The Long-run Impact of Openness on Military Expenditure in Turkey

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Abstract: In this study we analyze the long-run relationship between openness and military expenditure in Turkey by employing an annual data set running from 1960 to 2018 and ARDL estimation technique. We conducted our analyses by using two different measures of military expenditure to check the validity and robustness of the findings. Co-integration test results show that openness and military expenditure are co-integrated; thus, they move together in the long-run in Turkey. Long-run coefficient estimation results disclose that openness has statistically significant positive effect on military expenditure. In other words, one percent increase in openness cause to a jump in military expenditure by 1.55% and 1.18% for ARDL (1,1) and ARDL (2,1) models respectively in Turkey. On the other hand, openness has a negative influence on military expenditure in the short-run. Meanwhile diagnostic test results indicate that our models do not contain autocorrelation, heteroskedasticity, model misspecification, and parameter instability problems.

Key Words: Military Expenditure, Openness, Long-run Analysis, ARDL Model, Turkey.

INTRODUCTION

While the globalizing world moves away from the traditional understanding of society, economic factors are becoming increasingly important in increasing the welfare level of countries. For this reason, as the wealth, production volumes and trade understanding of countries develop, economic growth is achieved and thus their national security is strengthened. When we look at world history, states have experienced economic crises in certain periods and have sought ways to cope with these crises. Today, there are many different opinions about the causes, determinants and solutions of these economic crises. Although there are many different approaches, the current account deficit is highlighted by economists as the cause of the crises. Therefore, the balance of payments items included in the current account deficit have become an important parameter that shows the financial situation of countries. Negative deviations in the current account balance can be seen as a harbinger of the crisis for the country in question. For this reason, current account deficit data has become a basic issue that economists frequently look at in order to keep Current Account statistics regularly and to make accurate determinations based on these data.

Countries spend on security such as military equipment, military vehicles and weapons to protect their national security and deter threats from outside. Military spending rates differ from country to country, depending on the geographic location of the country in question, terrorist incidents and relations with neighboring countries. For the welfare of the country and the acceleration of economic activities, first of all, National Security must be ensured and the country must act freely. For this reason, states reduce their expenditures such as health, education and infrastructure and allocate budget for Military Expenditures. These military expenditures, also called Defense Expenditures, constitute one of the important expense items. So much so that sometimes primary needs such as education and health expenditures are put in the second place, while defense and military expenditures can become the largest expense item of the state. From this point of view, increasing taxes to finance the increase in military expenditures, creating new resources for defense by reducing primary investment items may cause economic contraction as well as negatively affecting growth with the decreasing domestic demand. For this reason, the financing of Military Expenditures, which is a public expense item, and the calculation of the optimal budget to be allocated for it gain importance.

Due to its geographical location, Turkey is located in an important region where Asia and Europe intersect. Public expenditures play a major role in the continuity of growth and development in developing economies. The budget allocated to defense and military expenditures also gains importance in this respect. Looking at the eastern and southeastern borders, the colonization of neighboring countries with oil fields by developed countries and the internal turmoil in these countries pose a threat to Turkey. Tensions between the newly established countries after the collapse of the Soviet Union from the north, the historical conflict

with Greece in the west and the terrorist incidents that occurred within the borders at certain periods equalize the military expenditures in Turkey. It's a more important issue than national security. Therefore, it is thought that investigating the economic efficiency of Military Expenditures and its impact on the Current Account Deficit, which is a chronic problem for Turkey, will be important data for decision makers.

In this study, the long-term relationship between Current Account Deficit and Military Expenditures in Turkey has been examined. For this purpose, analysis was made using ARDL technique using annual data from 1960 to 2018. In the light of the empirical data obtained, the results and evaluations were made and a contribution to the literature was made.

