Debt and Fiscal Sustainability in Sri Lanka

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    Abstract- Fiscal policy plays a central role in the economy in order to achieve its economic and social objectives through macroeconomic stability. Especially, developing countries are suffering from higher rate of debt and budget deficit. Consequently, the fiscal policies of these countries are not in a sustainable position. Therefore, it is timely important to examine the sustainability of the fiscal policy in term of Sri Lanka. Hence in this study, I attempt to examine the debt and fiscal sustainability of Sri Lanka by using Inter-temporal Budget Constraint Approach. In this regards, Dickey Fuller, Augmented Dickey Fuller and Phillip Paron tests have been employed. Further, the study applied Ordinary Least Squares method to analyze the determinants of factors that affect to increase the net total debt in Sri Lanka. Time series data set from 1990 to 2009 has been used on this regard. The results reveal the stance of the fiscal policy is unsustainable during the considered time duration. Moreover, the results pointed out that growth rate of GDP, budget deficit, political instability and time trend positively affect to increase the net total debt. Thus, it is necessary to expand government revenue while reducing the expenditure in order to achieve the debt and fiscal sustainability. Further, the study strongly recommends improving the tax administration, introducing broad based new taxes, minimizing welfare expenditure, defense expenditure and reduction of transfers to corporations in order to reach the mentioned achievements.

    Index Terms- inter-temporal budget constraint, fiscal sustainability, budget deficit, ordinary least squares

I. INTRODUCTION

B *ackground of the Study*
    In recent years, several developing countries have been facing dramatically high fiscal deficits. The government's ability to cope with the fiscal deficit has been receiving the increasing attention from economists. A high and accelerated level of economic growth is a must to achieve fiscal sustainability. Hence, the effect should be made to follow the "Golden Rule" of public finance, which emphasizes that public sector borrowings should be undertaken exclusively for the purpose to financing growth enhancing investment activities. It should be also ensure that economic growth and fiscal consolidation efforts should not be in conflict with each others, consequently that both objectives are achieved.

    The notion of fiscal sustainability has been defined in several ways. As Blanchard et al (1990) sustainability is essentially an analysis of whether (based on current policy stance) a government is headed towards excessive debt accumulation. Therefore, fiscal policy has to maintain level of deficit and that a country can afford without excessive increase. Wilcox (1989) notes that a sustainable fiscal policy is one that would be expected to generate a sequence of debt and deficits such that the present value condition would hold. If this condition is violated, perpetual deficit will be impossible and changes in fiscal policy will be inevitable.

    Sri Lanka and other developing countries, endured persistent budget deficit for several decades. Especially, after 1977 there was a rapid increase budget deficit and debt level. This situation is more developed with political instability of Sri Lanka after 1983. The continued deficits increased borrowings resulting in accumulation of the county's debt stock. All in all, a prudent fiscal policy is needed without further delay and/or reveals in order to turn around the increasing debt/GDP ratio of the country and ensure fiscal sustainability in the medium term.

    According to the background fiscal policy system is more important in Sri Lanka's development process. Therefore, this study analyses the long run fiscal sustainability concerning the joint behavior of debt and budget deficit using Inter-Temporal Budget Constraint (IBC) approach. Furthermore, this study attempts to determine factors that affect to increase net total debt in Sri Lanka using time series data for 52 years. The paper has been organized as follows. This section describes the overall fiscal policy and accumulation of debt and budget deficit in Sri Lanka. Further, this section provides the details about objectives of the research. In the next section, the conceptual framework of fiscal sustainability can be seen followed by the theoretical background of the study. After that, IBC approach and derived the IBC approach to Sri Lanka has been included. Further, the model for determining the factors that are affecting to net total debt in Sri Lanka also enclosed. Afterward, I have indicated the results of the study and ultimately conclusion and policy implication as well.

B. Budget Deficit and accumulation of debt in Sri Lanka
    After gaining the independence in 1948, Sri Lanka has come almost full circle with respect to economic policy regimes. In the early 1950s, the country followed by pro-enterprise liberal economic policies with little direct government involvement in economic activity and with minimum intervention in foreign trade and exchange controls. However, direct government intervention and control over economic activities commenced in the late 1950s and increased in 1960s, transforming Sri Lanka basically in to semi-planned mixed economy. By the early 1970s, the economy had become highly regulated and controlled. In 1977, a complete turnaround in the co untry's economic policy was initiated with the introduction of market-oriented policy package featuring the deregulation of market activities and the reduction of direct government participation in the economy. The liberalization programme was continued in the 1980s, making the economy the most liberalized in the South Asian region. The balance of payment deficit after the late 1950s led to a large foreign debt and the most of that was accumulated after 1978.

The rapid increase in external debt, by comparison with the domestic debt, presented a double burden. The following graph illustrates the changes of the budget deficit and debt as a percentage of GDP from 1950 to 2010.

