

American Journal of Humanities and Social Sciences Research (AJHSSR)

e-ISSN :2378-703X

Volume-02, Issue-06, pp-68-78

[www.ajhssr.com](http://www.ajhssr.com)

Research Paper

Open Access

## Budget Deficit and Economic Growth in Liberia: An Empirical Investigation

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**ABSTRACT:** This paper investigates the relationship between budget deficits and economic growth in Liberia. The study employed: the Classical Ordinary Least Squares Technique (OLS); The Augmented Dickey Fuller (ADF) and Phillip Perron unit root tests for stationarity; the Co-integration test using Engle-Granger Two-Step procedure (EGTS); and a parsimonious Error Correction Model of the relationship between Budget deficit and economic growth in Liberia. It is evident from the analysis that there exists a long run relationship between Budget deficit and economic growth in Liberia. There also exists a positive and significant relationship between Budget deficit and economic growth in Liberia. Therefore, a 1.0 percent increase in deficits will result in an increase of approximately 0.42 percent in economic growth in Liberia. The study recommends that government, policy makers and the monetary authorities should ensure an appropriate mix of monetary and fiscal policies such that would deliberately and strategically maximize the growth potentials of deficits in Liberia.

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

**KEYWORDS:** Budget Deficit, Economic Growth, Cointegration, Liberia

### I. INTRODUCTION

The consequence of budget deficit on economic growth is one of the fiercely contested themes in economics. The effect of fiscal deficit on output growth has been immensely debated in the past four decades. Achieving sustainable economic growth and macroeconomic stability is the reverie of several developed, developing, and underdeveloped economies. Governments in the global economy deploy diverse policies, plans and programmes to achieve macroeconomic stability in their respective countries. Fiscal Policy is one of the main drivers for the attainment of this laudable objective. Fiscal deficit is essentially the difference between government revenue and expenditure (including government expenditure and investment). Unpredictable deficits, regardless of the mode of financing, are assumed to be growth retarding. For instance, deficits financed through arrears is synonymous to imposition of unexpected and illegal tax on its local creditors by the government. This will lead to unexpected reduction in the profitability of indigenous investors, dimple relationship between the private and the public sectors, or perhaps create a crisis of confidence and thus dampen private initiative. Even when the accumulation is limited to domestic arrears, the damage done to the profitability of national endeavors could be enormous and the country's credibility could be systematically eroded.

With respect to deficit financed through monetary expansion which amounts to imposition of an inflation tax, the real value of private claims on the government could be battered. Beaugrand (2004) noted that the negative effects on economic activities and social peace of continued attempts to impose the inflation tax will precipitate uncertainty in real interest and real exchange rates. The external financing option of deficits through the issue of foreign liabilities or accumulation of external arrears, could through the market perception of the risk of future debt-servicing difficulties, push up the country's risk premium, raising the country's cost of borrowing in international financial markets. Clearly, the concern about crowding out is closely related to the concept of inter-generational equity. Indeed, there is no consensus among economists on this issue either theoretically or empirically. The received wisdom is that high budget deficit is a source of macroeconomic instability. However, the empirics seem not to have conclusively supported this traditional perception as findings from various studies are varied and contentious across countries, data, and methodologies ((Fisher, 1993); Nelson and Singh, (1994); Ghura and Hadjimichael, (1996); Kneller et al., (2000) and Onwioduokit (2012)). These conflicting results have raised the vital interrogation of heterogeneity and underscores the usefulness of country specific studies as against cross-country studies, to address heterogeneity.

On the other hand, one strand of the argument, following Keynes, is that high budget deficits accelerate capital accumulation and growth (Krishnamurthy 1984, Chandrasekhar 2000, and Shetty 2001). The claim here is that enlarged budget deficit arising from public sector investment, particularly in infrastructure, boosts growth in the private sector. Increasing public investment within an appropriate policy framework, gives the private sector adequate equanimity and incentives to invest, leading to overall economic growth.

What is the relationship between budget deficits and economic growth in Liberia? Do high budget deficits induce or retard growth in the Liberian economy? Is high budget deficit a source of macroeconomic instability in Liberia? Thus, the key objective of this paper is to investigate the relationship between budget deficits and economic growth in the Liberia. The remaining part of the paper is organized as follows: Section 2 reviews Theoretical and Empirical Literature while Section 3 contains the Research Methodology. The results are presented in Section 4 while Section 5 embodies the Summary, Conclusions and Recommendations.

