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Does Conflict Disrupt Economic Growth in South Asia?

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Abstract

Several South Asian countries, namely Bangladesh, India, Nepal, Pakistan and Sri Lanka have experienced numerous internal as well as external armed-conflicts. Due to ongoing conflicts and militarization, military spending and the cost of conflict have increased drastically in South Asia. The direct and indirect causes of armed-conflict posing to be major threats to growth of national output in this region. This study examines the impact of conflict on economic growth in conflict affected South Asian region for the period 1980-2014 by employing the Solow growth model and Autoregressive Distributed Lag (ARDL) bounds test approach to cointegration. Prior to the estimation of cointegration, test to confirm evidence of long-run equilibrium relationship, unit root test and diagnostic tests were performed. The results of this study clearly suggest that armed conflict significantly contribute in decreasing per capita GDP in all countries in South Asia. Therefore, it is highly recommended that policy makers and government in respective countries should adopt constructive policies to prevent and control all possible internal and external conflicts. Ending conflict undoubtedly leads to minimize cost of conflict and supports opens the ways to enhancing output in South Asia.

Key words: ARDL bounds test, conflict, militarization, per capita GDP, South Asia

1. INTRODUCTION

Economic growth is the backbone of any country as it is the basis for all types of economic planning and policy making. When there is an increase in the value of national economic output, it enhances people's standard of living by providing employment opportunities, reducing poverty, improving public services, enhancing consumption and boosting investment, and limiting the government borrowing and deficit. Armed conflicts, therefore, have been identified as major threats to economic growth in the developing world, particularly in South Asia. Most of the countries in this region were previously colonies of European empires, therefore, this region is highly vulnerable in economic development. Ongoing conflicts and vulnerable situations led to continual economic degradation. Moreover, South Asia is home for more than one fourth of the global population in that more than 40 percent living below poverty line, and also this region contributing only 3.7 percent to the global GDP in 2015 (World Bank's World Development Indicators (hereinafter, WBs-WDI), 2015).

Most of the South Asian countries gained independence in the late 1940s, after the withdrawal of super powers from the colonised countries. But this was not the end of their problems. Several countries of this region started facing armed conflicts within their borders or between borders. These conflicts often led to outbreaks in the form of civil wars, religious riots, terrorist attacks, political violence, homicides, border threats and other form of domestic violence (Ghani & Iyer, 2010; Dunne, 2000). There were several negative consequences of continual conflicts: the government's economic capacity decreased due to a fall in local and foreign investments as well as in tourism that was the main source of revenue; the economy further deteriorated due to demolition of infrastructure, destruction of commercial and capital assets, and loss of cultivatable land (Arunatilake, Jayasuriya, & Kelegama, 2000). In addition, there was a sharp decrease in productivity mainly due to the killings of productive workers in the battles, transferring skill workers from civilian to military, lack of confidence, vulnerability, hopelessness, and depression among the youth.

In addition to the conflicts, the arms race and nuclear experiment between India and Pakistan, regional power, unstable political systems and external threat from neighbouring countries have urged this region into militarization (Berry & Desai, 2009). Eventually, all these cases led to an increase in military spending and the cost of conflict in South Asia. Military spending sharply increased by 168 percent since 1998, reaching US$65.6 billion in 2015, which is equal to 3.9 percent of world military expenditure and 2.8 percent of GDP in South Asia (SIPRI military expenditure database (hereinafter, SIPRI-MED), 2015; WBs-WDI, 2015). On the other hand, the estimated cost of conflict in selected five countries was US$ 437 billion in 2014, which is equal to 17 percent of GDP in South Asia (Institute for Economics and Peace, 2015). Since the sources of income are limited because of poor economic performance, most of the governments in this region crowd out resources from the important socioeconomic functions to manage an ever increasing and higher war spending (Collier, 2006; Harris, 1996). Increasing operational cost of conflicts also limits the government capacity to investment on infrastructure and other economic development activities, which is the fundamental requirement of economic growth. Diversion of resources would be another reason for a fall in national savings and investment, and increase in the debt burden and inflation.

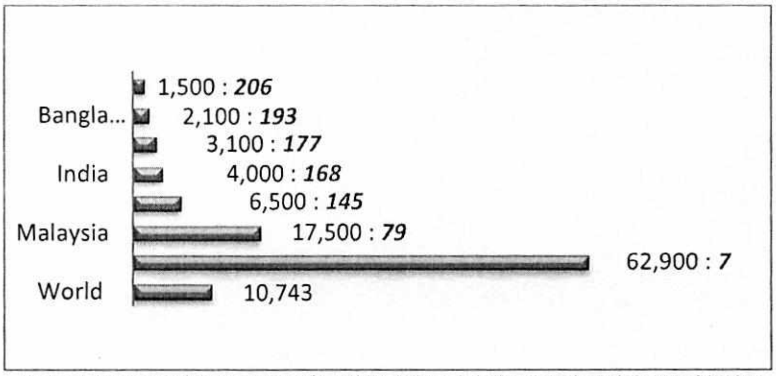

Figure 1.1: Per Capita GDP (in US$) and Global Rank in South Asia and the World, 2014
Source: UNs Statistical Division, 2015

Figure 1 clearly illustrates that per capita GDP derived from purchasing power parity (ppp) in South Asia is far below the global average and lies in between US$1,500 (in Nepal) to US$6,500 (in Sri Lanka) in relation to US$10,743 in the world and, US$17,500 in Malaysia and US$62,900 in Singapore, which are the peaceful[1] countries in Asia (UNs Statistical Division, 2015). In addition, out of 228 countries in the world, South Asia places rank 145 (Sri Lanka) to 206 (Nepal) under top 80 poor countries in the world.

