

Fiscal Deficits and Current Account Imbalances: Evidence from Sierra Leone

Tarawalie Abu Bakarr¹

Director of Research and Statistics
West African Monetary Institute
Gulf House
Ghana

Abstract

This study examines the short and long run relationships between budget and current account deficits in Sierra Leone within the framework of the bounds test approach and Toda Yamamoto (1995) causality analysis. Using annual data for the period 1980-2012, the results reveal that budget deficit, real GDP and political instability (proxy by war dummy) have positive impact on current account deficit in the long run. In addition, the short run estimates show that budget deficit and war dummy were the most significant variables influencing current account deficit in Sierra Leone during the review period. The granger causality tests reveal that, uni-directional causality runs from budget deficit to current account balance and from current account balance to real GDP, with no feedback effect. However, no causality was evident between current account balance and the other explanatory variables. A key lesson of this study is that, policy measures that are able to reduce the budget deficit should be seriously considered by the authorities in order to reduce the trade deficit. This can be achieved through the implementation of sound and prudent fiscal policies aimed at providing incentives to increase revenue mobilization and rationalization of government expenditure.

Keywords: Budget deficit, current account deficit, bound testing, granger causality, Sierra Leone

JEL Classification: B22, H62, E62, O40

1. Introduction

The growing government deficits along with steady current account deficits have been an important issue for policy-makers in Sierra Leone. This is largely due to the implication of current account imbalances on a nation's long term economic growth prospects. From a theoretical point of view, large budget deficit potentially worsen the current account balances as well as appreciation of the real exchange rate (Salvatore, 2006). The imbalances could slow down economic activities and cause a decline in output growth and thereby reducing the well being of a nation. Furthermore, the relationship between budget and current account deficits has important policy implications for a number of reasons; first, persistent large deficits cause indebtedness by borrowing internally and externally, second, it imposes burden on future generations. As such, rising current account deficits could escalate government budget deficits, and such deficit cannot be reduced unless policies that address government deficits are put into place (Anoruo and Ramchander, 1998).

In the theoretical literature, there are various schools of thought regarding the relationships between current account deficit and budget deficit. In the Mundell-Flemming model based on the conventional Keynesian "twin deficit hypotheses", budget deficits generate current account deficits. In this twin deficits framework, increases in budget deficits in an open economy like Sierra Leone tend to increase domestic interest rate, which in turn induce a capital inflow and resultantly cause a real exchange rate appreciation. The real appreciation of the domestic currency, in turn, deteriorates the current account balance, and consequently budget deficit causes current account deficit.

¹ TARAWALIE Abu Bakarr is the Director of Research and Statistics at the West African Monetary Institute (WAMI), Accra, Ghana. The views expressed in this study are those of the author and do not necessarily represent the views of WAMI.

Under the Ricardian Equivalence Hypothesis (REH), there is no relationship between current account deficit and budget deficit (Seater, 1993). According to this hypothesis, an intertemporal shift between taxes and budget deficits does not matter for the real interest rate, the quantity of investment or the current account balance. In other words, the absence of any Granger causality between the two deficits would be in accordance with the REH.

Since the early 1970's following the first oil shock, Sierra Leone has experience persistent fiscal deficits and deteriorating current account balances. Budget deficit (excluding grants) deteriorated from 10.0 percent of GDP in 1975 to 12.0 percent of GDP in 1980². This was partly due to the huge expenditure outlay following the hosting of the Organization of African Unity (OAU) Summit in 1980. However, budget deficit declined to 7.0 percent of GDP in 1988 following the implementation of the Structural Adjustment Programme (SAP) in 1986/1987, before deteriorating to 16.5 percent in 2001 mainly on account of increased government expenditure on rehabilitation, reconstruction and resettlement programme following the end of the civil war. Furthermore, the deficit deteriorated from 1.4 percent in 2005 to 8.0 percent in 2012. In a similar development, current account deficit deteriorated from 10.3 percent of GDP in 1975 to 14.9 percent of GDP in 1980. On the contrary, the deficit significantly improved from the 1980 position to 1.8 and 0.3 percents of GDP in 1983 and 1988, respectively. After the persistent declines, the current account deficit increased in 2001 to 12.2 percent of GDP. Following these developments, the country embarked on major structural reforms aimed at reducing the fiscal deficits, rein in inflation in order to create a stable macroeconomic environment conducive for growth. Despite these reforms, fiscal deficit and current account imbalances still remain an important issue to policy makers in Sierra Leone, because reforms have not achieved the intended targets.

Sierra Leone is part of the West African Monetary Zone (WAMZ) programme that is aspiring to form a monetary union with a single currency and a common central bank. A precondition for the formation of the monetary union for member countries in the WAMZ is the achievement of certain convergence criteria. These include the fiscal deficit/GDP ratio of not more than 4.0 percent, foreign external reserves adequate to cover at least three months of normal imports, single-digit inflation and central bank financing of fiscal deficit of not more than 10.0 percent of previous year tax revenue. Satisfying these criteria has been a thorny issue for the Sierra Leonean authorities. Thus, the persistent fiscal and current account deficits in Sierra Leone have called for a re-examination of the causal relationship between fiscal deficit and current account imbalances.

The objective of this paper is to examine the short and long run relationships between budget and current account deficits in Sierra Leone using the Autoregressive Distributed Lag (ARDL) bound testing approach and the multivariate Granger causality test developed by Toda and Yamamoto (1995). This paper contributes to the empirical debate on the causal relationship between budget and current account deficits in the following ways: First the paper uses the ARDL bound testing approach which is known to have superior small sample properties than that of the Engel-Granger and the Johansen and Juselius cointegration technique. Second, the study also utilized the multivariate Granger causality test developed by Toda and Yamamoto (1995), which tends to overcome the pretest bias associated with unit root and cointegration tests³. Third, despite the plethora of empirical literature on the relationship between budget and current account deficits, the author is not aware of any study on Sierra Leone. Thus in this study, the empirical evidence on the link between the two deficits is drawn from the experience of Sierra Leone – a small open economy in Sub-Saharan Africa (SSA), which experienced both budget and current account deficits since the 1970s.

Following this introduction, the rest of the paper is organized as follows: Section II presents the theoretical paradigms and related literature on the connection between fiscal deficits and current account deficits, while section III provides a brief overview of the fiscal and current account deficits issue in Sierra Leone. Section IV briefly discusses the conceptual framework of the study and the data used in the analysis. Section V presents the empirical findings, while the concluding remarks and policy implications are contained in section VI.

