FISCAL SUSTAINABILITY AND GROWTH DYNAMICS IN WEST AFRICAN MONETARY ZONE (WAMZ)

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ABSTRACT

Fiscal sustainability is very important for macroeconomic stability, monetary policy effectiveness and the pursuit of economic growth. The current study accesses fiscal sustainability and growth dynamics in West Africa Monetary Zone (WAMZ). The literature on the issue of public debt considers it sustainable if the growth of debt is not greater than the growth of Gross Domestic Product (GDP). The study applies Panel data using the Hausman Test, Cointegration and Granger Causality methodologies were also used to evaluate fiscal processes in these WAMZ countries. A model for testing the sustainability of fiscal policy was also developed, based on the Intertemporal budget constraint while the outcome shows that fiscal policy in WAMZ countries is weakly sustainable which led to the recommendation that WAMZ countries should strengthen their fiscal performance.

Keywords: *Fiscal Sustainability, Growth Dynamics, WAMZ, Panel Data Estimation.*

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1. INTRODUCTION

Macroeconomic dynamics in West African Monetary Zone (WAMZ)[2] countries have been dominated in the past decades by fiscal instability and gross fiscal indiscipline which has resulted in persistent budget deficits and mounting stock of public debt. Due to this, most central banks in this WAMZ region have not been able to efficiently utilize their monetary policies instruments to curtailed rising inflation, high unemployment rate, high debt/GDP ratio and poor growth rate.

Fiscal sustainability refers to the level of debt which permits a country to fulfill its present and future debt servicing obligations without any rescheduling or accumulation of accruals. Over the last decades, the pattern of economic growth in WAMZ has remained unstable due low revenue generation and high debt servicing. This scenario is evidenced as depicted by the graph showing some periods of poor growth rate which is an indication of a drop in countries output as a result of low productivity and high volatility in their exchange rate.

However, the economic growth of the three largest economies in the West African Monetary Zone, Nigeria, Ghana, and Sierra Leone have improved in the last decade, same cannot be said about the other countries. It becomes expedient, therefore, to consider the possible growth drivers that can reverse the economic contraction and instability of these WAMZ countries. Thus, sustainability of public finances and fiscal discipline remains a key policy issue for the West African Monetary Zone (WAMZ), since inherent of the WAMZ fiscal framework is the assertion that the attainment of macroeconomic objectives through monetary policy implementation would mean a collaborative adoption of fiscal policy discipline.

Moreso, as sustainability is usually discussed in the context of a non-drastic shift in fiscal policy to satisfy debt obligations, the analysis of fiscal sustainability implies a capacity-focused view on how the government could generate an adequate level of primary budget surplus so as to consistently meet her debt/GDP ratio requirement. Hence, the purpose of fiscal sustainability analysis is usually to show the difference between the fiscal position resulting from current policies and the sustainable position in a certain moment in future. Such general intuition of fiscal sustainability, therefore, is self-evident: sustainable policies are those that can be continued on current trends, while unsustainable policies will ultimately have to be modified. Maintaining fiscal sustainability is seen as a sine qua non for the establishment of the monetary union, especially within the WAMZ, since unsustainable fiscal policy may impede the achievement and sustainability of the primary objectives of these countries.

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2 - The West African Monetary Zone (WAMZ), comprising of The Gambia, Ghana, Guinea, Nigeria and Sierra Leone.

The main objective of this paper is to deal with fiscal sustainability and growth dynamics in WAMZ by adopting contemporary advancements in the Present Value of Budget Constraint (PVBC)/econometrics of non-stationary time series and descriptive statistic of time series using Panel Data methodology in order to ascertain whether WAMZ countries growth is dynamics and its implications for fiscal sustainability. The rest of the paper is organized as follows: Section 2 is devoted to theoretical-related issues on fiscal sustainability as well as a review of literature expounded by different researchers. Section 3 presents a trend analysis of growth dynamics and fiscal policy in WAMZ countries, drawing on economy-wide modelling. Section 4 deals with the methodology for the study which includes panel data estimation, unit root test, cointegration test, Granger causality and Hausman test. The final section provides some concluding remarks and recommendations. It was found in this paper that the fiscal process in these WAMZ countries is weakly sustainable.

2.   LITERATURE REVIEW

2.1   Theoretical Review

Fiscal sustainability is anchored on three major strands viz; the convergence hypothesis, the Neoclassical and Keynesian propositions. Primarily, the convergence proposition is couched infinite, initial and infinite horizon outlook in relation to the convergence path with which the public-debt ratio threads (Langenus, 2006). The first version which was initiated by Domar (1944) predicts the convergence of debt ratio to a finite value, the second – which is enshrined in the study of Buiter (1990) and Blanchard, Chouraqui, Hagemann and Sartor (1990) requires convergence to an initial level while the last version popularized by Blanchard et al. (1990) implies that the debt ratio converges to zero. Given these multifarious dimensions to fiscal sustainability, specific measurement indicator is lacking with different options revolving around real and nominal variables, gross or net debt level, nominal or market valuation of securities and delineation of government expenditure into recurrent and capital forms have been proposed (Ballassone and Franco, 2000).

Besides, the sustainability of fiscal policy can be explained under the conditions to which fiscal policies are managed by observing existing fiscal rules (Marnefee, Aarle, Van De Wielen and Vareeck, 2011). It is from this thought that the motivation for both the Neoclassical and Keynesian propositions relate. According to Marnefee et al., (2011), fiscal rules can be of two categories: (i) fiscal rules whose primary aim is to restrict government expenditure, budgetary deficits and government debt so as to ensure fiscal sustainability. Such fiscal rules informed by neoclassical principles are of this category. (ii) Fiscal rules whose primary aim is to stabilize macroeconomic fluctuations. The short-run new Keynesian principles of fiscal management are those that guide these rules.

Fiscal rules based on neoclassical principles are focused to ensure that the government remains solvent through the inter-temporal budget choice and also allow for public debt provided it is channelled towards productive investment that would yield a high return. In effect, this suggests that the solvency of government can go with public deficit since the present value of the discounted future amount is positive and higher, thus, amounting to the country's fiscal gap – that is, the measure of additional burden that will need to be imposed on future generations to satisfy the inter-temporal budget constraint. As a way of emphasis, the neoclassical theory presumed a long-run fiscal policy sustainability through the balanced budget.

From literature, to evaluate fiscal sustainability, the two approaches commonly used are the Accounting Approach and the Present Value Budget Constraint (PVBC) Approach. The Accounting approach is such purposely focused on macroeconomic targets notably pre-defined in the economy, and these include inflation, the growth rate of the economy (g) and interest rate (r). Accordingly, a primary deficit (or surplus) would be implied as sustainable if it generates a constant (rather than ever-increasing) debt/GDP ratio, given a specified real GDP growth target and constant real interest rate. Therefore, the condition for sustainability states the real interest rate (RR) need be lower than the growth rate of the economy (g). Varied indicators of fiscal sustainability, of which are thus based on the Government Budget Constraint are used in the accounting approach.