LITERATURE REVIEW

Studies examining whether the budget allocated by states for military expenditures affect their economies, and if so, what effect it has, are generally based on two theoretical bases. The first of these, the "Military Keynesian Approach", evaluates the supply side and argues that investments and expenditures in the field of Defense Industry have a positive effect on economic growth by increasing supply. The second view, the "Neoclassical Approach", argues that Military Spending reduces limited resources and negatively affects the economy. Apart from these two basic views in the literature, there are also studies suggesting that Military Expenditures have no effect on the economy.

E. Benoit made the first study examining the relationship between military expenditures and economic factors in 1973. Benoit found a linear relationship between Defense Expenditures and Economic growth in the countries he researched. After his study, which concluded that "Military Expenditures positively affect economic growth", this theory is now known as the "Benoit Hypothesis" in the world.

Many studies were carried out later on this subject, which Benoit began to research. These studies generally try to determine the direction of the relationship of the Military Expenditure of the countries on the economic factors and whether the positive or negative effect is dominant. For this reason, the literature review part of our study was created according to country and country groups.

Frederiksen and Looney (1982) used different variables to explain the relationship between military expenditures and economic growth by dividing countries into specific groups. According to this, countries are examined in two groups as those with limited resources and those with rich resources. As a result of the study, it has been determined that military expenditures make a positive contribution to the economy in strong countries, but no positive effect can be detected in weak countries.

Yakovlev (2007) examined the military expenditures and the effects of arms trade on the economy of 28 countries, including Turkey, covering the years 1965-2000. According to the results obtained, it has been determined that military expenditures affect economic growth positively if the countries are exporters rather than importers in the defense sector.

Mintz and Stevenson (1995) examined military spending and economic growth variables for 103 different countries. As a result of his study, he determined a positive relationship. Landau (1986) examined 65 less developed countries with data covering the years 1960-1980. As a result of his study, he determined that military expenditures do not have a significant relationship on economic growth.

Odehnal and Neubauer (2012) found a positive relationship between military expenditures and economic growth in their study for OECD countries. Likewise, Keller (2006) examined the same relationship for OECD countries and found a negative relationship between the variables. Alozious (2015), in his study with data covering the years 1995-2011 in OECD countries, determined that military expenditures increased the current account deficit.

Biswas and Ram (1986) examined the relationship between military expenditures and economic growth for 58 underdeveloped countries with data covering the years 1960 and 1977. According to the results they found, they concluded that there is no long-term significant relationship between the variables.

Among the studies examining the relationship between Military Expenditures and Economic growth on the basis of countries; Kinsella (1990) for the USA from 1943-1989; Manchester (2017) for USA 1947-2016; Poyne and Ross (1992) for the USA; Kollias and Makrydakis (2000) did not find a relationship between the variables in their study for Greece. Wijeweera and Webb (2009) for Sri Lanka; Rufael-Wolde for China (2001); Ateşoğlu for the USA (2009); Feridun (2011) for Northern Cyprus, Raju and Ahmet (2019) for India, Pakistan and China; Murdoch (1997), in his study for Asian and Latin

American countries, found that the effect of military spending on economic growth is positive. Dunne and Vougas (1999) for South Africa; D'Afostino(2012) For countries in Africa; Hou and Chen (2013) for 35 developing countries; Arshad (2017) for 61 countries; In his study for 64 Developing Countries, Galvin (2003) found that the effect of military spending on economic growth is negative.

Different results have been reported in studies conducted for Turkey. From these studies; Sezgin (2001), for the period 1956-1994; Halıcıoğlu (2004) For the 1950-2002 period; Erdoğdu (2006) found a positive relationship between military expenditures and economic growth in Turkey for the 1968-2004 period. Against this; Akçan (2019) For the 1982-2017 period; Hook and Hook for the period 1980-2017 (2020); Dunne (2001) found a positive relationship between military expenditures and economic growth in Turkey for the period 1960-1996. When we look at the literature, there are positive and negative relationships between the variables, as well as in studies where no relationship was found. According to this; Kollias (1997) For the period 1954-1993; Topal (2008) For the period 1960-2016; İpek (2014) for the period 1980-2012; Durgun and Timur (2017) for the period 1970-2015; Görkem and Işık (2008) could not find a relationship between military expenditures and economic growth variables in Turkey for the 1968-2006 period.

