

Haffner, Ozolina C. E.; Aruna, Alfred J. H.; Adams, Kormay

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IMPACT OF DOMESTIC DEBT ON ECONOMIC GROWTH IN SIERRA LEONE: AN EMPIRICAL INVESTIGATION

Ozolina C.E Haffner, Alfred J.H. Aruna and Kormay Adams¹

Abstract

The impact analysis of domestic debt on economic growth in Sierra Leone had over the years, received surprisingly little empirical attention. This study which covers the period 1970 to 2015, therefore, seeks to assess the impact of domestic debt on economic growth in Sierra Leone. Following some schools of thought which opine that the growth of domestic debt beyond a sustainable level adversely affects growth performance, mainly through the crowding out of private sector credit, we seek to investigate at what level does domestic debt exert deleterious effect on economic growth in Sierra Leone. Preliminary investigations reveal that our series are of different orders of cointegration and therefore justify the application of the Autoregressive Distributed Lag (ARDL) model. The regression results of the model show that both in the short and long runs domestic debt exerts negative impact on economic growth. Further, treasury bills rate also negatively affects economic growth, while private sector credit and net investment impact positively on economic growth. The paper also found that above the ratio of 20 percent of domestic debt to GDP, investment and private sector credit are crowded out, reinforcing “debt overhang”. In view of these findings, it is recommended that the government of Sierra Leone should reduce the level of domestic borrowing and also improve efficiency by utilising domestic debt for more productive economic activities, such as: promoting development in the financial sector to enhance private sector and investment growth.

Key Words: Domestic Debt; Economic Growth; Autoregressive Distributed Lag (ARDL)

JEL Codes: E62; O4; C51

¹ Ozolina C.E. Haffner, the corresponding author is a Senior Manager at the Bank of Sierra Leone and was on secondment at the West African Monetary Institute (WAMI), Accra, Ghana. Email Address: ohaffner@bsl.gov.sl. Alfred J.H. Aruna is a Banking Officer at the Bank of Sierra Leone and Kormay Adams is also an Economist at WAMI.

1.0 INTRODUCTION

In most African countries including Sierra Leone, the need for accelerated economic growth, financial market deepening and protection from negative external shocks has motivated the establishment of domestic markets for government securities. However, governments in these countries have found it difficult to meet their expenditure commitments from domestic revenue (tax and non-tax) and from externally-sourced grants and borrowings. Due to this mismatch between expenditures and resource inflows (both external & internal), most governments in Sub-Saharan African countries have resorted to domestic borrowing to finance their budgets. Therefore, the rationale for domestic borrowing in these countries currently focuses more on the need to achieve immediate and intermediate goals of financing fiscal deficits, rather than the ultimate desire for accelerated growth through monetary policy implementation and financial sector development.

The management and sustainability of domestic debt has become increasingly problematic with the dramatic increases in the breadth and depth of treasury instruments created to finance the growing budget deficits, and the associated costs of servicing them. In fact, in many highly indebted poor countries (HIPC), the cost of servicing domestic debt represents a larger claim on government revenue (liquidity burden) than external debt servicing even before the HIPC debt relief (Christensen 2004).

Evidence of studies conducted overtime show that domestic debt has indeed been increasing at an alarming rate, fuelled by high interest rates in most HIPC economies. Therefore, unlike past decades, when little or no attention was paid to the issue of escalating domestic debt in developing countries, it has in recent years become a growing concern for the International Monetary Fund (IMF) and other development partners, as its potential effect on fiscal budgets, macroeconomic stability, private sector credit, and in the long run growth performance, could be significant (Bua, Pradelli and Presbitero, 2014). From a survey of 14 HIPC countries conducted by Presbitero and Arnone (2006), it was noted that, although domestic debt is a relatively small percentage of total debt, the macroeconomic framework of these countries is already strained by enormous external debt, therefore, domestic debt stock however small, could adversely affect the economy. Other schools of thought albeit, reiterated that moderate levels of domestic debt stock can enhance monetary policy operations, develop the financial market, mobilise domestic savings and protect an economy from adverse external shocks.

Abbas and Christensen (2007) in their review of previous studies noted that moderate levels of domestic debt as a share of GDP and bank deposits, assuming sound monetary policies and broad financial market, can have an overall positive impact on economic growth via its contribution to macroeconomic stability, in terms of low inflation, reduced vulnerability to external as well as domestic shocks, generation of domestic savings and private investment. This is evident in fast-growing emerging markets such as China, India and Chile, which have maintained relatively low external indebtedness and concentrated their efforts on domestic borrowing, thereby avoiding major financial or fiscal crisis. There is also some evidence that as domestic debt grows beyond a sustainable level, it begins to undermine growth resulting from the crowding out of the private sector, increase in the price level, depreciation of the exchange rate and worsening of the government's budget.

Based on a research conducted on the impact of domestic debt on government budget and private investment, Christensen (2004) concluded that, the sharp increase in domestic interest payments in The Gambia, Ghana, Malawi, Sierra Leone, and Zimbabwe have significantly worsened governments' budget, as they have to set aside 15 percent of their revenue to pay interest on domestic debt. He further explained that given the significant domestic debt burden coupled with large stock of foreign debt and the degree of financial intermediation in these countries, further expansions in domestic debt, which is unavoidable, is more likely to crowd out private investment.

Sierra Leone's domestic debt has been growing over the years (see figure 1) and given its potential effect on economic growth, it remains important to ask the question: what is the effect of domestic debt on growth in Sierra Leone? However, apart from some studies, notably Christensen (2004) and Bua et al (2014) on the impact of domestic debt on economic growth in low income/HIPC countries, Sierra Leone inclusive, there is no evidence in empirical literature of a study conducted; with particular focus on Sierra Leone. Therefore, there is a primary need to research on the subject, so as to provide empirical evidence on whether or not the growing domestic debt is harmful or supports economic growth in Sierra Leone. The findings from this study will not only assist in the formulation of sound policy decisions, but will also add to the existing body of literature on domestic debt and economic growth. Thus, this paper seeks to empirically assess the impact of domestic debt on economic growth in Sierra Leone.

The paper is divided into six sections. Following this introductory section, section 2 focuses on some stylized facts on the Sierra Leone economy and section 3 provides the theoretical and empirical review on the subject. Section 4 covers the methodology, while section 5 gives the model estimation and empirical results. Section 6 dwells on the conclusion and policy recommendations.

2.0 SOME STYLIZED FACTS ON ECONOMIC GROWTH AND DOMESTIC DEBT

2.1 Overview of Economic Growth

In the 1960s, Sierra Leone on average, recorded a real GDP growth of about 4 percent per annum. Though endowed with substantial natural resources in terms of minerals, agriculture and fishery, the physical and social infrastructure were not well developed to enhance growth in these industries. This status quo, coupled with ineffective economic policies and deteriorating terms of trade in the 1970s resulted to a considerable decrease in incomes.

