BUDGET DEFICITS, EXTERNAL DEBT AND ECONOMIC GROWTH IN NIGERIA

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Abstract

The necessity for governments to borrow in order to finance a deficit budget has led to the development of external debt. This study examines how the use of budget deficits as an instrument of stabilization leads to the accumulation of external debt with the attending effects on growth in Nigeria between 1970 and 2003. By synthesizing a relationship between budget deficits and external debt the study shows the implications on economic growth of conducting a fiscal policy within the contexts of debt stabilization and debt sustainability. The results of the econometric analysis confirm the existence of the debt Laffer curve and the nonlinear effects of external debt on growth in Nigeria. The study concludes that if debt-financed budget deficits are operated in order to stabilize the debt ratio at the optimum sustainable level debt overhang problems would be avoided and the benefits of external borrowing would be maximized.

JEL classification:

Keywords: Debt Overhang, Debt Service Burden, Debt Sustainability, Debt Stabilization, External Debt, Optimal Debt Stock, Economic Growth, Nigeria.

1.Introduction

Modern fiscal thinking underscores the importance of deficit budgeting as a potent instrument of stabilization but modern fiscal practice demonstrates that the success of this instrument predicates on its judicious use by the government. The success of a stabilization policy instrument can be generally assessed by its ability to smoothen-out fluctuations that usually occur in the economy. Hence, the use of the alternative terminology *countercyclical fiscal policy* is not uncommon. Very few countries have been successful at adopting this policy, especially deficit budgeting, as remarked in Encyclopaedia (1998):

“Experience with countercyclical fiscal policy has been disappointing; in many cases, the lag between identifying the problem and fiscal response has been too long, with the result that a fiscal boost coincided with the next boom while a contraction might coincide with the next recession. Fiscal policies that were intended to be countercyclical could end up exacerbating the original problems”.

The prominent danger associated with a persistent use of deficit budgeting as a countercyclical instrument is the escalation of the debt stock of a country. High unstabilized debt can lead to vicious circles that make the conduct of fiscal policy extremely difficult because the government must issue more debt or run a surplus to pay the interest on the existing debt. This shows an undesirable mutual-reinforcing relationship between budget deficit and government debt, which unambiguously has serious implications on the growth of the economy if not properly checked. One of the greatest challenges that confronts Nigeria as a developing nation is the need to effectively coordinate its fiscal policy in the face of a rising external debt created by past budget deficits. A sizeable proportion of the country's annual budget sinks into this

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seemingly non-productive expenditure. The implication of this is the diversion of resources which were originally meant to promote the objectives of economic growth and development to debt servicing. The problem has deteriorated to the extent that the country seldom pays the full annual interest due on loan. Each year the deferred debt service earns additional interest that contributes to the astronomical growth of the outstanding debt.

The origin of the gloomy Nigeria debt situation can be traced back to the late 1970s when there was the need to finance the widening deficit gap created by profligate spending. This marked the beginning of the collapse of the oil boom era which was characterized by falling foreign exchange earnings and rising fiscal deficits and external borrowing. Nigeria's foreign debt quadrupled from \$9 billion in 1980 to \$36 billion in 1990. These debt obligations accumulated and crystallized into what is today known as the Paris Club debts, promissory note and par bonds. The Paris Club debt component, which was a mere \$5.39 billion in 1983, graduated to \$21.6 billion in 1999. The debt burden of Nigeria inevitably imposes constraints on its growth prospects. The burden of principal and interest repayments drains the nation's resources and curtails the possible expenditure of resources on other productive ventures. Attempts by the government to run either balanced budgets or further budget deficits by way of deferring debt service payments have compounded the problem. Deferred debt service earns additional interest payment that increases the burden of the original debt. Thus the nation's inability to meet all its debt services payments constitutes one of the reasons for the self-reinforcement of the debt problem. There is no contention that Nigeria's huge debt burden has serious implications for the economy. The servicing of the external debt has severely encroached on resources available for economic development, thus, exerting a powerful drag on growth prospects. While it is easy to identify the undesirable effects of a huge external debt on economic growth, a proper diagnosis of the problem from its root cause is necessary to avoid treating the symptoms and leaving out the underlying cause itself. The Nigerian government has continued to wander about in the debt conundrum by pursuing "fleeting" policies geared towards debt reduction or cancellation without taking recourse to a sound conduct of its fiscal policy. This is one of the major concerns of this study. This paper investigates the relationship between budget deficit and external debt as well as their implications on economic growth in Nigeria within the period 1970 to 2003. Section 2 reviews both theoretical and empirical studies on the nexus between deficit and debt. Furthermore, it investigates the dynamics of the effects of external debt burden on economic growth in Nigeria. Section 3 provides a framework for the methodology and empirical analysis in sections 4 and 5 respectively. Section 5 traces the factors alongside the budget deficit that are responsible for the evolution of the external debt burden of Nigeria and tries to identify, if possible, the sustainable level of external debt in Nigeria using a relevant debt sustainability indicator. Finally, section 6 attempts to proffer policy recommendations on how to effectively coordinate fiscal policy in order to stabilize external debt as well as foster economic growth in Nigeria.

2. Brief Review of Related Literature

2.1. Theoretical Review: The macroeconomic effects of budget deficits, their financing, and the ensuing debt dynamics as well as the implications on growth have not received sufficient attention in recent analyses of the Nigerian debt problem. The magnitude of budget deficit a country registers and the means of financing it determine the debt dynamics and the fiscal constraints the country will be subject to in the medium to long term. Deficits can be financed through money printing, internal and/or external borrowing and use of central bank's foreign

reserves. Each financing mechanism would involve different macroeconomic repercussions such as inflation, balance of payments crises and external debt crises. The option of foreign borrowing is usually favoured where a huge investment is required to meet the growth objectives of a nation. A very interesting cyclical interrelationship exists among budget deficits, external debt and economic growth. Budget deficits are used in periods of depression to stimulate growth. This is accompanied by the accumulation of external debt; the principal being used to finance the deficit and the compounding interests representing the cost of borrowing. Unless this debt is stabilized at a level below that which is considered optimum sustainable, it will grow and wipe off the initial growth benefits of the debt-financed deficit, and even probably more. This may drag the economy back into depression with graver effects. The body of theories that explain this cycle starts with one that analyzes the role of the government budget constraint in fiscal policy sustainability and debt stabilization; continues with theories that examine the relationship between external debt and growth; and ends with the concept of external debt sustainability. One interesting observation is that two compatible objectives can be abstracted from these theories: debt stabilization and debt sustainability. The relationship between them will be understood after a treatment of these theories.

Fiscal Policy Sustainability and Debt Stabilization: The government budget constraint is a relation among debt, deficits, government spending and taxes. It gives the evolution of government debt as a function of spending and taxes. One way of expressing the constraint is that the change in debt (the deficit) is equal to the primary deficit plus interest payments on the debt. The primary deficit is the difference between government spending on goods and services, G , and taxes net of transfers, T . The government budget constraint plays a crucial role in analyzing the sustainability of fiscal policy and debt stabilization because both focus on the change in debt which is given by the constraint. The magnitude of the fiscal deficits run by a country raises the question as to whether certain fiscal positions are sustainable or not. Formally, a fiscal position is defined as sustainable if the present value of future fiscal surpluses that would be generated under prospective fiscal policies is sufficient to cover the existing stock of net debt (Lebow, 2004). Less formally, because sustainability implies that the debt will not rise as a share of GDP indefinitely, policies that lead to constant debt ratios are often defined to be sustainable. The fiscal adjustment that leads the existing debt/GDP ratio to be maintained at current levels is by no means the optimal adjustment for a country to choose at any given moment. On one hand, countries with high debt ratios may believe that lower debt levels would be beneficial in promoting economic growth. Reducing the debt ratios would require fiscal adjustments in excess of those indicated by the sustainability indices. On the other hand, a country in recession may wish to employ stimulative fiscal policies that are unsustainable in the long run but that are nevertheless desirable on a short-term basis. In this second case, however, it remains important to recognize that fiscal adjustments must eventually be made, and that the longer adjustment is delayed the larger will be the adjustments that are eventually required to service the higher debt levels. Debt stabilization is another way of viewing this problem. It refers to the adoption of policy measures that will maintain a constant level of debt. Essentially, fiscal policies that lead to debt stabilization are sustainable. To avoid a further increase in debt in a particular year, the government must run a primary surplus equal to real interest payments on the existing debt. It must do so in following years as

well: Each year, the primary surplus must be sufficient to cover interest payments, and thus leave the debt level unchanged. The consequence of this is that past deficits culminate in higher debt (Blanchard, 1997). There is no contention that deficits have an important effect on activity. In the short run, larger deficits are likely to lead to higher demand and higher output. In the long run, however, higher debt lowers capital accumulation and thus lowers output. The fact that deficits have long-run adverse effects on capital accumulation and output does not imply that deficits should not be used for output stabilization. Rather, it implies that deficits during recessions should be offset by surpluses during booms, so as not to lead to a steady increase in debt. On the contrary, if the fiscal policy is not coordinated in order to stabilize debt at a level below that which is considered optimum sustainable, it will have depressing effects on growth. How this works would be understood in the next few sections. In the Annex we include a section on early perspectives on external debt and growth.

