Impact of Military Expenditure and Economic Growth on External Debt: New Evidence from a Panel of SAARC Countries

Khalid Zaman,
Department of Management Sciences,
COMSATS Institute of Information Technology / Abbottabad, Pakistan
khalidzaman@ciit.net.pk

Iqtidar Ali Shah
Department of Management Sciences,
COMSATS Institute of Information Technology / Abbottabad, Pakistan
iqtidar@ciit.net.pk

Muhammad Mushtaq Khan
Department of Humanities,
COMSATS Institute of Information Technology / Abbottabad, Pakistan

Mehboob Ahmad
Department of Management Sciences,
Bahria University / Islamabad, Pakistan

ABSTRACT

This paper examines the impact of military expenditure and economic growth on external debt for a panel of five selected SAARC countries including Bangladesh, India, Nepal, Pakistan and Srilanka, over the period of 1988-2008. Using Pedroni's (2004) test for panel cointegration, it was found that there is a long-run relationship between external debt, economic growth and military expenditure. The study finds that external debt is elastic with respect to military expenditure in the long run and inelastic in the short run. In the long run, 1% increase in military expenditure increase external debt between 1.18 % and 1.24%, while 1% increases in economic growth reduce external debt between 0.64% and 0.79%, by employed DOLS and FMOLS estimator respectively. In the short run, 1% increase in military expenditure increases external debt by 0.15%, while 1% increase in economic growth reduces external debt by 0.47 %.

JEL Codes*: O1, O4, O5 and H5*

KEYWORDS
External Debt, Economic Growth, Military Expenditure, Panel Cointegration, SAARC Countries.

ARTICLE HISTORY
Submitted: 2 April 2012
Resubmitted: 28. February2013
Accepted: 25. March 2013

Introduction and Literature Review

The relationship between military expenditure and economic growth has been examined extensively in the literature. However, the effect of military expenditure on external debt has received less attention. In countries with large military expenditure, the role of military spending in contributing to external debt is important because of the potential adverse economic effects of external debt as excessive foreign debt accumulation can cause deterioration in the terms of trade, an overvaluation of the domestic currency and slower economic growth.

Benoit (1973, 1978) in his pioneered study examined the relationship between military expenditure and economic growth in 44 less developed countries and found that there is a positive correlation between military expenditure and economic growth. Dakurah et al. (2000) studied 62 LDCs and found 13 countries showing unidirectional causality from military expenditure to growth; 10 countries from economic growth to military expenditure; 7 countries suggest bidirectional causality and the rest 18 countries displaying no meaningful relationship. Yildirim, Sezgin & Ocal (2005) examined the effect of military expenditure on economic growth for 12 Middle Eastern countries and Turkey using cross-sectional and dynamic panel data estimation techniques from 1989 to 1999 and found that military expenditure enhances economic growth in the Middle Eastern countries and Turkey as a whole. So for as the South Asian Regional Cooperation Council (SAARC) countries are concerned, a study was carried out by Hassan et al. (2003) to show the relationship between military expenditure and economic growth. They examined the impact of the military expenditure on economic growth and FDI covering five out of seven SAARC nations using panel data over the 1980-1999 periods. Interestingly the result suggests positive relationship between military expenditure and economic growth, and thus supporting the view that military expenditure can bring positive impact on growth. Other studies which have also found a positive relationship between military expenditure and economic growth include Mueller and Atesoglu (1993); MacNair *et al.* (1995), Chlestos and Kollias (1995), Sezgin (1999b, 2000) and Yildirim and Sezgin (2002).

Equally military spending may have a negative effect on economic growth through reducing the availability of public funds for spending in the supposedly more productive civilian sector and creating inflationary pressures. Deger (1986) found negative relationship between military expenditure and growth in the less developed countries citing that defense expenditure takes resources away from productive investments and fails to mobilize and create additional savings. Other empirical studies that found significant adverse effect of defense spending on the economy include studies by Deger and Smith (1983), Deger and Sen (1983) and Faini et al. (1984), Antonakis (1997), Heo (1998), Linden (1992), Dunne and Mohammed (1995), Sezgin (1999a) and Dunne, Nikolaidou & Smith (2002). Aizenman and Glick (2006) studied the long-run impact of military expenditure on growth and suggested that military expenditure induced by external threats should increase growth, while military expenditure induced by rent seeking and corruption should reduce growth. Abu- Bader *et al*. (2003) found that military expenditure had a negative effect on economic growth in Egypt, Israel and Syria over the period 1972 to 2001 within a Granger causality framework. DeRouen (2000) reaches the same findings in a single country study of Israel.

