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INTRODUCTION

The debt structure of a country affects individual citizens, institutions of government, privately owned corporate organizations like banks and consequently the economy at large. The debt structure in this context is the magnitude of the domestic debt as well as the magnitude of the external debt.

The issue of Nigeria's public debt became important in recent times especially prior to the period of the debt forgiveness because of its magnitude and the amount which was required to service such debts as well as its attendant possible effects on different operating sectors of the economy especially the banking sector and the growth of the economy at large. As at the month of July 2005, Nigeria external debt was US$34 billion of which about $28 billion or 85% was owed to the Paris club of fifteen creditor nations.

Apart from external debts, Nigeria's domestic debt as at 31st December, 2003 was N1.329 trillion and as at July 2006 it was N1.5 trillion as at July 2005 as reported by the debt management office. Nigeria's domestic debt is defined mainly as debt instruments by the federal government and denominated in local currency. It consists mainly of Nigerian Treasury Bills, Nigerian Treasury Certificates, Treasury Bonds, Federal Government Development Stocks, Ways and Means and recently considered are Contractor debts. According to Alison (2003), three reasons have been advanced for the growing government domestic debt. The first of this is that debt incurred from financing budget deficit. The second reason is debt arising from the implementation of monetary policy (the purchase and sale of treasury bills in the open market operations) and thirdly domestic debt incurred to develop the financial sector through the supply of tradable financial instruments so as to deepen financial markets.


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Abstract

This paper focuses on the impact of public debt on economic growth using Nigeria as a case study. An analysis of the long-run relationship and impact of debt from the perspective of the value impact and proportional impact was done. The value impact variables used herein include the external debt value, domestic debt value, total debt value and budget deficit figures. The proportional impact variables are ratios of the value impact to the gross domestic product (GDP). An augmented Cobb Douglas model was used and subsequently a dynamic version of the functional relationship was estimated using Co-integration technique to capture the long-run impact of debt variables on economic growth. The result showed that the joint impact of debt on economic growth is negative and quite significant in the long-run though in the short-run the impact of borrowed funds and coefficient of budget deficit is positive. In the study, the speed at which the short-run equation converges to equilibrium in the long-run as shown by the Error Correction Mechanism coefficient was found to be slow. The conclusion from this study is that though in the short-run the impact of borrowed fund on the Nigerian economy was positive, the impact of debt in the long-run depressed economic growth as a result of incompetent debt management.

Key words: Public debt; Economic growth; Empirical analysis; Nigeria

1) Government borrowed to finance emergencies such as natural disasters and economic depression.
2) Government borrowed to finance important capital projects such as water dams, agricultural development projects, river basin development projects.
3) Government borrowed to finance current expenditure in anticipation of reasonable revenue collection.

At a point in year 2003 it was estimated that Nigeria needed approximately US$3 billion yearly to fully service her external debt apart from her domestic debt and this is considered unthinkable to do as it will result in the economy getting almost grounded.

In Nigeria, the genesis of the present existing market for domestic government debt was the financial reforms introduced by the colonial government in 1958 which led to the creation of the Central Bank of Nigeria with the creation of marketable public securities to finance anticipated fiscal deficits. This is explicitly stated in the Central Bank of Nigeria ordinance 1958 thus: "The Bank shall be entrusted with the issue and management of federal government loans publicly issued in Nigeria, upon such terms and conditions as may be agreed between the federal government and the Bank. To the ordinary man, public debt evidenced in budget deficit might not make sense however different governments have used both budget deficit and budget surplus as a means of forestalling or spending as occasion demands. In Nigeria like so many developing countries especially between the period covered by this study including the structural adjustment years to date, the government has assumed an active role in the development of the economy in trying to put in place the infrastructure and institutional superstructure necessary for economic growth and development. This necessitated borrowing from different sources with the aim of putting the funds on various projects believed to have the ability of driving growth in which case they are supposed to be productive loans.

Also, over the years, the ever increasing Nigerian population has put some pressure on the government to spend more on public goods and merit goods. The contribution or provision of infrastructural facilities which is termed total factor productivity and often the responsibility of the nation state has made borrowing on the part of government also inevitable.

Since most of these infrastructures cannot be left in the hands of the private sector judging from the experience of other developing countries where this has been experimented, the public sector is then seen as the one better at handling issues of social overheads or infrastructural facilities.

Essentially, the argument for the public sector activity is that because of its ability to run systems assigned to it efficiently but that the social marginal gain derivable from state functions usually far exceeds their social marginal cost even if the ventures are run at a commercial loss.

