Dynamics of Public Debt Sustainability and Economic Growth: The Case of Sri Lanka

Rathnasiri, R. A.[1*], and Soysa, J. S. V. N. T[2]

[1]*Department of Banking and Finance, Wayamba University of Sri Lanka*

[2]*Institute of Human Resource Advancement, University of Colombo, Sri Lanka*

**Corresponding author:*
Email: rathnasiri76@gmail.com

ABSTRACT

Over the past decades, most of the developing nations in the world have to face a critical issue of rising public debt. In Sri Lanka, public debt has increased to a higher level during the post liberalization period. Debt can be influenced economic growth and general welfare of the public only it is used properly without transferring additional burden on public. Therefore, it is beneficial to evaluate the short run and long run effect of debt on economic growth and its sustainable level. Hence, this study examines the dynamics of debt sustainability and the impact of public debt on economic growth in Sri Lanka using annual time series data for the period 1960-2018. This study uses deductive research approach and the model framework develops based on the literature. This study adopts econometric procedures to find out the short run and long run effect of internal and external public debt on economic growth in Sri Lanka and the sustainability of public debts analyze using graphical analysis with the support of the past literature. The econometrics procedure follows unit root test, co-integration tests and vector error correction mechanism together with granger causality test to investigate short run and long run effects of debt on growth. Empirical findings of the study revealed that internal and external public debt has positive impact on economic growth in the long run confirming crowding in effect of investment. Further, Gross domestic capital formation and government expenditure has positive impact on economic growth in the long run. The coefficient of Error Correction Term (ECT) suggests disequilibrium in the real GDP growth is corrected at the speed of 58 percent annually confirming the existence of long run relationship between debt and growth. Granger causality test confirmed uni-directional causality running from real economic growth to internal public debt in Sri Lanka. The sustainability of public debt in Sri Lanka is not in a good position as most of such measures reflect unfavorable trend over the last period. Finally, the finding of the study is useful to the policy makers to design and implement appropriate policies to achieve desired level of economic growth for the country.

KEYWORDS: Debt sustainability, Economic growth, Public debt

Introduction

In general, as a social science economics is concern about the economic wellbeing of general public. Today, most of the countries in the world have to face a critical issue on

rising public debt. The total outstanding government debt or termed as "Public Debt" has caused to heat the economy and it reached to the unprecedented level in most of the Developing countries (Atique and Malik, 2012). In Sri Lanka, the public debt has reached to the higher level during the past period and the way it is financed has implications for macroeconomic environment and the welfare of public at present and future generations too. As such, the stem of this article address the critical issue dynamic of sustainability of public debt in Sri Lanka and their impact on growth performance of the country.

In the history of Sri Lanka since 1940's all the government came into office followed the deficit financing policies in which the total government expenditure exceeded the revenue collected from tax and non-tax sources. One exception can be seen for the above mentioned in the years 1954 and 1955 where government has run with surplus budget (CBSL Annual Report, 2010). Most serious implication of this deficit financing policy is that since 1987 the ruling governments have to face current account deficit throughout the period where government revenue collected was not sufficient to meet the recurrent expenditure of the government. Most of the governments prefer debt or borrowing option for deficit financing as it is anti-inflationary compared with the printing money or imposing high taxes on public (Attapattu and Padmasiri, 2018). Printing money is highly inflationary and it has far-reaching negative consequences on the economy.

The adoption of tax policy to reduce the deficit by increasing tax rates to unprecedented level or cutting down the capital expenditure are ill-advised as they hampered future growth potentials of the country (Fonseka and Ranasinghe, 2007). Even though these arguments are formed in favor of debt, excessive borrowings over the capacity of the country is also ill-advised as it caused to create more economic repercussions since government had to rely on additional debts to pay even debt servicing payments including capital of it which will negatively impact on internal and external balance of the country. As a result, researchers has paid their attention on the threshold level of debt saying that the ruling government should try to keep the debt level well below this level to create favorable environment for growth. The debt sustainability refers to the ability of country to meet potential debt obligation of the country without having any side effects on the macroeconomic environment. Hence, debt sustainability is an important indicator, which ensure long term, sustain of growth. It seems that the debt is not at its sustainable level as the debt ratio increase up to 83 per cent of GDP in 2018 from 34 per cent in 1960 and it fluctuates considerably throughout the study period (CBSL, 2018). However, assessing debt sustainability using a single indicator is a matter of opine as the literature provides variety of indicators to assess whether the debt is at its sustainable level (Kappagoda and Alexandar, 2004).

The total outstanding debt comprised with internal and external debt. Debt can be influenced on growth and welfare of public. Many economists have paid their attention to test the association between debt and economic growth, (Agenor and Montiel, 2011; Atique, and Malik, 2012; Reinhart and Rogoff, 2010).

Some researchers concluded that there is a positive impact of public Debt on Economic Growth (Misztal, 2010; Lin and Sosin, 2002) where as other researchers confirmed the negative association between public debt and economic growth (Attapattu and Padmasiri, 2018; Kumar and Woo, 2010; Sen et al., 2007; Cunningham, 1993). As such, in the literature, empirical results confirmed the inconclusive results on the debt-growth nexus. Therefore, totally this empirical matter needs to be tested. Further, in the literature the relationship between internal debt and external debt on economic growth is not clearly investigated. Some studies has explained the composition of debt and identified the internal public debt for referencing purposes to discuss the impact of external debt on economic growth. Not only that, most of these studies are conducted using panel data neglecting country specific economic factors (Naeem, 2017).

The aim of this research is to investigate the debt sustainability of in Sri Lanka and assess the effect of both internal and external public debt on the growth performance of the country. In order to achieve above objectives, this study concerns on following to research questions, firstly, what is the impact of internal and external debt on economic growth of Sri Lanka? Secondly, is the public debt in Sri Lanka is at the long-term sustainable level? This issue is important to investigate because there is a strong dialogue among policy makers, academics, government, and public on this matter. Debt sustainability has become a heated topic among the above parties with the advance consequences of global economic recession and debt crisis in euro zone and USA. Not only that, countries all over the world focused their attention on debt sustainability, since it is critical to achieving fiscal sustainability.

The structure of this research paper is developed as follows. The first section of this article attempts to introduce the issue of this research highlighting the significance of analyzing it. The second section covers the literature review on the debt growth nexus. The third section deals with evolution of public debt and economic growth in Sri Lanka with special reference to debt sustainability indicators following the literature. The forth section focuses on the methodological framework of this study covering data sources and reconstruction of data based on the develop model. The fifth section focuses econometrics analysis; sixth section covers on the findings and the discussion of the outcome of the study and the final section deals with the conclusion and the recommendations based on the findings of the study.