Smyth and Narayan (2009) have examined the relationship between external debt and military expenditure nexus in the six Middle Eastern countries and found that external debt is elastic with respect to military expenditure in the long-run while inelastic in the short-run.

In this paper an analysis has been carried out to find a panel cointegration between external debt and military expenditure along with economic growth in SAARC countries, using secondary data from 1988 to 2008. This paper does not include all dimensions and factors of the external debt and military expenditure problem from an econometric perspective, the small panel (T=19, N=5) is only sufficient to accommodate two explanatory variables without a substantial loss in power.

The objectives of this paper are:

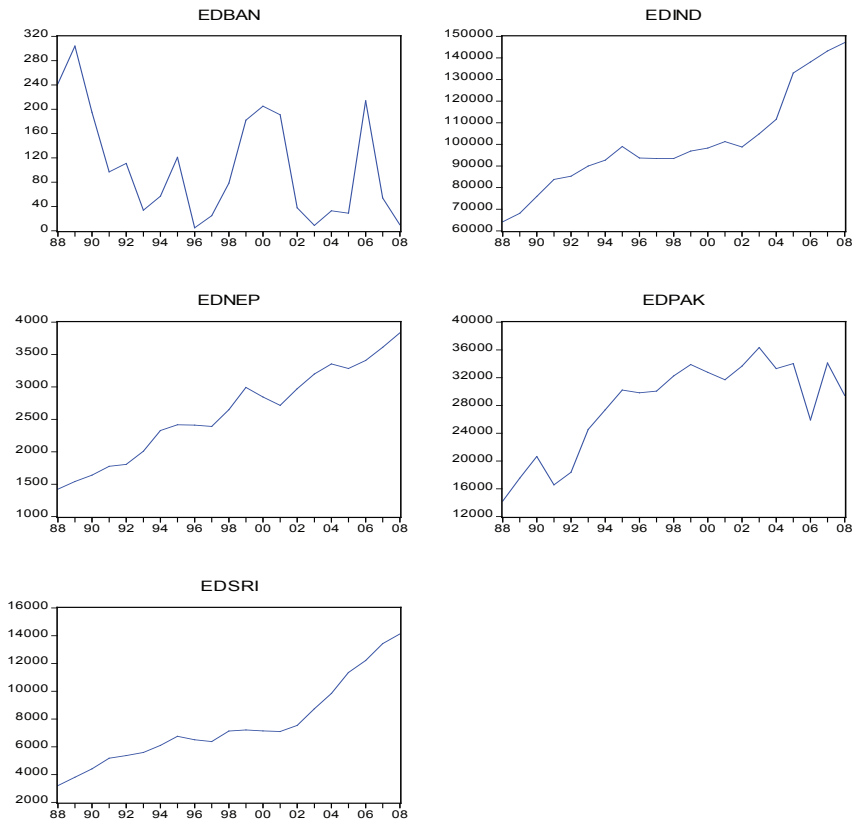
1. To empirically investigate the relationship between external debt, economic growth and military expenditure using a panel unit root and panel cointegration framework in selected SAARC countries.
2. To empirically investigate, whether there is a long-run or short-term relationship between the external debt, economic growth, and military expenditure.

This paper is organized as: after introduction and literature review above, a brief overview of external debt, economic growth and military expenditure of the selected SAARC countries is given followed by data source and methodological framework. Next results and discussion has been carried out and conclusion of the study is given at the end.

Overview of External Debt, Economic Growth, and Military Expenditure in the Selected SAARC Countries

External Debt: Debt service liability as percentage of export of goods and services has decreased considerably in all the Member States of SAARC countries. In Bangladesh and India debt service liability has been reduced from 25.8 percent and 31.9 percent in 1990 to 3.7 percent and 7.7 percent in 2006 respectively. Pakistan and Sri Lanka have witnessed decline from 22.9 percent and 13.8 percent in 1990 to 8.6 percent and 12.7 percent in 2006 respectively. Figure 1 below shows the trend.