Debt Overhang Hypothesis: In the literature relating to the potential negative effect of a heavy external debt burden on growth, the dominant paradigm is the debt overhang hypothesis. This theory is based on the premise that if debt will exceed the country's repayment ability with some probability in the future, expected debt service is likely to be an increasing function of the country's output level. Thus some of the returns from investing in the domestic economy are effectively taxed away by existing foreign creditors and investment by domestic and new foreign investor is discouraged. Debt servicing, including interest payments and repayments, may also be a real linkage from an indebted country. It takes large benefit from the domestic economy to transfer to the foreign economy. Therefore, the country foregoes some spectacular multiplier-accelerator effects. This decreases the domestic country's ability to grow its economy and raise its dependence on foreign debt (Metwally and Tamaschke, 1994).

Debt Laffer Curve and debt sustainability. A very important deduction that can be made from the debt Laffer curve is that there is an optimal level of debt that a nation can sustain without having a debt overhang problem. This point is represented by the peak of the debt Laffer curve, in Annex 1, where it is also included a subsection which analyzes the conditions that surround the optimal level of debt stock, and the external debt sustainability.

2.2. Empirical Review. Several empirical studies have been carried out to show the effects of a debt-financed expansionary fiscal policy on output. While some focused only on the debt overhang effects of budget deficits, others took a broader view of analyzing the positive and negative effects of persistent expansionary fiscal policies. Perotti (1999) demonstrates that low levels of debt or deficit are likely to generate positive effects of public expenditure shocks, while high levels of public debt leads to negative effects. Similar results were obtained by Alfredo (2002) in a study that investigated the relationship among fiscal deficits, public debts, and economic growth in emerging markets. Giavazzi and Pagano (1990) studied the fiscal consolidations in Denmark and Ireland in the 1980s and showed that in these countries a drastic cut in public deficits led to a sharp increase in private consumption. The empirical studies that focus on the debt overhang effects of budget deficits try to analyse the nonlinear relationship between public spending and public debt with the growth rate of the economy. Borensztein (1990) provided a major and interesting attempt to test the debt overhang effect empirically. Using data for the Philippines, he found that the debt overhang hypothesis was largely valid. Specifically, he found that debt overhang had an adverse effect on private investment. The effect was strongest when private debt, rather than total debt, was used as a measure of debt overhang. Fairly similar results were obtained in another study carried out by

Alfredo and Francisco (2004). They explored the relationship between external debt and growth for a number of Latin American and Caribbean economies. The result of their study showed that lower total external debt levels were associated with higher growth rates, and that this negative relationship was driven by the incidence of public external debt levels, and not by private external debt levels.

Ndung'u (1998) examined the dynamic impact of external debt accumulation on private investment and growth in Africa. He argued that the external debt problem in Africa has led to an investment pause and has reduced growth performance substantially. To strengthen his argument, he used results from recent empirical work by Elbadawi, et al. (1997) to show the dynamics of the problem and how a country moves from one side of the Laffer curve to the other and the effects on investment and growth. Once a country gets onto the wrong side of the Laffer curve and does not reverse the trend, the accumulated effects further affect growth performance. In another study, Iyoha (1999) adopted a simulation approach to investigate the impact of external debt on economic growth in sub-Saharan African countries. An important finding in this study was the significance of debt overhang variables in the investment equation, suggesting that mounting external debt depresses investment through both a "disincentive" effect and a "crowding out" effect. Policy simulation was undertaken to investigate the impact of alternative debt stock reduction scenarios (debt reduction packages of 5%, 10%, 20% and 50%) on investment and economic growth. It was found that debt stock reduction would have significantly increased investment and growth performance. Audu (2004) investigated the impact of external debt on economic growth and public investment in Nigeria. The results confirmed the operation of crowding out and import compression hypotheses in Nigeria. This means that debt-servicing pressure in the country has had a significant adverse effect on the growth process.

In summary, these empirical studies for the most part confirm three main channels through which external debt could have effects on growth: the disincentive effect, the crowding out effect and the import compression effect. This is the aim of this study in the context of Nigeria. The difference between the present study and previous studies conducted for Nigeria is our adoption of the linear spline specification for its flexibility. This will be explained in section 4. However, the similarity is the presupposition of the debt overhang effect. Since Nigeria is an open economy predisposed to different exchanges (i.e. of factors, goods and services) with the global economy external debt could have effects on growth through these channels but to varying degrees.

4. Methodology and Data

4.1. Introduction. The debt overhang hypothesis has identified the various channels through which external debt could affect growth. These channels, namely, the disincentive effect, the crowding out effect and the import compression effect, impact on growth via a reduction in investment. This study tries to explain the debt dynamics of Nigeria and find out if a debt Laffer curve exists for Nigeria. The existence of a debt Laffer curve will validate the debt overhang hypothesis and also suggest the mechanisms through which debt affects growth. The basic regression equation that we use to uncover the relationship between external debt and economic growth is a linear spline. The linear spline specification is used as an approximation

to the quadratic nonlinear model, which is more representative of the debt Laffer curve. We adopt the linear spline because it is a more general test of nonlinearity than the quadratic model which seeks to find out only if a U-curve relationship exists between the variables. So, instead of having an inverted U-curve for a quadratic model, we would have an inverted V-curve or other possibilities for the spline function. The linear spline model has been used in different studies (See Pattillo et al., 2000; Alfredo and Francisco, 2004) to analyse the nonlinear relationship between public debt and economic growth.

4.2.Theoretical Framework. The theoretical basis for this study derives mainly from a model of certain macroeconomic aggregates, namely, investment, savings, government expenditure and taxation, on one hand and the debt overhang hypothesis on the other. The simple national income determination model provides a general macroeconomic framework to understand the need for external borrowing. The following equation gives the equilibrium condition in a three-sector economy consisting of the household, firm and the government¹:

$$I = S - (G - T)$$

where **I** denote investment; **S** private saving; **(G-T)** budget deficit (i.e. excess of government spending, **G** over tax, **T**). The equation shows that private saving goes toward either financing the budget deficit or financing investment. This implies that the higher the budget deficit the less the amount of private saving that goes to investment. Apart from private saving (i.e. borrowing internally), the government has other sources of finance for the budget deficit such as grants, foreign direct investment, foreign exchange reserves and foreign loans and credits. The first three sources are non-debt-creating flows. But if these are not available, the government resorts to foreign loans and credits. Generally, where there is dearth of private saving available for investment in the domestic economy the government usually finance the budget deficit by borrowing externally. According to Soludo (2001), the underlying logic of external borrowing entails three phases of the debt cycle as seen in Annex 2.