DATA AND METHODOLOGY

In this study we examine the short-run and long-run relationship between openness and military expenditure for the case of Turkey by employing ARDL estimation technique and a data set covering the years between 1960 and 2018. We check the validity of results for two different indicators of military expenditure, which are military expenditure (current USD) (MILEXP) and per capita military expenditure (MILEXPPC). Openness (OPEN) is given by percentage of trade in GDP. All data are obtained by WDI of the World Bank and in logarithmic forms.

ARDL estimation method was utilized to conduct ARDL boundary test via following models:

$$\Delta \mathrm{MILEXP}_t = \alpha_0 + \sum_{i=1}^{p} \delta_i \Delta \mathrm{MILEXP}_{t-i} + \sum_{i=0}^{q} \phi_i \Delta OPEN_{t-i} + \theta_0 \mathrm{MILEXP}_{t-1} + \theta_1 OPEN_{t-1} + \varepsilon_t \quad (1)$$

$$\Delta \mathrm{MILEXPPC}_t = \alpha_0 + \sum_{i=1}^{p} \delta_i \Delta \mathrm{MILEXPPC}_{t-i} + \sum_{i=0}^{q} \phi_i \Delta OPEN_{t-i} + \theta_0 \mathrm{MILEXPPC}_{t-1} + \theta_1 OPEN_{t-1} + \varepsilon_t \quad (2)$$

In above two equations, θ_0 and θ_1 symbols stand for long-term coefficients; δ_i and ϕ_i symbols represent short-term coefficients; Δ is first degree difference operator; α_0 is constant term of the models, and ε_t is white noise error term of the models.

The null hypothesis of ARDL boundary test (i.e., $H_0 : \theta_0 = \theta_1 = 0$) claims absence of co-integrating relationship between military expenditure and openness and the alternative hypothesis of ARDL boundary test ($H_1 : \theta_0 \neq \theta_1 \neq 0$) asserts presence of co-integrating relationship between military expenditure and openness. If the F-statistic value of ARDL boundary test is beyond the upper limit for a given significance level then we conclude that there is co-integrating relationship between military expenditure and openness while F-statistic value less than the lower limit for a given significance level hints that there is no co-integrating relationship between military expenditure and openness. Lastly, we are indecisive if F-statistic value falls between the lower and upper limits.

We also estimated following models to get short-run and long-run coefficients:

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

$$MILEXPPC_t = \beta_0 + \sum_{i=1}^{p} \delta_i \Delta MILEXPPC_{t-i} + \sum_{i=0}^{q} \phi_i \Delta OPEN_{t-i} + \gamma ECM_{t-1} + \varepsilon_t \quad (4)$$

In above equations, δ_i and ϕ_i notations show dynamic coefficients which bring the model back to the balance in the long run; ECM notation is error correction term of the model; γ notation stands for the speed of adjustment at which the model return back to long run in response to a shock occurred in short-run. The speed of adjustment term must be negative and statistically significant.

ESTIMATION RESULTS

We firstly performed Kwiatkowski-Phillips-Schmidt-Shin (KPSS) stationarity test to check the stationarity status of each series. The null hypothesis of KPSS test asserts the stationarity of series against to the alternative hypothesis claiming the non-stationary of series. In Table 1 below we displayed the KPSS stationarity test results.

Table 1. KPSS Stationarity Test

Variable	Model	LM-Stat.	Result
MILEXP	Constant	*0.908606*	-
1. difference of MILEXP	Constant	*0.092355*	I(1)
MILEXPPC	Constant	*0.890148*	-
1. difference of MILEXPPC	Constant	*0.077278*	I(1)
OPEN	Constant	*0.887379*	-
1. difference of OPEN	Constant	*0.142596*	I(1)

Asymptotic critical values are 0.739, 0.463, and 0.347 for 1%, 5%, and 10% significance levels respectively.