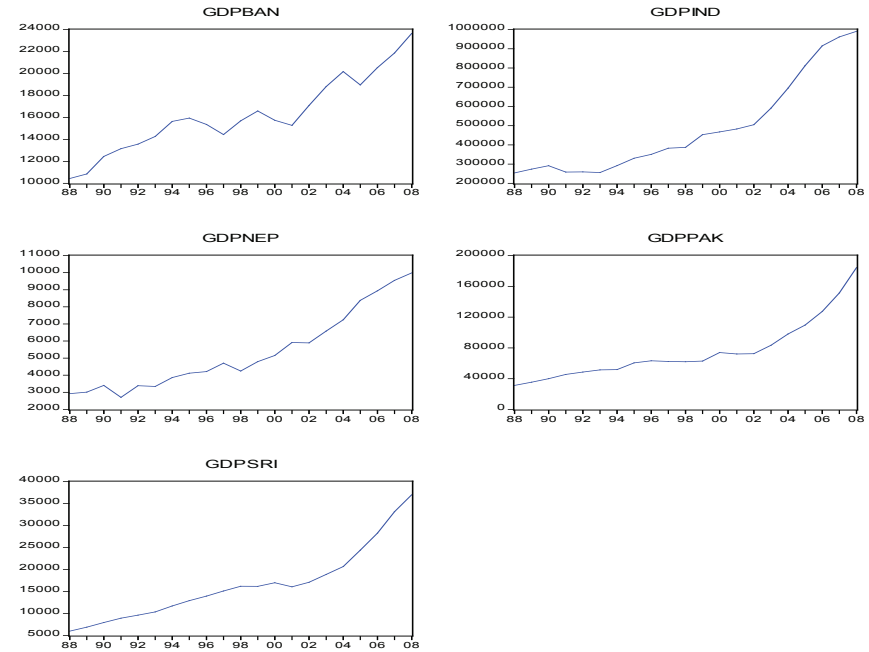
Figure 1. External Debt in SAARC Region (1988-2008)



Sources: Asian Development Bank, 2008; World Banks, 2008.

Economic Growth: SAARC member states have maintained GDP growth rate in 2006 at 8.9%. GDP growth in South Asia is significantly higher compared with other developing regions. However, trickle down effects of growth would take time to effect the population of the region. Real GDP growth rate has increased in almost all the countries. Country-wise analysis shows that Bangladesh's real GDP growth at 6.2 percent in 1990 increased to 6.6 percent in 2006. Bhutan during the period 1990-2006 witnessed sharp increase from 5.6 percent to 7.8 percent. India maintained its growth momentum from 5.6 percent in 1990 to 9.6 percent in 2006. Nepal economy has witnessed low and high GDP growth from 2.3 percent in 2005 to 2.8 percent in 2006. Pakistan was maintaining its growth but has witnessed a low growth rate of 5.8 percent in 2006. Sri Lankan economy has showed an increase 7.7 percent in 2006 (see, SHRDC, 2008). Figure 2 below shows the trend.