4.3. Model Specification. This study proceeds by first tracing the causes of the rising debt burden and then establishing the effects of external debt burden on economic growth. For the latter, the linear spline method is used to test for the effect of external debt on economic growth while for the former, a graphical analysis is employed. The econometric model expresses the real GDP in terms of the debt overhang variable and controls for a policy variable, openness, which affects growth in an open economy.

$$GDP = \alpha_1 + \alpha_2\psi + \alpha_3 (\psi - \psi^*) \partial + \alpha_4 OPEN + \mu$$

where GDP is the real Gross Domestic Product (measured at 1984 factor cost); ψ is the debt overhang variable (the standard debt indicator that will be used to estimate the debt overhang effect is the debt/GDP ratio); ψ^* denotes the threshold value of debt (this value is exogenously determined for the debt overhang variable by fitting scatter with a quadratic curve using the SPSS software package); ∂ is the dummy variable which takes the following values: $\partial = 1$ if $\psi > \psi^*$, $\partial = 0$ if $\psi < \psi^*$; OPEN is a policy indicator which measures the degree of openness of the economy (the degree of openness is measured as the ratio of trade volume to GDP); $\alpha_1, \alpha_2, \alpha_3, \alpha_4$ are the parameters to be estimated; and μ is the stochastic error term. Based on our

¹ This equation can derived by rearranging the following equation which shows that planned leakages is equal to planned injections in an economy: **S+T = I+G**

framework of argument, we expect $\alpha_1 > 0$, $\alpha_2 > 0$, $\alpha_3 < 0$, $\alpha_4 > 0$. Debt contributes positively to growth initially via ψ and negatively after the threshold value has been exceeded via $(\psi - \psi^*) \partial$. Openness on the other hand is expected to boost output. We have shown in the Annex 1 (see equation 11) factors that affect the change in the debt-to-GDP ratio or the debt burden as follows:

$$\Delta(D/Y) = f(\bar{i}, g_y, D_{t-1}/Y_{t-1}, D)$$

This equation implies that the increase in the debt ratio will be larger the higher the real interest rate $\bar{i}$, the lower the growth g_y , the higher the initial debt ratio D_{t-1}/Y_{t-1} , and the higher the ratio of the primary deficit to GDP D . The evolution of the debt-to-GDP ratio in Nigeria shall be studied with the aid of graphs by focusing on the trend of practically determinable explanatory variables such as the primary deficit-to-GDP ratio and the growth rate.

4.4. Data. This study uses annual time series data covering a period of 34 years, 1970 to 2003, and the sources include: the Federal Office of Statistics Publications, Statistical Bulletin of the Central Bank of Nigeria, Central Bank of Nigeria Annual Reports and Statement of Accounts and other published works. The debt-to-GDP ratio compares the total outstanding external debt with the income of a country at a particular time. It measures the country's ability to meet its future debt obligations on one hand and the burden of the debt on the other. The changes in the Nigerian debt-to-GDP ratio have been both positive and negative at different times indicating increasing and decreasing debt burden respectively, see figure 1(a) and 1(b). These variations can be explained using the framework developed in Annex 1 (see equation 11) i.e.

$$\Delta(D/Y) = f(\bar{i}, g_y, D_{t-1}/Y_{t-1}, D)$$

where $\Delta(D/Y)$ is the change in debt-to-GDP ratio or simply the change in the debt burden; $\bar{i}$ is the real interest rate on the debt; g_y denotes the growth rate of GDP; D_{t-1}/Y_{t-1} is the initial debt ratio; and D is the ratio of primary deficit to GDP.

From 1970 to 1981 the change in debt-to-GDP has been either very low or negative ranging from -1.17% to 2.47% in 1973 and 1978 respectively. Nigeria did not have any debt problem during this period. In 1982, the debt-to-GDP ratio rose sharply for the first time by 12.48%. This period was marked by a negative growth rate of -0.34% and a high deficit-to-GDP ratio of about 11.8%. This clearly shows positive but adverse deadweight and deficit effects on the debt burden. The debt-to-GDP ratio declined slowly after 1982 and again rose sharply by a greater magnitude of 36.83%. This year was also marked by a negative growth rate of -0.47% and a high deficit-to-GDP ratio of 5.4%. The subsequent decade, from 1988 to 1998, was a debt-problem-free period. It showed a generally decelerating, though fluctuating, debt-to-GDP ratio. The decade was that of a stable and positive growth rate. Although, the deficit-to-GDP ratio was high, there are possible explanations for the negative changes in the debt-to-GDP ratio. The deadweight effect may be higher than the deficit effect implying a net negative change in debt-to-GDP ratio. This could be due to the fact that the stable and positive growth rate exceeds the real interest rate, and the debt-to-GDP ratios in the previous years are generally high. A year worthy of attention in this decade was 1995 when the debt-to-GDP plunged by the largest amount, 34.65%. The negative deficit-to-GDP ratio of -0.1% showed clearly that there was a budget surplus and thus a negative and favourable deficit effect. Although, the growth rate was positive, 2.44%, there strong tendencies that the real interest rate exceeded it. In 1999, the debt-to-GDP ratio accelerated faster than ever before by 57.81%.

This was the year of the greatest increase in debt burden on the economy in the history of Nigeria from 1970 to 2003. The deficit-to-GDP ratio reached another peak of 8.4% this year, though the growth rate was positive at 2.82%. See figures 1(a) and 1(b) at the Annex.

Table 1: Evolution of the Nigerian Debt-to-GDP Ratio

Year	Change in Debt/GDP (%)	Deficit GDP (%)	Growth Rate of GDP (%)	Year	Change in Debt/GDP (%)	Deficit GDP (%)	Growth Rate of GDP (%)
1970	1.5378	8.7	7.68	1987	36.828	5.4	-0.47
1971	-0.6455	-2.6	21.35	1988	-0.4115	8.4	9.91
1972	0.968	0.8	5.48	1989	14.1758	6.7	7.39
1973	-1.1652	-1.5	6.42	1990	7.7363	8.5	8.2
1974	-0.7575	-9.8	11.74	1991	-13.3612	11	4.73
1975	-0.0923	2	-2.96	1992	-2.45	7.2	2.98
1976	-0.2643	4	11.08	1993	-8.4409	15.5	2.65
1977	-0.247	2.4	8.15	1994	-20.3342	7.7	1.02
1978	2.4668	7.8	-7.36	1995	-34.6508	-0.1	2.44
1979	0.2166	-3.4	2.44	1996	-14.0357	-1.6	3.4
1980	-0.0804	-3.9	5.48	1997	-1.5057	0.2	3.16
1981	0.859	7.7	-26.81	1998	1.8679	4.7	2.31
1982	12.4814	11.8	-0.34	1999	57.8147	8.4	2.82
1983	1.5509	5.9	-5.37	2000	-16.7365	2.9	3.87
1984	4.8509	4.2	-5.1	2001	-6.6888	4.1	4.21
1985	0.7379	4.2	9.38	2002	8.7383	4.8	3.26
1986	33.229	11.3	3.13	2003	4.2984	3.3	5.12

Source: CBN Statistical Bulletin, 2003

The deficit effect was clearly negative and adverse but we cannot be very certain about the nature of the deadweight effect. One reason could be alluded for the high negative change in the debt-to-GDP ratio: the growth rate may be less than the real interest rate thus implying a negative and adverse deadweight effect also. Once more the debt-to-GDP ratio declined in 2000 and 2001 by 16.74% and 6.69% with higher growth rates of 3.87% and 4.21% and lower deficit-to-GDP ratios of 2.9% and 4.1% respectively. Finally, the debt burden increased in both 2002 and 2003 by 8.74% and 4.3% respectively. Part of these increases was due to the positive and adverse deficit effects indicated by the deficit-to-GDP ratios of 4.8% and 3.3%. The other part might have been due to the excess of the real interest rate over the growth rate implying a positive and adverse deadweight effect. The foregoing analysis of the evolution of the Nigeria debt-to-GDP ratio identifies three factors that explain the dynamics of the debt-to-GDP ratio or the reasons for the changes in the debt burden: the differential between the real interest rate on debt and the growth rate of GDP, the debt-to-GDP ratio in the previous year and the primary deficit-to-GDP ratio. This answers the first research question, (a), posed in this study.

5. Estimation

The Threshold Value of Debt ψ^* . The use of a linear spline equation requires first the specification of the threshold value which marks the break in the relationship between the explained and the explanatory variables. Depending on the nature of the model used the threshold value is exogenously given or sometimes estimated using either a methodical or a

judgmental approach. In the present study the threshold value is the optimal level of external debt beyond which the debt overhang exists. We shall estimate this value by fitting the scatter of the GDP vs. debt overhang variable with a quadratic curve and identifying the maximum point. This is done with the aid of the SPSS software package. The graph is displayed in Figure 3 and the threshold value of debt is about 60%. In the Annex 3 we present values of Gdp, ψ , and Open for the period 1970-2003.

