Research on

Assessing Government Debt Sustainability in Sri Lanka

Debt sustainability is an important element of overall fiscal development. Its impact also spreads to overall economy of a country including monetary sector. Therefore, assessing the debt sustainability of a country is very important. This study focuses on the debt to GDP ratio in the medium term. Accordingly, a Structural Vector Auto Regression Model (SVAR) is used to project endogenous variables related to debt dynamic and to estimate the joint dynamic impact of structural shocks on the relevant variables that affect the debt level. The results were incorporated in to a debt dynamic equation to project the debt to GDP ratio and to measure the combined impact of shocks to the level of debt and the fiscal effort required to maintain the debt to GDP ratio at the projected levels.

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1. Introduction

The stock of outstanding government debt obligations resulting from government borrowings is one of the major indicators of fiscal policy. It is a by-product of the overall fiscal operations. Government borrowings facilitate the smoothening of consumption and assist the development of a country by generating opportunities to finance public investment. Though it appears to be a virtuous force, it could grow to be a vicious force if it is not managed prudently. In other words, high indebtedness makes a country more vulnerable to shocks and crisis. Further, it can reduce the effectiveness of fiscal and monetary policies. High indebtedness can reduce the ability of the monetary authority to raise interest rates for monetary policy purposes due to its effect on the deficit and debt. As highlighted by the debt overhang hypothesis, high indebtedness affects the behaviour of economic agents through the expectation of further increase in taxes to service debt. Hence, counter- cyclical fiscal policy that is measures taken to increase investment to boost the economic activities when an economy grows slowly and vice versa might be a disincentive to investors when a country is suffering from high indebtedness as explained in the Recardian Equivalence. Accordingly, it discourages investment and negatively effects economic growth. It has perverse effects on debt sustainability in the medium term (Roubini, 2001). In the worst case scenario it can lead a country towards a financial crisis. High indebtedness has been at the heart of several crises, including the prominent ones experienced in Argentina, Brazil, Turkey and Uruguay, USA and the Euro zone.

Debt sustainability has become a popular topic among policy makers with the advance consequences of the recent global economic recession and debt crisis in Euro zone and USA.

Countries all over the world have focused their attention on debt sustainability, since it is critical to achieving fiscal sustainability. With the adverse impact of the global financial crisis, achieving fiscal sustainability has been a challenge since most countries were forced to run fiscal deficits to finance higher public expenditure required to stimulate economic activity, resulting in higher indebtedness. According to the International Monetary Fund Staff estimates published in the World Economic Outlook, October 2010, fiscal deficits of advanced economies increased from pre-crisis levels of around 1.1 per cent of PPP-weighted GDP in 2007 to 8.8 per cent of PPP-weighted GDP in 2009. Emerging economies,

which recorded an average fiscal surplus of 0.5 per cent of PPP-weighted GDP prior to crisis in 2007, recorded an average fiscal deficit of 4.5 per cent of PPP-weighted GDP in 2009. Similarly in developing Asia, the average fiscal deficit of around 0.8 per cent of PPP-weighted GDP recorded in 2007 increased to an average fiscal deficit of 4.6 per cent of PPP-weighted GDP in 2009.

Table 1
Fiscal Balance in PPP-weighted GDP

	2007	2008	2009
Advanced economies ((-) deficit, (+) surplus)	-1.07	-3.65	-8.80
Emerging and developing economies ((-) deficit, (+) surplus)	0.53	-0.11	-4.47
Developing Asia ((-) deficit, (+) surplus)	-0.83	-2.25	-4.63

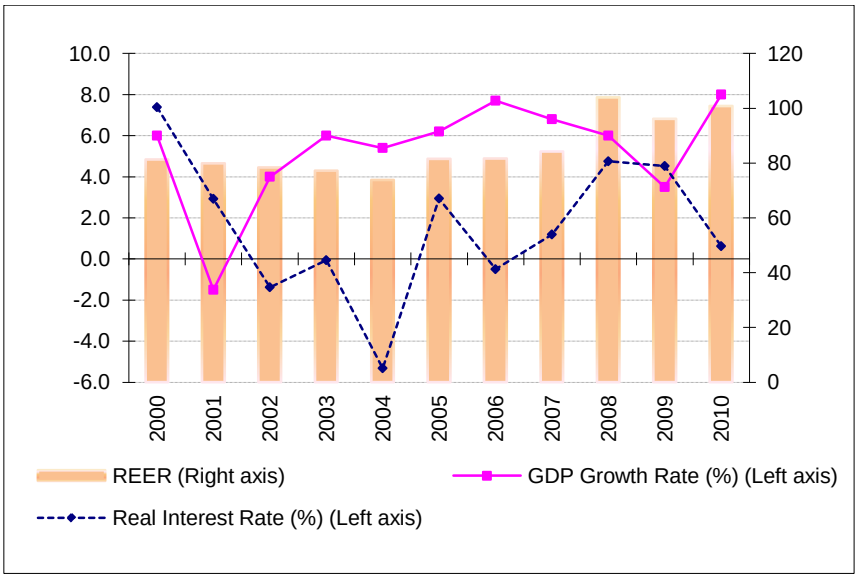
Source: International Monetary Fund, World Economic Outlook Database, October 2010

Sri Lanka is not an exception in this context. Sri Lanka has repeatedly experienced deviations of actual fiscal operations from original fiscal targets. In the original budget in 2009, it was expected fiscal deficit could be reduced to 5.9 per cent of GDP. With the impact of the global economic recession the fiscal deficit was reversed to 7 per cent of GDP. In 2009, it further increased to 9.9 per cent of GDP, which is the second highest level of fiscal deficit recorded during the last two decades. Reflecting the adverse consequences of this outcome, in 2009 the total outstanding debt stock of Sri Lanka increased by 16.8 per cent from Rs. 3.6 trillion in 2008 to Rs. 4.2 trillion in 2009 in absolute terms. During the last two decades, the total debt stock increased from Rs. 0.3 trillion in 1990 to Rs.4.2 trillion in 2009 which is an increase of 93 percent in absolute terms. However, with the recovery of the economic crisis together the fiscal consolidation measures of the government, the fiscal deficit declined to 8 per cent of GDP in 2010 contributing to reduce the debt burden.

The total debt stock consisted of 56 per cent of domestic debt and 44 per cent of foreign debt at the end of 2010. Of the total foreign debt stock, concessional borrowing which was 92. per cent in 2006 declined gradually to 65.6 percent by 2010 with the opening of Treasury bills and bonds market to foreign investors from 2007 and the issuance of international sovereign bonds from 2008. Decline in access to foreign concessional borrowing has with the graduation of the country as a middle income economy was the main reason for moving toward non concessionary borrowings.

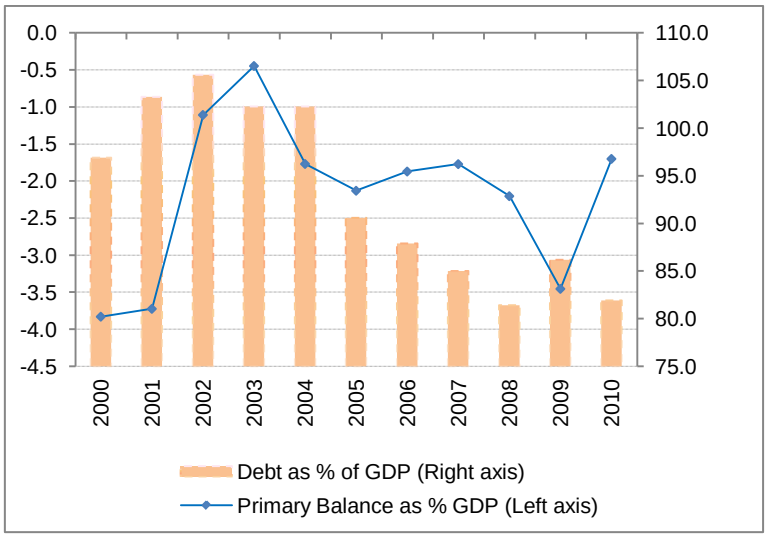
Nevertheless, considering the behaviour of the key macro variables that are important in debt management as explained above, it clearly shows that negative and slow growth, high real interest rates[1] and the real depreciation of the rupee measured by the real effective exchange rate (REER)[2] together have resulted in an increase in the debt burden during 2000 to 2004 to about 102 per cent of GDP on average. The trend was reversed in 2005 and it declined gradually to 81.4 per cent of GDP in 2008. The negative real effective interest rate except in 2009, the increasing trend in GDP, the real appreciation of the rupee and the improvement in the primary balance have helped to reduce the debt burden from 2005. However, the declining trend in the primary deficit reversed in 2009 due to the decline in real GDP with the impact of the global economic recession and an increase in non interest expenditure with the post war resettlement and development activities. The situation was favourable in 2010, declining the primary deficit to 1.7 per cent of GDP with the fiscal consolidation measures and improvement in the real GDP growth contributing to reduce the debt to DGP ratio to 81.9 per cent of DGP. (See Figures 1 and 2).