² Sources: World Development Indicators and International Financial Statistics year book, various issues.

³ In most application, it is not known aprior which order of integration the variables are and whether they are cointegrated or not. Consequently, unit root and cointegration are normally required before estimating the model and the hypothesis therefore conditional on these pretests. As the power of unit root test are known to be low and test of cointegration are known not to be very reliable for small sample, these pretest biased might be severe (see Toda 1995).

2. Literature Review

2.1 Theoretical Literature

The discussion on fiscal and current account nexus has mainly centered on four major theoretical models. The first view is based on the popular Keynesian twin deficit hypothesis. This hypothesis asserts that the budget deficit and current account deficit move together (i.e. a positive relationship between budget deficit and current account deficit), with the causality running from budget deficit to current account deficit at least in the long-run, with no feedback effects (unidirectional causality). The basic transmission mechanism according to the conventional Keynesian absorption (i.e. income-expenditure) approach is that a rise in the government expenditure will increase domestic income that induces imports causing a deficit in the current account balance. Thus, an increase in budget deficit would induce domestic absorption and hence, domestic income. The increase in domestic income will induce import expansion, resulting to a current account deficit or a reduction in the current account surplus. This is the effect of government sector deficit on the external sector deficit causing twin deficits.

Another version of the Keynesian framework is the Mundell-Fleming model which assumes capital mobility. The model assumes that capital flows move faster than trade flows because international investors arbitrage differences in interest rates across countries to take advantage of unrealized profit opportunities. In this twin deficits framework, Keynes showed that increases in budget deficits in an open economy tend to increase the domestic interest rate. If the domestic interest rate is higher than foreign interest rate, there will be capital inflows from abroad, causing a real exchange rate appreciation. The real appreciation of the domestic currency, in turn, deteriorates the current account deficits, and consequently budget deficit causes current account deficits.

The second theoretical model is based on the Ricardian Equivalence Hypothesis (REH) Under the REH which is based on the Permanent-Income-Life Cycle Hypothesis; there is indeed no relationship between current account deficit and budget deficit (Seater, 1993). According to this hypothesis, budget deficit that is financed through a tax cut and sale of bonds would be seen as incurring future tax liabilities to offset the debt. Thus, in order to dampen the effect of the future tax increase, individuals who seek to maximize the inter-temporal welfare of the next generation would increase current savings rather than expenditure on consumption. In other words, an increase in the public sector deficits will not affect the private sector lifetime budget constraint and the real wealth of the consumer. Consequently, the equilibrium levels of current account, interest rates, investment and consumption will not be affected by the changes in the level of budget deficits.

The third proposition is that, under certain situations, the causality may be running from current account deficit to budget deficit rather than the reverse. A unidirectional causality is one that runs from current account deficit to budget deficit, or vice versa. The causality from current account deficit to budget deficit may occur when the deterioration in current account leads to a slower pace of economic growth and hence increases the budget deficit. This is especially true for a small open developing economy that highly depends on foreign capital inflows (e.g. foreign direct investment) to finance their economic developments. In other words, the budgetary position of a country will be affected by large capital inflows or through debt accumulations and with that a country will eventually run into budget deficit.

The fourth proposition maintains that, a bi-directional causality between the two deficits may also exist. In other words, budget deficit Granger causes current account deficit and vice-versa. While budget deficit may cause current account deficit, the existence of significant feedback may cause causality between the two variables to run in both directions.

2.2 Empirical Literature

Despite the plethora of work on the relationship between budget and current account deficits, the empirical literature has produced conflicting results. For instance, studies by Hutchison and Pigott (1984), Zietz and Pemberton (1990), Vamvoukas (1999), Piersanti (2000), Leachman and Francis (2002), Abell (1990), Leachman and Francis (2002), and Bachman (1992) supports the conventional view that, the twin deficits are closely linked and causality runs from budget deficit to current account deficit. On the other hand, studies by Laney (1984), Miller and Russek (1989), Winner (1993), Kim (1995), Enders and Lee (1990), Evans (1988), Winner (1993), Bartlett (1999) and Boucher (1991), do not find a stable long-run relationship between the two deficits. In a separate development, Darrat (1988), Kearney and Monadjemi (1990) and Normandin (1999) identify bi-directional causality between the twin deficits.

Furthermore the empirical works of Ramchander (1998), Khalid and Teo (1999) and Alkaswani (2000) support the reverse causality running from current account deficit to budget deficit.

Employing cointegration analysis, error correction modeling and granger causality test, Vamvoukas (1997) examines the twin deficits phenomenon for the Greek economy. Using annual time series data for the period 1948 – 1993, the author found one-way causality from budget deficit to trade deficit, a result consistent with Keynesian proposition in the long and the short run. Using similar methodology, Alkaswani (2000) investigates the relationship between budget deficits and trade deficits in the case of Saudi Arabia for the period 1970-1999, and finds that there is a long run relationship between the two deficits and the direction of causality runs from the trade deficit to the budget deficit. The study by Darrat (1988) investigates the causality between budget deficit and current account deficit in the USA using quarterly data for the period from 1960 to 1984. Employing the Granger- type multivariate causality tests combined with Akaike's final prediction error criterion, the result shows that a bi-directional link exists between the two deficits.

Enders and Lee (1990) develop a two- country macro- theoretical model to test the validity of the REH in the USA, using the Vector autoregressive (VAR) technique. Using quarterly data for the period from 1947 to 1987, their findings appear to be inconsistent with the REH. They find that the Ricardian equivalence proposition with the data cannot reject the hypothesis that budget deficits do not affect the current account. Using similar methodology (VAR), Rosenweig and Tallman (1991) examine the relationship between budget deficit and trade deficit for the USA. Their study finds evidence in support of the conventional Keynesian proposition that high budget deficits cause high trade deficits.