Literature Review

The public debt management is an important element of fiscal policy. Debt obligations are created from government borrowings in which facilitate for smoothing consumption and public investment for infrastructure development. Public debt may promote economic growth through government expenditure and on the other hand it may cause to create serious economic illness if it is not utilized and managed properly (Naaem, 2017; Levy and Chowdhury, 1993; Sachs, 1990). The debt life cycle theory developed by Chaudhary and Anwar, (2000) pointed out long run effect of debt via three stages of development, which promotes economic growth.

When a country borrows in the first stage, it generates additional resources and is able to stand on its own feet in the second stage by expanding resource base. Finally, with the utilization of such funds properly, country may emerge as surplus of resources and it can therefore repay the loans in the third stage. This process helps recipient countries to sustain and accelerate the economic growth.

Theoretically, economists do not support to maintain large budget deficit because of their detrimental effect on long-term growth and stability of an economy (Public Bank Berhad, 2002). The prolong debt outstanding at a higher level may create many challenges in front of the nation. The excessive borrowings have negatively effect on economic growth and that is explained by using various driving mechanism such as debt overhang, crowding out effect, risks and uncertainty (Naeem, 2017).

Debt overhang theory explained that excessive borrowings over the countries repayment capacity might increase the anticipated cost of debt servicing payments that can depress the investment and reduce the potential growth of the economy (Naeem, 2017; Sawanda, 1994). The other side of the debt overhang mechanism points out that if government imposes more and more taxes on private sector to finance the debt obligations which results in reducing expected return on investment leading to reduction in investment and growth. Similarly, excessive borrowings to finance the debt servicing may transfer the funds from private sector to public sector limiting the funds available for the private sector investment and weakened growth (Sachs and Williamsons, 1986). This is known as crowding out effect. Further, risks and uncertainty created by debt obligations may increase the possibilities of default would have an impact on capital inflow and stability of the environment where investors wait and see economic situation as concluded in the real option theory of investment (Naeem, 2017; Rathnasiri, 2011).

Debt overhang may discourage private investment and growth due to the fact that uncertainty in many fronts. Higher prolonged debt over a periods increases uncertainty about government actions and policies to meet the debt servicing payments, which in turn negatively affect private investment since there is high potentiality to increase taxes to finance debt servicing (Agenor and Montiel, 2011; Feldstein, 1986).

High debt ratio involves substitution of future taxes for current taxes and thus, places a burden on future generation too. According to the studies, indicate a threshold level of debt, which is harmful to the countries growth potentials for a long period (Reinhart and Rogoff, 2010). Reinhart and Rogoff's research investigated the relationship between public debt and the real GDP growth rate for a range of countries and concluded that countries having average public debt to GDP ratios above 90 percent would experience a major decline in the economic growth rate. This research work finds that public debt ratio would strongly decrease the economic growth rate in advanced countries when public debt ratio might go above 220%.

High government debt and debt servicing has create long-term economic impact to the economy. Sachs (1990) argues that increasing tax rates just mere to cover up the debt servicing may result in negative outcomes such as high tax evasions, reduction in working times, capital outflows and trade barriers.

Levy and Chowdhury, (1993) also confirmed the above result and concluded that high debt burden discourage capital formation through the crowding out effect, encourage capital flight and reduced economic growth. Sen et al. (2007) also reveals that excessive borrowings crowd out private investment lowering the growth for Latin American countries. As a conclusion, these studies identified the negative impact of public debt on economic growth through the high government expenditure, which leads to widen the deficit of the government budget. However, only other hand high government expenditure financed through the borrowings may have proactive influence on economic growth on the ground of ensuring effective utilization of such borrowed funds. This can be highlighted as the first line of channel where public debt influence on economic growth. Second line of channel is the productivity of capital. In the literature, several studies have paid attention on the transmission mechanism of debt on economic growth. Accordingly, Chunningham (1993) revealed that negative impact of debt on economic growth transmitted through the productivity of capital and labour. This is further confirmed by Fosu, (1999) and Patillo et al. (2002) identified that debt negatively effect on economic growth due to lower marginal productivity of labour and capital. In line with the productivity channel Lin and Sosin, (2002), concluded that debt-growth nexus is different from country to country depending on the utilization of such funds. According to them debt is growth enhancing for Asian developing countries where as African and Latin American countries debt has negative relationship with growth.

Karagol, (2002) tests the short run and long run effect of debt on economic growth for Turkey found that public debt affects growth negatively both in the short run and long run. Similarly Taghavi, (2000) confirmed the negative impact of investment both in the short run and long run by public debt. Moreover, different country specific studies done by various researchers confirmed the negative significant impact of public debt on economic growth (Were, 2001; Habimana, 2005; Karagol, 2002).

There are limited studies conducted to analyze the effects of debt on economic growth in Sri Lanka. Fonseka and Ranasinghe, (2008) examined the public debt in Sri Lanka and observed both overall debt and debt servicing payments has increased over the years creating negative impact on economic growth. Kumarasinghe and Purankumbura, (2015) analyze the long term impact of public debt on economic growth through the data available over 50 years starting from 1963 using econometrics analysis. The study reveals that debt has non-linear relationship with the growth rate and public debt has negative impact on economic growth.

Kumara and Cooray, (2013), investigated non-linearity and threshold level of public debt and economic growth in Sri Lanka by employing conditional convergence time series econometric model for the period 1960-2010. This study finds that there is a nonlinear relationship between the public debt and GDP per capita growth in Sri Lanka. According to them, the threshold level for public debt is 59.42 per cent of GDP. Above this level, public debt makes a negative impact on GDP per capita growth. Attapattu and Padmasiri, (2018) investigated the long run effect of public debt on economic growth in Sri Lanka for the period 1977-2012 by employing auto regressive distributive lag model.

This study confirmed the existence of long run negative relationship between debt and economic growth in Sri Lanka.

The concept of debt sustainability is an important topic coming under the discussion of debt growth nexus. Debt sustainability refers to government ability or capacity to pay off debt obligations consistently without influencing growth potentials of the country. As highlighted in the Ricardian Equivalence theory, high indebtedness discourages investment and negatively effects on economic growth. Moreover, high indebtedness may affect to fiscal sustainability especially under the crisis. One of the adverse impacts of the global financial crisis is that it poses challenge to achieve fiscal sustainability as most of the countries forced to run deficit budget to accelerate the economic growth and resulting in high indebtedness. As such, debt sustainability become a critical issue not only there negative effects on economic growth but also its effects on fiscal sustainability.