## II. LITERATURE REVIEW

### 2.1 Theoretical Literature

By portrayal, a country faces a problem of budget deficit when government expenditures exceed its revenues. In other words, the level of public savings is negative. This situation may hamper the economic growth of a country. Economic growth can be defined as an increase in the level of production over time. It can be measured by looking at the increasing pattern of Gross Domestic Product (GDP) from time to time. Snowdon and Vane (2005) identified labour force, technology, capital, knowledge, natural resources among factors that may contribute to the economic growth.

Jhigan (2002) averred that the phrase deficit financing is used to connote any public expenditure that is more than current revenues. In industrialized countries, deficit financing is used to describe the financing of a deliberately created gap between public revenue and public expenditure or a budgetary deficit. The term deficit financing is used to denote the direct addition to gross national expenditure through budget deficits whether the deficits are on the revenue or capital account. The essence of such a policy lies in the government spending more than the revenue it receives in the form of taxes, earnings of state enterprises, loans from the public deposits and funds and other miscellaneous sources. Budget deficit basically refers to the excess of the public sector's spending over its revenue (World Bank, 2005).

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 Neoclassicals 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

Nyong and Odubekan (2002) using ordinary least squares estimation procedure, showed that monetary financing of deficits leads to an increase in the money supply which affects inflation. The increase in inflation generates instability in the macro economy and hence poor economic growth due to the negative signal it sends to the investors and savers. Saleh (2003) building on earlier studies on the impact of budget deficit on different economic variables, concluded that budget deficit has diverse impact on different economic variables. The range of impact varied from country to country but could not ascertain the true impact on the economic growth. He applied the IS-LM model to explore the impact of budget deficit on different variables, including, interest rate, using simultaneous equations model for trade deficit and used simple equation model in to assess its impact on the GDP. He reported a positive and significant relationship between budget deficits and economic growth.

Ozatay (2005) opined that budget deficits lead to instability in the economy through the expectations about how the deficits will be financed. If the private sector assumes that the government will monetize the deficit and therefore lead to inflation, these expectations will lead to inflation even though the authorities do not monetize the deficit. The real sector will suffer from the crowding-effect of budget deficits, leading to reduced output growth. This will put prices up, resulting in inflation. Gulcan and Bilman (2005) applied co-integration methodology and causality test to investigate the stationarity of the individual time series. The authors used data from Turkey over the period 1960 to 2003 and showed that there is a strong impact of budget deficit on the real exchange rate. The study also found that the budget balance plays a critical role in maintaining equilibrium real exchange rate. The authors suggested that budget deficit affects trade balance and the real exchange rates adversely.

Sill (2005) also adopted the methodology of Saleh (2003) but took sample of 94 countries and reported a positive relationship between the budget deficit and inflation. Loizides and Vamvoukas (2005) applied the trivariate causality test to examine the relationship between government spending and economic growth, applying Greece, United Kingdom, and Ireland data set. The study found that government expenditure granger causes economic growth in all the countries. The finding was true for Ireland and the United Kingdom both in the long and short-run. The results also indicated that economic growth granger causes budget deficit for Greece and United Kingdom, when inflation is included.

Olowononi (2006) showed that budget deficits had negative impacts on most macroeconomic variables. The results showed that budget deficits had increasingly caused inflation in Nigeria. Budget deficits were found to be negatively correlated with unemployment, meaning that the results confirmed the prescription of economic theory that rising budget deficits leads to reduced unemployment. It was also discovered that there is negative relationship between budget deficits and gross capital formation and private investment in Nigeria. Olawumi and Tajudeen (2007) examined the contribution of fiscal policy in the achievement of sustainable economic growth in Nigeria using the Solow growth model and reported that fiscal policy has not been effective in promoting sustainable economic growth in Nigeria. They attributed the poor performance of fiscal policy to the problems of policy inconsistencies, high level of corruption, wasteful spending, poor policy implementation and lack of feedback mechanism for implemented policies.