Figure 1
Behaviour of Key Macro Variables



[1] One year Treasury bills rate adjusted for inflation was taken as a proxy for real interest rate.
[2] Real effective exchange rate (REER) is in terms of 24 trading partner and competitor countries.

Figure 2
Behaviour of Key Fiscal Variables



2. Aims and objectives

The objective of this study is to assess the debt sustainability in Sri Lanka. The study will specifically identify the key fiscal and macro economic variables which affect debt sustainability in Sri Lanka, namely the real interest rate, the exchange rate and economic growth rate. The study aims to identify the structural behaviour of debt dynamics and to measure the joint dynamic effects of the variables on the debt to GDP ratio. Further, the study will propose the required adjustments in the fiscal and macroeconomic sectors to mitigate the unfavourable impact of shocks to the debt to GDP ratio.

3. Literature Review

For a country to maintain its government debt at a sustainable level, the future primary balance of the government, which is the difference between total government revenue and total government expenditure, excluding interest payment, should be large enough to meet its debt obligations. There are a number of studies on public debt sustainability. Researchers have developed various models to estimate the sustainable level of debt.

Some researchers have used general equilibrium models, calibrated for a particular country of interest, which shed light on a targeted debt level. Aiyagari and McGrattan (1998) develop such a general equilibrium model to determine the optimal quantity of risk free public debt and the welfare costs of deviating from the optimum level. This paper further

discusses the benefits and risks of public debt. The model is calibrated for the United States. However, it focuses on a closed economy to determine the optimal debt ratio.

The International Monetary Fund's (IMF) approach to debt sustainability analysis can be categorised into two frameworks. One is the traditional analysis of debt sustainability and the other one is the new sustainability framework. As explained by Da Costa and Ramon (2005) the traditional approach projects the medium and long term debt ratio using a baseline scenario. The baseline scenario assumes the future primary balances and macroeconomic parameters, such as the real interest rate, real GDP growth rate, inflation and exchange rate to project the debt ratio that reflects current and announced policies and market reactions. The trend of the debt ratio under the baseline projection, the debt level, and structure are taken into consideration to determine the sustainable debt level. It appears that this traditional approach depends heavily on the baseline scenario in determining the sustainable debt level.

The IMF's new approach to debt sustainability involves a standard template for projection of debt. This new approach addresses the unexpected shocks that any economy could face by conducting stress tests that provide statistical upper bounds on estimation of the debt ratio. Accordingly, the baseline scenario must be complemented with stress testing.

The Overborrowing Hypothesis uses a relative approach to ascertain the gravity of the existing debt situation. Under this approach a benchmark debt ratio is calculated and the current debt ratio is compared with the benchmark ratio. If the current level exceeds the benchmark, it is considered as a situation of over borrowing. This approach can be reprecented as follows,

$$d^* \cong \frac{ps}{r-g} = \frac{rev - pexs}{r-g}$$

where, *ps* is the constant primary surplus as a percent of GDP expected into the future and *d** is the benchmark debt level. The difference between the average total revenue ratio and the average primary expenditure ratio in a particular period of the history is considered as the primary surplus. The real interest rate and economic growth rate are given by *r* and *g*, respectively. The benchmark debt ratio is calculated as the present value of expected primary surpluses as a percentage of GDP over an infinite period, assuming that the real

interest rate remains higher than the economic growth rate. This benchmark debt ratio is considered as the steady state solution for debt dynamics and this hypothesis is based on the assumption of an unchanged primary surplus. According to an empirical study conducted by the IMF, the government revenue ratio, trade openness and property rights contribute to reducing overborrowing.

Mendoza and Oviedo (2004) developed a Natural Debt Hypothesis which calculates the tolerable debt ratio under a crisis situation if the primary balance remains at its lowest value and this debt level is considered as the upper bound. This upper bound of debt ratio is called the Natural Debt Limit (NDL). It can be presented as

$$d^* = \frac{rev^{min} - pex^{min}}{r - g}$$

where d^* is the NDL and r and g stand for the real interest rate and economic growth rate, respectively. The minimum ratio of revenue to GDP is rev^{min} and pex^{min} is the minimum level of primary expenditure to GDP ratio that the government can reduce its expenditure in a crisis situation. According to this model, shocks force the government to adjust spending to a minimum tolerable level to maintain indebtedness at a tolerable level in a crisis situation where there is no access to the debt market. If the debt ratio is lower than NDL at a particular time, the government increases the debt ratio to finance its primary expenditure. On the other hand, primary expenditure should be reduced to the minimum level, if the debt ratio is equal to NDL at a particular time.

Croce and Ramón (2003) developed an operational recursive algorithm to derive fiscal sustainability using the law of motion of the debt ratio and two additional variables. The conceptual framework for assessing solvency is based on the government intertemporal budget constraint.

Accordingly, the law of motion of debt-to-GDP ratio, (d_t) can be obtained as:

$$d_t = \beta_t d_{t-1} - ps_t$$

where ps_t represents the ratio of primary surplus to GDP, while d_t and d_{t-1} represent debt to GDP ratio in time t and debt to GDP ratio in time $t-1$,respectively. The discount factor is $\beta = (1+r_t) / (1+g_t)$, where r is the real interest rate and g_t is the real GDP growth and it indicates the impact of the differential of interest rate and real growth rate on the debt to

GDP ratio. Accordingly, it shows that the debt stock of the government will increase over time in the presence of a persistent primary deficit and a higher interest rate than the economic growth rate, given that there are no shocks or corrective policies. If the discount factor (β) is constant over the time by solving the equation for *N* period, Croce and Ramón (2003) reprecents the formal condition for solvency as:

$$d_t = \beta^{-1} ps_{t+1} + \beta^{-2} ps_{t+2} + \cdots + \beta^{-N} ps_{t+N} + \beta^{-N} d_{t+N}$$

Accordingly, the discounted value of future primary surpluses is equal to the value of its outstanding stock of debt .It implies theat afterN period of time debt stock should be equel to zero ($d_{t+1} = 0$). This is named as the strict condition for solvency.

The authors use two additional equations with the low of motion of debt ratio to characterise a fiscal rule or a policy reaction function. Accordingly, they derive the law of motion of debt ratio which includes the policy reaction parameter λ_t as:

$$d_t = (\beta_t - \lambda_t) d_{t-1} - (\beta^* - \lambda_t - 1) d^*$$

where, d^* is the targeted debt ratio and β^* is the discount factor that would enable convergence to d^*.

Assuming that the debt ratio at time t-1 is higher than the long term target for that ratio, the authors state that $(\beta_t - \lambda t) < 1$, d_t would converge to d^*. Therefore, $(\beta_t - \lambda_t)$ is recommended as an indicator of fiscal sustainability (IFS).

$$\text{IFS}_\text{t} = (\beta_t - \lambda_t) = \left[\frac{1 + r_t}{1 + g_t} - \frac{ps_t - ps^*}{d_{t-1} - d^*} \right]$$

As per this equation, if IFS is below 1, it indicates a sustainable fiscal position and if it is above or equal to 1, it signals unsustainability.