Fig. 1 Budget Deficit and Debt as a Percentage of GDP from 1950 to 2010.
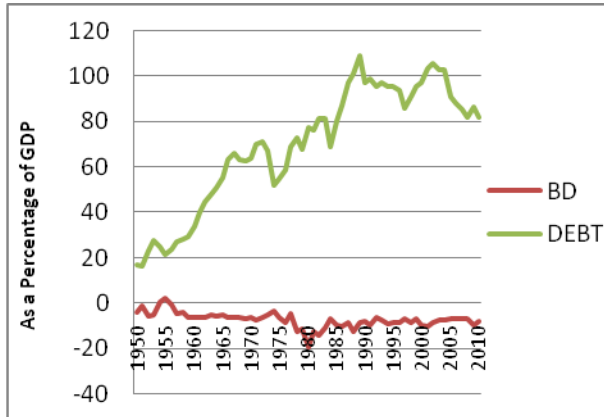
Source: Central Bank Annual Report 2010

According to the graph, Sri Lanka generally has a considerable budget deficit and higher rate of debt. There were only two years specifically; in 1954 and 1955 Sri Lanka had very little budget surpluses. During the period of 1960-1977, budget deficit was around 8% and after 1977, increases in expenditures were not recovered by corresponding increase in revenue, and the results was rapid increase in the public debt. The average budget deficit was 15% as percentage of GDP from 1978 to 1986. The highest budget deficit recorded in 1980 which was 23% of GDP. As a remedy for dramatic budget deficit, government had addressed the balance of payments deficit in the 1960s by imposing direct controls that restricted imports. However, they were unable to avoid increase in the foreign debt, which rose from around 62 US$ millions in 1960 to 231 US$ millions in 1969 and 380 US$ millions in 1974. After liberalization of the economy in 1977, import restrictions were loosened and foreign credit became much more readily available. The accumulated foreign debt tended to increase annually in rupee terms in the 1980s because of the steady depreciation of the rupee in relation to the currencies of the lending nations. The total external debt, including short-term loans and credits, was estimated to be approximately 4 US$ billions at the end of 1986.

Considering the overall situation, the shock of outstanding public debt increased progressively from Rs. 24,752 million in 1977 to Rs. 907,426 million in 1998 showing an annual average growth rate of 11%. The public debt/GDP ratio was 69% in 1977 and it had increased to 89% by 1998. The sharp growth of government debt can be attributed to the budget deficit which increased sharply in relation to GDP requiring more and more borrowings. The average budget deficit as a ratio of GDP is 9.1% from 1996 to 2002 due to rapid increase in government debt. In 2002 it recorded the highest total debt Rs 1,669,282 millions. During this period, the national debt as a ratio of GDP was 105.3%; which consists 59.8% domestic debt and 45.5% foreign debt.

The achievement of fiscal sustainability of Sri Lanka has also been linked to the recently introduce Fiscal Management Responsibility Act (FMRA). FMRA requires the government debt to be a level of 5% and 85% of GDP respectively by 2006. It also requires that the outstanding government debt to be reduced 60% of GDP by 2013.

C. Statement of problem

The issue of debt sustainability is often discussed in the context of fiscal sustainability as the government debt is the final outcome of a fiscal policy of a country. The issue of fiscal sustainability generally revolves around the question of whether the present and prospective fiscal stance is heading towards an excessive and persistent accumulation of debt levels. Hence, in order to maintain fiscal sustainability, fiscal policy should be planed to stabilize the debt/GDP ratio within a feasible range rather than the allowing it to increase to an unsustainable level.

A higher and increasing level of debt has several implications. The government will have to pay a significant amount of its revenue receipts as interest payments on outstanding debt which will increase pressure on the government's ability to meet its other commitments, leaving little room for other essential and development oriented expenditure. It also tends to reduce resources availability to the private sector. Apart from that it also results to increase the interest rates in domestic market. This will increase the cost of borrowing by the private sector occurring crowding out effect heavily that adversely affects to the economic growth of country. High government debt also increases the need for frequent rollover of existing debt making fiscal management more difficult. Furthermore, it limits the maneuvering ability of fiscal policy emphasizing the need for bringing down the level of government debt to more desirable levels in the medium to long run, there by restoring fiscal sustainability.

The persistently high fiscal deficits and associated high level of outstanding government debt stock have raised the questions regarding debt sustainability in Sri Lanka. As a percentage of GDP, the overall budget deficit and the outstanding government debt stock have averaged around 10% and 97% respectively during the period of 1990-2002. Interest payments on outstanding debt have also averaged to 6.3% of GDP during the same period. In particular, there has been a significant increase of outstanding debt from 1997 a year in which the lowest debt/GDP ratio (85.8%) was recorded in the recent past, to 2002 where the debt/GDP ratio rose to 105.3%.

The high level of deficits and debt are the combined outcome of various factors. The slowdown of the government revenue collection and relatively high government expenditure are the major factors that affected the increase in the overall deficit. In addition, the slippage in fiscal consolidation efforts in recent years, the reduction of financial repression with increased liberalization of financial markets and the resulting increase in the average interest rate on government borrowings and the gradual decline in extreme concessional loans, which had helped to keep the average cost of foreign borrowing at a relatively high level, also contributed the worsening of the fiscal position.