One interesting cross-country study is by Bernheim (1988). The study investigates budget deficit and the balance of trade relationship for the USA and its five major trading partners (Canada, the UK, West Germany, Mexico and Japan), using annual time series data for the period 1960 to 1984. Using the ordinary least square regression technique, the study found support for the conventional Keynesian hypothesis. Specifically, the result indicates that a \$1 increase in the budget deficit is associated with roughly a \$0.30 decline in the current account surplus. Piersanti (2000) utilizes the Granger-Sims causality technique to examine the relationship between the current account deficit and budget deficits for seventeen Organizations for Economic Cooperation and Development (OECD) countries for the period 1970-1997. They find a strong evidence to support the view that current account deficits have been associated with large budget deficits during the study period in most industrial countries.

It is evident from the review of empirical literature that the twin deficits relationship had been extensively investigated especially for developed countries. However, there are relatively few empirical studies on the twin deficits in the case of developing countries. For instance, Onafowora and Owoye (2006) examine the twin deficits phenomenon in Nigeria using annual time series data for the period 1970 to 2001 within a cointegration and error correction techniques. They also utilize the Granger causality test and generalized impulse response techniques. The study finds evidence of a positive relationship between trade and budget deficits. Specifically, their results indicated a uni-directional causality from trade deficits to budget deficits. The body of evidence in the literature for both developed and developing countries, however, does not yield a consensus on the causal relationship between the two deficits. Based on the controversy that exists in the literature on the twin deficits hypothesis for both developed and developing countries and the scanty research in the case of Sierra Leone, this study intends to fill this gap by investigating both the short and long run relationships between budget and current account deficits in Sierra Leone

3. Trends in Fiscal and Current Accounts Imbalances

This section discusses the general trends of the fiscal and current account imbalances in the Sierra Leone. Specifically, the section reviews historic episodes of fiscal balance as it relates to the behavior of current account balance.

3.1 Sierra Leone's External Sector Performance

The performance of the external sector of Sierra Leone had been poor since the early 1970s (see Table 1 and Figure 1). Export of goods and services as a percentage of GDP declined from 23.9% between 1970 and 75 to 20.0% during 1976-80 and further decline to 13.3% between 1981 and 85, before gradually increasing to 18.4% during 1986-90, following the implementation of the Structural Adjustment Programme (SAP) in 1986 (Table 1). Export performance decline significantly during the 1990's, following the outbreak of the civil unrest (rebel war).

The war period (1991-2000) saw some disruption of agriculture and mining and the collapse of public service, health and education. The sluggish pace of economic activities during the war period reduced export. Agricultural exports suffered as the security situation affected production, while a large proportion of diamond and gold exports continued to be traded in the parallel market. Following the signing of the Lome Peace Accord in July 1999, the government adopted an economic recovery and rehabilitation programme aimed at sustaining peace and promoting economic recovery and macroeconomic stability. The relative stable security situation strengthened business confidence and consequently export gradually picked up and the export to GDP ratio increased significantly from 8.95% during 2001-2005 to 15.7% by 2006-2010.

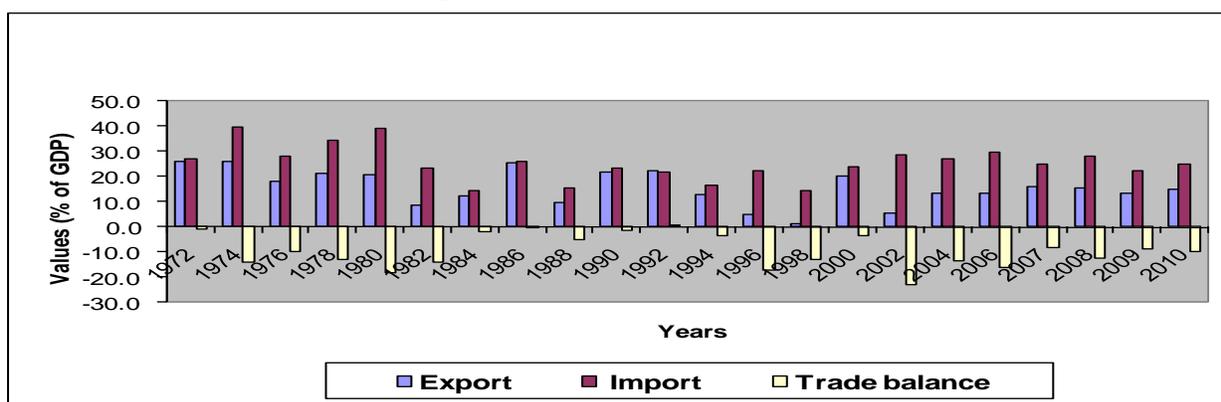
Imports of goods and services as a percentage of GDP remained higher than the corresponding export of goods and services, during the review period. However, imports fell gradually from 30.37% between 1970 and 1975 to its lowest value of 16.48% between 1996 and 2000 and thereafter increased sharply to 27.63% and 28.30% during the period 2000 to 2005 and 2006 to 2011, respectively.

Table 1: Selected External Sector Performance Indicators for Sierra Leone

Indicators	1970-75	1976-79	1980-85	1986-90	1991-95	1996-00	2001- 05	2006-12
Export (% of GDP)	23.99	20.03	13.31	18.36	14.72	2.15	8.95	15.7
Import (% of GDP)	30.37	30.57	23.13	20.6	18.49	16.48	27.63	28.3
Trade Balance (% of GDP)	-6.38	-10.5	-9.82	-2.24	-3.77	-14.33	-18.68	-12.6
Gross International Reserves (foreign reserves) Excluding Gold (Millions of U.S dollar)	43.17	35.02	14.96	7.31	26.56	39.52	99.65	253.6
External Debt (Millions of U.S dollar)	138	319.6	610.03	1046.3	1444	1255.4	1607.98	843.13
Foreign Aid Inflows (Millions of U.S dollar)	11.74	33.8	70.34	84.25	180.26	145.26	346.49	60.20
Nominal Exchange Rate appreciation (%)	1.4	4.8	34.07	112.07	41.97	23.83	6.9	7.7
Bilateral Real Exchange Rate with U.S dollar)	-1.31	4.65	-3.03	16.01	-1.66	5.00	3.02	4.3

Source: Author's calculation from International Financial Statistics CD ROM 2012 and World Development Indicators CD ROM 2012

Figure 1: External Trade (% of GDP)



Source: International Financial Statistics CD ROM 2012 and World Development Indicators CD ROM 2012

The trade balance was negative throughout the review period, reflecting an excess of imports over export. From Figure 1, the trade deficit was high during the 1970s and early 1980s, but remained low during the late 1980s and 1990s, and thereafter the deficit surged to its highest level between 2002 and 2003, and gradually decline thereafter. The trade deficit on goods and services worsens during the 1970s and early 1980s as it deteriorated from -6.38% of GDP during 1970 and 75 to -10.5% of GDP between 1976 and 80.