Studying the effect of conflict on per capita GDP growth in South Asia is important, as the region has experienced hundreds of internal and external armed-conflicts. Apart from the discussion by Ganegodage and Rambaldi (2014) confined to Sri Lanka, no empirical research has been carried out in the South Asian region. However, Hassan, Waheeduzzaman and Rahman (2003) and Wijeweera and Webb (2011) do investigate the nexus between military spending and economic growth but they do not support their arguments with any theories. Considering the research gap, this study examines the impact of conflict on per capita GDP growth in the conflict-affected five countries of South Asia, namely, Bangladesh, India, Nepal, Pakistan and Sri Lanka. To achieve this research objective, this study adopts the theoretical Solow growth model and the ARDL bounds test approach to cointegration. The rest of the paper is organised as follows. Section 2 reviews the existing literature. Section 3 discusses the theoretical model and estimation tool. Section 4 discusses the research findings an finally, section 5 concludes.

[1] Global Peace index in Singapore is 24 and Malaysia is 28

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2. LITERATURE REVIEW

Since the end of the Cold war, a significant volume of studies has examined the nexus between military expenditure and economic growth in industrial and developing countries. Though conflict has been identified as a unique reason for poor GDP growth in many developing world countries, very limited attention has paid to discuss this issue in contemporary empirical research. For example, Murdoch and Sandler (2002a & 2002b), in their study between 1960s and 1990s, employing the Solow theoretical model, found conflict had negatively affected per capita income in groups of countries. In line with similar theoretical model, another study by Dunne (2012) investigated the impact of war on growth using military spending for four income groups of countries, including Sub-Saharan Africa. Dunne estimated the model separately for each group, one which was involved in the conflict and the other which was not involved. He found military burden was significant and negative for all income groups, except the upper-middle income countries in Sub-Saharan Africa. However, it was alarming in the poorer countries of the region. Focusing on the effects of conflict on economic growth, he found no impact of military spending on economic growth in the countries that had experienced conflict but and significant negative impact for countries not involved in conflict.

Another study by Polachek and Sevastianova (2010), which used fixed-effects estimation techniques to study the impact of different types of conflict on economic growth for 90 countries for the period 1970 - 2000. The sample countries comprised OECD nations, Latin America, Africa, the Asian Tigers, and the Organization of Petroleum Exporting Countries (OPEC). The study concluded that war negatively affects the poorer low-growth countries as they were affected from civil wars. Furthermore, they concluded that the effect of the conflict was greater in the short-run periods as compared to long-runs and the effect of both civil war and interstate war leads to diminished economic growth for all countries. In contrast to the research findings of Dunne (2012), this study observed that the war effect was more severe in countries with low-income as compared to the effect on countries with high-income. Reviewed empirical studies commonly confirmed that conflict destroyed economic growth mostly in conflict-affected developing world.

Phillips (2014) has recently examined how civil war, neighbours' war and neighbours' military spending affect military expenditure in the home country. Using the panel data analysis for developing countries apart from OECDs from 1950 to 2006, the author concludes that civil war, neighbours' war and neighbours' military spending and population significantly affect military expenditure in respective country. Most recently, Kunu, Hopoglu and Bozma (2016) have also examined the impact of conflict and defence expenditure on economic growth in 12 Middle East countries between 1998 and 2012 using panel data analysis. By measuring the conflict using corruption index, internal and external conflict index, they found that military expenditure, corruption, internal and external conflict and population negatively contributes to GDP in the Middle East countries.

There are few empirical research studies on this issue based on some countries in South Asia. For example, Ganegodage & Rambaldi (2014) investigated the effects of war on Sri Lanka for the period 1960 - 2008 using a Solow theoretical framework. Using the variables of war effort measured through a combination of military participation and military expenditure, the study discovered the variable war-effect significantly and negatively determine economic growth in both periods. Most recently, similar conclusion has been derived for Sri Lanka over the period 1973 - 2014 by Sithy Jesmy *et al.* (2016). They employed the Solow theoretical model to measure the impact of conflict in terms of ratio of battle related death to military participation. All the reviewed studies commonly conclude that conflict destroyed economic growth mostly in conflict-affected developing world.

Although South Asia experienced hundreds of internal and external armed-conflicts and there is evidence for a slower rate of economic growth, apart from Sri Lanka, empirical research on this topic has not received much attention in other South Asian countries. Moreover, a dummy variable is generally employed in existing literature to measure the conflict-effect. Nevertheless, some study employed military expenditure or battle related death. Therefore, it is increasingly important to use appropriate measure to evaluate conflict-effect.