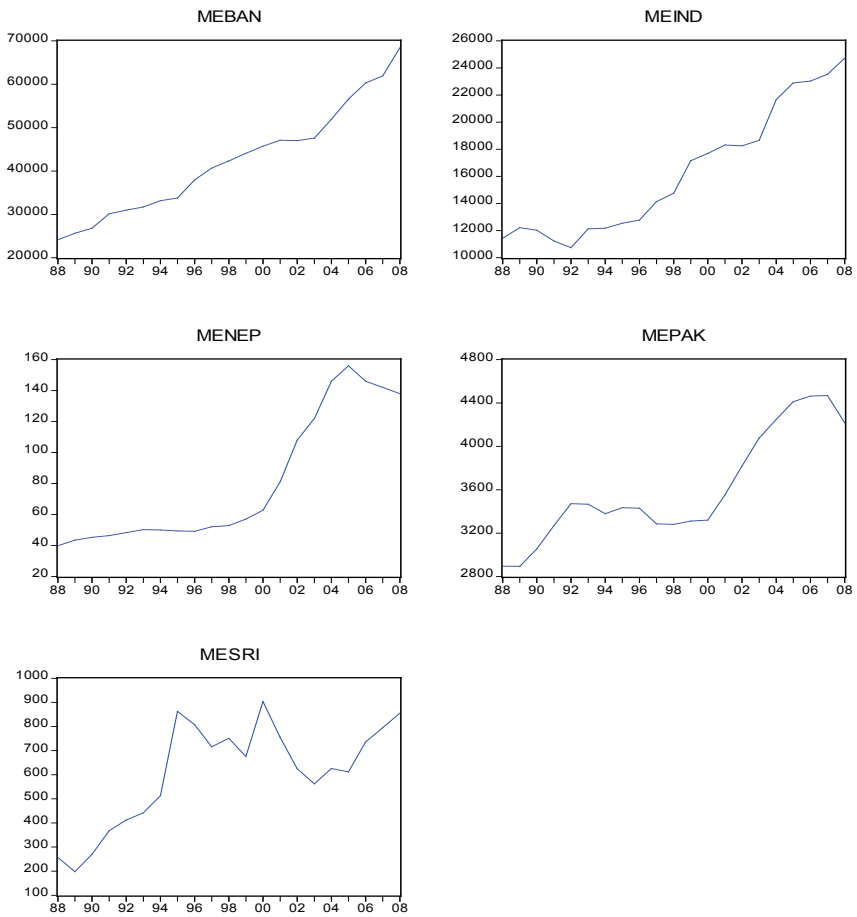
Figure 2. Economic Growth of SAARC Countries (1988-2008)



Source: Human Development Report 2007-08; UNDP, 2008.

Military Expenditure: An increasing trend has been noticed in military expenditures over the time period. Pakistan and India are in the competitive zone, therefore, both have increased their military expenditure. In terms of military expenditure as percentage of GDP, Sri Lanka spent 4.1%, Pakistan 3.5%, India and Nepal 2.5%, Bangladesh 1.5%. Figure 3 shows individual country assessment of military expenditures over a time period.

Figure 3. Military Expenditure in SAARC Region (1988-2008)



Source: UNDP, 2008 and Human Development Report 2007-08.

Data Source and Methodological Framework

The data set for five SAARC countries is collected from International Financial Statistics (IFS, 2008), World Bank (2008), SHRDC report, (SHRDC, 2008); Stockholm International Peace Research Institute (SIPRI, 2008) and Economic Survey of Pakistan (2008-09). The dependent and independent variables used in this study are listed in Table 1. External Debt is used as a dependent variable for the study. Independent variables are Economic Growth (GDP) and Military Expenditures (ME).

Table 1. Variables used for the External debt-Military expenditure Model

Variables	Symbol	Expected Sign
Dependent Variable:		
External Debt	ED	
Independent Variable:		
Economic Growth	GDP	Negative
Military Expenditure	ME	Positive

Panel Econometric Model: There is lack of panel cointegration to explain the relationship between external debt and military expenditure in the SAARC context. This paper uses panel cointegration analysis to test this relationship in Bangladesh, India, Nepal, Pakistan and Sri Lanka during 1988-2008. The model used to test the relationship between external debt and military expenditure is as follows:

ln(ED) = f ln(GDP, ME)

The general representation of the equation mentioned above is as follows:

$$Log(Y_t) = C + \beta_{1t} \log(X_{1t}) + \beta_{2t} \log(X_{2t}) + \varepsilon_t \quad (1)$$

Where:

Y_t = dependent variable;
C = intercept;
β_t = slope of the independent variables;
X_t = independent variables (GDP and ME)
T = 1, 2…21 periods;
i = 1, 2…5 countries;
ε_t = error term;
β_1 = coefficient of economic growth;
β_2 = coefficient of military expenditure;

In the above model, the sign of β_1 is expected to be negative as it is argued that SAARC countries might have a capacity to repay external debt. Similarly, β_2 is hypothesized to be positive as it is argued that large military expenditure can result in large external debt.

This paper uses a panel cointegration method to examine the long-run relationship between external debt and military expenditure in the selected SAARC countries. Thus, three different panel unit roots tests [(i.e. Levin-Lin- Chu (LLC) test, Im-Pesaran-Shin (IPS) test and Maddala-Wu (MW) test)] have been used in this study.