However, the deficit in the trade balance as a ratio of GDP improved from an average deficit of -9.82% between 1981 and 1985 to a deficit of -2.24% during 1986 and 1990. In addition, the deficit gradually increased from an average of -2.24 % over the period 1986 and 1990 to -3.72 % over the period 1991 and 1995 and further to -14.33 % over the period 1996 to 2000. During the post war period, the trade balance as a ratio of GDP worsened to -18.68 % between 2001 and 2005, but declined to -12.6% over the period 2006 and 2010.

3.2 Trends in Fiscal Policy

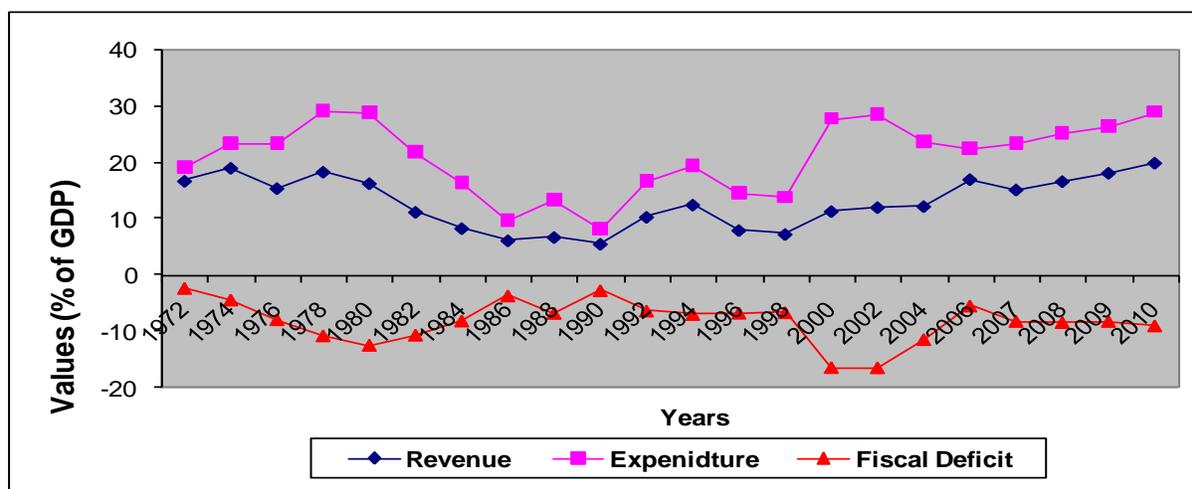
The major emphasis during the 1970's was to reduce budget deficit and hence, money growth. The argument was that, government financed its deficit by borrowing from the central bank that saw the increase in money supply (credit creation) with rising prices as the inevitable result. Since the 1970's Sierra Leone has experienced persistent fiscal deficit, arising from the vast expansion in government expenditure over government revenue as shown in Table 2 and Figure 2. From Table 2, it is evident that Sierra Leone's fiscal position has been in deficit throughout the review period.

Sierra Leone's fiscal position deteriorated since the 1970's as evident by the persistent government budget deficit during the review period, arising from the huge expenditure outlay, while revenue generation remained below expenditure level. Budget deficit as a ratio of GDP (excluding grant) increased from -3.5 % over the period 1970 and 1975 to -9.8 % between 1976 and 1979 and further increased to -10.4% during 1980 and 1985. The increase in budget deficit during the late 1970's and early 1980's, was partly attributed to the huge expenditure incurred by the government for hosting the OAU Summit, which also saw the reduction of revenue mobilization following the granting of waivers for the importation of vehicles, machinery and equipment relating to the preparation of the OAU Summit. However, during the late 1980's, government budget deficit declined from an average of -7.5% between 1986 and 1990 to -6.1 percent over the period 1991 and 1995, partly on account of increase in revenue performance arising from strong fiscal discipline following the implementation of the SAP. Following the end of the war in 2000, government expenditure surged in respect of resettlement, reconstruction and rehabilitation resulting to a higher budget deficit during the post war period.. Fiscal deficit (excluding grant) as a ratio of GDP recorded its highest average value of -12.5% over the period 2001 and 2005, higher than the averages of the 1970s, 1980s and 1990s. This implies that fiscal performance in the post-war period was worse than it was in both the pre-war period (1970-1990) and the war period (1991-2000).

Table 2: Fiscal Performance of Sierra Leone

Indicators	1970-75	1976-79	1980-85	1986-90	1991-95	1996-00	2001- 05	2006-12
Government Revenue (% of GDP)	16.57	16.75	11.34	6.17	10.81	8.93	13.4	18.7
Government Expenditure (% of GDP)	20.04	26.46	21.74	13.71	16.95	18.51	25.85	30.2
Growth of Government Revenue (%)	12.16	16.45	10.91	84.2	100.21	17.65	31.48	30.6
Growth of Government Expenditure (%)	24.7	20.28	11.27	136.75	108.2	25.83	15.61	17.8
Budget Deficit: Excluding Grant (% of GDP)	-3.47	-9.71	-10.4	-7.54	-6.14	-9.58	-12.45	-11.5

Source: Author's calculation from IFS CD-ROM 2012

Figure 2: Trends in Revenue, Expenditure and Fiscal Deficit (% of GDP)

Source: International Financial Statistics CD ROM 2012 and World Development Indicators CD ROM 2012

4. Conceptual Framework and Methodology

To analyze the relationship between fiscal deficits and the current account deficit, it is helpful to begin with some national income accounting identities. The national income account identity provides the basis for the relationship between budget deficit and current account deficit. The model starts with the national income identity for an open economy that can be represented as follows:

$$Y = C + I + G + (X - M) \quad (1)$$

Where Y is real GDP, C is private consumption, I is investment, G is government expenditure, and (X-M) is net exports (also called current account balance) which is the different between exports (X) and imports (M).