The gradual shift in deficit financing process towards more domestic borrowings and the consequent structural change in the outstanding debt stock (towards more domestic debt) and increased debt service payments have further aggravated and

situation. The interest rate on foreign loans has been 9% of total interest payments although foreign loans amount to about 45% of total government debt. The main reason is about 97% of foreign loans have been obtained at highly concessional interest rates. However, the continuous depreciation of Sri Lanka rupee, particularly against currencies in which a large portion of the outstanding foreign debt stock is dominated, such as the Japanese yen and Special Drawing Rights (SDR), has resulted in a significant expansion in the outstanding value of external debt, although net new foreign financing in the budget is very small. The average economic growth rate has also remained below the potential level is recent past. These developments indicate that debt dynamics are likely to worsen in the future in the absence of comprehensive and prolonged fiscal consolidation process and economic growth accelerating efforts.

Therefore, this fiscal policy background has provided more attention to analyze fiscal sustainability and factors affecting to the national debt in Sri Lanka.

D. Objectives of the Study

There are two objectives involve with this study.

1. Analyze the fiscal policy sustainability concerning the joint behavior of debt and budget deficit.
2. Determine the factors affecting to the national debt in Sri Lanka

II. CONCEPTUAL FRAME WORK

A. Government Budget Constraint

Any discussion of fiscal sustainability starts with the dynamic government budget constraint. The change in nominal value of the debt is given by;

$$dB/dS = G + H - T + iB \tag{1}$$

B – Nominal debt
i – Nominal interest rate on debt
G – Nominal government spending on goods and services
H – Transfers
T - Taxes

The value of spending plus transfer, minus taxes is referred as the primary deficit. It will play an important role below, and it is denoted by D. The right side of the equation (1) corresponds to usual definition of the deficit.

As economies are growing over the time, it is more useful to rewrite the budget constraint in term of ratio to GNP. Then equation (1) can be written as;

$$dB/dS = g + h + t + (r - \theta)b = d + (r - \theta)b \tag{2}$$

b – Ratio of real debt to real GNP
g, h, t – Ratio of the primary deficit to GNP
θ – Real rate of growth
r – ex-post real rate of interest (I-JI, where JI is the rate of inflation)

Equation (2) is central to any discussion of sustainability. It says that the evolution of the ratio of debt to GNP depends on two sets of factors. The first, which reflects current spending, transfer and tax rules, is the primary deficit. The second reflects the inheritance from the past, is product of the ratio of the accumulated debt to GNP times the difference between the real interest rate and the growth rate. If this difference is positive, a primary surplus is needed to maintain a constant ratio of debt to GNP.

B. Defining Sustainability

A formal definition can now be given to the notion of sustainability of fiscal policy. Fiscal policy can be thought of as a set of rules, as well as inherited level of debt and sustainable fiscal policy can be defined as a policy such that the ratio of GNP eventually converges back to its initial level, "b_0". Obviously, it would make little sense to classify as unsustainable which implies a temporary bulge in the ratio. The justification for requiring the ratio eventually return to its initial level, as opposed to say to zero, or to a higher but stable level, is, however, much less evident. As noted later, this condition can be substantially relaxed with no change in results; the discussion will be easier once the basic equations have been laid out.

What restriction does sustainability then impose on fiscal policy? To answer the question, the first equation is to use the equation (2) to characterize the evolution of "b". Suppose one starts at time zero with a ratio of debt to GNP equal to b_0 and that fiscal policy as currently deficit to GNP (ds). It is assumed that the difference between "r" and "θ" is a constant and positive. Although, constancy is only for notational simplicity, the assumption that (1- θ) is positive is an important one about which more is said below. The debt to GNP ratio at any time "n" is then given by;

$$b_n = b_0 \exp(r - \theta)\mathrm{n} + \int_0^{\mathrm{n}} d_s \exp(r - \theta)(n - s)ds \tag{3}$$

The ratio of debt to GNP at time "n" is equal to the value of the initial ratio at time zero, accumulated at a rate equal to the difference between the interest rate and the growth rate, pulse the accumulated value, at the same rate, of the primary deficits along the way. Two sample manipulations of equation (3) are needed. First, both sides of equation (3) are pre-multiplied by "exp – (1- θ) (Which in economics term is equivalent to discounting both sides to time zero), yielding;

$$\int_0^n d_s \exp-(r - \theta)sds = -b_0 + b_n \exp-(r - \theta)n \tag{4}$$

Secondly, taking the limit of equation (4) as "n" goes to infinity yields the proposed definition of sustainability. The requirement that the ratio of debt to GNP, "b_n" tends eventually back to "b_0" as "n" tends to identify implies that the discounted value of debt goes to zero;

$$\lim \xrightarrow{n \to x} b_n \exp-(r - \theta)n = 0 \tag{5}$$

Combining equation (4) and (5) yields a second important relation;

$$\int_0^x d_s \exp-(r - \theta)sds = -b_0 \tag{6}$$

Equation (6) says that the fiscal policy is sustainable if the present discounted value of the primary deficit to GNP under the latter policy is equal to the negative of the current level of debt to GNP. Furthermore, putting another and simple way, for a fiscal policy to be sustainable, a government which has debt outstanding must anticipate sooner or later to run primary budget

surpluses. Those surpluses have to be large enough to satisfy equation (6).