Murty and Soumya (2007) averred that deficit financing provides stimulus to economic growth by financing investment, employment, and output in the economy. When government resorts to deficit financing for development, large sums are invested in basic heavy industries with long gestation period and economic and social over heads. This leads to immediate rise in monetary incomes while production of consumption goods cannot be increased immediately with the results that prices go up. However, it helps rapid formation for economic growth and development. Kumar and Soumya (2010) studied the relationship between GDP growth and Budget deficits taken as percentage of GDP estimated a simple regression equation. The result yielded a negative correlation, though a weak one, between GDP growth and Budget deficit as a percentage of GDP. However, the long run relationship between Budget deficit and GDP, using the logarithm of both to avoid non-stationary problem, was surprisingly positive.

Obi and Nurudeen (2009) examined the effects of budget deficits and government debt on interest rates in Nigeria, by applying the Vector Auto-regression approach. The results of the estimation show that the explanatory variables account for approximately 73.6 percent variation in interest rate in Nigeria. The estimation also shows that Budget deficits and government debt are statistically significant. For instance, a 1 percentage increase in government debt-GDP ratio raises interest rate by approximately 2.47 percent. The results indicate that budget deficits and government debt have positive impact on interest rates, while inflation and international rate were found to have negative effect on interest rates. The authors concluded that deficits financing leads to huge debt stock and tends to crowd-out private sector investment, by reducing the access of investors to adequate funds, thereby raising interest (and/or lending) rates. The rise in interest rate reduces investment demand and output of goods and services. These in turn reduce national income as well as employment rate, and the overall welfare of the people would decline.

Korsu (2009) investigated the effects of budget deficit on the external sector of Sierra Leone. The study utilized aggregate annual data from 1971 to 2005. Equations for money supply, price level, real exchange rate and the overall balance of payments were estimated simultaneously, using Three Stage Least Squares (3SLS). Counterfactual policy simulation was then performed. The result shows that fiscal restraint improves the external sector of Liberia by reducing money supply and the price level. The result also points to the need for a sustained reduction in the budget deficit of Liberia as this helps in achieving monetary restraint and low-price level, which has real exchange rate depreciation and improvement in the balance of payments as ultimate external sector benefits.

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 *paripassu*, 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.

Most of the studies did investigate the relationship between budget deficit and economic growth from the perspective of cross countries. The common method used was panel data, to investigate the relationship between series by integrating time dimensions and various countries at a time. The results vary between various markedly. Some researchers found that the budget deficit does hampered economic growth, while others found the opposite. Apart from that, some researchers also found that there is no relationship between budget deficit and economic growth. However, studies, including Barro (1991), Ghali (1998), found support for a negative relationship between Budget deficit and economic growth. Another imperative that arises from the review is that the exact impact of deficits on economic growth is difficult to measure, thus, for any meaningful inference of policy relevance must be essentially a country specific study.

### III. RESEARCH METHODOLOGY

#### 3.1 Model Specification

In specifying the empirical model, the study relies on the theoretical framework which is the Keynesian framework and borrows heavily from Onwioduokit (2012). 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

$$Y_{it} = \text{GDPG}_t = \text{Growth rate of real GDP}$$

##### Independent variables

$$INV_t = \text{Gross fixed capital formation as a ratio of GDP as a proxy for growth in capital stock.}$$

$$Lab = \text{Secondary school enrolment as a proxy for labour force.}$$

$$Def_t = \text{FD/GDP} = \text{Budget deficit/GDP, excluding grants}$$

$$Inf_t = \text{Inflation rate}$$

$$Int_t = \text{Interest Rate} = \text{Lending Rate}$$

$$M_2GDP_t = \text{M}_2/\text{GDP ratio} - \text{measuring financial depth}$$

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

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

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:

$$GDGP_t = \alpha_0 + \alpha_1 INV_t + \alpha_2 Def_t + \alpha_3 inf_t + \alpha_4 int_t + \alpha_5 M2GDP_t + \alpha_6 Dept + \alpha_7 OPN_t + \alpha_8 Labt + U_t$$

**3.2 Data Sources and Estimation Techniques**

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 Bank of Liberia, while inflation rates were obtained from the Bureau of Statistics of Liberia. All variables are measured either in growth rate terms or as ratios.