This study is divided into five distinct sections as Introduction, Literature review and theoretical framework, methodology, estimation techniques and result analysis while the conclusion and forms the fifth section

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Many scholars in Africa and Nigeria have conducted researches into public debt and its impact on the economy of different countries. Lyola and lyare (1994) examined the causes of Africa's debt problems and Nigeria in particular and grouped them into four categories as:

(a) those arising from fundamental or structural causes
(b) those due to cyclical causes
(c) those arising from a hostile economic and political environment
(d) those due to inappropriate domestic policy

They affirmed that structural weakness in the typical African economy like Nigeria is a command economy in the sense of a monolithic administrative position in causing the debt problem because it made the economy extremely vulnerable to cyclical shocks such as oil price shocks, instability of primary commodity prices and declining terms of trade. Taking a good look at Nigeria's debt problem in the years considered in this study in relation to the existing theories of growth in literature like the Big Push Theory, The doctrine of balanced growth, Solow's growth model, Rostow's stages of economic growth, the new endogenous growth theory, some insights can be gotten into Nigeria's predicament.

Considering the amount needed to service Nigeria's debt as it relate to the big push theory it is obvious that Nigeria had a serious problem to contend with. The Big Push Theory hinges on the fact that a large comprehensive programme or project is needed in the form of high magnitude amount of investment to overcome the obstacles to development in an underdeveloped economy and to launch it on the path of steady progress. Consequently, resources have to be freed to achieve this. The scenario however is such that the debt overhang over the years did limit the amount of resources required to achieve enviably growth.

In Nigeria where budget deficit and financial gaps have existed between savings and investment, it becomes absolutely necessary to contract debt either from external sources or domestically when one considers the thinking of Rosenstein-Rodan who postulated the Big Push Theory of growth and development. The main thrust of this theory is that there is a minimum level of resources that must be devoted to a government development programme if it is to have any chance of success. This is more prevalent when one considers one of the indivisibilities and external economies articulated by Rosenstein-Rodan as necessary
inflation. The study also showed that budget deficits correlate highly with current account deficits implying that the external equilibrium is partly attributable to endogenous factors. This study looks at the impact of domestic and external debt service burdens both together and examines how they affect economic growth before the debt relief and their magnitude in relational terms.

**METHODLOGY**

In this study, an analysis of the long-run equilibrium relationship and impact of Nigeria's debt on economic growth was done from the perspective of national debt value-impact variables and the proportional impact variables. The value impact variable used herein includes the external debt value, domestic debt value, total debt value and budget deficit. The proportional impact variables are the ratios of the value impact variable to the gross domestic product. These include the external debt as a percentage of GDP, domestic debt as a percentage of GDP, total debt as a percentage of GDP. The economic growth for this study is proxied by the real growth rate. According to literature, public debt has been found to have both impact and incidence, the incidence is felt as the rate of servicing that thereby herein the debt service ratio is included as one of the impact variables.

**Model Specification and Estimation**

Following the objectives of this study, two models are specified. The first estimates the impact of debt variables on economic growth while the second model estimates the proportional impact of debt variables on the growth rate of the GDP and the isolated impact of debt service on economic growth. For the models, an augmented Cobb-Douglas model was used. However, in attempting to arrive at the most suitable functional model many models which have been used for similar studies were considered. For example the simultaneous equation model which was used by Mjema (1996) to analyze the impact of foreign debt on the economy of Tanzania was considered. The weakness of the model is that it used a two stage least square technique and the model was over identified. This might not sufficiently capture all the variables to be examined in this study.

Following Yekini (2002) the Cobb Douglas production function was considered as appropriate for this study. The model is thus specified as follows:

**Model 1**

\[
\text{GDP} = \text{f(TEXD, DDB, TDB, DBF, U)} \text{ \hspace{1cm} (3.1)}
\]

where GDP = Gross Domestic Product

TEXD = Exports of Goods and Services

DDB = Domestic Debt Value

TDB = Total Debt Value

DBF = Budget Deficit

The model is specified in augmented Cobb-Douglas functional form as follows:

\[
\text{GDP} = \text{a} (\text{EXD}) + \text{b} (\text{DDB}) + \text{c} (\text{TDB}) + \text{d} (\text{DBF}) + \text{u}\hspace{1cm} (3.2)
\]

