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The Dynamics between Government Debt and Economic Growth in South Asia: A Time Series Approach

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Abstract: Increasing government debt is one of the key economic issues in South Asia. An understanding in short run and long run dynamics between government debt and economic growth is essential. This article investigates such dynamics over the last two decades. The results of an autoregressive distributed lag analysis (ARDL) bounds test suggests a negative long run relationship between the two variables in Sri Lanka, India, Pakistan, Nepal and Bhutan. A significant negative short run relationship is found only for Pakistan. Therefore the government debt reduction would be a promising public policy in improving economic growth in the region.

Keywords: Government debt, Economic Growth, ARDL, South Asia

JEL Classification Number: *E62, F43, H63, O40*

1. Introduction

South Asia includes some of the world's highly populated developing countries in the world. Over the years the region has confronted various economic and social issues including high poverty, political instability and lower living standards. One of the main challenges of the twenty-first century is the high level of indebtedness. Most South Asian economies are functioned by the external debt support from the World Bank, International Monetary Fund (IMF), Asian Development Bank and other regional economic power houses such as China and Russia. Over the years, the South Asian countries have failed to collect the required revenues to finance their budget (Akram, 2013). As a result, most of the development activities are funded by external and domestic debt. Therefore they experience higher budget deficits and increased political and financial pressures from lenders. For an example, Sri Lanka heavily depends on the funds from the IMF and the World Bank. As a result, it has to follow austere regulations imposed by the World Bank and the IMF, which create frequent political and social instability. Moreover, Sri Lanka has financially and politically moved away from its long time regional friend, India, to gain more financial support from the emerging powerhouse, China. This has laid the substance for moderate political unrest between the two countries.

The relationship between government debt and economic growth is extremely important in the policy formulation. Should countries look for short run captivations from initial

spending of increased debt or should they take the necessary steps to overcome the effects of growing indebtedness on economic growth? This paper provides the answers for this important issue by analyzing the long and short run relationship between government debt and economic growth in South Asian countries.

The structure of the paper is as follows. The section 2 provides a literature review. The section 3 provides a brief description of government debt and economic growth in South Asia. Section 4 describes the data and methodology. Section 5 presents the results and section 6 provides conclusions and policy implications.

2. Literature Review

The literature on the long run relationship between government debt and economic growth in a time series perspective for South Asia is scare. It is almost non-existent for Nepal and Bhutan. Some of the research on South Asia can be presented as follows. Khanous and Bari (2001) concluded that the foreign resource inflow increased the resource availability and therefore the economic growth in South Asia. Siddiqui and Malik (2001) concluded that given the rising debt burden, Pakistan should make significant policy changes to reduce its dependence on foreign debt and make promising efforts to mobilize domestic resources to achieve this goal. Singh (1999) investigated the nexus between the economic growth and government debt for the period 1959-1995 for India. The Engle-Granger causality test suggested no causality between the two variables. Fonseka and Ranasinghe (2008)found that the debt servicing cost and public debt have increased over time in Sri Lanka. They recommended reducing government expenditure as a short-term solution for this problem. One of the preliminary works for Nepal finds significantly positive impact of fiscal deficit and public debt on economic growth, investment, government expenditure and government revenue both in the long run and short run (Bista, 2014). Sharma in 2009 recommends the Nepali government in improving quality of the public debt allocation in capital and recurrent expenditure as it increases the production capacity and economic growth.

3. Data and Methodology

The quarterly data for the government debt to GDP and real GDP growth rate from 1990 to 2013were obtained from the State Bank of Pakistan, Nepal Rasta Bank, Central Bank of Sri Lanka, Bangladesh Bank, World Bank Development Indicators and Trading Economics. The order of integration of the variables is detected from an Augmented Dickey-Fuller Test (ADF) (Dickey &Fuller, 1981) and Phillip and Perron Test (PP) (Phillip &Perron, 1988). The ADF test is performed using the following equation.

$$dX_t = \alpha_1 + \beta_1 X_{t-1} + \sum_{i=1}^{n} \delta_1 dX_{t-i} + e_{1t} \quad (1)$$

The PP test is as follows:

$$\Delta X_t = \gamma_2 + \beta_2 X_{t-1} + \theta \left(t - \frac{T}{2} \right) + \sum_{i=1}^{m} \mu_i \Delta X_{t-i} + e_{2t} \quad (2)$$