The findings in Table 1 point out that none of our variables are stationary in level but they are stationary at first difference. Hence, given the fact that our variables are integrated order one (i.e., their integration order less than two), we are able to use ARDL boundary test.

Before using ARDL technique we need to determine optimal lag lengths for our ARD models. We used the AIC criterion to identify the optimal leg length of each model constructed in Equation 1 and 2. Table 2 and 3 disclose that the best models are ARDL (1,1) and ARDL (2,1) for the models given in Equation 1 and 2 respectively.

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

Model	LogL	AIC*	BIC	HQ	Adj. R-sq	Specification
19	34.126484	**-1.095509**	-0.949521	-1.039054	0.987663	**ARDL(1, 1)**
14	35.003326	-1.09103	-0.908545	-1.020462	0.987811	ARDL(2, 1)
18	34.127649	-1.059187	-0.876702	-0.988619	0.987416	ARDL(1, 2)
13	35.122180	-1.058988	-0.840007	-0.974306	0.987616	ARDL(2, 2)
9	35.029012	-1.0556	-0.836619	-0.970918	0.987574	ARDL(3, 1)
4	35.423322	-1.033575	-0.778097	-0.93478	0.987495	ARDL(4, 1)
17	34.357072	-1.031166	-0.812184	-0.946484	0.987266	ARDL(1, 3)
12	35.285338	-1.028558	-0.773079	-0.929762	0.987433	ARDL(2, 3)
8	35.169008	-1.024328	-0.768849	-0.925532	0.987379	ARDL(3, 2)
11	35.585005	-1.003091	-0.711115	-0.890182	0.987304	ARDL(2, 4)
16	34.548504	-1.001764	-0.746285	-0.902968	0.987091	ARDL(1, 4)
3	35.495968	-0.999853	-0.707878	-0.886944	0.987263	ARDL(4, 2)
7	35.289738	-0.992354	-0.700378	-0.879445	0.987167	ARDL(3, 3)
2	35.592976	-0.967017	-0.638545	-0.839994	0.987032	ARDL(4, 3)
6	35.585018	-0.966728	-0.638255	-0.839705	0.987028	ARDL(3, 4)
1	35.685585	-0.934021	-0.569052	-0.792885	0.986788	ARDL(4, 4)
20	27.158094	-0.878476	-0.768985	-0.836135	0.984410	ARDL(1, 0)
15	27.814572	-0.865984	-0.719997	-0.80953	0.984480	ARDL(2, 0)
10	27.814574	-0.829621	-0.647136	-0.759053	0.984169	ARDL(3, 0)
5	28.391779	-0.814247	-0.595265	-0.729564	0.984182	ARDL(4, 0)