By the end of the 1980s, the economic situation worsened, underpinned by instability of macroeconomic indicators such as GDP, inflation and balance of payments. As the trade deficit widened, the economic condition became practically insurmountable, leading to heavy indebtedness to international financial institutions such as the World Bank and IMF.

The ten-year civil war that started in 1991 exacerbated Sierra Leone's already tragic situation, accounting for an average of 4.3 percent contraction in GDP growth between 1992 and 1998. The war adversely impacted on all sectors including educational and health facilities, settlements in both the rural and urban areas, as well as social and economic infrastructure. This worsened economic performance and, consequently, the poverty situation.

Notwithstanding the economic drag experienced in the 1990s, Sierra Leone started its growth recovery during the decade following the end of the war. The economy registered robust growth of 18.1 percent in 2001, 18.8 percent in 2002, 21.6 percent in 2003 and an average of more than 5.0 percent in the remaining years. After a relatively slower pace of growth since 2004, real GDP strengthened to 15.2 percent in 2012 from 6.0 percent in 2011, and the country was listed as one of the fastest growing economies in Africa (World Bank, 2013). Consistent with 2012, growth accelerated to 21.0 percent in 2013, with real GDP (including iron-ore) growing by 20.1 percent, whilst GDP (excluding iron-ore) grew by 5.5 percent supported mainly by agriculture and services. The improvement in economic growth was largely on account of increased domestic food production, vibrant mining activities (especially for iron-ore), sound macroeconomic management and favourable international commodity prices.

The positive developments witnessed in 2013 were, however, reversed with the outbreak of the Ebola Virus Disease (EVD) in May 2014, coupled with the weak global demand and depressed prices for primary commodities including iron ore, which had an adverse impact on the Sierra Leone economy. Economic activities were seriously disrupted in all the key sectors resulting in increased unemployment, erosion of business and investor confidence, reduced domestic revenue collection and increased Ebola-related spending. In addition, external sector performance deteriorated with the widening of the current account deficit owing to decline in exports, and depreciation of the domestic currency. Against these developments, as at end-2015, real GDP contracted by 21.1 percent.

2.2 Domestic Debt Profile

The primary objective for issuance of domestic debt instruments is to finance the government budget deficit as well as to manage liquidity in the banking system. The adherence to fiscal and monetary targets is crucial to determining the domestic debt issued.

Sierra Leone's domestic debt stock comprises marketable securities, non-marketable debt instruments and arrears. The marketable securities are short-term with maturities of one year or less. Non-marketable instruments are mainly held by the Bank of Sierra Leone, consisting of Ways and Means Advances and medium to long term bonds with maturities of two, three, five and ten years. Domestic arrears include outstanding obligations owed to suppliers and state-owned enterprises, as well as wages and other emoluments accruing to ex-diplomats.

Sierra Leone's Domestic Debt Market is characterised by:

- *Dominance of Short-Term Paper*

There is dominance of short-term paper in the securities market and this has resulted in increased roll-over and market risks, thus causing a significant burden on government budget. Financial liberalization has also induced more interest rate flexibility and made countries with large amount of short-term debt vulnerable to changes in market conditions.

- *Mismatch between Debt Issued and Government Expenditure*

Domestic debt is not always issued with the appropriate maturity length to mirror the maturity structure of the short-term current and long-term capital expenditures, as short-term securities are sometimes issued to finance infrastructure projects, which represents a re-financing risk.

- *Large Ratios of Domestic Debt to Broad Money (M2)*

There is a rise in domestic stock and hence, increase in debt burden (domestic debt/M2 ratio), which limits the scope for expanding domestic debt, given the small size of the financial sector. The large domestic debt/M2 ratio implies that further expansion of domestic debt would absorb increased commercial bank credit and thereby constrain credit to the private sector.

- *Narrow Investor Base*

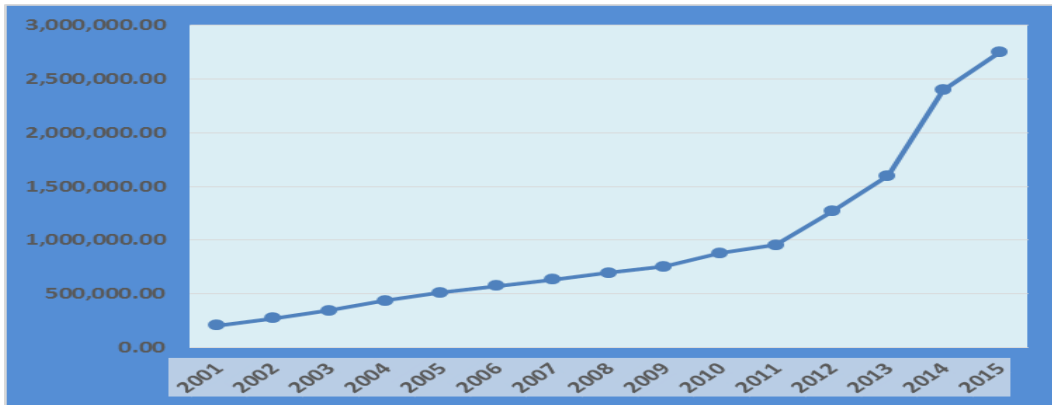
There is prevalence of narrow investor base and with commercial banks being major holders of government securities; this increases the risk of crowding out private investment.

Domestic debt is jointly managed by the Bank of Sierra Leone and the Ministry of Finance and Economic Development (MoFED). Techniques used by the Bank of Sierra Leone for the management of domestic debt involve rolling over of existing maturities supported by a secondary market for sale

and purchase of securities. Ways and means advances are also occasionally converted into tradeable securities upon authorization by the MoFED.

As at end 2015, total stock of government securities stood at Le2.7 trillion, consisting of Le2.2 trillion marketable securities and Le0.5 trillion non-marketable securities. Figure 1 depicts the trend in domestic debt stock from 2001 to 2015. Sierra Leone’s domestic debt has consistently been increasing over time but notably from 2011 as shown in the chart. This can be attributed to the increase in both current and capital expenditures, resulting from higher wage bills and government’s investment on infrastructure during the period.