However, the main problem with studying the sustainability of the fiscal process in WAMZ countries is that the fiscal processes of these countries are not well developed to achieve the WAMZ convergence criteria. The reason for this continual failure borders essentially on the lack of considerable economic convergence among the monetary union due to exchange rate differentials and fiscal process among member countries.

The heterogeneity of the WAMZ countries led to the used of Panel data econometrics estimation techniques which make the study unique. Furthermore, the methodology used is purely for a stochastic environment which is more relevant for these countries. Note that the existence of uncertainty and the discount rate which is time variant and subjective affect growth rate in these countries.

2.2 Empirical Review

Empirical reviews on the subject matter have generally been divided into two prominent strands. These are those that harp on investigating fiscal sustainability under non-stochastic (certainty condition and constant discounting factor) environments. Studies like Afonso, 2004; Hussin, Jauhari and Muszafarshah, 2012 which focus on stochastic (uncertain and risky) economic conditions.

Hussin, Jauhari and Muszafarshah (2012) carried out an empirical study between fiscal sustainability and Gross Domestic Product (GDP) in Malaysia with the use of cointegration tests analysis under a Vector Autoregressive (VAR) framework coupled with the Vector Error Correction Modeling (VECM) technique for the period 1970-2009. The results indicated that the macroeconomic performance on the output in Malaysia was sustainable and thus further established that the fiscal sustainability levels in Malaysia were sustainable. In effect, the results of the study which was based on an Error Correction Model (ECM) showed that the fiscal policy conduct with the policy of the government within the sample frame was consistent though with a need for some fiscal adjustment.

Hussin et. al (2012) employed descriptive indicators for fiscal sustainability viz; ratio of government net financial liabilities, gross government interest payments, net government interest payments, government total disbursement, government total receipts, short-term nominal interest rate and long-term interest rate and suggested a simultaneous analysis of indicators and tests for fruitful policy evaluation and design.

Oshikoya and Tarawalie (2010) used Cointegration test to investigate fiscal policy sustainability among WAMZ using time series data for the period 1980 to 2008. Their result revealed the existence of a weakly sustainable fiscal policy for some the countries while the unsustainable fiscal policy was found to exist in Sierra Leone.

Eyitayo (2010) also with similar perspective examined the sustainability often ECOWAS economies in 1980 to 2006, but in terms of their current account balances, with a view to providing an insight into the possibility of achieving common currency goal in the region and employing Vector- Auto Regression analysis technique. The results showed only Burkina Faso, Ghana and Nigeria to have had their current account balances sustainable, amidst the ten countries.

Antonio Afonso (2004) using co-integration to test for sustainability of budget deficits among some EU countries within 1970–2003 periods between public expenditures and public revenues. The empirical results thereof revealed fiscal policy may not have been sustainable due to few exceptions. As a result, EU governments might, therefore, risk becoming inherently highly indebted even if the debt-to-GDP ratios seemed to be somehow stabilizing at the end of the 1990s.

Lusinyan and Thornton (2009) however examined long-run fiscal sustainability in South Africa for the period 1895 to 2005, performing unit root and co-integration tests using data on real revenue and spending. The findings showed that allowing for structural breaks, South African revenue and spending during this period were I (1) series and cointegrated, with the estimated long-run equilibrium relation supporting the presence of a weak deficit sustainability condition. In addition, the authors did

examine the short-run relationship between government revenue and expenditure in South Africa through error correction method of analysis as a sufficient condition to establish sustainability and only through which speed of adjustment could be determined.

Taofeek Olusola, Ayinde, Afonso and Jalles (2012) revisited fiscal sustainability for OECD countries. They employed panel cointegration test and further observed the structural breaks for these countries over the period 1970-2010. In the study, they traced the causal relationship between government expenditures and revenues and sought to confirm the panel cointegration test with time series trend for fiscal sustainability for robustness and completeness purpose. The result showed lack of cointegration as well as absence of sustainability between government revenues and expenditures for most countries (except for Austria, Canada, France, Germany, Japan, Netherlands, Sweden and the UK) and improvements of the primary balance after previous worsening debt ratios for Australia, Belgium, Germany, Ireland, Netherlands and the UK. Causality link occurred from government debt to the primary balance for 12 countries (suggesting the existence of the Ricardian regime). Overall, fiscal policy was less sustainable for several countries, and panel results corroborate the time series findings.

The intertemporal budget constraint holds when revenue and debt are cointegrated. This implies that deficit processes are sustainable. The bulk of the existing reviewed literature assumes that the discount rate remains constant and positive. This assumption is valid in a non-stochastic environment.

3. STYLIZED FACTS

Fig 3.1 RGDP Growth Rate in WAMZ Countries
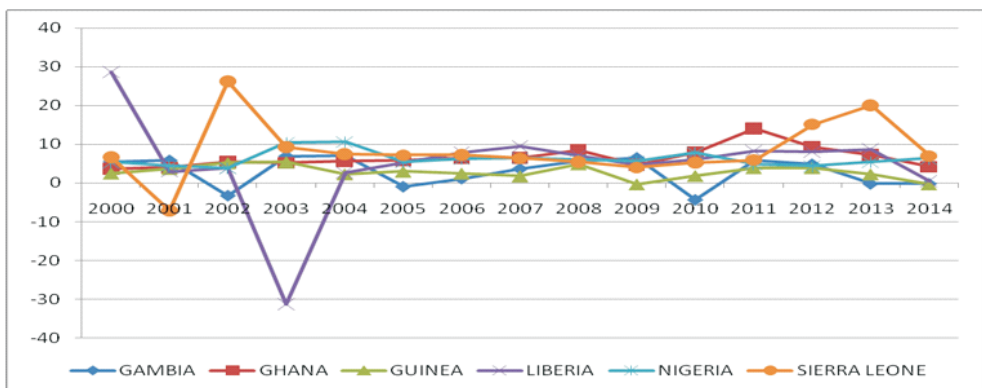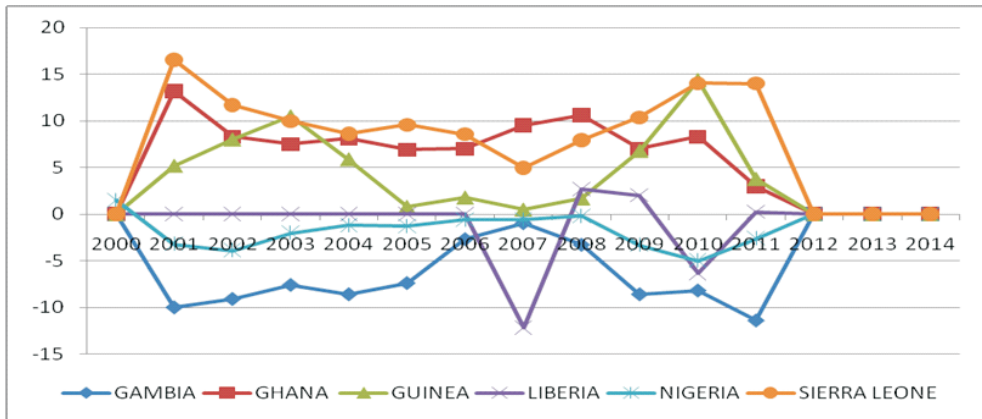

Source: Computed by the Authors

The graph depicts the trend analysis of RGDP growth rate in West African Monetary Zones (WAMZ) countries. Most economies are expanding at an accelerating pace since 2008 after the global financial crisis. Ghana and Sierra Leone are leading the pack, while Guinea and Gambia growth are relatively low. Ghana launched new oil production in December 2010, boosting an already strong economic growth trend. RGDP growth is now expected to hit double-digits in 2011, 2012 and 2013.