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3. RESEARCH METHODOLOGY

3.1. Theoretical Model

As suggested by Dunne, Smith and Willenbockel (2005), in view of the limitations of the other theoretical growth models, the augmented Solow neoclassical growth model is very much popular in recent meta studies on the subject of the effect of conflict on economic growth (Sithy Jesmy *et al.*, 2016; Ganegodage & Rambaldi, 2014; Dunne, 2012; Murdoch & Sandler, 2002a & 2002b).

In the defence economy, Knight, Loayza and Villanueva (1996) were the first authors, who employed Solow growth model to examine the military-growth nexus. However, Dunne *et al.* (2005) systematically developed the Solow growth model, including military expenditure. They formulated military expenditure share of output as follows;

$$A(t) = A(t,M) = A_0 e^{gt} m(t)^{\psi} \quad (1)$$

Since the objective of this research is to examine the impact of conflict on economic growth, Equation (1) has been reformulated to include conflict-effect as follows.

$$A(t) = A(t,M) = A_0 e^{gt} [C(t)]^{\psi} \quad (2)$$

Battle related death is an appropriate proxy to measure conflict-effect. Since, unavailability of the data for battle related death in all South Asian countries, this study measure conflict-effect variable through average military spending (million US$) per warring population (million). Warring population proxies by arm-personnel in a country (Jeanty & Hitzhusen, 2006). Ganegodage and Rambaldi (2014) measured war-effect variable through combination of military spending and armed personnel. Thus, by substituting military spending per warring population, Equation (2) can be rewritten asunder,

$$A(t) = A(t,M) = A_0 e^{gt} \left[\frac{m(t)}{wp}\right]^{\psi} \quad (3)$$

where $(m(t))$ represents military expenditure and $(wp))$signifies waring population. The above equation (3) assumes that conflict '$c(t) = \frac{m(t)\ wp}{Y}$' influences the output via an efficiency parameter that controls labour-augmenting technical changes (Dunne *et al.*, 2005). The Solow growth model for output [$Y(t)$], including labour [$L(t)$], physical capital [$K(t)$] and human capital [$H(t)$], conflict [$c(t)$] and level of technology parameter [$A(t)$] can be written as:

$$Y(t) = A(t, c(t))\, K(t)^{\delta}\, H(t)^{\eta}\, L(t)^{1-\delta-\eta} \ ; \quad 0 \langle \delta + \eta \langle 1 \quad (4)$$

Existing studies prove that conflicts are detrimental to national output in a number of ways: for instance, in order to manage increasing operational cost of conflicts, it reduces investment and reallocation of resources from other economic activities. Such measures undoubtedly affect the economic growth (Dunne & Uye, 2010; Harris, 1996). Besides, there are other measures that can be said as direct or indirect results of the conflict, namely, destruction of infrastructure and cultivatable land; diminishing local and foreign investment; destruction of physical and commercial assets and last but not the least, increase in human casualties and disability and, diversion of skilled labour from the civilian sector to the military sector resulting in a decline in the labour productivity (Arunatilake *et al.*, 2000).

The steady state model for per capita GDP with conflict can be written as follows:

$$\ln y_e(t) = e^{-\tau t} \ln y(0) + \left(1 - e^{-\tau t}\right) \left[\begin{array}{l} (\ln A(0, C(t)) + gt) + \left(\frac{\delta}{1-\delta-\eta} \ln(s_k)\right) + \left(\frac{\eta}{1-\delta-\eta} \ln(s_h)\right) - \\ \left(\frac{\delta+\eta}{1-\delta-\eta} \ln(g+n+d)\right) \end{array} \right] + \varepsilon(t) \quad (5)$$

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where, ' $C(t)$ ' represents conflict-effect. Hence, equation (5) can be rearranged as follows:

$$\ln y_e(t) = e^{-\tau t}\ln y(0) + \left(1-e^{-\tau t}\right)\left[\begin{array}{l}\left(\ln A(0) + \left(\frac{\delta}{1-\delta-\eta}\ln(s_k)\right) + \left(\frac{\eta}{1-\delta-\eta}\ln(s_h)\right) - \right. \\ \left.\left(\frac{\delta+\eta}{1-\delta-\eta}\ln(g+n+d)\right)\right.\end{array}\right] + \quad (6)$$
$$(1-e^{-\tau t})(g.t) + \psi(1-e^{-\tau t})\ln c(t) + \varepsilon(t)$$

The steady state long run GDP per capita can be re-parameterised in detail by setting $\alpha_0 = (1-e^{-\tau t})\ln A_0 + e^{-\tau t}\ln y(0)$ in equation (6) as follows:

$$\ln y_e(t) = \alpha_0 + \left(1-e^{-\tau t}\right)\frac{\delta}{1-\delta-\eta}\ln s_k(t) + \frac{\eta}{1-\delta-\eta}\ln s_h(t) - \frac{\delta+\eta}{1-\delta-\eta}\ln(g+n+d) + \quad (7)$$
$$(1-e^{-\tau t})(g.t) + \psi(1-e^{-\tau t})\ln c(t) + \varepsilon(t)$$

Equation (7) can be further re-parameterised in reduced form, including the control variable 'trade openness' as follows:

$$\ln y(t) = \alpha_0 + \alpha_1\ln(s_k(t)) + \alpha\phi_2\ln(s_h(t)) - \alpha_3\ln(g+n_t+d) + \alpha_4(g.t) + \alpha_5\ln c(t) + \alpha_6\ln to(t) + \varepsilon(t) \quad (8)$$