C. Fiscal policy and economic growth

Fiscal policy is generally believed to be associated with growth. More precisely, it is held that appreciate fiscal measures in particular circumstances can be used to stimulate economic growth or developement. (Barro, 1990; Barro and Sala – i-Martin, 1992). There is considerable debate over the effect on government fiscal policy on economic growth, especially in developing countries. The impact on fiscal policy on economic growth is a controversial and long-standing topic in economic theory, empirical research and economic policy making. Tanzi and Zee (1997) have discussed that there are three candidate indicators of fiscal policy-government expenditure, taxes and deficits. The literature does not systematically favor one indicator of fiscal policy over the others. In recent years, a vast literature has emerged on the relationship between fiscal policy and long-run economic growth. Generally, the empirical literatures have found an inverse relationship between government spending and growth (Engen and Skinner, 1992; Levine and Renelt, 1992), but there seems to be a positive relationship between the increase in expenditure and the economic growth rate (Easterly and Rebelo, 1993).

In general, government impact can have a positive impact on growth through two main channels: through increasing the quality of factors of production and thus causing increase in output growth, and indirectly through increasing marginal productivity of privately supplied factors of production (Barro and Sala-i-Martin, 1992).

Much of theoretical debate centers on the effect of fiscal expansions on growth where the classical Keynesian theory expects this effect to be positive, and vice versa, fiscal contractions are in this tradition associated with lower growth and recessions.

III. METHODOLOGY

A. Data Description

The time series data during the period of 1950 – 2010 were used in this study. Data is obtained from various issues of the Central Bank reports published by Central Bank of Sri Lanka. Data was analyzed using E-views statistical software.

B. Model 1- Determine the Fiscal Sustainability using Inter-Temporal Budget Constraint Approach

a. Theoretical Derivation of IBC Approach

In this present theoretical derivation of the IBC that satisfied the fiscal sustainability. Fiscal process is sustainable if the expected discounted value of the debt convergence to zero.
Consider the government budget identity;

$$B_t - B_{t-1} = r_1 B_{t-1} + d_t \qquad (1)$$

Where;
B_t – Real stock of outstanding debt at the end of year "t"
r_t – Real rate of interest during the period "t"
d_t – At period "t" net-of-interest "deficit"
Equation (1) describes the evaluation over the time of stock variable B. Let I_{t-1} denote the information set of private agents at the beginning of period "t". Assume that r_t is stochastic with $E(r_{t+1}/I_{t-1})=r$, for all $i \geq 0$. R_t will be used to denote the realized

gross rate of return $1+r_t$, and its expected value will be denoted by R. Further, assume that while B_{t-1} is in I_{t-1}, neither r_t nor d_t are in I_{t-1}. Taking expectation of equation (1), conditional on the information set I_{t-1} and recursively eliminating future value of the stock debt yields the IBC.

$$B_{t-1} = -\sum_{j=0}^{\alpha} R^{-(j+1)}(d_t / I_{t-1}) + \lim R^{-(j+1)} E(B_{t+j} / I_{t-1})$$

(2)

Under the hypothesis of present value budget value balance, the last term in equation (2) must be equal to zero.

$$\lim_{j \longrightarrow \alpha} R^{-(j+1)} E(B_{t+1} / I_{t-1}) = 0$$

(3)

If the condition (3) is satisfied, the discounted value of the expected future stock of debt convergence to zero as the time horizon goes to infinity. Then the equation (2) implies that the current outstanding real stock of debt B_{t-1}, must be equal to the present discounted value of current and expected future net-of-

$$\sum R^{-(j+1)}(d_t / I_{t-1})$$

interest surpluses, -   . (Trehan, B and Walash, C.W, 1991).

b. Theoretical Derivation of Inter-Temporal Budget Constraint Model for Sri Lanka

The derivation of IBC in this section is mainly drawn from the work by Grasen and Nellor (1997). The relationship between the government debt and fiscal deficit is described by the following equation.

$$B_t = B_{t-1} + r_{t-1} B_{t-1} - S_t \qquad (4)$$

Where;
B – Total debt
r – Interest rate
S – Primary deficit

$$S = G_t - R_t$$

G – Expenditure net of interest rate
R – Revenue
This can be written as;

$$B_t = (1 + r_{t-1}) B_{t-1} - S_t \qquad (5)$$

This equation describes the dynamics of accumulation of debt at time "t", can be given as a function of previous debt, amount of interest rate for previous debt and primary surplus at time "t".
The government budget identity for Sri Lanka is as follows (Siriwardena M, 1998)

$$D_t + X_t D_t = (1 + r_{t-1}) D_{t-1} + (1 + r^*_{t-1}) X_t D^*_t - S_t - \sigma_t \qquad (6)$$

D_t – Domestic currency denominated net total debt
D^*_t – Foreign currency denominated net total debt in foreign currency
X_t – Current period exchange rate
r_{t-1} – Interest rate on domestic currency denominated debt
r^*_{t-1} – Interest rate on foreign currency denominated debt
S_t – Primary surplus of government
σ_t - Increase of the nominal stock of reserve money (or base money)
Hence,

$$B_t = D_t + X_t D^*_t \qquad (7)$$

B_t – Net total debt measured in domestic currency

Define δ_t as the proportional depreciation rate of the exchange rate.