Celasun, Debrun and Ostry (2007) described a probabilistic approach using fan charts to asses debt sustainability in an open economy. The approach is developed to determine the combined impact of shocks to the endogenous variables of debt dynamics resulting from the covariance between the fiscal and nonfiscal variables. The approach is applied to Argentina, Brazil, Maxico, South Africa and Turkey. The simulation algorithm consists of three steps. First, a fiscal reaction function, which describes the average fiscal policy pattern of the

considered economies is estimated. Second, an unrestricted Vector Auto Regression (VAR) is estimated to capture joint statistical properties of non fiscal variables namely, interest rate, growth rate and exchange rate and to generate forecasts of these variables consistent with the simulated shocks. Third, the corresponding debt path is calculated using fiscal reaction function incorporating results obtained through the VAR. The algorithm provides a large number of debt paths associated with different shocks. The frequency distributions of each debt paths are presented using fan charts.

Frank and Ley (2009) modified the probabilistic approach developed by Celasun, Debrun and Ostry (2007) allowing for structural breaks which are identified through a Markov-Switching Structural Vector Auto Regression (SVAR). Instead of the assumption of normally distributed shocks used by Celasun, Debrun and Ostry (2007), bootstrapping technique is applied, since behaviour of economic variables are asymmetric and thick tails are displayed during turbulent times. The effects of interest rate, growth rate and exchange rate on the debt to GDP ratio are estimated using this technique. Further, instead of estimating a fiscal reaction function, debt stabilising balance is used for baseline projection, while time varying debt stabilising balances are calculated by drowning repeated shocks from the empirical error distribution. The study is conducted based on data related to Argentina, Brazil and South Africa and the debt to GDP projections were generated for both normal and turbulent times separately by doing separate SVAR estimations.

Carlomagno, Egger and Sicilia (2008) used a SVAR model to determine the interrelation between endogenous variables, namely interest rate, exchange rate and growth rate and to obtain the projections of these debt dynamics based on Uruguayan economy. The results of the projections are incorporated into fiscal reaction function to obtain the debt to GDP ratio. Impulse response are used to assess the estimated combined impact of different shocks to the debt dynamics. This captures the joint dynamic effects of structural innovations on endogenous variables and the debt to GDP ratio.

4. Methodological Aspects

The algorithm used here for assessing debt sustainability consists of four stages.

Firstly, a Structural Vector Auto Regressive (SVAR) model is estimated to determine the interrelation between the relevant macroeconomic variables that are important in assessing

debt sustainability. Future projections of the relevant variables are obtained based on the SVAR estimation.

Secondly, a debt dynamics equation which describes an open economy is built up by using the law of motion of debt to GDP ratio.

Thirdly, results of the SVAR estimation are incorporated to the developed debt dynamics equation in order to calculate a medium term baseline projection of the debt to GDP ratio.

Lastly, a stress test is conducted through an impulse response analysis by plotting the joint dynamic effects produced by the structural economic innovations that affect the relevant variables. The behaviour of the debt to GDP ratio in response to the various structural shocks is examined to determine the adjustment in the primary surplus required to mitigate the negative impacts of shocks in order to the originally targeted levels of debt to GDP ratio.

4.1 The Theoretical Foundation

An Structural vector Auto Regression (SVAR) model is constructed to determine nonfiscal variables of the public debt dynamics. These endogenous variables are namely the real interest rate, real GDP growth rate and real exchange rate. In order to impose restrictions on the model, the Keynesian model developed by Blanchard and Quah in 1989 using a model of Stanley Fischer (1977) and which was further developed by Carlomagno, Egger and Sicilia (2008) is used with some modification This allows the identification of the most relevant structural shocks that affect the relevant variables in the long run. The model is modified by using the domestic real interest[3] rate instead of the sovereign spread and using Real Effective Exchange Rate (REER) of 24 trading partner and competitor countries instead of the bilateral exchange rate. The behaviour of REER well explains the effect of exchange rate variation on debt dynamics since it represents the weighted average exchange rate of the bilateral and multilateral lending partner currencies. Assuming all the other factors, such as foreign interest rate, are constant the model can be specified as follows.

$$y_t = m_t - p_t + a_1\Theta_1 + a_2 REER_t \qquad \text{(1)}$$

[3] Since more than 75 per cent of the foreign debt stock consists of concessional loans only the impact of movement in the domestic interest rate is considered in the model.

where y is the logarithm of the GDP, Θ_1 is the logarithm of the productivity of the productive factors, m_t is the logarithm of the money supply, p_t is the logarithm of the level of domestic prices, e is the logarithm of REER. Accordingly, aggregate demand is a function of the real money balances, the productivity of the factors and the REER.

As per the economic theories demand disturbances have a short run effect on output and that effect gradually die out overtime. Only the supply related productive disturbances have a long run affect on output. This has been proven by Blanchard and Quah (1989).

Further, real interest rate can be given as

$$i = b_1\Theta_t + b_2 e_t + \eta_t \quad \text{——————} \quad (2)$$

where η_t is other factors that affect t to the real interest rate

Real Effective Exchange Rate can be presented as follows

$$REER = c_1\,\Theta_t + c_2 i_t + \nu_t \quad \text{——————} \quad (3)$$

Where i_t is the interest rate and ν_t is other factors effect to the REER.

In the long run only productive related shocks have a long run impact on real interest rate while demand disturbances have only short term impact on it. However, REER is highly vulnerable and it is affected by both demand disturbances and supply disturbances in the long run. This has been proven by Carlomagno, Egger and Sicilia (2008).

Accordingly, change in REER can be presented as

$$\Delta REER = c_1\varepsilon_t^{\Delta y} + c_2\varepsilon_t^{i} + \varepsilon_t^{e} \quad \text{——————} \quad (10)$$

As per the above formula, REER is affected by its own innovations, real economic growth (Δy) shocks and interest rate shocks in the long run.

4.2 Construction of SVAR model

The SVAR model consists of,

$X_t = X_{t-i} + \varepsilon_t$

where $X_t = [\ \Delta y, i, REER]$ ——————— (11)

$$\varepsilon_t = [\varepsilon_t^r, \varepsilon_t^i, \varepsilon_t^{REER}] \quad \text{——————} \quad (12)$$

Assuming that Vector X_t follows a covariance stationary process, it can be written as:

$x_t = \sum_{i=0}^{\infty} A_i \varepsilon_{t-i} = A(L)\varepsilon_t$ ——————— (13)

where L is the lag operator and it can be presented as :

$A(L) = \sum_{s=0}^{\infty} A_s L^s$ ——————— (14)

A_s is the matrix of impulse responses of the endogenous variables to structural shocks.

For the purpose of identifying the long-run effects of structural shocks, a number of restrictions were imposed based on the theoretical background discussed above. As it is observed, long- run GDP growth is affected only by productivity related real shocks, while real interest rate and real exchange rate shocks do not cause any lasting effects on GDP growth. This leads to make two long run restrictions as $\sum_{s=0}^{\infty} a_{12}(s) = 0$ and $\sum_{s=0}^{\infty} \div a13(s)=0$.

Further, as explained by theory interest rate is affected by only its own innovations and productivity shocks, while REER is affected by its own innovations, real shocks and interest rate shocks in long run.

This leads to make another restriction as $\sum_{s=1}^{\infty} a_{23}(s) = 0$.

A (1) = A_0+A_1+A_2.....

When $a_{11}(1) = \sum_{s=1}^{\infty} a_{12}(s) = 0$.

In view of that, the matrix A_s , which can be spesified as $\sum_{s=0}^{\infty} A_s L^s = \{a_{ji}(L)\}$ consist of structural shocks, ε_t^r, ε_t^i , ε_t^{REER}, can be presented as follows.

$$\begin{bmatrix} a_{11}(1) & 0 & 0 \\ a_{21}(1) & a_{22}(1) & 0 \\ a_{31}(1) & a_{32}(1) & a_{33}(1) \end{bmatrix}$$

As per the macroeconomic theories, expansion of aggregate demand with economic growth increases the demand for money raising interest rate if money supply remains unchanged.