In Sierra Leone, a rebound in remittances, government spending on infrastructure and agricultural growth are fueling the current expansion of their economy. Expansion in the economy of Sierra Leone in 2012 and 2013 was driven mainly by Iron boom in 2012 and 2013. Non-iron oil growth was 5.5 % in the same periods, which was similar to other economies in the region. The economy even experienced negative growth of 21% in 2015, due to a significant drop in the iron ore price in the global market. The economic crisis which started in mid-2014 became severe as a result of oil prices shock in the global market, falling oil production (as a result of attacks by militants), and depletion in reserves resulting into a scarcity of foreign exchange.

Nigeria's recorded a 3% annual growth rate in 2015. A wide range of economic sectors faced severe capacity shock on the backdrop of higher input cost and foreign exchange shortage. Although Nigeria needs to further diversify its economy away from crude oil exportation to non-oil sector. Favorable weather and efforts to expand credit availability are helping the agricultural sector grow in line with the other sectors. Strong FDI inflows have boosted the telecommunications stock and turned that into a booming sector for the economy with the added bonus of improving the general business climate.

Guinea's economic growth has suffered from stunted private sector development and recurrent socio-political instability. In Liberia, rising commodity prices and debt relief under the HIPC process are both imparting buoyancy to the economy. Presently, the WAMZ countries are experiencing an average substantial growth rate that can boost monetary integration among member countries.

**Fig 3.2 Fiscal Deficits/GDP in WAMZ Countries**

Source: Computed by the Authors

The overall fiscal deficit to GDP ratio (excluding grants) for the Zone moderated from 4.2% in 2001 to 1.3% in 2007, but deteriorated to 1.4, 3.8 and 6.2% in 2008, 2009 and 2010, respectively. All countries registered deficits, though at varying levels during the period. Tax mobilization efforts, represented by tax revenue/GDP ratio, declined from 14.6% in 2001 to 12.0% in 2003. The ratio improved steadily to 19.6% in 2005, and thereafter dropped to 11.2% in 2007. In 2008, 2009 and 2010, respective ratios of 17.0, 12.1 and 12.3% were recorded. Overall, the ratio for the Zone fluctuated between 10.7% (lowest) in 2002 and 19.6 %(highest) in 2005. The observed development in the ratio reflected weak revenue performances in most of the member countries. With regards to total expenditure and net lending as a ratio of GDP, the zonal performance showed a mixed trend.

For Gambia as shown in fig 3.3 (Real GDP, FDGDP, TRGDP and RINR, from 2000-2014 in Gambia), the trend of fiscal deficit as a ratio to GDP shows that the Gambia government over the years under review has been targeting the development of public and private sector investment on its way to attempt a satisfactory economic growth in accordance with fiscal consolidation. This shows why the Gambia has one of the highest taxation rates in the region from 2000 to 2011. The government projects to keep on the reforms in tax policy and revenue administration to inflow more revenues, gain efficiency and get better business environment. It has also set up a smooth introduction of the VAT in sequence with its commitments to the Economic Community of West African States (ECOWAS).

Fig 3.3 Real GDP, FD/GDP, TR/GDP and RINR IN Gambia
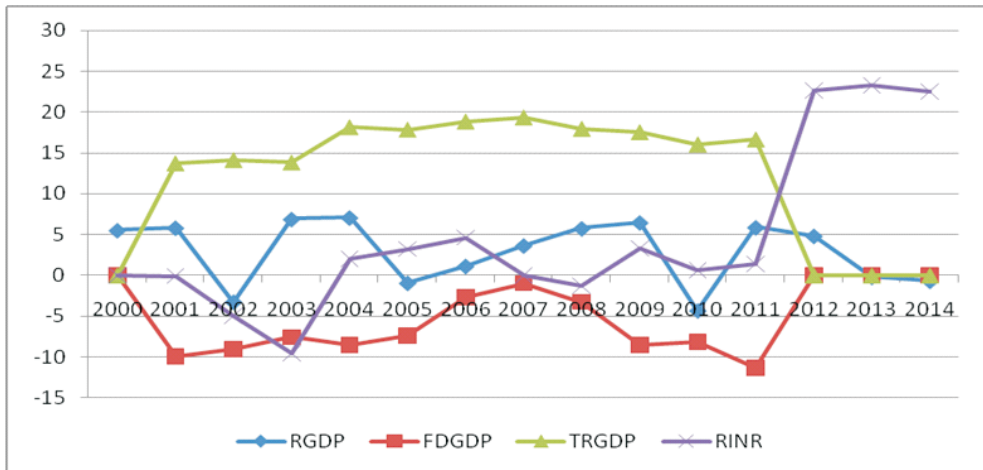
Following the 2011 drought-induced contraction of the Gambia's gross domestic product (GDP), the country's economy recovered moderately in 2012 and in 2013. GDP growth in 2014 is estimated to have contracted to about -0.7%, compared to earlier estimated GDP growth of
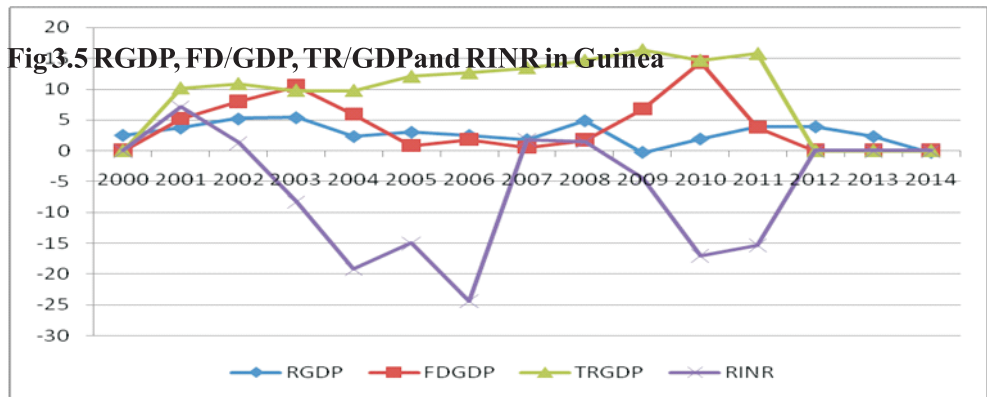
Fig 3.4 Real GDP, FDGDP, TRGDP and RINR IN Ghana
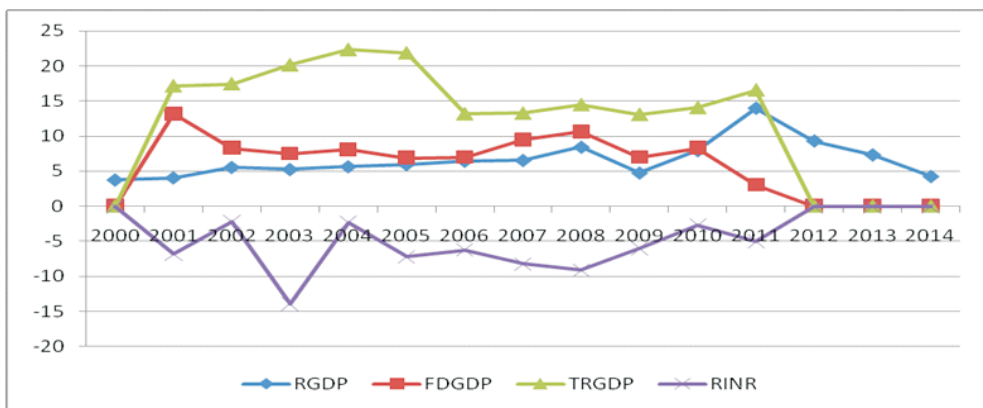
Source: Computed by the Authors

