Evaluating Sri Lanka's Debt Sustainability through Fiscal Reaction Function: A Structural Vector Autoregression Approach

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Abstract

This research significantly advances the understanding of fiscal policy and debt sustainability by combining the Fiscal Reaction Function and Structural Vector Autoregression techniques. Traditionally, these methods have been explored independently, but their combination addresses a crucial gap in the literature. The study focuses on Sri Lanka and provides nuanced insights into its fiscal behavior and prospects for debt stabilization. The developed framework offers a robust analytical tool for policymakers to evaluate and adjust fiscal policies effectively. The analysis covers historical data from fiscal years 1960 to 2021, providing a comprehensive understanding of fiscal policy dynamics over an extended period. By examining how fiscal policy reacts to various economic conditions and impacts macroeconomic variables, the research offers strategic recommendations for enhancing fiscal discipline and debt management. The results show that a one-unit increase in debt significantly increases the GDP growth rate due to government spending financed through borrowing stimulating economic activity. The higher GDP growth rate boosts tax revenues and improves the primary balance relative to the size of the economy over time. This Impulse Response Function analysis underscores the need for continuous and disciplined fiscal monitoring to ensure that debt remains manageable. These findings are vital for developing fiscal policies prioritizing immediate economic needs while providing long-term fiscal responsibility, thus supporting sustainable economic growth and stability in Sri Lanka.

Key Words*: Debt Sustainability, Fiscal Reaction Function, Primary Balance to GDP, Debt to GDP*

JEL Classification: E62, C32, C51, H63

Introduction

The global economy has long struggled with debt sustainability, balancing economic growth and fiscal responsibility. As of 2024, total global debt has surpassed $300 trillion, with significant contributions from both public and private sectors (Kose et al., 2021). This trend has intensified interest in debt sustainability theories and practices, as policymakers and economists aim to understand the long-term effects of this debt burden and develop mitigation strategies.

Debt sustainability is essential in macroeconomics, determining a country's capability to meet its present and future debt commitments without restructuring or defaulting (Blanchard, 2019). A sustainable debt level allows a country to service its debt while maintaining stable economic growth and avoiding excessive borrowing or austerity measures (Reinhart & Rogoff, 2010). Debt sustainability directly impacts a country's solvency, access to international financial markets, and overall economic stability.

The 2008/09 worldwide recession and the 2019 Covid pandemic have increased government debt levels as countries implemented fiscal measures to support their economies (Blanchard & Summers, 2020). Since the 1950s, the IMF Global Debt Monitor (GDM) has analyzed global debt patterns, covering governmental and private debt across 190 nations. The GDM employs a multidimensional approach to maintain consistency over time, providing various debt series with different coverages and doubling the cross-sectional dimension of current private debt datasets (IMF, 2023). This comprehensive data has been crucial in tracking debt trends and understanding the sustainability of debt levels across different economies.

Many economists are concerned of the high level of global debt, which could lead to a financial crisis if interest rates rise or the global economy weakens. This high level of debt makes it difficult for countries to invest in their economies and grow while leading to vulnerability and financial shocks. Rising global debt is a challenge for countries that forces them to reduce their debt levels to boost economic growth and stability. This paper evaluates Sri Lanka's debt sustainability using Fiscal Reaction Function (FRF) and Structural Vector Autoregression (SVAR) methodologies. It highlights the importance of debt sustainability and the country’s fiscal challenges, followed by a literature review on fiscal policy and debt. The methodology section describes the integration of FRF and SVAR with data from 1960 to 2021. The results from the SVAR analysis, Impulse Response Functions (IRFs), and Forecast Error Variance Decomposition (FEVD) provide insights into fiscal policy dynamics. The paper concludes with policy recommendations for improving debt sustainability and suggestions for future research.