Therefore, a positive sign is expected for a_{21}. Further, as per the Mundell-Fleming model, which explains an economy with imperfect capital mobility and floating exchange rate regime[4], an increase in domestic real interest rate generates a capital inflow thereby forcing the domestic currency, (REER), to appreciate. Further, high economic growth can accommodate expansions in exports foreign exchange inflows. Further, high growth can attract more foreign investment since it increase investors' confidence. Accordingly, positive signs are expected for a_{31} and a_{32}[5].

4.3 Data and Econometric Analysis

Quarterly data relevant to debt dynamics, namely growth rate, debt to GDP ratio, interest rate, inflation rate and REER were taken from the Annual Reports and other publications of the Central Bank of Sri Lanka for the period of 1997 Q1:2010 Q4 (56observations).

364 day Treasury Bill yield rate was used as a proxy for the domestic nominal interest rate. It was adjusted for inflation to obtain the real interest rate using Fisher equation. Point to point change in the CCPI price index with 2002 as the base year was taken as the domestic inflation and it was rebased to 2000. GDP growth rate is based on the estimates of the Department of Census and Statistics of Sri Lanka with the base year of 2002.This was also rebased to 1996 and seasonally adjusted for this study. REER is the Real Effective Exchange Rate of 24 trading partner and competitor countries.

Augmented Dickey Fuller Test (ADF) was conducted to test whether the data series are stationary or not since the stationary transformations of the relevant variables to the debt dynamic should be taken for the estimation of the SVAR. The results proved that data series related real interest rate is stationary, while data series related to GDP and REER has a unit

[4] Sri Lankan economy has the characteristics of imperfect capital mobility. Further, exchange rate regime of Sri Lanka is also known as a floating exchange rate regime

[5] REER is derived from the original Central Bank Series which covers 24 trading partner countries. The Original Central Bank series is based on the IMF index of $\mathrm{REER} = \prod_{i=1}^{24} [(e/e_i)(p/p_i)]^{wi}$

Where P : Consumer Price Index (CPI) of Sri Lanka
Pi : Consumer price index of country i
e : Exchange rate of the Sri Lankan rupee against the US dollar US dollars per rupee in index form)
ei : Exchange rates of currency i against the US dollar
(US dollars per currency i in index form)
wi : Weights attached to the country/ currency i in the index
i : The number of currencies in the basket
Accordingly, increase in index is a real appreciation of local currency

root at levels. However, GDP and REER series are stationary at first deference of its logarithmic form. The results of the unit root test are presented in the following table

Table 1
Summary of the Results of the ADF Unit Root Tests

Variable	level		1st difference	
	t statistic	p value	t stat	p value*
GDP	0.507822	0.9991	-3.458808	0.0134
i	-3.623057	0.0082		
REER	-1.368259	0.8598	-6.466468	0.0000

*MacKinnon (1996) one-sided p-values.

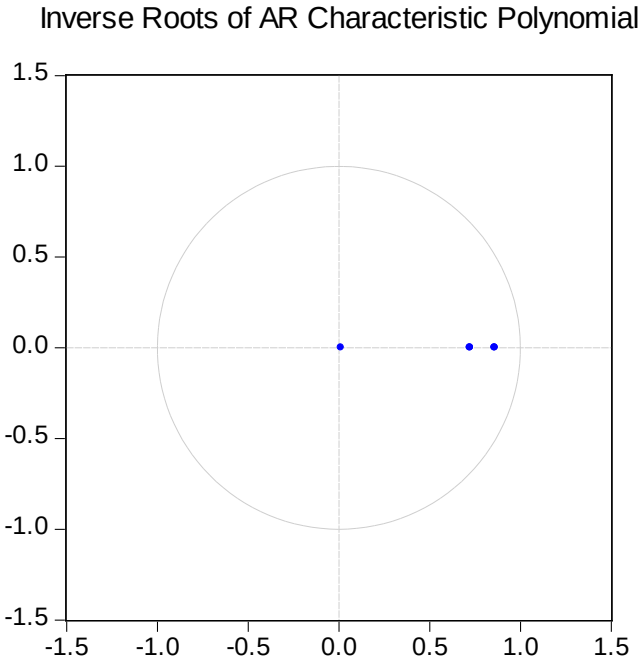
Test critical values for dlnGDP:	1% level	-3.568308
	5% level	-2.921175
	10% level	-2.598551
Test critical values for i:	1% level	-3.552666
	5% level	-2.914517
	10% level	-2.595033
Test critical values for $lnREER$:	1% level	-4.133838
	5% level	-3.493692
	10% level	-3.175693

Accordingly, the vector of endogenous variables in stationary transformation which was used in the model is as follows:

$X_t = [\ \Delta y, i, dlnREER]$

Where Δy is the log first difference of GDP and dlnREER is the log first difference of REER.

In addition to ADF test, stationary property of the variables was confirmed by using AR root graph. The result is as follows.



According to the graph, all the variables were placed inside the unit circle .Therefore, the stability of the series was confirmed. Further, the test for lag length criteria was performed to find the suitable lag level to be used. Both Akaike information criterion (AIC) and Schwarz information criterion (SC) suggested using one lag for the model. Accordingly, SVAR estimation was performed and the results of the estimation are given bellow.

Structural VAR Estimates
Date: 10/13/11 Time: 16:14
Sample (adjusted): 1998Q2 2010Q4
Included observations: 51 after adjustments
Estimation method: method of scoring (analytic derivatives)
Convergence achieved after 7 iterations
Structural VAR is just-identified

Model: Ae = Bu where E[uu']=I
Restriction Type: long-run pattern matrix
Long-run response pattern:

C(1)	0	0
C(2)	C(4)	0
C(3)	C(5)	C(6)

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	0.104903	0.010387	10.09950	0.0000
C(2)	-0.069266	0.017447	-3.970158	0.0001
C(3)	0.017971	0.005223	3.440930	0.0006
C(4)	0.114563	0.011343	10.09950	0.0000
C(5)	-0.022401	0.004381	-5.113347	0.0000
C(6)	0.026979	0.002671	10.09950	0.0000

