International Journal of Advanced Science and Technology
Vol. 28, No. 1, (2019), pp. 294-305

Does Defence Expenditure Crowd out Human Capital Expenditure? An Empirical Investigation in South Asia

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Abstract

Military expenditure and human capital expenditure are important components of central government expenditure. It has been accepted that high and increasing military expenditure may crowd out resources from human development expenditure, as the sources of government revenue are limited. The purpose of this study is to examine the relationship between military expenditure and, education and health expenditure in conflict affected five countries in South Asia, namely, Bangladesh, India, Nepal, Pakistan and Sri Lanka from the period 1980 to 2014, by applying the ARDL bounds test approach to cointegration and VECM Granger causality method. The finding of this study shows a significant negative effect of military expenditure on both health and education expenditure in several countries in South Asia. Moreover, it also provides an evidence for Granger causality in the long-run and in the short-run in most of the countries in South Asia. In addition, the findings of this study serve as a guide to the government and the policy-makers should take rigorous steps to minimize military expenditure through preventing conflict and enhancing good governance, which eventually enhance investment in human development.

Keywords*: Cointegration, Granger causality, Human development expenditure, Military Expenditure, South Asia*

1. INTRODUCTION

Military expenditure and the human capital expenditure are two major components of central government expenditure. It has been agreed that when the sources of income are limited, for a given central government expenditure, an increase in military expenditure may crowd out resources from human development expenditure. This argument is quite true in South Asia, as this region spends multi-million worth of scarce resources to manage higher and increasing military expenditure, despite its poor economic performance.

Countries spend multi-million dollars’ worth scarce resources to maintain internal and external threats and to keep up regional, political and military power. As a result, global military expenditure increased to nearly US$1.8 trillion in 2015, which is equivalent to 2.5 percent global GDP and four times higher than the GDP of low-income countries (SIPRI Military expenditure database (hereinafter SIPRI-MED), 2015). The share of military expenditure in developing countries has constantly increased, despite the continuous decreases in industrial countries. Besides the high population growth and poor economic performance, high military expenditure becomes costly to the socioeconomic development in developing countries.

South Asia is one of those poor developing region, spending a major portion of central government expenditure on the military. South Asia has experienced more than 400 armed conflict events with more than two hundred thousand battle deaths (Uppsala

ISSN: 2005-4238 IJAST

conflict database, 2015). In addition, since declaring independence in the late 1940s, countries in this subcontinent have placed greater priorities on the military sector's development rather than economic and human development (Hashmi, 2013). As a result of conflict and militarism, military expenditure in South Asia has increased sharply by 168 percent since 1998, reaching US$65.6 billion in 2015, which was equivalent to 3.9 percent of global military spending and 2.8 percent of GDP in South Asia (SIPRI-MED, 2015; World Bank's World development Indicators (hereinafter WBs-WDI), 2015).

Economic Development in South Asian region is compromised since most of the countries in this region were previously colonies of European empires. This region heavily relies on debt for their third sources of income. Deficit and debt are the common phenomenon in this region. Moreover, South Asia is home to more than one-fourth of the global population, contributing only 3.7 percent of the world GDP in 2015 (WB-WDI, 2015). South Asian countries face difficulties in managing high and increasing military budgets with its lower scale of economy and poor sources of income. Furthermore, poor economic performance and increasing defence budget limit the governing capacity in South Asia in allocation of resources to health care and education sectors. During the period between 2000 and 2014, this region has spent on average 20 percent of the central government expenditure in the military, whereas the same amount for the both education and health sector (calculated by the researcher based on the data from WB-WDI, 2014). Moreover, in certain countries, military spending was estimated to be around US$40 per capita in 2013, while education and health accounted for only about US$28 and US$18 per capita, respectively (calculated by the researcher based on SIPRI-MED data, 2014). Policies to manage increasing military expenditure in South Asia is frequently targeted to substitute resources for human development and infrastructure development, rather than significant improvements in output and national income.

The nexus between military expenditure and human development expenditure is becoming a central topic of the defence economy in the conflict-affected developing world. Although, South Asia has experienced hundreds of conflict and spent a major portion of central government expenditure on the military, but there are rare studies found in this area. In addition, very few existing studies employed underpin theory and appropriate econometric model. Therefore, this study is aimed to examine the causal relationship between military expenditure and human development expenditure for conflict-affected five countries in South Asia by employing the opportunity cost hypothesis; the autoregressive distributed lag (ARDL) bounds test approach and the vector error correction model (VECM) Granger causality method. The rest of the paper is organized as follows. Section 2 reviews the literature and opportunity cost hypothesis. Section 3 discusses the econometric methods employed to achieve the objectives. Section 4 presents and discusses the empirical findings. Finally, Section 5 concludes.

2. LITERATURE REVIEW AND OPPORTUNITY COST HYPOTHESIS

There is an on-going debate on gun and butter argument that government need to spend its scarce resources on butter (for human needs) or gun (for military). In the defence economy, the seminal empirical contribution by Russett (1969) for the USA, UK and France, become one of significant reference in a trade-off hypothesis. He argued that higher military expenditure can adversely affect human capital development by crowding out resources from social spendings. Based on this concept, several researchers employed opportunity cost theory by employing several econometric tools.