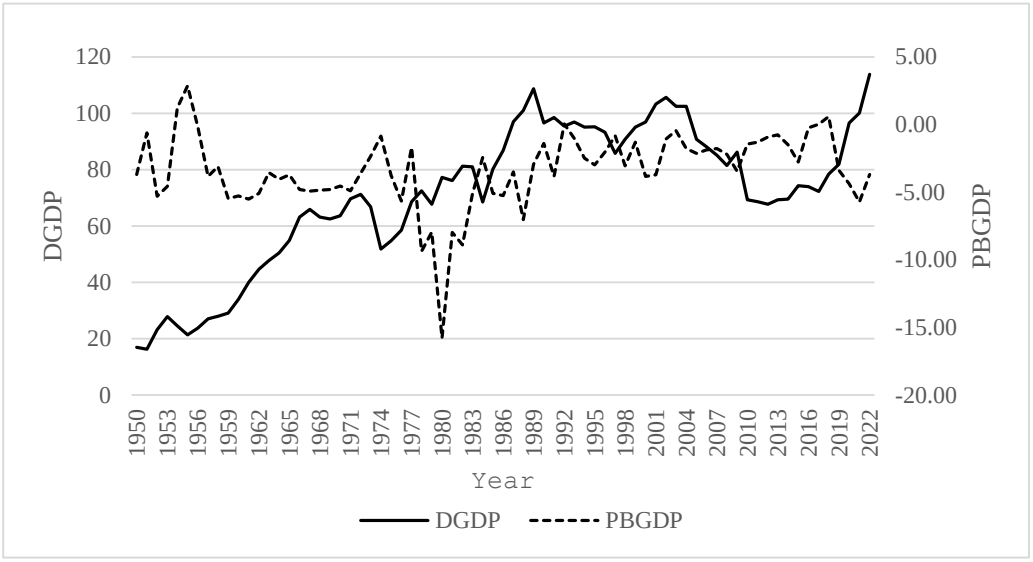
Fiscal Performance in Sri Lanka

The fiscal performance and debt sustainability of Sri Lanka have raised concerns amidst rising global debt levels. Sri Lanka's public debt surged to 114.2% of GDP at the end of 2022 from 94% in 2021, driven by fiscal indiscipline, weak revenue collection, and pandemic-related economic fallout (World Bank, 2023). A significant portion of this debt, denominated in foreign currencies, worsened due to the Sri Lankan currency depreciating by over 81% against the dollar in the same year, increasing the actual value of this debt (IMF, 2023; World Bank, 2023).

Sri Lanka’s debt crisis stems from structural weaknesses and fiscal mismanagement. By 2019, foreign debt's share of total public debt increased to around 60% from 40% in early 2000 (CBSL, 2022). This increased reliance on foreign borrowing exposed the country to external shocks and exchange rate risks. The crisis peaked in early 2022 when Sri Lanka suspended external debt payments to facilitate restructuring, with sovereign arrears reaching approximately $3 billion by 2023 (IMF, 2023).

In early 2023, the IMF granted a $3 billion loan (Extended Fund Facility) to support Sri Lanka's reform agenda to restore macroeconomic stability and debt sustainability. This bailout is contingent on Sri Lanka securing funding guarantees from its largest bilateral creditors, China, India, and Japan, who account for around 60% of the nation's foreign debt (IMF, 2023). Achieving debt sustainability is challenging. Even under restructuring, public debt will remain high, around 100% of GDP by 2025. Key risk factors include vulnerability to external shocks, a significant sovereign-bank nexus, and the need for deep fiscal reforms (IMF, 2023). Securing adequate financing assurances from creditors is crucial for successful debt restructuring and implementing the IMF program.

The economic crisis in Sri Lanka has highlighted the country's enduring economic and fiscal vulnerabilities, manifesting in fiscal deficits, debt accumulation, currency depreciation, inflation, balance of payments issues, and significant sociopolitical upheaval (Samarakoon, 2024). The primary cause of the crisis is substantial and persistent budget deficits financed through unsustainable public debt, particularly foreign commercial loans. Sri Lanka issued ISBs totaling $23.8 billion during 2007-2019, compared to $2.2 billion in international aid in the previous decade. This debt-fueled strategy exacerbated the crisis as the country struggled to service its growing foreign debt amid declining economic conditions (Samarakoon, 2024). Sri Lanka's public debt reached $88 billion at the end of 2021, comprising $32.5 billion in foreign debt and $55.4 billion in domestic debt, making Sri Lanka increasingly vulnerable to external shocks (Samarakoon, 2024).



Note: Author's estimation

Figure 1: GDP Ratio of Primary Balance and Debt

Figure 1 shows fluctuations in Sri Lanka's debt-to-GDP (DGDP) and Primary balance-to-GDP (PBGDP) over the past six decades (CBSL,2023). It highlights the country's difficulties in maintaining fiscal discipline and achieving debt sustainability. Periods of fiscal consolidation and primary surpluses have been interspersed with episodes of high deficits, often driven by external shocks, policy decisions, and structural economic imbalances. Maintaining a sustainable PBGDP is essential for Sri Lanka to address its debt challenges and restore macroeconomic stability.