Figure 3: **Estimation of the Threshold Value of Debt – Curve Fit**

Estimation and Analysis of the model. Given the threshold value of debt, the parameters in the econometric model can now be estimated using the EViews software package. The results of the “unadjusted” Ordinary Least Square estimation are presented below in table 2(a). These results could however be spurious if the variables are nonstationary. The approach we adopt is to analyze the results of the preliminary linear spline estimation and carry out further tests to confirm the validity of these results. The further tests that would be carried out are the Dickey Fuller test of stationarity and the Johansen cointegration test. Recall that:

$$GDP = \alpha_1 + \alpha_2\psi + \alpha_3(\psi - \psi^*) + \alpha_4OPEN + \mu$$

T-Test:- Decision Rule: If p-value (probability) of t-statistic is lower than .05 reject then null hypothesis that the variable is statistically insignificant at 5% level. From table 2(a), the t-statistics show that all the variables including the intercept are significant at 5% level i.e. $\alpha_1 \neq 0$, $\alpha_2 \neq 0$, $\alpha_3 \neq 0$, $\alpha_4 \neq 0$

F-Test:- Decision Rule: If p-value (probability) of F-statistic is lower than .05 reject then null hypothesis that all the variables are statistically insignificant at 5% level. The result shows that all the variables including the intercept are significant at 5% level i.e. $\alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq 0$

Adjusted R-Squared:- The adjusted R^2 value shows that 73.14% of changes in GDP are explained in the model. The remaining 26.86% is due to exogenous factors not considered in the model or not related with the included explanatory variables.

Durbin-Watson Statistic:- The DW statistic, 1.18649, indicates the presence of positive autocorrelation. This reduces the efficiency of the estimated parameters. We therefore take account of the presence of autocorrelation in our estimation by assuming the errors are

generated by a moving average process of order two, MA(2). This takes the following form: $\mu_t = \varepsilon_t + \theta_1 \varepsilon_{t-1} + \theta_2 \varepsilon_{t-2}$. The assumption of an MA(2) was made after comparison with other error specifications using the EViews software. The results of estimation in the presence of autocorrelation are given in table 2(b). A comparison of the test of significance under the assumption of no autocorrelation and autocorrelation respectively shows that there is no difference between the conclusions to be drawn. The differences between the two estimations are the adjusted R^2 value and the Durbin-Watson statistic. The new adjusted R^2 value shows that 81.47% of changes in GDP are explained in the model. The new DW statistic shows that the autocorrelation has been removed by the moving average error specification.

Table 2(a): Preliminary Linear Spline Regression Estimates

Table 2(b): Linear Spline Regression Estimates Allowing for Autocorrelation

Dependent Variable: GDP					Dependent Variable: GDP				
Method: Least Squares. Sample: 1970 2003					Method: Least Squares. Sample: 1970 2003				
Variable	Coefficient	Std. Error	t-Stat	Prob.	Variable	Coefficient	Std. Error	t-Stat	Prob.
Constant	39161.1	5978.71	6.55	0	Constant	63942.3	8333.3	7.67	0
ψ	405.47	106.4	3.80	0.0006	ψ	390.1	142.5	2.73	0.0106
$(\psi - \psi^*)$ ∂	-938.94	237.2	-3.95	0.0004	$(\psi - \psi^*)$ ∂	-779.9	287.9	-2.70	0.0114
OPEN	91280.7	12716.2	7.17	0	OPEN	40078.5	12449	3.21	0.0032
					MA(1)	0.8981	0.1700	5.28	0
					MA(2)	0.3824	0.1716	2.22	0.0341
R-squared	0.7558	F-stat=30.95		0	R-squared	0.8427	F-stat=30.0194		0
Adjusted R^2	0.7314	DW = 1.1864			Adjusted R^2	0.8147	DW = 1.8791		0
					Inverted Roots	-.45 -.43i	-.45+.43i		

Stationarity and Cointegration Tests: It was mentioned earlier in this section that the results of the preliminary linear spline estimation might be spurious if the variables were nonstationary. This subsection carries out a unit root test of stationarity for each of the variables adopting the Dickey-Fuller specification. The decision criterion for rejection of the hypothesis of a unit root, and acceptance of stationarity, is that the ADF test statistic calculated, ADF_{calc} , must be lower than the critical value of the ADF, ADF_{cri} .

The test procedure indicates that all the variables are nonstationary at the levels while they are stationary at the first difference levels. In other words the variables all exhibit unit roots. Table 3 displays the results of the Dickey-Fuller unit root test of stationarity using the EViews software package. Since all the variables are found to be stationary in their first differences (i.e. they exhibit unit roots), we proceed further to carry out a cointegration test using the method suggested by Johansen (1995).

Table 3: Unit Root Test of Stationarity for the Variables

Variable	Stage	ADF test statistic	Critical Value 5%	Critical Value 1%	Conclusion
GDP	Level	-0.3283	-2.9527	-3.6422	Nonstationary
GDP	First Difference	-5.4905	-2.9558	-3.6496	Stationary
ψ	Level	-1.2646	-2.9527	-3.6422	Nonstationary
ψ	First Difference	-4.4264	-2.9558	-3.6496	Stationary
$(\psi - \psi^*) \partial$	Level	-1.6936	-2.9527	-3.6422	Nonstationary
$(\psi - \psi^*) \partial$	First Difference	-5.1787	-2.9558	-3.6496	Stationary
OPEN	Level	-2.1417	-2.9527	-3.6422	Nonstationary
OPEN	First Difference	-8.1914	-2.9558	-3.6496	Stationary

Table 4: Johansen Cointegration Test

Sample: 1970 2003. Included observations 33. Lags interval: No lags				
Test assumption: Linear deterministic trend in the data				
Series: GDP ψ $(\psi - \psi^*) \partial$ OPEN				
	Likelihood	5 Percent	1 Percent	Hypothesized
Eigenvalue	Ratio	Critical Value	Critical Value	No. of CE(s)
0.538353	37.00820	47.21	54.46	None
0.202298	11.50073	29.68	35.65	At most 1
0.104981	4.042056	15.41	20.04	At most 2
0.011509	0.382001	3.76	6.65	At most 3
*(**) denotes rejection of the hypothesis at 5%(1%) significance level				
L.R. rejects any cointegration at 5% significance level				
Unnormalized Cointegrating Coefficients:				
GDP	ψ	$(\psi - \psi^*) \partial$	OPEN	
-1.19E-05	0.000772	-0.004471	1.872248	
9.57E-06	-0.009279	0.024221	-0.334302	
-4.27E-06	0.006942	-0.005999	0.257530	
-5.58E-06	-0.002815	0.009316	-0.249144	
Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)				
GDP	ψ	$(\psi - \psi^*) \partial$	OPEN	Constant
1.000000	-64.60308	374.2638	-156735.1	-16135.43
	(153.582)	(323.691)	(22554.4)	
Log likelihood	-539.1018			

Note: The other cointegrating equations have been omitted because they are not relevant.

The likelihood ratio of at most one cointegrating equation which is lower than the critical values at both 5% and 1% significance levels shows that the variables are cointegrated.

This test enables us to find out if the residuals of the preliminary linear spline regression are stationary. The test procedure provides options for specifying the type of deterministic trend present in the data. We have assumed linear deterministic trend in the data. The results of the cointegration model are presented in table 4 and they show that the variables are cointegrated. Thus, there is a long-term equilibrium relationship between GDP and the explanatory variables. This result implies that our preliminary linear spline regression is not spurious and

our conclusions on them are valid.

The signs of the parameters conform to our theoretical expectations. The coefficients of the debt overhang variable, α_2 , and openness, α_4 , are positive while the coefficient of the dummy-debt overhang variable, α_3 , is negative. The results show that low levels of debt contribute positively to growth while high levels of debt above the threshold value contribute negatively to growth. This confirms that there is a nonlinear relationship between external debt and growth in Nigeria. In other words a debt Laffer curve exists for Nigeria. It was emphasized in section 2, sub-sections 2.1.4 and 2.1.5, that the peak of the debt Laffer curve corresponds to the optimal level of debt that a nation can sustain. The peak of the debt Laffer curve in our study is represented by the threshold value of the debt indicator, ψ^* , i.e. debt/GDP. The estimated value of this threshold is 60%. This implies that the sustainable level of external debt in Nigeria is approximately a 60% debt-to-GDP ratio. In sum, the Nigerian experience not only confirms the existence of the debt Laffer curve and the nonlinear effect of external debt on growth but also reasonably shows that in a fiscal year the debt-to-GDP ratio (or debt burden) declines when the growth rate exceeds or is equal to the real interest rate and/or the government operates a budget surplus while it increases when the real interest rate exceeds or is equal to the growth rate and/or the government operates a budget deficit.

