THE IMPACT OF NATIONAL DEFENSE EXPENDITURE ON GROWTH OF ECONOMY IN SRI LANKA

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ABSTRACT

This study aims to analyze the relationship between defense expenditure and growth of the economy in Sri Lanka applying annual data during the period between 1990-2019 by engaging the ARDL bounds test and the Granger causality test. Economic growth is considered as a dependent variable whereas; defense expenditure, broad money supply, capital investment and exchange rate are considered as independent variables for this study. The findings revealed that defense spending has a significant and positive effect on economic growth in the long- run. Exchange rate, capital investment and broad money supply have a significant and positive influence in the short-run and long-run. Further, the output of the Granger causality confirms the one-way association between the growth of the economy and defense expenditure. The study suggests that government should concentrate more on human capital development rather than spending on defense.

1. INTRODUCTION

In developing countries, defense expenses are vital and comparatively higher than the expenses of health and education in total government expenditure. The economist proposes that defense spending crowds out private investment and extra productive expenditure, and its impetus to the negative impact on economic growth Na & Bo (2013). So, in recent years, policymakers and economists interested to study the connection between defense expenditure and macroeconomic variables particularly economic growth (Muhammad and Imran, 2016). Not only in developed countries also in developing countries defense expenses has been one of the major components of government expenditures both for and can affect economic growth through infrastructure developments, an expansion of aggregate demand, employment creation, political stability in positive ways and crowding out investments, interruptions to productive activities, increasing government debt in negative ways (Tekeoglu, 2008) and (Selvanathan and Saroja, 2014). Since defense spending offers the best production events to domestic and foreign investors and a peaceful environment for investment and found a positive relationship between defense

spending and economic growth in the developing countries (Aviral and Muhammad 2013).Since defense spending offers the best production events to domestic and foreign investors and a peaceful environment for investment and found a positive relationship between defense spending and economic growth in the developing countries (Aviral and Muhammad 2013). Albert & Webb (2009) recommends that when the government considers non-military spending with a higher priority significantly achieved a higher rate of growth. Further, they elaborate the transformation of government expenditure from the military to non-military sectors increase in economic growth resulting from– following the cessation of hostilities could be substantial.

Sri Lankan Government has experienced ethnic conflict during 1983–2009, which absorbed a massive amount of its defense expenditure. In Sri Lanka, the average defense budget for the period 1983 – 87 was 421 Million US Dollars. In 2009, 2019 and 2020 was Rs.214 billion, Rs.306 billion and Rs.312 billion respectively (Central bank, Reports). It is evident that even though after thirty years of the civil war the Sri Lankan government has less concentration on economic and social service activities. On the other hand, the government allocates more community funds to the defense sector rather than the main sectors of health and education. Therefore, it is vital to understand that the increase in defense expenditure increases the growth capacities of the Sri Lankan economy.

The rest of the study is organized as follows: Section 2 discusses the review of the literature. data presentation and analysis of the time-series properties of the variables used in this study discussed in the subsequent section. Empirical findings based on econometrics methodology are described in section 4. Finally, section 5 discussed the conclusions and policy recommendations.

2. REVIEW OF THE LITERATURE

From time to time the researchers try to study the association between government expenditure and growth of the economy in various parts of the globe and concluded mixed of findings since they apply various methods, a different time-spanning, a mixed of variables and using single and panel data. This section discusses some related literature on the association between defense expenditure and economic growth around the world.

Selvanathan et al. (2014) studied the causal relationship between defense spending and the growth of GDP in Sri Lanka during 1994 and 2013. And concluded the existence of unidirectional causality running from defense expenses to the growth of the economy. Sheikh et al. (2016) explored the influences of defense expenditures on economic growth for Pakistan and India for the period from 1972-2010 by using the Deger-type (demand and supply) model. They confirmed that the net effect of defense spending for Pakistan is positive while negative for India.

Enimola et al. (2006) presented the relationship between defense expenditures and the level of economic growth of Nigeria from 1977 to 2006. The Granger causality analyzes demonstrate that a unidirectional causality exists between economic growth and defense spending. Tekeoglu (2008) surveyed the relationship between military expenditures and economic growth in Turkey from 1969 and 2004 and found a significant negative relationship between military expenses and economic growth.

Pradhan (2010) studied the link between defense spending and economic growth in Nepal, China, Pakistan and India based on the integration and cointegration test for the period 1988-2007 and concluded China and India experienced bidirectional causality between public debt and economic growth; the existence of unidirectional causality from economic growth to public debt in Pakistan; unidirectional causality from defense spending to growth economy in Nepal and China, unidirectional causality from public debt to defense spending in India. Based on regression technique and Granger causality, cluster analysis, quintile analysis, Brasoveanu (2010) considered the association between military expenses and growth of Romania during 1998 and 2007, and suggested the existence of a significant negative correlation running between military expenses and economic growth.