Prior research has highlighted the importance of debt sustainability in Sri Lanka. Nevertheless, there is a need for a more comprehensive analysis using the FRF approach, which accounts for the potential endogeneity of the DGDP and the dynamic nature of fiscal policy. This methodology can offer significant insights into the factors influencing the government's fiscal policy decisions and the longstanding viability of fiscal policy in Sri Lanka.

The research aims to comprehensively analyze Sri Lanka's debt sustainability by examining the government's historical fiscal behavior in response to debt and economic conditions changes, identifying key determinants that impact the primary balance, and providing policy recommendations to strengthen fiscal discipline and improve debt management.

Literature Review

Debt sustainability has been the subject of extensive public finance and macroeconomic research. Maintaining government debt at a maintainable level is crucial for a country's longstanding financial stability. This literature survey examines the theoretical and empirical approaches to assessing debt sustainability, focusing on Bohn FRF approaches.

Theoretical Review

The Ricardian Equivalence theory argues that financing government expenditure through debt or taxation does not impact economic outcomes (Buchanan, 1976). The hypothesis contends that when debt is utilized to fund government expenditure and economic expansion, households will save entirely, anticipating future tax hikes. The Keynesian approach, on the other hand, contends that debt-financed government expenditure can boost employment and economic expansion (Keynes, 1971). This posits that public debt and budget deficits can act as countercyclical instruments to increase aggregate demand and steady the economy during recessions. Conversely, the neoclassical paradigm highlights the possible negative consequences of fiscal deficits and national debt. According to this hypothesis, a large amount of public debt can deter investment, drive interest rates, and obstruct economic expansion (Barro, 1974). Lastly, to optimize social welfare, the optimal fiscal policy theory recommends an ideal level of public debt and fiscal equilibrium (Arrow & Kruz, 2013). According to this perspective, governments should strive to find the optimal balance between public debt, fiscal deficits, and economic outcomes.

Empirical Review

A key idea in the consideration of public debt sustainability is fiscal solvency. It describes the ability of the country to pay off its current and prospective debt without defaulting or using excessive spending (Blanchard, 1990; Buiter et al., 1985). Conversely, debt sustainability is a more comprehensive notion that includes the government's longstanding fiscal viability and solvency. The literature regarding the sustainability of public debt is based on the government's intertemporal budget constraint (IGBC), which establishes a relationship between the level of government indebtedness at the moment and future debt servicing necessities (Graham & Colm, 1988). The basis for evaluating debt sustainability, which can be stated as a percentage of GDP or in monetary terms, is the IGBC. The long-term effects of a deterministic interpretation of the government's budget restriction are the main emphasis of the IGBC method for evaluating debt sustainability. This method connects the DGDP, which is subsequently described as the sustainable debt level, to the long-term PBGDP (Blanchard, 1990; Buiter et al., 1985). When the IGBC approach is applied empirically, it usually entails examining the historical trends of fiscal policy variables. For example, unit-root tests on the DGDP or cointegration tests between public expenditure and revenue are commonly performed (Blanchard, 1990; Buiter et al., 1985).

Despite being widely used the conventional IGBC method of assessing debt sustainability came under criticism for several reasons. According to Bohn (1995), the IGBC approach is misspecified and may cause wrong conclusions to be drawn, rejecting fiscal solvency even when it is present. Furthermore, Bohn (2007) has shown that testing for debt sustainability is not helpful because the IGBC still holds even in unstable circumstances. Specifically, the requirement is met if revenue and spending, including debt service, are combined in a very high but still finite amount of debt. This finding invalidates several fiscal solvency tests that depended on specific cointegration and stationarity assumptions.

The FRF examines the link between the primary balance and the level of public debt, providing a way to assess the sustainability of fiscal policy. Bohn (1998) introduced the FRF approach by regressing the primary surplus on the lagged DGDP, with a positive and substantial coefficient implying a sustainable fiscal policy. The FRF approach provides a more robust and comprehensive framework for assessing debt sustainability, as it focuses on the fiscal policy reactions to changes in the DGDP rather than relying on the specific stationarity and cointegration conditions required by the traditional IGBC approach.