Figure 1: Trend in Domestic Debt: 2001-2015 (In Millions of Leones)



Source: Bank of Sierra Leone

Figure 2 shows domestic debt as a percentage of GDP from 1985 to 2015. Domestic debt as a percentage of GDP prior to 1993 shows a declining trend. However, as the war intensified with the intervention of the Economic Community of West African States Monitoring Group (ECOMOG) to fight back the rebels, there was a one-time jump in the ratio as it peaked at 70 percent in 1993. Thereafter, the ratio commenced a gradual decline but was above 20 percent up to 2005. From 2005 to 2010, the ratio continued to decline, and was below 20 percent. Albeit, there has been an upward movement in the ratio since 2011, as the domestic debt stock rises.

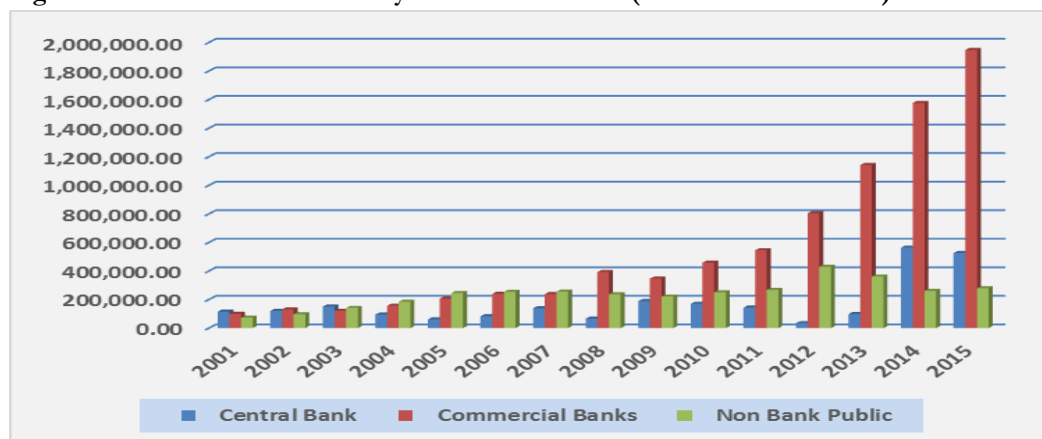
Figure 2: Domestic Debt as Percentage of GDP (1985-2015)



Source: International Financial Statistics

Figure 3 shows government securities by holders from 2001 to 2015. The chart portrays that the government securities market has been dominated by the commercial banks since 2008. This can be attributable to commercial banks' risk-averse approach to investments, following the 2007 global financial crisis.

Figure 3: Government Securities by Holders: 2001-2015 (In Millions of Leones)



Source: Bank of Sierra Leone

3.0 LITERATURE REVIEW

Both theoretical and empirical literature on domestic debt and its impact on economic growth has shown mixed results overtime. Some studies conducted on the topic reveal that domestic debt has a positive impact on economic growth, while others are of the view that domestic debt has a negative impact on economic growth.

3.1 Theoretical Literature Review

According to the Classicalists, public borrowing to a large extent diminishes savings and, hence, the investment capacity of a nation. They argued against government running into fiscal deficits, as the resulting debt accumulation is considered “pernicious” for the economy even if all the borrowings is from the domestic market. In their opinion, government in redeeming the debt will increase taxes leading to domestic capital flight, depreciation of the local currency and retardation of domestic production, since resources could be diverted from private sector development to non-productive activities, thus, adversely affecting economic growth. (Tsoulfidis, 2007)

The Keynesians give a strong argument for a high level of fiscal deficit as a means of fighting unemployment. They believe that booms and busts are fundamental features of market economies. Therefore, with the reserves accumulated during the boom period, government can temporarily involve in deficit spending and borrowing to combat economic contraction, without causing explosion of debt-GDP ratios in the long term (Filger, 2011).

The Ricardian theory discusses two types of equivalence between taxation and bond financing of government expenditures. The contemporaneous equivalence ascribes that for a closed economy, taxation and public domestic borrowing as means to finance government expenditures are essentially equivalent in terms of the forgone private output. The intertemporal equivalence on the other hand, equates government bonds to the present value of future taxes to retire the debt. The implication is that, fiscal deficits only amount to tax postponement, as the fiscal deficit accumulated in any current

period is equivalent to the present value of future taxation that is required to redeem the additional debt resulting from deficit (Ahiakpor, 2013). In summary, the Ricardian theory shares the same view as the Classicalists that government expenditures are usually unproductive and biased in nature, so, financing of budget deficits through public borrowing reduces investment and, thus, wealth accumulation and economic growth.

Sachs and Larrain (1993) point out that financing the fiscal deficit with higher domestic debt often postpones the day when the inflation tax comes into effect. The problem with domestic borrowing is that, although it provides resources today, it is in itself a debt that has to be serviced tomorrow. Interest payments on government debt add to fiscal expenditures, and, thereby, increase the deficit overtime. In other words, borrowing today might postpone inflation, but at the risk of even higher inflation in the future. They further aver that in the short run, domestic borrowing is a viable option that may truly enable the government to buy time so as to implement the expenditure cut/tax increases that will eventually close the deficit.

Itsede (1998) indicates that domestic debt involves government's resort to borrowing from the domestic economy to finance its investment programme when tax receipts fall below programmed expenditure. Alison (2003) also highlights that for most developing countries, the term "domestic debt" is generally a shorthand expression for debt instruments issued by the Central Bank.

Christensen (2004) reveals that "extensive use of domestic borrowing can have severe repercussions on the economy, as servicing of domestic debt can constitute a huge fraction of government revenue, especially as interest rates on domestic debt is higher than that of external debt in most cases. Therefore, given the shallowness of financial markets in developing countries, interest payments on domestic borrowing have the tendency to increase as the debt stock increases. Another downside risk in the issuance of domestic debt is that, governments tap into domestic private savings that would otherwise have been available to the private sector, hence crowding out private investment. Furthermore, he is of the view that in HIPC's, particularly in The Gambia, Ghana, Malawi, Sierra Leone, and Tanzania, there is limited potential for domestic debt expansion when compared with non-HIPC's, as the commercial banks are the dominant players in the market. As such, further increase in domestic debt would reduce their resources available for private sector credit.

Omoruyi (2005) proposes that in a macroeconomic context, governments borrow domestically for three main reasons: budget deficit financing, monetary policy implementation and financial sector development.

Presbitero and Arnone (2006) in their analysis suggest that, one of the key challenges in forming a large secondary market and a stable demand for securities in developing countries is the concentration of government securities among few holders, particularly the banking sector. As such, these countries may not reap the expected benefits of increase in domestic debt, despite its overall low level.

Sheikh, Faridi and Tariq (2010) note that, public debt is as an imperative tool used by governments in developing countries to finance their expenditures. Issuing of public debt, they further note, can increase economic growth if the resources are effectively and proficiently utilised to achieve macroeconomic goals. However, if not properly used, public debt would constrain economic growth and become the biggest curse for the economy.