Fath (2016) examined the linkages between defense expenditures and GDP in Turkey and Indonesia spanning from 1988 to 2014 using oil prices, defense spending, the growth rate of money supply, foreign direct investment and external balance on goods and services as variables. He concluded the correlation between defense expenses and economic growth is positive in Indonesia, while negative for Turkey. Anvar et al. (2012) explored the relationship between defense expenditures and economic growth in Pakistan by applying time-series data from 1980 to 2010 and using Granger Causality tests and Johansen Cointegration test. The empirical findings show that economic growth Granger causes with defense spending whereas the existence of a long-run association among defense spending and economic growth.

3. DATA AND METHODOLOGY

Applying Auto-Regressive Distributed Lag (ARDL) approach, this study analysis annual time-series data covering 30 years from 1990 to 2019 to investigate the relationship between defense expenses and economic growth in Sri Lanka. Economic growth is proxied by the real gross domestic product of the country. Also, the data on GDP, broad money supply, capital investment, and exchange rate are extracted from the World Bank Data Base. The defense expenditure is collected from the Annual reports of the Ministry of Finance, Sri Lanka.

3.1. UNIT TOOT TEST

The ADF method is used to determine the stationarity of the variables. The unit root test concluded whether a variable of time series possesses a unit root or non-stationary in statistics.

The hypotheses for the test:

$H_0 = \beta_1 = 1$ (Non- Stationary)

$H_0 = \delta_1 = 0$ (Stationary)

Generally, the unit root means rejection of the null hypothesis when a p-value is less than ∞ (1%,5%,10%) value.

3.2. ARDL AND THE ECM APPROACH

The ARDL approach examines the existence of a long-run association between the variables in levels and related regardless of whether the primary regressors are purely I (1), purely I (0), or slightly integrated.

$$\text{GDP}_t = \delta_1 \text{GDP}_{t-1} + \delta_2\, Defense_{t-1} + \delta_3\, \text{M2}_{t-1} + \delta_4\, Capital_{t-1} + \delta_5 Exchange_{t-1} + \sum_{i=0}^{p} \beta_{1i}\, \Delta\text{GDP}_{t-1} + \sum_{i=0}^{q1} \beta_{2i}\, \Delta Defense_{t-1} + \sum_{i=0}^{q2} \beta_{3i}\, \Delta\text{M2}_{t-1} + \sum_{i=0}^{q3} \beta_{4i}\, \Delta capital_{t-1} + \sum_{i=0}^{q4} \beta_{5i}\, \Delta Exchange_{t-1} + u_t$$

Where GDP is the Gross domestic product (billion Rupees)

Defense = Defense expenditure (billion Rupees)

M2 = Broad money supply (billion Rupees)

Capital = Capital Investment (percent of GDP)

Exchange = Exchange rate (local currency units per U.S dollar)

$\delta_1, \delta_2, \delta_3$, and δ_4 are coefficients

U_t is the error term

The existence of a long-run relationship among the variables is determine by the value of F-test in the ARDL co-integration method. Based on Wald or F-statistic, the null hypothesis is tested by considering the Unrestricted Error Correction Model while excluding the lagged variables ΔGDP, ΔDefense, ΔM2, ΔCapital and ΔExchange. Value of F-statistic is below the value of lower critical bounds, it suggests that there is no co-integration among the variables in the long run.

The null hypothesis of no co-integration:

$H_0 = \delta_1 = \delta_2 = \delta_3 = 0$ (There is no co-integration among the variables)

$H_1 = \delta_1 \neq \delta_2 \neq \delta_3 \neq 0$ (There is co-integration among the variables)

When there is long-run co-integration among the variables the following model is estimated.

$$\Delta\text{GDP}_t = \text{GDP}_1 + \sum_{i=0}^{p} \delta_{1i}\, \Delta\text{GDP}_{t-1} + \sum_{i=0}^{q1} \beta_{1i}\, \Delta Defense_{t-1} + \sum_{i=0}^{q2} \beta_{2i}\, \Delta\text{M2}_{t-1} + \sum_{i=0}^{q3} \beta_{3i}\, \Delta capital_{t-1} + \sum_{i=0}^{q4} \beta_{4i}\, \Delta Exchange_{t-1} + u_t$$