Panel Unit Root Tests: Panel unit root tests could be considered as an extension of the univariate unit root test. The LLC test is based on the pooled panel data as follows (Levin & Lin, 1992);

$$\Delta y_{it} = \rho y_{t-1} + \alpha_0 + \sigma_t + \sigma_i + \theta_t + \varepsilon_t \qquad (2)$$

Where ρ, α_0, σ are coefficients, α_i is individual specific effect, θ_t is time specific effect.

According to Levin & Lin (1992), the LLC test could be conducted by the following steps. In step1, subtract the cross-section average from data;

$$\bar{y} = 1/N \sum_{i=1}^{N} y_{it} \qquad (3)$$

In step 2, an ADF test is applied to each individual series and normalizes the disturbance. The ADF model could be expressed as;

$$\Delta y_{it} = \rho_i y_{t-1} + \sum_{j=1}^{P_i} \delta_j \Delta y_{i,t-j} + \alpha_i + \varepsilon_t \qquad (4)$$

Maddala and Wu (1999) argued that this is equivalent to perform two auxiliary regressions of Δy_{it} and $y_{i,t-1}$ on the remaining variable n equation (3). Let the residuals from these two regression be $\hat{e}_{i,t}$ and $\hat{V}_{i,t-1}$ respectively. The, regress $\hat{e}_{i,t}$ on $\hat{V}_{i,t-1}$.

$$\hat{e}_{i,t} = \rho_i \hat{V}_{i,t-1} + \varepsilon_t \qquad (5)$$

Levin & Lin (1992) suggest the following normalization to control the Heteroskedasticity in error.

$$\hat{\sigma}^2_{\dot{e}} = \frac{1}{T - P_i - 1} \sum_{t=p+2} (\hat{e}_{i,t} - \hat{\rho}_i - \hat{V}_{i,t-1})^2$$

$$\tilde{e} = \frac{\hat{e}_{i,t}}{\hat{\sigma}_{\dot{e}}}$$

$$\tilde{v}_{i,t-1} = \frac{\tilde{v}_{i,t-1}}{\hat{\sigma}_{\dot{e}}}$$

In the next step, the LLC test statistic could be obtained from the following regression;

$$\tilde{e}_{i,t} = \rho \tilde{v}_{i,t-1} + \tilde{\varepsilon}_{i,t}$$

The t-statistic for testing $\tilde{o} = 0$ is given by

$$t_\delta = \frac{\hat{\delta}}{STD(\hat{\delta})}$$

Where

$$\hat{\delta} = \frac{\sum_{i=1}^{N} \sum_{t=2+p}^{T} \hat{v}_{t-1} \hat{e}_t}{\sum_{i=1}^{N} \sum_{t=2+p} \hat{v}^2_{t-1}}$$

Next, the paper also employs the IPS test which is based on the mean value of individual ADF statistics or *t*-bar (Im, Pesaran and Shin, 2003). The IPS test provides separate estimation for each *i* section, allowing different specifications of the parametric values, the residual variance and the lag lengths. Their model is given by:

$$\Delta Y_{i,t} = \alpha_i + \rho_i Y_{i,t-1} + \sum_{k=1}^{n} \phi_k \Delta Y_{i,t-k} + \delta_i t + u_t \qquad (6)$$

The null hypothesis and the alternative hypothesis are formulated as:

$$H_0 : \rho_i = 0$$
$$H_A : \rho_i < 0$$

for at least one *i*

Thus, the null hypothesis of this test is that all series are non-stationary process under the alternative that fraction of the series in the panel are assumed to be stationary. IPS also suggested a group mean Lagrange multiplier test for testing panel unit roots.

Maddala & Wu (1999) attempted to improve to the same degree the drawbacks of all previous tests by proposing a model that could also be estimates with unbalanced panels. Basically, Maddala and Wu are in line with the assumptions that a heterogeneous alternative is preferable, but they disagree with the use of the average ADF statistics by arguing that it is not the most effective way of evaluating stationary.