Sichula (2012) highlights that debt overhang which occurs at the peak of the Laffer debt curve, can worsen economic performance by changing the quality of investment. The reason is that, in tandem with the increase in debt service burden, the expected future taxes on the private sector increase, thus

reducing private investment. In other words, resources that would have been used to fund investments are consumed by debt servicing.

3.2 Empirical Literature Review

Cohen (1993) in his empirical study on the relationship between debt and investment in Least Developed Countries (LDC's) in the 1980s, finds that the level of debt stock does not have significant impact on investment and, thus, does not explain the slowdown of investment observed in developing countries during the 1980s. He concludes, however, that the actual flows of net transfers matter and that the actual servicing of debt crowds out investment.

Christensen (2004) in investigating the impact of domestic debt on private sector credit on twenty seven SSA countries including Sierra Leone for the period 1980-2000, used a simple panel data model to estimate the effect of private sector lending on domestic debt (both variables were in percent of broad money). The regression results lend significant support for the crowding out hypothesis, as on average across the countries a 1 percent increase in domestic debt relative to broad money results to a decline in the ratio of private sector lending to broad money by 0.15 percent.

Abdi (2004) points to three potential factors in his New Growth Theory that influence output and productivity growth; investment in human capital, research & development (R&D), and investment in machinery and equipment (M&E). He employs panel data (1961-1997) for 20 Canadian manufacturing industries and time-series data (1961-2000) for the entire Canadian manufacturing sector, using a constant returns to scale Cobb Douglas production function. The results suggest that the elasticities of output with respect to M&E capital stock and M&E investment are well over the human capital's share of national income. Nonetheless, the coefficient of labour is approximately the same as its income share. The results also indicate that investment in M&E is not the only source of growth as the elasticity of output with respect to investment in infrastructure is far above its income share. This implies that there exists the probability that both types of investments are complementary.

Demirgüç-Kunt and Detragiache (2005) using government domestic interest payments as proxy for domestic debt in 82 low income countries and emerging markets for the period 1990-2001, find that the coefficient on interest payments is significantly negative, but not as robust as in the case of regressing bank assets scaled to GDP, hence suggesting at first glance a typical crowding out effect. Albeit, interest payments on domestic debt enter the loans to GDP and deposits to GDP regressions positively, significantly and robustly, indicating a crowding in effect.

Adofu and Abula (2010) investigate the empirical relationship between domestic debt and economic growth in Nigeria. Using OLS regression techniques and time series data from 1986 to 2005, the result of their study shows that domestic debt adversely affects the growth of the economy.

Sheikh et al (2010) in investigating the impact of domestic debt on economic growth in Pakistan applied the OLS technique for the period 1972 to 2009. Their findings indicate that the stock of domestic debt impacts positively on economic growth in Pakistan. This implies that part of the resources garnered from domestic borrowing was utilised to finance government expenditures which contribute to economic growth. It was also noted that domestic debt servicing and economic growth has an inverse relationship. This is owing to the fact that economic growth is impeded if the percentage of non-development expenditures is high. The study concludes that the negative impact of domestic debt servicing on economic growth far outweighs the positive impact of domestic debt on economic growth.

Reinhart and Rogoff (2010) examine a new multi-country historical dataset on public debt to establish a systemic relationship between high public debt levels, growth and inflation. The main findings of their

study show that (i) there appears to be a relatively weak link between growth and debt at “normal” debt levels; (ii) countries with public debt over roughly 90 percent of GDP have median growth rates that are about one percent lower, and average (mean) growth rates that are several percent lower than countries with low levels of debt. However, they noted that the relationship between public debt and growth is remarkably similar across advanced economies and emerging markets.

Presbitero (2010) in his study of low and middle-income countries over the period 1990-2007 using panel analysis, reveals that public debt up to a threshold of 90 percent of GDP negatively impacts on output growth, beyond which, its effect is insignificant. Since debt overhang is a growth constraint only in countries with sound macroeconomic policies and stable institutions, it can be concluded that country-specific factors are responsible for this non-linear effect.

Checherita-Westphal and Rother (2012) investigate the impact of government debt on per-capita GDP growth in twelve euro area countries over a period of 40 years. Their findings reveal that debt has a non-linear impact of on growth with a turning point, because beyond a public debt-to-GDP ratio of about 90-100 percent, debt has a harmful effect on long-term growth. Based on the confidence intervals for the debt turning point, the negative impact of high debt on growth may have started from levels of around 70-80% of GDP, suggesting the need for more prudent indebtedness policies. There is also evidence that the annual change of the public debt ratio and the budget deficit-to-GDP ratio are negatively and linearly related to per-capita GDP growth. In addition, it was found that, the channels via which the change in government debt level impacts on the economic growth are: (i) private saving; (ii) public investment; (iii) total factor productivity (TFP), and (iv) sovereign long-term nominal and real interest rates.

Atique and Malik (2012) explore the long and the short run relationship between public debt and economic growth for Pakistan from 1972 to 2012, using the autoregressive distributed lag (ARDL) approach. The findings of the study reveal that external debt has a significant negative effect on GDP and GNP in both the short and long run, while debt servicing is inversely related to GDP and GNP only in the short run. However, domestic debt is found to have no impact on economic growth.

Oneyiwu C. (2012) investigates the relationship between domestic debt and economic growth in Nigeria. Using OLS and error correction model, he establishes a negative relation between economic growth and domestic debt. The empirical results also show that private sector credit has an inverse relationship with domestic debt and is statistically significant as a determinant of economic growth, while exchange rate and money supply were found to be positively related to domestic debt.

Putunoi and Mutuku (2013) in their study on the impact of domestic debt on economic growth of Kenya over the period 2000-2010, employ the Engel-Granger residual-based and Johansen VAR-based cointegration tests. The results of the analysis revealed that domestic debt markets play an increasingly important role in supporting economic growth. They find that domestic debt expansion has a positive long-run and significant effect on economic growth in Kenya for the period of study.

Mbate (2013) estimates a dynamic cross-country model to investigate the impact of domestic debt on economic growth and private sector credit in a panel of 21 sub-Saharan African (SSA) countries over the period 1985 to 2010. System-GMM results reveal a non-linear relationship between domestic debt and economic growth, characterized by a maximum turning point of 11.4 per cent of GDP. In addition, domestic debt is found to crowd out private sector credit by an elasticity of negative 0.3 per cent of GDP, deterring capital accumulation and private sector growth.