The sustainability of debt can be measured the total outstanding debt as a percentage of Gross Domestics Product (GDP). Comparisons of GDP demonstrate the size of debt in comparison to the size of the economy. Simply, if the country is able to maintain its debt ratio at a lower level with minor fluctuations the sustainability of debts can be achieved. In another analysis, the sustainability of debt can be evaluated by analyzing the primary balance of the budget. The difference between government revenue and total government expenditure excluding interest payment formed the primary balance of the government and if it is large enough to meet countries debt obligation the debt is at sustainable level. Kappagoda and Alexandra, (2004) developed five indicators to assess the debt sustainability of low income countries such as present value of debt to GDP ratio, present value of debt to Export ratio, Present value of debt to Government revenues ratio. Debt service to exports ratio, and the Debt service to Government revenue ratio. The capacity or the strength of the any economy depends on the output and exports. The Gross Domestic Product (GDP) is the overall performance of the domestic economy, which reflects the overall resources of the country. The export relates to foreign exchange and it reflects foreign resources of the country while government revenue relates with fiscal resources. They provide insight for determining debt capacity of the country. The value of exports of the country gives the more accurate impression of the income of foreign currency that can be used service the debt. This measure is useful to assess the debt solvency of the country. As such, in the following discussion, study intends to evaluate the overview of the debt structure and growth performance by given more attention on debt sustainability.

An Overview of Public Debt & Economic Growth in Sri Lanka

The public debt has dramatically increased after 1950's as a result of the large overall fiscal deficit (CBSL 1998). The total public debt stock was Rs. 11.9 trillion in 2018 (82.9 as a percentage of GDP), and the relevant figure in absolute term was Rs. 2,228 million (34.0 as a percentage of GDP) in 1960 (CBSL, 2018).

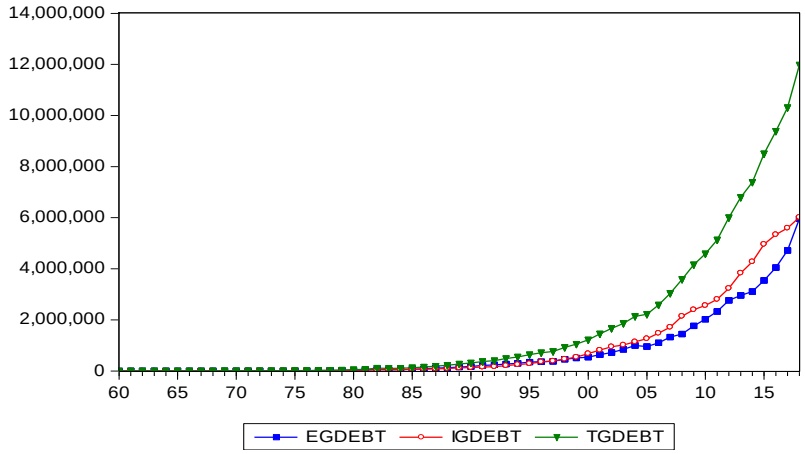

Figure 1: Internal & External Public Debts 1965-2018

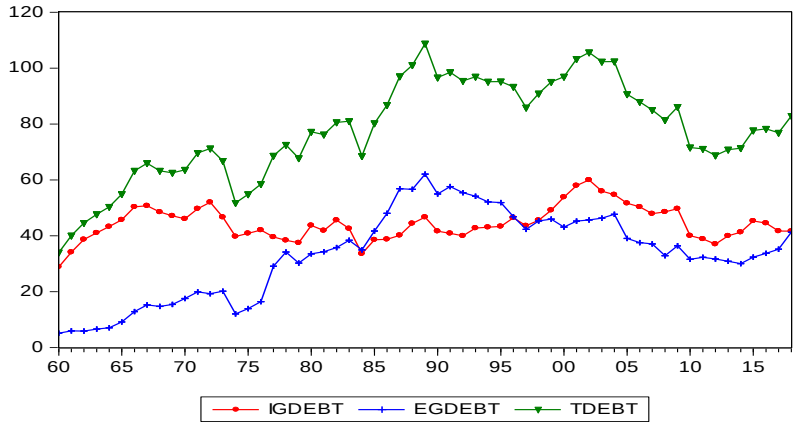

Figure 2: Debt as a % of GDP from 1960-2018

Source: Central Bank of Sri Lanka

As shown in the Figure 1, total debt has dramatically increased in absolute terms from the year 1997. The relevant figure in absolute terms increased from Rs.764, 071 million in 1997 to Rs. 11.9 trillion in 2018. The relative importance of domestic public and external debt as a percentage of GDP also changed over this period (Figure 2). As highlighted in the literature, in developing countries external debt is the main important component of the debt structure. However many developing countries have taken policy measures to changed their debt structure with more resilience on internal debt (Atique and Malik, 2012). As per the figure 1 and 2, Sri Lanka moves to debt financing by paying more attention on internal sources after 1997 remarkably.

Even though, the total debt in absolute terms has increased; the sustainability of debt has improved in some aspects during the last three decades, which reflect as a good sign of fiscal sustainability. According to the figure 2, the total debt ratio has steadily decreased over the last three decades.

The relevant figure has declined from 109 percent in 1989 to 82.9 percent in 2018. The recorded average total public debt ratio is 78% for the study period and it stood well below the threshold level of 90%. Domestic and foreign debt ratios have also been declining since then (Figure 2). Despite this decline, the public debt ratio - at 82.9 per cent at end-2018 - remains high in a relative context. Further, the analysis of primary balance (PB) of the budget reflects continuous deficit throughout the period, means that the debt sustainability is not in a good position in the country (Figure 3). The comparison of the current debt ratio with the other Asian countries' is vital to assess the country's debt level. It seems this ratio is well above with other neighboring countries in the South Asian region (Table 1).

Table 1: Comparison Figures of Debt Radios in South Asia (Year -2018)

Country	Debt Ratio	GDP Growth Rate
Afghanistan	7.1	2.7
Bangladesh	27.9	7.4
Bhutan	110	7.4
India	69.6	6.7
Maldives	51.8	4.8
Nepal	30.4	7.9
Pakistan	72.5	5.4
Sri Lanka	82.5	3.3

Source: World Bank Data Base 2018

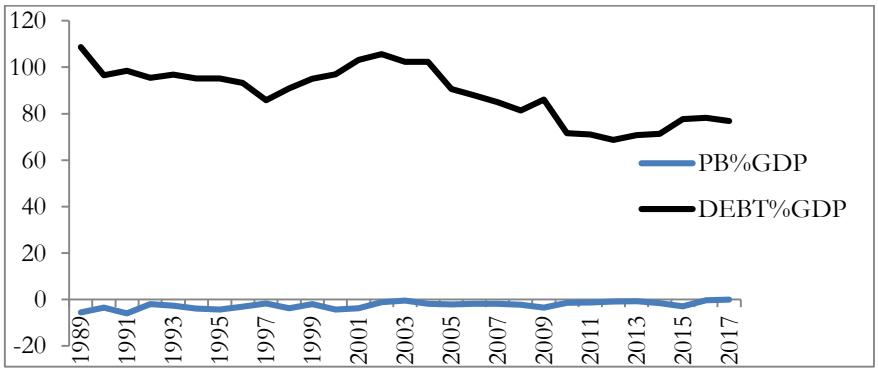

Figure 3: Primary Balance of the Budget and Public Debt Ratio

Source: Central Bank of Sri Lanka

The figure 4 reflects total interest payments on public debt as a percentage of GDP and as a percentage of total government expenditure. This is an indebtedness indicator for the period 1989-2018, which measures the debt sustainability. The reported average values of the interest payment as a percentage of GDP and as a percentage of government expenditure were 5.7 per cent and 24 per cent respectively for the period 1989-2018.

