Relationship between budget deficit and economic growth: Evidence from Sri Lanka

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Introduction

Budget deficit (BD) is one of the major macroeconomic factors, which has various impacts on economic growth as well as other macroeconomic variables. At the same time economic growth and other macroeconomic variables also have an impact on BD. BD is considered as a reliable and valid fiscal policy measurement but it is not adequate to estimate the impacts of fiscal policy (Fisher, 1993). Basically BD means where the government expenditure exceeds its revenue or inability to collect tax revenue from the economic agents (Ahmad, 2012).

Government finances BD by using both domestic and international sources. This is a burden not only for current generation but future generation as well. Ricardian Equivalence indicates if the current generation receives the tax cut the future generations should bear the burden of repaying it. BD is a main problem for under developing countries. Sri Lanka is one of the lower middle income earning countries struggling with the BD problem. Data reflect that Sri Lanka is one of the lower tax revenue earning countries in the world and tax to Gross Domestic Product (GDP) ratio has been declining over time.

In 1978 tax to GDP ratio was to 24.2 percent and it declined to 12.4 percent by 2016 (Central Bank of Sri Lanka, 2016). Sri Lankan government continuously enhance the expenditure rather than collecting revenue. Hence the Sri Lankan government has been advised to reduce the BD to 3.5 percent of GDP in 2020 and public debt to 70 percent of GDP by 2020 in order to stabilize good macroeconomic environment and sound fiscal policy in the country. BD reduces the national saving; compare to other developing countries Sri Lanka has recorded a very minimum level of average saving which was 23.8 percent of GDP in 2016 (Central Bank Report, 2016). Lower savings discourage economic performance of the country due to the shortage of investment. On the other hand Ricardian Equivalence indicates that a deficit caused by a tax cut will not affect consumption therefore it will not affect national saving.

Literature shows that BD has a different impact on economic growth. According to the Keynes there is a positive relationship between BD and economic growth (Bose et al., 2007) similarly Neo-Classical economists had identified there is an inverse relationship between BD and economic growth (Fischer, 1993; Bevan,

2005; Fatima, 2011) while the Ricardian says there is a neutral relationship between BD and economic growth (Ahmad, 2012; Velnampy & Achchuthan, 2013). Furthermore, a Mondel-Fleming framework which argued that an increase in the BD would induce upward pressure on interest rates, causing capital inflows and an appreciation of the exchange rate that will increase the current account deficit.

There are number of empirical studies also analyze the relationship between BD and economic growth. Scholars such as Bose et al. (2007) and Odhiambo et al. (2013) confirmed there is a positive relationship between BD and economic growth which are supported with Keynesian theory. Neo-Classical theory tested by several academic studies. Fischer (1993) and Bevan (2005) found there is a negative impact of BD on economic growth. Moreover Bose (2007) and Ahmad (2012) identified there is a neutral relationship between BD and economic growth.

In Sri Lanka, a very few of studies analyzes the relationship between BD and economic growth in Sri Lanka. Study of Velnampy and Achchuthan (2013) found out there is a neutral relationship between BD and economic growth which followed the Ricardian approach. In contrast the study by Aslam (2016) which found positive relationship between BD and economic growth supported with Keynesian theory of positive relationship. Similarly, there is no sufficient studies which addressed the linkages between BD and economic growth in the context of Sri Lanka. Moreover, the impact of BD on economic growth in Sri Lanka remains scantly researched in recent time and it is widely debating issue. Thus, this study attempts to examine the relationship between BD and economic growth in Sri Lanka. The objective of this study is to investigate the relationship between BD and economic growth in Sri Lanka during the period of 1978 to 2016.

Methodology

The study has used the time series data collected from World Bank and Central Bank during the period of 1978 to 2016. Agmented Dickey Fuller, Phillips Peron and Ng-Perron unit root tests were applied to check out the stationary properties of the data. Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), Sequential modified LR tests statistics were adapted to determine the optimal lag length. The granger causality test was employed to find out the causal relationship while Johansen cointegration test captured the number of cointegrating relationships.

$$RGDP_t = \pi_0 + \pi_1 BD_t + \pi_2 FDI_t + \pi_3 CPI_t + \pi_4 TO_t + u_t \quad (1)$$

Where, RGDP: Real Gross Domestic Product, BD: Budget deficit, FDI: Foreign Direct Investment, CPI: Consumer Price Index, TO: Trade Openness and u_t is the white noise error term.