Alternatively, we can also identify the national income by consumption (C), saving (S) and tax payments (T):

$$Y = C + S + T \quad (2)$$

Combining equations (1) and (2), we obtain:

$$C + S + T = C + I + G + (X - M) \quad (3)$$

This simplifies to the following:

$$(X - M) = (T - G) + (S - I) \quad (4)$$

Or

$$CAB = BD + SI \quad (4b)$$

Where CAB is current account balance, BD is budget deficit and SI is the savings-investment gap.

Equation (4b) shows that the current account balance (X-M) is related to private saving-investment balance (S-I) and the budget balance (T-G). Under the assumption that the private saving-investment balance is constant, a deficit in the budget will cause current account deficit which according to the Keynesian doctrine, is the rationale behind the twin deficits hypothesis. This identity provides the basis for an expected positive long-run relationship between budget deficit and current account balances. Based on this identity, the Keynesian twin deficit hypothesis is explained as follows: an increase in the government expenditures will have a deteriorating effect on the budget balance and thereby cause a decline in national savings. However, by offering higher interest rates to finance the budget deficit, the government will attract foreign investors and this will cause an appreciation of the domestic currency. Hence import expenditures will increase and inversely, export revenues will decline through the loss of competitiveness in the international arena. Consequently, the budget deficit, formed by expenditures, will cause current account deficit through exchange rate and interest rate mechanisms.

4.1 Methodology

Based on previous theoretical and empirical findings as articulated in the literature, as well as the structure of the Sierra Leone economy, the current account deficit depends on government budget deficit, domestic income, interest rate, money supply and real effective exchange rate. Thus, Equation (4b) forms the basis of our ARDL model, and the long-run current account deficit model for Sierra Leone can be specified as:

$$CAB_t = \alpha_0 + \alpha_1 BD_t + \alpha_2 RGDP_t + \alpha_3 IN_t + \alpha_4 REER_t + \phi DW + \varepsilon_t \quad (5)$$

Where CAB is current account balance, which is defined as $CAB = (X - M) + F$, where X is export; M is import and F is net income and transfer flows (i.e. income received from abroad or paid abroad and unilateral transfers), BD is budget deficit, defined as government revenue less expenditure; RGDP is real GDP growth rate; IN is interest rate (proxy by the 3-months discount rate); REER is real effective exchange rate (trade weighted exchange rate); DW is dummy for war which takes the value one for war period (1991-2000) and zero elsewhere, ε is a white noise process and t is the time period.

4.2 Estimation Techniques and data

The methodology used in this study is based on the autoregressive distributed lag (ARDL)' framework which does not involve pre-testing variables. This methodology is used to examine the cointegration relationship between CAB_t , BD_t and other macroeconomic variables as specified in equation (5) in order to validate the relationship between current account deficit and budget deficit for Sierra Leone.

The ARDL framework for equation (5) is given as

$$\begin{aligned} \Delta CAB_t = & \alpha_0 + \sum_{i=1}^n \alpha_{1i} \Delta CAB_{t-1} + \sum_{i=1}^n \alpha_{2i} \Delta BD_{t-1} + \sum_{i=1}^n \alpha_{3i} \Delta RGDP_{t-1} + \sum_{i=1}^n \alpha_{4i} \Delta IN_{t-1} \\ & + \sum_{i=1}^n \alpha_{5i} \Delta REER_{t-1} + \beta_1 CAB_{t-1} + \beta_2 BD_{t-1} + \beta_3 RGDP_{t-1} + \beta_4 IN_{t-1} + \beta_5 REER_{t-1} + \phi DW + \varepsilon_t \end{aligned} \quad (6)$$

The ARDL model testing procedure starts with conducting the bound test, which states the null hypothesis of zero cointegration, that is:

$$H_0 = \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$$

against the alternative hypothesis of the existence of cointegration, i.e.

$$H_1 \neq \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq 0.$$

The statistic underlying the procedure is the F-statistic which is used to test the significance of lagged levels of the variables, in order to establish the existence of cointegration. Two sets of critical values are reported in Pesaran and Pesaran (1997), Pesaran et al (2001) or Narayan (2004). The critical values are divided into upper and lower critical bounds. The upper critical values assume that all the series are I(1) while the lower critical values assume that all the series are I(0). In the bound testing approach, the calculated F-statistic is compared with the critical values provided by Pesaran and Pesaran (1997), Pesaran et al (2001) or Narayan (2004). However, due to the limited number of sample observations, the critical values in this paper are extracted from Narayan (2004)⁴. If the computed F-statistic falls outside the critical bound, a conclusive inference can be made without considering the order of integration of the underlying regressors. For instance, if the F-statistic is higher than the upper critical bound, then the null hypothesis of no cointegration is rejected. Alternatively if the F-statistics is lower than the lower critical bound, then the null hypothesis of no cointegration cannot be rejected. If however the calculated F-statistic lies within the lower and upper bounds, then the test is said to be inconclusive. In this context, the unit root tests should be conducted to ascertain the order of integration of the variables. If all the variables are found to be I(1), then the decision is taken on the basis of the upper critical value. On the other hand, if all the variables are I(0), then the decision is based on the lower critical bound value.

⁴ The critical values provided by Narayan (2004) are considered to be more appropriate for ARDL modeling using small samples compared to Pesaran and Pesaran (1997) or Pesaran et al (2001).

Once cointegrating relationship is ascertained, the error correction estimates of the ARDL model are obtained. The diagnostic test statistics of the selected ARDL model can be examined from the short run estimates at this stage of the estimation procedure. Similarly, the test for parameter stability of the model can be performed. The error correction representation of equation 6 can be specified as follows:

$$\Delta CAB_t = \alpha_0 + \sum \alpha_{1i} \Delta CAB_{t-1} + \sum_{i=1}^n \alpha_{2i} \Delta BD_{t-1} + \sum_{i=1}^n \alpha_{3i} \Delta RGDP_{t-1} + \sum_{i=1}^n \alpha_{4i} \Delta IN_{t-1} + \sum_{i=1}^n \alpha_{5i} \Delta REER_{t-1} + \lambda ECM_{t-1} + \varepsilon_t \tag{7}$$

Where ECM is the error correction term which measures the speed of adjustment, and λ is the coefficient of the error correction term, which is expected to be negative and statistically significant to further confirm the existence of a cointegrating relationship.