The equation (8) requires a linear modelling of the transition path of output per capita around its steady state level (Knight *et al.*, 1996). As a result, all the variables in the Equation (8) follow a natural log. The description of the variables are, $y(t)$: per capita GDP (dependent variable) and $c(t)$: conflict-effect (main independent variable) measured through military spending per warring population ratio to GDP. Since conflict generally decrease output in numerous ways, its sign is expected to be negative in determining per capita GDP. Empirical research by Murdoch and Sandler (2002a & 2002b); Sithy Jesmy *et al.* (2016) found a significant negative effect of conflict on per capita GDP. Apart from the main independent variable, other control variables, namely, fixed capital ratio to GDP (s_k), human capital expenditure ratio to GDP (s_h) proxied by education and health expenditure and, Trade openness ratio to GDP ($to(t)$) are generally supported to enhance per capita GDP. As revealed in a few studies, (Knight *et al.* 1996; Baldacci, Clements, Gupta & Cui, 2008; Dunne *et al.*, 2005) that have traced out positive effect of these control variables on per capta GDP. Meanwhile, ' n ' is another control variable, which is the population growth rate, that uses as a proxy for the labour force[2] of a country. The value of ($n+(g+d)$)[3] is equivalent[4] to $n+0.05$. Empirical research by Baldacci *et al.* (2008) also used population growth rate as a proxy for the labour force growth rate and found a significant negative effect in determining per capita GDP.

3.2 Econometric Model: ARDLBound Test Approach to Cointegration

Compared to other cointegration approaches, the Autoregressive Distributed Lag (ARDL) bounds test approach postulated by Pesaran, Shin and Smith (2001) has been chosen for this study, mainly because it has been proved more efficient for small sampling; moreover, it has developed a simple single-equation set-up, making it simple to implement and interpret (Harris & Sollis, 2003). Moreover, this approach has not been a victim of endogeneity as it allows testing the cointegration relationship by differentiating dependent and explanatory variables (Ahmed, Muzib & Roy, 2013). Considering the advantages over conventional cointegration methods, in the defence economy, many researchers have employed this approach in empirical studies (Sithy Jesmy *et al.*, 2016; Shahbaz, Afza & Shabbir, 2014). Before estimating short-run dynamic effects, and the long-run

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[2] Long time series data for labour force is not available in any of South Asian countries.

[3] n is the population growth rate, g is the technological progress and d is the capital depreciation rate

[4] Mankiw *et al.* (1992) assumed $(\delta+g)=0.05$. According to their empirical study based on U.S. data on capital consumption allowance, they obtained $\delta=0.03$ and $g=0.02$

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equilibrating relationship between the variables, the following unrestricted ARDL model has been developed by Pesaran *et al.* (2001) in order to examine some pre-requisites.

$$\begin{aligned}\Delta \ln GDP_{PC} = \vartheta_{\ln GDPpc} + \sum_{i=1}^{P1} \vartheta_{1i} \Delta \ln GDP_{t-i}^{PC} + \sum_{i=0}^{P2} \vartheta_{2i} \Delta \ln FC_{t-1}^{gdp} + \sum_{i=0}^{P3} \vartheta_{3i} \Delta \ln HCE_{t-1}^{gdp} + \sum_{i=0}^{P4} \vartheta_{4i} \Delta \ln ngd_{t-i} \\ + \sum_{i=0}^{P5} \vartheta_{5i} \Delta \ln TO_{t-i}^{gdp} + \sum_{i=0}^{P6} \vartheta_{6i} \Delta \ln C_{t-i}^{gdp} + \theta_1 \ln GDP_{t-1}^{PC} + \theta_2 \ln FC_{t-1}^{gdp} + \theta_3 \ln HCE_{t-1}^{gdp} + \\ \theta_4 \ln ngd_{t-1} + \theta_5 \ln TO_{t-1}^{gdp} + \theta_6 \ln c_{t-1}^{gdp} + u\end{aligned} \qquad (9)$$

In the ARDL approach to cointegration, it is important to determine the optimum lag-length of variables included in the model, to make sure the errors in the Equation 9 are serially independent and the estimated model is dynamically stable. Similarly, bounds test are to be performed in order to take the decision of cointegration[5] by testing the null hypothesis of no-cointegration in Equation 9 $(H_o: \theta_1 = \theta_2 = \theta_3 = \theta_4 = \theta_5 = \theta_6 = 0)$. If there is an evidence for long-run relationship between the variables, then the long-run and the short-run model can be estimated from the following ARDL error correction model.

$$\begin{aligned}\Delta \ln GDP_{PC} = \vartheta_{\ln GDPpc} + \sum_{i=1}^{P1} \vartheta_{1i} \Delta \ln GDP_{t-i}^{PC} + \sum_{i=0}^{P2} \vartheta_{2i} \Delta \ln FC_{t-1}^{gdp} + \sum_{i=0}^{P3} \vartheta_{3i} \Delta \ln HCE_{t-1}^{gdp} + \sum_{i=0}^{P4} \vartheta_{4i} \Delta \ln ngd_{t-i} \\ + \sum_{i=0}^{P5} \vartheta_{5i} \Delta \ln TO_{t-i}^{gdp} + \sum_{i=0}^{P6} \vartheta_{6i} \Delta \ln C_{t-i}^{gdp} + \lambda ETC_{t-1} + u\end{aligned} \qquad (10)$$

From Equations 9 and 10, ϑ_{ij} are the short-run coefficients, θ_{ij} is the long-run coefficients and ECT_{t-1} is an error correction term.

