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An Empirical Estimation of the Optimum Level of Budget Deficit in Liberia

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Abstract:
Economic theory establishes that high fiscal deficit is one of the causes of macroeconomic instability. Empirical findings, however, do not prodigiously support this assertion as results from various studies are mixed and inconclusive across countries These inconsistent results have underscored the expediency of time series data for country specific studies to address the problem. This paper investigates the threshold level of Budget deficit that is favourable for growth in Liberia. The threshold level of budget deficit conducive for economic growth was identified at 6.0 percent. The findings of this paper provide sufficient evidence in support of the proposition that budget deficit beyond certain threshold is inauspicious to growth. This suggests that the Liberian authorities should endeavour to implement policy measures aimed at reducing Budget deficits to levels not exceeding 6.0 per cent (levels consistent with economic growth).

JEL Classification: *C2, E1, E2, O4, O5*

Keywords: *Budget deficit, economic growth, threshold, Liberia*

1. Introduction

Drawing inspirations from the European Union convergence Criterion, that prescribed low budget deficit/GDP ratio of not more than 3.0 per cent, most of the studies on the advanced economies have advocated that reducing the budget deficits can enhance economic growth. Stumpy level of budget deficits can decrease the government borrowing, thereby exerting downward pressure on interest rate in the economy.

Drawing inspirations from the European Union convergence Criterion, that prescribed low budget deficit/GDP ratio of not more than 3.0 per cent, most of the studies on the advanced economies have advocated that reducing the budget deficits can enhance economic growth. Stumpy level of budget deficits can decrease the government borrowing, thereby exerting downward pressure on interest rate in the economy. Furthermore, higher private investment can be induced by the low level of interest rates that would induce the economic growth. Moreover, declining deficits signal the private sector to cut its estimates of current and future tax liabilities, thus, providing an extra boost to investment and consumption. Lastly, higher investment can also ease supply constraints on growth. However, the applicability of these assertions to the developing countries has been called to question (see Clements, Gupta and Inchauste, 2003; Onwioduokit, 2012).

Fiscal deficit is essentially the difference between government revenue and expenditure (including government expenditure and investment). The accrued value of the deficit over time represents the gross national debt. The primary concern underpinning the overall deficits is that, except the deficit is limited, the private sector would be crowded out; government debt would build up to a point where it will become unsustainable resulting in payments arrears, and eventually weakening the economy by causing inflation, as well as reduction in output growth.

The theoretical debate regarding the prudency and the prospect of governments persistently operating an unrestricted budget deficit is inconclusive. However, in real life the long-run government expenditures and taxes are endogenously determined to avoid a catastrophe. If the current deficits are not sustainable, eventually the government will be forced to repudiate its debt, either explicitly or through inflationary depreciation. In a growing economy, the government deficit may be regarded as sustainable if the deficit grows at a rate slower than the growth rate of the economy. If the real interest rate is less than the economic growth rate, deficits could continue forever without an increase in the ratio of debt to GDP. In such a case, the deficit need not be zero ultimately.

In the light of the controversy regarding the impact of deficit financing on economic growth, it is apropos to empirically ascertain the level of budget deficit that is beneficial to economic growth in that country. The assumption is that there is a level of budget deficit beyond which economic growth could be retarded. Thus, the key objective of this paper is to

estimate the threshold level of budget deficit that is beneficial for economic growth in Liberia. Determining appropriate threshold for this significant indicator is essential in the overall economic management as it would apprise policy in Liberia. The remaining part of the paper is organized as follows: Part II reviews theoretical and empirical literature while part III contains analytical framework. The results are presented in Part IV. Part V contains summary and some concluding remarks.

2. Review of Literature

2.1. Theoretical Literature

Generally, theoretical conclusions regarding the relationship between budget deficit and economic growth are contentious. While the Keynesians opine a positive relationship between deficit and output growth, the neo classicals argued the opposite. Meanwhile, the Ricardian equivalence hypothesis claimed that there is a neutral relationship between budget deficit and economic growth. Briotti (2005) observed that the variances in terms of opinions and analyses are mainly due to various factors including time dimension, the level of economic development of the countries, forms of government administration and method of analysis as well as the level of budget deficit.

Brender and Drazen (2008) noted that budget deficit can also reduce the economic growth of a country based on the perspective of politics and election process. They opined that high budget deficits recorded by a country will give negative signals to the citizens as an indication of the inability of the government to perform well in managing the resources of a country. As a result, there is a probability of re-election process to be conducted to replace the authorities. Indirectly, the authorities who did not perform well may not be able to bring the country to the upper level. Hence, it will not contribute to high economic growth due to lack of confidence among citizens, investors, and other bordering countries.

Benos (2009), in line with the Ricardian equivalence hypothesis, argued that the budget surplus that is currently recorded by the government will be used to finance future deficits. Therefore, an increase in the budget deficit will not impact the economic growth since it is financed through previous surplus. Bivens, and Irons (2010), asserted that by and large, the government must borrow money internally or externally to finance budget deficit. An increase in the demand of the loanable funds by the government will distort the level of private investment due to an increase in the interest rate. The decline in the private investment will reduce the level of economic growth.

2.2. Empirical Literature

Aschauer (1989), applied annual data for the US over the period 1953-1986 to examine the effect of government deficit on private investment and the rate of return to private capital. He found that an increase in public investment arising from deficit may be expected to reduce private investment nearly one-to-one as the private sector utilizes the public capital for its required purposes rather than expand private capacity. At a deeper level, a distinctive feature of deficit used to provide public infrastructure is that it complements private capital in the production and distribution of private goods and services. Hence, public investment is expected to raise private investment as the former raises the profitability of private capital stock. The empirical results indicated that while both channels appear to be operating paripasau, the later comes to dominate, so the net effect of a rise in deficit financed public investment had a positive effect on private investment. This means that government deficit financed investment had a positive effect on private investment and caused *crowding-in* rather than *crowding-out*.