Following Bohn's work, De Mello (2008), Burger and Marinkov (2012), Ghosh et al. (2013), Checherita-Westphal and Žďárek (2017), Fournier and Fall (2017), Evan and Alvina (2018), Lee (2020) have applied the FRF framework to investigate fiscal sustainability in various contexts. For example, Burger and Marinkov (2012) estimated FRFs for South Africa and found evidence of a regime-dependent fiscal reaction, with a more robust response to the debt during periods of high debt levels. Lee (2020) analyzed how fiscal policy in Malaysia responds to external shocks using the SVAR approach. The findings verify that external shocks significantly impact FRF variables. However, the study also finds that Malaysia's direct response to external shocks through its budgetary measures is limited to attaining stable and sustainable growth, so authorities should enhance their capacity to respond effectively to external shocks. De Mello (2008) examines current fiscal performance trends in Brazil, calculates FRFs for various levels of government and the consolidated public sector, and assesses debt sustainability using monthly data for 1995–2004. Checherita-Westphal and Žďárek (2017) provided a comprehensive assessment of the FRF literature, highlighting the widespread use of this approach in fiscal sustainability analysis. They found that most studies at the country and panel levels reported evidence supporting the presence of FRFs and, thus, fiscal sustainability. Ghosh et al. (2013) highlighted the importance of assessing financial market reactions in fiscal sustainability, while Fournier and Fall (2017) noted that the debt coefficient in FRFs must be substantial to maintain public debt sustainability.

In addition, the literature has also explored the impact of fiscal rules and institutions on shaping fiscal behavior, as evident in the FRF. Burger and Marinkov (2012) and Burger et al. (2011) found that fiscal rules can influence the fiscal reaction to debt, with more vital rules leading to a more robust fiscal response. Overall, the literature using the FRF has provided essential insights into fiscal and debt sustainability.

Sri Lanka's rising public debt and persistent fiscal deficits have made debt sustainability a critical issue, prompting various research efforts to assess it. Ekanayake (2011) used the SVAR model to project debt dynamics and evaluate the impact of structural shocks on Sri Lanka's debt level, forecasting the DGDP ratio and measuring the combined effect of these shocks. Rathnasiri and Soysa (2020) found that domestic and foreign debt positively influence long-term economic growth, suggesting a crowding-in effect on investment. Chua et al. (2021) applied a regime-switching model based on the FRF technique to identify fiscal sustainability regimes from 1961 to 2017, revealing periods of both sustainable and non-sustainable fiscal regimes, and providing a historical perspective on Sri Lanka's fiscal sustainability. Moramudali (2024) explained that Sri Lanka's foreign debt problem requires long-term policy reforms for a meaningful resolution. Merely restructuring the debt is insufficient. It needs enduring tax reforms to boost government revenue, institutional changes focused on equity, good governance, and a strong system of checks and balances to combat corruption. Sester (2024) also argues that rather than alleviating future debt risks Sri Lanka’s macro-linked bonds may lead to renewed debt issues by 2029 or 2030.

Methodology

This research uses the SVAR approach to examine debt sustainability in Sri Lanka. This model is selected for its ability to capture dynamic interactions among macroeconomic variables and identify underlying economic shocks. The SVAR framework extends the traditional VAR approach by imposing structural restrictions based on economic theory to determine structural parameters from reduced-form estimates. Integrating the FRF, which assesses the affiliation between debt levels and the primary balance, with the SVAR methodology, the research comprehensively analyzes both long-term fiscal dynamics and short-term macroeconomic implications. This approach helps develop effective debt management strategies and promote budgetary stability.

The SVAR approach builds on the traditional VAR framework. It further imposes structural restrictions on the model to identify the underlying economic shocks and their propagation mechanisms. This is achieved by specifying a set of assumptions, often based on economic theory, allowing the researcher to recover the model's structural parameters from the reduced-form VAR estimates.

The history of SVAR modeling can be traced back to the seminal work of Sims (1980), who criticized the traditional macroeconomic models for their ad hoc identification assumptions and proposed the VAR approach as an alternative. Blanchard and Quah (1988) then introduced the SVAR methodology, which allowed the identification of structural shocks by imposing restrictions on the model. This approach is vital, particularly in the context of Sri Lanka where understanding the complex relationships between government debt, GDP growth, primary balance, inflation, and other factors is crucial for assessing debt sustainability. The SVAR model's capacity to disentangle these intricate relationships and establish causal links makes it well-suited for providing accurate and reliable policy recommendations.