Panel Cointegration Tests: Finally, this paper employs Pedroni's (1999, 2004) panel-co integration method in order to examine the long-run relationship between external debt and military expenditure. If the independent and dependent variables are co-integrated or have a long-run relationship, the residual e_{it} will be integrated of order zero, denoted I(0). Pedroni used two types of panel cointegration tests. The first is the "panel statistic" that is equivalent to a unit root statistic against the homogenous alternative; the second is the "group mean statistic" that is analogous to the panel unit root test against the heterogeneous alternative. Pedroni (2004) argued that the "panel statistic" can be constructed by taking the ratio of the sum of the numerators and the sum of the denominators of the analogous conventional time series statistics. The "group mean statistic" can be constructed by first computing the ratio corresponding to the conventional time series statistics, and then computing the standardized sum of the entire ratio over the N dimension of the panel. This paper uses two panel co-integration tests as suggested by Pedroni (1999, 2004), namely the "panel ADF statistic" and "group mean ADF statistic". The two versions of the ADF statistics could be defined as:

Panel
$$Z_t = (\tilde{s}_{NT}^2 \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{e}^2{}_{i,t-1})^{-1/2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{e}_{i,t-1} \Delta \hat{e}_{I,T} \quad (7)$$

Group Mean
$$N^{-1/2} Z_T = N^{-1/2} \sum_{i=1}^{N} (\sum_{t=1}^{T} \hat{s}_i \hat{e}_{i,t-1}^2)^{-1/2} \sum_{t=1}^{T} \hat{e}_{i,t-1} \Delta \hat{e}_{i,t} \quad (8)$$

Where $\hat{e}_{i,t}$ represents the residuals from the ADF estimation, $\tilde{s}_{NT}$ is the contemporaneous panel variance estimator, and $\hat{s}_i$ is the standard contemporaneous variance of the residuals from the ADF regression. The asymptotic distribution of panel and group mean statistics can be expressed in:

$$\frac{K_{N,T} - \mu\sqrt{N}}{\sqrt{v}} \Rightarrow N(0,1)$$

Where $K_{N,T}$ is the appropriately standardized form for each of statistics, μ m ADF regression is the mean term and v is the variance adjustment term. Pedroni provides Monte Carlo estimates of μ and v (Pedroni, 1999).

These statistics are based on the estimated residuals from the following regression:

$$\ln(ED)_{i,t} = v_i + \vartheta_i \ln(GDP)_{i,t} + \delta_i \ln(ME)_{i,t} + \xi_{i,t}$$

Where $\xi_{it} = \eta_i \xi_{i(t-1)} + \mu_i$ are the estimated residuals from the panel regression. The null hypothesis tested is whether η_i unity is. The finite sample distribution for the test statistics have been tabulated in Pedroni (2004) using Monte Carlo simulations, if the test statistic exceeds the critical values in Pedroni (2004), the null hypothesis of no cointegration is rejected, implying the variables are cointegrated.

Panel Long-run Relationship: If long-run relationship among the variables were found then the long-run and short-run coefficients of economic growth and military expenditure on external debt will be estimated. To estimate the long-run effect of economic growth and military expenditure, the panel FMOLS, proposed by Pedroni (2000) and DOLS developed by Stock and Watson (1993) have been used.

Results and Discussion

To test whether each of ED, GDP and ME contain a panel unit root, the panel unit root tests proposed by Levin, Lin and Chu Test (2002), Im, Pesaran & Shin (2003) and Maddala & Wu (1999) have been applied. The results are reported in Table 2 where they are divided into three panels. Panel A consists of results from the Levin, Lin and Chu (2002); panel B consists of the results from the Im, Pesaran & Shin (2003) test and panel C consists of results from the Maddala and Wu (1999) test. For each of these tests, *, ** and *** indicates the statistical significance at 1

percent; 5 percent and 10 percent respectively. The results from all three tests, with or without linear trends; suggest that ED, GDP and ME contain a panel unit root as mentioned in Table 2.