Bua et al (2014) introducing a new dataset in their study on domestic debt in 36 LICs for the period 1971 to 2011, found that i) domestic debt increased from 12.3 percent of GDP in 1996 to 16.2 percent

of GDP in 2011, almost reaching the size of external debt; ii) domestic debt burden is higher than external debt burden, but the former has been declining over time, as governments borrow at lower costs to enhance financial deepening; iii) the share of long-term instruments has been increased over time in LICs; and iv) the share of securities in government debt has increased, particularly for non-HIPCs, although for many HIPCs, central bank credit increased in response to the global financial crisis.

Serju (2014), using a finite distributed lag and VECM framework finds evidence that the high Treasury bill rates in Jamaica had an overall negative impact on the supply of loans to the productive sector. The paper concludes that, ceteris paribus, the relative low supply of credit to the private sector in Jamaica weaken its growth potential over the period of analysis and hence economic growth.

Babu, Kiprop, Kalio and Gisore (2015) empirically explore the impact of domestic debt as a percentage of GDP on economic growth in the East African Community for the period 1990-2010, based on the Solow growth model augmented for debt. The results show that domestic debt has a positive significant effect on per capita GDP growth rate in the EAC.

In assessing whether there exists a non-linear impact of domestic debt on real GDP growth rate in Sierra Leone, this research included a quadratic term in debt to the model. The quadratic term is used to capture the impact of increasing levels of domestic debt on the growth rate of real GDP in Sierra Leone. Despite the huge literature on domestic debt and economic growth for both developed and developing countries, the authors are not aware of any work on its non-linear impact in the case of Sierra Leone. Hence, this research fills the gap in that regard.

4. METHODOLOGY

4.1 The Model

The Empirical model is formulated, using the neoclassical production function analysis. Consistent with Cunningham (1993), the production function is employed to explain the relationship between GDP growth and debt burden. For heavily indebted nations, the fact that growth in exports only led to the payments of interest and principal on the debt inhibited the incentives for investment and growth in these nations, a phenomenon known as debt overhang. As debt burden affects the productivity of labour and accumulation of capital, it is, therefore, rational that it should be included in the production function. Hence, debt burden was added as an argument in the production function similar to the addition of exports in the neo-classical model.

$$Y = f(K, L, DB) \dots\dots\dots(1)$$

Where, Y=GDP growth, K= capital, L=labour, DB=debt burden

The nation`s total debt burden which is included in the Cunningham model, is replaced with domestic debt burden in this model. To make the analysis more specific, only domestic debt measures are included in this analysis, as the effect of domestic debt on the economy is different from that of external debt. The relationship between domestic debt and economic growth is, thus, estimated, using the following basic regression equation:

$$\ln RGDP_t = \delta \ln X_t + \gamma \ln DDS_t + \mu_t \dots\dots\dots(2)$$

Where;

$\ln RGDPG_t$ - is the growth rate of real GDP. It is the dependent variable.

-consists of different explanatory variables that were used. Net total investment, domestic credit to the private sector as a percentage of GDP and the treasury bills rate are the independent variables. These variables are known to be consistently associated with growth.

$\gamma \ln DDS_t$ - is the domestic debt variable, that is, the ratio of domestic debt to GDP.

μ_t - is the error term.

To gauge the relationship between domestic debt and economic growth, several quantitative methods are available for conducting the cointegration test but Pesaran and Shin (1999) and Pesaran, Shin and Smith (2001) introduced a new method of testing for cointegration. The approach, known as the Autoregressive Distributed Lag (ARDL) has at least three significant advantages over the two alternatives commonly used in the empirical literature: the single-equation procedure developed by Engle and Granger (1987) and the maximum likelihood method postulated by Johansen (1991, 1995) which is based on a system of equations. The first advantage of the ARDL bounds testing approach is that it allows the analysis of long-term relationships between variables, regardless of whether they are integrated of order 0 [I(0)], of order 1 [I(1)] or mutually cointegrated. Secondly, this approach allows a distinction to be made between the dependent variable and the explanatory variables, an obvious advantage over the method proposed by Engle and Granger. Although, similar to the Johansen approach, it enables simultaneous estimation of both the short-run and long-run components, thus, eradicating the challenges associated with omitted variables and the presence of autocorrelation.

Finally, while the estimation results obtained using the proposed methods of Engle and Granger as well as Johansen are not robust to small samples, Pesaran and Shin (1999) show that the short-run parameters estimated using the ARDL approach are \sqrt{T} - consistent and the long-run parameters are super-consistent in small samples.

The ARDL framework implemented in its log format is outlined below:

$$\Delta y_t = \beta_0 + \phi y_{t-1} + \gamma j_{t-1} + \eta X_{J,t-1} + \sum_{k=1}^p \phi_k \Delta y_{t-k} + \sum_{k=1}^p \lambda_k \Delta j_{t-k} + \sum_{l=0}^q \alpha_l \Delta X_{J,t-1} + \mu_t \dots \dots \dots (3)$$

In the model, the dependent variable Y_t (growth rate of real GDP), the main explanatory variable (measure by ratio of domestic debt to GDP) and explanatory variables (which include, investments, Treasury bill rate, domestic credit to the private sector) enter the ARDL regression with lag of order p and q , respectively.

The coefficients on the level effects are ϕ and η with the long-run effects estimated as $\frac{-\eta}{\phi}$ and $\frac{-\gamma}{\phi}$, with ϕ representing the convergence parameter (speed of adjustment to the long run relationship). Additionally, the short run coefficients are ϕ , λ and α .

Given that the research is interested in assessing whether there exists a non-linear impact of domestic debt on growth, a quadratic term in debt is included in the model. The latter is used to capture the impact of increasing levels of debt on economic growth. This is outlined in the model below:

$$\Delta y_t = \beta_0 + \phi y_{t-1} + \gamma j_{t-1} + \gamma j_{t-1}^2 + \eta X_{j,t-1} + \sum_{k=1}^p \phi_k \Delta y_{t-k} + \sum_{k=1}^p \lambda_k \Delta j_{t-k} + \sum_{l=0}^q \lambda_l \Delta j_{t-k}^2 + \sum_{l=0}^q \alpha_l \Delta X_{j,t-1} + \mu_t \dots \dots \dots (4)$$

Where: j^2 is the non-linear variable, which is derived by squaring the ratio of domestic debt to GDP. If the coefficients on the linear and quadratic debt terms are significantly different from zero then the hypothesis of a non-linear effect of debt on economic growth would be confirmed in Sierra Leone. Given the existence of a non-linear relationship between domestic debt and economic growth, equation 4 attempts to identify the level of debt at which the non-linear relationship holds by including dummy variables to capture specific debt levels. In this regard, the ARDL model employed is as follows:

$$\Delta y_t = \beta_0 + \phi y_{t-1} + \gamma j_{t-1} + \eta X_{j,t-1} + \sum_{k=1}^p \phi_k \Delta y_{t-k} + \sum_{k=1}^p \lambda_k \Delta j_{t-k} + \sum_{l=0}^q \alpha_l \Delta X_{j,t-1} + D_{i,t} + \mu_t \dots \dots \dots (5)$$

Where D_i , captures respective debt levels of interest.