The augmented Cobb-Douglas model in equation (3.2) captures both the direct impact of the two types of debts on growth and their respective elasticity. The parameters a, b, c, and d are the elasticity coefficient of economic growth with respect to the individual debt variable. For easy estimation equation (3.2), the linear form is presented in equation (3.3). The estimated Cobb-Douglas model in equation (3.2) captures both the direct impact of the two types of debts on growth and their respective elasticity. The parameters a, b, c, and d are the elasticity coefficient of economic growth with respect to the individual debt variable. For easy estimation equation (3.2), the linear form is presented in equation (3.3).

\[
\text{GDP} = \text{a} (\text{EXD}) + \text{b} (\text{DDB}) + \text{c} (\text{TDB}) + \text{d} (\text{DBF}) + \text{u}\hspace{1cm} (3.3)
\]

The model differs from model 1 only in proportional measurement. While model 1 captures the impact in total value term, model 2 captures the proportional impact. This is specified as follows:

\[
\text{GDP} = \text{a} (\text{EXD}) + \text{b} (\text{DDB}) + \text{c} (\text{TDB}) + \text{d} (\text{DBF}) + \text{u}\hspace{1cm} (3.4)
\]

Where \( \text{GR GDP} \) = Growth rate of GDP

\( \text{EXP} = \) External Debt Percentage of GDP

\( \text{DBP} = \) Domestic Debt Percentage of GDP

\( \text{DBS} = \) Domestic Debt Service

\( \text{DBS} = \) Domestic Debt Service

\( \text{U} = \) Error Term

**Estimation Techniques**

A dynamic version of Equation (3.3) and (3.4) are estimated using the co-integration technique. This is so to capture the long run impact of the debt variables on economic growth. The co-integration technique is based primarily on Engle and Granger (1989) and Yoo (1987). It is called the 3 stage co-integration analysis. The first stage is to determine the level stationarity of the variable, by doing the levels of integration of the variables are determined. The essence of determining this is to avoid spurious regression which can arise if the variables do not actually exhibit a long run relationship with economic growth, but are forced to due to the interference of another variable, say time, the implication of stationarity and non-stationarity are discussed below.

**Time Series Properties of Variables**

A time series is said to be stationary, if it has a constant mean independent of time and constant variance independent of time. A non-stationary variable is one in which one or all of these conditions do not hold. A non-stationary variable may belong to the random walk, random walk with drift or a random walk. To ascertain this, the unit root test is conducted in model in equation (3.2) captures both the direct impact of the two types of debts on growth and their respective elasticity. The parameters a, b, c, and d are the elasticity coefficient of economic growth with respect to the individual debt variable. For easy estimation equation (3.2), the linear form is presented in equation (3.3).
The Philip Peron test is used to test for the presence of a unit root in a series. For example GDP = a0 + a1 GDPt-1 + et

By taking the first difference, we have

\[ \text{GDP}_t - \text{GDP}_{t-1} = a_0 + a_1 \text{GDP}_t - 1 + \epsilon_t \]

The null hypothesis is that the coefficient of GDP$_t-1$ is 0, which implies no unit root in the series. The alternative hypothesis is that the coefficient is greater than 0, indicating a unit root in the series.

**Error-Correction Mechanism (ECM)**

This is the third stage of the 3-stage Engle Granger co-integration analysis. The error-correction model is a short-run dynamic adjustment to the co-integration equation. If a long run equilibrium relationship exists among the variables, then the error correction model is applicable. The error correction model is given by

\[ \Delta y_t = c + \beta (y_{t-1} - \beta_1 x_{t-1} - \cdots - \beta_p x_{t-p}) + \eta_t \]

Where \( y_{t-1} - \beta_1 x_{t-1} - \cdots - \beta_p x_{t-p} \) is the long-run equilibrium relationship among the variables.

The static regression for the model of the impact of debt on economic growth is given by

\[ y_t = \alpha + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_p x_p + \epsilon_t \]

The PP test for the Unit root in Table 4.1 indicates that the non-stationary variables are RDP, EXD, DDB and TDF. The model is non-stationary at their levels and therefore integrated of order zero (I(0)). This means that there is no unit root in the series. The values of the ADF test are given by

<table>
<thead>
<tr>
<th>Variable</th>
<th>Critical Value (5%)</th>
<th>Critical Value (1%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>-2.859</td>
<td>-3.794</td>
</tr>
<tr>
<td>RGDPPG</td>
<td>-4.095</td>
<td>-3.729</td>
</tr>
<tr>
<td>EXD</td>
<td>-1.997</td>
<td>-3.705</td>
</tr>
<tr>
<td>DDB</td>
<td>5.8419</td>
<td>-3.682</td>
</tr>
<tr>
<td>TDB</td>
<td>3.3117</td>
<td>-3.682</td>
</tr>
<tr>
<td>DGDPP</td>
<td>-2.3719</td>
<td>-3.682</td>
</tr>
<tr>
<td>TGDPP</td>
<td>-1.7867</td>
<td>-3.682</td>
</tr>
<tr>
<td>BDF</td>
<td>-5.6623</td>
<td>-3.6752</td>
</tr>
<tr>
<td>EGS</td>
<td>-1.6621</td>
<td>-3.6656</td>
</tr>
</tbody>
</table>