On the issues of trade-off hypothesis, earlier research work by, Caputo (1975), Deger (1985); and Apostolakis (1992) found a negative trade-off between military expenditure and social expenditures. Caputo (1975) argued large defence spending has a positive impact on health spending and a negative impact on education in the main western industrial countries, namely Australia, Sweden, UK, and the US over the period 1950-1970. Dager (1985) found a negative trade-off between military and education expenditures for 50 LDCs over the period 1967-1973 using 3SLS method. With the similar objective, Apostolakis (1992) also confirm guns versus the butter hypothesis that military spending crowded out the potential allocation of social spending for 19 Latin American countries from 1953-1987 by using pooled analysis. Most of the recent research work also proved trade-off between military expenditure and social expenditure. For example, Ozsoy (2002) found negative trade-off between military spending and social spendings (health, education) for Turkey from 1925 to 1998. Similarly, Musaba, Chilond, and Matchaya (2013) negative relationship between defence expenditure and other expenditures (education, health, transport and communication, and social protection) by using cointegration method in Malawi.

With the extension of the trade-off hypothesis, some researchers found mixed results between defence, education, and health expenditures. For example, Habibullah, Hirnissa, and Baharom (2009) and Rashid and Arif (2012) found mixed results between defence, education, and health expenditures in some selected countries in Asia. A number of country-level studies also found mixed results between military expenditure and social expenditure. The findings of recent research work by Yildirim and Sezgin (2002) and Ali (2011) shows that military expenditure crowded out resources only from the health sector and crowded in from education sector in Turkey (1924-1996) and Egypt (1987-2005) respectively.

Contrary to the guns versus butter trade-off, some studies found a positive relation between defence and social expenditure. For example, Kollias and Paleologou (2011) found a positive relationship between defence, education, and social spending in Greece. More recent studies by Lin, Ali, and Lu (2013) found a positive relationship between defence and social welfare expenditure for 29 OECD countries between 1988 and 2005. They justified that the OECD countries allocate a sufficient amount to social welfare programmes, thereby increased military spending would influence social welfare programmes.

In contrast to the above findings, some studies found no meaningful relationship between military expenditure and social expenditures. Perlo-Freeman (2011) found no evidence of a relationship one way or the other between military, health, and education expenditure for 21 Latin American countries over the period 1995-2009. Another attempt was also completed in Turkey with the objective of the trade-off between military spending and other selected government spending by Gunluk-Sensen (2002) for the period 1983-1998, he found no trade-off between military and other (health, general administration, infrastructure, and social services) expenditures.

Reviewed empirical studies for developing countries conclude opportunity cost exist between military spending and social spendings. Some of the existing studies examine only the causal relationship while others examine only the cointegration relationship. However, it is important to examine both cointegration and the causality relationship to understand the meaningful relationship between time series variables. Although military expenditure is a significant portion of central government expenditure with the poor achievement in human development, there are limited studies in this field in South Asia.

3. METHODOLOGY

Data: All the variables are transformed into a natural log. Annual data used for education expenditure and health expenditure from 1995 to 2013, gross domestic product and population from 1980-2014 for Bangladesh, India, Pakistan, Nepal and Sri Lanka are collected from the World Bank's, World Development Indicator, 2015. Various country-level statistics reports were used for other years to collect data for the variables. For example, data for India was collected from various reports from the department of higher education in the Ministry of Human Resource Development; data for Sri Lanka was collected from various issues of the Central Bank annual report; while data for Pakistan was obtained from "50 years of Pakistan", Volumes I-IV, published by the Pakistan Bureau of Statistics, Government of Pakistan and Nepal Statistics publication has used to collect data for Nepal. In Bangladesh, data extrapolated[1] from 1980-1987 using appropriate univariate time series method. Data for military expenditure from 1988 to 2014 was collected from SIPRI-MED, 2015. For the other years from 1980 to 1987 for India and Pakistan, the data were collected from the Regional Centre for Strategic Study's (RCSS) policy Study-10 (by Singh & Cheema, 2000). For Bangladesh and Sri Lanka are collected from RCSS policy Study-11 (by Chowdhury & De-Silva, 2000). However, data for Nepal from 1980-1987 is extrapolated using appropriate univariate time series method.