Where "X_t" is a time series variable, "d" is the difference operator, $\alpha_1, \beta_1, \gamma_2$ $and \beta_2$are coefficients and e_{1t} and $e_{2t}$are the covariance stationary random error. If the variables are integrated at different levels, I(0) and I(1), then the autoregressive distributed lag model is used for the long run relationship (Pesaran etal, 2001). The lags for the ARDL test areobtainedfrom a VAR criterion. The ARDL bound test is as follows:

$$d(GDP_t) = \alpha_0 + \alpha_{GDP} GDP_{t-1} + \alpha_{Debt} Debt_{t-1} + \sum_{i=1}^{n} \alpha_i d(GDP)_{t-i} + \sum_{j=0}^{m} \alpha_j d(Debt)_{t-j} + \varepsilon_{it} \quad (3)$$

$$d(Debt_t) = \beta_0 + \beta_{GDP} GDP_{t-1} + \beta_{Debt} Debt_{t-1} + \sum_{i=0}^{n} \beta_i d(GDP)_{t-i} + \sum_{j=1}^{m} \beta_j d(Debt)_{t-j} + \varepsilon_{jt} \quad (4)$$

Where "GDP" is a proxy foreconomic growth rate, "Debt", the "government debt as a percentage of GDP". The error terms are assumed to be white noise. The optimal lags are fromAkaike information criteria (AIC).

The long run relationship is determined from the hypothesis:

H_{Null}=There is no cointegration and $H_{Alternative}$ = There is cointegration

The null and alternative hypotheses for the above two equations are:

$$H_{null\ (1)}: \alpha_{Gdp} = \alpha_{Debt} = 0, H_{null\ (2)}: \beta_{Gdp} = \beta_{Debt} = 0 \text{ and}$$

$$H_{Alternative\ (1)}: \alpha_{Gdp} \neq \alpha_{Debt} \neq 0, H_{Alternative\ (2)}: \beta_{Gdp} \neq \beta_{Debt} \neq 0.$$

If the calculated F value of the model is greater than the upper bound, we reject the null hypothesis and conclude a cointegration or a long run relationship between the variables.If the F statistic is below the lower bound, the null hypothesis will not be rejected. If the F statistic is between the lower bound and the upper bound, then the results are inconclusive (Pesaran et al., 2001). An Error Correction Model (ECM) is used for the short run dynamics.

$$d(GDP_t) = \theta_0 + \sum_{i=1}^{n} \theta_i d(GDP)_{t-i} + \sum_{j=1}^{m} \theta_j d(Debt)_{t-j} + \upsilon_1 ECM_{t-1} + \mu_{it} \quad (5)$$

$$d(Debt_t) = \gamma_0 + \sum_{i=1}^{n} \gamma_i d(GDP)_{t-i} + \sum_{j=1}^{m} \gamma_j d(Debt)_{t-j} + \upsilon_2 ECM_{t-1} + \mu_{jt} \quad (6)$$

Where ECM_{t-1} is the lagged error correction term,$\mu_{it}$and μ_{jt} are serially independent random errors with finite covariance and zero mean. The estimates of $\upsilon_1$and υ_2 indicate the speed of adjustment. A Granger causality test (Engle &Granger 1987) is performed for the causality analysis.

4. Results

According to Table 1, the ADF test suggests that the variables are not stationary at their levels for all countries at 5% level. However the GDP growth rate is stationary at its first difference for all countries. The government debt to GDP ratio indicates I(1) for Nepal. The PP test indicates that the GDP growth rate is both I(0) and I(1) for all countries. However, the government debt to GDP ratio is only an I(1) for all countries. The results of the PP test are more reliable as it provides robust estimates given the structural breaks, time dependent heteroscedasticity and serial correlation (Culver and Papell, 1997). Due to different order of integration, an ARDL bound test is used to obtain the long run relationship.