The above graph shows the trend of Real GDP, FDGDP, TRGDP and RINR, from 2000-2014 in Ghana. The above cyclical upward trend depicts a steady growth of TRGDP on average of 17% between 2000-2011 while RGDP and FDGDP fluctuates

within the average range of 10% and 3.5% while the RGDP keep falling steadily since 2011 to 2014. The RINR has been negative from since 2000-2014 due to the tight contractionary monetary policy of the Ghana Central Bank in ensuring macroeconomic stability in order to sustain economic growth and development. In 2012 the deficit has increased to 4.9% of GD P and then predicted to de crease to 3.5 % in 2013 and 3% in 2014.This conform with the goal of the Ghana government in resource mobilization; allocation and run financial resources efficiently and rationally; shrink the debt weight and finally make stronger the private sector. Also, based on economy performance, it is not feasible for government of Ghana to continue generating stable debt-to-GDP ratio indefinitely. On this note, Ghana's government cannot continue to finance its debt which accumulates from budget deficit without necessary adjustments to her yearly budget; otherwise, the revenue capacity of the country would not be able to support her expenditure in the long run.

Fig 3.5 RGDP, FD/GDP, TR/GDP and RINR in Guinea

Source: Computed by the Authors

The above graph shows the trend of RGDP, FDGDP, TRGDP and RINR, from 2000-2014 in Guinea. The above cyclical upward trend depicts a steady growth of TRGDP on average of 15% within 2000-2011. Guinea also maintains an average of 5% of their FDGDP within 2000 to 2005 due to the fiscal surplus. The Guinean economy experienced persistent fiscal deficit during the period under review. The country was under military rule for over two decades, which resulted in an increased expenditure in excess of revenue, hence leading to persistent fiscal deficit. However, since 2005, the country has maintained a fiscal deficit as a ratio of GDP below the threshold of the WAMZ criterion of 4.0 percent while the RGDP keep falling steadily since 2011 to 2014. Guinea stabilize macroeconomic environment and boost economic growth by reducing the fiscal deficit and increasing public investment which boost the country's revenue generation. The fiscal fees in 2012 increased to 19.9% of G DP from 15.6% in 2011, boosted mainly by the growth of revenue from oil related products and income produced by foreign trade.
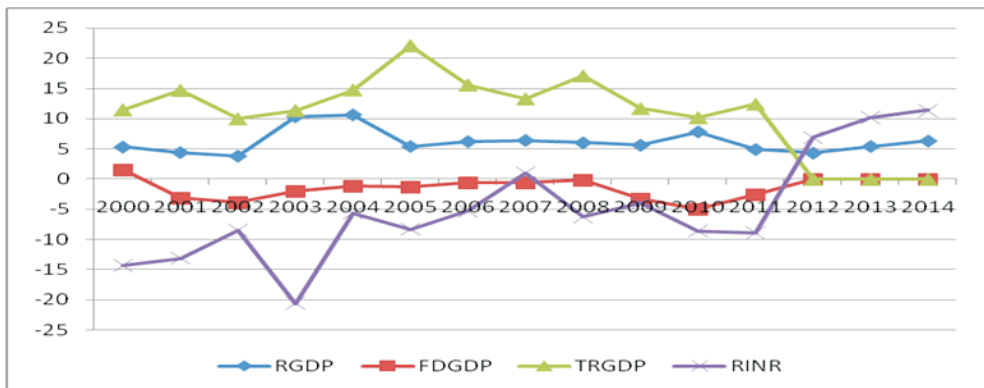
Fig 3.6 Real GDP, FDGDP, TRGDP and RINR in Liberia
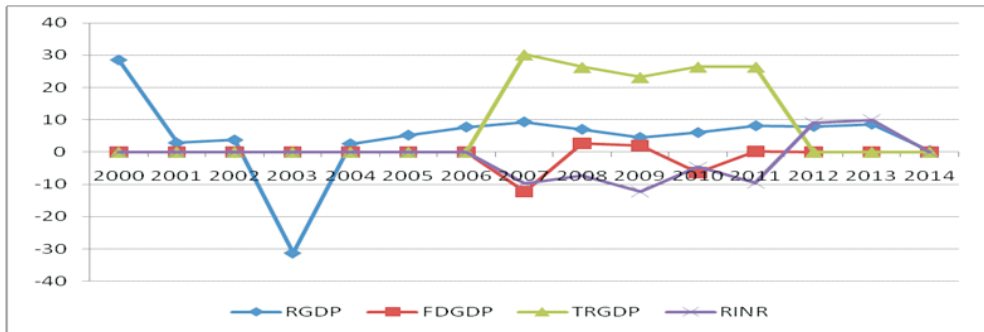
Source: Computed by the Authors

The above graph shows the trend of RGDP, FDGDP, TRGDP and RINR, from 2000-2014 in Liberia. The above cyclical downward trend depicts a static growth of TRGDP from 2000-2006 due to war and political instability which lead to negative growth rate of their RGDP -31.5 % between 202-2004. In 20008, there was a sharp increase in government budgets; the economy expansion has led to the expansion of public service. The government intends to finance primary deficit through concessional lending for majors projects using the Medium Term Expenditure Framework (MTEF). To avoid debt accumulation in MTEF government intends to finance projects through taxes and grants. Therefore fiscal rules were proposed to maintain capital spending at or above 25% of budget and constraint wage costs to no more than 34% in order to sustain the low negative fiscal deficit which occurs in the Liberia economy.

**Fig 3.7 RGDP, FDGDP, TRGDP and RINR in Nigeria**

Source: Computed by the Authors

The above graph shows the trend of RGDP, FDGDP, TRGDP and RINR, from 2000-2014 in Nigeria. The above cyclical upward trend depicts a steady growth of TRGDP on average of 14.5% within 2000-2005 and with a sharp fall in revenue generation due to unrest in the Niger delta region, financial meltdown and fall in crude price as show in the period of 2007-2009 which resulted into a sluggish growth of 4.2% of RGDP. From 2010 till date there is a sharp fall in government revenue due to demand and supply shock, crash in crude oil price, high debt, and high payment of fuel subsidies etc. As taken measures to combat this ailment of negative fiscal deficits and negative Real interest rate due to low productivity, In January 2012 the Nigerian government suppressed the subsidy on petrol because of the generate cost (4.2% of GDP in 2011), and lack of efficient by reorienting savings through the subsidy reinvestment and empowerment program (SURE-P) to reduces the deficits in the Country.