ARDL Bounds Test Approach to Cointegration: Based on the trade-off hypothesis as discussed above, present study employs the ARDL bounds test approach to cointegrtion in order to estimate crowding out effect**.**

Testing the equilibrium relationship using the cointegration technique provides a meaningful relationship among non-stationary time-series variables. Literature provides several methods to examine the long-run and cointegration relationship. The ARDL bounds test approach, proposed by Pesaran, Shin and Smith (2001), is chosen in this study since it can be applied to estimate the cointegration relationship even though the variables are integrated in mixed order $[I(0), I(1)]$ or mutually. Unlike the other approaches, each variable in the ARDL model can have a different number of its lags and does not require symmetry of the lag-length of variables in the model. Moreover, the ARDL method to cointegration is comparatively more competent for a small sample and permits assessing unbiased estimations of the short-run active with the long-run equilibrium model (Harris & Sollis, 2003; Tiwari & Shahbaz, 2013). Furthermore, the ARDL model does not suffer from the problem of endogeneity and allows differentiating dependent and explanatory variables (Ahmed, Muzib & Roy, 2013). Many studies, for instance, Tiwari and Shahbaz (2013) and Sithy Jesmy, Abd-Karim and Applanaidu (2016) have employed the ARDL bounds test approach to cointegration in order to examine the long-run cointegration and causal relationship between time series variables in the defence economy.

In the light of the trade-off arguments in the literature, the unrestricted ARDL cointegration equation for the impact of military expenditure on health (Equation 1) and on education expenditure (Equation 2) can be formulated as follows.

$$\begin{aligned}\Delta \ln HE_t &= \alpha + \sum_{i=1}^{p1}\alpha_{1i}\Delta \ln HE_{t-i} + \sum_{i=0}^{p2}\alpha_{2i}\Delta \ln ME_{t-i} + \\ &\sum_{i=0}^{p3}\alpha_{3i}\Delta \ln EE_{t-i} + \sum_{i=0}^{p4}\alpha_{4i}\Delta \ln GDP_{t-1} + \sum_{i=0}^{p5}\alpha_{5i}\Delta \ln Pop_{t-i} \\ &+\varphi_1 HE_{t-1} + \varphi_2 \ln ME_{t-1} + \varphi_3 \ln EE_{t-1} + \varphi_4 \ln GDP_{t-1} \\ &+\varphi_5 \ln Pop_{t-1} + u_t\end{aligned} \quad [1]$$

$$\begin{aligned}\Delta \ln EE_t &= \phi + \sum_{i=1}^{k1}\phi_{1i}\Delta \ln EE_{t-i} + \sum_{i=0}^{k2}\phi_{2i}\Delta \ln ME_{t-i} + \\ &\sum_{i=0}^{k3}\phi_{3i}\Delta \ln HE_{t-i} + \sum_{i=1}^{k4}\phi_{4i}\Delta \ln GDP_{t-1} + \sum_{i=0}^{k5}\phi_{5i}\Delta \ln Pop_{t-i} \\ &+\delta_1 EE_{t-1} + \delta_2 \ln ME_{t-1} + \delta_3 \ln HE_{t-1} + \delta_4 \ln GDP_{t-1} \\ &+\delta_5 \ln Pop_{t-1} + u_t\end{aligned} \quad [2]$$

[1] Univeraiate time series methods, such as, trend, cubic and exponential methods has employed. The most appropriate model among these three has selected based on error statistics, such as, mean square error, mean absolute error and mean absolute percentage error.

Where, α_{ij} and ϕ_{ij} are the short run coefficients, φ_{ij} and δ_{ij} are the long-run coefficients. ariables, ME_t , EE_t , HE_t , GDP_t and Pop_t are military expenditure, education expenditure, health expenditure, gross domestic product and size of the population, respectively. Empirical studies by Deger (1985), Apostolakis (1992), Ozsoy (2002) and Musaba *et al.* (2013) argued military expenditure crowd-out resources from education and health expenditure. Therefore, this study also hypotheses military expenditure negatively determines education expenditure and health expenditure. Other control variables, such as, GDP and population, which are the important determinant of education and health Lin *et al.* (2013) are included in this study.

The first step of the ARDL bounds test approach is to determine the existence of cointegration using Equations (1) for health expenditure and (2) for education expenditures (Pesaran *et al*., 2001). The decision of cointegration is taken by testing the null hypothesis of no cointegration from Equations (1) $(H_o : \varphi_1 = \varphi_2 = \varphi_3 = \varphi_4 = \varphi_5 = 0)$ and (2) $(H_o : \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = 0)$, through employing Pesaran *et al.'s* (2001) critical value table. The non-standard $'F'$ statistics was used to test null hypothesis. Two sets were taken to determine the decision of values (lower bound & upper bound and), for a assumed significance glassy. The deduction of cointegration is resolute, if the overall $'F'$ statistics surpass the upper critical bound value. If the null hypothesis of no cointegration in bounds test is rejected, then the long-run and the cointegration model can be appraised finished ARDL error correction model, as presented in Equations (3) and (4).