Table 1: ADF and PP Unit Root Results

Country	Variable	ADF_Test				PP_Test			
		Level		1st Difference		Level		1st Difference	
		c	c+t	c	c+t	c	c+t	c	c+t
Sri Lanka	GDP_Growth	-2.197	-2.361	-3.766*	-3.687*	-3.210*	-3.352*	-5.728**	-5.683**
	Debt_to_GDP	-2.108	-2.604	-1.877	-1.81	-0.813	-1.608	-4.933**	-4.895**
Pakistan	GDP_Growth	-2.112	-2.89	-3.854*	-3.832*	-2.676*	-2.669*	-5.523**	-5.493**
	Debt_to_GDP	-1.264	-2.521	-2.459	-2.519	-0.834	-1.6	-4.429**	-4.434**
India	GDP_Growth	-2.38	-3.339	-4.920*	-4.884*	-3.172*	-3.549*	-5.646*	-5.594*
	Debt_to_GDP	-2.255	-2.687	-2.491	-2.406	-1.571	-1.645	-4.957*	-3.452*
Nepal	GDP_Growth	-2.596	-2.57	-5.631*	-5.583*	-3.612*	-3.688*	-5.685**	-5.641**
	Debt_to_GDP	-0.028	-1.698	-4.814*	-4.694*	-0.618	-4.059	-5.299**	-5.236**
Bhutan	GDP_Growth	-2.541	-2.923	-4.016*	-4.054*	-4.208*	-4.735*	-5.886**	-5.806**
	Debt_to_GDP	-0.899	-2.883	-2.064	-2.231	-0.378	-2.048	-5.183**	-5.394**
Bangladesh	GDP_Growth	-1.721	-3.076	-3.076*	-3.041	-3.053*	-4.539**	-5.659**	-5.553**
	Debt_to_GDP	-0.866	-2.702	-2.871	-2.81	-0.565	-2.838	-5.461**	-5.444**

Note: * and ** indicate significance at 5 and 1 percent levels respectively.

Table 2: ARDL Bound Test Results

Country	F Stat. of $GDP_t = f(DEBT_t)$	Country	F Stat. of $GDP_t = f(DEBT_t)$
Sri Lanka	10.978**	Nepal	11.199**
Pakistan	9.595**	Bhutan	9.552**
India	10.724**	Bangladesh	6.352*

Note: ** and * indicate significance at 1% and 5% levels. At 1% - Upper_Bound: 7.84, Lower_Bound: 6.84 and at 5% – Upper_Bound: 5.73, Lower_Bound: 4.94).

According to Table 2, the F statistics for all countries except Bangladesh are greater than the upper bound critical value of 7.84 at 1% level. Therefore the existence of the long run relationship between the GDP growth rate and the Debt to GDP ratio is confirmed. For Bangladesh, a significant long run relationship is observed at 5% significance level. According to the results of ECM model in Table 3, a negative short run relationship between economic growth and government debt is found for Pakistan at 5% level. Bangladesh shows a positive and significant short run relationship between the two variables. These results intensify the need of a causality analysis between variables. According to causality results in Table 4, for Pakistan, the null hypothesis of "GDP Growth rate does not Ganger Cause Debt to GDP ratio" can be rejected at 1% significance level. Therefore we can conclude a unidirectional causality directing from GDP growth rate to Debt to GDP ratio for Pakistan. In addition, significant bidirectional causality is detected for India at 5% significant level. Moreover the stability tests of the long run models are provided in Figure 1.

Table 3: The Error Correction Model Results

Country	Variable	Coefficient
Sri Lanka	EC(-1)	-0.230*
	d(Debt_to_GDP(-1))	-0.06
	Constant	-0.019
Pakistan	EC(-1)	-0.171*
	d(Debt_to_GDP(-1))	-0.131*
	Constant	-0.026
India	EC(-1)	-0.193*
	d(Debt_to_GDP(-1))	-0.155
	Constant	0.007
Nepal	EC(-1)	-0.235*
	d(Debt_to_GDP(-1))	0.028
	Constant	0.01
Bhutan	EC(-1)	-0.211*
	d(Debt_to_GDP(-1))	0.004
	Constant	-0.02
Bangladesh	EC(-1)	-0.137*
	d(Debt_to_GDP(-1))	0.088*
	Constant	0.02

Note: * indicates significance at 5 percent level.