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

Model	LogL	AIC*	BIC	HQ	Adj. R-sq	Specification
14	35.315396	**-1.102378**	-0.919893	-1.03181	0.979473	**ARDL(2, 1)**
19	34.284876	-1.101268	-0.95528	-1.044814	0.979107	ARDL(1, 1)
13	35.431917	-1.070252	-0.85127	-0.98557	0.979143	ARDL(2, 2)
9	35.320863	-1.066213	-0.847231	-0.981531	0.979058	ARDL(3, 1)
18	34.288390	-1.065032	-0.882548	-0.994464	0.978692	ARDL(1, 2)
4	35.844352	-1.048886	-0.793407	-0.95009	0.979025	ARDL(4, 1)
12	35.566005	-1.038764	-0.783285	-0.939968	0.978812	ARDL(2, 3)
17	34.497834	-1.036285	-0.817303	-0.951603	0.978422	ARDL(1, 3)
8	35.448557	-1.034493	-0.779014	-0.935697	0.978721	ARDL(3, 2)
3	35.900902	-1.014578	-0.722603	-0.901669	0.978623	ARDL(4, 2)
11	35.900428	-1.014561	-0.722585	-0.901652	0.978623	ARDL(2, 4)
16	34.698570	-1.007221	-0.751742	-0.908425	0.978133	ARDL(1, 4)
7	35.566139	-1.002405	-0.710429	-0.889496	0.978361	ARDL(3, 3)
2	35.995690	-0.981661	-0.653189	-0.854638	0.978233	ARDL(4, 3)
6	35.907581	-0.978457	-0.649985	-0.851434	0.978164	ARDL(3, 4)
1	36.078509	-0.948309	-0.58334	-0.807173	0.977817	ARDL(4, 4)
20	27.271331	-0.882594	-0.773103	-0.840253	0.973556	ARDL(1, 0)
15	28.051571	-0.874603	-0.728615	-0.818148	0.973792	ARDL(2, 0)
10	28.058999	-0.838509	-0.656024	-0.767941	0.973275	ARDL(3, 0)
5	28.830150	-0.830187	-0.611205	-0.745505	0.973484	ARDL(4, 0)

Co-integration test results are given in Table 4 and 5 and as seen from the results, F-statistic values are bigger than upper limit critical values at least at 2.5% significance level. Therefore we can state that military expenditure and openness are co-integrated in two models. In other words, military expenditure and openness move together in the long-run in Turkey.

Table 4. ARDL Bound Test for ARDL(1,1) Model

F-statistic:	8.383554	*Critical Values*	
Significance		*Lower Limit*	*Upper Limit*
10%		3.02	3.51
5%		3.62	4.16
2.5%		4.18	4.79
1%		4.94	5.58

Table 5. ARDL Bound Test for ARDL(2,1) Model

F-statistic:	5.553456	*Critical Values*	
Significance		*Lower Limit*	*Upper Limit*
10%		3.02	3.51
5%		3.62	4.16
2.5%		4.18	4.79
1%		4.94	5.58

We reported long-run coefficient estimations of the ARDL(1,1) and ARDL(2,1) models in Table 6 and the estimation results indicate that openness has a positive and statistically significant impact on military expenditure in both models. In other words, if openness increases one percent then military

expenditure goes up by 1.55% and 1.18% for ARDL(1,1) and ARDL(2,1) models respectively in Turkey. This finding shows that sensitivity of military expenditure to openness is high.

Table 6. Long-run Coefficients of ARDL(1,1) and ARDL(2,1) Models

Model: ARDL(1,1) / Dependent Variable: MILEXP			
Variable	*Coefficient*	*t-statistic*	*Prob.*
OPEN	1.550727	3.240250	0.0020
Constant	18.19259	9.301109	0.0000
Model: ARDL(2,1) / Dependent Variable: MILEXPPC			
Variable	*Coefficient*	*t-statistic*	*Prob.*
OPEN	1.186549	3.628677	0.0007
Constant	0.970103	0.791482	0.4323

Table 7 shows the error correction estimation results for ARDL(1,1) model. Short-run coefficient of OPEN variable is significant and negative. Although openness has a positive effect on military expenditure in the long-run, it has a negative influence on military expenditure in the short-run in Turkey. In parallel to prior expectation, we have negative and statistically significant estimation for EC coefficient. We also conducted Breusch-Godfrey Serial Correlation LM test for autocorrelation, Breusch-Pagan-Godfrey test for heteroskedasticity, and Ramsey RESET test for model misspecification. According to the test results, ARDL(1,1) model do not contain autocorrelation, heteroskedasticity, and model misspecification problems.