The graph as follows (fig 3.8) shows the trend of RGDP, FD/GDP, TR/GDP and RINR, from 2000-2014 in Sierra Leone. Sierra Leone's fiscal performance during the review period has been weak, characterized by persistent fiscal deficit, due to huge expenditure outlay. Increased expenditure on arms to curtail the political impasse accounted for the huge expenditure during the period of war. However, in order to rebuild the economy and achieve macroeconomic stability, government expenditure increased significantly during the post war period (2011-2013). Amidst the high expenditure during the review period, revenue mobilization remained relatively weak. The drop in official diamond exports and reduction in the country's tax base (TR/GDP) informed the decline in revenue between 2002 and 2007, resulting to high fiscal deficit.

Fig 3.8 Real GDP, FD/GDP, TR/GDP and RINR in Sierra Leone
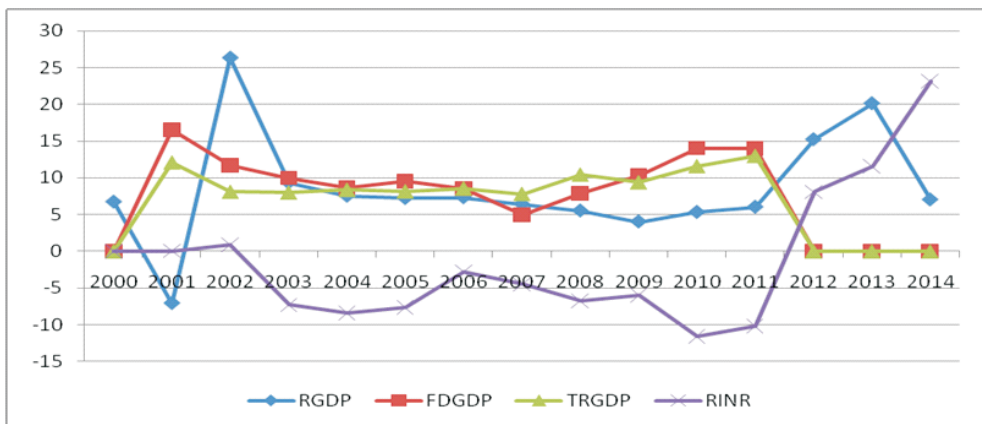
Source: Computed by the Authors

4.   THEORETICAL FRAMEWORK

4.1   Theoretical Framework

Fiscal sustainability describes the condition of fiscal policies, perhaps, due to the persistent implementation of fiscal rules, absence of political apathy and the existence of an economy; that is free from perpetual debt accumulation. Stemming from this, fiscal sustainability has been considered a multi-dimensional concept (Chalk and Hemming, 2000). More so, fiscal sustainability has definitional applications. As such, fiscal sustainability can be considered from an historical dimension or from a futuristic perspective in relation to the projective use of information. This aligns with the adaptive and rational expectation hypotheses. For the adaptive expectation view, the existence of historical fiscal variables is econometrically investigated on whether they affect the government budget constraints.

The choice of this methodology is as a result of the fact that the approach is predicated on recent advances in the econometrics of non-stationary and co-integration methodology for analyzing fiscal sustainability. In addition, contrary to the accounting approach, the (PVBC)/econometrics does not make assumptions that debt can continue to grow at the growth rate of the GDP in the economy, so that debt/GDP ratios remain constant, leaving rather no role that lenders ultimately play in the economy. More importantly, the accounting approach considers seignoirage (printing more money by central bank to finance deficit) as a major variable in assessing sustainability, a variable which has never been considered in financing deficit in Nigeria.

Adopting Cuddington (1996) and Jibao *et al.* (2012), to determine the equation of government budget constraint, given the assumption that all debt is in the form of domestic bonds B with a

$$\beta_t = \beta_{t-1} + I_t \beta_{t-1} - Ps \dots\dots\dots(1)$$

From equation (1), we obtain equation (2) by factorization;

$$\beta_t = (I + rr)\beta_{t-1} - Ps \dots\dots\dots(2)$$

Where denotes current debt of government measured at the end of period t, β_{t-1} is the outstanding debt at period $t – 1$, denotes the domestic interest rate in period t and Ps is the primary surplus. The following assumptions are made; time is discrete, debt matures in one period, and financing and interest payments take place evenly throughout the year.

Rewriting equation (2) by dividing it by price index such as the GDP deflator or CPI, moreover, the auxiliary assumptions required in the econometric tests of sustainability are more likely to be satisfied if we consider real debt. Dividing both sides of (2) by P_t, making use of $\frac{pt}{pt-1} = 1 + \pi t$ where πt is the domestic inflation rate between t-1 and t.

Equation (2) yields:

$$\frac{Bt}{Pt} = \frac{(1+rt)Bt-1}{Pt} - Ps \Rightarrow bt = \frac{(1+It)bt-1}{(1+\pi t)pt} - Ps \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3)$$

Equation (3) above becomes

$$bt = (1+rt)bt - 1 - Ps \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (4)$$

Equation (4) is the real values of the variables denoted in small letters which describes government budget constraint. Given time paths for i_t and Ps, the government financing constraint in (4) describes the time path of the stock of debt, i.e., the dynamics of debt accumulation or otherwise. It is straightforward to rewrite the financing constraint in (4) in terms of ratios to GDP, denoted by Y_t Use the identity $Yt/_{Yt} \equiv (1+gt)Yt - 1$ where g_t is the real GDP growth rate between t-1 and t and use arithmetic analogous to that used in deriving (4) from (3).

$$\frac{bt}{yt} = \frac{(1+rt)bt-1}{(1+gt)yt-1} - \frac{Ps}{Yt} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (5)$$

$\frac{bt}{yt} = bt$ is the ratio of current debt to GDP, $\frac{(1+rt)bt-1}{(1+gt)yt-1} = \frac{1-rt}{1-gt}$ bt-1 is the ratio of initial debt to GDP and $\frac{Ps}{Yt} = Ps$ is the ratio of primary surplus to GDP.

Then equation (6) becomes,

$$bt = \frac{1+rt}{1+gt} bt - 1 - ps \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (6)$$

From (6), the change in the debt/GDP ratio equals:

$$\Delta bt \equiv bt-1 = \frac{rt-gt}{1+gt} bt - 1 - Ps \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (7)$$

Where Ps is the ratio of real primary surplus to GDP. Thus, in the simple case where seigniorage revenue and foreign borrowing are ignored, the sustainable primary

surplus to GDP ratio is determined by setting the change in the debt/GDP ratio in (7) equal to zero, then;

$$Ps = \frac{r - g}{1 + gt} bt - 1 \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (8)$$

This is the level of the primary surplus that would be required each year to keep the debt/GDP ratio constant at its current level. In this case, in equation (8) should be interpreted as the primary surplus inclusive of sustainable seigniorage revenue (as a ratio of GDP). The seigniorage revenue is typically calculated by assuming that the ratio of real high-powered money to GDP is a negative function of the inflation rate, with the relevant elasticity taken from estimated (high-powered) money demand functions. The target inflation rate is then used to calculate the steady-state monetary base/GDP ratio and the resulting seigniorage (Cuddington, 1996). The above analysis completes the process of accounting approach.