Table 2. Panel Unit Root Test

	Levels		First Differences	
	Individual Effects	Individual Effects and Linear Trends	Individual Effects	Individual Effects and Linear Trends
Panel A: Levin, Lin, Chu Test (2002) Variables (in logs)				
ln(ED)	2.807	2.118	-1.400***	-1.580***
ln(GDP)	2.448	1.725	-1.621**	-1.812**
ln(ME)	-0.432	0.022	-4.294*	-3.827*
Panel B: Im, Pesaran, Shin Test (2003) Variables (in logs)				
ln(ED)	3.664	2.712	-1.815**	-2.495*
ln(GDP)	-0.846	0.356	-3.586*	-3.201*
ln(ME)	-0.071	0.352	-3.256*	-2.665*
Panel C: Maddala and Wu (1999) Variables (in logs)				
ln(ED)	0.015	1.985	20.712**	21.321**
ln(GDP)	12.285	8.253	38.361*	32.170*
ln(ME)	10.234	6.213	29.665*	27.424*

* indicates significance at the 0.01 level.
** Indicates significance at the 0.05 level.

To examine whether there is a long run relationship between the three variables for the panel of five selected SAARC countries, Pedroni's (2004) panel Phillips-Perron (1988) type rho-statistic and group Phillips-Perron (1988) type rho-statistic have been employed. The panel rho-statistic and group rho-statistic are 2.2 and 2.7, respectively and the associated one-sided p-value is less than 0.01. Thus, both test statistics suggest that there is panel cointegration between ED, GDP and ME at the 1% level of significance.

After finding that a long-run relationship exists between ED, GDP and ME, the long-run effect of GDP and ME on ED have been estimated using the panel FMOLS estimator suggested by Pedroni (2000) and panel DOLS estimator proposed by Kao & Chiang (2000). The results are reported in Table 3.

Table 3. Panel Long-run Elasticity

Panel Methods	ln(ME)	ln(GDP)
DOLS	1.182	-0.638
	(8.337)*	(-11.783)*
FMOLS	1.243	-0.796
	(3.210)*	(-3.974)*

Note: Figures in parenthesis are t-statistics. * denote statistical significance at the 1 % level.

For the DOLS estimator, 1% increase in economic growth decreases external debt by 0.638 %, while a 1% increase in military expenditure increases external debt by 1.18%. Both results are statistically significant at the 1% level. On the other hand, for the FMOLS estimator the coefficient on GDP is 0.796, suggesting that a 1% increase in growth (GDP) decreases external debt by 0.80%. The coefficient of military expenditure (ME) is 1.243, which implies that a 1% increase in military expenditure increases external debt by almost 1.24%.

The results for the short-run impact of economic growth and military expenditure on external debt for the panel of five selected SAARC countries are reported in Table 4.

Table 4. Panel Short-run Elasticities

Variables	Coefficient	t-statistics
Constant	9.452	19.528*
$\Delta_{\ln(ME)}$	0.149	6.102*
$\Delta_{\ln(GDP)}$	-0.471	-3.761*
ECT_{t-1}	-0.092	-2.183**
Goodness of fit: R^2 = 0.84; $\overline{R}^2$ = 0.81		

Note: *, ** and *** denotes statistical significance at 1, 5 and 10 % level.

Table 4 indicates that economic growth has a negative impact on external debt while military expenditure has a statistically significant positive impact on external debt in the short-run. The coefficient of the military expenditure is 0.149, suggesting that a 1% increase in military expenditure increases external debt by 0.15% respectively. On the other hand, GDP decreases external debt by almost 0.47%. The one period lagged error correction term, which measures the speed of adjustment to equilibri-

um following a shock to the system, has a negative sign and is statistically significant at the 5% level. Its sign and significance level suggests that external debt is able to revert to its equilibrium following a shock to growth and military expenditure. But, the magnitude of the coefficient, because it is very small, suggests that the speed of adjustment to equilibrium is very slow.

Overall military expenditure has a positive and significant impact on SAARC external debt in the short and long-run. The relationship is elastic in the long-run, but inelastic in the short-run.

Conclusion

In this paper a short term and long term impact of military expenditure and economic growth the external debt for five selected SAARC countries; namely, Bangladesh, India, Nepal, Pakistan and Sri Lanka has been examined using data for the period 1988-2008 by applying panel unit root and panel cointegration framework. It was found that the external debt, economic growth and military expenditure were cointegrated for the panel of five SAARC countries. In the long-run, both estimators (DOLS and FMOLS) suggest that economics growth has a statistically significant negative effect on external debt, while military expenditure has a statistically significant positive effect on external debt. Using DOLS estimator, it was found that 1% increase in economic growth decreases external debt by 0.638 %, while a 1% increase in military expenditure increases external debt by 1.18%. Both results are statistically significant at the 1% level. On the other hand, using FMOLS estimator, it was found that 1% increase in growth (GDP) decreases external debt by 0.796%. While 1% increase in military expenditure increases external debt by almost 1.24%.

