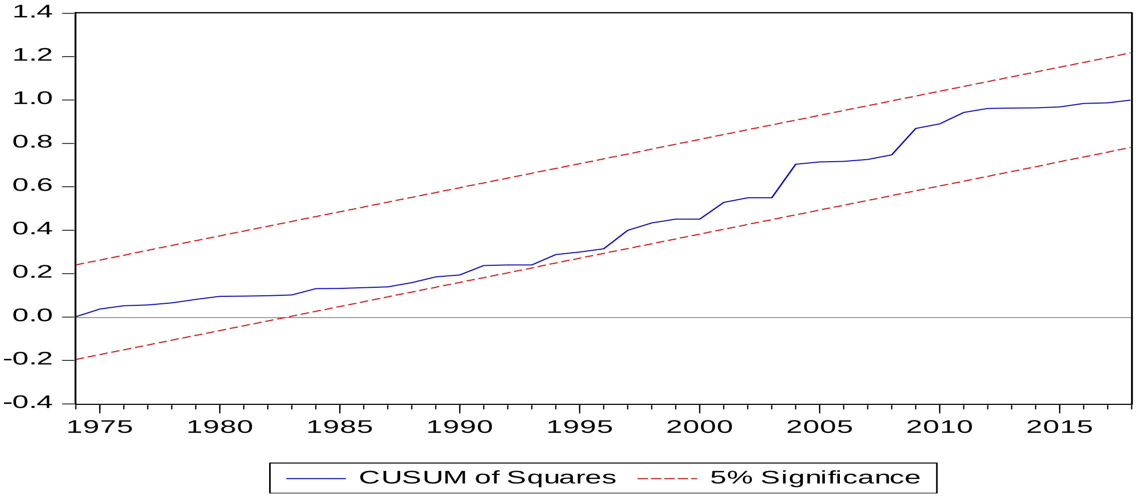


Figure 2: CUSUM Test for Parameter Stability of the Model in Equation 2



The last method implemented in this paper follows Granger causality test as Toda Yamamoto approach to see if there is any sort of causality association between military expenditure and economic growth. Using unrestricted VAR (2,2) model where optimal lag lengths were determined via AIC criterion, we conducted Granger Causality/Block

Exogeneity Wald test and estimation findings are shown in Table 9.

Causality test finding in Table 9 show that there is a statistically significant unidirectional causality running from military spending to economic growth and this finding remains valid for two models of Equation 1 and 2.

Table 9. Causality Test

Dependent Variable: MILEXP			
Excluded	*Chi-sq*	*df*	*Prob.*
GROWTH1	1.362540	2	0.5060
Dependent Variable: GROWTH1			
Excluded	*Chi-sq.*	*df*	*Prob.*
MILEXP	8.719553	2	0.0128
Dependent Variable: MILEXP			
Excluded	*Chi-sq*	*df*	*Prob.*
GROWTH2	1.995258	2	0.3688
Dependent Variable: GROWTH2			
Excluded	*Chi-sq*	*df*	*Prob.*
MILEXP	9.136531	2	0.0104

4. CONCLUSION

In this study, we examine the long-term relationship between military expenditure and economic growth in Turkiye by using an annual data set for the period of 1961-2018. We used two different indicators of economic growth in order to see how robust our result is. Firstly, we implemented PP unit root test and the test results pointed out that economic growth variables are stationary at level and military spending variable is stationary at first difference. After seeing none of the variables is integrated order no more than one, we conducted ARDL boundary test for co-integration analysis. ARDL boundary test findings implied that military expenditure and economic growth are co-integrated in Turkiye. According to the long-term coefficient estimation results, military spending has a statistically significant reverse impact on economic growth. In other words, one unit jump in the percentage share of military spending in GDP induces to a decrease in economic growth by 1.379% and 1.279% for the models given in Equation 1 and 2 respectively in Turkiye. Furthermore, as can be deduced from the results of several diagnostic tests conducted for the models given in Equation 1 and 2, none of the models contains autocorrelation, heteroscedasticity, non-normality, model specification, and parameter instability problems. Lastly, we identified a unidirectional causality association which runs from military spending to economic growth.

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