3.2. Data

Data used in the present research related to population growth rate, fixed capital formation, per capita GDP, trade openness, all from 1980 to 2014 and education and health expenditures from 1995 to 2013, for all five countries are collected from the World Bank's World Development Indicator, 2015. Statistical reports[6] for each country was used to collect data for other years of the variables, such as education and health expenditure.

Data for military expenditure and military participation from 1988 to 2014 was obtained from Stockholm International Peace Research Institute (SIPRI Military Expenditure Database, 2014). For 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) and for Bangladesh and Sri Lanka from RCSS Policy Study-11 (by Chowdhury & De-Silva, 2000). However, data for Nepal from 1980-1987 was extrapolated using appropriate univariate time series method. Due to the absence of data before 1980 for military, education and health expenditures, this study used annual time-series data from 1980 to 2014.

4. EMPIRICAL FINDINGS AND DISCUSSION

4.1. Unit root test

ARDL approach is employed in this study because it can be used to estimate the cointegration relationship even the variables are found integrated with mixed order [$I(0)$, $I(1)$] or mutually. However, it is important to confirm that none of the variables are stationary at second difference, i.e. $I(2)$, because it will invalidate the methodology. This study employs DF-GLS and Ng-Perron tests for testing the presence of unit root in time-

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[5] Using the Pesaran *et al.*'s (2001) critical value table, evidence of cointegration is tested. When the calculated 'F' statistics exceed the upper bound critical value, null hypothesis of no cointegration in bounds test has rejected.

[6] Some country level statistical reports has been used to collect data education and health expenditure. For example, India - various reports from the department of higher education in the Ministry of Human Resource Development; Sri Lanka - various issues of the Central Bank annual report; Pakistan - "50 years statistical summery of Pakistan", Volumes I-IV, published by the Pakistan Bureau of Statistics, Government of Pakistan ; Nepal - Statistical publication reports. Bangladesh - data extrapolated from 1980-1987 using appropriate univariate (trend, exponential and quadratic) time series method.

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series variables. These two statistics provide good explanatory power and size and, are also good for small samples (Martin, Hurn & Harris, 2012). Unit root test results reported in Table 1, confirm that most of the variables in all countries are stationary at first difference but some of them are stationary at level.

Table 1. Unit Root Test Results

Countries	Variables	DF-GLS			Ng-Perron (MZ_t Statistics)		
		Level	1st Difference	Conclusion	Level	1st Difference	Conclusion
Bangladesh	$Log(GDP_{PC})$	1.129	-5.030*	$I(1)$	1.568	-2.797*	$I(1)$
	$Log(ngd)$	-0.242	-2.255**	$I(1)$	-0.815	-2.169**	$I(1)$
	$Log(TO_{GDP})$	-0.473	-3.785*	$I(1)$	-0.412	-2.556**	$I(1)$
	$Log(FC_{GDP})$	0.532	-3.719*	$I(1)$	0.355	-2.546**	$I(1)$
	$Log(HCE_{GDP})$	-0.306	-6.260*	$I(1)$	0.179	-2.736*	$I(1)$
	$Log(MEPWP_{GDP})$	-1.246	-6.778*	$I(1)$	-1.121	-2.733*	$I(1)$
India	$Log(GDP_{PC})$	1.607	-5.022*	$I(1)$	2.081	-2.849*	$I(1)$
	$Log(ngd)$	2.287	-2.943*	$I(1)$	-0.774	-5.549*	$I(1)$
	$Log(TO_{GDP})$	0.543	-2.141**	$I(1)$	0.818	-2.702*	$I(1)$
	$Log(FC_{GDP})$	-1.195	-2.265**	$I(1)$	-1.008	-2.012**	$I(1)$
	$Log(HCE_{GDP})$	-0.598	-4.815*	$I(1)$	-0.579	-2.830*	$I(1)$
	$Log(MEPWP_{GDP})$	-0.748	-5.843*	$I(1)$	-0.695	-2.870*	$I(1)$
Nepal	$Log(GDP_{PC})$	2.011	-5.022*	$I(1)$	2.664	-2.836*	$I(1)$
	$Log(ngd)$	0.703	-2.974*	$I(1)$	1.446	-3.773*	$I(1)$
	$Log(TO_{GDP})$	-0.732	-4.188*	$I(1)$	-0.473	-2.724*	$I(1)$
	$Log(FC_{GDP})$	-0.476	-6.888*	$I(1)$	-0.294	-2.812*	$I(1)$
	$Log(HCE_{GDP})$	-0.897	-4.824*	$I(1)$	-0.728	-2.736*	$I(1)$
	$Log(MEPWP_{GDP})$	-0.281	-5.408*	$I(1)$	-0.072	-2.868*	$I(1)$
Pakistan	$Log(GDP_{PC})$	1.494	-4.492*	$I(1)$	2.019	-2.747*	$I(1)$
	$Log(ngd)$	0.907	-5.729*	$I(1)$	1.273	-2.498**	$I(1)$
	$Log(TO_{GDP})$	-2.730	-	$I(0)$	-2.174	-	$I(0)$
	$Log(FC_{GDP})$	-1.519	-5.713*	$I(1)$	-1.399	-2.814*	$I(1)$
	$Log(HCE_{GDP})$	-1.374	-3.576*	$I(1)$	-1.356	-2.256**	$I(1)$
	$Log(MEPWP_{GDP})$	-1.213	-3.997	$I(1)$	-1.033	-2.358*	$I(1)$
Sri Lanka	$Log(GDP_{PC})$	-1.392	-3.452*	$I(1)$	1.399	-1.992**	$I(1)$
	$Log(ngd)$	-1.958**	-	$I(0)$	-2.858*	-	$I(0)$
	$Log(TO_{GDP})$	-0.533	-3.843*	$I(1)$	-0.297	-2.624*	$I(1)$
	$Log(FC_{GDP})$	-2.372	-	$I(0)$	-1.953	-2.829*	$I(0)$
	$Log(HCE_{GDP})$	-2.400**	-	$I(0)$	-2.020**	-	$I(0)$
	$Log(MEPWP_{GDP})$	-0.849	-3.168*	$I(1)$	-0.382	-2.287**	$I(1)$