$$\begin{aligned}\Delta \ln HE_t &= \alpha + \sum_{i=1}^{p1}\alpha_{1i}\Delta \ln HE_{t-i} + \sum_{i=0}^{p2}\alpha_{2i}\Delta \ln ME_{t-i} + \\ &\sum_{i=0}^{p3}\alpha_{3i}\Delta \ln EE_{t-i} + \sum_{i=0}^{p4}\alpha_{4i}\Delta \ln GDP_{t-1} + \sum_{i=0}^{p5}\alpha_{5i}\Delta \ln Pop_{t-i} \quad [3] \\ &+ \pi_1 ECT_{t-1} + \varepsilon_{1t}\end{aligned}$$

$$\begin{aligned}\Delta \ln EE_t &= \phi + \sum_{i=1}^{k1}\phi_{1i}\Delta \ln EE_{t-i} + \sum_{i=0}^{k2}\phi_{2i}\Delta \ln ME_{t-i} + \\ &\sum_{i=0}^{k3}\phi_{3i}\Delta \ln HE_{t-i} + \sum_{i=1}^{k4}\phi_{4i}\Delta \ln GDP_{t-1} + \sum_{i=0}^{k5}\phi_{5i}\Delta \ln Pop_{t-i} \quad [4] \\ &+ \lambda_1 ECT_{t-1} + \varepsilon_{2t}\end{aligned}$$

The ARDL error correction model is employed to examine the causality between time series variables. Granger (1988) showed that there are two potential sources of causation, such as, long-run and short-run, in the error correction model (ECM). Further, Granger (1986 & 1988) notes that cointegration between two or more variables is sufficient to indicate there exist in at least one direction of causality. In the Equations (3) and (4), the presence of a significant relationship in first differences of the right hand side variables provide evidence of the direction of the short-run causation and a significance of the ECM illustrate a long-run causation.

4. EMPIRICAL FINDINGS AND DISCUSSION

The aim of this study is to examine the cointegration and causal relationships between military expenditure and education and health expenditures. Considering the nature of the conflict, the size of military expenditure and democratic character, a separate model is estimated for each five countries. This study provides a number of interesting empirical findings in the sub topics of pre-requests of the ARDL bounds test, short-run and long-run cointegration results and causality.

Pre- requisite of ARDL bounds test: Although, testing unit root of time series variables is not required in the ARDL bound test approach, it is necessary to confirm none of the variable follows ($I(2)$). Unit root test results based on DF-GLS and the Ng-Perron confirms that none of the variables follows $I(2)$ (Table 1). This unit root test result resembles to proceed the ARDL cointegration test with $I(1)$ variables.

Table 1: U*nit Root Test Results for Bangladesh*

Country	Variables	DF-GLS			Ng-Perron (MZ_t Statistics)		
		Level	1st Difference	Conclusion	Level	1st Difference	Conclusion
Bangladesh	$Log(EE)$	0.999	-5.718*	$I(1)$	1.805	-2.459**	$I(1)$
	$Log(HE)$	0.733	-6.806*	$I(1)$	1.398	-2.613*	$I(1)$
	$Log(ME)$	1.050	-4.655*	$I(1)$	1.291	-2.813*	$I(1)$
	$Log(pon)$	0.161	-6.494*	$I(1)$	-0.143	-2.827*	$I(1)$
	$Log(GDP)$	1.129	-5.030*	$I(1)$	1.568	-2.797*	$I(1)$
India	$Log(EE)$	0.930	-4.435*	$I(1)$	1.797	-2.743*	$I(1)$
	$Log(HE)$	-0.456	-4.722*	$I(1)$	-1.151	-2.803*	$I(1)$
	$Log(ME)$	0.253	-3.507*	$I(1)$	0.213	-2.563**	$I(1)$
	$Log(pon)$	-0.886	-2.939*	$I(1)$	-0.147	-2.245**	$I(1)$
	$Log(GDP)$	1.607	-5.022*	$I(1)$	2.081	-2.849*	$I(1)$
Nepal	$Log(EE)$	1.181	-4.914*	$I(1)$	2.010	-2.823*	$I(1)$
	$Log(HE)$	0.674	-5.138*	$I(1)$	1.017	-2.054**	$I(1)$
	$Log(ME)$	0.224	-3.825	$I(1)$	0.404	-2.650*	$I(1)$
	$Log(pon)$	1.601	-3.639*	$I(1)$	3.462	-2.428**	$I(1)$
	$Log(GDP)$	2.011	-5.022*	$I(1)$	2.664	-2.836*	$I(1)$
Pakistan	$Log(EE)$	0.269	-3.704*	$I(1)$	0.171	-2.619*	$I(1)$
	$Log(HE)$	-0.311	-4.883*	$I(1)$	0.178	-2.802*	$I(1)$
	$Log(ME)$	0.393	-5.505*	$I(1)$	0.921	-2.839*	$I(1)$
	$Log(pon)$	0.365	-2.565**	$I(1)$	-1.110	-2.751*	$I(1)$
	$Log(GDP)$	1.494	-4.492*	$I(1)$	2.019	-2.747*	$I(1)$
Sri Lanka	$Log(EE)$	0.749	-6.707*	$I(1)$	1.403	-2.800*	$I(1)$
	$Log(HE)$	0.743	-6.517*	$I(1)$	1.424	-2.804*	$I(1)$
	$Log(ME)$	-0.142	-3.941*	$I(1)$	0.592	-2.682*	$I(1)$
	$Log(pon)$	0.522	-4.299*	$I(1)$	0.428	-2.743*	$I(1)$
	$Log(GDP)$	-1.392	-3.452*	$I(1)$	1.399	-1.992**	$I(1)$

Note: ** and * denote 5% and 1% level of significance respectively.