To investigate the relationship between the domestic debt and economic growth in Sierra Leone the study estimates two models. The first model (Model 1), which is derived from equation 4, has real GDP as the dependent variable, the main independent variable as the ratio of domestic debt to GDP along with the quadratic term in debt and the vector X consisting of the other independent variables. These are private investment, lag real GDP, domestic credit to the private sector as a percentage of GDP, Treasury bill rate, and a dummy variable to capture the impact of the war. The second model (Model 2) seeks to determine the level at which domestic debt negatively affect economic growth. Model 2 consist of Model 1 (excluding the quadratic debt terms) along with a dummy variable to capture the threshold that debt negatively affect economic growth.

4.2 Data Sources and Measurement of Variables

4.2.1 Data Sources

Secondary data of selected variables is on annual basis from 1970-2015. The data sources are World Development Indicators (WDI) and the IMF International Financial Statistics (IFS). Private investment was obtained from IFS and the rest of the other annual series were obtained from the World Development Indicators. The brevity of the sample period is dictated by the availability of consistent data, most of which are compiled on an annual basis.

4.2.2 Measurement of Variables

The change in real GDP is used as a measure of economic growth while investment is measured by the change in gross fixed capital formation. This paper measures debt burden by the ratio of domestic debt to nominal GDP.

5.0. MODEL ESTIMATION AND EMPIRICAL RESULTS

5.1 Unit Root Test

The ARDL approach to cointegration theoretically does not require prior testing of the series for unit roots. However, some recent empirical studies have indicated that testing for unit root is necessary to ensure that none of the variables is I(2) which will invalidate the use of the ARDL approach (Shrestha and Chowdhury, 2005; and Jalil and Ma, 2008). The results of the Augmented Dickey-Fuller (ADF) test are reported in Appendix 1.

The results show that domestic debt stock (DDS), investment (INV), square of the domestic debt stock (DDS^2) and domestic credit to the private sector (DCPSG) are stationary at first difference. However, treasury bill rate (TBR) and GDP growth rate (GDPG) are stationary at levels. This result thus reinforces the use of the bounds test to determine cointegrating relationship among the series.

5.2 Bounds Cointegration Test

In order to perform the bounds testing procedure, we estimate equation (4) using the ARDL approach to cointegration. Narayan (2004) has provided critical values that are considered to be more appropriate for ARDL modeling using small samples as compared to Pesaran and Pesaran (1997) and Pesaran et al (2001).

Under the ARDL approach, the calculated F-statistics are compared against the critical values, which are extracted from Narayan (2004). The calculated F-statistics reported in Appendix 2 shows that; for equation (4) where the LGDPG is the dependent variable, $F(lgdp_g) = 4.5021$ is higher than the upper critical bound value (4.303) at 5 percent significance level. This implies that the null hypothesis of no cointegration among the variables in equation (4) can be rejected.

The calculated F-statistics reported in Appendix 3 (Model 2) shows that; for equation (5) where the LGDPG is the dependent variable, $F(lgdp_g) = 4.1325$ is higher than the upper critical bound value (3.637) at 10 percent significance level. This implies that the null hypothesis of no cointegration among the variables in equation (5) can be rejected.

5.3 Static Long Run Coefficients

Having established that output growth is cointegrated with its explanatory variables, we now estimate equation (4) for the long run elasticities using the appropriate lag lengths. A lag length of 2 is used in the bounds test in line with the Swartz Information Criterion (SIC) to ensure that the full dynamics are captured and the model is free of serial correlation. The results for the long run elasticities are reported in Table 1. The model estimates the relationship between domestic debt and economic growth in Sierra Leone. The results suggest that domestic debt has a non-linear impact on economic growth in the long and short run as indicated by the statistical significance of the non-linear variable. Furthermore, in the long and run, domestic debt at low levels as well as at high levels has a negative impact on growth.

Table 1: Estimated Long-Run Results Based on SBC- ARDL (1,1,0,0,1,2), RGDPG as Dependent Variable

<i>Regressor</i>	<i>Coefficient</i>	<i>Standard Error</i>	<i>Prob</i>
LnDDS	-0.3023	0.1652	0.078*
(LnDDS) ²	-0.491	0.1281	0.004***
TBR	-0.1705	0.0843	0.078*
DCPSG	0.2432	0.1101	0.054*
LnINV	0.0887	0.0303	0.007***
C	-0.3873	0.1379	0.009***
Diagnostics Tests			
Test Statistics	LM Version	F Version	
Serial Correlation	CHSQ(1)=1.2607(0.234)	F(1,19)=0.588(0.432)	
Functional Form	CHSQ(1)=1.0636(0.313)	F(1,36)=1.039(0.295)	
Normality	CHSQ(2)=0.19034(0.913)	Not Applicable	
Heteroscedasticity	CHSQ(1)=40.9698(0.000)	F(1,19)=755.642(0.000)	

*Note: ***, ** (*) imply significance at the 1, 5 & 10 percent levels respectively. Source: Computed by Author using Microfit Version 4.1 developed by Pesaran and Shin (1999).*

More specifically, in the long run and at low levels of debt, economic growth decreases by 0.30 percent after a one percentage point increase in stock of domestic debt, while at high levels of debt, a one percentage point increase in the domestic debt stock reduces economic growth by 0.49 per cent. Domestic debt has both positive and negative effects on economic growth. However, financial markets liberalisation and macroeconomic stability is a necessary condition for the domination of positive effects [Del and Piero (2003)]. Sierra Leone is lacking on these grounds so negative impacts of domestic debt are dominating. Notably, the result is consistent with the findings of Adofu I and M. Abula (2010) and Atique and Malik (2012) who found that debt has a negative effect on economic growth.

At the 10 percent level of significance, a one percentage increase in domestic credit to the private sector increase output by 0.24 percent in the long run but the effect on output growth is insignificant in the short run. This may have emanated from the government's expensive borrowing from the domestic money market which may have crowded out private sector investment. The increase in interest rates had a further dampening impact on economic growth. This result is consistent with Charles (2012) for Nigeria, Christensen (2004) and Mbate (2013).

5.4 Short Run Coefficients

The existence of a cointegrating relationship between growth and its determinants provides support for the estimation of a short-run dynamic model. The results of the error-correction model are reported in Table 2. All the short-run elasticities have the expected signs and are inelastic like their long-run counterparts.