Glannaros and Kolluri (1989) applied the OLS technique on different models, including fisher equations and the IS-LM general equilibrium models by using data set of five industrial countries from (1965-1985). The analysis yielded three different results; firstly, there is a negative relation between interest rate and inflation. secondly, there is an indirect significant effect of budget deficit on interest rate, thirdly, the study did not find any clear relation between variables with the help of other exogenous variables.

Easterly et al (1993) reported a consistently negative relationship between growth and budget deficits. Fischer (1993) findings supported Easterly et al (1992) results that concluded that large Budget deficits and growth are negatively related. Anusic (1993) investigated the relationship between budget deficit and economic growth in the Republic of Croatia using data from (1991-1992), he found that deficit is a priori harmful for the proper and smooth economic system, the increase in budget deficit will cause an increase in real interest rate, this increase will cause decrease in real investment. He concluded that the impact of budget deficit on overall economy is though harmful, irrespective on the internal condition and way of financing.

Jenkins (1997), stirred by the persistent deficits in Zimbabwe, studied public sector deficits and macroeconomic stability in Zimbabwe. The author identified an intense debt problem, drought, and terms of trade shocks as well as the government's unwillingness to engage in fiscal adjustment as fundamental macroeconomic setbacks in Zimbabwe. Findings of the study showed that uncertainty caused by the growing public-sector debt reduced private investment and further resulted in a decline in growth. The macroeconomic model explored by the author showed that the variable with greatest influence on overall growth was agricultural output. However, the budget deficit had an unambiguously negative impact on exports. It also reduced private welfare, worsened income distribution and reduced employment. The author concluded that the growth of government resulted in a drain on the economy, rather than facilitate economic growth and development.

Anyanwu (1998) deviated manifestly from past studies that focused more on the effects of deficits and concentrated on the impact of deficits financing. He applied regression analysis to pooled cross-section and time series data for Nigeria, Ghana, and the Liberia. The results did not reveal a significant positive association between overall Budget deficits (and its foreign financing) and domestic nominal deposit interest rates. Nevertheless, the author reported a significant positive relation between domestic financing of the budget deficits and domestic nominal deposit rates. He concluded that the concern of economists in the Sub-region should shift from the deficits itself to the manner of financing the deficit.

Hugume and Obwona (1998), concerned about the role of Budget deficits in the reform programme in Uganda, investigated public sector deficits and macroeconomic performance in Uganda. The study set out to provide a more systematic modelling framework to explain the interrelationships between Budget deficits, current account deficits and real exchange rate depreciation. The study also engrossed the research was to analyse the behaviour of important aggregate variables such as price level, current account balance, external sector and money stock as influenced directly and indirectly by changes in Budget deficits. A miniature macroeconomic model that captured the interactions between exports, import, real exchange rate, government expenditure, price, and money supply was specified. The empirical strategy attempted to build an integrated model linking the public sector with the financial market and then generate implications for the conduct of fiscal policy. A distinct finding of the estimations was the observed interaction of the public sector and monetary sector.

Bahmani (1999) applied the Johansen Juselius co-integration technique to investigate the relationship between the budget deficit and investment using quarterly data for the period of 1947-1992 for the U.S.A. The author reported a crowding in influence of the budget deficit on the real investment, which is a validation of the arguments of Keynesian regarding the expansionary effect of the budget deficit on the investment.

Guseh (2000) investigated the relationship between government size and economic growth in Liberia from 1960-1986. The study found that growth in the size of government has been associated with a slowdown in economic growth in Liberia over the period. Thus, the author recommended a lesser role of government in economic activity as the best route towards economic growth and development in the country.

Ahmed and Miller (2000) in a cross-sectional study of thirty-nine states utilizing data for period of 1975-1984, while using Ordinary Least Squares model (OLS), fixed effect and random effect methods apprised that government spending can be segregated into two parts. First is the spending on social security and welfare of its people and due to which it reduces the investment. Secondly, the spending on communication sector, including transport, increases investment by the private sector less developed countries (LDCs). He suggested that reduction in investment leads to less revenue generation hence causing deficit, and vice-versa when spending in transport and communication.

Adams and Bevan (2002) assessed the relation between budget deficits and growth in a panel of forty-five (45) developing countries. An overlapping generation's model in the tradition of Diamond (1965) that incorporated high-powered money in addition to debt and taxes was specified. The estimation strategy involved a standard fixed effect panel data estimation and bi-variate linear regression of growth on the budget deficits using pooled data. An important contribution of the empirical analysis is the existence of a statistically significant non-linearity in the impact of budget deficit on growth. However, this non-linearity the authors argued reflected the underlying composition of deficit financing. In effect, Adams and Bevan posited that for a given level of government spending, a shift from a balanced budget to a (small) deficit may temporarily reduce distortions especially if the distortions impact growth rather than output.

Based on a consistent treatment of the government budget, the authors found evidence of a threshold effect at a level of the deficit around 1.5 percent of GDP. While there appeared to be a growth payoff to reducing deficits to level, this effect disappeared or reversed itself for further fiscal contraction. The magnitude of this payoff, but not its general character, necessarily depended on how changes in the deficit were financed (through changes in borrowing or seigniorage) and on how the change in the deficit was accommodated elsewhere in the budget. The authors also found evidence of the interaction effects between deficits and debt stock, with high debt stocks exacerbating the adverse consequences of high deficits.

3. Research Methodology

3.1. Analytical Framework Methodology

The analytical framework adopted for this study follows essentially the Keynesian framework and borrowed heavily from Onwioduokit (2012). Recall that in a simple Keynesian framework, desired aggregate demand relationship is specified in the goods market as:

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

With the following behavioural equations:

$$C = a + bY^d, \quad b > 0$$
$$Y^d = Y - T$$
$$I = \delta + \gamma i, \quad \gamma < 0$$
$$G = \bar{G}$$
$$X = s + \sigma e, \quad \sigma > 0$$
$$M = m + \phi Y^d, \quad \phi > 0$$

Where *Y* is output; *C*, consumption; *I*, investment; *G*, government spending which is assumed to be exogenous; *X*, exports; *M*, imports; Y^d, disposable income; *T*, tax revenue; *i*, interest rate; *e*, exchange rate.