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

4.2. Prerequisites of ARDL bounds test

Determining an optimal lag-length of the variables included in the model is one of the important prerequisites in ARDL approach and is important to acquire meaningful cointegration results (Ng & Perron, 2001). In addition, unlike the other approaches, different variables can be assigned different lag-lengths as they enter in the model. The optimal ARDL model for $ARDL(p_1, p_2, p_3, p_4, p_5, p_6)$ is selected based on Akaike Information Criterion (AIC) and Schwarz Beysian Criterion (SBC) statistics. A summary of selected ARDL models for all countries are presented in Table 2.

Table 2. Pre-requisite of ARDL bounds test

Country	Optimal Lag	*Decision of Cointegration*		*LM test for Serial Correlation*	
		'*F*' Statistics	Conclusion	'*F*' Statistics	'*p*' Value
Bangladesh	ARDL(1,0,2,0,2,0)	10.818 (a)	exist at 1%	1.944	0.169
India	ARDL(1,2,0,0,1,2)	4.078 (b)	exist at 5%	1.247	0.309
Nepal	ARDL(1,1,1,1,1,1)	7.028 (c)	exist at 1%	3.647	0.071

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Pakistan	ARDL(2,0,0,0,0,2)	5.660 (b)	exist at 1%	1.696	0.206
Sri Lanka	ARDL(1,0,0,1,1,0)	5.080 (b)	exist at 1%	1.478	0.236

N.b.: (a): Unrestricted intercept 10%: I(0)=2.26, I(1)=3.35; 5%: I(0)=2.62, I(1)=3.79; 1%: I(0)=3.41; I(1)=4.68
(b): Restricted intercept 10%: I(0)=2.08, I(1)=3.00; 5%: I(0)=2.39, I(1)=3.38; 1%; I(0)=3.06, I(1)=4.15
©: Restricted trend 10%: I(0)=2.49, I(1)=3.38; 5%:I(0)=2.81, I(1)=3.76; 1%; I(0)=3.50, I(1)=4.63

Often we assume that in the case of ARDL bounds test approach, errors in the Equation (9) are not correlated with each other. According to the results as reported in Table 2, we can accept the null hypothesis or no serial correlation accepted since the $'p'$ values recorded in the Breusch-Godfrey serial correlation LM test statistics are greater than 0.05. Results concludes that the estimated models are free from serial correlation in all countries. Although the ARDL model has the ability to detect heteroskedasticity since it allows different lag order, a robust ARDL model is estimated using a White test that rectifies the problem of heteroskedasticity. Another important prerequisite of the ARDL bounds test is that the estimated model must be dynamically stable. The CUSUM plot of recursive residuals presented in Figure 2 confirms that the parameters are stable for all countries, since the cumulative sum of residuals lies in between the five percent critical value.

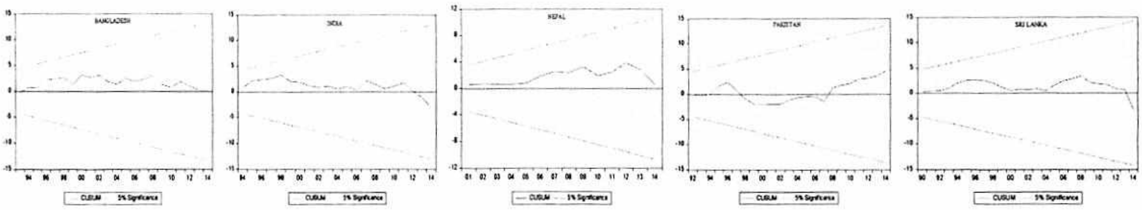

Figure 2. CUSUM plot for All South Asian Countries

Before proceeding to estimate the relationship between long run and short run estimates, it is imperative to confirm the presence of long-run relationship among variables. The conclusion of cointegration in this study is derived based on Pesaran *et al*'s (2001) critical value table recommended for the independent variables ($k=5$) and number of observations ($n=34$). According to the result presented in Table 2, the null-hypothesis of no-cointegration is rejected since the estimated $'F'$ values exceeded the upper bound critical value at a respective significance level.