Appropriate econometric techniques are employed in the study. For the linear growth model, the study employs the Classical Ordinary Least Squares Technique (OLS) as suggested by Li (2005). An extensive and systematic analysis of the data was carried out to ensure conformity with basic properties of the OLS estimate. The stationarity test using Augmented Dickey Fuller (ADF) and Phillip Perron unit root tests and the Co-integration test, using Engle-Granger Two-Step procedure (EGTS) were applied. The use of EGTS is informed by the large number of the explanatory variables and the fact that not all the series are integrated at order one to warrant the use of the Johansson Technique. The study also adopted a general- to –specific approach to estimate a parsimonious Error Correction Model of the relationship between Budget deficit and economic growth in Liberia.

**IV. 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.

**Table 1: Liberia Descriptive Statistics of Variables**

|              | DEF       | DEP       | INF       | INV      | LENDR    | M2       | OPEN      | RGDPG     |
|--------------|-----------|-----------|-----------|----------|----------|----------|-----------|-----------|
| Mean         | -9.013333 | 20.66370  | 38.90533  | 8.095667 | 27.00300 | 13.7     | 43.71633  | 1.516000  |
| Median       | -8.000000 | 13.20778  | 23.78500  | 8.005000 | 23.85000 | 13.2     | 44.57500  | 3.445000  |
| Maximum      | -2.700000 | 68.36544  | 178.7000  | 14.05000 | 62.83000 | 23.2     | 62.42000  | 18.19000  |
| Minimum      | -18.50000 | -5.335951 | -3.290000 | 4.380000 | 11.00000 | 6.72     | 20.08000  | -24.79000 |
| Std. Dev.    | 3.873494  | 20.83866  | 40.43692  | 2.278876 | 12.48440 | 4.45     | 12.19699  | 9.040446  |
| Skewness     | -0.790402 | 0.768122  | 1.688768  | 0.662532 | 1.592458 | 0.22     | -0.361102 | -0.882788 |
| Kurtosis     | 2.969751  | 2.394349  | 5.940851  | 3.240352 | 4.777601 | 2.30     | 2.233823  | 4.444223  |
| Jarque-Bera  | 3.124818  | 3.408577  | 25.07044  | 2.266957 | 16.62944 | 0.86     | 1.385757  | 6.503799  |
| Probability  | 0.209630  | 0.181902  | 0.000004  | 0.321912 | 0.000245 | 0.64     | 0.500134  | 0.038701  |
| Sum Sq. Dev. | 435.1147  | 12593.25  | 47419.19  | 150.6049 | 4519.945 | 585.9113 | 1311.490  | 45.48000  |
| Observations | 30        | 30        | 30        | 30       | 30       | 30       | 30        | 30        |

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).

**Table 2: Liberia Correlation Matrix**

|       | 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 |

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.

**Table 3: Liberia ADF Unit Root Test Results**

| VARIABLE | ADF-STATISTIC AT LEVEL | ADF-STATISTIC AT 1 <sup>ST</sup> 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)       |

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 1<sup>st</sup> 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.

**Table 4: Liberia Phillip Perron Unit Root Test Results**

| VARIABLE | PP-STATISTIC AT LEVEL | PP-STATISTIC AT 1 <sup>ST</sup> 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)       |

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 Co-integration Tests Analysis

**Table 5: Liberia Cointegration Test- Engel Granger First & Second Steps Results**

| Variable | Coefficient | Std. Error | t-Statistic | Prob.  |
|----------|-------------|------------|-------------|--------|
| M2GDP    | -1.505390   | 0.441110   | -3.412730   | 0.0020 |
| C        | 47.63236    | 6.351386   | 7.499522    | 0.0000 |

#### Engle-Granger Second Step Results Null Hypothesis: RESID01 has a unit root

|  |           | t-Statistic | Prob.* |
|--|-----------|-------------|--------|
| Augmented Dickey-Fuller test statistic |           | -2.745226   | 0.0078 |
| Test critical values:                  | 1% level  | -2.647120   |        |
|  | 5% level  | -1.952910   |        |
|  | 10% level | -1.610011   |        |

Source: Computed by the author

The ADF tests on the residuals at level (Table 5) confirm that the calculated ADF statistic (-2.745226) is greater (in absolute sense) than the tabulated critical value (-2.647120) at 1.0 percent level of significance. Thus, the null hypothesis of non-stationarity of the residuals is rejected. The apparent conclusion from these results is that the variables used in this study are co-integrated. That is, there is a stable long run relationship between them although there might be some deviations in the short run.