Determining optimal lag length leads to meaningful cointegration results (Ng & Perron, 2001). Selecting an optimal lag length is an important pre-requests in the ARDL approach, but it does not require symmetry of lag-lengths. The optimal ARDL model for health expenditure (Model 1) [$ARDL(p_1, p_2, p_3, p_4)$] and education expenditure (Model 2) [$ARDL(k_1, k_2, k_3, k_4)$] are selected based on SB Criterion statistics. Summary of selected ARDL models for all countries are presented in Table 2.

Table 2: Pre-requisite of ARDL bounds test

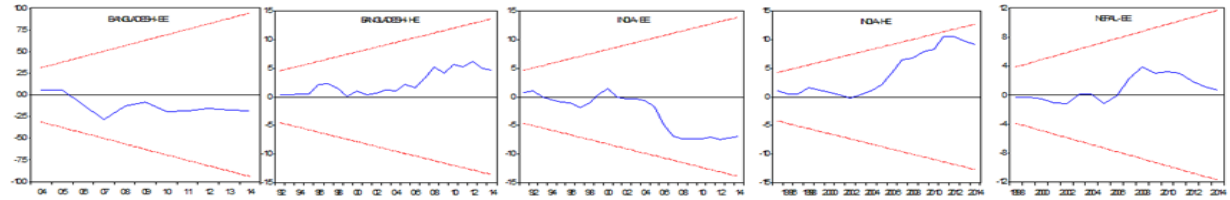
Country	Model	Optimal Lag	Decision of CI		LM test for SC	
			'F' Stat	Conclusion	'F' Stat	'p' Val
Bangladesh	1	ARDL(1,0,2,0,2)[a]	4.173	exist at 5%	0.186	0.831
	2	ARDL(1,2,0,3,2)[c]	11.270	exist at 1%	1.541	0.267
India	1	ARDL(1,4,0,0,0)[c]	4.022	exist at 1%	1.173	0.359
	2	ARDL(1,2,0,1,0)[a]	4.684	exist at 5%	0.617	0.549
Nepal	1	ARDL(1,0,0,0,1)[b]	5.171	exist at 5%	0.039	0.854
	2	ARDL(1,0,2,0,2)[b]	6.963	exist at 1%	1.788	0.192
Pakistan	1	ARDL(1,0,1,1,0)[b]	3.814	exist at 10%	2.051	0.164
	2	ARDL(1,0,0,0,0)[c]	4.730	exist at 5%	0.215	0.646

Sri Lanka	1	ARDL(1,0,0,0,0)[b]	6.550	exist at 1%	0.229	0.636
	2	ARDL(1,2,4,4,3)[c]	23.614	exist at 1%	3.052	0.094

Note: Unrestricted intercept (a) - 5%: I(0)=2.86, I(1)=4.01; 1%: I(0)=3.74, (1)=5.06.
Restricted intercept (b) - 10%: I(0)=2.20, I(1)=3.09; 5%: I(0)=2.56, I(1)=3.49; 1%; I(0)=3.29, I(1)=4.37.
Restricted trend (c) - 10%: I(0)=2.68, I(1)=3.53; 5%:I(0)=3.05, I(1)=3.97; 1%; I(0)=3.81, I(1)=4.93

A key assumption of the ARDL bounds test approach is that the errors in the Equations (1) and (2) must be serially independent. Results of Breusch-Godfrey serial correlation LM test for Model 1 and Model 2 are reported in Table 2. Results for the LM test indicate that 'p' values for both models are greater than 0.05. This result indicates the null hypothesis of no serial correlation is accepted and concludes the estimated models are free from serial correlation. The ARDL model can detect heteroskedasticity, since it allows different lag order. Nevertheless, a robust ARDL model using a White's test that rectifies the problem of heteroskedasticity is applied to estimate the long-run and short-run models. Other important step of the ARDL model is that the estimated model be dynamically stable. This study applied the CUSUM plot of recursive residuals against the critical bounds of five percentage significance level. Plots confirm parameters are stability in both models for all countries, since the cumulative sum of residuals lies in between the five percent critical value.

CUSUM Plot for HE



CUSUM Plot for EE

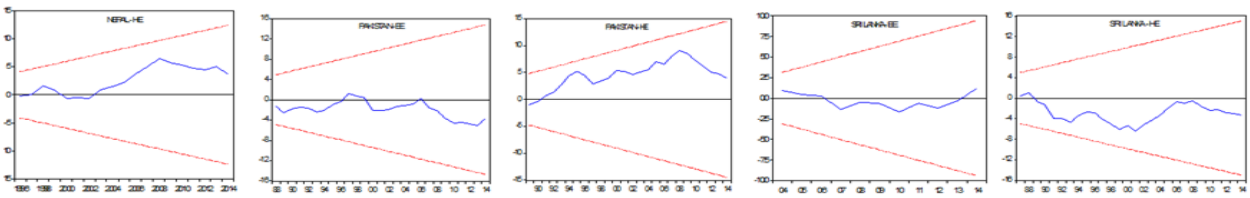


Figure 1: CUSUM plot for the models 1 and 2

Long-run and Short-run Cointegration Results: Negative and statistically significant error correction coefficient in all five countries in Model 1 and Model 2 indicates both responsible variables move towards equilibrium. Moreover, the absolute value of the coefficient of the error correction term is less than one. These results imply that system is not explosive and stability of the corresponding model.