$$\delta_t = \Delta X_t / X_t$$ In period "t". Then equation (6) can be written as

$$B_t = (1+r_{t-1})B_{t-1} - s_t + X_t D^*_{t-1} + \{(1+r^*_{t-1}) - (1+r_{t-1})(1-\delta_t)\} - \sigma_t \qquad (8)$$

Defining the augmented primary surplus, in order to account for changes in debt due to variations from uncounted interest parity and the increase in the reserve money as

$$S'_t = S_t - X_t D^*_{t-1}\{(1+r^*_{t-1}) - (1+r_{t-1})(1-\delta_t)\} + \sigma_t \qquad (9)$$

Then, the equation (8) can be written as

$$B_t = (1+r_{t-1})B_{t-1} - S'_t \qquad (10)$$

As suggested by Wilcox (1989), the following discounted factor is applied to discount the variables from period "t" back to period "0".

$$Q_t = \pi_{j=0}^{t-1} \frac{1}{1+r_j}; Q_0 = 1$$

This allows stochastic interest rates in the process, as against the assumption of fixed interest rate made by Hamilton and Flavin (1986). The realization of Q_t will be known as time "t". Applying this discounted factor in to equation (10) the discounted variables can be obtained in the following form.

$$Q_t B_t = Q_{t-1}B_{t-1} - Q_t S'_t \qquad (11)$$

Letting b_t and S_t as the discounted value of the debt and augmented primary surplus respectively, equation (10) can be written as follows.

$$b_t = b_{t-1} - S_t$$

Rearranging the above equation

$$\Delta b_t = b_t - b_{t-1} = -S_t \qquad (12')$$

This implies that the changes in the discounted value of the debt at period "t" equals to the discounted primary surplus at period "t".

As Hamilton and Flavin (1986) pointed out, forward recursive substitution of equation (12) yields the following equation.

$$b_t = b_{t+N} + \sum_{j=1}^{N} S_{t+j} \qquad (13)$$

If the first term of the right hand side of the equation (13) goes to zero or is non-positive in the final period, the stock of debt will be zero or non-positive in a finite horizon economy. In an infinite horizon economy if the transversality condition holds;

$$N \xrightarrow{Lim} \alpha \; E_t b_{t+N} = 0 \qquad (14)$$

Then, the outstanding debt of time "t" equals to the present discounted value of future augmented primary surpluses. The, term E_t is equation (14) act as the expectation operator based on the information at time "t". This stated that the expectation at time "t" of the present value of future government debt go to zero in the limit. Then, the supply this condition to equation (13) the government IBC can be obtained as follows.

$$b_t = \sum_{j=1}^{\alpha} S_{t+j} \qquad (15)$$

When b_t is the current stock of debt and S_t is the expected future augmented non interest (primary) surplus. If the debt stock is positive, government will have to make negative primary surpluses in the future to compensate current positive primary surpluses.

The sustainability of fiscal policy can be determined by obtaining the forecast trajectory of stochastic process of the b_t and testing whether $N \xrightarrow{\lim} \alpha \; b_{t+N} = 0$. If forecasted trajectory of the discounted debt convergence to zero, fiscal policy can be considered as sustainable (Wilcox, 1989). In order to conduct econometric analysis it is assumed that b_t (discounted debt) follows Multivariate Auto Regressive Integrated Moving Averaged (ARIMA) process as suggested by Wilcox (1989). In this analysis b_t should display two properties. First, it has to be stationary and secondly, b_t must have its unconditional means equals to zero. If non-stationary is found, then it would imply that the policies pursued during the sample period would be unsustainable and if they were adhered in to the indefinite future, imply ultimate insolvency of the government.

The following model is used to ascertain the stationary of discounted net total debt.

$$b_t = \alpha + \beta b_{t-1} + u_t \qquad (16)$$

Where,

b_t – Discounted net total debt at time "t"
α – Drift term
β – Auto regressive parameter
U_t – Random error term

$$E\left(e_t / Y_{t-1} Y_{t-2}.........Y_0\right) = 0 \qquad (17)$$

The error term is assumed to be independent and identically distributed. The equation (16) is used a conventional model developed by Dicky and Fuller (1979) for unit root tests. β is the parameter concern in this analysis. The discounted net debt will be stationary if β is less than one. If b_t follows a equation (16) it has unit root if and only if β=1. If α=0 and β=1, b_t follows a random walk without drift (with the innovations e_t satisfying (17)). If $\alpha \neq 0$ and β = 1, b_t is a random walk with drift, which means that E(b_t) is a linear function of "t". A unit root process drift behaves very differently from without drift. Nevertheless, it is common to leave α unspecified under null hypothesis and this approach applied for this study. Therefore, the null hypothesis has unit root.

H_0: β = 1

In almost all cases it is interested in one side alternatives.

H_1: β < 1

(In practice this means 0< β<1 as β<0 for series that we suspect it has unit root would very rare) Alternative H_1: β > 1 is not usually considered, since it implies that b_t is explosive. In fact, if α > 0, b_t has an exponential trend in its mean when β > 1.