4.3 Data

For the econometric analysis, we use annual time series data for the period 1980 to 2012. Variables used include current account balance as a percentage of GDP (CAB). This variable is defined as $CAB = (X - M) + F$, where X is export; M is import and F is net income and transfer flows (i.e. income received from abroad or paid abroad and unilateral transfers). Budget deficit as a percentage of GDP (BD), (i.e. excluding grants), real GDP growth rate (RGDP), interest rate (IN) (i.e., 3-months discount rate) and real effective exchange rate (REER). Data were obtained from the International Monetary Fund International Financial Statistics CD ROM, 2012 and WAMI data base.

5. Empirical Analysis

5.1 Bound test Cointegration Result

In order to perform the bound testing procedure, we estimated equation (6) using the ARDL approach to cointegration, to examine the long-run relationships among the variables in equation 5. A lag length of 2 was chosen as the maximum lag length based on the Akaike Information Criterion (AIC) and the Schwarz Bayesian criterion (SBC). This is also consistent with Pesaran and Shin (1999) who recommended choosing a maximum lag length of 2 for small sample annual data. The F-statistic and critical bounds values for testing the null of no cointegrating relationship are reported in Table 3.

Table 3: Bounds Test Results

Dependent Variable	F-Statistic	Probability	Inference
CAB	11.5341	0.000	Cointegration
BD	2.0883	0.137	No cointegration
RGDP	3.7249	0.024	No cointegration
IN	0.9979	0.450	No cointegration
REER	1.3012	0.315	No cointegration

Notes: Critical values (CV) from the bounds test are obtained from Narayan (2004): Case II: restrict intercept and no trend. For K=5, CV at 5% CV= [2.899, 4.143], where the first sets of values in the parenthesis are the lower bound values, while the second sets are the upper bound values

The result in Table 3 showed that the calculated F-statistic when current account balance is the dependent variable (CAB) is 11.5341, which is higher than the upper bound critical value at the 5 percent level of significance (4.143). This implies that the null hypothesis of no cointegration is rejected at the 5 percent level and that there is indeed a cointegration relationship among the current account balance and its determinants. However, when the other variables in equation 6, are normalized as dependent variables, respectively, the F-statistics are smaller than the lower bound critical values at the 5 percent level, implying the existence of no cointegration. Thus, the intuition behind the result displayed in Table 3 implies that there is unique long run equilibrium in equation 5.

5.2 Long Run and Short Run Dynamics

Given that the bounds test indicated the existence of cointegration when CAB was used as a dependent variable, we now estimate equation 5 for the long run coefficients. Using the AIC, the long run results are reported in Table 4. The result revealed a positive relationship between current account deficit and budget deficit with statistically significant coefficient at the 5 percent significance level. The result suggests that an increase in the budget deficit will increase the current account deficit in the long run, a finding consistent with the conventional Keynesian proposition. For instance a one-percentage point increase in fiscal deficit will lead to 0.03 percentage point increase in current account deficit in. This result is not at variance with the findings of Onafowora and Owoye (2006) for Nigeria and, Lau and Tang (2006) for Cambodia. The result also revealed a significant positive relationship between real GDP and current account deficit, suggesting that an increase in income will increase the current account deficit in the long run, a result consistent with the findings of Glick and Rogoff (1995). The intuition is that, increase in income will result to expenditure switching in favour of tradables, which will consequently increase import and hence cause deterioration in the current account balance. The war dummy also had positive impact on current account deficit. The war period (1991-2000) saw some disruption of agriculture and mining, which resulted to a decline in the country’s export, while imports rose significantly, resulting to an increase in current account deficit during the period.

Table 4: Estimates of the Long-run Coefficients based on AIC- ARDL (1,0,0,0)

Dependent Variable is CAB

Variable	Coefficient	Standard Error	T-Ratio
BD	0.032	0.0125	2.564**
RGDP	0.133	0.0503	2.646**
IN	-0.055	0.0344	-1.597
REER	0.049	0.0680	0.721
DW	0.052	0.0197	2.642**
Intercept	5.685	1.5554	3.655***

Diagnostic Tests			
* Test Statistics *	LM Version	* F Version	*
* A:Serial Correlation*	CHSQ(1)= 3.6959[0.055]*	F(1, 26)= 3.0133[0.099]*	
* *	* *	* *	
* B:Functional Form	*CHSQ(1)= 11.3768[0.001]*	F(1, 26)= 13.8358[0.001]*	
* *	* *	* *	
* C:Normality	* CHSQ(2)= 1.8138[0.404]*	Not applicable	*
* *	* *		
* D:Heteroscedasticity	*CHSQ(1)= 1.3302[0.249]	*F(1, 32)= 1.2954[0.266]*	

Notes: *** Statistical significance at 1% level; ** Statistical significance at 5% level; * Statistical significance at 10% level.

5.3 Short-run Dynamic Coefficients based on SBC-ARDL

The presence of a cointegrating relationship among current account balance and its explanatory variables necessitated the estimation of a short-run dynamic model of the ARDL. The results of the short-run dynamic coefficients (error correction model) are presented in Table 5

Table 5: Error Correction Representation for the Selected ARDL Model - ARDL (1,1,0,0,0)

Variables	Coefficients	Standard Error	T-ratio (prob)
dBD	0.01521	0.00691	2.2043 (.0048)
dRGDP	-0.05182	0.08502	-0.6096 (0.549)
dIN	0.10903	0.07575	1.4394 (0.165)
dREER	0.004277	0.01003	0.4263 (0.674)
DW	0.01292	0.00543	2.3785 (0.026)
Intercept	-9.62950	4.22981	-2.2766 (0.033)
Ecm(-1)	-0.62210	0.20684	3.0077 (0.007)
R-Squared	0.52498	R-Bar-Squared	0.38248
S.E. of Regression	3.5902	F-stat. F(5, 21)	4.4208(0.007)
Mean of Dependent Variable	0.100000	S.D. of Dependent Variable	4.5687
Residual Sum of Squares	257.7909	Equation Log-likelihood	-68.7716
Akaike Info. Criterion	-75.7716	Schwarz Bayesian Criterion	-80.3070
DW-statistic	1.8627		

Table 5 revealed that the most significant variables influencing current account balance during the review period are budget deficit and war dummy. The results showed that budget deficit had a positive and significant relationship with current account balance, consistent with the long run results. A one percentage point increase in budget deficit will increase the current account deficit by 0.02 percent. In a similar vein, the war dummy had a positive impact on the current account balance with a statistically significant coefficient. The result also showed that the error-correction term is statistically significant with a negative coefficient. The magnitude of the coefficient indicates that about 62.0 percent of any previous disequilibrium in the long-run current account balance relationship is corrected in the current year, denoting a high speed of adjustment.