The following equations describes the specification of short-run dynamics of the ARDL model and the error correction model:

$$\Delta\text{GDP}_t = \delta_0 + \sum_{i=0}^{p} \beta_{1i}\, \Delta\text{GDP}_{t-1} + \sum_{i=0}^{q1} \beta_{2i}\, \Delta Defense_{t-1} + \sum_{i=0}^{q2} \beta_{3i}\, \Delta\text{M2}_{t-1} + \sum_{i=0}^{q3} \beta_{4i}\, \Delta capital_{t-1} + \sum_{i=0}^{q4} \beta_{5i}\, \Delta Exchange_{t-1} + \Lambda\, \Delta ECM_{t-1} + v_t$$

4. RESULTS AND DISCUSSION

The findings of the ADF are presented in Table 01. The stationarity position of the variables is fixed before carried out the ARDL bounds test, in order to ensure that the variables are not I (2) (Narayan, 2004).

Table 1: Unit Root Test

| Variables	Augmented Dickey-Fuller		
	I (0)	I (1)	Remark
Lngdp	0.6331	0.0495**	I (1)
lndefense	0.0376**	-	I (0)
lnm2	0.8947	0.0714*	I (1)
lncapital	0.1842	0.0001***	I (1)
lnexchange	0.0907*	-	I (0)

Note: Significant at 10%, 5% and 1% are *, **, and *** respectively

The unit root test is carried to all variables using the Augmented Dickey-Fuller test with only intercept and the findings are shown by Table. 01. According to Table -1 lngdp, lnm2 and lncapital are not-stationary at level, but stationary at the first difference I (1), while lndefense and lnexchange are stationary at level meaning that they are I (0) variables. Thus, the empirical variables have mixed with I (0) and I (1) and suggested applying the ARDL bounds test approach.

Table 2: VAR lag order selection criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	51.20420	-	2.54e-08	-3.300300	-3.062406	-3.227573
1	228.7823	279.0513	4.85e13	-14.19874	-12.77138*	-13.76238
2	260.1984	38.14814*	3.71e-13*	-14.65703*	-12.04020	-13.85704*

The above Table 2 reports the VAR lag order selection. The LR, FPE, AIC, and HQ criteria are recommended lag 2. Moreover, the following the polynomial graph, in figure 1, validate the selection of appropriate lag length of the VAR approach.
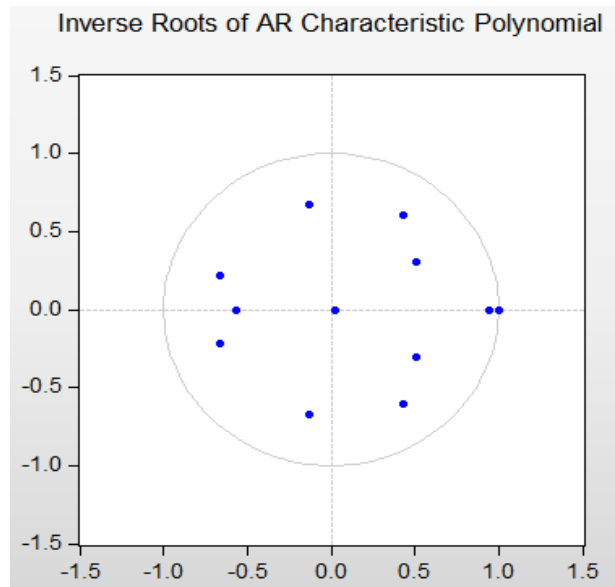
Figure 1: Polynomial graph

In this figure 1, all the dots are scattered interior the circle that confirms that at lag 2, estimation would be valid to obtain the best outcomes.

Table 3: ARDL (2,1,2,1,2) Bounds test for Cointegration

Critical Values	Value	Significant	Upper bounds I (0)	Lower bounds I (1)
F - Statistic	4.062204	10%	2.2	3.09
k	4	5%	2.56	3.49

Table 2 illustrates the results of the ADRL bounds cointegration test and the calculated value of F-statistic describes the normalized regression of economic growth. The computed value of F-statistic (4.062204) is higher than the upper critical bound at 10% and 5% critical values and support to reject the null hypothesis of no co-integration among the variables. And from the ARDL bounds test, it can be pronounced that there is a long-run association among the variables. Table 4 presents the empirical findings of the long-run cointegration which selected by the AIC through the bound tests ARDL (2, 1, 2, 1, 2).