As shown in figure 4, the interest payments/expenditure ratio has significantly increased up to 32 per cent in 2018 from 17 percent in 1989. This means that approximately 1/3 of government expenditure allocated to payment of interest of the public borrowings.

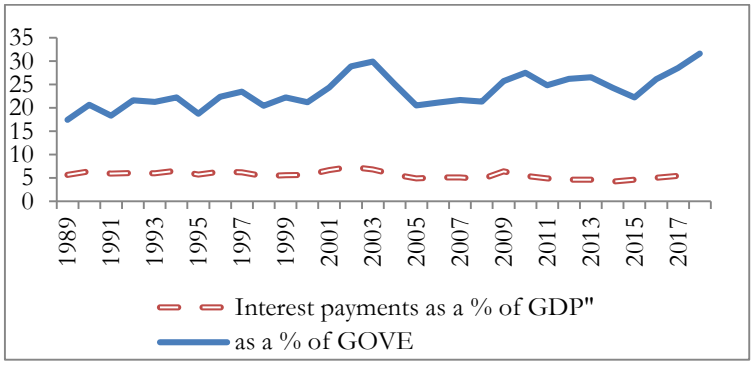

Figure 4: Interest Payments on Public Debt

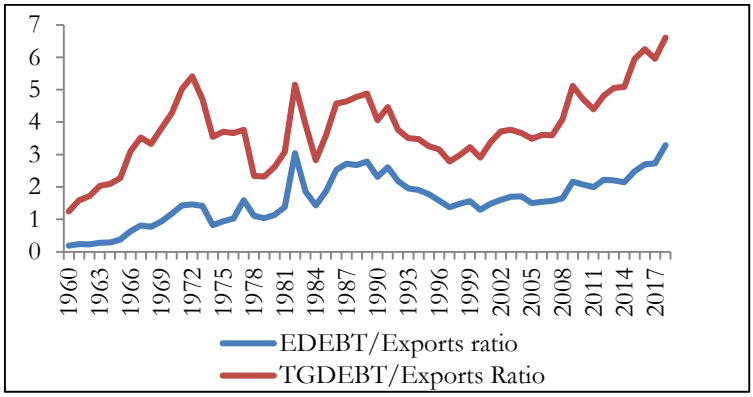

Figure 5: Public Debt/Export Ratios

Source: Central Bank of Sri Lanka

The figure 5 reflects both the external debt: exports ratio and Total Public Debt to Exports ratios for the period 1960-2018. As shown in the figure, external debt/exports ratio and total debt to exports ratios continuously increased due to rise in the demand for external borrowings and total borrowings. The figure 5 shows the upward trend in the above ratios is not a good sign of debt sustainability as it is affect to solvency of debt. But, the reported average EDEBT/exports ratio and TDEBT to exports ratios are 1.6% and 3.8% respectively for the period.

The analysis of public debt services following the indicators explained by Kappagoda and Alexandar, (2004) is given in the table 2 and figure 6. As shows in the table 2, the total public debt services as a percentage of GDP was 14.1% in 2005 declined up to 12.4% in 2017. The recorded average Debt services/GDP for period 2005-2017 is 13.5% of GDP. As shown in the figure 6, even though there is declining trend of the debt services/GDP ratio the absolute figure is relatively high. The calculation of Debt services to government revenue ratio is 94% for the period average.

Table 2: Debt Services Indicators (as a Percentage)

Year	Debt Services/GDP	Debt Services/Revenue	Foreign Debt Services/Export Earnings & Remittances
2005	14.1	90.8	2.9
2006	15.1	93.0	6.7
2007	14.0	88.6	7.6
2008	13.4	90.5	12.7
2009	17.1	118	12.6
2010	14.6	100.4	9.4
2011	13.7	92.5	9.6
2012	13.4	96.8	14.2
2013	13.4	100.2	14.4
2014	10.4	90.2	12.6
2015	11.9	90.6	16.8
2016	11.4	80.2	11.6
2017	12.4	87.5	13.4

Source: Annual Reports-Ministry of Finance Sri Lanka

The figure 6 shows slight upward trend of the foreign debt services as a percentage of export earnings and remittances for 2005 to 2017. The relevant average figure is 11.1% for the period 2005-2017.

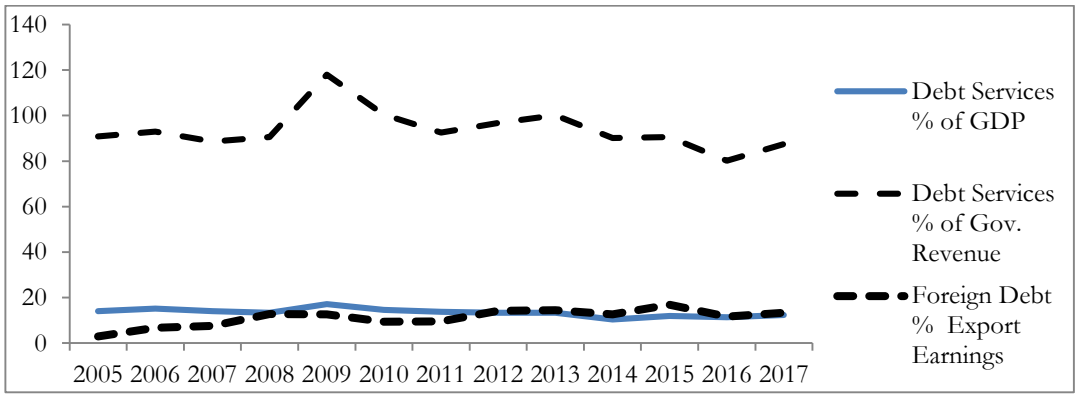

Figure 6: Debt Services Indicators (as a Percentage)

Source: Ministry of Finance, Sri Lanka

In the history of Sri Lankan economic development, the year 1977 is a turning point of the economic development. This is because Sri Lanka embarked economic liberalization after 1977. During 1960-1977, the average annual growth rate was 4 percent per annum (Figure 7). Although there was a 4 percent, average growth during the pre-1977 period the growth has been fluctuated noticeably and the country has not been able to maintain favorable and improving growth trend.