In equilibrium (after substituting behavioural equations into the desired aggregate demand equation (1)), output will be given by

$$\bar{Y} = \frac{A}{\theta} + \frac{1}{\theta}\left(\gamma i + \sigma e + G - (b - \phi)T\right) \quad (2)$$

Where $\theta = 1 - b + \phi, \quad A = a + \delta + s - m$

From equation (2), increasing taxes will reduce output, while increasing government spending will increase output.

But Budget deficit (*FD*) is given by

$$FD = G - T \approx G - (b - \phi)T \quad (3)$$

Budget deficit is the excess of government expenditure over its revenue. If the government derives its total revenue from tax sources (which is quite realistic), G-T gives the deficit position of the government. Since individuals do not spend all their income, the total revenue that could be generated from consumption expenditure is $(b - \phi)T$. Thus, subtracting this from government expenditure will give approximate position of the fiscal balance.

Putting (3) into (2) gives

$$\bar{Y} = \frac{A}{\theta} + \frac{1}{\theta}\left(\gamma i + \sigma e + FD\right) \quad (4)$$

Given that Liberia is essentially a small-open economy (without ability to influence international price developments) and for holistic treatment of the economy, the model is extended to incorporate the money sector as well as the external sector. The money market in an open economy can be represented by the following equations:

Money Demand Function: $\frac{M^D}{P} = kY + \lambda i, \qquad k > 0, \ \lambda < 0 \quad (5)$

Money Supply Function: $\frac{M^S}{P} = m_1 \frac{B}{P} + m_2 i, \qquad m_1, m_2 > 0 \quad (6)$

Equilibrium Condition: $M^D = M^S \quad (7)$

where $P \equiv$ is the general price level, $B \equiv$ international reserves held by the central bank and m_1, m_2 are coefficients.

From the above money market model, the LM schedule[1] can be specified as

LM Schedule: $i = \psi \frac{B}{P} + \varphi Y, \qquad \psi < 0, \ \varphi > 0 \quad (8)$

Given the importance of the external sector in Liberia, the influence of the sector is incorporated through the balance of payments schedule. The balance of payments schedule is given as

BP Schedule: $B = A_2 - \theta_0 Y + \theta_1 e + \theta_2 i, \qquad \theta_0, \theta_1, \theta_2 > 0 \quad (9)$

where A_2 is the aggregate of exogenous components in the net export function and $\theta_0, \theta_1, \theta_2$ are coefficients.

Putting equation (8) into (3) gives

$$Y = A_1 + \beta_1 \frac{B}{P} + \beta_2 Y + \sigma e + FD \quad (10)$$

where $\beta_1 = \frac{\psi\gamma}{\theta}$ and $\beta_2 = \frac{\phi\gamma}{\theta}$

[1] The LM curve is used to determined equilibrium in the money market. The L stands for liquidity and M for Money.

Putting equation (9) into (10) produces

$$Y = A_1 + \frac{\beta_1}{P}\left(A_2 - \theta_0 Y + \theta_1 e + \theta_2 i\right) + \beta_2 Y + \sigma e + FD \quad (11)$$

Isolating like terms and re-arranging equation (11) gives

$$Y = C + \frac{1}{P}\left(\alpha_1 e + \alpha_2 i\right) + \alpha_3 e + \alpha_4 FD \quad (12)$$

where $1 + \beta_1\theta_0 - \beta_2 = \varphi, \quad C = \frac{A_1 + \beta_1 A_2}{\varphi}, \quad \alpha_1 = \frac{\beta_1\theta_1}{\varphi}, \quad \alpha_2 = \frac{\beta_1\theta_1}{\varphi}, \quad \alpha_3 = \frac{\sigma}{\varphi}, \quad \alpha_4 = \frac{1}{\varphi}$

Recasting the second term on the right-hand side of equation (12) in logarithmic generic term gives

$$Y = C + \lambda e + \alpha_2 i - \pi + \alpha_4 FD \quad (12b)$$

where $\pi \equiv$ the rate of inflation and $\lambda = \alpha_1 + \alpha_3$.

In equation (12B), equilibrium output is positively related to Budget deficit.

Within a time series context, output is influenced by its own past level (output dynamics) which is consistent with accelerator principle. Equation (12b) can be restated as

$$Y_t = c + \varpi Y_{t-1} + \alpha_2 i_t + \lambda e_t + \alpha_4 FD_t - \pi \quad (13)$$

Recasting (13) gives

$$y_t = c + \delta_1 i_t + \delta_2 e_t + \delta_3 FD_t + \delta_4 \pi \quad (14)$$

where $y_t = Y_t - Y_{t-1}$ which captures the change in GDP (growth rate of GDP) and $\delta_1, \delta_4 < 0$. Equation (14) is essentially an output (GDP) growth model which gives the long-run relationship between output growth (change in output) and Budget deficit. This relationship is positive; implying that widening of Budget deficit will improve growth. However, some empirical studies document the negative relationship between growth and Budget deficit, while some others establish a positive relationship as given by the simple Keynesian framework. This ambiguity of the relationship between growth and Budget deficit suggests a threshold effect of Budget deficit on growth. This will inform the empirical modelling of growth-deficit relationship in this study.

From the supply-side of the economy, output is a function of capital stock and labour. A simple Cob-Douglas production function generates a growth model of the form

$$y = \omega_0 + \omega_1 \Delta \ln K + \omega_2 \Delta \ln L \quad (15)$$

where *K* refers to capital stock, *L* refers to labour force growth, Δ is a change notation and $\omega_0, \omega_1, \omega_2$ are coefficients.