When $|\beta < 1|$, b_t is stable AR(1) process which means it is weakly dependent and asymptotically uncorrelated. A convenient test for carrying out the unit root test is to substrct $bt-1$ from both sides of the equation (16) and defines θ = β − 1. Then equation (16) become;

$$\Delta b_t = \alpha + \theta b_{t-1} + e_t \qquad (18)$$

E_t satisfied condition of equation (17). This is dynamically completed model and hence it seems to be straight forward to test.

H_0: $\theta = 0$

H_1: $\theta < 0$

Further, this study analyzes the unit root is more completed dynamic process adding more lags for equation (18). Then it becomes;

$$\Delta b_t = \alpha + \theta b_{t-1} + \gamma \Delta b_{t-1} .... \gamma_p \Delta b_{t-p} + e_t \qquad (19)$$

Then, t-test is carried out on θ, the coefficient on b_{t-1} as before. This extended version on Dicky Fuller is known as Augmented Dicky Fuller Test (ADF Test).

Then, this can be modified using time trend as follows.

$$\Delta b_t = \alpha + \delta_t + \theta b_{t-1} + \gamma \Delta b_{t-1} .... \gamma_p \Delta b_{t-p} + e_t \qquad (20)$$

Pillips and Perron (1988) have introduced another more useful test for unit roots where the residuals are not necessarily white noise in this test. In order to make the results more robust, the econometric analysis of this study based on these three targets. In addition to discounted net total debt, the total debt as a percentage of GNP or debt/GNP ratios will be analyzed using the same models.

Moreover, the definition for the variable areas follows. The net total debt cossets of net total domestic debt and bet foreign debt. The net total domestic debt calculated by adjusting government domestic debt to treasury bills held by Central Bank of Sri Lanka. The net total foreign debt consist of public and publicly guaranteed long term and short term foreign debt and use of IMF credit for Sri Lanka. Foreign assets are subtracted this figure. In order to discount the variables, government rupee loan interest rate and Treasury bill yields rate used. It is difficult to find one discount rate which represents the true marginal cost of public debt. This is the main limitation of this study. Therefore, in order to obtain more accurate findings, two different discount rates are used in this study.

C. Model 2 - Determining the Factors Affecting the National Total Debt in Sri Lanka

In order to achieve this objective, regression analysis has been applied according to the Ordinary Least Squares (OLS) method. Further, following model is used to determine the factors affecting to the national total debt in Sri Lanka.

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + U \qquad (20)$$

Y – Total national debt

X_1 – GDP

X_2 – Budget deficit

X_3 - Economic policy – Dummy variable

    $X_3 = 1$: Open economic policy

    $X_3 = 0$: Otherwise

X_4 – Time trend

X_5 – Ethnic problem – Dummy variables

    $X_5 = 1$: War period

    $X_5 = 0$: Otherwise

IV. RESULTS AND DISCUSSION

A. Results of IBC Approach

This section presents the results of model 1 and model 2 that mention in the previous section. Table 1 illustrates the results of equation (18).

Table 1: DF Test Results for Discounted Net Total Debt

Test Variables	α	θ
b_1	109.82 (674.39) (0.16)	0.159 (0.06) (2.47)
b_2	218.62 (801.33) (0.27)	0.12 (0.05) (2.36)
b_3	3.91 (2.02) (1.93)	-0.033 (0.02) (-1.177)
Critical Value		
1%	-3.55	
5%	-2.91	
10%	-2.59	

Note: Standard errors are in the first parentheses and test statistics are in the second parentheses.

b_1 – Discounted net debt by government rupee loan interest rate

b_2 – Discounted net debt by Treasury bill yield rate

b_3 – Net total debt as a percentage of GNP

*** - Significant at 1%

** - Significant at 5%

* - Significant at 10%

According to DF test results illustrated in above table, the parameter θ is not significant at any significance level. Therefore, the results are in unit root process. This situation reflects un-sustainability of Sri Lanka's fiscal policy system.

Table 2: ADF Unit Root Test Results for Discounted Net Total Debt and Net Total Debt-GNP Ratio with Drift

	Number of Lags		
Critical Value	1	2	3
1%	-3.56	-3.56	-3.56
5%	-2.91	-2.92	-2.92
10%	-2.59	-2.25	-2.59
With Drift Only			
b_1	0.24 (0.11) (2.14)	0.246 (0.43) (1.72)	0.44 (0.18) (2.32)
b_2	0.223 (0.15) (1.46)	0.41 (0.18) (2.26)	0.24 (0.08) (2.97)*
b_3	-0.039 (0.02) (-1.31)	-0.034 (0.03) (-1.08)	-0.03 (0.03) (-0.96)

Above table illustrates the results of ADF test for discounted net total debt and net total debt to GDP ratio with drift and three lags. According to this result, net total debt discounted by Treasury bill yield rate with only third lags case is significantly shown stationary process at 10% significance level. Remaining cases reflect that fiscal policy is un-sustainable.

The following table presents the results of ADF test for discounted net total debt and net total debt to GDP ratio with drift and trend variable.