Table 4: Estimated ARDL (2, 1, 2, 1, 2) Long-Run Coefficients

Variables	Coefficient	t-statistics	P-value
Lndefense	0.331928	2.731828	0.0154**
lnm2	0.449261	2.741920	0.0151**
Lncapital	0.687290	1.952550	0.0698*
Lnexchange	0.613076	2.180101	0.0456**

Note: Significant at 10%, 5% and 1% are *, **, and *** respectively

Since the long-run coefficients, defense spending has significant positive impacts on economic growth throughout the study. Anton Abdul Fathh and Salih Salihoglu (2016) in Indonesia; Muhammad Ramzan Sheikh and Imran Sharif Chaudhry (2016) in Pakistan and Benoit (1973, 1978) in 44 growing economics have concluded a positive relationship, However, Anton Abdul Fathh and Salih Salihoglu (2016) in Turkey; Tekeoglu, Ertugrul (2008) in Turkey; Muhammad Ramzan Sheikh and Imran Sharif Chaudhry (2016) in India; Sam S. Enimola and Akungba Akoko Brasoveanu (2010) in Romania found a significant negative relationship between defense spending and growth of economy and J. Paul Dunne and Nan Tian (2013) surveyed 170 previous study and concluded that stronger evidence for a negative association between defense expenses and economic growth.

A one percent increase in defense expenditure causes to increase in economic growth as 0.33% when all other factors are held constant. On the other hand, the broad money supply has the expected sign and a positive significant impact on economic growth for the study period which shows that a one percent increase in broad money supply leads to expedite economic growth by about 0.45% when all other factors are held constant. Similarly, capital investment and exchange rate have a significant positive impact on the growth of the Sri Lankan economy throughout the study period which indicates a one percent rise in capital investment, and the exchange rate are projected to stimulate economic growth of the country by around 0.69% and 0.61% at 5% and 10% significant level, respectively once all other factors are held constant.

Table 5: Error Correction Model

Variables	Coefficients	P-value
C	-0.035981	0.5929
D(LNGDP(-1))	0.895228	0.0025***
D(LNGDP(-2))	-0.171856	0.3970
D(LNDEFENSE)	0.016319	0.7578
D(LNDEFENSE(-1))	0.082409	0.1387
D(LM2)	0.500943	0.0657*
D(LNM2(-1))	-0.070230	0.8161
D(LNM2(-2))	-0.126387	0.6179
D(LNCAPITAL)	0.156926	0.0665*
D(LNCAPITAL (-1))	0.151221	0.0522*
D(LNEXCHANGE)	-0.153664	0.3668
D(LNEXCHANGE(-1))	0.686684	0.0011***

D(LNEXCHANGE(-2))	-0.236134	0.0699*
ECT(-1)	-0.955334	0.0215**

Note: Significant at 10%, 5% and 1%   are *, **, and *** respectively

Table 5 describes the estimated short-run coefficients and the Error Correction term of the Model (ECM) that measures the speed of adjustment of the existing model to the long-run equilibrium. The error correction term of this present model is correctly signed and highly significant. This specifies an adjustment to long-term equilibrium in the dynamic model and evidence for a steady long-term relationship Bannerjee et. al. (1998).   The value of error correction term (-0.955334) expresses, that the short-run instability will be resigned in the long-run at an adjustment rate of nearly 96% per annum. Further, broad money supply, capital investment and exchange rate have a significant positive impact in the short-run, but not defense expenditure.

Table 6: Pairwise Granger Causality Test represent at ARDL (2,1,2,1,2)

Direction of the causality	P-value	Decision
lndefense → lngdp	0.9486	Reject
lngdp → lndefense	0.0579*	Do not reject
lnm2 → lngdp	0.1201	Reject
lngdp →lnm2	0.0240**	Do not reject
lncapital → lngdp	0.1618	Reject
lngdp →lncapital	0.2693	Reject
lnexchange →lngdp	0.4125	Reject
lngdp →lnexchange	0.2382	Reject

Note: Significant at 10%, 5% and 1%   are *, **, and *** respectively

Table 6 reveals the causality results of the variables considered for the present study. AIC Lag selection is employed to select the appropriate lag length of this study. The findings express that there is no causality from defense spending to economic growth while there is causality from economic growth to defense spending. This indicates that in Sri Lanka, a unidirectional causality exists from economic growth to defense expenditure and economic growth causes to broad money supply, but broad money supply does not cause to economic growth.

By performing various diagnostic tests, the estimated model has ensured the acceptable of heteroscedasticity, autocorrelation and structural instability and reported in Table 7.

Table 7:   Results of Residual diagnostic Test

Test Statistic	P-value
Breusch- Godfrey Serial Correlation LM test	0.2218
ARCH LM test	0.4718
Ramsey's RESET test	0.7470

According to Table 7, The Breusch – Godfrey serial correlation LM test value (0.22) is higher than 5% significant level, indicates that the error term is normally distributed and the estimated model has no serial correlation. ARCH LM test probability value is 0.47, which indicates that there is no problem in homogeneity. Further, Ramsey's RESET test (0.75), describes that the short run model is well specified the function form is correct and the model does not suffer from omitted variables.