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

	Dependent Variable: MILEXP		
	Coefficient	*t-Statistic*	*Prob.*
$\Delta OPEN$	-0.457656	-4.523839	0.0000
ECM_{t-1}	-0.064285	-5.107070	0.0000
EC = MILEXP - (1.5507*OPEN + 18.1926)			
Diagnostic Tests			
Tests		Test Value / Prob.	
Breusch-Godfrey Serial Correlation LM Test		0.888973 *(*0.4172*)*	
Breusch-Pagan-GodfreyHeteroskedasticity Test		0.267303 *(*0.8487*)*	
Ramsey RESET Test		2.237495 *(* 0.1406*)*	

Table 8 reports the error correction estimation results for ARDL(2,1) model. Short-run coefficient of MILEXPPC is positive but not statistically significant whereas short-run coefficient of OPEN variable is significant and negative. Unlike the long-run positive impact of openness on military expenditure, openness has a negative short-run effect on military expenditure in Turkey. As anticipated, a negative and statistically significant estimation for EC coefficient was obtained. Moreover the findings of Breusch-Godfrey Serial Correlation LM test, Breusch-Pagan-Godfrey test, and Ramsey RESET test reveal that ARDL(2,1) model does not suffer from autocorrelation, heteroskedasticity, and model misspecification problems.

Table 8. Error Correction Estimation (ECM) Results of ARDL(2,1) Model

	Dependent Variable: MILEXPPC		
	Coefficient	*t-Statistic*	*Prob.*
$\Delta \text{MILEXPPC}_{t-1}$	0.150584	1.464555	0.1491
$\Delta OPEN$	-0.340600	-2.892602	0.0056
ECM_{t-1}	-0.093041	-4.159465	0.0001
EC = MILEXPPC - (1.1865*OPEN + 0.9701)			

Diagnostic Tests

Tests	Test Value / Prob.
Breusch-Godfrey Serial Correlation LM Test	0.035002 *(0.9656)*
Breusch-Pagan-GodfreyHeteroskedasticity Test	0.458945 *(0.7655)*
Ramsey RESET Test	1.155941 *(0.2874)*

Lastly, according to CUSUM test results indicated by the graphs in Figure 1 and 2 below, parameters of ARDL(1,1) and ARDL(2,1) models are stable and thus none of the models has parameter instability problem.