3.2. Model Specification

In specifying the empirical model, the study relies on the theoretical framework. From both the demand and supply sides of the economy, variables such as interest rate, exchange rate, inflation, Budget deficit, investment (change in capital stock) and labour are identified as the key variables explaining growth. However, it is appropriate to include in the empirical model those reform variables that also influence economic growth. In Liberia, financial sector reforms have been undertaken, while trade liberalization policies have also been implemented. Hence, it is appropriate to include financial reforms variable and trade openness variable in the empirical model. The key variables in the empirical model are defined as follows:

Dependent variable

Y_{it} = $GDPG_t$ = Growth rate of real GDP

Independent variables

INV_t = Gross fixed capital formation as a ratio of GDP as a proxy for growth in capital stock.

Lab = Secondary school enrolment as a proxy for labour force.

Def_t = FD/GDP = Budget deficit/GDP, excluding grants

Inf_t = Inflation rate

$Int_t = Interest\ Rate = Lending\ Rate$

M_2GDP_t = M_2/GDP ratio – measuring financial depth

Dep_t = Exchange Rate expressed as a given amount of local currency per US dollar (Depreciation/ appreciation)

OPN_t = Degree of openness of the economy, measured as $[(Imports + Exports)/GDP]$

Besides investment, labour force and Budget deficit; other control variables included in the model are, namely, interest rate (int), exchange rate depreciation/ appreciation (dep), inflation (inf), financial deepening M2/GDP and openness index (OPN). Interest rate has an important role in economic growth. Higher interest rates reduce the growth of consumer spending and economic growth. This is because more incentive to save in a bank rather than spend, more expensive to borrow,

therefore less spending on credit and less investment; increase cost of mortgage repayments, therefore, reduce disposable income and therefore consumer spending. Consequently, an inverse relationship is expected between interest rate and economic growth.

Exchange rate development impacts on the economic growth process. On balance, we expect a positive relationship between depreciation and economic growth. Inflation is another significant variable influencing output growth rate. This variable is especially significant in Liberia, where food price and other exogenous factors including high imports of food and intermediate products play very important role. In general, very high levels of inflation may undermine economic growth. However, if the inflation rate is low, stable, and sustainable, it may be interpreted as an indicator of macroeconomic stability that would enhance growth. And if the economy is at equilibrium higher inflation should impact adversely on growth. Hence, we expect to get inverse relationship with output growth.

Financial deepening measured by the ratio of M_2 to GDP essentially seek to capture the role of the financial sector development in economic growth. The conventional theory predicts a positive correlation between the level of financial deepening and economic growth. In modern economic theory, the role of the financial sector is seen to be catalytic to the growth of the economy. Also, the index of openness proxy by the ratio of the sum of imports plus export over GDP is expected to positively influence growth, all things being equal, the more open the economy the more access to foreign capital that is expected to increase investment and economic growth. Thus, the level of openness of the economy is expected to positively impact on economic growth.

Budget deficit is another significant variable influencing output growth rate. This variable is especially significant for most developing countries including the Liberia, where fiscal discipline plays very important role. In general, very high levels of Budget deficit may undermine economic growth. However, if the budget deficit is low, stable, and sustainable, it may be interpreted as an increased demand for goods and services. And if the economy is below its equilibrium on Keynesian cross, higher Budget deficit, that is increased government expenditures, should stimulate growth. Consequently, we expect to get positive relationship with output growth.

Based on the general framework provided and the foregoing variables identified, the linear growth equation is explicitly specified as follows:

$$GDPG_t = \alpha_0 + \alpha_1 INV_t + \alpha_2 Def_t + \alpha_3 inf_t + \alpha_4 int_t + \alpha_5 M2GDP_t + \alpha_6 Dept + \alpha_7 OPN_t + \alpha_8 Labt + U_t \ldots. \quad 16$$

Where, $\alpha_1, \alpha_2, \alpha_5, \alpha_6, \alpha_7, \alpha_8 > 0$ and $\alpha_3, \alpha_4 < 0$.

3.3. Specification of Threshold Autoregressive (TAR) Model

The TAR model specifies that individual observations can fall into discrete classes based on the value of an observed threshold variable (Lee and Wong, 2005). Following the framework of Li (2005), we specify the threshold model for the Liberia as follows:

$$GDPG_t = \alpha_0 + \alpha_1 GDP_{t-1} + \alpha_2 Def_t[DM_t(Def_t < K^*)] + \alpha_3 Def_t[DM_t(Def_t > K^*)] + \alpha_4 INV_t + \alpha_5 inf_t + \alpha_6 int_t + \alpha_7 M2GDP_t + \alpha_8 Dep_t + \alpha_9 OPN_t + \alpha_{10} Labt + U_t \quad \ldots\ldots\ldots 17$$

Where DM_t = Dummy variable with values 1 if $Def_t > K^*$ or 0 otherwise.

Def_t = Annual Budget deficit - GDP ratio.

K^* = The threshold level of Budget deficit/GDP which is to be calculated.

α_2 = The effect of Budget deficit below the threshold level.

α_3 = The effect of Budget deficit above the threshold level.

Other variables are as previously defined.

All the variables are as defined above. From the above equation, *a priori* expectations of a threshold effect of deficit on growth are that $\alpha_2 > 0, \alpha_3 < 0$. If threshold effect holds then the turning point can be calculated using the relation[2]:. $InDef_t = \frac{\alpha_2}{2\alpha_3}$.Taking the antilog of this will give optimal level of Budget deficit that will maximize real GDP growth.

3.4. Data Sources and Estimation Methodology

GDP growth data, gross capital formation as well as secondary school enrolment data were obtained from the World Bank's World Development Indicators; Budget deficit data were obtained from the Ministries of Finance of Liberia. Imports, Exports, Interest rates, exchange rate, and broad money growth data were sourced from the central banks of Liberia, while inflation rates were obtained from the Bureau of Statics of Liberia. All variables are measured either in growth rate terms or as ratios.