Long-run and the short-run ARDL conitegration results for Model 1 and Model 2 are presented in Tables 3 and 4 respectively. Empirical findings shows, there is indeed heterogeneous in all five South Asian countries. Although, a sign of the coefficient of military expenditure has an expected negative sign, it is negative and statistically significant in the short-run in Bangladesh and India and, in the long-run in Sri Lanka to determine health expenditure. However, the coefficient of military expenditure is positive and significant in the long-run in Bangladesh. Similarly, the coefficient of military expenditure is negative and statistically significant in both periods in Bangladesh and Sri Lanka and in the short-run in India. While, the coefficient is positive in India and Pakistan in the long-run to determine education expenditure. Massive military expenditure might be the reason for the negative relationship between military expenditure and social expenditure in Sri Lanka and Bangladesh. On the other hand, the positive association between military expenditure and education expenditure can differ markedly in India and Pakistan. Because these two countries are producing some kinds of arms, whereby, military education is an important part in these two countries. Our empirical findings of the negative effect of military expenditure on education expenditure (Bangladesh and Sri Lanka) and health expenditure (Bangladesh, India and Sri Lanka) are in line with the earlier findings of Ozsoy 2002) and Mushaba *et al.* (2013). The positive effect of military expenditure on education expenditure in India and Pakistan is consistent with the findings of Lin *et al.* (2013).

Education expenditure is the main determinants of health and, health expenditure is main determinants of education, and their signs are expected to be positive to determine each other. Results presented in Tables 3 and 4 provide an expected positive sign in South Asia. For instant, variable education expenditure is positive and significant in all South Asian countries, except Nepal to determine health expenditure. Similarly, the coefficient of health expenditure is positive and statistically significant in all countries except Bangladesh. Another important factor that determines human capital is GDP and it has an expected positive sign in all countries. However, the coefficient of GDP is statistically significant to determine health expenditure in Bangladesh, India and Nepal and to determine education expenditure in all countries apart from Nepal. It is expected that increasing population may negatively determine human capital. However, some countries have positive and some have a negative sign.

Table 3: Long-run and Short-run Coefficient for Model 1 (Health Expenditure)

Variable	Bangladesh ARDL(1,0,2,0,2)		India ARDL(1,4,0,0,0)		Nepal ARDL(1,0,0,0,1)		Pakistan ARDL(1,0,1,1,0)		Sri Lanka ARDL(1,0,0,0,0)	
	Coefficient	't' Value	Coefficient	't' Value	Coefficient	't' Value	Coefficient	't' Value	Coefficient	't' Value
Long – Run Estimated Results										
$Log(ME)$	0.356	3.203*	-1.565	-1.430	0.348	0.742	-0.319	-0.368	-0.224	-2.24**
$Log(EE)$	0.283	2.954*	1.537	1.79***	-0.626	-1.113	-0.831	-0.759	0.758	2.37**
$Log(GDP)$	0.733	3.687*	4.916	1.87***	1.621	2.12**	0.681	0.706	0.236	0.940
$Log(POP)$	-1.535	-5.213*	27.261	1.226	0.238	0.151	2.611	2.01***	3.412	3.062*
C	-	-	-	-	-7.630	-1.383	-5.293	-1.118	-9.873	-4.416*
t	-	-	-0.727	-1.322	-	-	-	-	-	-
Short –Run Estimated Results										
$\Delta Log(ME)$	-0.298	-2.22**	-0.257	-2.39**	-0.067	-0.231	0.048	0.203	-0.008	-0.087
$\Delta Log(ME)(-1)$	-	-	-0.182	-2.27**	-	-	-	-	-	-
$\Delta Log(ME)(-2)$	-	-	0.046	0.596	-	-	-	-	-	-
$\Delta Log(ME)(-3)$	-	-	-0.359	-4.130*	-	-	-	-	-	-
$\Delta Log(EE)$	-0.235	-2.47**	0.287	1.90***	0.327	1.298	0.391	2.337**	0.519	3.688*
$\Delta Log(EE)(-1)$	-0.215	-2.23*	-	-	-	-	-	-	-	-
$\Delta Log(GDP)$	0.754	4.482*	0.859	8.062*	0.741	2.14**	-0.491	-1.98***	0.203	0.910
$\Delta Log(POP)$	-3.921	-3.925*	5.022	2.995*	-11.179	-4.076*	0.416	0.428	1.315	0.604
$\Delta Log(POP)(-1)$	-3.619	-3.419*	-	-	-	-	-	-	-	-
C	1.735	6.442*	-39.752	-6.385*	-	-	-	-	-	-
ECT_{t-1}	-0.829	-6.187*	-0.172	-6.388*	-0.502	-4.247*	-0.212	-3.594*	-0.801	-4.639*

Note: * and ** denotes significance at the 1% and 5%.