The SVAR model's flexibility in incorporating various time-series variables and its robustness in capturing the dynamic effects of fiscal policy changes make it an ideal choice for debt sustainability analysis. It can accommodate shocks such as fiscal policy adjustments, external economic conditions, and global financial market fluctuations, which are highly relevant to Sri Lanka's debt dynamics. This versatility allows for a comprehensive analysis of both short-term and long-term fiscal dynamics, offering valuable insights for policymakers.

Empirical evidence from previous research further reinforces the suitability of the SVAR model for analyzing debt sustainability in Sri Lanka. Ekanayake (2011), and Favero and Giavazzi (2007) have established the model's effectiveness in assessing the impact of structural shocks on debt dynamics, forecasting DGDP, and measuring the combined effects of shocks on debt levels and required fiscal adjustments. This empirical support, coupled with the model's theoretical strengths, solidifies the choice of the SVAR model as a robust analytical framework for Sri Lanka's debt sustainability analysis.

SVAR Model

$$AX_t = \sum_{k=1}^{m} C_k X_{t-k} + B\varepsilon_t \quad (1)$$

Matrix A includes contemporaneous effect between the endogenous variables, X_t is a vector that includes endogenous variables, C_k is a matrix of lagged relationships, B is a matrix that describes the linear relationships between structural and reduced form shocks, and ε_t is a vector of structural shocks.

Equation *(1)* is multiplied by an inverse matrix A^{-1} to obtain the reduced form, which is needed to estimate the SVAR model.

$$X_t = \sum_{k=1}^{m} D_k X_{t-k} + u_t \quad (2)$$

$C_k = A^{-1}D_k$; D_k is a matrix of lagged relationships, $u_t = A^{-1}B\varepsilon_t$, and u_t is a vector of shocks (reduced form)

The Ordinary Least Squares technique can be employed to estimate the reduced-form VAR model, as this estimator is unbiased and efficient (Enders, 2004). However, obtaining structural innovations from reduced-form innovations is not straightforward, as they lack direct economic interpretation. External constraints must be imposed on the model to obtain structural innovations, as highlighted by Lütkepohl (2005). This can be achieved through either the A-model, the B-model, or AB-model approaches.

The AB model combines constraints of both A-model and B-model. Specifically, the *A* matrix may include elements constrained to zero, akin to the A-model. Similarly, the *B* matrix can be diagonal or have certain elements set to zero, as in the B-model (Lütkepohl, 2005). This dual approach provides greater flexibility in identifying structural shocks by merging contemporaneous restrictions with orthogonality assumptions. The correlation between the reduced-form innovations and the structural innovations is as follows.

$$Au_t = B\varepsilon_t \quad (3)$$

In this study, the AB model has been employed to impose external constraints. The Cholesky factorization, used as the identification scheme for the AB model, assumes that the matrix *A* is a lower triangular. However, this approach has a significant limitation: in the SVAR model, the order of the endogenous variables is crucial, as it implicitly determines the connections between the innovations (Keating, 1992). This model requires $\{2n^2 - \frac{n(n+1)}{2}\}$ restrictions to be just-identified, where n represents the number of endogenous variables. Since the SVAR methodology aims to discover structural innovations and their dynamic impacts on endogenous variables, it can be viewed as a shock analysis.

It is common practice to arrange the variables according to the chronological order in which they occur. However, this approach may not always be appropriate as the underlying economic theory should guide the ordering decision to ensure meaningful interpretations of the structural innovations and their dynamic effects. The variables in the Cholesky factorization are arranged as follows.