Similarly, in the short-run, at a high level of domestic debt, economic growth is reduced by 0.19 percent following a percentage point increase in the stock of domestic debt. At low levels of debt, a one percentage point increase in domestic debt decreases output growth by 0.02 percent. The above results

imply that debt has a statistically significant inverse relationship with economic growth at high levels in Sierra Leone. That is, the greater the level of debt the more economic growth decreases. The result may partly reflect the notion that a significant portion of debt proceeds in Sierra Leone is used to finance recurrent expenditure (domestic debt servicing for instance) rather than to boost capital investment. The results are consistent with the findings of Reinhart and Rogoff (2010), Bua et al (2014), and Checherita-Westphal and Rother(2012). Further, government's absorption of losses and debt from loss making public entities such as Sierra Leone Commercial Bank and Rokel Commercial Bank and the exposure of the country's public debt to exchange rate depreciation as well as the civil war also contributed significantly to its high debt levels. The crowding out of the private sector by Government, as it seeks to finance its debt payments, could also explain the negative relationship.

Table 2: Error Correction Representation of the Selected ARDL Model (1,1,0,0,1,2), RGDPG as Dependent Variable

<i>Regressor</i>	<i>Coefficient</i>	<i>Standard Error</i>	<i>Prob</i>
dGDPG1	-0.1493	0.054	0.010***
dLnDDS	-0.0178	0.0105	0.093*
(dLnDDS)^2	-0.1921	0.0598	0.050**
dTBR	-0.4229	0.0500	0.000***
dDCPSG	0.5046	0.4123	0.235
dLnINV	0.2485	0.1193	0.071*
dwar	-0.0099	0.005	0.071*
dC	-0.0005	0.0002	0.002***
ecm(-1)	-0.3738	0.1376	0.001***
R-Squared	0.7837	R-Bar Squared	0.7694
S.E. of Regression	0.0238	F-Stat F(15,26)	109.6536(.000)
Mean of Dep. Var	0.2435	S.D. of dependent variable	0.1517
Residual Sum of Squares	0.0119	Equation log-likelihood	111.9573
Akaike Info. Criterion	90.9573	Schwarz Bayesian Criterion	72.7117
DW-Statistics	2.0622		

*Note: ***, ** (*) imply significance at the 1, 5 & 10 percent levels respectively.*

Source: Estimation results using Microfit Version 4.1

Domestic credit to the private sector promotes economic growth in both the long and short run, though not significant in the short run. Domestic credit to the private sector, however, is yet to be a significant driver of GDP growth in Sierra Leone at least in the short-run.

In both the long and short run and at 1 percent and 10 percent level of significance, a one percentage point increase in the treasury bill rate decreases GDP growth by 0.42 and 0.17 respectively, consistent with the findings of Serju (2014). Intuitively, this could be attributed to the shallow financial market and a narrow investor base, coupled with government's extensive borrowing from the domestic market. Given that financial resources are limited, expansion in domestic debt will more easily lead to higher domestic interest rates. Since the government's volume of revenue mobilization is low, the only resort to acquiring much needed funds is from the domestic market and, hence, the spike in the rates. Moreover, since the investor base in Sierra Leone is dominated by commercial banks, the government is most times held hostage by this group of investors and hence the spike in the Treasury bill rate.

Furthermore, a one percent increase in net investment increases GDP growth by 0.09 percent in the long run and by 0.25 percent in the short run at the 1 percent and 10 percent significance levels respectively. These results conform to the findings of Abdi (2004) who found a strong link between investment in general, and machinery and equipment investment in particular, with economic growth in Canada.

The literature postulates that the coefficient of the lagged error correction term should be negative and statistically significant to further confirm the existence of a long-run relationship. The coefficient of the lagged ECM term is -0.3738, which suggests a moderate adjustment process at the 1 percent level of significance. This implies that 37 percent of the disequilibrium of the previous year's shock adjusts back to the long run equilibrium in the current year. The regression fit remarkably well (adjusted R-squared of 0.769) and pass the diagnostic tests against serial correlation, non-normality and functional-form misspecification but failed heteroscedasticity in the errors. This should not be a problem because the presence of heteroscedasticity alone does not cause bias or inconsistency in the OLS estimates (Wooldridge, 2015). The tests of CUSUM and CUSUMSQ suggest no evidence of structural instability in the parameters during the sample period as the plots (which are presented in appendix 4) lie within the 5 percent critical bounds. The result of the specification test supports the use of domestic debt stock in determining its effects on output growth.

The second model (Model 2) seeks to gauge the level at which domestic debt negatively affects economic growth in Sierra Leone. Model 2 consists of Model 1 (excluding the quadratic debt terms) along with a dummy variable to capture the threshold that debt negatively affect economic growth.

Table 3: Estimated Long-Run Results Based on SBC- ARDL (1,1,0,1,0,1,2), RGDPG as Dependent Variable

<i>Regressor</i>	<i>Coefficient</i>	<i>Standard Error</i>	<i>Prob</i>
LnDDS	-0.507	0.096	0.000***
debt dum	-0.683	0.080	0.000***
TBR	-0.068	0.059	0.260
DCPSG	0.465	0.337	0.168
LnINV	1.321	0.828	0.150
C	-0.211	0.069	0.005***
Diagnostics Tests			
Test Statistics	LM Version	F Version	
Serial Correlation	CHSQ(1)=15.2093(0.385)	F(1,19)=0.588(0.432)	
Functional Form	CHSQ(1)=1.1425(0.256)	F(1,36)=1.039(0.295)	
Normality	CHSQ(2)=1.7716(0.535)	Not Applicable	
Heteroscedasticity	CHSQ(1)=13.7135(0.431)	F(1,19)=755.642(0.000)	

Hence, Table 4 (Model 2) indicates that on average, the ratios of debt to GDP in excess of 20 percent reduce economic growth by 0.38 percent at the 5 percent significance level when compared to ratios below 20 percent, holding other explanatory variables constant. Interestingly, both investment and domestic credit to the private sector are crowded out at domestic debt levels in excess of 20 percent of GDP in Sierra Leone. Though they are consistent on a priori grounds, they are both insignificant, thus,

reinforcing the phenomenon of “domestic debt overhang” in the economy and corroborating the long-run results. Moreover, at low levels of debt, a one percentage point increase in domestic debt decreases output growth by 0.31 percent. The results also indicate that the civil war has a statistically significant negative impact on economic growth in Sierra Leone.