Figure 1: CUSUM Test for Parameter Stability of ARDL(1,1) Model

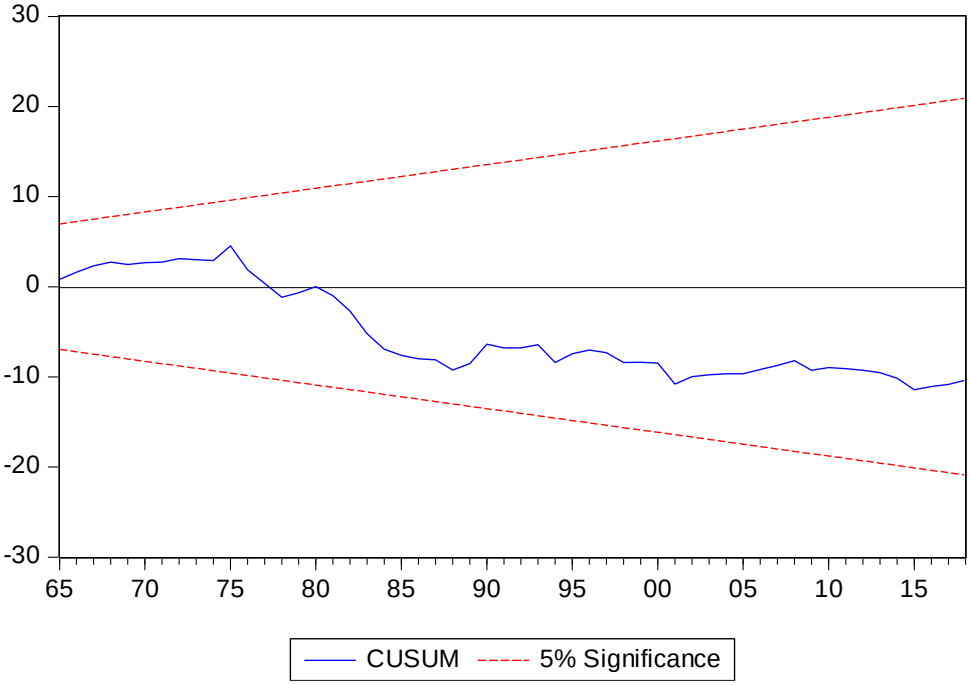
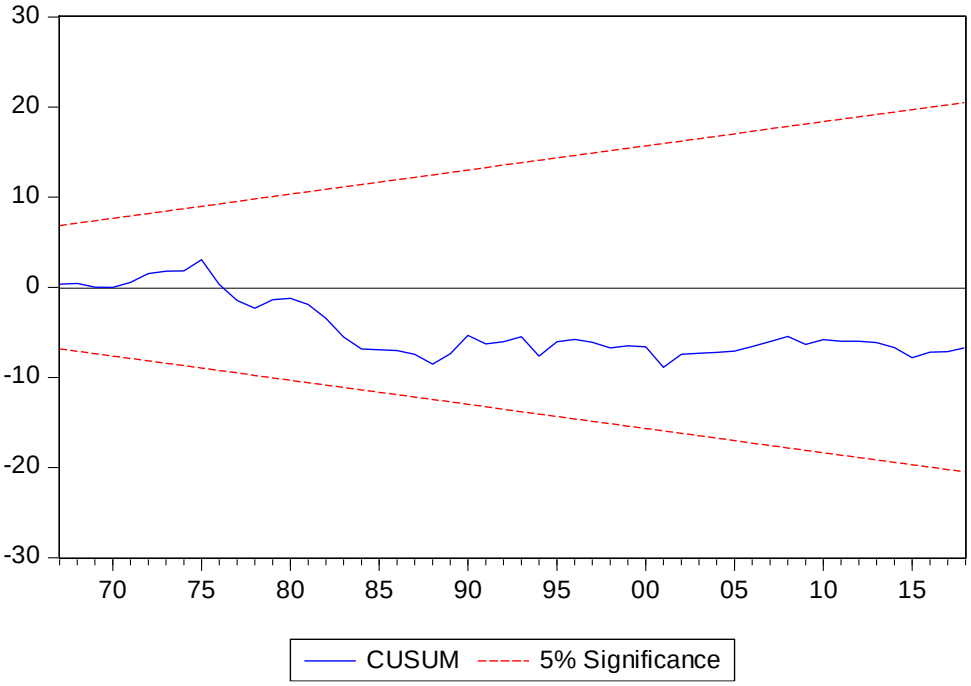


Figure 2: CUSUM Test for Parameter Stability of ARDL(2,1) Model



CONCLUSION

This study investigates the long-run association between openness and military expenditure in Turkey by using an annual data set running from 1960 to 2018 and ARDL estimation technique. To check the robustness of the findings we employed two different measures of military expenditure. Firstly we utilized KPSS stationarity test to see if our series are stationary and the test findings disclosed that variables of military expenditure, per capita military expenditure, and openness are integrated order one. Given none of the variables has integration order no more than one, we conducted co-integration analysis by using ARDL boundary test. ARDL boundary test results disclosed that openness and military expenditure are co-integrated; hence, they move together in the long-run in Turkey. According to the long-run coefficient estimation findings, openness possesses a statistically significant positive effect on military expenditure. More specifically, one percent jump in openness leads to an increase in military expenditure by 1.55% and 1.18% for ARDL(1,1) and ARDL(2,1) models respectively in Turkey. Since openness causes to an increase in military expenditure more than its own increase we can say that sensitivity of military expenditure to openness is high. On the other hand, openness has a negative influence on military expenditure in the short-run. Lastly diagnostic test results imply that our models do not suffers from autocorrelation, heteroskedasticity, model misspecification, and parameter instability problems.

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