Figure 2 presents the Normality test - Histogram, the Jarque-Bera value (1.662) is lesser than 3 and its probability value (0.435) is higher than at 5% significant level, that the error is normally distributed.
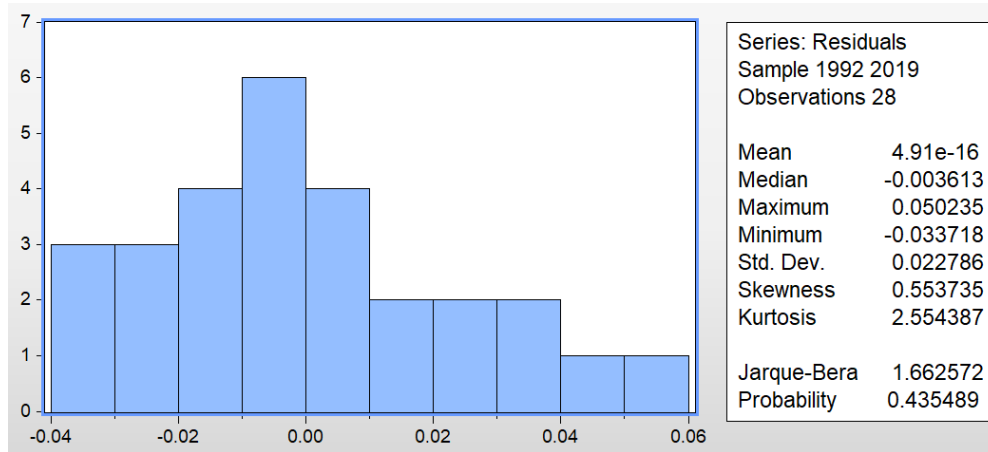
Figure 2: Normality Test - Histogram

The stability Test

By performing the cumulative sum (CUSUM) tests the estimated model checks the long-run and short-run stability. The outcomes of CUSUM disclose that both short-run and long-run are reliable and stable.
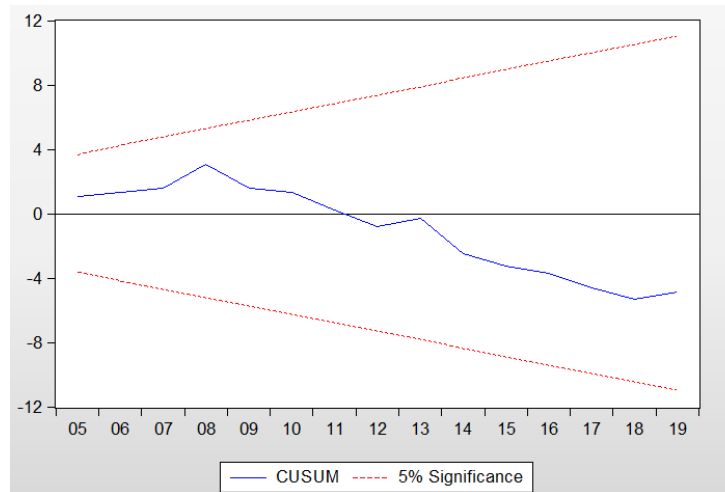

Figure 3: Stability Test

Note: The straight lines represent critical bounds at a 5% significance level

Figure 3 illuminates the Schwarz Bayesian criterion-based plots of the CUSUM test. The plot rely on 5% significance level of critical bounds, accepting the null hypothesis of coefficients and the ARDL (2,1,2,1,2) are stable.

5. CONCLUSION

Generally, the allocation of scarcity resource into defense or nondefense spending for emerging economies is one of the vital policy issues which direct the economic growth particular nation. And also, frequent nexus between economic growth and defense spending will take into consideration. Therefore, the connection between defense expenditure and economic growth of Sri Lanka from 1990 to 2019 is examined by employing annual data and ARDL bounds test approach to cointegration. The study applied the ADF unit root test and concluded that the variables are stationary at level, I (0) and the first difference I (1). A lag structure of two years is the correct specification of this model.

The main findings recommend that existence log run cointegration among variables in the long and short run. Further, defense expenditure has a significant positive impact on economic growth in the long-run and no significant impact on economic growth in the short-run. The broad money supply, capital investment and exchange rate have a positive and significant impact both in the long-run and short-run. The Granger causality finding directs that a

unidirectional causality running since economic growth to defense expenditure. The study concludes that government should concentrate more on human capital development through reducing its expenditure on defense.

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