The results in Table 4.2 confirm the stability of the variables. The critical values are given at 5% and 1% level of significance. The unit roots tests for stationarity, non-stationarity of variable are presented in Tables 4.3 and 4.4.

**Time Series Properties of Variables**

The Philip Peron (PP) test for unit root was conducted for all the time series variables used in the two models. The unit root test was first conducted at levels and then at first differences. The unit root regression assumes an intercept but not trend, that is a random walk with drift. The null hypothesis applicable here is that there is no unit root in all the variables, that the variables are stationary at their levels.

**Table 4.1 Philip Peron Unit Root Tests at Levels**

<table>
<thead>
<tr>
<th>Variable</th>
<th>PP statistics</th>
<th>Critical value (5%)</th>
<th>Critical value (1%)</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>-2.9956</td>
<td>-3.6752</td>
<td>Non Stationary at 5%</td>
<td></td>
</tr>
<tr>
<td>RGDPPG</td>
<td>-4.0952</td>
<td>-3.7294</td>
<td>Stationary at 1%</td>
<td></td>
</tr>
<tr>
<td>EXD</td>
<td>-1.9971</td>
<td>-3.7054</td>
<td>Stationary at 5%</td>
<td></td>
</tr>
<tr>
<td>DDB</td>
<td>5.8419</td>
<td>-3.6820</td>
<td>Stationary at 5%</td>
<td></td>
</tr>
<tr>
<td>TDB</td>
<td>3.3117</td>
<td>-3.6820</td>
<td>Stationary at 5%</td>
<td></td>
</tr>
<tr>
<td>DGDPP</td>
<td>-2.3719</td>
<td>-3.6820</td>
<td>Non Stationary</td>
<td></td>
</tr>
<tr>
<td>TGDPP</td>
<td>-1.7867</td>
<td>-3.6820</td>
<td>Non Stationary</td>
<td></td>
</tr>
<tr>
<td>BDF</td>
<td>-5.6623</td>
<td>-3.6752</td>
<td>Non Stationary</td>
<td></td>
</tr>
<tr>
<td>EGS</td>
<td>-1.6621</td>
<td>-3.6656</td>
<td>Non Stationary</td>
<td></td>
</tr>
</tbody>
</table>

The results in Table 4.2 confirm the non-stationary variables at levels are made stationary at first difference and therefore integrated of order one (I(1)). This also confirms that the persistence shock is not an infinite memory. The results in Tables 4.1 and 4.2 set the pace for the likelihood of co-integration among the variables. This is so as some of these variables are integrated of the same order therefore meeting the first order condition for co-integration. The results of the co-integration test for the two models are presented as follows:

**Table 4.2 Philip Peron Unit Root Test at First Difference**

<table>
<thead>
<tr>
<th>Variable</th>
<th>PP statistic</th>
<th>Critical value (5%)</th>
<th>Critical value (1%)</th>
<th>Order of integration</th>
</tr>
</thead>
<tbody>
<tr>
<td>DDBDPP</td>
<td>-4.8412</td>
<td>-2.9570</td>
<td>-3.6959</td>
<td>I(1)</td>
</tr>
<tr>
<td>TGDGDPP</td>
<td>-4.0163</td>
<td>-2.9570</td>
<td>-3.6959</td>
<td>I(1)</td>
</tr>
<tr>
<td>EGS</td>
<td>-5.1923</td>
<td>-2.9570</td>
<td>-3.6852</td>
<td>I(1)</td>
</tr>
</tbody>
</table>

Source: Computed from data.

The results in Table 4.2 confirm the non-stationary variables at levels are made stationary at first difference and therefore integrated of order one (I(1)). This also confirms that the persistence shock is not an infinite memory. The results in Tables 4.1 and 4.2 set the pace for the likelihood of co-integration among the variables. This is so as some of these variables are integrated of the same order therefore meeting the first order condition for co-integration. The results of the co-integration test for the two models are presented as follows:

**Table 4.3 Johansen's Co-Integration Test for Model 1**

The static regression for the model of the impact of debt variables on economic growth is presented in Table 4.3. The result however only shows the short run static relationship between economic growth (GDP) and the debt variables.