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ a_{gd} & 1 & 0 & 0 & 0 & 0 \\ a_{pd} & a_{pg} & 1 & 0 & 0 & 0 \\ a_{\pi d} & a_{\pi g} & a_{\pi p} & 1 & 0 & 0 \\ a_{id} & a_{ig} & a_{ip} & a_{i\pi} & 1 & 0 \\ a_{ed} & a_{eg} & a_{ep} & a_{e\pi} & a_{ei} & 1 \end{bmatrix} \begin{bmatrix} u_{dt} \\ u_{gt} \\ u_{pt} \\ u_{\pi t} \\ u_{it} \\ u_{et} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_{dt} \\ \varepsilon_{gt} \\ \varepsilon_{pt} \\ \varepsilon_{\pi t} \\ \varepsilon_{it} \\ \varepsilon_{et} \end{bmatrix} \quad (4)$$

Note: u_{yt} represents the reduced form of innovation of variable '*y*' at time t and ε_{yt} represents the structural form of innovation of variable '*y'* at time t. (*y = d, g, p, π, i,*

The Government DGDP (*d*) is considered a predetermined variable in the model, meaning it is not contemporaneously affected by any other variables in the current period. Its value is determined by past realizations of the variables and its own lagged values. The GDP growth rate (*g*) is contemporaneously affected by the Government DGDP. This implies that changes in the government debt level can immediately impact the economic growth rate in the same period. The PBGDP (*p*) responds contemporaneously to changes in the GDP growth rate and the Government DGDP. The PBGDP adjusts to changes in economic growth and government indebtedness within the same period, alongside their contemporaneous effects from inflation. Changes in government debt, economic growth, primary balance, and inflation can immediately impact the effective interest rate. The exchange rate responds to all other variables in the model but not contemporaneously with the effective interest rate. Overall, the relationships among these variables illustrate how shocks can affect one another within the same period.

Data

The data was carefully gathered to extensively analyze fiscal debt indicators from 1961 to 2021. The comprehensive compilation includes data from reliable sources: the WB, the IMF, World Development Indicators, the Ministry of Finance in Sri Lanka, and the CBSL. The analysis focuses on key variables for assessing debt sustainability based on the Bohn FRF and debt dynamics of Sri Lanka. PBGDP measures the government's budget surplus or deficit relative to GDP. A positive PBGDP indicates a surplus for debt reduction, while a negative ratio indicates a deficit that can increase debt. GDP Growth Rate (GDPR) represents the annual growth rate of Sri Lanka's economy. A strong and growing economy generates higher government revenue to service and repay debt. DGDP represents the public debt to GDP ratio. The inflation rate (INF) represents the inflation rate in Sri Lanka. High inflation can wear down the actual value of debt over time, potentially improving debt sustainability but it can also create economic instability. The effective interest rate (NIR) represents the average interest rate Sri Lanka pays on its debt. Higher interest rates lead to larger debt service payments and can strain debt sustainability. The exchange rate (EX), which uses the year-end US Dollar to Sri Lankan Rupee rate, is crucial in assessing Sri Lanka's economic dynamics, particularly regarding its trade balance and foreign debt

obligations. In addition, the study incorporates exogenous variables (not determined by the model and assumed to be independent of the endogenous variables) to capture their direct effects on endogenous variables which can enhance the model's accuracy. The exogenous variables include Fiscal rules, IMF interventions, the effect of the Civil War and Economic Crisis, the World GDP growth rate, Brent crude oil price, the real interest rate, and the inflation rate in the United States.

Results and Discussion

Table 1: ADF Test Results

Variable	Test statistics	5% critical value	p-value	Conclusion
GDP	-4.15	-2.921	0.0008	Stationary at the level. Integration of order one *I(0)*
PBGDP	-3.982	-2.921	0.0015	
ln_db	-6.945	-2.922	0.0000	
ln_ex	-5.966	-2.922	0.0000	
NIR	-4.041	-2.922	0.0000	
INF	-3.261	-2.921	0.0167	

Note: Author's estimation

The first stage is verifying that the time series data is stationarity using the Augmented Dickey-Fuller (ADF) test. According to Table 1, all the endogenous variables are stationary at the level.

Table 2: Lag Selection Criteria

Lag	LL	LR	FPE	AIC	HQIC	SBIC
0	-142.067		7.30E-06	5.19535	5.27893	5.41401
1	-67.1964	149.74	1.90E-06	3.83145	4.41651*	5.33686*
2	-37.6446	59.104	2.40E-06	4.0577	5.14423	6.85346
3	11.9505	99.19	1.70E-06	3.58068	5.16868	7.66679
4	57.9296	91.958*	1.5e-06*	3.23054*	5.32001	8.60699

Note: Author's estimation

According to Table 2, HQIC and SBIC select lag one, while FPE and AIC select lag four. I have chosen lag one based on HQIC, a compromise between AIC and SBIC. The choice aims at selecting the optimal lag length while avoiding overfitting, and it is also considered a good choice for SVAR models in macroeconomics (Lütkepohl, 2005).