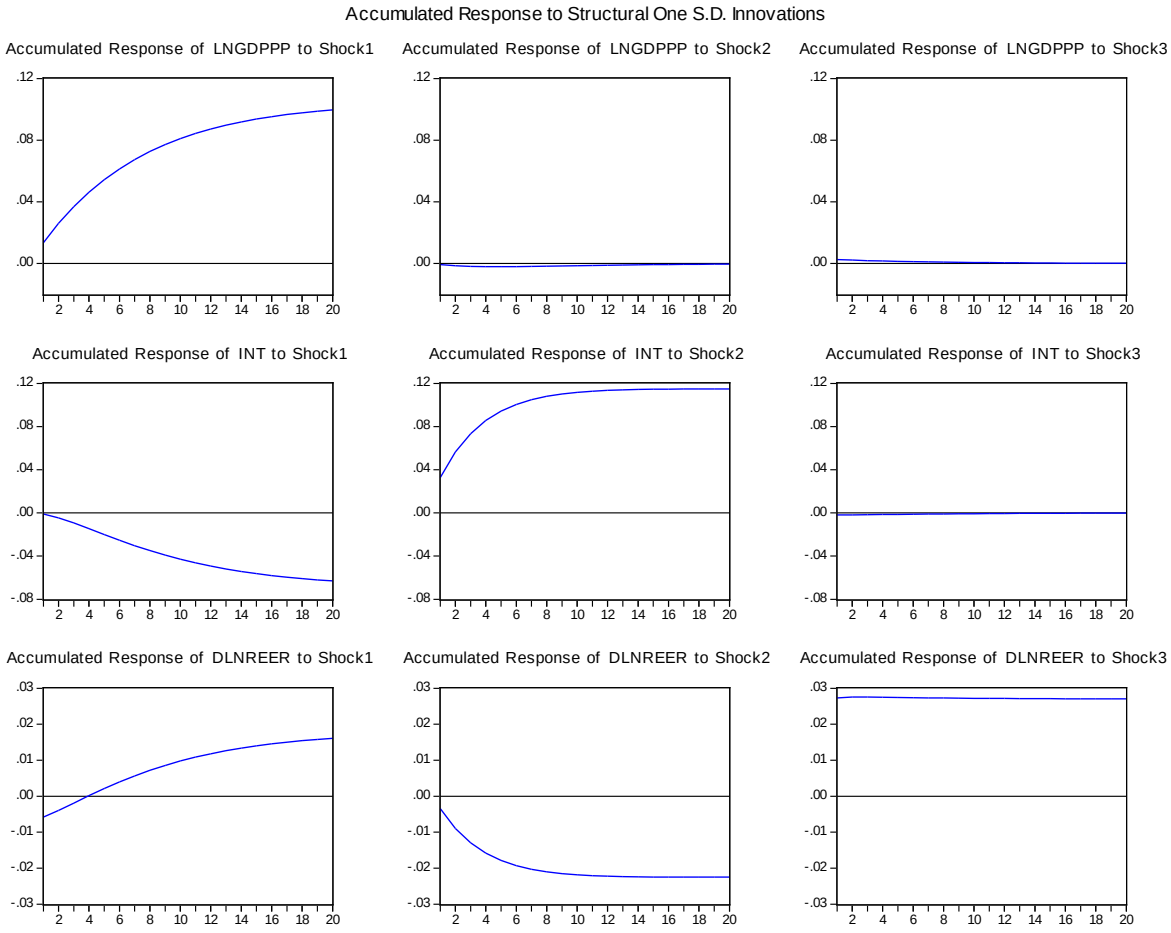
Log likelihood 358.7330

Estimated A matrix:		
1.000000	0.000000	0.000000
0.000000	1.000000	0.000000
0.000000	0.000000	1.000000
Estimated B matrix:		
0.013559	-0.000735	0.002517
-0.000983	0.032730	-0.001893
-0.005790	-0.003442	0.027305

As per the estimation output, all the coefficients are statistically significant. However, the theoretically expected relationship was found for all the coefficients except for C(2) and C(5) which are a_{21} and a_{32} of the matrix A_s, respectively. Coefficient C(2) represents the relationship between the real interest rate and GDP growth, whereas Coefficient C(5) represents the relationship between the real interest rate and REER. CCPI is highly vulnerable to demand driven shocks in the market, such as rise in food prices and hike in oil prices than the productivity related factors. The real interest rate is directly affected by this, since it is derived adjusting 364 day Treasury bill yield rate for CCPI. This might be the reason for not receiving the expected relationship for C(2). The sign of coefficient C(5), which describes the relationship between the interest rate and REER, depends on the elasticity of the capital mobility to the domestic interest rate. Further, the capital account of the Balance of Payment is not fully liberalised in Sri Lanka. This might be the reason for not achieving the expected sign for C(5).

4.4 Impulse response analysis

The accumulated responses of the variables on structural shocks are presented in the impulse response functions given below. Accordingly, the graphs present the accumulated response of the variables to one standard deviation shock



The graphs indicates that the economic growth stocks have a permanent effect on all three variables. Accordingly, product shocks raises GDP and make exchange rate to appreciate. However, real economic growth shocks initially make a decline in real interest rate and gradually die out. Further, it can be observed that shocks on real interest rates have no significant impact on growth in long run though it has a negative impact on growth in the short term. Further, effect of shocks on real interest rates on its own innovation is also consistent with theory. Accordingly, the impact of real interest rate shocks on its level remains about 10 quarters and gradually stabilises. On the other hand, shocks on real interest rate affect negatively on exchange rate and it takes about ten quarters to stabilise. As

explained in the theory, exchange rate (REER) shocks have no long run impact on GDP growth and interest rates, while it affects its own level negatively about two quarters and then stabilise.

4.5 Variance Decomposition Analysis

The relative importance of the each shock to explain the behaviour of the variables can be obtained by conducting a Variance Decomposition Analysis.

Variance Decomposition of Economic Growth:

Period	S.E.	Shock1	Shock2	Shock3
1	0.013810	96.39454	0.283098	3.322364
2	0.018623	97.84288	0.301802	1.855323
3	0.021549	98.33659	0.258072	1.405341
4	0.023506	98.58430	0.222152	1.193545
5	0.024870	98.72687	0.198577	1.074550
6	0.025842	98.81448	0.184501	1.001015
7	0.026543	98.87035	0.176773	0.952882
8	0.027054	98.90681	0.173007	0.920188
9	0.027427	98.93100	0.171582	0.897421
10	0.027701	98.94725	0.171454	0.881295
11	0.027902	98.95828	0.171980	0.869736
12	0.028051	98.96584	0.172780	0.861380
13	0.028160	98.97106	0.173642	0.855303
14	0.028241	98.97468	0.174454	0.850865
15	0.028300	98.97722	0.175169	0.847613
16	0.028344	98.97900	0.175770	0.845226
17	0.028377	98.98027	0.176261	0.843471
18	0.028401	98.98117	0.176654	0.842179
19	0.028419	98.98181	0.176963	0.841227
20	0.028432	98.98227	0.177203	0.840525

Variance Decomposition of Interest Rate:

Period	S.E.	Shock1	Shock2	Shock3
1	0.032800	0.089816	99.57700	0.333184
2	0.040638	0.840182	98.94239	0.217433
3	0.044311	1.860384	97.95582	0.183801
4	0.046257	3.017437	96.81286	0.169700
5	0.047378	4.185600	95.65160	0.162798
6	0.048073	5.275594	94.56533	0.159079
7	0.048532	6.237477	93.60560	0.156919
8	0.048851	7.052629	92.79179	0.155580
9	0.049081	7.723091	92.12221	0.154703
10	0.049251	8.262333	91.58357	0.154101
11	0.049379	8.688719	91.15761	0.153674
12	0.049475	9.021477	90.82516	0.153364
13	0.049548	9.278519	90.56835	0.153136
14	0.049603	9.475469	90.37157	0.152966
15	0.049645	9.625397	90.22176	0.152839
16	0.049676	9.738931	90.10833	0.152744

17	0.049700	9.824536	90.02279	0.152673
18	0.049717	9.888854	89.95853	0.152619
19	0.049731	9.937038	89.91038	0.152579
20	0.049741	9.973046	89.87440	0.152550

Variance Decomposition of REER:

Period	S.E.	Shock1	Shock2	Shock3
1	0.028124	4.237884	1.498110	94.26401
2	0.028724	4.469216	5.154298	90.37649
3	0.029073	4.859245	6.922623	88.21813
4	0.029284	5.279087	7.771948	86.94897
5	0.029421	5.678224	8.175787	86.14599
6	0.029513	6.032235	8.361908	85.60586
7	0.029579	6.332454	8.442369	85.22518
8	0.029628	6.579245	8.472650	84.94811
9	0.029663	6.777573	8.480080	84.74235
10	0.029691	6.934271	8.477917	84.58781
11	0.029711	7.056475	8.472405	84.47112
12	0.029727	7.150813	8.466337	84.38285
13	0.029738	7.223053	8.460841	84.31611
14	0.029747	7.278014	8.456270	84.26572
15	0.029754	7.319611	8.452637	84.22775
16	0.029759	7.350959	8.449827	84.19921
17	0.029763	7.374500	8.447690	84.17781
18	0.029766	7.392126	8.446082	84.16179
19	0.029768	7.405293	8.444880	84.14983
20	0.029769	7.415109	8.443987	84.14090

Factorization: Structural

As per the above table, it can be observed that the shocks well represent the variance of the growth rate, real interest rate and exchange rate in the long run. Accordingly, growth shocks represent 99 per cent of the variance of growth after 20 quarters. Further, growth shocks and interest rate shocks represent 10 per cent and 90 per cent of the variance of interest rate , respectively, in the long run (after 20 quarters). With respect to REER, about 7 per cent of variance is from growth shocks, while about 8 per cent of variance is from interest rate shocks. The balance of 84 per cent is from itself

4.6 Debt Dynamics Equation for an Open Economy

The basic requirement of debt sustainability is that a borrower should be able in future to pay back the debt built up in the past. In other words, debt sustainability is a situation in which a borrower is expected to be able to continue servicing its debt with available resources.