In the short-run it was found that economic growth and military expenditures have a statistically significant negative and positive effect on external debt. In short run it was found that 1% increase in military expenditure increases external debt by 0.15% while 1% increases growth (GDP) decreases external debt by almost 0.47%.

One important limitation on our finding is that, from an econometric perspective, the small panel (T=21, N=5) is only sufficient to accommodate two explanatory variables without a substantial loss in power. Future studies for the South Asia as well as other regions in the world could include more potential determinants of external debt within a panel cointegration framework subject to an increase in data availability.

References

Asian Development Bank (2008). Asian Development Outlook, Asian Development Bank. Available Online at: http://www.adb.org/Documents/Books/ADO/2008/ Update/default.asp accessed on May 2, 2010

Abu-Badar, S. & Aamer S. Abu-Qarn, (2003). Government expenditures, military spending and economic growth: causality evidence from Egypt, Israel, and Syria, *Journal of Policy Modeling, 25(6-7): 567-583.*

Aizenman, J. and Glick, R. (2006). Military expenditure, threats and growth, *Journal of International Trade and Economic Development, 15(2), 129-155.*

Antonakis, N. (1997). Military expenditure and economic growth in Greece, 1960-1990, *Journal of Peace Research, 34(1): 89-100.*

Benoit, E. (1973.). Defense and Economic Growth in Developing Countries. Lexington: Lexington Books.

Benoit, E. (1978). Growth and defense in developing countries, *Economic Development and Cultural Change, 26(2): 271-280.*

Chletsos, M. & Kollias, C. (1995). The demand for Turkish military expenditure 1960-1992', *Cyprus Journal of Economics, 8(1): 64-74.*

Dakurah, A.H., Davies, S.P. and Sampath, R.K. (2000). Defense spending and economic growth in developing countries: a causality analysis, *Journal of Policy Modeling, 23, 651-658.*

Deger, S. (1986). Economic development and defense expenditure, *Economic Development and Culture Change, 35,179-196.*

Deger, S. and Smith, R. (1983). Military expenditure and growth in LDCs, *Journal of Conflict Resolution, 27(2),335-353.*

Deger, S. and Sen, S. (1983). Military expenditure, spin-off and economic development, *Journal of Development Economics, 13, 67-83.*

DeRouen, K. (2000). The Guns-Growth relationship in Israel*, Journal of Peace Research*, 37(1): 69-83.

Dunne, J. Paul & Mohammed, Nadir A. L. (1995). Military spending in Sub-Saharan Africa: some evidence for 1967-1985, *Journal of Peace Research*, 32(3): 331-343.

Dunne, J. Paul; Nikolaidou, E & Smith, R.P. (2002). Military spending, investment and economic growth in small industrializing economies, *The South African Journal of Economics*, 70(5): 1-27.

Economic Survey of Pakistan (2008-09). Finance division, economic advisor's wing, Government of Pakistan, Islamabad.

Faini, R., Annez, P. and Taylor, L. (1984). Defense spending, economic structure and growth: evidence among countries and over time, *Economic Development and Culture Change, 32, 487-498.*

Hassan, M.K., Waheeduzzaman, M. and Rahman. A. (2003). Defense expenditure and economic growth in the SAARC countries, *The Journal of Political, Social and Economic Studies, 28(3), 275-293.*

Heo, Uk, (1998). Modeling the defence-growth relationship around the globe, *Journal of Conflict Resolution*, 42(5): 637-657.

IFS (2008). International Financial Statistics 2008, International Monetary Fund, Washington, available at: http://www.imfstatistics.org/imf. Accessed on April 30, 2010

Im, K. S., M. H. Pesaran and Y. Shin (2003). Testing for unit roots in heterogeneous panels. *Journal of Econometrics* 115, 53-74.

Kao, Chihwa and Min-Hsien Chiang (2000). On the estimation and inference of a cointegrated regression in panel data, *Advances in Econometrics, 15: 179-222.*