Different models specified are estimated using different appropriate econometric techniques. For the linear growth model, the study employs the Classical Ordinary Least Squares Technique (OLS) as suggested by Li (2005). For the non-linear model, the study uses the non-Linear Least Square (NLLS) method as suggested by Khan *et al*. (2001). As explained by Khan *et*

[2] $\frac{\partial GDP}{\partial Def} = \alpha_2 + 2\alpha_3 Def = 0;\ Def = \frac{\alpha_2}{2\alpha_3} = \frac{\alpha_2}{2\alpha_3}, when\ \alpha_2 > 0, \alpha_3 < 0$

al. (2001), the method involves the following procedures: for any K*, the model is estimated by OLS, yielding the Residual Sum of Squares (RSS) as a function of K*. The least square estimate is found by selecting the value of K* that minimizes the sum of squared residuals. However, for completeness, we specify an alternative threshold model in the spirit of Pollin and Zhu (2006). An extensive and systematic analysis of the data was carried out to ensure conformity with basic properties of the OLS estimate.

3.5. Diagnostic Tests for Optimal Level of Deficit

After identifying the threshold level for deficit, it is important to determine whether the threshold effect is statistically significant. In this regard, this study conducted Normality Test (J-Qtest); Serial Correlation **(**LM test**);** Heteroscedasticity **(**ARCH) and Stability **(**Cusum square).

4. Analysis of Results

4.1. Descriptive Statistics for all Variables

The distribution properties of the variables for the model indicate that most of the variables matched theoretical expectation (see Table 1). Budget deficit for example has a mean value of -9.01, median of -8.0, and small standard deviation (3.8735). The probability of 0.21 for the deficit indicates that it is somewhat normally distributed. Real GDP was normally distributed with a mean of 1.52, a median of 3.45 and standard deviation of 9.04. Deficit and real GDP are negatively skewed with values of 0.79 and 0.88, respectively.

	DEF	DEP	INF	INV	LENDR	M2GDP	OPEN	RGDPG
Mean	-9.013333	20.66370	38.90533	8.095667	27.00300	13.70367	43.71633	1.516000
Median	-8.000000	13.20778	23.78500	8.005000	23.85000	13.40500	44.57500	3.445000
Maximum	-2.700000	68.36544	178.7000	14.05000	62.83000	23.50000	62.42000	18.19000
Minimum	-18.50000	-5.335951	-3.290000	4.380000	11.00000	6.730000	20.08000	-24.79000
Std. Dev.	3.873494	20.83866	40.43692	2.278876	12.48440	4.494868	12.19699	9.040446
Skewness	-0.790402	0.768122	1.688768	0.662532	1.592458	0.224004	-0.361102	-0.882788
Kurtosis	2.969751	2.394349	5.940851	3.240352	4.777601	2.301027	2.233823	4.444223
Jarque-Bera	3.124818	3.408577	25.07044	2.266957	16.62944	0.861594	1.385757	6.503799
Probability	0.209630	0.181902	0.000004	0.321912	0.000245	0.649991	0.500134	0.038701
Sum	-270.4000	619.9110	1167.160	242.8700	810.0900	411.1100	1311.490	45.48000
Sum Sq. Dev.	435.1147	12593.25	47419.19	150.6049	4519.945	585.9113	4314.230	2370.160
Observations	30	30	30	30	30	30	30	30

Table 1: Liberia Descriptive Statistics of Variables
Source: Computed by the Author

4.2. Correlation Matrix

Table 2 contains the correlation matrix of the variables applied in this study for Liberia. The highest correlation (0.82) is between depreciation (DEP) and inflation (INF) followed by (0.53) between depreciation (DEP) and openness (OPEN). The correlation coefficient of (-0.32) was registered between our variable of interest; Budget deficit (DEF) and real GDP growth (RGDPG). The weakest correlation (0.05) is between Lending rate (LENDR) and Openness (OPEN).

	DEF	DEP	INF	INV	LENDR	M2GDP	OPEN	RGDPG
DEF	1.000000							
DEP	0.280094	1.000000						
INF	0.046791	0.816095	1.000000					
INV	-0.045454	0.082253	0.129272	1.000000				
LENDR	0.365897	0.363788	0.354014	-0.106119	1.000000			
M2GDP	-0.199544	-0.189971	-0.154222	0.185878	-0.541999	1.000000		
OPEN	-0.100664	-0.527376	-0.611965	-0.014122	0.055316	0.145558	1.000000	
RGDPG	-0.317035	-0.222309	-0.172233	0.088485	-0.348338	0.483112	0.303409	1.000000

Table 2: Liberia Correlation Matrix
Source: Computed by the Author

4.3. Unit Root Test Results

`Essentially, we implemented both the Augmented Dickey-Fuller (ADF) and the Phillip-Perron (PP) tests for stationarity of the variables used in this study. The results are presented below.

Variable	ADF-Statistic at Level	ADF-Statistic at 1st Difference	Conclusion
DEF	-2.967767**	-	I(0)
DEP	-3.580623**	-	I(0)
INF	-3.574244**	-	I(0)
INV	-4.309824*	-	I(0)
LENDR	-3.679322	-3.689194***	I(1)
M2GDP	-4.309824	-4.323979***	I(1)
OPEN	-3.612199**	-	I(0)
RGDPG	-1.952910**	-	I(0)

Table 3: Liberia ADF Unit Root Test Results
Source: Author's Computation
**** Significant at 1%, ** Significant at 5%, Significant at 10%*

The results of the unit root tests (ADF) show that all the variables except for (lending rate and broad money) passed the unit root test at conventional 10.0 percent level of significance in their levels. The two variables, however, passed the test for stationarity at 1st difference. The results obtained when the test for unit root was conducted using variables in their first difference form are also reported in Table 3.