#### 4.5 Analysis of Estimation Results for Linear Growth Equation

The estimation of the Liberia model for this study adopted a general-to-specific modelling approach in the estimation process. This process imposes lag structures of all the variables in the cointegrated equation. Moreover, this technique makes it possible to deal with irrelevant variables rather than omitting relevant ones (Thomas 1993), using the Akaike information criterion<sup>1</sup>, the significance of the individual variable, and the adjusted R<sup>2</sup> as a guide. The results of the parsimonious deficit-growth model is presented in table 6.

The equation represents formulation of the hypothesis that the growth in real output in Liberia depends on the growth rate of Budget deficit as a ratio of GDP, real investment (INV<sub>t</sub>), money stock (M<sub>2</sub>) to GDP ratio (measure of financial depth), the lending rate (LENDR<sub>t</sub>), the rate of depreciation of the domestic currency vis-ad-vis the US dollar, rate of inflation (INF<sub>t</sub>) and the degree of openness of the economy (OPEN<sub>t</sub>).

**Table 6: Liberia Parsimonious Deficit -Growth Model Results**

| Variable  | Coefficient | Std. Error | t-Statistic | Prob.  |
|-----------|-------------|------------|-------------|--------|
| C         | -62.46934   | 6.862757   | -9.102659   | 0.0000 |
| RGDPG(-1) | 0.550824    | 0.071384   | 7.716319    | 0.0000 |
| RGDPG(-2) | -0.543803   | 0.080788   | -6.731273   | 0.0000 |
| DEF       | 0.422944    | 0.174054   | 2.429958    | 0.0317 |
| M2GDP     | 0.643761    | 0.370656   | 1.736816    | 0.1080 |
| OPEN      | 0.567258    | 0.088859   | 6.383796    | 0.0000 |
| DEF(-1)   | -1.410862   | 0.167858   | -8.405097   | 0.0000 |
| DEP(-1)   | 0.368336    | 0.060995   | 6.038776    | 0.0001 |
| INF(-1)   | -0.249240   | 0.037757   | -6.601189   | 0.0000 |
| INV(-1)   | 0.725454    | 0.294261   | 2.465346    | 0.0297 |
| LENDR(-1) | -0.444053   | 0.119092   | -3.728662   | 0.0029 |
| M2GDP(-1) | 1.172393    | 0.324739   | 3.610256    | 0.0036 |
| DEP(-2)   | 0.313234    | 0.048691   | 6.433134    | 0.0000 |
| INV(-2)   | 1.129017    | 0.305218   | 3.699045    | 0.0030 |
| LENDR(-2) | 0.467140    | 0.101230   | 4.614634    | 0.0006 |
| OPEN(-2)  | -0.311500   | 0.083891   | -3.713161   | 0.0030 |

<sup>1</sup> The AIC often is used in model selection for non-nested alternatives—smaller values of the AIC are preferred



|                    |           |                       |          |
|--------------------|-----------|-----------------------|----------|
| R-squared          | 0.976307  | Mean dependent var    | 1.380000 |
| Adjusted R-squared | 0.946690  | S.D. dependent var    | 9.352732 |
| S.E. of regression | 2.159450  | Akaike info criterion | 4.673143 |
| Sum squared resid  | 55.95869  | Schwarz criterion     | 5.434403 |
| Log likelihood     | -49.42401 | Hannan-Quinn criter.  | 4.905868 |
| F-statistic        | 32.96472  | Durbin-Watson stat    | 2.835661 |
| Prob(F-statistic)  | 0.000000  |                       |          |

The result shows that the impact of deficit, the variable of interest, on real growth rate is positive and significant at the 5.0 percent level. The coefficient of deficit suggests a positive effect on growth contemporaneously. This means that a 1.0 percent increase in deficits will result in an increase of approximately 0.42 percent in economic growth in the current year, but a reduction in growth of 1.41 percent with a year lag. This result is consistent with Onwioduokit (2005) who found a positive and significant relationship between deficit and growth in Nigeria, but inconsistent with the findings reported by Karras (1994), who concluded that deficits are negatively correlated, with the rate of growth of real output, and that increased deficits do appear to retard investment.

