# Exploring the Dynamics of External Debt Stock and Servicing on the Nigerian Economic Growth Rate

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## ABSTRACT

*This study attempt to econometrically explore the relationship between external debt stock, external debt servicing and economic growth rate in Nigeria proxy by GDP within the period of 1981to 2010. The study used Nigeria time series data for the period under review. The OLS, ADF Unit Roots, Co-integration and the Error Correction Mechanism (ECM) tests were applied on the data. The results revealed a negative relationship between external debt stock (DS) ,external debt servicing(XDS) and GDP. Similarly, it was also revealed that there exists presence of both short and long-run equilibrium relationship among the variables. The ECM coefficient indicates that the explained variable adjust fairly to influences the explanatory variables. Hence, it is recommended that the Nigeria government should strengthened existing debt management strategies and if possible explore new ones aim at curtailing external finance thereby avoiding its negative on economic growth rate in Nigeria, ensure proper utilization of contracted loans into priority projects in the form of investment to accelerate economic growth.*

## INTRODUCTION

The classical liberal theory of economic development under- score economic growth and capital formation are key to national development. The key to economic growth under this theory is capital formation. This led to the emphasis of large scale infrastructure projects and foreign loans (Fields, 1991). A major preoccupation in the minds of countries specially the third-world nations is the vexed issue of external debt. It is so because majority of the third world countries are debt ridden and therefore, incapable of generating any quantifiable economic development. Over the years the nation has been grappling with the problem of debt overhang and debt servicing. It is generally acknowledge that   the existence of these twin problems affect investment mainly through "crowding out effect" and credit rationing". Crowding out effect arises from the consideration that the resources which could have been used for productive investment are often diverted for debt servicing, Iyola (1996). Credit rationing effect arises when a debtor nation is unable to repay contracted debt and in order to narrow the savings-investment gap, so as to generate a greater surplus for debt servicing and it consequent repayment the authorities then raises interest which inturn affect new profitable investment adversely and its consequential negative impact on future growth prospect. It is therefore obvious that both the debt overhang problem and the credit rationing effect can impede investment in debtor nations and thereby reduce economic growth rate. External debt servicing and repayment act as hindrance to economic growth and development of developing countries like Nigeria. In the last decades it has been observed that external debt servicing is one of the major causes of decline investment and the growth performance of many third world countries.

External debt servicing is like an unfavorable tax on future generations, which they have to pay for nothing, Shahnawaz, M et al (2010).

However, the severity of debt servicing liability is a function of a country GDP and the level of debt stock. The absolute volume of external debt stock of a country is not a matter of concern as the extent of it servicing obligation. The Nigerian external debt servicing and repayment obligation constitutes a major impediment to the revitalization of its shattered economy as well as the alleviation of poverty. Since the enthronement of democracy in 1999-2014 Nigeria external debt servicing liability has gulf greater percentage of her national budget from 14.5 percent to about 17.5 percentages respectively. Nigeria external debt ratio has continued to be on its highest point inspites of effort aimed at minimizing it and its negative impact Oj0 (1990). The repayment of the principal loan and its servicing is an important international obligation to a debtor country. Any debt not reschedules on due date or after the period of grace is deem to be a default and a default could hamper international credit worthiness and confidence in debtor country's ability to discharge her international commitment. This erodes the prospect of the debtor country to servicing future loan. Therefore, due to the negative consequences of external debt stock and servicing on GDP, the ratio of external debt stock and servicing is widely accepted as a standard measurement of economic performance. It is important to investigate the Nigeria external debt servicing, macro-economic adjustment has remained elusive. In view of the above therefore, it is imperative to investigate the implications of the increased external debt repayment and servicing on the growth prospect of the Nigeria economy.

## STUDY OBJECTIVE/ SIGNIFICANCE

Following the stands of Ojo (1990) that debt servicing ratio had to be maintained at a region of 40% if the debtor country had to fully meet her debt servicing commitments. We have also noted that servicing external borrowings amount to leakages (outflow) of resources that would have been use to increased domestic savings, investments and economic growth. Giving the number of years Nigeria gained independence and the substantial debt it had incurred, couple with existing institutions, one can claim that the entire spectrum of the economy has been sufficiently in active especially when compared with other third world nations. Hence, the trust of this work to investigate the effects of external debt stock and servicing on the Nigerian economic growth rate aimed, at exploring the relationship between debt stock, debt servicing and GDP.