6. Recommendations and Conclusion

Recommendations. Several strategies have been adopted by the government to tackle the debt overhang problem of Nigeria. Examples of these are the embargo on new loans, maximum limits on external borrowing, limit on debt service repayment, debt restructuring, debt conversion programme, debt buy-back and collateralization, debt refinancing, debt rescheduling and campaign for debt cancellation. Most of these have not yielded substantial positive results save the last one recently. After a series of negotiations between the Nigerian government and the creditor-nations, about 50% of the outstanding debt was written off. This is no doubt a great achievement in the debt history of Nigeria. The immediate discernible effects of this are a decrease in debt burden and a reduction or elimination of the debt overhang effects. However, the story does not end there. This study has taken a profound perspective to debt problem of Nigeria by tracing its origin from the conduct of fiscal policies. If Nigeria enjoys the benefits of debt cancellation now, it is not excluded from debt problems in the future. A proper understanding of how budget deficits could be used to stimulate growth without having long-term debt problems and negative growth effects is very necessary in this learning period. Based on the conclusions of the study we make the following recommendations: 1) A sound analysis of the economic and social profitability of all debt-financed projects must be carried out to ensure that the returns generated will be in excess of the interest and capital repayment. This prevents the deadweight effect. 2) If the government must run a budget deficit, its consequences on the debt ratio must be critically analyzed before resorting to external borrowing as a means of finance. The analysis must guarantee that the borrowing would not lead to a debt overhang. 3) The use of externally borrowed funds for government projects must be closely monitored to make sure they are applied efficiently and effectively. 4) Empirical investigations must be carried out periodically to ensure that the optimal debt ratio is not exceeded. 5) If the country is found at any time to be in a debt overhang situation, the reduction of the debt ratio should be the priority of the government. The main instrument available to the government to do this is the budget. Operating a budget surplus has the effect of reducing the debt ratio. The second but indirect instrument is the growth rate of output. If

output grows at a higher rate than the real interest rate on debt, the debt ratio will reduce. 6) At all time the government should pursue a fiscal policy that ensures an optimum sustainable debt. This is compatible with the simultaneous goals of debt stabilization and debt sustainability. Debt is actually good for growth if it does not exceed the optimum. 7) Finally, the government should finance a budget deficit through external borrowing only if the following conditions are met: a) the investment capital required is so large that it cannot be raised conveniently through other means; b) the real economic rate of return is reasonably greater than the real interest rate on the debt-financed investment project; c) it has been confirmed empirically that the country is not in a debt overhang situation. i.e. it is not on the wrong side (falling part) of the debt Laffer curve; d) the size of the borrowing required will not make the debt ratio exceed the optimum.

Conclusion. The crux of this study is that prudence is required in the conduct of the fiscal policy of Nigeria to achieve the objective of stabilization. This prudence must however not be construed as a complete avoidance of external debt as a means of financing budget deficits. As a matter of fact, given the low level of capital formation in Nigeria, caused by the low level of income and the generally high incidence of poverty, the country has few prospects to source sufficient resources for development internally. This provides a sound argument for a conscious and carefully planned schedule of acquisition, deployment and retirement of foreign loans contracted for developmental purposes. Indeed it may be correct to assert that Nigeria's external debt crisis stems from the expansion of fiscal responsibility beyond the earning capacity of the government. The indiscipline of the government is not a tenable excuse for not exploiting the tremendous growth benefits that a debt-financed budget deficit offers to a developing nation like Nigeria. The country would be losing out of the recent globalization if doors were shut against external borrowing. Undoubtedly, external borrowing has the advantage of stimulating growth but the extent would be determined by the application of the acquired resources. In the light of these, Nigeria has the chance of not only achieving the 8 millennium development goals outlined by United Nations development organizations but also reaffirming its position as the economic and political giant of Africa.

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Annex

Early Perspectives on External Debt and Growth: The works of early development economists such as Domar (1957), Higgins (1959), Pearson (1969), Symonds (1970), Chenery (1966) and Strout (1966) provided a foundation for the development of a comprehensive theory of external debt and growth. They all shared a common view that the transfer of foreign resources (through loan, aids and grants) to less developed countries will help to transform their economies, characterized by low or zero growth rates, into economies capable of adequate and sustainable growth. Their contributions show that the transfer of foreign resources to developing countries is necessary and serves to supplement domestic resource gaps with positive effects on growth. The consequence of the foregoing is that a strand of thought runs through the early contributions on external debt and economic growth: “reasonable levels of borrowing by a developing country are likely to enhance its economic growth”. Countries at early stages of development have small stocks of capital and are likely to have investment opportunities with rates of return higher than those in advanced economies. As long as they use the borrowed funds for productive investment, growth should increase and allow for timely debt repayments. This explains the short-term positive relationship that exists between external debt and growth for countries that will glide through the debt cycle within reasonable time.² The limitation of the early contributions is that the long-term effect of external debt on growth, which is the debt overhang, is not explained. This motivated the formulation of a comprehensive theory of external debt and economic growth. The major theory that explains this long-term effect is the debt overhang hypothesis. A graphical explanation of this theory became known as the debt Laffer curve. In order to proffer a solution to the debt overhang problem, which is clearly understood by the existing theories, economists shifted their attention towards finding the optimal debt stock for any nation. This would be the level of debt that country can sustain without having a debt overhang problem or in other words without being trapped in the debt cycle.

External Debt Sustainability: A country can be said to achieve external debt sustainability if it can meet its current and future external debt service obligations in full, without recourse to debt rescheduling or the accumulation of arrears and without compromising growth (IMF 1995; 1996). Once the burden of current and future obligations is reduced to sustainable levels, it is possible to eliminate the disincentive effect of a heavy debt burden on investment and new capital inflows, thereby improving growth prospects. Some indicators for assessing external debt sustainability are: 1) the ratio of scheduled debt service to export of goods and services; 2) the external financing gap (after allowing for expected inflows in the form of grant receipts, loan disbursements, and any commercial capital flows); and 3) the ratio of the net present value (NPV) of the debt to export. A country’s external debt position might generally be considered

¹ The debt cycle has three phases: in the first phase, debt grows in order to fill resource gaps; in the second phase, the country generates resource surplus but probably not enough to offset interest payments; while in phase three it must generate enough surpluses to cover interest payments and amortization (Soludo, 2001).

sustainable over the projection period if the following thresholds are not exceeded (Obadan, 1999): 1) ratio of scheduled debt service to export of goods and services of 20-25 percent; 2) a ratio of the NPV of debt to export of 200-250 percent. These are thresholds, which if exceeded, may signal imminent debt servicing difficulties. On the financing gap indicator, the external debt position will be sustainable if the financing gaps were eliminated. Notice, however, that the level of the above indicators that could be considered sustainable may vary from country to country, depending on specific macroeconomic and other circumstances. Although there is no hard and fast rule for determining the threshold level of external debt that is sustainable for a country the debt Laffer curve provides a good guidance on how to estimate this value. As noted earlier on the threshold value corresponds to the peak of the debt Laffer curve. The source of variation from country to country is the methodology adopted in estimating this curve. Generally the two main approaches used are the quadratic and the linear spline regression methods. These methods already assume the nonlinearity of the debt-growth relationship as put forward by the debt Laffer curve. It should be clear at this point that those who assume a linear relationship take the short-term perspective that debt has a “definite” positive relationship with growth while those who assume a nonlinear relationship take the long-term perspective that there is an optimal level to which debt can contribute positively to growth. The latter group seeks to investigate the debt overhang effect and will be our focus in the next section.

Evolution of the Nigerian Debt-to-Gdp Ratio for 1970-2003

Figure 1(a):

Figure 1(b):

Laffer curve and optimal level of borrowing

A1.1. Laffer curve. The argument of the “debt overhang” theories- that if there is some likelihood that, in the future, debt will be larger than the country's repayment ability, expected debt-service costs will discourage further domestic and foreign investment and thus harm growth- is represented in the debt “Laffer curve”. The basic proposition of the debt Laffer curve is that larger debt stocks tend to be associated with lower probabilities of debt repayment. On the upward-sloping or “good” section of the curve, increases in the face value of debt are associated with increases in expected debt repayment, while increases in debt reduce expected debt repayment on the downward-sloping or “bad” section of the curve. This is illustrated in figure 2.