Growth performance during the post liberalization period is higher than the pre liberalization period. Sri Lanka was able to maintained average 5 per cent growth but it

is also not consistent throughout the period (Figure 7). Moreover, it is important to note that the recorded average growth is not sufficient compared with the past records and other Asian countries. The economic growth performance of the domestic economy has been considerably higher during the post liberalization period in comparison to the pre liberalization period (Rathanasiri, 2011). The average growth rate was 3.8% in the 1970-1980 period and has it has increased by 4.1% for the period 1980-1989. The relevant average growth rate increased 5.1% in 1990's. Finally, there was a 5.9% annual average growth rate during the period 2011-2018.

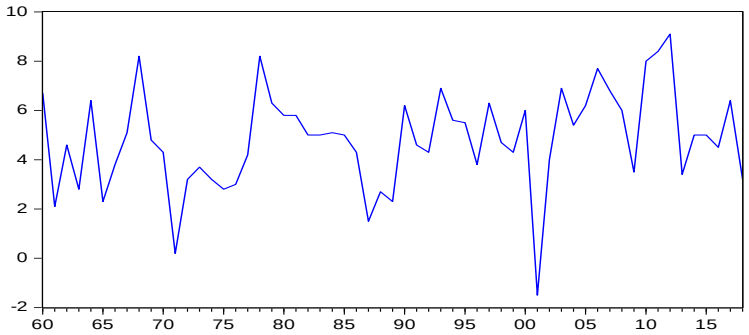

Figure 7: Real GDP Growth 1960-2018

Source: Central Bank Annual Reports

Data and Model Specification

The study adopts deductive research methodology to address the research questions. The study develops theoretical framework and the model framework based on the literature. Thus, the progression of the study is based on the confrontation of literature with the empirical findings. The study is based on the secondary time series data spanning the period 1960 to 2018. The relevant data collected from the World Bank reports, Central Bank annual reports and Ministry of Finance annual reports.

The economic theory depicts that if the country utilizes the borrowed funds in an efficient and effective manner that country can increases its growth. However, broad literature confirmed that excessive borrowing above the threshold level may lead to negative effect on economic growth due to the fact that debt plays the role of tax which will negatively effect on economic growth(Amilcar, 2016; Égert, 2015; Herndon et al., 2013; Reinhart and Rogoff, 2010; Kumar and Woo, 2010).

The study adopted neo classical growth theory and growth model specified as a real GDP as a function of capital labour and public debt. The present study uses real GDP (RGDP) as a dependent variable. A set of debt related explanatory variables such as government internal debt (GIDEBT) and government external debt (GEDEBT), government expenditure (GEXP) and control variables such as labour force participation rate (LFPR), gross domestic capital formation (GDCF), and total foreign trade (TFT), for the period 1960 to 2018 were used.

To evaluate the impact of public debt on economic growth in Sri Lanka, the explanatory variables in different form convert to the most appropriate form of log linear form and express as general log function.

The general model for the debt-growth nexus can be express as follows (table 3).

$$Y=A.K^{a}.L^{\beta}.TD^{\gamma} \quad [1]$$

$$RGDP_t=\beta_0+\beta_1 lnIGDEBT_t+\beta_2 lnEGDEBT_t+\beta_3 lnGOVE_t+\beta_4 lnGDCF_t +\beta_5 lnTFT_t+\beta_6 lnLFPR_t+\varepsilon_t \quad [2]$$

Table 3: Data Source and Definition

Name of the variable	Abbreviation	Data Source	Definition
Real GDP growth rate	RGDPG	Central Bank Annual report	Annual average real GDP growth rate
Government Internal Debt	IGDEBT	Central Bank Annual report	Total government internal debt obligations in rupees million
Government External Debt	EGDEBT	Central Bank Annual report	Total government external debt obligations in rupees million
Government Expenditure	GEXP	Central Bank Annual report	Total government expenditure in rupees million
Gross Domestic Capital Formation (investment)	GDCF	Central Bank Annual report	Gross Domestic Fixed capital formation in rupees million
Foreign Trade	TFT	Central Bank Annual report	Total exports and Imports in rupees million
Human Capital	LFPR	Central Bank Annual report	Economically active population as a % of Labour-force

In order to assess the impact of public debt on economic growth performances study uses famous cointegration and error correction techniques and granger causality tests by using e-views software package.

Methodology

Unit Root Tests

This study deals with time series annual data for the period 1960-2018 to analyze the central issue of the study. Since the study deals with time series data, a test for stationary is a very important pre-condition before proceeding to deeper analysis. In general, various macro-economic theories assumed a long run stable relationship between certain economic variables. This means that a set of macroeconomic variables cannot move away too far from each other, if there is a long run relationship among them (Wang and Rathnasiri, 2011). Therefore, prior to the estimation of the dynamic model, it is essential to determine the variable's stationary properties or order of integration using unit root test. The unit root test is generally based on either using Dickey-Fuller (DF) tests or Augmented DF Tests (ADF) or the Phillips-Perron (PP) unit root tests test. In this study, ADF unit root test is used to check the stationary of the data.

Cointegration Test and Error Correction Modeling

After checking stationary properties of data, cointegration test can be performed. It uses co-integration test to find the long run relationship between the variables in the model. The prerequisite to perform this test is to first check the existence of unit root and it can be decided whether the series are stationary or not. The pre-condition to verify the long run relationship among the variables is that all the variables must be non-stationary at their levels but be stationary at their first differenced. If this condition is satisfied, it gives the validity that variables have long run relationship. For testing the existence of co-integration between the variables a method developed by Johansen and Juselius, (1990) is used. This test incorporates maximum likelihood inference and statistics in estimating number of co-integrating vectors in a vector autoregressive (VAR) system. This test suggests two test statistics one is trace statistics and the other one is maximum eigenvalue to find out number of co-integrating vectors. If there is difference between the outcome of the trace statistics and maximum eigenvalue stat, then the results of maximum eigenvalue test is preferred because it is more authentic in case of small samples (Atique and Malik, 2012). When all the variables are co-integrated, the study can develop Vector Error Correction Model (VECM). The short run dynamics of the debt model can be tested using Wald Test. The study performs parameter instability test using the CUSUM test. This test is based on the cumulative sum of the recursive residuals. The CUSUM test plots the cumulative sum together with the 5% critical lines. The parameter instability is found if the cumulative sum goes outside the area between the two critical lines (Amilcar, 2016). Finally, study performs diagnostic testing to verify the goodness of the model. To check whether the variance of the residuals is homoscedastic or heteroscedastic, the White's Heteroscedasticity test is applied to the regression model. By using the Breusch-Godfrey Serial Correlation LM Test, we check whether autocorrelation exists or not (Atique and Malik, 2012).