Above model was developed based on the empirical studies such as Ahamad (2012) and Fathima et al. (2011). Error correction model (ECM) used to identify the short-run and long-run relationship as well as long-run equilibrium of the model. The model is given below:

$$\Delta Y_t = \delta_0 + \Psi Y_{t-1} + \sum_{i=1}^{p-1} \Upsilon_i^* \Delta Y_{t-i} + \varepsilon_t \quad (2)$$

Where, $\Psi = \alpha\beta'$. where, α: error correction term β': (1×5) vector of cointegrating coefficients, $Y_t = [RGDP_t, BD_t, FDI_t, CPI_t, TO_t]'$ vector of dependent variables, Y_{t-i}: lagged value of Y_t and ε_t: white noise error term.

Results and discussion

All three unit root tests (ADF, PP and Ng-Perron) applied to check the stationary properties of the data. The results of ADF and PP are reported in Table 1. Philliphs Peron unit root test confirmed that all the variables are stationary at their first difference with trend. Which suggesting that all variables considered under this study are integrated in order one PP test. Agmented Dickey Fuller and Philliphs Peron unit root test results are presented in Table 1.

Table 1 Results of ADF and PP Unit Root Test (With & Without Trend)

Variables	ADF				PP			
	Intercept		Trend & Intercept		Intercept		Trend & Intercept	
	Level	1st difference	Level	1st difference	Level	1st difference	Level	1st difference
RGDP	1.000	0.216	1.000	0.008	1.000	0.333	1.000	0.010
BD	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000
FDI	1.000	0.059	0.999	0.000	0.916	0.068	0.630	0.000
CPI	1.000	0.051	0.984	0.018	1.000	0.060	0.980	0.020
TO	0.304	0.064	0.773	0.000	0.313	0.062	0.779	0.000

Once, established the order of integration, the study process requires the estimation of the relationships among the included variables. However, before estimating this relationship need to identify the optimal lag length of the model. Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), Sequential modified LR tests statistics are adapted to determine the optimal lag length of the model. The lag length selection results are reported in Table 2.

All the lag length selection criteria suggest to use two lag as an optimal lag length for this study. Therefore two lags were included in this model. The trace statistics and maximum eigenvalue statistics of Johansen cointegration technique are detected to identify the cointegrating relations in the system of equation at 5 percent level of significance. The results of Johansen Co-integration test are presented in Table 3.

Table 2 Results of optimal lag length selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-3096.589	NA	4.69e+68	172.3105	172.5304	172.3873
1	-2906.922	316.1117	5.07e+64	163.1623	164.4819	163.6229
2	-2850.988	77.68546*	9.90e+63*	161.4438*	163.8631*	162.2882*

Note: ** indicates lag order selected by the criterion. LR: sequential modified likelihood ratio test statistic, FPE: final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion and HQ: Hannan Quinn information criterion test statistics*

Table 3 Results of Johansen Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.923497	189.0724	88.80380	0.0000
At most 1 *	0.784904	99.10752	63.87610	0.0000
At most 2 *	0.498115	45.32411	42.91525	0.0281
At most 3	0.359283	21.19566	25.87211	0.1713
At most 4	0.148217	5.614822	12.51798	0.5107

Johansen Cointegration Trace test statistics and Maximum Eigen value both are identified three co-integrating relations in the system of equation at 5 percent significance level since reject null hypothesis at rank 0, 1 and 2 but failed to reject null hypothesis at rank 3. This indicates the existence of long-run equilibrium. Therefore Vector Error Correction Model (VECM) was used.