There are a number of methodologies developed for assessing debt sustainability as discussed in the literature review. According to these studies, debt sustainability basically depends on the behaviour of the real interest rate, the primary balance (government expenditure excluding interest payments), the real exchange rate and the real rate of growth. As explained above a high real interest rate implies an increase in debt servicing costs and a negative primary balance implies borrowing for budgetary financing other than interest payments. For an open economy, the exchange rate is also a key variable which affects the level of public debt, since the depreciation of the domestic currency against any foreign currency results in an increase in the debt stock denominated in the domestic currency.

The debt to GDP ratio is also one of the major indicators which is important in managing public debt. A low debt-to-GDP ratio indicates that the production of an economy is sufficient to service its debts. Accordingly, an increase in GDP that is a growth in the economy would help to reduce the debt burden.

If a government runs a primary deficit, it says that government expenditure exclusive of interest payment is higher than the revenue collection and it should be financed through borrowings assuming that there is no other source of revenue, such as proceeds from privatisation. Accordingly, the total debt stock of a country in the current year is equal to the sum of last year's debt stock, interest payment on that stock minus the primary balance of the current year. This can be presented as follows.

$$D_t = D_{t-1} + iD_{t-1} - PB_t \quad \text{——————} \quad (15)$$

where D_t is the debt stock of the current year (at time t), D_{t-1} is the previous year debt stock, i is the effective interest rate on debt and PB is the primary balance. Accordingly, any increase in primary deficit ($PB_t < 0$), or interest cost (i) will results in an increase in debt in the current year.

If the primary balance is zero (PB = 0) , that is, if government revenue is sufficient to meet all expenditure other than interest payments, the additional amount of borrowing required in the current year would be only for servicing the past debt stock. Moreover, if the government is able to achieve a primary surplus (PB >0), when revenue is greater than expenditure excluding interest payment, those savings can be used for servicing past debt, thus reducing the additional amount of borrowing required.

If we divide the above formula by Gross Domestic Product (GDP) , we can get the debt as a proportion of GDP. Debt to GDP ratio is one of the indicators of the health of an economy. A low debt-to-GDP ratio indicates that an economy produces a large number of goods and services that are sufficient to pay back its debts. Accordingly, increase in GDP, that is growth of an economy, helps to reduce the debt burden. It can be expressed by taking D_{t-1} as the commen element in the following way

$$\frac{D_t}{Y_t} = (1 + i)\frac{D_{t-1}}{Y_t} - \frac{PB_t}{Y_t} \quad \text{——————} \quad (16)$$

Taking current growth rate and adding to past year GDP it can be presented as

$$\frac{D_t}{Y_t} = \left(\frac{1+i}{1+g}\right)\frac{D_{t-1}}{Y_{t-1}} - \frac{PB_t}{Y_t} \quad \text{——————} \quad (17)$$

The change in debt to GDP can be presented as

$$\frac{D_t}{Y_t} - \frac{D_{t-1}}{Y_{t-1}} = \left(\frac{1-i}{1+g}\right)\frac{D_{t-1}}{Y_{t-1}} - \frac{D_{t-1}}{Y_{t-1}} - \frac{PB_t}{Y_t} \quad \text{——————} \quad (18)$$

Setting $\Delta\frac{D}{Y} = \frac{D_t}{Y_t} - \frac{D_{t-1}}{Y_{t-1}}$ and adjusting for inflation give:

$$\Delta\frac{D}{Y} = \left(\frac{r-g}{1+g}\right)\frac{D_{t-1}}{Y_{t-1}} - \frac{PB_t}{Y_t} \quad \text{——————} \quad (19)$$

This is known as the law of motion of the government's debt-to GDP ratio[6], where, r is the real interest rate, Y is GDP and g is the real growth rate. If the interest rate is greater than the growth rate, it implies that interest burden on existing debt increases, while the debt stock as a percentage of GDP also increases. At the same time, if a government borrows for servicing debt (a negative PB to GDP ratio), it increases the debt burden further.

Furthermore, if the government can achieve a primary balance which is sufficient to meet the interest cost under a given growth rate, then the debt to GDP ratio will be stabilised at the existing level, since there is no need for new borrowings. Accordingly, if the actual primary balance to GDP ratio is greater than the stabilising primary balance to GDP ratio, the public debt would be falling over the time and vice versa. Furthermore, if the real interest rate is equal to growth rate, then the actual primary surplus to GDP ratio required to solvency will be the same. If real interest rate is greater than the growth rate, then the actual primary surplus to GDP ratio required for solvency will rise over time and vice versa.

6 Staff Guidance Note on the Application of the Joint Bank-Fund Debt Sustainability Framework for Low-Income Countries , International Development Association and the International Monetary Fund, 2010

Accordingly, the required development in fiscal side (primary balance) to achieve a targeted level of debt can be measured by combining debt to GDP data with real interest rates and the economic growth rate using this formula.

This approach is most suitable for a closed economy, since the impact of the exchange rate on the foreign debt component is not taken into account. Accordingly, this has developed by IMF adding some additional notations which describe an open economy. The details of the model developed by IMF are given below.

Public debt of an open economy consists of domestic debt and external debt. It can be presented as

$$D_t = D_t^h + eD_t^f \text{ ——————} (20)$$

where e is the nominal exchange rate, Accordingly, D_t^h and eD_t^f represent the total domestic debt and total foreign debt, respectively.

In an open economic environment, GDP is effected by the potion of tradable and non tradable good sector, while inflation (GDP deflator) depends on domestic inflation, foreign inflation rate and exchange rate movements. Further, interest rate on debt in an open economy also consists of domestic interest rate and foreign interest rate, where the impact of foreign interest rate is affected by exchange rate movements.

For simplicity, it is assumed that

1. Inflation is given($\bar{\pi}_t$)
2. Portion of foreign denominated debt is constant at

$$\alpha = \frac{eD_t^f}{D_t} \quad \text{——————} \ (21)$$

The interest payment on existing debt in an open economy can be given as

$$i_t D_{t-1} = i_t^h \mathrm{D}_{\mathrm{t-1}}^{\mathrm{h}} + i_t^f \varepsilon_t \mathrm{e}_{\mathrm{t-1}} \mathrm{D}_{\mathrm{t-1}}^{\mathrm{f}} \text{ ——————} \ (22)$$

where ε_t is the rate of depreciation in domestic currency. Accordingly, interest payment on foreign debt is determined by the foreign interest rate and the value of foreign debt stock in

domestic currency at the time of servicing the debt which implies that depreciation in local currency increases the servicing cost and vice versa.