Variable	PP-Statistic at Level	PP-Statistic at 1st Difference	Conclusion
DEF	-2.967767**	-	I(0)
DEP	-3.574244**	-	I(0)
INF	-3.574244**	-	I(0)
INV	-4.309824*	-	I(0)
LENDR	-3.679322	-3.689194***	I(1)
M2GDP	-4.309824	-4.323979***	I(1)
OPEN	-3.574244**	-	I(0)
RGDPG	-3.679322	-3.689194***	I(1)

Table 4: Liberia Phillip Perron Unit Root Test Results
Source: Author's Computation
**** Significant at 1%, ** Significant at 5%,* Significant at 10%*

Investment, deficit, depreciation, inflation, real GDP growth rate and openness variables were stationary at levels, while lending rate and broad money as a ratio of GDP were stationary at first difference. Similar results were recorded when we applied the Phillip Person (PP) to test for the existence of unit roots in the variables (see Table 4)

4.4. Analysis of Estimation Results for the Threshold Model

The estimation results, based on repeated estimation of the threshold model for the different values of expected threshold (K), are reported in Table 5. The first column labeled K, gives the range over which the search for the threshold is conducted. The dummy variable D_{1t} represents the effect of deficit below the chosen threshold (K) value while G_{2t} represents the effect of deficit above the threshold. Only the explanatory variables that are statistically significant are reported along with the deficit dummies to conserve space.

K	Variable	Coefficient	Std. Error	t-Statistic	Prob.	RSS	R^2
3%	D3*DEF	-0.602047	0.428548	1.404854	0.1854	344.43	0.672
	G3*DEF	5.292883	3.274741	-1.616275	0.1320		
	RGDPG(-1)	0.708356	0.169988	4.167100	0.0013		
	DEF(-1)	-1.203191	0.411766	-2.922025	0.0128		
	INF(-1)	-0.322624	0.094549	-3.412230	0.0052		
	DEP(-2)	0.415429	0.140323	2.960518	0.0119		
4%	D4*DEF	-0.751969	0.582630	1.290646	0.2211	441.58	0.58
	G4*DEF	1.097843	2.762660	0.397386	0.6981		
	RGDPG(-1)	0.760777	0.189887	4.006468	0.0017		
	DEF(-1)	-1.109921	0.482898	-2.298459	0.0403		
	INF(-1)	-0.296972	0.113235	-2.622618	0.0223		
	DEP(-2)	0.280969	0.136948	2.051640	0.0627		
5%	D5*DEF	-0.792895	0.543775	1.458131	0.1705	435.41	0.59
	G5*DEF	0.802732	1.397114	0.574565	0.5762		
	RGDPG(-1)	0.764401	0.188750	4.049803	0.0016		
	DEF(-1)	-1.095727	0.454929	-2.408564	0.0330		
	INF(-1)	-0.299040	0.107284	-2.787373	0.0164		
	DEP(-2)	0.300060	0.140444	2.136508	0.0539		
6%	D6*DEF	-0.767288	0.554049	1.384873	0.1913	18.44	0.97
	G6*DEF	1.011968	1.432758	0.706308	0.4935		
	DEF(-1)	-1.084967	0.460726	-2.354909	0.0364		
	INF(-1)	-0.298864	0.110744	-2.698685	0.0194		
	DEP(-2)	0.288530	0.138696	2.080310	0.0596		
7%	D7*DEF	-0.659884	0.147213	4.482513	0.0020	241.34	0.79
	G7*DEF	1.297777	0.368463	3.522136	0.0078		
	RGDPG(-1)	0.488093	0.062911	7.758452	0.0001		
	RGDPG(-2)	-0.498793	0.045134	-11.05142	0.0000		
	M2GDP	0.626480	0.302256	2.072681	0.0719		
	OPEN	0.529421	0.077886	6.797400	0.0001		
	DEF(-1)	-1.403013	0.092920	-15.09911	0.0000		
	DEP(-1)	0.325677	0.038391	8.483156	0.0000		
	LENDR(-1)	-0.555736	0.101483	-5.476157	0.0006		
	M2GDP(-1)	1.026591	0.343141	2.991743	0.0173		
	DEP(-2)	0.366352	0.024897	14.71447	0.0000		
	INV(-2)	1.524335	0.298344	5.109313	0.0009		
	LENDR(-2)	0.620096	0.078804	7.868791	0.0000		
	OPEN(-2)	-0.397831	0.060889	-6.533745	0.0002		
8%	D8*DEF	-1.035420	0.431111	2.401746	0.0334	312.57	0.70
	G8*DEF	-2.350726	0.841315	2.794109	0.0162		
	RGDPG(-1)	0.651814	0.166927	3.904793	0.0021		
	RGDPG(-2)	-0.378206	0.183597	-2.059983	0.0618		
	DEF(-1)	-0.846547	0.402757	-2.101882	0.0574		
	INF(-1)	-0.214100	0.095030	-2.252973	0.0438		
	DEP(-2)	0.286232	0.114812	2.493037	0.0283		
9%	D9*DEF	-0.955809	0.526315	1.816040	0.0944	408.22	0.61
	G9*DEF	-1.464029	0.888367	1.648000	0.1253		
	RGDPG(-1)	0.680385	0.199144	3.416552	0.0051		
	DEF(-1)	-1.127354	0.444850	-2.534235	0.0262		
	INF(-1)	-0.283542	0.101495	-2.793652	0.0162		

K	Variable	Coefficient	Std. Error	t-Statistic	Prob.	RSS	R^2
	DEP(-2)	0.313785	0.134829	2.327279	0.0383		
10%	D10*DEF	0.550323	0.396097	1.389364	0.1900	448.99	0.57
	G10*DEF	0.682364	0.649899	1.049954	0.3144		
	RGDPG(-1)	0.765364	0.197301	3.879178	0.0022		
	DEF(-1)	-1.014176	0.450761	-2.249922	0.0440		
	INF(-1)	-0.264260	0.101757	-2.596980	0.0234		
	DEP(-2)	0.242626	0.124311	1.951772	0.0747		

Table 5: Liberia Threshold Model Results[3]
Source: Computed by the Researcher

As shown in Table 5 the minimization of RSS occurs at the threshold point of 6.0 percent, where the RSS records the lowest value of 18.44. To further confirm the threshold effect, the adjusted R^2 from the estimation at 7.0 percent yields the highest value of 97.0 percent. A passing perusal of the Table 5 shows that the coefficient of deficit dummy at the threshold ($G_{2t)}$, carries positive sign indicating that above 6.0 percent, the effect of deficit on growth may be positive. Conversely, the coefficient of deficit dummy D_{1t}, representing effect of deficit below the threshold level possess negative sign, suggesting that, deficit level below 6.0 percent is detrimental to growth. Thus the threshold level of deficit for the Liberia is identified at 6.0 percent. It should be noted that the two parameters are statistically significant at 1.0 percent.