Results of Johansen Cointegration Equation is as follows.

$$\begin{aligned} RGDP_t = \; & -6.060563BD_t \; + \; 6.985596FDI_t \\ & (0.82368) \qquad (3.62490) \\ & [-7.35791] \qquad [1.9271] \end{aligned}$$

Note: t-statistics are given in the square brackets

First, the results of Johansen Cointegration in long run identified three co-integrating relations; which confirmed the long-run relationship among the variables. It shows that increase in BD has a negative and significant long-run relationship on RGDP. This followed the Neo classical approach whereas BD negatively and significantly affects the RGDP of the country.

Table 4 Results of Granger Causality Test

Null hypothesis	obs	F-Statistics	Probability
BD does not Granger Cause RGDP	36	1.81143	0.1803
RGDP does not Granger Cause BD		1.35261	0.2734
CPI does not Granger Cause BD	36	1.82774	0.1853
BD does not Granger Cause CPI		5.04058	0.0314
BD does not Granger Cause FDI	36	6.12980	0.0057
FDI does not Granger Cause BD		19.2350	0.0004

The Granger Causality test was employed to find out the causal relationship between BD and economic growth in Sri Lanka. The results of Granger Causal Test are presented in Table 4. The results indicate that some of the variables are having a causal relationship between BD; especially the results show that RGDP does not granger cause with BD and BD does not granger cause with RGDP because null hypothesis rejected at 0.05 significance level. Therefore BD and RGDP do not granger cause with each other. But there is a bi-directional causality is running from BD to foreign direct investment and foreign direct investment to budget deficit and there is a unidirectional causality running from BD to CPI.

Table 5 Results of ECM long run equilibrium

	D(RGDP)	D(BD)	D(FDI)	D(CPI)	D(TO)
Cointegrating Equation 1	-0.197575	0.025997	0.048908	2.25E-05	1.54E-12
	(0.24846)	(0.05555)	(0.02478)	(8.6E-06)	(7.1E-13)
	[-0.79519]	[0.46799]	[1.97406]	[2.61719]	[2.15828]

Note: *t-statistics are given in the square brackets*

Generally the coefficient of speed of adjustment explains how the model is adjusted towards long-run equilibrium. Table 5 illustrates that the coefficient of speed of adjustment of RGDP is negative as expected which is not statistically significant at level of significance. This indicates that the external shocks do not bring the model to equilibrium significantly in the long-run. Since speed of adjustment coefficient of the dependent variable (RGDP) is negative, independent variables (BD, FDI, CPI, TO) coefficient of speed of adjustment should have positive sign to bring the model to long run equilibrium. But in here there is no any adjustment towards long-run equilibrium between BD and economic growth in Sri Lanka. But other macroeconomic variables have adjustment towards long-run equilibrium. The short run part of the results of ECM shows that BD has a negative and significant short-run relationship with RGDP and this result followed the Neo classical approach which indicates that the BD has a negative impact on RGDP.

Conclusion

The results of Johansen cointegration reveal that budget deficit have a negative and significant long-run relationship with Real Gross Domestic Product (RGDP) and this result followed the Neo classical theoretical approach. The granger causality test found out that the RGDP does not granger cause with budget deficit and budget deficit does not granger cause with RGDP. There is no any adjustment towards long-run equilibrium between budget deficit and economic growth in Sri

Lanka. The results also suggested there is a negative and significant short-run relationship with RGDP and budget deficit.

This study confirms that the budget has a negative and statistically significant impact on economic growth in Sri Lanka. Government expenditure was expanded dramatically rather than the government tax revenue due to the economic and social infrastructure development progress of Sri Lanka in last decade. Therefore the government incurs budget deficit and it finances by using both domestic and international sources. This is a burden (loans + interests) not only for current generation but future generation as well. Moreover excessive domestic borrowing by the government pushup interest rate and crowed out the private investment from the county also it accumulate the public debt and fear that the government may resort to money printing or seignior age leads inflation tax. Therefore this study concludes budget deficit has a negative an impact on economic growth in Sri Lanka. This finding is supported by both theoretical (Neo classical theory) and empirical studies (e.g., Fischer, 1993; Bevan, 2005).

Keywords: *Budget deficit, cointegration, economic growth, gross domestic product.*

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