4.3. Long-run and Short-run Cointegration Results

The negative, statistically significant and less than one absolute value of the error correction coefficient (ECT) stated in Table 3 for all five countries ('-0.216' in Bangladesh; '-0.485' in India; '-0.752' in Nepal; '-0.239' in Pakistan and '-0.097' in Sri Lanka) indicates that the estimated model converge towards the equilibrium within the specific values of ECT. However, apart from Nepal, because of the long memory of time series data, all the countries have a slower rate of speed of adjustment in the growth model.

Long-run and short-run estimates are presented in Table 3 which indicates that most of the variables have an expected sign in the long-run and short-run for all five selected countries. In addition, estimated coefficients illustrate elasticity of independent variables. The sign of the coefficient of conflict-affect variable ($Log(MEPWP_{GDP})$) has an expected negative sign in both periods in all countries, it is however, statistically significant in the long-run in all countries apart from Bangladesh and in the short run in all countries apart from Nepal and Sri Lanka. The results suggest that in the long-run, other factors remain the same, a percentage increase in conflict-effect will decrease per capita GDP by 0.4 percent, 0.3 percent, 1.4 percent and one percent in India, Nepal, Pakistan and Sri Lanka respectively. Unlike the long-run, the effect of military spending on per capita GDP is marginal and statistically significant only in Bangladesh and Pakistan in the short-run. Results indicate that, in the short-run a percentage increase in conflict-effect will decrease per capita GDP by 0.1 percent in Bangladesh and 0.2 percent in Pakistan.

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Elasticity coefficients of the control variables included in the growth model also generally have an expected sign. One of the important determinants of per capita GDP in the Solow growth model is fixed capital ($Log(FC_{GDP})$) and it is generally adopted to boost the economic growth. The results appearing in Tables 3 show that apart from Bangladesh, the coefficient of fixed capital is mostly positive and statistically significant either in the long-run or in the short-run in all countries.

Another important determinants that enhance per capita GDP is human capital ($Log(HCE_{GDP})$). It is proxied by education and health spending. Similar to the fixed capital, human capital also commonly displays the positive relationship with per capita GDP in all countries. It is, however, statistically significant in Bangladesh and India in the long-run and in Sri Lanka in the short-run. Another important variable in the growth model is a trade-openness ($Log(TO_{GDP})$) and it generally enhances per capita GDP. Coefficient of trade openness has expected positive in all countries, either in the long-run or in the short-run. However, statistically significant in Bangladesh and Pakistan in both periods and in Nepal in the short-run. Similarly, the coefficient of *ngd* has expected negative sign in all countries apart from Bangladesh but statistically significant in India and Sri Lanka.

Table 3: *Long-run and Short-run Coefficient*

Variable	Bangladesh ARDL(1,0,2,0,2,0)		India ARDL(1,2,0,0,1,2)		Nepal ARDL(1,1,1,1,1,1)		Pakistan ARDL(2,0,0,0,0,2)		Sri Lanka ARDL(1,0,0,1,1,0)	
	Coefficient	't' Value	Coefficient	't' Value	Coefficient	't' Value	Coefficient	't' Value	Coefficient	't' Value
Long – Run Estimated Results										
$Log(ngd)$	0.397	1.701	-2.622	-2.400**	-0.114	-0.408	1.579	2.487**	-0.584	-1.323
$Log(TO_{GDP})$	2.119	3.324*	-0.156	-0.365	-0.779	-1.948***	1.247	2.099**	0.578	0.643
$Log(FC_{GDP})$	-4.173	-2.281**	0.949	3.719*	0.537	2.716**	-1.078	-1.878	-0.131	0.144
$Log(HCE_{GDP})$	1.697	4.987*	0.621	2.840*	-0.298	-1.570	0.374	1.056	1.134	0.862
$Log(MEPWP_{GDP})$	-0.434	-1.287	-0.464	-2.041**	-0.296	-2.196**	-1.438	-5.008*	-0.981	-3.054*
c	-	-	8.842	4.326*	-	-	5.967	3.058*	11.720	2.376**
t	-	-	-	-	0.036	5.950*	-	-	-	-
Short –Run Estimated Results										
$\Delta Log(GDP_{PC})(-1)$	-	-	-	-	-	-	-0.512	-3.048*	-	-
$\Delta Log(ngd)$	0.049	0.439	0.648	0.268	1.356	5.231*	0.193	-0.842	-0.064	-2.857**
$\Delta Log(ngd)(-1)$	-	-	7.364	2.406**	-	-	-	-	-	-
$\Delta Log(TO_{GDP})$	0.183	3.895*	0.018	0.138	0.291	2.719**	0.309	2.390**	11.720	-1.953***
$\Delta Log(TO_{GDP})(-1)$	-0.269	-5.215*	-	-	-	-	-	-	-	-
$\Delta Log(FC_{GDP})$	-0.914	-4.719*	0.432	4.231*	0.134	1.683	0.388	2.582**	0.664	5.332*
$\Delta Log(HCE_{GDP})$	-0.063	-1.263	-0.921	-6.308*	0.046	0.508	-0.204	-2.060**	0.292	2.417**
$\Delta Log(HCE_{GDP})(-1)$	-0.264	-5.438*	-	-	-	-	-	-	-	-
$\Delta Log(MEPWP_{GDP})$	-0.086	-3.153*	-0.021	-1.618	-0.031	-0.607	-0.205	-4.407*	-0.065	-1.446
$\Delta Log(MEPWP_{GDP})(-1)$	-	-	0.229	5.1468*	-	-	-0.353	-3.662*	-	-
c	2.384	11.761*	-	-	5.735	8.030*	-	-	-	-
ECT_{t-1}	-0.216	-11.440*	-0.485	-6.584*	-0.752	-7.953*	-0.239	-7.046*	-0.097	-6.224*