Table 4: Long-run and Short-run Coefficient for Model 2 (Education Expenditure)

Bangladesh ARDL(1,2,0,3,2)	India ARDL(1,2,0,1,0)	Nepal ARDL(1,0,2,0,2)	Pakistan ARDL(1,0,0,0,0)	Sri Lanka ARDL(1,2,4,4,3)

Variable	Coefficient	't' Value	Coefficient	't' Value	Coefficient	't' Value	Coefficient	't' Value	Coefficient	't' Value
Long – Run Estimated Results										
$Log(ME)$	-2.501	-9.948*	0.523	2.65**	-0.278	-1.186	0.446	1.84***	-0.469	-3.658*
$Log(HE)$	0.151	0.549	0.645	1.98***	0.374	1.8***	0.713	4.107*	-0.211	-0.890
$Log(GDP)$	4.607	9.264*	-0.894	-1.94**	0.333	0.734	1.512	5.078*	2.094	6.192*
$Log(POP)$	4.267	3.533*	1.713	6.021*	2.176	3.198*	3.696	2.12**	17.375	5.476*
C	-	-	-	-	-4.004	-2.65**	-	-	-	-
t	-0.102	-3.159*	-	-	-	-	-0.16	-3.284*	-0.214	-6.557*
Short –Run Estimated Results										
$\Delta Log(ME)$	-0.693	-4.266*	-0.305	-3.449*	-0.095	-0.623	-0.191	-1.064	-0.180	-4.519*
$\Delta Log(ME)(-1)$	0.676	3.826*	0.222	3.072*	-	-	-	-	0.213	4.713*
$\Delta Log(HE)$	0.109	0.818	0.212	1.581	-0.079	-1.031	0.243	2.14**	0.716	11.700*
$\Delta Log(HE)(-1)$	-	-	-	-	-0.342	-3.808*	-	-	0.498	8.055*
$\Delta Log(HE)(-2)$	-	-	-	-	-	-	-	-	0.331	6.394*
$\Delta Log(HE)(-3)$	-	-	-	-	-	-	-	-	0.520	10.45*
$\Delta Log(GDP)$	0.904	5.017*	0.077	0.519	0.154	0.754	0.861	4.789*	0.495	4.572*
$\Delta Log(GDP)(-1)$	-1.446	-5.217*	-	-	-	-	-	-	-1.077	-6.428*
$\Delta Log(GDP)(-2)$	-1.174	-4.764*	-	-	-	-	-	-	-0.420	-3.357*
$\Delta Log(GDP)(-3)$	-	-	-	-	-	-	-	-	0.513	4.612*
$\Delta Log(POP)$	2.368	2.21**	2.458	1.88**	-3.519	-1.882	1.689	1.112	7.346	5.264*
$\Delta Log(POP)(-1)$	-4.070	-4.194*	-	-	-4.024	-1.99**	-	-	-13.123	-5.338*
$\Delta Log(POP)(-2)$	-	-	-	-	-	-	-	-	-7.878	-3.947*
C	-45.22	-9.085*	-0.435	-4.830*	-1.951	-3.333*	-16.95	-5.121*	55.918	14.37*
ECT_{t-1}	-0.963	-9.121*	-0.413	-4.031*	-0.462	-5.449*	-0.517	-5.109*	-0.980	-14.35*

Note: * and ** denotes significance at the 1% and 5%.

Causality: The VECM ARDL model provides short-run and long-run causality information from right hand side variables to dependent variables. Since the variables are cointegrated, negative and significant one period lagged error term (ECT_{t-1}) provide long-run causality. Results reported in Table 5 provide short-run and long-run causality. Beginning with the long-run causality, the null hypothesis of no-causality is rejected, as the probability for 't' value for corresponding coefficient of (ECT_{t-1}) being less than one percent level of significance. Therefore, this study can conclude that military expenditure Granger causes health expenditure and education expenditure with other control variables in the long-run in all five countries in South Asia.

The short-run causality is determined by the statistical significance of the partial 'F-statistics' associated with the Wald test for right hand side variables in the Equations 3 and 4. The null hypothesis of no–causality will be rejected if the probability value of corresponding 'F-statistics' is less than the significant value. According to the results presented in Table 5, military expenditure Granger causes health expenditure only in Bangladesh and India and military expenditure Granger causes education expenditure in Bangladesh, India and Sri Lanka. However, military expenditure does not Granger causes health or education expenditures in Nepal and Pakistan. This study found heterogeneous results of Granger causality between military expenditure and, health and education expenditures. This finding is consistent with the research findings of Habibullah *et al.* (2009), however, they found only long-run causality. It is important to highlight here that, there was no single study for South Asia, however, Habibullah *et al.* (2009) included Bangladesh, Nepal and Sri Lanka in their study. They observed no meaning full results in the case of Sri Lanka and Nepal. Their finding is consistent in the case of Nepal, but finding shows a significant relationship between military expenditure and, education and health expenditures in Sri Lanka. Furthermore, they observed military expenditure Granger causes only education expenditure in Bangladesh, whereas, this study found military expenditure Granger cause health and education expenditures.