Table 6 presents another fascinating finding of this study. The effects of deficit, précised by the signs of the coefficients of the deficit dummies are generally positive. The coefficients of the deficit dummy G_{21t}, maintain positive values between 3 and 7.0 percent, indicating that deficit impacts positively on growth within the deficit range of 3 to 6.0 percent. The policy implication is that running a deficit beyond -6.0 percent will be detrimental to growth. Thus, the range 3.0 and 6.0 percent provides the arena for a menu of policy preferences on deficit levels that would be consistent with economic growth in Liberia.

	D_{1t} = Effect of Deficit below K		G_{2t} = Effect of Deficit above K	
K	Coefficient	Effect	Coefficient	Effect
3%	-0.602047	Negative	5.292883	Positive
4%	-0.751969	Negative	1.097843	Positive
5%	-0.792895	Negative	0.802732	Positive
6%	-0.767288	Negative	1.011968	Positive
7%	-0.659884	Negative	-1.297777	Negative
8%	-1.035420	Negative	-2.35	Negative
9%	-0.955809	Negative	-1.464029	Negative
10%	-0.550323	Negative	-0.682364	Negative

Table 6: Liberia Range of Budget Deficit Conducive for Growth
Source: Computed by the Researcher

4.5. Diagnostic Tests Results

Diagnostic tests were carried out for the 6 percent threshold model. Diagnostic results for the optimal level of deficit is depicted in Table 7.

Test Type	Statistic	Value	Probability	Remarks
Normality	Jarque Bera	3.722841	0.155452	Normally distributed residuals
Serial Correlation (LM)	F-statistic	3.163727	0.1235	No serial correlation
Heterescedasticity (ARCH)	F-statistic	0.675159	0.4190	No heteroscedasticity
Stability	Cusum Squares	Within Bands		Stable

Table 7: Liberia Diagnostic Test Results at 7 Percent Threshold
Source: Computed by the Researcher

The residuals for all the estimated equation was found to be normally distributed and stable. No serial correlation and heteroscedasticity were observed in the equation, implying that the estimates are reliable and accordingly, can be relied on for policy indication.

3 Due to the data generating process for Liberia, the threshold dummy for the Budget deficit at 1.0 and 2.0 percent yielded identical matrix thus Git were zero. Hence 1.0 and 2.0 percentages level were excluded

5. Summary, Conclusions, and Recommendations

This paper sought to identify the budget deficit threshold that is consistent with economic growth in Liberia. It is evident from the analysis that the threshold level of Budget deficit conducive for economic growth for Liberia was identified at 6.0 percent. Consequently, the level of Budget deficit beyond 6.0 percent is averse to economic growth in Liberia.

On the policy front, this paper has provided ample evidence in support of the proposition that Budget deficit beyond certain threshold is detrimental to growth. This suggests that the Liberian authorities should endeavour to reduce Budget deficits to 6.0 per cent (levels consistent with economic growth)