The diagnostic test statistics indicates that there is no evidence of autocorrelation in the disturbances. The coefficient of determination (R-Squared) indicates that the model is reasonably accurate in prediction, and 52 percent of the variation in the dependent variable is accounted for by the independent variables. The stability of the regression coefficients are evaluated using the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMSQ) test for structural stability (Brown et al., 1975). The regression equations appear to be stable as both the CUSUM and CUSUMSQ test statistics lies within the 5 percent critical bound as shown in Figures 3 & 4

Figure 3: Plot of Cumulative Sum of Recursive Residuals

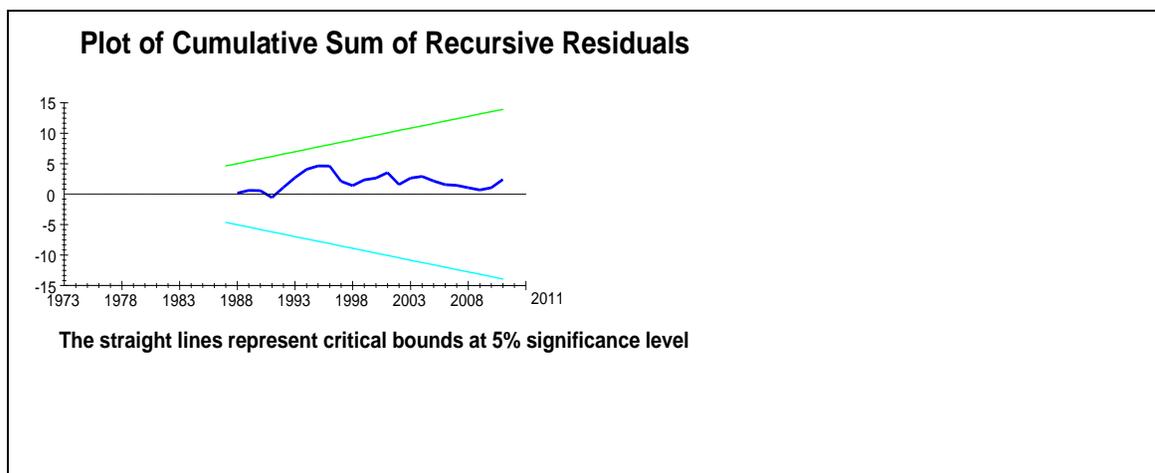
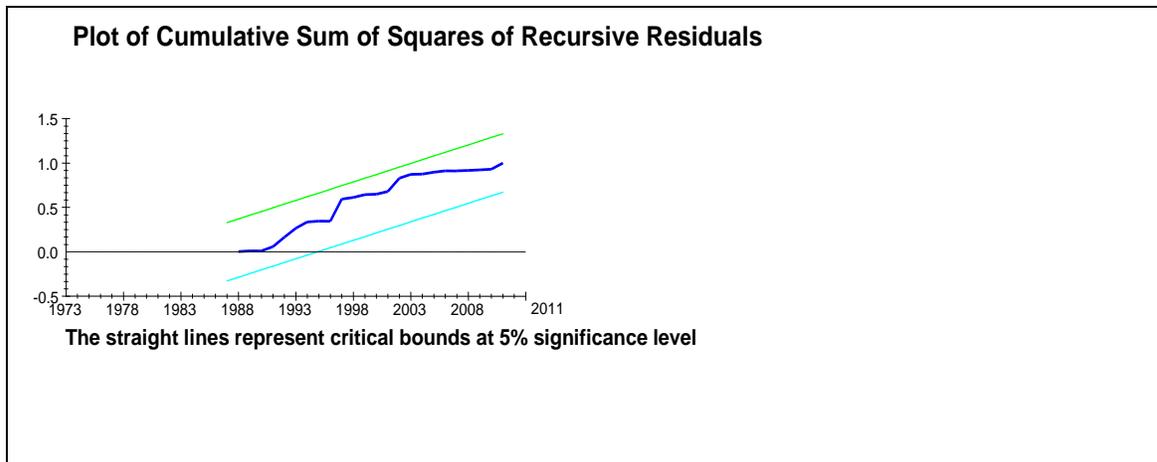


Figure 4: Plot of Cumulative Sum of Squares of Recursive Residuals



5.4 The Toda–Yamamoto Approach to Granger Causality Test

According to Toda and Yamamoto (1995), WALD hypothesis test is performed with adding extra lag to VAR model in accordance with the maximum cointegration relationship of the series and will have a chi-square (χ^2) distribution. This approach fits into a standard VAR model in variable levels (instead of first differences as in Granger causality tests) and accordingly minimizes the risks resulting from the possibility of wrong detection of cointegration levels of the series (Mavrotas and Kelly, 2001). A causality analysis was performed in the context of VAR model $(k + d_{max}) = (2 + 1) = 3$ level by adding the maximum cointegration level of 1 to the optimal lag length. Note that in the VAR model, “k” represents the number of lags, and “ d_{max} ” represents the maximum cointegration level of the variables entered into the model. The results of the granger causality tests as presented in Table 6 showed that, a uni-directional causality runs from budget deficit to current account balance and from current account balance to real GDP, with no feedback effect. This suggests that budget deficit influences current account balance. However, no causality was evident between current account balance and the other explanatory variables.

Table 6: Toda-Yamamoto Granger Causality Test Results

$VAR(k + d_{max}) = 3$	Modified Wald Statistics	Direction of causality
CAB does not Granger cause BD	0.5251 (1.231)	No causality
BD does not Granger causes CAB	2.6789 (0.0395)*	Uni-directional causality
CAB does not Granger cause RGDP	3.0150 (0.012)*	Uni-directional causality
RGDP does not Granger causes CAB	1.10341 (0.8427)	
CAB does not Granger cause IN	0.6741 (0.9972)	No causality
IN does not Granger causes CAB	0.5011 (1.0212)	
CAB does not Granger cause REER	0.0633 (1.369)	No causality
REER does not Granger causes CAB	0.0243 (1.942)	

*significant at 5%

6. Conclusion and Recommendations

This study investigated the short and long run relationships between budget and current account deficits in Sierra Leone within the framework of the bounds test approach and Toda Yamamoto (1995) causality analysis approach. Using annual data for the period 1980-2012, the existence of a cointegration relationship between the two series was established following the bounds test results. The long run estimates revealed that budget deficit, real GDP and political instability (proxy by war dummy) had positive impact on current account deficit in Sierra Leone during the review period with statistically significant coefficients.