Results and Discussion

Descriptive Properties

Table 4 presents the descriptive statistics of the variables used in the study for period 1960-2018

Table 4: Descriptive Statistics

	RGDPG	IGDEBT	EGDEBT	GDCF	FT	GOVE	LFPR
Mean	4.824	44.297	33.881	23.387	51.707	27.423	43.066
Median	5.000	43.340	34.318	24.249	53.139	27.460	46.500
Maximum	9.100	59.953	65.768	39.056	80.474	42.670	54.100
Minimum	-1.500	28.863	5.141	12.531	26.713	17.300	31.300
Std. Dev.	2.008	5.981	16.124	6.185	14.173	5.345	7.629
Skewness	-0.390	0.315	-0.158	0.057	0.013	0.374	-0.057
Kurtosis	3.713	3.304	2.110	2.311	1.838	3.503	1.358

Table 4 shows that Sri Lanka has maintained 4.8 per cent average real GDP growth rate throughout the period. According the data minimum GDP growth rate is -1.5 of GDP and the maximum growth rate is 9.1 per cent of GDP per year. This may indicate that Sri Lanka is maintained moderate growth rate throughout the period and this highlights the issue of utilizing the internal and external debt to accelerate the economic growth in Sri Lanka. Table 4 shows that on average, the mean internal debt ratio is 44 per cent and the mean external debt is 34 per cent per annum. It is also evident that borrowing from external and internal sources is impressive during the study period and country's resilience on internal borrowing is more attractive than the external borrowings to meet the economic requirements. The range of the internal government debt is 29% to 60% whereas the range of the external government debt is 5% to 66%. The country is able to maintain 24 per cent of investment rate, 52 per cent of trade dependency ratio, 27 per cent of government expenditure ratio, and 43 per cent of labour force participation rate on average during the period 1960-2018. The time series standard deviation of external debt ratio, foreign trade ratio, and labour force participation rate is substantial for the period of 1960-2018.

Stationary Tests

Prior to the empirical analysis, Augmented Dickey Fuller (ADF) unit root tests were performed to identify the order of relevant variables as a prerequisite for co-integration test. Results of ADF test is shown in following Table 5. Table 5 presents ADF test statistics for both levels and first differences. The ADF test statistics pertaining to levels are greater than 5 per cent critical value; hence do not reject the null hypothesis of non-stationary. In other words, all the variables in the system are non-stationary at their levels. However, the hypotheses of unit roots can be rejected, when the variables are in first differences.

In other words, since the t values of first differenced data variables are less than 5 per cent critical value, meaning that reject the null hypothesis of non-stationary or say that variables in their first differences are stationary time series. Therefore, variables in the system are integrated of order (I).

Table 5: Results of the ADF Unit Root Tests

Variable	Level		1st Difference		Decision	Order of Integration
	Intercept	Intercept & Trend	Intercept	Intercept & Trend		
RGDPG	-1.109	-3.235	-7.26***	-7.19***	Stationary at 1st difference	I(1)
LGEDBDT	-1.536	-1.131	-7.78***	-8.01***	Stationary at 1st difference	I(1)
LIGDEBT	-0.426	-1.180	-5.66***	-5.61**	Stationary at 1st difference	I(1)
LGDCF	0.063	-3.588	-4.63***	-4.57**	Stationary at 1st difference	I(1)
LFT	0.009	-1.855	-5.71***	-5.64***	Stationary at 1st difference	I(1)
LLFPR	-0.276	-2.222	-6.58***	-6.53***	Stationary at 1st difference	I(1)
LGOVE	-0.146	-1.839	-8.78***	-8.69***	Stationary at 1st difference	I(1)

*Note: *,**,*** show significant at 10%.5% &1% respectively*

According to the table 5, variables have the same order of integration implies that variables move together overtime and hence, there exists a long-run relationship among the variables in the system. In addition to the ADF test, Stationary properties of the variable confirmed by the Inverse roots of AR polynomial as all the points are inside the circle (see figure 8) which confirm the stability of the series. Next step is to test co-integration between variables, which would help to identify any equilibrium relationship between variables in the debt-growth model.

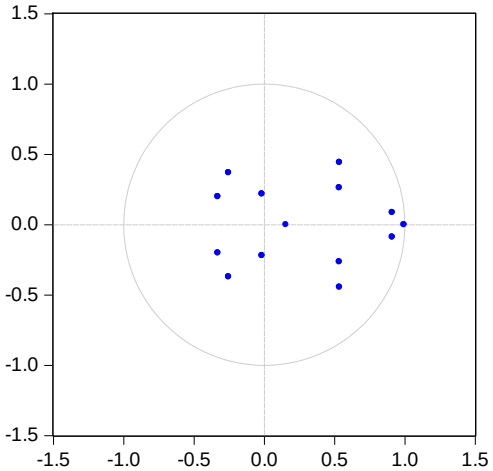

Figure 8: Inverse Roots of AR Characteristic Polynomial

Johansson Co-integration Tests

Prior to estimation of long run model to identify the relationship between dependent variables and the explanatory variables, it is required to decide the optimal lag length of the model using selection criterion for VAR lag length. Under that, LR: sequential modified LR test statistic FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion are selected as lag length selection criterion. The lag length provided by most of the information criterion is adopted in the study. As many criterions suggested one lag length, researcher applied one lag length in VAR.

Table 6: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-110.780	NA	1.58×10^{-7}	4.206	4.460	4.305
1	290.476	687.867	5.52×10^{-13}*	-8.374	-6.349*	-7.589*
2	327.627	54.399	9.13×10^{-13}	-7.951	-4.153	-6.479
3	392.376	78.623*	6.47×10^{-13}	-8.513*	-2.944	-6.354

*Note: * indicates lag order selected by the criterion*

The results of the Johansen Co-integration test for both trace statistics and maximum eigenvalue statistics are given in table 7 and 8. According to the Co-integration test rejects the null hypothesis that there is no co-integrated vector (None), there is at most one co-integrated vector (At most 1) at 0.05 levels. It indicates that trace statistics and maximum eigenvalue identified two co-integrating equations at 0.05 levels indicating that there exists a long run relationship between the variables in the model. The results of the long run co-integration model are reported in the table 9.