Figure 2:

Debt “Laffer” Curve

Larger debt stocks are associated with lower probabilities of debt repayment.

Source: Patillo C. et. al (2002) “External Debt and Growth,” Finance & Development, IMF, June

Although the debt overhang models do not analyze the effects on growth explicitly, the implication is that large debt stocks lower growth partly by reducing investment. But in addition, the incentive effects associated with debt stocks tend to reduce the benefits to be expected from policy reforms that would enhance efficiency and growth, such as trade liberalization and fiscal adjustment: the government will be less willing to incur current costs if it perceives that the future benefit in terms of higher output will accrue partly to foreign lenders. Thus, some considerations suggest that, at reasonable levels of debt, further borrowing would be expected to have a positive effect on growth. Others stress that large accumulated debt stocks may be a hindrance to growth. Both these elements together imply that debt is likely to have nonlinear effects on growth. Although the debt overhang theories have not explicitly traced the effect on growth, it may be possible to extend and translate the debt Laffer curve posited by these models into a Laffer curve for the effect of debt on growth. Since the peak of the debt Laffer curve shows the point at which rising debt stocks begin acting as a tax on investment, policy reforms, or other activities that require up-front costs in exchange for future benefits, the peak may relate to the point at which debt begins to have a negative marginal impact on growth. The following sub-section analyzes the conditions that surround the optimal level of debt stock.

³ The debt overhang represents the “bad” section of the debt Laffer curve where a country becomes trapped in the debt cycle.

A1.2.Optimal Level of Borrowing. If properly used, borrowed external resources can greatly benefit a developing country and contribute to its growth – they add to the total resources available to an economy over a given period. However, such borrowing is desirable when it is used to finance investment that is expected to yield an adequate rate of return or to smoothen consumption in the face of an uneven aggregate supply, since it can provide a level of economic welfare that could not otherwise be obtained. It is important to stress that if debt problems are to be avoided, the investments financed by foreign borrowing must have a real economic rate of return that is at least equal to the real rate of interest.⁴ And since the borrowing is presumably in foreign currency, the required equal rate of return must also be expressed in foreign currency (Obadan, 1999).

If the conditions for optimal borrowing are violated then external debt becomes a burden and the country can no longer sustain the existing level of debt stock. The concept of external debt sustainability has occupied a center-stage in recent analyses of the debt problem of developing nations. Attempts have been made to come up with criteria for evaluating whether the external debt for any nation is sustainable or not. This issue is tackled in the next sub-section.

Annex 2

In the first phase, debt grows in order to fill resource gaps; in the second phase, the country generates resource surplus but probably not enough to offset interest payments; while in phase three it must generate enough surpluses to cover interest payments and amortization. The peculiar experience of highly-indebted countries is that they have been trapped in phases I and II for decades. The fact of entrapment is symptomatic of inherent difficulties in servicing the debt. Debt service difficulties usually arise when maturing obligations cannot be redeemed either owing to liquidity or solvency problems.

Most countries that complete the three phases of the debt cycle within a relatively short period experience only the positive impact of external debt on economic growth. This comes in the form of a relief to the savings or foreign exchange bottlenecks as we have noted earlier on. However, countries that become trapped in phases I and II of the debt cycle experience both the positive and negative impacts of external debt on economic growth. At the initial stage external borrowing provides the necessary supplementary capital for economic growth. As the debt grows to a certain threshold, the burden of servicing increases until it becomes a tax on investment and growth. This observation provides a useful means of classifying the literature on external debt and economic growth. The early theories- by Domar, Higgins, Pearson, Symonds, Chenery and Strout- consider only the “short-term” effect of external debt on growth while later theories- of which the debt overhang hypothesis is dominant- examine the “long-term” effect for countries trapped in the debt cycle.

Obviously, Nigeria is trapped in phases I and II of the debt cycle. We thus adopt the debt overhang hypothesis to analyze the long-term effect of external debt on growth in Nigeria. Furthermore, we extend the simple national income model to identify the determinants of the growth of debt. These present a two-dimension approach to our study. The first is to understand the relationship between external debt and growth in Nigeria and the second is to

⁴ This condition for optimal borrowing makes an assumption which reduces its scope as we shall see in section 3.

proffer policy recommendations on how to stem the growth of debt in the short term and to completely redeem it in the long term.

Sachs (1990) and Kenen (1990) argue that external debt overhang plays an important role in the heavily indebted countries. Debt overhang is the main reason for slowing economic growth in indebted countries. Borensztein (1990) defines debt overhang as follows:

“The debt overhang arises in a situation in which the debtor country benefits very little from the return to any additional investment because of debt service obligations. When foreign obligations cannot be fully met existing resources and actual debt payments are determined by some negotiation process between the debtor country and its creditors, the amount of payment can be linked to the economic performance of the debtor country, with the consequence that at least part of the return to any increase in production would in fact be devoted to debt servicing. This creates a disincentive to investment from the point of view of the global interest of the country”.

Because of large debt overhang private investments are discouraged and the payments of the debt service of some countries are so large that the prospects for a return to growth paths are dim, even if the governments were to apply hard adjustment programmes. Thus a debt overhang creates adverse incentive effects on the economic growth in the long run. How a debt overhang discourages private investment depends on how the government is expected to raise the resources needed to finance external debt service and whether private and public investment are complementary. For example, if a government resorts to inflation tax or to a capital levy, private investment is likely to be discouraged.

Other channels through which the need to service a large amount of external obligations can affect economic performance include the crowding out and import compression effect. External borrowing increases future debt service obligations because the foreign exchange constraint is tightened in the future. In the crowding out effect, a reduction in the debt service should lead to an increase in investment for any given level of future indebtedness. If a greater portion of foreign resources are used to service external debt, very little is available for investment and growth. For countries with non-traded currencies, external debt-service payments require the purchase of foreign currency that must be earned from exports or capital inflows, or for drawing down reserves. In the absence of substantial reserve coverage, buoyant exports, or sizeable capital inflows, higher debt service payments means reduced import capacity. The growth effect of a heavy debt burden mediated through the external account is called the "import compression" effect.

The second dimension of the debt problem that we intend to tackle is to identify the determinants of the growth of external debt burden. It was shown earlier on in this section that foreign borrowing is one of the sources of finance for government budget deficit. Blanchard (1997) defines the budget deficit in year t as:

$$\text{Deficit} = iD_{t-1} + (G_t - T_t) \dots \dots \dots (1)$$

where D_{t-1} is government debt at the end of year $t-1$, or equivalently at the beginning of year t ; i

is the real interest rate. Thus iD_{t-1} is equal to the real interest payments on the existing government debt. G_t is government spending on goods and services in year t . T_t is equal to taxes minus transfers in year t . $(G_t - T_t)$ is called the primary deficit (or primary surplus if taxes exceed spending). Thus the budget deficit is equal to spending, inclusive of interest payments, minus taxes net of transfers.

The government budget constraint states that the change in government debt during year t is equal to the deficit in year t :

$$D_t - D_{t-1} = \text{Deficit} \dots \dots \dots (2)$$

The implication of this is that government debt increases during periods of budget deficits while it decreases during periods of budget surpluses. Combining equations (1) and (2), we can restate the government budget constraint as follows:

$$D_t - D_{t-1} = iD_{t-1} + (G_t - T_t) \dots \dots \dots (3)$$

The government budget constraint links the change in debt to the initial level of debt (which affects interest payments) and to current government expenditure and taxes. Transferring D_{t-1} to the right-hand side of equation (3) and rearranging gives

$$D_t = (1+i)D_{t-1} + (G_t - T_t) \dots \dots \dots (4)$$

This shows the level of debt at the end of year t as equal to $(1+i)$ times debt at the end of year $t-1$, plus the primary deficit, which is equal to $(G_t - T_t)$. We can also derive an expression for the growth of debt in year t . If we divide both sides of equation (3) by D_{t-1} we will obtain:

$$\frac{D_t - D_{t-1}}{D_{t-1}} = i + \frac{(G_t - T_t)}{D_{t-1}} \dots \dots \dots (5)$$

The left-hand side of (5) is the growth of the debt for year t and we shall denote it by

$$g_{dt} = \frac{D_t - D_{t-1}}{D_{t-1}} = i + \frac{(G_t - T_t)}{D_{t-1}} \dots \dots \dots (6)$$

This equation shows that the growth of government debt for a year depends on the real interest rate, which we assume is constant over a long period of time; and the ratio of primary deficit to the debt in the previous year. This relation is very useful in understanding the reason why debt grows from time to time. However, the emergence of the debt-to-GDP ratio as a more appropriate measure of debt burden makes it necessary to also consider the corresponding growth of output. If we divide both sides of equation (4) by real output Y_t , we get

$$\frac{D_t}{Y_t} = (1+i) \frac{D_{t-1}}{Y_t} + \frac{(G_t - T_t)}{Y_t} \dots \dots \dots (7)$$

By introducing Y_{t-1} into the first term on the right the relation becomes

$$\frac{D_t}{Y_t} = (1+i) \frac{Y_{t-1}}{Y_t} \frac{D_{t-1}}{Y_{t-1}} + \frac{(G_t - T_t)}{Y_t} \dots \dots \dots (8)$$

We can denote the growth rate of output by g_y , so that (Y_{t-1}/Y_t) can be written as $1/(1+g_y)$.