This result also points out except debt discounted by Treasury bill yield rate with two lags. Therefore, in all other cases null

hypothesis cannot be rejected. Hence, fiscal policy system is in non stationary process. Thus, this result also evidence for un-sustainability of fiscal policy of Sri Lanka.

Table 3: ADF Unit Root Test Results for Discounted Net Total Debt and Net Total Debt-GNP Ratio with Drift and Trend

	Number of Lags		
Critical Value	1	2	3
1%	-4.14	-4.14	-4.15
5%	-3.49	-3.50	-3.50
10%	-3.17	-3.17	-3.18
With Drift and Trend			
b_1	0.41 (0.13) (2.93)	0.2229 (0.08) (2.67)	0.42 (0.23) (1.79)
b_2	0.22 (0.88) (2.48)	0.37 (0.11) (3.26)*	0.20 (0.88) (2.27)
b_3	-0.25 (0.094) (-2.706)	-0.034 (0.10) (-2.69)	-0.03 (0.01) (-2.21)

The following illustrates Phillips-Parron Test results for two discounted debt series and debt to GDP ratio with drift.

Table 4: Phillips-Parron Unit Root Test Results for Discounted Net Total Debt and Net Total Debt-GNP Ratio with Drift

	Number of Truncation Parameters		
Critical Value	1	2	3
1%	-3.55	-3.55	-3.55
5%	-2.91	-2.91	-2.91
10%	-2.59	-2.59	-2.59
With Drift			
b_1	2.32	2.41	2.13
b_2	1.97	1.57	1.23
b_3	-1.18	-1.18	-1.16

The following results also show Sri Lanka's fiscal policy is in un-sustainable way since they are in non-stationary process reflecting unit root process.

Moreover, the following table summarizes Phillips-Parron test results for two discounted debt series and debt to GDP ratio with drift and trend.

Table 5: Phillips-Parron Unit Root Test Results for Discounted Net Total Debt and Net Total Debt-GNP Ratio with Drift and Trend

	Number of Truncation Parameters		
Critical Value	1	2	3
1%	-4.14	-4.14	-4.14
5%	-3.49	-3.49	-3.49
10%	-3.17	-3.17	-3.17
With Drift and Trend			
b_1	2.32	3.08	2.39
b_2	2.81	2.72	2.06
b_3	-2.55	-2.61	-2.57

After including the trend term also, the results indicate that un-sustainability of Sir Lanka's fiscal policy under the Phillips-Parron test.

Considering all results of DF, ADF and PP tests, Sri Lanka's fiscal policy system is un-sustainable for discounted two debt series and debt GDP ratio. In very few cases, it reflects Sri Lanka's fiscal policy system is sustainable. Sometimes, high interest rate may cause these different results. It is difficult to find appropriate discount rate which represented true marginal cost of public debt for developing countries like Sri Lanka.

Moreover, the second model was used to quantify the factors that influence to increase the total debt in Sri Lanka.

B. Results of the OLS Regression

The following table indicates the results of OLS regression that was employed to identify the factors that affect to national total debt in Sri Lanka.

Table 6: Results of the OLS Regression

R- square	0.98			
Adjusted R-square	0.98			
Variables	Coefficients	Standard Error	t-Values	Prob.
Intercept	-97867.53***	25205.86	-3.88	0.00
GDP	1.16***	0.26	4.51	0.00
Budget deficit	7.51***	0.79	9.45	0.00
Economic policy	-29677.94	37620.43	-0.79	0.00
Time Trend	7478.11***	2203.87	3.39	0.00
Ethnic problem	99664.718***	38032.73	2.62	0.01

*** - Significant at 1% level

According to the results overall results is good in fit since there is a higher R-square and adjusted R square values. Almost same R-square and adjusted R square values also suggest that sufficient variables have been included in the model. The variables GDP, budget deficit, time trend and ethnic problem are highly significant and show positive relationship with total debt. The relationship further emphasizes the above DF, ADF and PP unit root test results of un-sustainable way of Sri Lanka's fiscal situation. The most obvious reason that affects to increase debt is higher growth of GDP. With a liberalized policy, Sri Lanka's GDP growth rate is increased because of investment on industrial and services sectors. Most of this investment is supplied by foreign and domestic debt and this situation badly affect the fiscal system. Budget deficit also highly affects to increase the net total debt in Sri Lanka. Especially, except two years; Sri Lanka recorded higher rate of budget deficit and it resulted to increase the debt. According to the figure -1 in the introduction part showed the gap between debt and budget deficit. Economic policy i.e. open economic policy compared to the closed economic situation does not significantly affect the debt level. However, with the time trend there is a positive and significant relationship with the debt level. The main reason for this situation is also high growth rate of GDP and political instability with war in 1980s decade. With the continuing war situation in Sri Lanka, especially after 1980; defense expenditure is highly increased. Therefore, Sri Lanka had to depend on more foreign and domestic debt. This situation also increases the debt level in Sri Lanka.

Hence, the overall results suggest that Sri Lanka's fiscal policy is in a un-sustainable position and GDP, budget deficit, ethnic

problem and time trend are positively affect to the national debt level.