Table 7: Unrestricted Co-integration Rank Test (Trace)

Hypothesized		Trace	0.05	
No. of CE(s)	**Eigenvalue**	**Statistic**	**Critical Value**	**Prob.****
None *	0.939	276.579	125.615	0.000
At most 1 *	0.581	117.565	95.754	0.001
At most 2	0.387	68.009	69.819	0.069

** Denotes rejection of the hypothesis at the 0.05 level*
***MacKinnon-Haug-Michelis (1999) p-values*

Table 8: Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized		Max-Eigen	0.05	
No. of CE(s)	**Eigenvalue**	**Statistic**	**Critical Value**	**Prob.****
None *	0.939	159.015	46.231	0.000
At most 1 *	0.581	49.556	40.078	0.003
At most 2	0.387	27.937	33.877	0.216

** Denotes rejection of the hypothesis at the 0.05 level*
***MacKinnon-Haug-Michelis (1999) p-values*

Table 9: Long Run Co-integrated Results

Variables	Coefficients	Standard Errors	T-statistics on	Conclusion
LGEDEBT	2.832	0.933	3.036	Significant
LIGDEBT	6.560	1.581	4.148	Significant
LGEXP	0.351	0.195	1.804	Significant
LGDCF	7.092	2.459	2.883	Significant
LTFT	0.032	1.330	0.024	Insignificant
LLFPR	4.979	3.680	1.353	Insignificant
Constant	6.920	-	-	-

As per the results of the long run growth model, LGEDEBT, LIGDEBT, LGEXP, LGDCF variables are significant and rests of the variables are statistically not significant. Moreover, those statistically significant variables have theoretically expected positive sign. As reported in the table 9, internal and external debt directly related with the economic growth in Sri Lanka. The results reveal that government internal and external debt positively related with the economic growth at 5 percent significant level suggesting one percent increase in internal public and external public debt leads to 2.83% and 6.6% increase in economic growth respectively. This is not complying with most of the previous literature which identified long run negative relationship between Debt and Economic growth (Fonseka and Ranasinghe, 2008; Ekenayake, 2011). The results of the study does not collaborate with the crowding out hypothesis which explains high public borrowings would crowed out private investment and cause negative impact on economic growth.

Moreover, the rejection of crowding out hypothesis suggests that increase in public investment through public borrowings would result in an increase in both private investment and economic growth (Hyder, 2001). In the Sri Lankan context this result is supported by Thilanka and Ranjith (2018); Naeem 2017; Abbas and Christensen (2007) and Chaudhary and Anwar, (2000). Accordingly, their study confirmed the crowding in effect of government borrowings rather crowding out effect on private investment. Debt can be considered as the by-product of the overall fiscal policy operations and it facilitate for smoothing consumption and long-term development of the country by providing funds available for public investment in infrastructure. This outcome further confirmed by the positive association between government expenditure and economic growth.

The Crowding in effect implies that public debt is not necessarily detrimental to the developing economy. In Sri Lanka government has heavily relied on borrowing from non -banking sector than the domestic banking sector during the past period leaving no pressure on interest rate in the money market and that policy leave freely available private funds for the development projects (Thilanka and Ranjith, 2018; CBSL, 2015). Further, government external borrowings heavily utilized for the leading development projects in the country, which generates long-term benefits to the country. Among these, the most of the projects are infrastructure development projects, which facilitate for private sector investment by lowering costs of capital. Because of that, private sector investment in physical capital promotes economic growth in the long run. Further, in the literature, the studies, which focus on the Asian countries, found the similar outcome confirming positive association between public debt and economic growth (Lin and Sosin, 2002).

Table 9 shows that the coefficients of gross domestic capital formation and government expenditure have the expected sign suggested by the economic theories. The results are showing that 1% increase in investment, economic growth will increase by 7.1%. Further, government expenditure has a positive relationship with the economic growth at 10 per cent significant level confirming Keynesians theory. According to the findings, one percent increase in government expenditure will increase economic growth 0.35 percent indicating weak significant. In the Keynes theory, government expenditure considered as an exogenous variable which can be utilized as a fiscal management tool promotes economic growth. On the other hand, the coefficient of foreign trade and labour force participation rate, although insignificant have expected positive sign indicating positive relationship with economic growth.

Error Correction Modeling

Having identified the co-integration relationship between the variables in the model, the study can perform the vector Error Correction modeling (VECM). System model identified the error correction term a value that corrects the disequilibrium of the system. It should have a negative sign and should be significant. If the error correction term/speed of adjustment is negative sign and significant it confirms the existence of long-term relationship between the variables in the growth model. In addition to the confirmation of the long run relationship, the short run dynamics of the model has been examined by estimating ECM as reported in table 10.

The log changes in the relevant variables represent short run elasticities while ECM term represents the speed of adjustment back to the long run relationship among the variables.

The table 10 indicates that the error correction term negative and statistically significant. Thus, the results indicate the cointegration among the variables, real gross domestic product, lagged government internal debt, government external debt, government expenditure, gross domestic capital formation, foreign trade, and labour force participating rate. This result is consistent with the previous studies by Thilanka and Ranjith, (2018) and Naeem, (2017). The absolute value of the coefficient of the error correction term (i.e. is 0.58) implies that 58% of the disequilibrium in the real GDP is adjusted towards the equilibrium annually. The diagnostic test of the error correction model indicates that there is no evidence of serial correlation and heteroscedasticity. Further Jarque-Bera normality test indicates that the residuals are normally distributed. The results of the CUSUM test indicate that the parameter instability is not found because the cumulative sum does not go outside the area between the two critical lines (Figure 9).

Table 10: Error Correction Results

Regressor	Coefficient	Standard error	t-statistics	P-value
ECM Term	-0.581	0.189	-3.075	0.004**
D(RGDPG(-1))	-0.206	0.189	-1.088	0.283
D(RGDPG(-2))	0.059	0.170	0.347	0.730
D(LGEDEBT(-1))	1.725	1.781	0.968	0.339
D(LGEDEBT(-2))	0.466	1.892	0.246	0.807
D(LIGDEBT(-1))	-1.902	6.180	-0.308	0.760
D(LIGDEBT(-2))	9.852	5.774	1.706	0.096*
D(LGEXP(-1))	-5.153	3.983	-1.294	0.203
D(LGEXP(-2))	2.222	4.065	0.547	0.588
D(LGDCF(-1))	7.786	3.604	2.161	0.037**
D(LGDCF(-2))	0.832	3.368	0.247	0.806
D(LLFPR(-1))	2.092	1.598	1.309	0.198
D(LLFPR(-2))	0.111	1.031	0.108	0.915
D(LFT(-1))	-0.448	2.861	-0.157	0.876
D(LFT(-2))	-4.543	3.506	-1.296	0.203
Constant	-0.524	1.064	-0.493	0.625
R^2- 0.49; Adj. R^2- 0.30; Std. Err - 2.07; F-stat - 2.534 (0.009); AIC - 4.532; DW - 2.02				
Diagnostic test:				
Serial Correlations	Obs. R2 1.9729		Prob. Chi-square (2) 0.3729	
Heteroscedasticity	Obs. R2 9.7101		Prob. Chi-square (21) 0.982	
Normality	Jarque-Bera stat 5.666		prob. 0.056	

*Note: *, ** show significant at 10% & 5% level respectively.*

Table 10 denotes short run dynamics of the error correction mechanism. The short run coefficients of the model indicates that immediate impact of the log difference variables and the subsequent year impact is not significant in most of the cases. The results show that there is no short run relationship between variables, implying no short run reaction in real GDP to the variation of public debt in Sri Lanka. But, short run VECM results revealed that log gross domestic capital formation(LGDCF) of the of last year(2017) and log internal government debt(LIGDEBT) of two years before (2016) are found to be positively related with real GDP growth of the current year at 5% and 10% significant levels respectively.