Table 5: The VECM Granger Causality Analysis

Countries	DV	Direction of Causality Short-run					Long-run
		$\sum \Delta \ln ME_{t-i}$	$\sum \Delta \ln HE_{t-i}$	$\sum \Delta \ln EE_{t-i}$	$\sum \Delta \ln GDP_{t-i}$	$\sum \Delta \ln Pop_{t-i}$	ECT_{t-1}
Bangladesh	$\Delta \ln HE$	4.911** (0.036) (1)	Θ	7.768* (0.002) (2)	20.089* (0.000) (1)	3.018*** (0.068) (2)	-0.829* (0.000)
	$\Delta \ln EE$	7.9817* (0.003) (2)	0.668 (0.424) (1)	Θ	6.988* (0.002) (3)	4.596** (0.024) (2)	-0.963* (0.000)
India	$\Delta \ln HE$	17.044* (0.000) (4)	Θ	3.610*** (0.071) (1)	64.991* (0.000) (1)	8.971* (0.007) (1)	-0.172* (0.000)
	$\Delta \ln EE$	3.786** (0.037) (2)	2.501 (0.127) (1)	Θ	0.268 (0.608) (1)	3.489*** (0.074) (1)	-0.413* (0.000)
Nepal	$\Delta \ln HE$	0.053 (0.818) (1)	Θ	1.685 (0.205) (1)	4.583** (0.041) (1)	16.614* (0.000) (1)	-0.502* (0.000)
	$\Delta \ln EE$	0.388 (0.539)	2.314 (0.121) (2)	Θ	0.538 (0.458) (1)	5.195** (0.014) (2)	-0.462* (0.000)
Pakistan	$\Delta \ln HE$	0.041 (0.840) (1)	Θ	5.461** (0.027) (1)	3.942*** (0.058) (1)	0.183 (0.672) (1)	-0.212* (0.001)
	$\Delta \ln EE$	1.133 (0.296) (1)	4.566** (0.042) (1)	Θ	22.944* (0.000) (1)	1.236 (0.276) (1)	-0.517* (0.000)
Sri Lanka	$\Delta \ln HE$	0.007 (0.931) (1)	Θ	13.601* (0.001) (1)	0.829 (0.370) (1)	0.365 (0.550) (1)	-0.801* (0.000)
	$\Delta \ln EE$	5.796** (0.019) (2)	52.57** (0.000) (4)	Θ	19.062* (0.000) (4)	15.286* (0.000) (3)	-0.980* (0.000)

Note: DV denotes dependent variables. * and ** denotes significance at the 1% and 5%. P-values are listed in 1st parenthesis. Lag-length of variables are in 2nd parenthesis. Short-run causality is tested by Wald's 'F' statistics. Long-run causality is determined by statistical significance of the respective error correction term using 't' statistics.

Control variable, education expenditure Granger causes health expenditure in all countries apart from Nepal. On the other hand, health expenditure Granger causes education expenditure only in Pakistan and Sri Lanka. The variable GDP Granger causes health expenditure in all countries except in Sri Lanka. On the other hand, GDP Granger causes education expenditure in Bangladesh, Pakistan and Sri Lanka. The variable size of population Granger causes education expenditure in all countries except Pakistan. While population Granger causes health expenditure in Bangladesh, India and Nepal.

5. CONCLUSION

This study aims to examine the relationship between military expenditure and education and health expenditure in conflict affected five South Asian countries, namely, Bangladesh, India, Nepal, Pakistan and Sri Lanka from 1980 to 2014, by applying the ARDL bounds test approach to cointegration and VECM Granger causality method. Finding reveals a significant negative effect of military expenditure on health and education expenditure in Bangladesh, India and Sri Lanka. Empirical results on Granger causality results shows that the long-run causality from military expenditure (with other control variables) to health and education expenditures exists in all five countries in South Asia. However, in the short-run military expenditure Granger causes health expenditure in Bangladesh and India and military expenditure Granger causes education expenditure in Bangladesh, India and Sri Lanka. In general, these finding highlights a significant trade-off exists between military expenditure and human capital expenditure. These findings are evident in South Asia, as they have spent on average one fifth of central government expenditure on the military, whereas the same amount for both education and health sector. Naidoo (2013) indicated the estimated cost to resolve fundamental health and education problem was USD 120 billion, which is just seven percent of global military expenditure. It is the crucial responsibility of the world, particularly countries in South Asia to justify such a significant amount of money needed to ensure security and that amount is more rationalise than human development. Moreover, findings of present study highly recommend the respective governments and policy-makers of all countries have to pay much attention to decrease military expenditure and emphasis that every cent spend and allocate on the defence sector be efficient, accountable and transparent to all citizens in a country. Decreasing and efficient use of military expenditure eventually prompts the government to increase education, health and other necessary human development sectors through releasing extra resources from defence sector.

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