Therefore, the effective nominal interest rate can be given as

$$i_t = i_t^h \frac{\mathrm{D}_{t-1}^{\mathrm{h}}}{D_{t-1}} + i_t^f (1 + \varepsilon_t) \frac{\mathrm{e}_{t-1}\mathrm{D}_{t-1}^{\mathrm{f}}}{D_{t-1}} \qquad \text{(23)}$$

Taking portion of foreign debt which is $\frac{\mathrm{e}_{t-1}\mathrm{D}_{t-1}^{\mathrm{f}}}{\mathrm{D}_{t-1}} = \alpha$ and hence $\frac{\mathrm{D}_{t-1}^{\mathrm{h}}}{D_{t-1}} = \alpha - 1$ which are and portion of domestic debt, this can be written as:

$$i_t = i_t^h(\alpha - 1) + i_t^f (1 + \varepsilon_t)\alpha \qquad \text{(24)}$$

Government budget constraint in an open economy can be mentioned as:

$$D_t = (1 + i_t)D_{t-1} - PB_t \qquad \text{(25)}$$

Where $(1 + i_t)$ is

$$(1 + i_t) = (1 + i_t^h)(\alpha - 1) + (1 + i_t^f)(1 + \varepsilon_t)\alpha \qquad \text{(26)}$$

Further

$$(1 + i_t) = 1 + \left((1 - \alpha)i_t^h + \alpha i_t^f\right) + \alpha\varepsilon_t(1 + i_t^f) \qquad \text{(27)}$$

The effective interest rate in an open economy is a weighted average of domestic and foreign rates and exchange –rate movements. The weighted average interest rate can be presented as:

$$\overline{\iota_t} = (1 - \alpha)i_t^h + \alpha i_t^f \qquad \text{(28)}$$

Accordingly, debt dynamics for an open economy can be given as

$$\Delta d_t = \left\{\frac{\bar{\iota}_t - g - \bar{\pi}(1+g_t) + \alpha\varepsilon_t(1+i_t^f)}{1+g_t+\bar{\pi}_t+g_t\bar{\pi}_t}\right\} d_{t-1} - PB_t \qquad (29)$$

Assuming that $\bar{\iota}_t \approx i_t^h$ and foreign interest rate is fixed at $\bar{\iota}_t^f$, the debt dynamics can be written as:

$$\Delta d_t = \left\{\frac{i_t^h - g - \bar{\pi}(1+g_t) + \alpha\varepsilon_t(1+\bar{\iota}_t^f)}{1+g_t+\bar{\pi}_t+g_t\bar{\pi}_t}\right\} d_{t-1} - PB_t \qquad (30)$$

5. Results and implications

5.1 Baseline Projection of Debt Dynamics

Based on the SVAR model, medium term projections of all the endogenous variables were made. This baseline projection covers the period from 2010 to 2015. For the purpose of obtaining annual projections, quarterly data were annualised and point to point change was taken. Further, it is assumed that there would be no any structural change or new policy measures taken during the period 2010 to 2015. Consequently, projections depend on the historical values of the variables.

The results of the projection are given below.

Table 2

Baseline Projection of Endogenous Variables of Debt Dynamics

Year	GDP Growth	Interest Rate	REER
2011	7.3	0.4	-3.5
2012	6.4	1.2	-3.2
2013	5.9	1.4	-2.5
2014	5.8	1.7	-2.1
2015	5.7	2.2	-1.7

The projection shows that the economic growth rate is to be stable around 6 per cent of GDP. This result shows the historical trend of the GDP data. Further, the real interest rate is projected to remain around 1 to 2 per cent over the medium term. REER is projected to be appreciated. However, the rate of appreciation declines gradually over time. The results of the projections were incorporated in to the debt dynamics to project the debt to GDP ratio in the medium term.

For this purpose, inflation (GDP deflator) is assumed to be fixed around 6 to 5 per cent over the medium term as published by the CBSL in the Central Bank Annual Reports and other publications . More than 60 per cent of total foreign debt was obtained at a fixed interest rate. Accordingly, the foreign interest rate was determined taking into account the average of the past 10 years data relating to interest payment. Therefore, the foreign real effective interest rate is assumed to be 2 per cent during the medium term

5.2. Estimation of Debt to GDP under different scenarios and its implications

The baseline projections of fiscal variables are given below.

Table 3

Baseline Projections

Year	2011	2012	2013	2014	2015
d_{t+k}	77.2%	74.1	71.8%	70.1%	68.9%
g	7.3%	6.4%	5.9%	5.8%	5.7%
r^{h*}	0.4%	1.2%	1.4%	1.7%	2.2%
PB	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%
ε	-3.5%	-3.2%	-2.5%	-2.1%	-1.7%
α	44.0%	44.0%	44.0%	44.0%	44.0%
$\bar{\imath}_t^f$	2.0%	2.0%	2.0%	2.0%	2.0%
$\bar{\pi}$	5.0%	6.0%	5.0%	5.0%	5.0%

*real domestic interest rate

The portion of foreign debt to total debt is estimated to be 44 per cent which is the average of the relevant value of last 10 years. Further, primary deficit is assumed to be stable at 1.7 per cent which is the value recorded in 2010. It can be observed that the debt to GDP ratio is in a declining trend over the medium term with the projected economic growth rate of around 6 per cent, real interest rate of around 2 per cent and the appreciation of REER.

Effects of the structural innovations are given below.

Table 4

Impact of Growth Shocks

Year	2011	2012	2013	2014	2015
d_{t+k}	76.2%	72.3%	69.6%	67.8%	66.5%
g	8.2%	6.9%	6.2%	6.0%	5.8%
r^{h*}	-0.1%	0.7%	1.1%	1.7%	2.1%
PB	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%
ε	-3.5%	-3.9%	-3.0%	-2.4%	-1.9%
α	44.0%	44.0%	44.0%	44.0%	44.0%
$\bar{\iota}_t^f$	2.0%	2.0%	2.0%	2.0%	2.0%
$\bar{\pi}$	7.0%	6.0%	5.0%	5.0%	5.0%

Accordingly, productivity related growth shocks result an increase in growth and appreciate the exchange rate while it reduces the real interest rate. This combined impact reduces the debt to GDP ratio over the medium term.

Figure 3

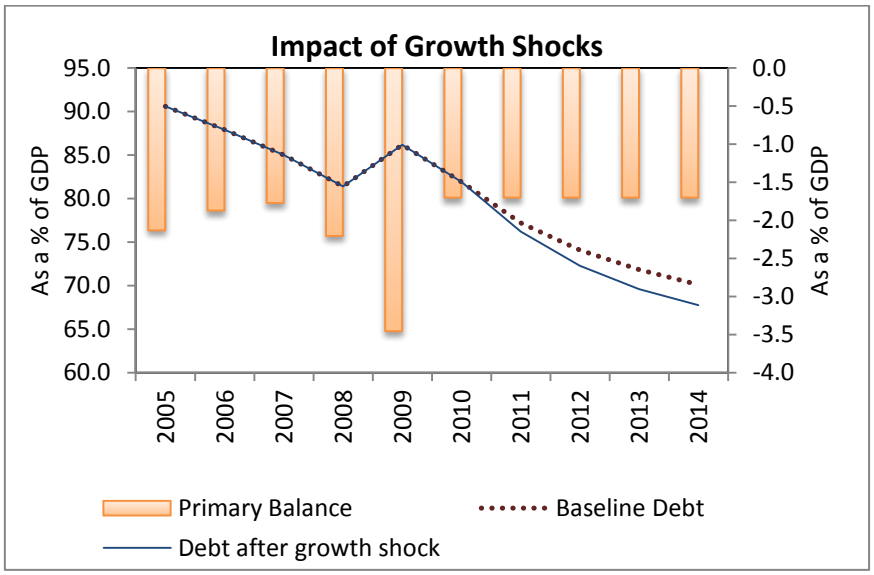


Table 5

Impact of Interest Rat Shocks

Year	2011	2012	2013	2014	2015
dt+k	78.6%	75.8%	73.6%	71.8%	70.5%
g	7.2%	6.4%	5.9%	5.8%	5.7%
r^{h*}	1.8%	1.2%	1.1%	1.3%	1.3%
PB	-3.4%	-3.4%	-3.4%	-3.4%	-3.4%
ε	-1.6%	-2.4%	-2.9%	-2.9%	-2.9%
α	44.0%	44.0%	44.0%	44.0%	44.0%
$\bar{i}_t^f$	2.0%	2.0%	2.0%	2.0%	2.0%
$\bar{\pi}$	7.0%	6.0%	5.0%	5.0%	5.0%

Increase in interest rate does not have any long term impact on GDP growth though it witnessed a short term negative impact on growth. Further, it has a negative impact on exchange rate which also dies out gradually. As a combined outcome of these developments, interest rate shocks have resulted in an increase in the debt to GDP ratio higher than the baseline level.