6. References

i. Adam, C. and D. L. Bevan (2002). "Fiscal deficits and Growth in DevelopingCountries", Department of Economics, University of Oxford.
ii. Ahmed, H. and S. M. Miller (2000). "Crowding-Out and Crowding-In Effects of the Components of Government Expenditure", Contemporary Economic Policy, Vol. 18, No. 1, pp. 124-133.
iii. Aisen, A., and D. Hauner (2008).'Budget Deficit and Interest Rates', IMF Working Papers, 42, 1- 21.
iv. Al-Khedair, S. I. (1996). 'The Impact of the Budget Deficit on Key Macroeconomic variables in the Major Industrial Countries'. Department of Economics Florida Atlantic University.
v. Anusic, Z. (1993). "Budget Deficit and Inflation: Croatia in the 1991 and 1992''Ekonomski Pregled, Zagreb, Vol. 7, No. 8
vi. Anyanwu, J. C. (1998), "Do Fiscal deficits Produce High Interest Rates?: The Caseof Nigeria, Ghana and the Gambia", CBN Economic and FinancialReview, Vol. 36 (1).
vii. Aschauer, D. A. (1989). 'Does public capital crowd out private capital' Journal of Monetary Economics, 25, 171–88.
viii. Bahmani, O. M. (1999), The Federal Budget Deficits Crowd-out or Crowd-inPrivate Investment. Journal of Policy Modeling, 21, 633-640.
ix. Ball, L., and N. G. Mankiw, (1995), 'What Do Budget Deficits Do?' Budget Deficits and Debt: Issues and Options. Kansas City: Federal Reserve Bank ofKansas City, PP 95-119
x. Barro, R. J. (1991), "Economic Growth in a Cross-Section of Countries", QuarterlyJournal of Economics, 106(2), pp. 407-443.
xi. Beaugrand, P. (2004), "How the Congo Decomposed in the 1990's", In The Africa Competitiveness Report, 2004, Ernesto Hernández-Catá, editor. World Economic Forum, Geneva, Switzerland.
xii. Bose, N., M. Haque and D. Osborn (2007). Public expenditure and economic Growth: A disaggregated analysis for developing countries. The Manchester School. 75(5) pp. 533-556
xiii. Chandrasekhar, C. P. (2000), "Economic Reform and the Budget," Bombay,Economic and Political Weekly, April 1140-1142.
xiv. Diamond, P. (1965), "National debt in a neoclassical growth model", American Economic Review, 55, 1126-1150.
xv. Easterly, W. and S. Rebelo, (1993), "Fiscal Policy and Economic Growth: AnEmpirical Investigation", Journal of Monetary Economics, 32, 417-458
xvi. Fischer, S. (1993), "The Role of Macroeconomic Factors in Growth", Journal of Monetary Economics, Vol.32.
xvii. Ghali, K. H. (1998), 'Public Investment and Private Capital Formation in a Vector Error Correction Model of Growth', Applied Economics 30, 837–844.
xviii. Giannaros, D., and B. Kolluri (1989). 'The Impact of Budget Deficits on Real Interest Rates: An International Empirical Investigation'. International Economic Journal, 3 (2), 17-25.
xix. Gulcan, Y. And M.E. Bilman (2005). "The Effects of Budget Deficit Reduction onExchange Rate: Evidence from Turkey" Discussion Paper No. 05/07, Dokuz Eylul University, Department of Economics.
xx. Hakkio, C. S. (1996). 'The Effects of Budget Deficit Reduction on the ExchangeRate'. Economic Review (Federal Reserve Bank of Kansas City) , 81, 21-38.
xxi. Huynh, N. D. (2007). 'Budget Deficit and Economic Growth in Developing Countries: The Case of Vietnam'. Kansai Institute for Social and Economic Research (KISER) .
xxii. Jenkins, C. (1997). "Economic Objectives, Public-Sector Deficits and Macroeconomic Stability in Zimbabwe", Working Paper Series, Centre for the Study of African Economies, University of Oxford. No. 97, Pp 1-61.
xxiii. Jhingan, M.L.(2002). 'The Economics of Development and Planning', New Delhi: Vrinda Publications Ltd
xxiv. Kormendi, H., and P.G. Meguire(1985). 'Macroeconomic determinants of growth: Cross-country evidence'. Journal of Monetary Economics. 16: 141-163.
xxv. Korsu, R. D. (2009), "Fiscal deficit and the Eternal Sector Performance of SierraLeone: A Simulation", West African Journal of Monetary and Economic Integration, Vol. 9 (1), pp. 51-73
xxvi. Krishnamurthy, K. (1984), "Inflation and Growth: A Model for India"', Indian Economic Review 19(1): 16-111.
xxvii. Kumur, R. and A. Soumya (2010). 'Fiscal Policy Issues for India after the Global Financial Crisis (2008-2010)', Asian Development Bank Institute Working Paper 249, Tokyo.
xxviii. Laubach, T. (2003), "New Evidence on the Interest Rate Effects of Budget deficits and Debt", Board of Governors of the Federal Reserve System, May

xxix. Loizides, J. and G. Vamvoukas (2005). 'Government Expenditure and Economic Growth: Evidence from Trivariate Causality Testing'. Journal of AppliedEconomics, viii (1),Allens University of Economics and Business.

xxx. Murty, K.N. and A. Soumya (2007). 'Effects of Public Investment on Growth and Poverty'. Economic and Political Weekly, XLII (1).

xxxi. Nelson, M. A. and R. D. Singh (1994), "The Deficit-Growth Connection: Some Recent Evidence from Developing Countries", Economic Development and Cultural Change, Vol.42, pp.167-191.

xxxii. Nyong, M. O. and F. Odubekun (2002). 'The Macroeconomic Effects of Monetary Financing of Fiscal deficits in Nigeria', West Africa Journal of Monetary and Economic Integration, Vol.2 No. 2.

xxxiii. Obi, B. and A. Nurudeen (2009), "Do Fiscal deficits Raise Interest Rates inNigeria? A Vector Auto- regression Approach" Journal of Applied Quantitative Methods, Vol. 4, (3) Fall

xxxiv. Olaniyan, O. (2000). "The effects of Economic Instability on AggregateInvestment in Nigeria". The Nigerian Journal of Economic and Social Studies, Vol 42, No. 1 pages 23 - 36.

xxxv. Olawunmi, O. and A. Tajudeen (2007)."Fiscal Policy and Nigerian EconomicGrowth", Journal of Research in National Development, 5(2).

xxxvi. Olowononi, G. (2006). 'The Effect of Fiscal deficits on the Nigerian Economy',Journal of Economic and Social Research, Makurdi, Nigeria

xxxvii. Onwioduokit, E. A. (1996), "Budget deficit and Inflation Dynamics in Nigeria:Empirical Re- Examination", CBN Fiscal Economic and Financial Review. Vol. 43 (2)

xxxviii. Onwioduokit, E.A. (2005), "Fiscal deficit, Inflation and Output Growth in Nigeria: A Vector Error Correction Model Approach" Journal of Economics and Financial Studies, Vol. 2(1)

xxxix. Onwioduokit, E. A. and N. Apo (2006), 'Inflation and Financial Depth in Nigeria: A Threshold Regression Approach', West African Journal of Monetary and Economic Integration, 6(2):1-14.

xl. Saleh, S. A. (2003). 'The Budget Deficit and Economic Performance'; University Wollongong Economics Working Paper Series, 12, 1-55.

xli. Sill, K. (2005). 'Do Budget Deficits Cause Inflation?' Business Review, 26-33.

xlii. Snowdon B, and H.R.Vane (2005). Modern macroeconomics: Its origins,development and current state. Northampton: Edward Elgar.

xliii. Vit, K. (2004). ' The Possibilities of Budget Deficit Financing. Ministry of Finance of the Czech Republic, 44, 1-17.

xliv. World Bank . (2005). 'Reaching the Poor: What Works, What Doesn't ', World Bank, Washington D.C.

xlv. Guseh, James (2000) "Government Size and Economic Growth: The Case of Liberia," African Social Science Review: Vol. 1: Iss. 1, Article 3