Empirical findings of this study is consistent with the present situations in South Asia as it is a region that has experienced hundreds of armed conflicts. India and Pakistan experienced regional war, ethnic war, political conflicts, religious extremist attack and terrorist attack for most of the year. Sri Lanka experienced three decades of bitter ethnic war, and other religious extremist and political conflicts. Nepal experienced ten years of civil war. Compared to other countries, conflict is not as severe in Bangladesh, but there are several minor conflicts. Because of ongoing conflict, the global peace index in five South Asian countries climbed up from 105 to 157 out of 161 countries in the world (Institute for Economics and Peace, 2015). These conflicts also limited the output by destroying thousands of hectares of land and making it unusable, which resulted in the increase in the cost of food production, holding back of commercialization and stock management system, decrease in productivity of labour by human casualties and by relocation of the productive labourers to the military sector.

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These dreadful conflicts also used military power to uphold political power and military sector's development in all South Asian countries mainly by accelerating the military expenditure. The nuclear race between India and Pakistan was an additional cause and reason for increase of military expenditure in these two countries. On an average, 20 percent of government spending is devoted to the military sector in South Asia. It has been felt that an increase in military spending can limit the government capacity to invest resources in other economic sectors. In addition, governments in this region are also forced to finance military spending by way of an increase in the money supply, and debt since the sources of income are limited in each country.

The empirical results of this study are also in agreement with the theoretical indications as suggested by the Solow model, which shows that military expenditure wherever on the rise has depleted the economic growth. Moreover, the expected sign of positive for such variables like physical capital, human capital, trade openness and negative sign of ngd to determine per capita GDP are also consistent with the theoretical argument. Moreover, the finding of this study also exhibits how conflict has depleted per capita GDP growth rate both in the long-run and short-runs durations in almost all South Asian countries. The results are in agreement with the findings of Murdoch and Sandler (2002a & 2002b); Ganegodage and Rambaldi (2014); Sithy Jesmy *et al.* (2016). Apart from the independent variables, the significance of other control variables is also largely consistent with earlier findings. For example, the positive effect of fixed capital, trade openness, and the negative, effect of 'ngd' being in line with the earlier findings of Knight *et al.* (1996) and Baldacci *et al.* (2008). The results of positive effect of human capital spending are consistent with the previous findings of Baldacci *et al.* (2008), and Rahman (2011).

5. CONCLUSION

This study aims to determine the impact of conflicts on per capita GDP growth rate in conflict-affected five countries in South Asia, namely, Bangladesh, India, Nepal, Pakistan and Sri Lanka for the period 1980 - 2014 by applying the Solow theoretical growth model and ARDL bounds test approach to cointegration. Prior to the estimation of equilibrium relationship, we performed unit root tests, diagnostic test, stability test and evidence of cointegration test. The findings from the ARDL estimations show that conflict has detrimental effect on per capita GDP in the long-run as well as in the short-run in all South Asian countries. Apart from conflicts, all the other control variables also have the expected sign at least in the long-run or in the short-run in all countries.

South Asia has been identified as the world's second most violent region after some of the Arab countries (Ghani & Iyer, 2010). Research findings of this study have shown that conflict is the unique reason for the decreases in per capita GDP in South Asia. Enhancing economic growth in South Asia therefore now highly depends on stopping and ending this conflict. Solutions to these conflicts are possibly more effective by political meant rather than military. For example, by implementing good governance from grass root level and giving due honour to the minority rights, the government can control several political conflicts, ethnic conflicts, religious riots and homicides. It has been observed in South Asia that most of the conflicts took place due to social, religious, ethnic and reasons which are preventable by government by reducing regional disparity between lagged and lead regions. In addition, implementation of cross border cooperation between countries is vitally important for each of the government to prevent international conflicts and several local conflicts. Most importantly, most of the political, social, religious and homicides can be preventable by getting rid of all minor political goals through the elected representatives of each country. Therefore, it is highly recommended that policy makers and government in respective countries should establish constructive policies to prevent and control these conflicts which are certainly preventable. Preventing conflicts and encouraging peace undoubtedly support the economic growth in South Asia.

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