Using the approximation $(1+i)/(1+g_y) \simeq 1+i-g_y$, we can restate equation (8) as

$$\frac{D_t}{Y_t} = (1+i-g_y) \frac{D_{t-1}}{Y_{t-1}} + \frac{(G_t - T_t)}{Y_t} \dots \dots \dots (9)$$

Finally, if we transfer D_{t-1}/Y_{t-1} to the left-hand side of the equation we get

$$\frac{D_t}{Y_t} - \frac{D_{t-1}}{Y_{t-1}} = (1-g_y) \frac{D_{t-1}}{Y_{t-1}} + \frac{(G_t - T_t)}{Y_t} \dots \dots \dots (10)$$

The change in the debt ratio is equal to the sum of two terms. The first is the difference between the real interest rate and the growth rate times the initial debt ratio. The second is the ratio of the primary deficit to GDP. This equation implies that the increase in the debt ratio will be larger the higher the real interest rate, the lower the growth, the higher the initial debt ratio, and the higher the ratio of the primary deficit to GDP. Practically, it is only the primary deficit-to-GDP ratio that can be directly and instantaneously controlled by the government. This can be done by cutting down on deficit or operating a budget surplus. The growth of output can be influenced slowly with time via fiscal and monetary policies. Both the real interest rate and the initial debt ratio are not directly under the control of the government. If we denote the change in debt-to-GDP ratio by $\Delta(D/Y)$ and the primary deficit-to-GDP ratio by D , we can show the functional relation of the change in debt-to-GDP ratio as follows:

$$\Delta(D/Y) = f(i, g_y, D_{t-1}/Y_{t-1}, D) \dots\dots\dots(11)$$

(+, -, +, +)

A positive sign under a variable shows a positive relationship with the change in debt-to-GDP ratio while a negative sign shows a negative relationship. This functional relation summarizes the factors that affect “changes in the debt burden” i.e. changes in the debt-to-GDP ratio.

It is worth mentioning here that equation (10) provides a very powerful tool with which the government can maintain the external debt at a sustainable level for each fiscal year. To see how this works, we can divide the causes of a change in the debt-to-GDP ratio into two parts. Let us call the first part that contains the difference between the real interest rate and the growth rate, $(i-g_y)$, the **deadweight effect** and the second part that contains the primary deficit-to-GDP ratio, D , the **deficit effect**. The reason for these appellations is quite obvious. If the real interest rate exceeds the growth rate then debt could be considered as deadweight.

The deadweight effect could either be adverse or favourable depending on the values of the real interest rate and growth rate. Since the debt-to-GDP ratio in the previous year is positive from a priori reasoning, we may ignore its changes. We must however bear in mind that its magnitude is very important in the determining the magnitude of the change in the debt-to-GDP ratio. There are three possible scenarios that determine the nature of the deadweight effect:

$$(i) \text{ when } i > g_y, (i-g_y)D_{t-1}/Y_{t-1} > 0 \dots\dots\dots(12)$$

$$(ii) \text{ when } i = g_y, (i-g_y)D_{t-1}/Y_{t-1} = 0 \dots\dots\dots(13)$$

$$(iii) \text{ when } i < g_y, (i-g_y)D_{t-1}/Y_{t-1} < 0 \dots\dots\dots(14)$$

The first scenario shows that the deadweight effect is positive and adverse when the real interest rate exceeds the growth rate. The second scenario shows that the deadweight effect is zero when the real interest rate and the growth rate are equal while the third scenario shows that the deadweight effect is negative and favourable when the growth rate exceeds the real interest rate. Thus, the growth rate of GDP must be greater than or equal to the real interest rate for the deadweight effect to be favourable or nil.

In section 2.1.5, we emphasized that if debt problems are to be avoided, the investments financed by foreign borrowing must have a real economic rate of return (i.e. growth rate) that is at least equal to the real interest rate.⁵ This statement is partially true as we

⁵ Refer to page 7.

now know that the change in debt-to-GDP ratio is due not only to the deadweight effect but also the deficit effect. When the government operates a budget deficit for a fiscal year the debt-to-GDP ratio increases. However, when the government operates a budget surplus the debt-to-GDP ratio decreases. The deduction to be drawn from the foregoing is that in a fiscal year the debt-to-GDP ratio declines when

- (a) the growth rate exceeds or is equal to the real interest rate and/or
- (b) the government operates a budget surplus

while the debt-to-GDP ratio increases when

- (a) the real interest rate exceeds or is equal to the growth rate and/or
- (b) the government operates a budget deficit.

In conclusion, the framework we have developed in this chapter serves as a precursor for the formulation of the econometric model that will be used to test the validity of our proposition that external debt has a nonlinear relationship with economic growth. On the other hand, the evolution of the debt-to-GDP ratio in Nigeria shall be studied with the aid of graphs by focusing on the trend of practically determinable explanatory variables such as the primary deficit-to-GDP ratio and the growth rate. There are two reasons for this: the relation derived, equation 10, is an identity which holds true in all cases; this is different from a behavioural equation that operates under certain assumptions; and the real interest rate is excluded because its calculation will be subject to the problems of aggregation.

Annex 3

Year	GDP	Ψ	$(\Psi - \Psi^*) \partial$	OPEN	Year	GDP	Ψ	$(\Psi - \Psi^*) \partial$	OPEN
1970	54148.9	3.3621	0	0.3154	1987	70741.4	94.2984	34.2984	0.4512
1971	65707	2.7166	0	0.361	1988	77752.5	93.8869	33.8869	0.3689
1972	69310.6	3.6846	0	0.3363	1989	83495.2	108.0627	48.0627	0.3993
1973	73763.1	2.5194	0	0.3187	1990	90342.1	115.799	55.799	0.6034
1974	82424.8	1.7619	0	0.4116	1991	94614.1	102.4378	42.4378	0.6512
1975	79988.5	1.6696	0	0.4126	1992	97431.1	99.9878	39.9878	0.6488
1976	88854.3	1.4053	0	0.4464	1993	100015	91.5469	31.5469	0.5565
1977	96098.5	1.1583	0	0.4671	1994	101040	71.2127	11.2127	0.4048
1978	89020.9	3.6251	0	0.4133	1995	103503	36.5619	0	0.87
1979	91190.7	3.8417	0	0.4365	1996	107020	22.5262	0	0.6832
1980	96186.6	3.7613	0	0.4691	1997	110400	21.0205	0	0.7363
1981	70395.9	4.6203	0	0.4729	1998	112950	22.8884	0	0.5746
1982	70157	17.1017	0	0.368	1999	116140	80.7031	20.7031	0.6424
1983	66389.5	18.6526	0	0.2893	2000	120640	63.9666	3.9666	0.6007
1984	63006.4	23.5035	0	0.2582	2001	125720	57.2778	0	0.6039
1985	68916.3	24.2414	0	0.2632	2002	129820	66.0161	6.0161	0.5456
1986	71075.9	57.4704	0	0.2066	2003	136470	70.3145	10.3145	0.7994

$\psi^* = 60\%$, $\partial = 1$ if $\psi > \psi^*$, $\partial = 0$ if $\psi < \psi^*$. **OPEN**⁶ = Tradable Goods / GDP, where total trade has been used as a proxy for tradable good.