Table 4: Error Correction Representation of the Selected ARDL Model (1,1,0,1,0,1,2) (MODEL 2), RGDPG as Dependent Variable

<i>Regressor</i>	<i>Coefficient</i>	<i>Standard Error</i>	<i>Prob</i>
dGDPG1	-0.0250	0.0020	0.000***
dLnDDS	-0.3068	0.0229	0.000***
debt dum	-0.3768	0.0822	0.0500**
dTBR	-0.2801	0.2390	0.4200
dDCPSG	0.0769	0.1658	0.5261
dLnINV	0.0311	0.0406	0.4526
dwar	-0.2747	0.0862	0.0470**
dC	-0.0288	0.0142	0.0419**
ecm(-1)	-0.5928	0.2821	0.000***
R-Squared	0.726	R-Bar Squared	0.717
Serial Correlation	0.385	Functional Form	0.256
Normality	0.535	Heteroscedasticity	0.431

Moreover, this model passes all the diagnostic tests including heteroscedasticity and the speed of adjustment to equilibrium from previous year’s shock is corrected in the current year at a speed of 59 percent.

6.0 CONCLUSION AND POLICY RECOMMENDATIONS

6.1 Conclusion

The main objective of this paper is to examine the impact of domestic debt on economic growth in Sierra Leone for the period 1970-2015. Using the ARDL approach, the study reveals that domestic debt exerts a significant negative effect on economic growth in Sierra Leone, both in the short and long runs and at low and high levels. This implies that, as the stock of domestic debt increases, economic growth decreases, thus, reflecting that domestic borrowings are not utilised for productive activities, among others. The results further show that private sector credit and net investment have positive effects on economic growth, while treasury bills rate has a negative effect. The study concludes that at ratios of domestic debt to GDP in excess of 20 percent, there is crowding out of private sector credit and investment, emphasising “debt overhang”. The implication is that government has limited capacity to increase domestic borrowings, given the debt to GDP ratio of 11.8 percent in 2015.

The need for domestic debt management has, hence, become urgent to mitigate the effect of the rising cost of servicing domestic debt associated with increase in the stock level, on government revenue and overall fiscal balance. Domestic debt growth if not contained will continue to adversely affect economic growth by crowding out private investment, as commercial banks will prefer to invest in government’s securities, rather than give out loans to the private sector, because of the seemingly risk-free nature of government debt instruments.

6.2 Policy Recommendations

Based on the empirical results, the following policies are recommended which are aimed at reducing government’s fiscal deficit and, hence, domestic debt:

- i. Government should reduce its fiscal deficit by raising revenues through aggressive tax collection and/or reducing its expenditure.
 - a. To enhance revenue mobilisation, it is imperative that the government enhance the capacity of the National Revenue Authority (NRA), so that the large informal sector will be captured in the tax net and tax evasion in the formal sector minimised.
 - b. Fiscal discipline should be the watchword of government and this can be observed by profiling expenditure against revenue. Additional spending should only be undertaken when both fiscal and macroeconomic space are available to safeguard the solvency as well as stability for long-term growth. To achieve this, the government needs to strengthen the capacity of the Public Expenditure Tracking (PET) project being implemented by the Ministry of Finance.
- ii. Strategies for effective debt management, which include incorporating ceiling to limit domestic debt, as well as the design of financial policies to enhance availability of credit, should be pursued.
- iii. There is a dire need to deepen the money market, strengthen the capital market, and provide added impetus for government to broaden the domestic budget financing base, especially by the non-bank private sector.
- iv. For effective debt management, debt restructuring is pertinent in order to limit debt service costs to sustainable levels: such as converting some proportion of government instruments to longer-term securities of more than one-year maturity tenor.

- v. The authorities should pursue much more aggressive fiscal consolidation in order to ensure macroeconomic stability, so that the enabling environment will be created for financial market and private sector growth.
- vi. Finally, given the gradual build-up of the domestic debt-GDP ratio from 8.00 percent in 2013 to 11.8 percent in 2015, government is cautioned to reduce its domestic borrowing so that the ratio will not revert to the above 20 percent level it was in the 1990's and early 2000's.

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APPENDIX 1

ADF Unit Root Test Results

Variable	ADF Statistic		Lag Length	Inference
	Intercept without Trend	Intercept with trend		
LnDDS	-1.712	-1.126	1	Non-Stationary
D(LnDDS)	-4.23	-4.595	0	Stationary
LnINV	-1.458	-3.248	0	Non-Stationary
D(LnINV)	-6.493	-6.379	2	Stationary
TBR	-6.22	-6.182	1	Stationary
DCPSG	-2.243	-2.374	1	Non-Stationary
D(DCPSG)	-3.866	-4.029	0	Stationary
$Ln(DDS^2)$	-1.932	-1.324	1	Non-Stationary
$\partial[Ln(DDS^2)]$	-5.543	-5.856	0	Stationary
GDPG	-3.214	-4.635	2	Stationary

Note critical values: without trend = -2.98; with trend = -3.57 at 5%

APPENDIX 2

Bounds Test Results

Test Statistic	Value	Lag Length	Bounds Critical Values		
			I(0)	I(1)	
F-Statistic	4.5021	2	1%	3.979	5.806
			5%	2.860	4.303
			10%	2.390	3.637

Source: Critical values are obtained from Narayan & Narayan (2004)

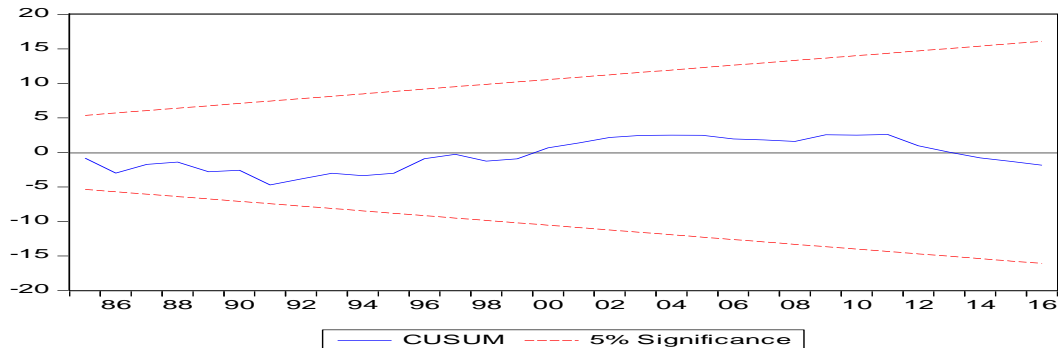
APPENDIX 3

Bounds Test Results (MODEL 2)

Test Statistic	Value	Lag length	Bounds Critical Values		
			I(0)	I(1)	
F-Statistic	4.1325	2	1%	3.979	5.806
			5%	2.860	4.303
			10%	2.390	3.637

APPENDIX 4

Plot of Cumulative Sum of Recursive Residuals



Plot of Cumulative Sum of Squares of Recursive Residuals