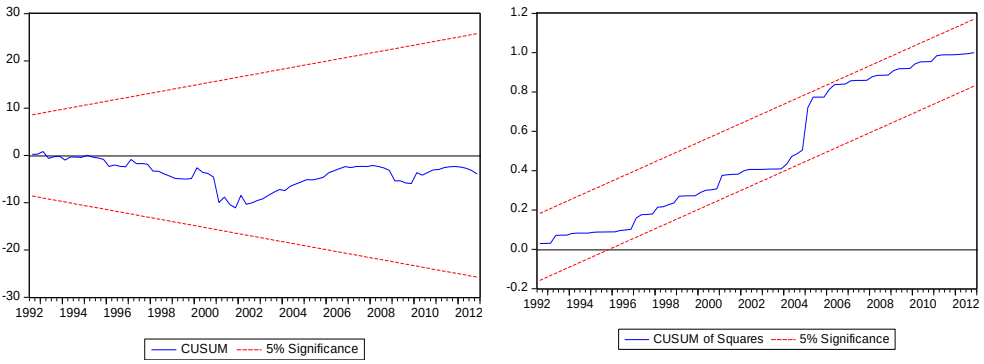
Table 4: Granger Causality Test Results

	Null Hypothesis	F-Statistics	Probability
Sri Lanka	GDP_Growth_ratedoesn not Ganger Cause Debt_to_GDP	0.374	0.542
	Debt_to_GDPdoes notGranger Cause GDP_Growth_Rate	0.443	0.507
Pakistan	GDP_Growth_ratedoes notGanger Cause Debt_to_GDP	27.245*	1.00E-06
	Debt_to_GDPdoes notGranger Cause GDP_Growth_Rate	2.909	0.092
India	GDP_Growth_ratedoes notGanger Cause Debt_to_GDP	4.770*	0.032
	Debt_to_GDPdoes notGranger Cause GDP_Growth_Rate	10.811**	0.002
Nepal	GDP_Growth_ratedoes notGanger Cause Debt_to_GDP	0.072	0.789
	Debt_to_GDPdoes notGranger Cause GDP_Growth_Rate	0.374	0.542
Bhutan	GDP_Growth_ratedoes notGanger Cause Debt_to_GDP	0.563	0.455
	Debt_to_GDPdoes notGranger Cause GDP_Growth_Rate	0.167	0.684
Bangladesh	GDP_Growth_ratedoes notGanger Cause Debt_to_GDP	0.215	0.807
	Debt_to_GDPdoes notGranger Cause GDP_Growth_Rate	1.149	0.322

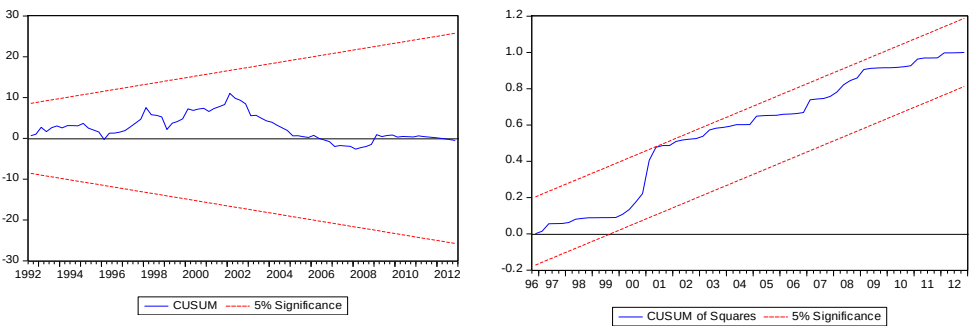
Note: * and ** indicate significance at 5 percent and 1 percent levels respectively.

Figure 1: CUSUM and $CUSUM_{SQ}$ Stability Test Results

Sri Lanka



Pakistan



India

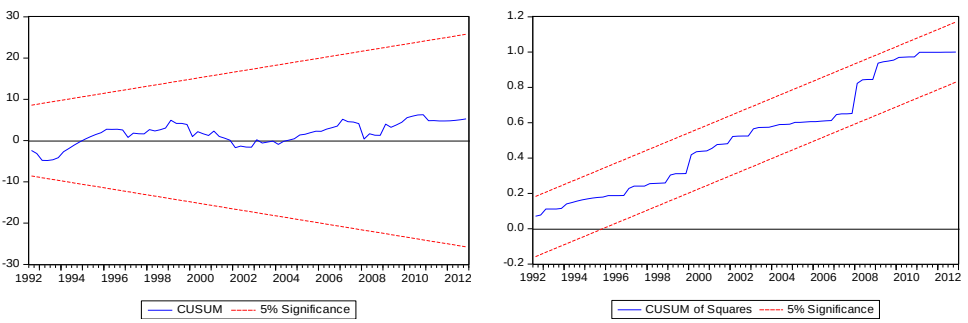
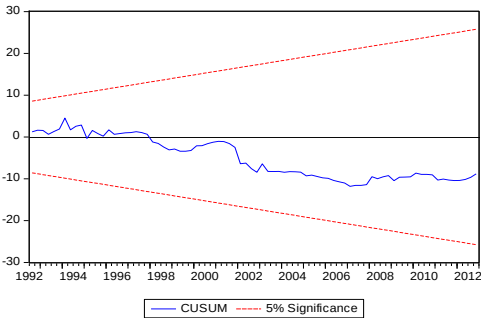
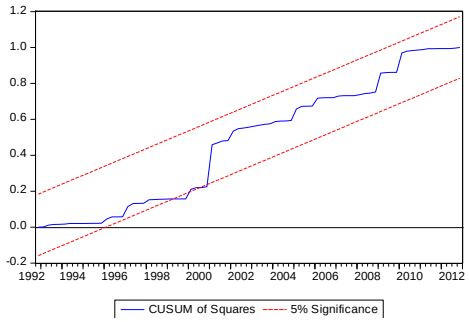