With the government budget constraint in real level terms, not ratios to GDP, as in (4) above, make $Bt - 1$ the subject of the formula:

$$bt - 1 \frac{bt}{1 + rt} + \frac{ps}{1 + rt} \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots . (9)$$

This expression can then be iterated forward N periods. If we make the simplifying assumption that real interest rates are constant over time, the result of this forward iteration:

$$bt - 1 = \sum_{i=0}^{n} \frac{Pt + j}{(1 + r)^{j+1}} + \frac{bt + N}{(1 + r)^{t+N}} \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots . (10)$$

The assumption of a constant interest rate is made here for expositional convenience.

Here, the so-called No Ponzi game (NPG) condition is invoked to argue that the last term in (10) goes to zero in the limit i.e.

$$\lim_{N \to \infty} \frac{bt + N}{(1 + r)^{t+N}} = 0 \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (11)$$

Equation (11) states that the debt stock, when measured in present value terms, vanishes in the limit. By implication, it excludes Ponzi financing; that is, the government is not 'bubble'-financing its expenditure by issuing new debt to finance the deficit.

Assuming that the NPG condition in (11) is satisfied, it is easy to see from (10) that the government debt, at any point in time, must equal the present value of its expected future primary surpluses:

$$bt - 1 = \sum_{J=0}^{N} \frac{Pt + j}{(1 + r)^{j+1}} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots. (12)$$

The above equation (12) is called intertemporal government budget constraint.

$bt - 1$ is the value of initial debt, $Pt + j$ represents primary balance while $(1 + r)^{J+1}$ is the discounting factor. This is the so-called present value constraint (PVC).

The (PVC)/econometric approach to evaluating fiscal sustainability involve econometric techniques instationarity and co-integration analysis. The starting point for these tests is to take the first difference of equation (10) to get an empirical testable representation of the intertemporal government budget constraint. Following Jibao *et al.* (2012), equation (12), the intertemporal government budget constraint can be written as follows:

$$Gt - Rt = \sum_{J=0}^{\infty} (1 + r)^{-J+1} (\triangle Rt + j - \triangle Gt + rBt + j) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (13)$$

Where the $(1 + r)^{-J+1}$ discounting factor is $\Delta Rt + j$ while and ΔGtare are differences of government revenues and expenditure respectively. The inter-temporal budget constraint, under the no-Ponzi scheme rule, imposes restrictions on the time series properties of government expenditure and revenue given by the right hand side of equation (13). This will be stationary, as long as government expenditure, revenue and the stock of debt are all stationary in first differences. Specifically, if (Gt) and are I(1), they will be co-integrated, implying that there exists an error-correction mechanism pushing government finances towards the levels required by the inter-temporal budget constraint Jibao *et al.* (2012). Consequently, equation (13) can be rewritten as:

$$Gt = \alpha + Rt + \lim_{N \to \infty} \frac{bt + j}{(1 + r)^{j+1}} + \varepsilon t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots. (14)$$

Equation (14) forms the basis for testing the hypothesis of sustainability of fiscal deficit. If the transversality condition for the budget constraint holds and the limit term in (14) is zero, we obtain the equation below;

$$Rt = \alpha + BGt + \varepsilon\, t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(15)$$

Along with the null hypothesis of $\beta =1$ and εt is a stationary process (Quintos, 1995). From the above, (Rt) is the government revenue, α is a constant parameter, β represents the slope of the equation, (Gt) is the government expenditure and is the error term of the model.

Following Quintos (1995), the deficit is strongly sustainable if and only if the I(1) process of R and G are co-integrated and $\beta=1$. The deficit is only weakly sustainable if R and G are co-integrated and $0 < \beta < 1$ while fiscal policy is not sustainable if $\beta \leq 0$. He argued that $0 < \beta < 1$ satisfied both necessary and sufficient conditions of fiscal sustainability.

4.2 Model Specification

Based on the theoretical work and empirical literature, a model to investigate fiscal sustainability and growth dynamics in West Africa Monetary Zone (WAMZ) is developed.

$GDP = f (EXR, INT, INF, FDD GDP, TR/GDP)$

Where *GDP* is annual growth rate of gross domestic product of WAMZ countries, *EXR* is official exchange rate of local currency against the US dollar, *INF* is inflation (annual percentages of consumer prices), FD D GDP is the fiscal deficit to GDP ratio and TR/GDP is the tax revenue to GDP ratio.

$GDP_{it} = B_0 + B_1 EXR_t + B_2 INT_{it} + B_3 INF_{it} + B_4 \text{FD/GDP}_{it} + B_5 \text{TR/GDP}_{it} + \varepsilon_{it}$

Here, ε represents error term.

B_0 is a constant which represents the value of R*GDP* when all the explanatory variables are zero. $B_1, B_2, B_3, B_4 B_5$ is the slope coefficient of the explanatory variables *INT, EXR, INF,* FD/GDP and TR/GDP respectively.

Apriori Expectations $B_0 > 0$; $B_1 < 0$; $B_2 < 0$; $B_3 < 0$; $B_4 > 0$, $B_5 > 0$;

4.2.1 Panel Unit Root Test

The most adapted econometrics models for time series estimation is Unit Root test. It can be used to examine the degree of integration between Fiscal Deficit/ Gdp, Tax Revenue/ Gdp, Real Interest Rate, Exchange Rate and Inflation, and RGDP by capturing the country-specific effect. To assess the stationarity properties of the variables used, this study utilizes two different panel unit root tests, for each technique, we test for unit roots in the panel using a model that has a constant and a

deterministic trend. Firstly, Levin and Lin (1992) approach is based on the **PP** test but proceeds from the assumption of a homogeneous panel (independent error terms and all the ρ are identical across the cross sections). This approach to a large extent increases the power of the test relative to the time series **PP**tests that is adjusted to account for any heteroscedasticity. Then, a pooled t-test is produced to test the null, which are asymptotically distributed under the normal distribution by allowing for different lags across different cross sections.

$$\Delta y_{it} = \rho y_{i,t-1} + \sum_{L=1}^{\rho_i} \phi_{iL} \Delta y_{i,t-L} + z_{it}'\gamma + u_{it}$$

$$z_{it}' - \frac{fixed}{random}\, effect \qquad \text{................. (3.6)}$$

In contrast, the ImPesaran and Shin test (2003) relaxes the homogeneous assumptions by allowing for heterogeneity in the autoregressive coefficients for all panel members. It then tests a null hypothesis that each series contains a unit root (for all *i* cross sections) by averaging all the individual ADF test statistics, the IPS test is given as:

$$\Delta y_{it} = \rho y_{i,t-1} + \sum_{L=1}^{\rho_i} \phi_{iL} \Delta y_{i,t-L} + z_{it}'\gamma + u_{it}$$

$$z_{it}' - \frac{fixed}{random}\, effect \qquad \text{................. (3.7)}$$

The line of deviation between the two tests, is that one assumes a common unit root while, the other individual unit root, also the IPS has an alternative hypothesis stating that at least one of the cross section series is stationary, so Levin and Lin requires all to be stationary, IPS only some.