The short run results also revealed that budget deficit and war dummy were the most significant variables influencing current account balance in Sierra Leone, a finding that is consistent with the long run estimates.

The findings also indicated that about 62.0 percent of any previous disequilibrium in the long-run current account balance relationship is corrected in the current year, denoting a high speed of adjustment. In addition, the granger causality tests showed that, a uni-directional causality runs from budget deficit to current account balance and from current account balance to real GDP, with no feedback effect. This suggests that budget deficit influences current account balance. However, no causality was evident between current account balance and the other explanatory variables. An important implication of this study is that, policy measures that are able to reduce the budget deficit should be seriously considered by the authorities in order to reduce the trade deficit. This can be achieved through the implementation of sound and prudent fiscal policies aimed at providing incentives to increase revenue mobilization and rationalization of government expenditure. There is also need to increase labour productivity, maintain wages at competitive levels and boost export through the diversification of the country's export base for both traditional and non-traditional exports.

References

- Abell, J. D. (1990), Twin Deficits during The 1980s: An Empirical Investigation, *Journal of Macroeconomics*, 12, 81–96.
- Alkswani, M. A. (2000), the Twin Deficits Phenomenon in Petroleum Economy: Evidence from Saudi Arabia, Seventh Annual Conference, Economic Research Forum (ERF), 26-29 October, Amman, Jordan.
- Anoruo, E. and S. Ramchander, (1998), Current Account and Fiscal Deficits: Evidence from Five Developing Economies of Asia, *Journal of Asian Economics* 9, 487-501.
- Bachman, D. D. (1992), Why is the US Current Account Deficit So Large? Evidence from Vector Autoregressions. *Southern Economic Journal* 59, 232–40
- Bartlett, B. (1999), "Current Account Deficit Unrelated to Budget Surplus". National Center for Policy Analysis. Available at <http://www.ncpa.org/barlett.html>.
- Boucher, J.L. (1991), "Debt, Deficits and Finite Horizons", *Journal of Political Economy*, 93(2): 223-47
- Darrat, A. F. (1998), Have Large Budget Deficits Caused Rising Trade Deficits? *Southern Economic Journal* 54, 879–887.
- Enders, W., and B. S. Lee (1990) Current Account and Budget Deficits; Twin or Distant Cousins? *The Review of Economics and Statistics* 72, 373-81.
- Evans, P. (1988), Do Budget Deficits Affect the Current Account. Ohio State University. Unpublished Paper.
- Glick, R. and K. Rogoff (1995), "Global versus Country-Specific Productivity Shocks and the Current Account", *Journal of Monetary Economics*, 35, 159-192.
- Hutchison, M. and C. Piggott, (1998), Budget Deficits, Exchange Rates and the Current Account: Theory and U.S. evidence, *Economic Review*, Federal Reserve Bank of San Francisco, fall, 5-25.
- Kearney, C. and M. Mehdi (1990). Fiscal Policy and Current Account Performance: International Evidence on the Twin Deficits. *Journal of Macroeconomics*; 12 (2), spring 1990, pages 197-219.
- Khalid, A. M. and W.G. Teo, 1999, Causality Tests of Budget and Current Account Deficits: Cross-Country Comparisons, *Empirical Economics* 24, 389-402.
- Kim, K. H. (1995), On the Long-run Determinants of the US Trade Balance: A Comment. *Journal of Post Keynesian Economics* 17, 447–55.
- Laney, O. Leroy (1984). The Strong Dollar, the Current Account, and the Federal Deficits: Cause and Effect. *Federal Reserve Bank of Dallas Economic Review*; 0 (0), January 1984, pages 1-14.
- Leachman, L. L. and Francis, B. (2002) Twin Deficits: Apparition or Reality? *Applied Economics*, Volume 34 No: 9
- Miller, S. M. And Russek, F. S. (1989) Are The Twin Deficits Really Related? *Contemporary Policy Issues*, 7, 91–115.
- Normandin, M. (1999). Budget deficit persistence and the twin deficits hypothesis. *Journal of International Economics* 49: 171-193.
- Onafowora, A. O and O. Owoye (2006). An Empirical Investigation of Budget and Trade Deficits: The Case of Nigeria. *The Journal of Developing Areas* 39 (2), Spring
- Pesaran, M.H., (2007), A Simple Panel Unit Root Test in the Presence of Cross-Section Dependence, *Journal of Applied Econometrics* 22, 265-312.

- Piersanti, G., 2000. Current account dynamics and expected future budget deficits: Some international evidence. *J. Int. Money Finance*, 19: 255-271. <http://ideas.repec.org/a/eee/jimfin/v19y2000i2p255-271.html>
- Rosenweing, J.A. and E.W. Tallman. 1993. "Fiscal Policy and Trade Adjustment: Are the deficits Really Twins?" *Economic Inquiry*, 31.
- Salvatore, D., (2006), 'Twin Deficits in the G-7 countries and global structural imbalances', *Journal of Policy Modeling*, 28, 701-712.
- Seater, J. J. (1993) Ricardian Equivalence, *Journal Of Economic Literature*, 31, 142–90.
- Toda, H.Y. and T. Yamamoto, 1995. Statistical inference in vector autoregressions with possibly integrated process. *J. Econ.*, 66: 225-250. <http://cat.inist.fr/?aModele=afficheN&cpsidt=3520347>
- Vamvoukas, G.A. (1997). "Budget Expenditures and Revenues: An application of Error Correction Modelling" *Public Finance*, Vol. 52 No. (1), pp. 125-38
- Vamvoukas, G. A. (1999), the Twin Deficits Phenomenon: Evidence From Greece, *Applied Economics*, 31, 1093–1100.
- Winner, L, E. (1993): "The Relationship of the Current Account Balance And The Budget Balance", the *American Economist*, 37, (2) (fall).
- Zietz, J. and D.K. Pemberton. (1990). "The US Budget and Trade Deficits: A Simultaneous Equation Model." *Southern Economic Journal*, 57.