V. CONCLUSION AND POLICY IMPLICATION

A. Conclusion

The budget deficit constitutes a major fiscal indicator as it has important ramifications on a country's macroeconomic position. Without fiscal sustainability, no economic development strategy get succeed. Unfortunately, in many emerging markets and developing countries, weak political institutions, incompetent and corrupt public administrations impose very strict limits on the amount of public debt, internal and external, that can be carried. In principle, tight constraints on government borrowings and debt capacity does not prevent from reaping the benefits of consumption smoothing. In developing countries particularly, governments are likely spend more on various obligations incurring high expenditure costs though revenue sources are limited. This leads to incur budget deficit. According to Keynesian Theory, budget deficit through expansionary spending and increased borrowing have desirable counter cyclical and growth effects. The higher deficit has resulted in accumulation of debt over the years and this is more common in developing countries. Sri Lanka also faces budget deficit and a higher rate of accumulation of debt. This situation causes the un-sustainability of fiscal policy.

Hence, in this study analyzed the fiscal sustainability of Sri Lanka using IBC approach and determine the factors that affect to the net total debt in Sri Lanka using OLS regression model. Time series data from 1950 to 2010 were used for the analysis. Further, DF, ADF and PP unit root test results reflect Sri Lanka's fiscal policy is un-sustainable in almost all cases and OLS regression model emphasizes that GDP, budget deficit, time trend and ethnic problem in Sri Lanka positively related with national debt level.

B. Policy Implication

This analysis suggested the need for fiscal consolidation measures to address the problem of sustainability. In this regards, the reduction of budget the deficit would constitute an important fiscal adjustment measures towards a more sustainable deficits. The adjustment would be made in mainly two ways i.e. trough increased tax revenues and decreased government expenditure. However, increase in tax revenue would be a difficult task because of the inelastic nature of the tax base in Sri Lanka. However, this achievement can be reached by improving tax administration, introducing new tax and introduce broad base tax system. Although the revenue could be increased through the taxes, there will be a limited opportunity because higher taxes may reduce private sector participation in the production activities. Therefore, reduction in expenditure would be other alternative way. The minimization of the welfare expenditure, better targeting of welfare programmes, reduction of transfers to corporation and specially reduce the defense expenditure can be introduced as important policy implications. As an important way of obtaining primary surpluses (or at least to reduce the budget deficit to considerable level), reduction of interest burden is important. This will have favorable effect on the debt procedure since interest payments have significantly increased recent years.

REFERENCES

[1] Barro, R.J and Sala-i-Martin, X. (1999), Economic Growth. Massachusetts: MIT Press.

[2] Barro, R.J and Sala-i-Martin, X. (1992b), "Regional Growth and Migration: AJapan-United States Comparison", Journal of the Japanese and International Economies, 6, 312-346.

[3] Blanchard O. Jean Claude Chouraqui Robert P. Hagemann and Nicola Sartor 1990, "The Sustainable of Fiscal Policy, New Answer to an Old Question", OECD Department of Economics and Statistics Working Paper No.15 (Autumn), pp7-36

[4] Central Bank of Sri Lanka, Annual Report (Various Issues)

[5] Dicky, David A. and Wayne A. Fuller (1979), "Distribution of Estimator for Autoregressive Time Series with a Unit Root", Journal of the American Statistical Association, Vol.74 (July), pp 427-431

[6] Dicky, David A. and Wayne A. Fuller (1981), "Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root", Econometrica, Vol.49 (July), pp 1057-72

[7] Easterly, W and Rebelo, S. (1993). "Fiscal Policy and Economic Growth; An Empirical Investigation", Journal of Monetary Economics, 32 (December)

[8] Engen, E and Jonathan, S. (1992). "Fiscal Policy and Economic Growth", Bureau of Economic Research Working Paper, # 4223

[9] Gerson, P. and David, N. (1997), "Philippine Fiscal Sustainability, Growth and Savings in Maroeconoic Issues Facing ASEAN COuntries"

[10] Hamilton, J.D. and Flavin, M. (1986), "On the Limitation on Government Borrowing: A Frame Work for Empirical Testing", American Economic Review, Vol 76 (September), pp 808-819

[11] Levine, R. and David, R. (1992), "A Sensitivity Analysis of Cross-Country Regressions", American Economic Review, 82 (September), pp 942-963

[12] Phillips, P.C.B. and Pierre, P. (1988), "Testing for Unit Root in Time Series Regression", Biometrica, Vol. 75, pp 335-46.

[13] Siriwardeana, K.M.M, (1998), "An Analysis of Fiscal Sustainability in Sri Lanka", Staff Studies, Central Bank of Sri Lanka.

[14] Tanzi, V. and Howell H. Z. (1997), "Fiscal Policy and Long-Run Growth", International Monetary Fund Staff Papers, 44 (June):n179-209

[15] Trehan, B. and Walsh, C.E. (1991), "Testing Inter-Temporal Budget Constraint: Theory and Application to US Federal Budget and Current Account Deficits", "Journal of Money Credit and Banking, Vol.23, No. 2, pp 206-23

[16] Wilcox, D.W., (1989), "The Sustainabilty of Government Deficits: Implications of the Present Value Borrowing Constraint", Journal of Money, Vol 21, (August), pp 291-306

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