4.2.2 Granger Causality Test

The Granger causality test is a statistical hypothesis test for determining whether or not one variable is useful to forecast another. According to Granger causality, if a variable (*x*) Granger-causes variable (*y*), then past values of variable (*x*) should contain information that helps predict variable (*y*). Granger test assumes that appropriate information for the relevant variables, and includes testing the following equations:

$$FD/GDP_t = \alpha_0 + \sum_{i=1}^{N1} \alpha_{1i} FD/GDP_{t-1} + \sum_{i=1}^{N2} \alpha_{2i} RGDP_{t-1} + \varepsilon_{1t} \quad \text{.......................} \quad (1)$$

$$RGDP_t = \beta_0 + \sum_{i=1}^{T1} \beta_{1i} RGDP_{t-1} + \sum_{i=1}^{T2} \beta_{2i} FD/GDP_{t-1} + \varepsilon_{2t} \quad \text{.......................} \quad (2)$$

$$TR/GDP_t = \alpha_0 + \sum_{i=1}^{N1} \alpha_{1i} TR/GDP_{t-1} + \sum_{i=1}^{N2} \alpha_{2i} RGDP_{t-1} + \varepsilon_{1t} \quad \text{.......................} \quad (3)$$

$$RGDP_t = \beta_0 + \sum_{i=1}^{T1} \beta_{1i} RGDP_{t-1} + \sum_{i=1}^{T2} \beta_{2i} TR/GDP_{t-1} + \varepsilon_{2t} \quad \text{.......................} \quad (4)$$

$$TR/GDP_t = \alpha_0 + \sum_{i=1}^{N1} \alpha_{1i} TR/GDP_{t-1} + \sum_{i=1}^{N2} \alpha_{2i} FD/GDP_{t-1} + \varepsilon_{1t} \quad \text{.......................} \quad (5)$$

$$FD/GDP_t = \beta_0 + \sum_{i=1}^{T1} \beta_{1i} FD/GDP_{t-1} + \sum_{i=1}^{T2} \beta_{2i} TR/GDP_{t-1} + \varepsilon_{2t} \quad \text{.......................} \quad (6)$$

Where: $N_{i's}$ and $T_{i's}$ are the maximum lag length, $å_{1t}$ and $å_{2t}$ are white noise error terms, identically and independently normally distributed with mean zero and constant variance.

4.2.3 Panel Cointegration Test

The main approaches to cointegration have the same advantages as the panel Unit roots tests, in that they increase the power of the test. There are essentially two approaches, one based on the Engle-Granger approach and the other using a Johansen ML type methodology. There are in turn variations of both approaches, for example in the Engle –Granger approach, there is the Kao test, which assumes the same values across all cross sections, whereas Pedroni assumes they can vary across the cross sections, in effect allowing considerable differences in the dynamics across the cross sections.

5. EMPIRICAL RESULT

5.1 Panel Unit Root Test

As expected of any data with time series component, a panel unit root test is carried out on each of the variables in the model to determine their level of stationarity (zero mean

and constant variance); this is to ensure that the regression result is not spurious. A panel series is said to be integrated of order d, denoted I(d), if the series becomes stationarity after being differenced d times. The study adopts the Levin-Lin-Chu (LLC) and Im-Pesaran-Shin (IPS) unit root tests based on their features which make them suitable in this study.

- LLC assumes a common unit root process and can be used if the asymptotic

  property of $\sqrt{N}/T \to \infty$. (LLC, 2002).

- IPS assumes individual unit root process, can be used for an unbalanced data and for when N and T are fixed.(IPS, 2003).

Table 5.1: Panel Unit Root Tests (Data Properties)

Panel Data	Levin, Lin &Chut t* (Common Unit Root process)		Im, Pesaran and Shin W stat (individual unit root process)		Order of Integration
	P-values @ Levels (Individual Intercept)	P-values @ 1st diff (Individual Intercept)	P-values @ Levels (Individual Intercept)	P-values @ 1st diff (Individual Intercept)	
RGDP	--	0.0000**	--	0.0000**	I(1)
RINR	--	0.0480**	--	0.0152**	I(1)
TR/GDP	--	0.0003**		0.0030**	I(1)
INF	--	0.0000**	--	0.0000**	I(1)
FD/GDP	--	0.0000**	--	0.0000**	I(1)
EXR	--	0.0014**	--	0.0262**	I(1)

Note: (**) denotes rejection of the null hypothesis at the (1%) level
Source: Computed by the Authors

Table 5.1 presents unit root test of two unit root test, that is, Levin, Lin &Chut t*and Im, Pesaran and Shin W-stat tests are conducted. The statistics of both tests permit to test formally the null hypothesis of presence, of common unit root (Levin, Lin &Chut t*) and Individual Unit Root Process (Im, Pesaran and Shin W-stat). The unit root test

augments the decision about the Stationarity of the panel data, they present a dependable result.

The result of the panel unit root test shows that all the variables are stationary at first difference, hence they are I (1) variables. Having established that Real Gross Domestic Product, Fiscal Deficit/ Gdp, Tax Revenue/ Gdp, Real Interest Rate, Exchange Rate and Inflation were integrated of the first order i.e. I(1), we, therefore, continued to assess the potential long run relationship (cointegration) between the variables. In this case, we tested whether variable used were cointegrated. This was because stationarity of the variables of interest had satisfied the prerequisite and primary condition of using the econometric technique for the analysis. Therefore, we invoked the sufficient condition of testing for sustainability through cointegration process, by applying Engle-Granger 2-step procedure of cointegration.

5.1.2. Granger Causality

Since the FD/GDP, TR/GDP and the RGDP became stationary at first difference, granger causality testing for (DFD/FGDP), (DTR/GDP), and (DRGDP) is needed to check the causal relationship of this variables on each other. The below table show that there is a causal relationship between FD/GDP and RGDP but in one direction so that changes in the economic growth have effects on fiscal deficit and not vice versa. This test shows that there was no causal effect of changes in fiscal deficit to gross domestic product ratio on real gross domestic product growth rate. This demonstrates that FD/GDP actually does not cause growth in real GDP in WAMZ countries. This means that an increase or a decrease in economic growth can affect and causes the fiscal deficit/gdp at 1% significant level. On the other hand, Fiscal deficit to GDP ratio does not seem to Granger Cause economic growth. This suggests that information about fiscal deficit in past periods cannot explain the behavior of economic growth in the present time.