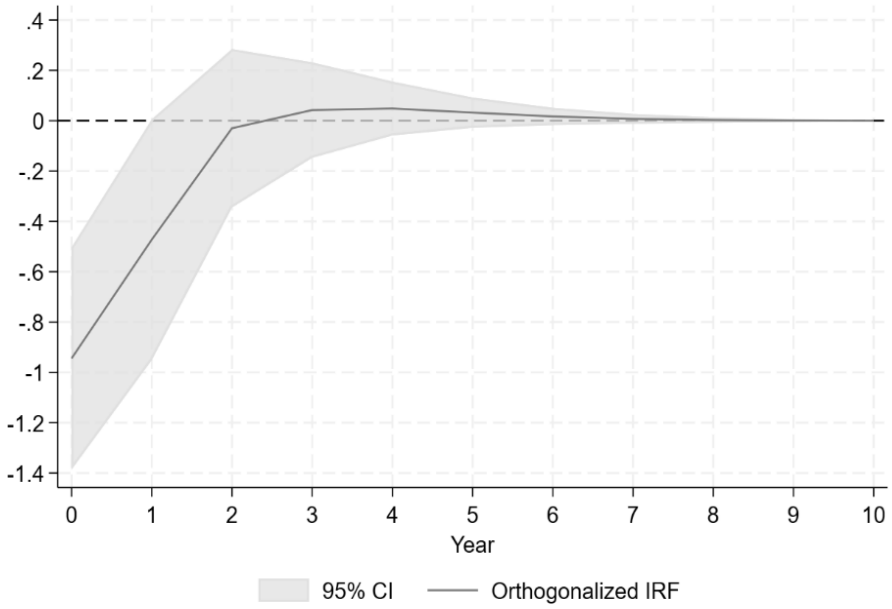
Table 3: SVAR Short Run Results

	ln_db	GDPR	PBGDP	INF	NIR	ln_ex
ln_db	1	-	-	-	-	-
GDPR	7.7822***	1	-	-	-	-
PBGDP	15.3631***	0.1729	1	-	-	-
INF	21.6323***	-0.1139	0.3778	1	-	-
NIR	-0.0055	-0.0001	0.0138***	-0.0002	1	-
ln_ex	-0.9066***	-0.0088*	0.0202	-0.0015	3.3777**	1

Note: Author's estimation; the dependent variables are represented on the vertical axis, and the independent variables are represented on the horizontal axis

The SVAR short-run regression[1] results in Table 3 highlight how structural shocks affect key macroeconomic variables in Sri Lanka. These findings offer valuable insights into sustainable debt management and economic stability. A shock to debt-to-GDP significantly increases GDPR (7.7822***). This may be because government spending financed through borrowing stimulates economic activity. A shock to debt-to-GDP leads to higher GDPR, boosting tax revenues and improving the primary balance relative to the size of the economy over time. This highlights the importance of borrowing for sustainable fiscal capacity enhancement. A shock to debt-to-GDP significantly increases INF (21.6323***). This may be due to heightened aggregate demand and potentially accommodating monetary policies. Policymakers should focus on using debt strategically to finance growth-enhancing projects while ensuring that borrowing does not undermine fiscal stability. Implementing strict expenditure controls, improving tax collection, and ensuring transparency in public spending are crucial for achieving long-term fiscal discipline and debt sustainability.

[1] In the short run, SVAR models capture the immediate effects of shocks on the system.



Note: Author's estimation

Figure 2: The response of PBGDP to the shock on debt-to-GDP

IRFs illustrate how shocks to one variable affect others over time, revealing dynamic interactions and temporal effects within the Economy. By orthogonalizing the shocks OIRFs ensure that the responses are more straightforward to interpret, as each shock is independent. This improves forecasting accuracy and facilitates policy analysis by isolating specific shocks. OIRFs provide more precise insights into the effects of shocks, making them more valuable for forecasting than traditional IRFs.