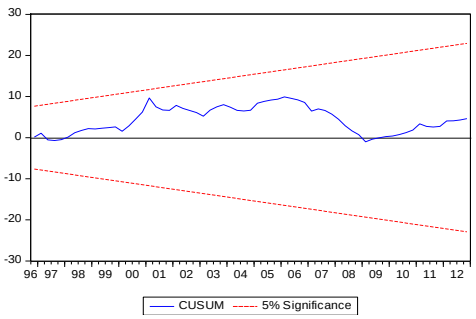
Figure 1 continued

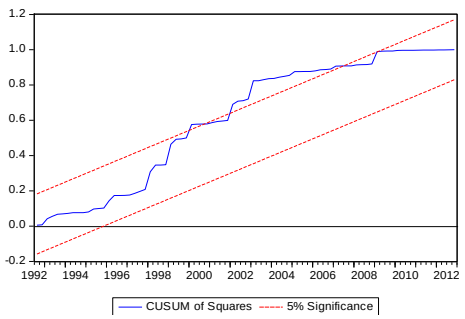
Nepal



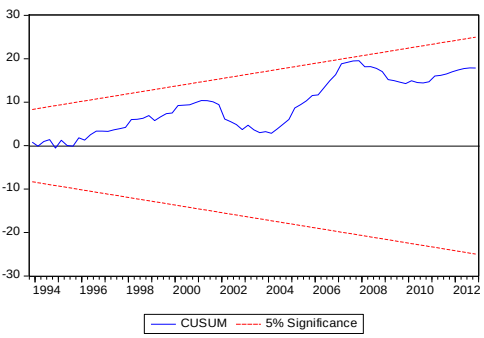


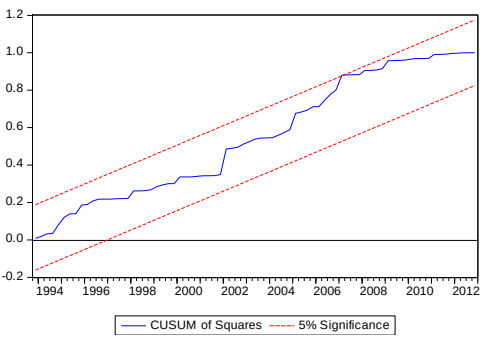
Bhutan





Bangladesh





5. Conclusion and Policy Implications

This study uses an ARDL bounds test and an ECM to examine the long run and short run relationship between government debt and economic growth in South Asia. Empirical results suggest a negative long run relationship between government debt and economic growth for Sri Lanka, Pakistan, India, Nepal and Bhutan. Bangladesh shows a significant and positive relationship for long run. In general, South Asian economies rely on both foreign and domestic borrowings. These funds are obtained at higher interest rates and are mismanaged by inefficient political systems. As a result, the development has had sub-par outcomes including further borrowings to manage the increasing debt servicing costs which result prolonged economic downturns. Therefore, in the long run, these countries should explore different funding sources. A negative and significant short run effect from government debt to economic growth is seen for Pakistan. The macro and political inequities in Pakistan may have exacerbated the debt burden. Therefore Pakistan needs to undertake significant fiscal and monetary policy reforms such as increased tax revenues, efficient resource management and stable political environment to mitigate the existing debt burden. Sri Lanka is going through a substantial economic expansion after its 20-year-old civil war. It was recognized as one the fastest growing emerging markets in the world in 2010. However, most of these projects are primarily funded by excessive borrowings from foreign financial markets as the weak tax administration results limited government revenue. According to our findings, the high dependence on government debt will not benefit Sri Lanka in the long run as the government debt negatively influences its long run economic growth. Therefore, the policy makers may explore possible ways in improving its tax system and finding alternative funding sources for its development process.

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