Table 5.2 Granger Causality Tests (Data Properties)

Null Hypothesis:	F-Statistic	P-Value
FDGDP does not Granger Cause RGDP	5.93323	0.0171
RGDP does not Granger Cause FDGDP	0.01385	0.9066
TRGDP does not Granger Cause RGDP	2.05228	0.1558
RGDP does not Granger Cause TRGDP	0.14217	0.7071
TRGDP does not Granger Cause FDGDP	0.00199	0.9645
FDGDP does not Granger Cause TRGDP	0.08601	0.7701

Source: Authors' Computation

5.1.3 Panel Cointegration Test Analysis

In quest to assert further the long run interdependence relationship among the variables considered in the study over the period under review, the potential long run equilibrium relationship between these variables was assessed and the result put forth in table below

Table 5.3: Pedroni (Engle-Granger Based) Test of Co integration

H$_0$; No co integration

	t-Statistic	Prob.
PP	-2.684069	0.0000
Residual variance	88.98215	
HAC variance	99.81404	

Note: (**) denotes rejection of the null hypothesis at the (1%) level
Source: Authors' Computation

Having established the stationarity of the variables considered in this study, with a significant PP t-statistics (-2.684069) and p-value (0.0000) in table 5.3 above it is evident that there exists long-run interdependence among these variables. This consistency in the test results confirmed the existence of long-run relationship among the exogenous and endogenous variables in the model.

5.1.4 Static Panel Model Estimation Result and Hausman Test Analysis

Having transformed the data of selected variables as appropriately required, the result of the Correlated Random Effects static panel data estimation procedure aligned with the hausman test for fiscal sustainability and growth Dynamics in West African Monetary Zone (WAMZ) economies over the period under review is as presented in table 5.1.4 following.

Table 5.4: Correlated Random Effects Static Panel Model Estimates Result

Variables	D(RINR)	D(TR/GDP)	D(INF)	D(FD/GDP)	D(EXR)
Coefficients	-0.065037	0.035063	0.043587	-0.204175	-0.187279
Std. Errors	0.068037	0.075218	0.075635	0.089759	0.061726
T-Statistic	-0.955907	0.466144	0.576278	-2.274690	3.034037
P-Values	0.3424	0.6425	0.5662	0.0259	0.0034

$R^2 = 0.469576$ Adjusted $R^2 = 0.394868$ D.W. Stat. $= 1.969667$ F-Statistic $= 6.285513$ Prob. F-Statistic $= 0.000001$ taking DRGDP as dependent variable.

Table 5.5: Hausman Test Result

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	P-value
Cross–section random	0.000000	5	1.0000

Source: Computed by the Authors

As presented in table 5.4, the relationship estimates i.e. the coefficients for all explanatory variables in the fiscal sustainability and growth dynamics model over the period under review in (WAMZ) economies notably conformed with the apriori expectations and with reliable t-statistics and p-values except for Inflation D(INF) and Fiscal deficits to GDP ratio D(FD/GDP) relationship ascertained to be significant. Hence by implication, FD/GDP ratio in WAMZ countries is highly unproductive. This means that government deficits spending across West African Monetary zones were not in any way supporting their fiscal policy thrust which is meant to boost economic performance and sustained economic growth.

The Real Interest Rate D(RINR), Fiscal deficits to GDP ratio D(FD/GDP) and Real Exchange Rate D(EXR) coefficients of (-0.065037) (-0.204175) (-0.187279) and

significant at 0.3424, 0.0259, and 0.0034 respectively have a significant negative impact on the depth of fiscal sustainability and growth dynamics. It then implies that on average over the period under review in the selected WAMZ economies, a percentage increase in these variables help to reduce the depth of the Real Gross Domestic Product (RGDP) by 6.5037%, 20.4175% and 18.7279% respectively. These conform to the apriori expectation that high-interest rate, high debt/GDP and high exchange rate retard RGDP and this has affected drastically fiscal sustainability and growth dynamics in all WAMZ countries. Also, this reflects an indirect relationship posed by the high export of primary product and high import of specialized goods with has crippled the value of WAMZ countries currency through devaluation which has also delayed the achievement of the ECO as a common currency.

There exists a positive relationship between TR/GDP, INF and RGDP; therefore an increase of 1% in the Tax revenue/GDP and Inflation would result in an increase RGDP by 0.35% and 4.35%, keeping the influence of other factors constant. This shows that the revenue generating a capacity of WAMZ countries is still low due to their tax policies that are aiding tax avoidance and evasion or the low revenue generating capacity of the government caused by positive and negative externalities and imported inflation. The price increase in the non-food items was the main driver of this inflation in the zone.

Whereas, the coefficient of determination (R^2) value of 0.469576 or otherwise the adjusted coefficient of determination (Adjusted R^2) value of 0.394868 show that about 50% of the variation in RGDP is explained in the model i.e. by the explanatory variables. The Durbin Watson Statistic (D.W. Stat.) test value for autocorrelation in the model is however ignored since the study involves a cross-sectional analysis or pooled regression or cross-sectional / pooled data. The F-Statistic value of 6.285513 with a p-value of 0.000001 which is significant at 1% explains that there is a linear relationship between the RGDP and all the explanatory variables put together. In attesting to the reliability of the technique or mode of panel estimation, the Hausman test was undertaken and such with a significant p-value supported the use of the Random effect estimation process or procedure.

6. CONCLUSION

In this paper, based on the outcome of fiscal sustainability and growth dynamics using the panel data Hausman test and a variety of estimation techniques, the outcome shows that fiscal policy in WAMZ countries is weakly sustainable for all countries under investigation. This shows that the revenue generating a capacity of WAMZ countries is on the low ebb to cushion the effect of debt servicing leading to unsustainable fiscal policy implementation.

6.1 Recommendations

Based on the findings of this research, the recommendations for policy can be drawn: It is hoped that the measures will be impactful in boosting fiscal sustainability and growth stability in the development of WAMZ countries' economies through:

(i) Fiscal policy should not be contemplated in a vacuum, but rather it must be seen within the wider context of overall macroeconomic sustainability. In this regard, policymakers in the WAMZ countries must coordinate fiscal policy with other policy areas, so as to maintain an environment of low inflation, exchange rate stability and external account equilibrium, as well as fiscal sustainability. In addition, domestic debt reduction should be set as a fiscal anchor over the medium term.

(ii) Governments in the WAMZ countries, with particular reference to Sierra Leone, should pursue a robust fiscal policy aimed at raising revenue and reducing expenditure. On the fiscal policy side, direct measures should aim to streamline the tax system in order to make it more efficient. On the expenditure side, governments should prioritize and rationalize their expenditure towards growth enhancing and poverty reduction activities. Thus, WAMZ countries should strengthen fiscal performance through the enhancement of domestic revenue mobilization and rationalization of expenditure through prudent fiscal management and discipline, and should inject efficiency in tax administration, reforming of the tax structure and broadening the tax base by installing more equitable and transparent tax system, with prudent tax reforms which are intended to increase revenue.

(iii) Financial deepening policy should be pursued by the various Central banks in order to improve the financial sector development which acts as Risk Management-shielding mechanism against exchange rate volatility by enshrining prudent debt management practices to avoid unsustainable accumulation of huge external debt.

(iv) The Government of WAMZ countries should refocus their efforts towards fostering sound monetary, fiscal and exchange rate policies and also, strengthened domestic revenue bases to create additional fiscal space for financing the country's development needs and also, public service reforms to improve efficiency.

(v) Rationalization of public expenditure and fiscal discipline should be put in place toÊefficiently monitored government expenditure and revenue by implementing the treasury single account in WAMZ countries.

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