This study is expected to provide an objective view to the relevance of the Nigeria Debt Management Office (DMO) via its debt management strategies. Also to provide grounds for the satisfaction and workability of the present debt management strategies or otherwise.

**HYPOTHESIS**: There may not be any functional relationship between external Debt Stock (DS) and servicing (XDS) on a nation's growth rate process measured in term of her GDP.

Apriori expectation, given the above therefore, it is expected that external debt should impact positively on economic growth process; (a>0) while external debt servicing is expected to impact negatively (a<0).

## THEORETICAL/EMPIRICAL LITERATURE

The debt overhang, bureaucratic politic and economic base theories recognized that external debt servicing payments have negative consequences on investments, exports, reserves and GDP which are the major determinants of economic growth. Therefore, in this paper, GDP is

the parameter used to capture economic growth rate. The debt overhang theory is based on the premise that debt will exceed the debtor nation's repayment ability with some probability in the future. And that expected debt servicing is likely to be an increasing function of the country's output level. Thus, some of the returns on investment in the domestic economy are effectively taxed away by existing creditor countries and investments are discouraged. According to Erdal karagol (2010) debt servicing includes interest-payments and repayment which constitutes real leakages from debtor's country. He further posits that debt servicing takes large benefits from the domestic economy to foreign economy. This according to him decreases the domestic economy's ability to grow its economy and raises it dependency on foreign debt. Metwathy and Tamaschke (1994) and Sach, Kenen, (1990) in Erdal (ibid) argued that external debt overhang play an important role in the heavily indebted countries (HICs). They maintained that debt overhang is the main reason for slow economic growth in indebted countries and that it discourages private investment, also that debt servicing liability of debtors countries becomes larger such that the prospect for a return to growth path are dim.

Kamin et al (1989) holds that foreign borrowing affects future growth through it effect on interest payments (servicing) obligation, this causes a higher stock of external debt.

The economy growth theory points out that reasonable productive investment of borrowed funds can enhance economic growth of a country but large external debt servicing have been found to be detrimental to economic growth resulting from the paradox of debt overhang Hameed and Muhammed, A.C (2008).

The "dual gap theory" asserts that the reason for opting for external finances is to complement domestic resources in order to sustain economic development. The theory postulates that investment is a function of savings and that the level of savings in developing countries is not sufficient to fund the needed investment to ensure economic development. According to Edelman (1993) the critical factors affecting debt servicing capacity are returns on investment (ROI), cost of borrowing and the rate of savings. Colaco, (1985) explains external debt servicing vulnerability of developing countries using three contents; the size, the proportion of debt of floating interest rate and the maturity period being shattered considerably in large part due to the declining share of official flows, no wonder Mehram (1989) argued that debt management is of essence in any economy. Akinlose, S.A. (2005) posits that increased debt servicing and overvalued exchange rate promote capital flight and therefore maintained that debt servicing payments and exchange rate are one of the most important factors contributing to poor growth record of Nigeria. He added that while debt servicing represses economic growth, exchange rate misalignment hampered economic development via distortions. Nnana (2005) and Cohen (1992) maintained that external debt at low level is positively related to economic growth but a high level requires higher debt servicing obligations that complicate debt accumulation thereby rendering the assumption of a positive correlation between external debt and economic growth unrealistic. Adekinje et al (2009) Ndiyo (2008) and Patillo (2010) recognized that debt servicing and repayments act as an anticipated foreign tax by reducing incentives to save and invest and thus promote capital flight. Elbadawi, et al (1996) identified debt servicing ratio to foreign reserves, debt servicing payment and its crowding out effects, debt servicing ratio to exports depletes and retared growth as debt burden indicators. Ono, (2007) had argued that the Nigeria debt service ratio for most of the years exceeded the maximum of 10% recommended by IMF adding that her debt service ratio by far trebled IMF standards implying that a high debt service ratio will have enormous strain on the debtor country's economy.