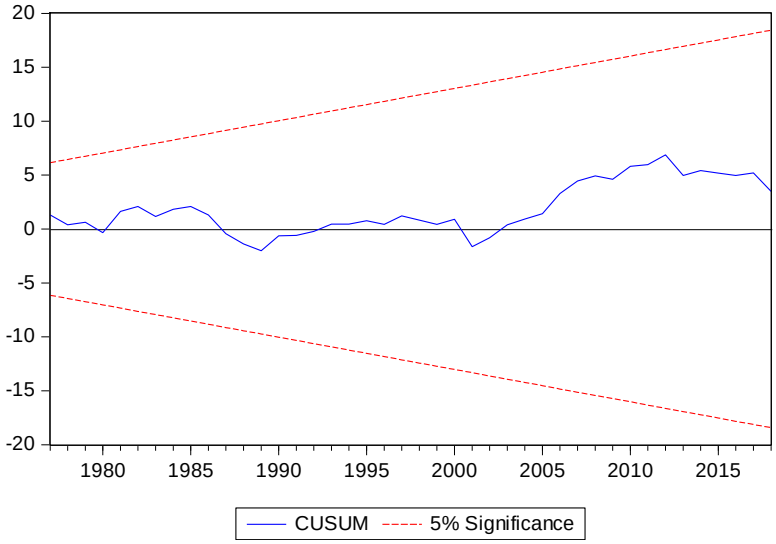

Figure 9: The CUMSUM Test Results

Apart from the above analysis, study examined the joint effect of the relevant lag variables (Lag 1 and Lag 2) on real GDP growth, using Wald test and found that jointly the relevant variables have no effect on economic growth.

Granger Causality Results

The results of the granger causality also revealed that there is no short run causality running from explanatory variables (GEDEBT, GIDEBT, GDCF, GEXP, LFPR, and FT) to real GDP growth rate. However, results indicate uni-directional positive relationship between real GDP growth rates to internal government debt at 10% significant level (Table 11).

Table 11: Pairwise Granger Causality Tests

Null Hypothesis:	Obs.	F-Statistic	Prob.
LGEDEBT does not Granger Cause RGDPG	57	1.67833	0.1966
RGDPG does not Granger Cause LGEDEBT		0.30027	0.7419
LIGDEBT does not Granger Cause RGDPG	57	1.25473	0.2936
RGDPG does not Granger Cause LIGDEBT		2.54552	0.0882
LGDCF does not Granger Cause RGDPG	57	2.29928	0.1104
RGDPG does not Granger Cause LGDCF		0.12925	0.8790
LGEXP does not Granger Cause RGDPG	57	1.17469	0.3170
RGDPG does not Granger Cause LGEXP		0.50975	0.6036
LLFPR does not Granger Cause RGDPG	57	0.33045	0.7201
RGDPG does not Granger Cause LLFPR		1.55179	0.2215
LFT does not Granger Cause RGDPG	57	0.94034	0.3970
RGDPG does not Granger Cause LFT		1.43811	0.2467

Conclusions

The aim of this study is to investigate the link between public debt and economic growth in Sri Lanka and assess its sustainability over the long run using annual time series data covering the period 1960 to 2018. The data analysis of the study is based on the famous cointegration and error correcting mechanism to identify the long run and short run effect of public debt on economic growth. It can be observed that the relative composition of public debt structure has been dramatically changed during the study period giving more priority on internal borrowings than the external borrowings. This implied that government has relied more on internal sources than external sources for financing its budget deficit. In the literature, most of the studies pay attention on the sustainability of debt, as it is important to achieve fiscal sustainability. The sustainability of debt is not in a good position in Sri Lanka according to the analysis of liquidity and solvency sustainability measures specified in the literature. Even though the total debt ratio declined during the recent past but in absolute term, it is high and not only that analysis revealed that most of the debt sustainability indicators reflect un-favorable trend during the study period. Moreover, Sri Lankan debt ratio is relatively high with the comparison of the debt ratios with other South Asian countries.

In Sri Lanka, budget deficit has widened with the government commitments on welfare and infrastructure development making high expenditure cost though the revenue sources are limited. High budget deficit has resulted in accumulation of public debt over the study period. The empirical results show that the natural log of public internal and external debt has significant positive long run impact on real GDP growth. Hence, for the safe side study can be concluded that the debt is at sustainable level. Nevertheless, it cannot be ignored the threshold level of debt above which may negatively effect on long run economic growth. The threshold level can be varied from country to country depending on the nature of the economy. In Sri Lanka, Kumara and Cooray, 2013 identified the threshold level of public debt as 60% of GDP. Accordingly, the current debt ratio is above the threshold level.

The long run positive results between public debts-growth nexus confirmed the crowding in effect. This reveled that utilizing public borrowings facilitate for public investment through government expenditure and promotes economic growth in the long run. Further, study revealed that natural log of gross domestic capital formation and government expenditure has positive long run impact on economic growth in Sri Lanka. In the short run both internal public external public debt has no significant impact of real economic growth in Sri Lanka. Further, according to the granger causality test study confirmed uni-directional causality between real economic growth and internal public debt in Sri Lanka. This implied economic growth facilitate for more internal borrowings than the external borrowings in the short run.

The study would like to make following recommendations based on the findings of the study, The findings of the study confirmed that public borrowings is very important source of promoting economic growth through the government expenditure and improving productivity of funds available for the private sector. The debt financing promotes economic growth due to the lack of resources available for the private investment. Hence, current study recommends responding appropriately to ensure productive use of resources and the rate of return of public debt than the debt serving rate.

Previous studies investigated a threshold level for different countries where the debt would decline the real GDP. This can be varies from country to country depending on the economic and financial factors. As such, even though the public debt has positive impact on economic growth over the longer period in Sri Lanka it is advisable to take into account the possible threshold level of debt with the proper analysis to verify its sustainable level by considering the macroeconomic factors and financial performance. Hence, policy makers must ensure the rising public debt burden does not reach to the unsustainable level. Accordingly, it is the prime responsibility of the policy makers and practitioners' to maintain optimal debt structure to enhance the growth performance of the country. Moreover, the finding of the study is useful to the policy makers to design and implement appropriate policies to achieve desired level of economic growth for the country.

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