Table 6

Improvement in the Primary Balance Required to Maintain the Debt to GDP Ratio as in the Baseline Scenario-With an Interest rate Shock

Year	2011	2012	2013	2014	2015
dt+k	77.2%	73.1%	69.6%	66.6%	64.1%
g	7.2%	6.4%	5.9%	5.8%	5.7%
r^{h*}	1.6%	1.5%	1.5%	1.7%	2.2%
PB	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%
ε	-1.6%	-2.4%	-2.9%	-2.9%	-2.9%
α	44.0%	44.0%	44.0%	44.0%	44.0%
$\bar{i}_t^f$	2.0%	2.0%	2.0%	2.0%	2.0%
$\bar{\pi}$	7.0%	6.0%	5.0%	5.0%	5.0%

In order to mitigate the advance impact on debt caused by the increase in interest rates, the primary deficit should be reduce from 1.7 per cent of GDP to 0.3 per cent of GDP in 2011 through fiscal consolidation. It is noteworthy that the government can maintain the debt to GDP ratio even at a low level than the base line if government continue the fiscal consolidation process. This is because the impact of the shock gradually dies out by 2015.

Figure 4

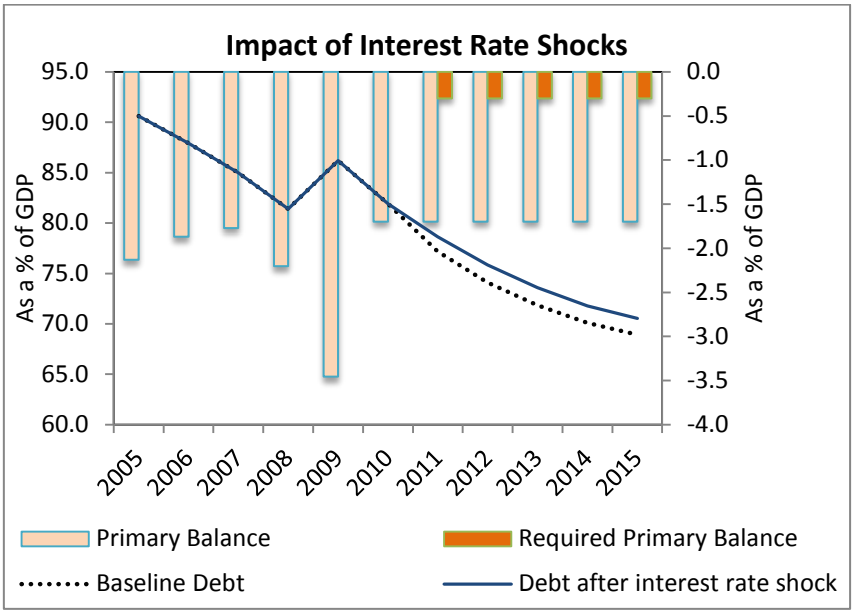


Table 7

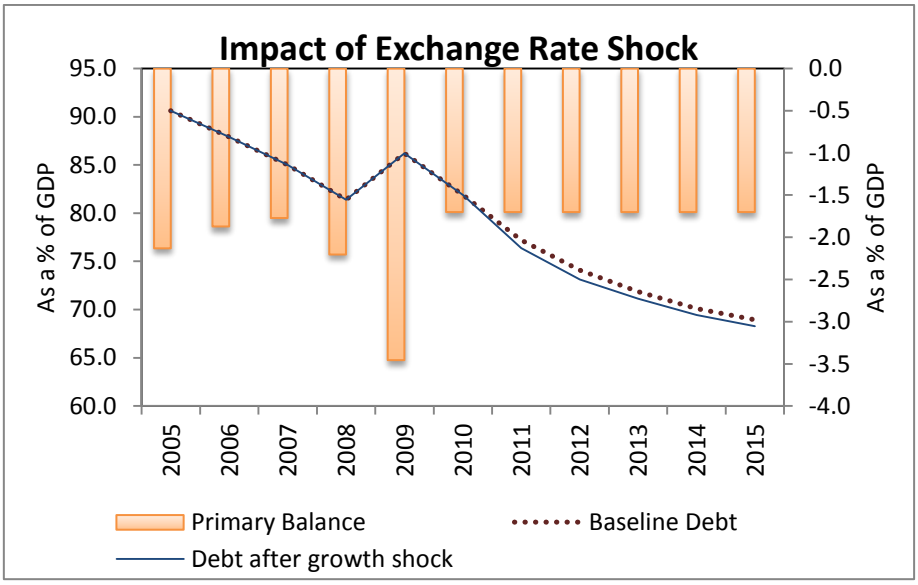
Impact of Exchange Rate Shocks

Year	2011	2012	2013	2014	2015
d_{t+k}	76.4%	73.3%	71.1%	69.4%	68.3%
g	7.2%	6.4%	5.9%	5.8%	5.7%
r^{h*}	0.4%	1.2%	1.4%	1.7%	202%
PB	-1.7%	-1.7%	-1.7%	-1.7%	-1.7%
ε	-6.3%	-3.3%	-2.5%	-2.1%	-1.7%
α	44.0%	44.0%	44.0%	44.0%	44.0%
$\bar{\iota}_t^f$	2.0%	2.0%	2.0%	2.0%	2.0%
$\bar{\pi}$	7.0%	6.0%	5.0%	5.0%	5.0%

Shocks to the exchange rate do not have a considerable impact on ether GDP growth or interest rates while it has an impact on itself as expected in the theory. It should be noted that the impact of the exchange rate prevails only for a short period. However, it causes a

permanent increase in the debt to GDP ratio since the initial increase in the debt level effect for the future debt levels.

Figure 5



6. Conclusion

The study focused on estimating the impact of macroeconomic variables on debt to GDP ratio and debt sustainability. The baseline scenario was built up by incorporating the projections of the key macroeconomic variables generated from the SVAR estimation to the debt dynamic equation. Impulse response functions and variance decomposition analysis were used to identify the joint dynamic impact of the structural shocks on the relevant macroeconomic variables. The impact of the structural shocks on the debt to GDP ratio and the fiscal sector improvements required to mitigate the impact of the shocks on debt to GDP ratio were estimated using the debt dynamic equation.

As per the results, in the long run, economic growth rate is affected only by its own innovations, while the interest rate is affected by economic growth shocks and its own variance. Further, the exchange rate is vulnerable to both growth shocks and interest rate shocks other than its own innovations.

As per the estimation output, economic growth shocks were more powerful than interest rate shocks and exchange rate shocks. It is noteworthy that the debt to GDP ratio is on a declining path over the medium term in the baseline scenario and also under the shocks.

Economic growth shocks results in a 2.4 per cent decline in the debt to GDP ratio from the baseline scenario in by 2015, while negative interest rate shocks results in a 1.6 percent increase in debt to GDP ratio from the baseline level by 2015 due to the combined impact. Due to the positive exchange rate shocks, debt to GDP ratio decline only by 0.6 per cent. In order to mitigate the impact of interest rate shocks, short to medium term measures should be taken from the fiscal front reducing the primary deficit. Accordingly, the primary deficit should be reduced through fiscal consolidation. However, the impact of the shock gradually dies out and hence the fiscal authority can also gradually relax its policies by increasing its primary deficit without having a significant impact on the debt level in the long run. Regarding the exchange rate, the combined impact of its shocks prevails only for a shorter period of time. Therefore, the exchange rate deviations do not have a lasting impact on debt to GDP ratio as shown by the results.

However, according to the projections of the SVAR model, the economic growth during the medium term is expected to be around 6 per cent. This result is because the SVAR estimation depends on the past trend of the variables. Hence, the changes that took place in the economy in 2010 are not reflected in the outcome of the model. As per the latest projections of the Central Bank of Sri Lanka, the economic growth rate is expected to be around 8 per cent during the medium term with the development initiatives which are currently taken place and the present improvements in the country. As explained above, a one standard deviation positive growth shock results in a reduction in the debt to GDP ratio by 2.4 per cent by 2015. Therefore, if the growth rate increases by 8 per cent as in the medium term, the debt to GDP ratio would reach a level of around 65 per cent by 2015 given other macroeconomic variables remains favourable. Any improvement in the primary balance with measures taken at present to raise revenue and reduce expenditure will also contribute to reducing the debt to GDP ratio further over the medium term.

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