**Table 4.4 Results of Static Regression Analysis of Model 1**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Co-efficient</th>
<th>Std. err</th>
<th>E. statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-10590.71</td>
<td>66862.31</td>
<td>-0.15590</td>
<td>0.8792</td>
</tr>
<tr>
<td>EXD</td>
<td>19439.36</td>
<td>23907.35</td>
<td>0.811132</td>
<td>0.4257</td>
</tr>
<tr>
<td>DDB</td>
<td>32095.39</td>
<td>24180.34</td>
<td>0.327342</td>
<td>0.1993</td>
</tr>
<tr>
<td>TDD</td>
<td>12.38677</td>
<td>2.532813</td>
<td>4.890518</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

Source: Computed from data.

The result is Table 4.3 show that the budget deficit has significantly affected the economic growth (GDP) in the short run. The rest are not significant at the 5% level. The point impact of all the debt variables on economic growth is also significant as shown by the high R2 (0.95) and probability of the F-statistics. This implies that 95 percent of the changes in total variables in economic growth can be explained by changes in the debt variables that are external debt, domestic debt, total debt and budget deficit. The co-efficient of budget deficit (BDF) is positive in this short run signifying that budget deficit tends to decrease the economic growth in the short run.

The dynamic analysis of the result in Table 4.3 is presented in Table 4.4. This is the long run equilibrium relationship among the variables in the model.
The Johansen co-integration test in Table 4.4 is based on the Likelihood Ratio (trace statistics) test. The LR test requests the null hypothesis of no co-integration among the variables. The rejection of the null hypothesis up to r = 3 implies that there are at least 4 co-integration equations among the integrated variables at both 1% and 5% level of significance. This is because at r = 0, r < 1, r = 2, and r = 3, the trace statistics are greater than the critical values respectively at the 1% and 5% levels.

The normalized co-integration equation to GDP is presented in the Equation (4.1). It shows that both the external and domestic debt have negative impact on the economy in terms of borrowing but the debt in the light of budget financing improved the economy in terms of borrowing but the debt in the light external and domestic debt have negative impact on the present in the Equation (4.1). It shows that both the variables. The rejection of the null hypothesis up to r<3 implies that there are at least 4 co-integration equations of the GDP equation. The result shows that the short run Equation (4.1) converges to equilibrium relationship among the variables. The speed at which the short run is shown by the ECM Co-efficient. The estimate of the ECM co-efficient and highly significant indicating that the impact of the proportional debt ratios on the growth rate of the economy may not be felt immediately but debt and budget deficit has a negative impact on economic growth may not be felt immediately but could be devastating in the long run.

The dynamic analysis of the relationship in Table 4.6 is presented in Table 4.7, which is the ECM correction model presented in Table 4.8.

The Vector Error Correction Model for Model 1
The co-integration result equation of the Equation (4.1) implies that there exists a long run equilibrium relationship among the variables. The speed at which the short run Equation (4.1) converges to equilibrium the long run is shown by the ECM Co-efficient. The result shows that the co-efficient of ECM (-1) is -0.1426. It is properly signed and highly significant indicating that the adjustment is in the right direction to restore the long run relationship.

The result shown in Table 4.5 is the over parameterized form. That is the model is written in its auto regressive distributed lag (ADL) form. The estimate of the ECM Co-efficient shows that the speed of adjustment is quite slow. The estimate also shows that the total debt and budget deficit has a negative impact on growth in the long run, even though they meet the short run needs. This is so because the co-efficient of the ADL for TDB and BDF are all negatively signed. This also suggests that the burden of debt and deficit budget increases, its impacts is sustained beyond the year the money was borrowed.

The result in Table 4.8 is the over-parametrised VECM for model 2. The direction of the adjustment in the right direction to restore the equilibrium as the ECM is negative. (10.0484). But the adjustment is slow that is the magnitude of the ECM co-efficient. Also the result confirms the negative impact of the proportional debt ratio variables on the growth rate of GDP as most of the lagged variables are negative.

CONCLUSION
Borrowed money has a positive effect on growth in the short run but debt and budget deficit has a negative impact in the long run. The impact of huge debt on economic growth may not be immediate but could be devastating in the long run.

The whole in managing public debt, efforts must be made at ensuring fiscal sustainability with adequate consideration to ensuring that the debt profile does not exceed the discounted value of its future net revenue.

REFERENCES