Figure 2 reveals how Sri Lanka's primary balance (PBGDP) reacts to debt shocks, providing insights into fiscal policy adjustments. Following a one-time positive debt shock, PBGDP initially declined significantly due to increased government spending outpacing revenue gains. This initial deterioration highlights the stimulative but short-term impact of debt-financed expenditures on economic activity. Over time, PBGDP stabilizes as fiscal policies and adjustments take effect, emphasizing the necessity of disciplined fiscal monitoring to ensure sustainable debt management and economic stability.

Table 4 shows the forecast error variance of PBGDP over ten years. This analysis highlights that while PBGDP's shocks are the primary driver of its forecast error variance, *ln_db* also plays a significant and consistent role, with other variables having a more minor yet noticeable impact over the long term.

Table 4: Forecast Error Variance Decomposition PBGDP as Response Variable

Year	ln_db	GDPR	PBGDP	INF	NIR	ln_ex
1	0.259513	0.024529	0.715957	0	0	0
2	0.277643	0.021026	0.64877	0.035831	0.005863	0.010865
3	0.269541	0.022185	0.638587	0.041515	0.016589	0.011583
4	0.268111	0.022595	0.635074	0.041631	0.021065	0.011524
5	0.268186	0.022629	0.633932	0.041555	0.022195	0.011504
6	0.268301	0.022623	0.633632	0.041553	0.022392	0.011498
7	0.268337	0.02262	0.633571	0.041562	0.022413	0.011497
8	0.268343	0.02262	0.633562	0.041566	0.022414	0.011497
9	0.268343	0.02262	0.63356	0.041567	0.022414	0.011497
10	0.268343	0.02262	0.63356	0.041567	0.022414	0.011497

Note: Author's estimation

Post Estimation

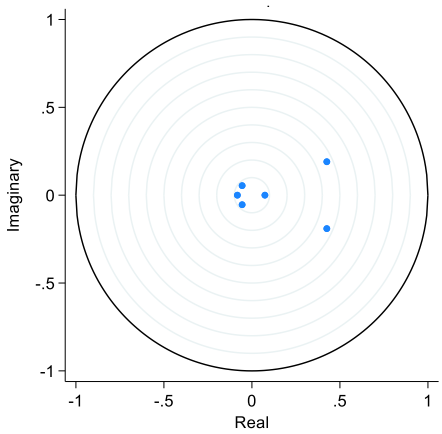


Figure 3: Roots of the companion matrix

The first stability condition for a VAR/SVAR model necessitates that all roots of the characteristic polynomial, or eigenvalues, remain inside the unit circle. This condition ensures the stationarity of the VAR/SVAR process, allowing for meaningful interpretations of the IRF and FEVD. The VAR/SVAR model is considered stable if this condition is met. As depicted in Figure 3, all model parameters lie within the unit circle, being less than one, satisfying the stability requirement.

Table 5: Lagrange-multiplier test results

lag	chi2	df	Prob > chi2
1	39.9450	36	0.29912
2	46.7571	36	0.10811

Note: Author's estimation

The Lagrange multiplier test (Table 5) indicates no significant autocorrelation in the residuals at lags one and two, suggesting that the model effectively captures the underlying data structure without leaving significant autocorrelation in the residuals.

Conclusion

This study underscores the critical importance of adopting a multidimensional approach to debt management in Sri Lanka. By integrating the Bohn FRF with SVAR methodology, the research provides a detailed analysis of fiscal policy's responsiveness to rising debt and its broader macroeconomic implications. The findings reveal that stimulating economic growth is vital for improving debt sustainability, particularly through tradable sectors, as growth in non-tradable sectors has failed to enhance fiscal stability or foreign exchange reserves. This finding aligns with empirical evidence and academic literature on Athukorala (2024) which emphasizes the importance of sectoral growth composition and structural reforms in addressing Sri Lanka's debt challenges.

Maintaining fiscal discipline is equally important, requiring strict expenditure controls and efficient use of public funds. Comprehensive tax reforms are essential to broaden the tax base, enhance revenue collection, and reduce evasion, with measures like digitalization and progressive taxation being key priorities. Prudent monetary policies should ensure low and stable inflation, while flexible exchange rate management can help absorb external shocks and stabilize debt servicing costs. Structural reforms are also crucial to improve productivity, governance, and the investment climate.

Implementing these measures will demand sustained political will and collaboration with international partners. Future research should explore long-term impacts and comparative studies with similar economies, providing deeper insights into Sri Lanka's debt challenges. A proactive and integrated strategy is essential to achieve economic stability and growth.

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