Depreciation in Liberia over the study period had a positive impact on growth with a lagged period of one to two year. The variable is significant at the 5.0 percent level. In order words, 1.0 percent change in the level of depreciation accounted 0.37 percent increase in the growth with one-year lag and 0.31 percent with two-year lag. The result implies that depreciation in a current year does not have any effect on growth, while it impacts growth positively with one to two years lag. The results confirm Karras, (1994) findings on the relationship between the variables. Inflation impacts growth negatively with a one-year lag and at 1.0 percent level of significance. Thus, a 1.0 percent increase in inflation will results in 0.25 percent reduction in growth rate. This is consistent with aprori expectations. The result is in line with the findings of Darrat (1985), who suggested that both monetary growth and government deficits significantly influence inflation. In addition, he concluded that government deficits bear a stronger and more reliable relationship to inflation than monetary growth. Also, Ahking and Miller (1985) concluded that government deficits appear to be inflationary.

The result suggests that money stock M2GDP is positively related with growth and that a 1.0 percent change in the level of money stock will lead to a 0.64 percent increase in output growth contemporaneously and 1.17 percent with one-year lag. This result is significant at 10 percent (current year) and 1.0 percent (with one-year lag). The outturn of the variable coefficient and significance is consistent with Onwioduokit and Apo (2006) on their studies on Nigeria. The variable *OPEN* used to proxy the impact of level of openness of the economy indicated a positive and significant relationship with growth over the period. The variable was statistically significant at 1.0 percent level. The result is consistent with theoretical expectations.

The results show that investment impact positively on growth with a lag of two years in line with theoretical expectations. A 1.0 percent increase in investment will increase output growth by 1.13 percent with a two-year lag. The result is statistically significant at the 1.0 percent level. The other variable in the model that was found to also be consistent with aprori expectations was the lending rate. The results also show that lending rate does have negative effect on growth in conformity to theoretical expectations. In Liberia, this variable was significant at 1.0 percent. Overall, the estimate illustrates that the coefficients of most of the explanatory variables have the expected signs. The value of adjusted  $R^2$  (0.946690) shows that most variations in output growth can be explained by the explanatory variables. In other words, about 94.67 percent of the changes in output growth can be explained by the parameter.

## V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This paper sought to investigate the nature of relationship between Budget deficits and economic growth in Liberia. The study employed: the Classical Ordinary Least Squares Technique (OLS); The Augmented Dickey Fuller (ADF) and Phillip Perron unit root tests for stationarity; the Co-integration test using Engle-Granger Two-Step procedure (EGTS); and a parsimonious Error Correction Model of the relationship between Budget deficit and economic growth in Liberia. It is evident from the analysis that there exists a long run relationship between Budget deficit and economic growth in Liberia. There also exists a positive and significant relationship between Budget deficit and economic growth in Liberia. Therefore, a 1.0 percent increase in deficits will result in an increase of approximately 0.42 percent in economic growth in the current year.

On the policy front, this paper has provided ample evidence in support of the proposition that Budget deficits have a positive relationship with economic growth in Liberia. However, it is absolutely imperative that government, policy makers and the monetary authorities ensure an appropriate mix of monetary and fiscal policies such that would deliberately and strategically maximize the growth potentials of deficits in Liberia. It is also pertinent to note that, depreciation as a policy measure should be applied by the authorities as the impact on the economy is positive, however, appropriate policy on both the fiscal and monetary front should be undertaken proactively to ensure that the real exchange rate of the local currency is properly aligned.

Furthermore, the Liberian authorities would need to adopt a mix of policy menu to ensure that inflation is not excessively high so that growth will not be retarded. The country should also pursue a transparent external policy that will attract foreign direct investment to augment the domestic savings so that growth could be augmented. The case for the availability and affordability of credit to the private sector should also be re-examined with a view to reducing the cost of credit to the economy to foster investment and growth.

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