Annex 4

ADF statistic					-0.3283					ADF statistic				-5.4905			
*MacKinnon critical values for rejection of hypothesis of a unit root, 1%, 5% and 10%: -3.64, -2.95 -2.61									*MacKinnon critical values for rejection of hypothesis of a unit root, 1%, 5% and 10%: -3.64, -2.95, -2.61								
ADF Test Equation for GDP									ADF Test Equation for GDP								
Dependent Variable: D(GDP)									Dependent Variable: D(GDP ,2)								
Method: Least Squares									Method: Least Squares								
Sample(adjusted): 1971 2003									Sample(adjusted): 1972 2003								
Included observations: 33									Included observations: 32								
Variable	Coeffi- cient	Std. Error	t-Stat	Prob.	Variable	Coeffi -cient	Std. Error	t- Stat	Prob.								
GDP (-1)	-0.01906	0.0580	-0.33	0.744	D(GDP (-1))	-0.9756	0.177	-5.49	0								
Constant	4191.93	5289.7	0.79	0.434	Constant	2153.7	1200	1.79	0.082								
R ²	0.00346	F-statistic			0.107	R ²	0.5012	F-statistic		30.14							
Adjusted R ²	-0.02868	Prob(F-statistic)			0.744	Adjusted R ²	0.4845	Prob(F-statistic)		6E-06							
Durbin-Watson stat	1.8434					Durbin-Watson stat	2.0065	Akaike info criterion		20.41							
Decision: Since $ADF_{cal} > ADF_{crit}$ the variable is nonstationary at level.									Decision: Since $ADF_{calc} < ADF_{crit}$ the variable is stationary at first difference								

		1% Critical Value*	-3.64	ADF Test Statistic	-4.4264	1% Critical Value*	-3.64
		5% Critical Value	-2.95			5% Critical Value	-2.95

⁶ This is the index of openness proposed by Blanchard (1997), *Macroeconomics*, Prentice Hall, New Jersey. The values used for this empirical study were computed from data published in the CBN Statistical Bulletin, 2003.

				. 9 5 2 7				
		10% Critical Value		- 2 . 6 1 4 8				10% Critical Value
*MacKinnon critical values for rejection of hypothesis of a unit root.					*MacKinnon critical values for rejection of hypothesis of a unit root.			
Augmented Dickey-Fuller Test Equation for ψ					Augmented Dickey-Fuller Test Equation for ψ			
Dependent Variable: D(ψ)					Dependent Variable: D(ψ ,2)			
Method: Least Squares					Method: Least Squares			
Sample(adjusted): 1971 2003					Sample(adjusted): 1972 2003			
Included observations: 33 after adjusting endpoints					Included observations: 32 after adjusting endpoints			
Variable	Coefficient	Std. Error	t-Statistic	P r o b .	Variable	Coefficient	Std. Error	t-Statistic
$\psi(-1)$	-0.092	0.07275	-1.264617	0. 2 1 5 4	D($\psi(-1)$)	-0.790038	0.178482	-4.426427
Constant	5.718047	4.06407	1.406976	0. 1 6 9 4	Constant	1.701342	2.948071	0.577104
R-squared	0.049058	F-statistic			R-squared	0.395079	F-statistic	
Adjusted R-squared	0.018383	Prob(F-statistic)			Adjusted R-squared	0.374915	Prob(F-statistic)	

			5 4 3					
Durbin-Watson stat	1.516874			Durbin-Watson stat	2.007485			
Decision: Since $ADF_{cal} > ADF_{crit}$ the variable is nonstationary at level.				Decision: Since $ADF_{calc} < ADF_{crit}$ the variable is stationary at first difference.				
ADF Test Statistic	-1.693632	1% Critical Value*		ADF Test Statistic	-5.178747	1% Critical Value*		-3.64
		5% Critical Value				5% Critical Value		-2.99
		10% Critical Value				10% Critical Value		-2.60
*MacKinnon critical values for rejection of hypothesis of a unit root.								
Augmented Dickey-Fuller Test Equation for $(\psi - \psi^*) \partial$								
Dependent Variable: $D((\psi - \psi^*) \partial, 2)$								
Method: Least Squares								
Sample(adjusted): 1972 2003								
Included observations: 32 after adjusting endpoints								
Variable	Coefficient	Std. Error	t-Statistic	Variable	Coefficient	Std. Error	t-Statistic	Pr
$(\psi - \psi^*) \partial(-1)$	-0.163839	0.096738	-1.693632	$D((\psi - \psi^*) \partial(-1))$	-0.946736	0.182812	-5.178747	
Constant	1.940611	1.901477	1.020581	Constant	0.312314	1.767998	0.176649	0.86
R-squared	0.084692	F-statistic		R-squared	0.472012	F-statistic		26.8
Adjusted R-squared	0.055166	Prob(F-statistic)		Adjusted R-squared	0.454412	Prob(F-statistic)		1.4E
Durbin-Watson stat	1.755722			Durbin-Watson stat	2.007089			
Decision: Since $ADF_{calc} < ADF_{crit}$ the variable is stationary at first difference.								
ADF Test Statistic	-2.141773	1% Critical Value*		ADF Test Statistic	-8.19142	1% Critical Value*		-3.64

		5% Critical Value				5% Critical Value		-2.93
		10% Critical Value				10% Critical Value		-2.60
*MacKinnon critical values for rejection of hypothesis of a unit root.								
Augmented Dickey-Fuller Test Equation for OPEN								
Dependent Variable: D(OPEN ,2)								
Method: Least Squares								
Sample(adjusted): 1972 2003								
Included observations: 32 after adjusting endpoints								
Variable	Coefficient	Std. Error	t-Statistic	Variable	Coefficient	Std. Error	t-Statistic	Pr
OPEN (-1)	-0.300509	0.140309	-2.141773	D(OPEN (-1))	-1.441174	0.175937	-8.19142	
Constant	0.156607	0.069591	2.250404	Constant	0.016874	0.02137	0.789584	0.43
R-squared	0.1289	F-statistic		R-squared	0.691038	F-statistic		67.09
Adjusted R-squared	0.1008	Prob(F-statistic)		Adjusted R-squared	0.680739	Prob(F-statistic)		
Durbin-Watson stat	2.279777			Durbin-Watson stat	1.980906			
Decision: Since $ADF_{calc} < ADF_{crit}$ the variable is stationary at first difference.								

Summary. This study examines how the use of budget deficits as an instrument of stabilization leads to the accumulation of external debt with the concomitant effects on growth in the short and long run. A sustainable fiscal policy that maintains the debt ratio (debt-to-GDP) at a constant level may not necessarily be the best policy for a nation in recession. The best policy is to stabilize the debt ratio at the optimum level. The optimum sustainable level of debt ratio for economic growth is that which corresponds to the peak of the debt Laffer curve. Evidently, a country on the rising part of the debt Laffer curve can combat recession by adopting a stimulative fiscal policy that leads to an increase in debt ratio within the optimum limit. At this level an increasing debt ratio is not a burden to the economy. Provided a level of debt is sustainable there is no need for the government to worry about debt stabilization or the sustainability of its fiscal policy. However, once the peak of the debt Laffer curve is reached, the government must focus on the objective of debt stabilization by adopting a sustainable fiscal policy. This is the point of reconciliation between the objectives of fiscal policy sustainability and external sustainability. A country that fails to stabilize its debt at the optimum level will experience debt overhang problems. These come in the forms of disincentive effect, crowding out effect and import compression effect. The methodology of this study is designed to establish the existence of the debt Laffer curve in Nigeria and to explain the influence of budget deficit and other relevant factors on the changing debt ratio of

the country. Our empirical study of the Nigerian experience confirms the existence of the debt Laffer curve and the nonlinear effect of external debt on growth. Low levels of debt contribute positively to growth while high levels of debt above the threshold value contribute negatively to growth. The results of the cointegration test show that there is a long-term equilibrium relationship between GDP and the explanatory variables. A very important finding in the estimation process is that the optimal debt ratio of Nigeria is approximately 60%. The results also show that variations in the debt ratio can be explained by two factors or variables: the type of budget the government operates in a fiscal year, whether deficit or surplus (this is captured by the primary deficit-to-GDP ratio); and the differential between the real interest rate on debt and the growth rate of GDP. These variations depend on the sign and magnitude of these variables.