Mustapha and Oliko (1987) opined that growth must be restored but there will be no growth when disproportionate amount of scare resources is being diverted into debt-servicing, it is therefore necessary to ensure strenuous effort to reduce the current level of debt and it attendant servicing requirements. No wonder Philips (1989) argued that debt becomes a burden when the debtor country cannot meet maturity obligations as at when due, without diverting substantial portion of its resources to servicing the debt. Studies have shown that the debt service burden and the dynamics of external debt showed that they do not contribute significantly to financing economic development in developing countries. In most cases, debt accumulates because of servicing requirements and the repayment of the principal. It is in the light of this fact that (Nakatami and Herera, 2007) opined that external debt is a self-perpetuating mechanism of poverty aggravation, work over exploitation and a constraint on development in third-world nations.

Adesola, W.A. (2009) investigated "debt servicing and economic growth in Nigeria. He analyzed the debt service components and its impact on GDP and GFCF using data spanning 1981 to 2004. He discovered that debt servicing payments to Paris club and promising notes have a positive impact on GDP and GFCF while those of the London club had a negative implication. Albert W. (2008) examined economic growth and external debt servicing; he used a co integration econometric analysis of Srilanka from 1952 to 2002. He focus was to analyses whether Srilanka faces a debt overhang problem. He explores the situation in two phases; long-run co-integration estimation and the short-run error correction methods. He found that Srilanka does not have a debt overhang. Problem probably because her debt stock coupled its servicing commitments was not too high. He further found that external debt stock and servicing can exert a negative impact on GNP in the long-run in the sampled country. Hameed et al (2008) explored the dynamic effects of external debt servicing, Capital stock, and labour force on the economic growth of Pakistan for the period 1970-2003. They found an adverse effect of external debt servicing on labour and capital productivity which ultimately hampers economic growth.

Erdal, K. (2010) in his study "The Causality Analysis of External Debt Servicing and GNP; the case of turkey, argued that debt servicing burden has a negative impact on investment and capital accumulation. According to him the main reason for this is that greater percentage of resources (Foreign currency) goes to meet debt servicing thereby causing reduction in external capital due to decrease in credit worthiness. He employ Cunninghan, (1992) and used the multivariate co-integration technique to develop a vector error correction model useful for investigating long-run effects of external debt servicing on GNP level. This revealed that external debt servicing has a negative impact on economic growth even in the short run and also that there is a unit directional relationship between debt servicing and GNP. Wadad, S. (2012) examined "The Causality Between Economic Growth, Exports and External Debt Servicing in Lebanon", his study covered the period between 1970-2010. He introduced exchange rate as the fourth macro-economic variables, he used the vector error correction model to explore the relationship and Granger causality test. The result showed that in both short and long-run there exist a linear relationship among external debt servicing and GDP, export, exchange rate.

**METHODOLOGY**

This study employed time series Nigeria data as published in the Central Bank of Nigeria statistical bulletin. The study use data spanning through 1981 to 2010. In attempt to achieve the objective, Eview 5.1 was used to carry out the following tests; OLS, Unit root, Co-integration and the error correction mechanism. The correlation and regression analysis was

found to be appropriate as it is one of the most natural directions in statistics useful for the study of relationship between variables Mac-Odo (1997). Hence, the goal of using this was to describe the nature of the relationship between the studied variables by fitting a regression equation to express the relationship between them.

## MODEL SPECIFICATION

The model that will analyze the relationship is implicit stated below following the work of Karagol (2010) and Wadad (2012) presented in the literature, we hypotheris that GDP is functions of external debt stock (DS) and external debt servicing.

Specifying the model in both linear and log linear, we have;

$GDP_t = f (DS, X DS)$ -     -    -     -     -     -     -     1.

$GDP_t = \alpha_0 + \alpha_1 DS_t + \alpha_2 DS_t + \mu$-  -    -     -     -     -     2.

$Log\ GDP_t = \alpha_0 + \alpha_1 DS_t + \alpha_2 \log XDSt + \mu$  -     -     3  -     -     3

Where;

$GDP_t$          =   Gross Domestic Product at time t which is used as proxy for   economic growth Rates.

$DS_t$          =    Debt Stock Outstanding at time t, which shows absolute value of external outstanding.

$XDS_t$          =    External Debt Servicing at time t, which is absolute value of Naira amount budgeted for debt servicing.

$\alpha_0$          =    The concept or intercept

$\alpha_0 + \alpha_1$          =    Coefficient of the explanatory variables.

$\mu$          =    Error term.

## ESTIMATION PROCEDURE

### Ordinary Least Square (OLS)

In this case the coefficient of determination, $R^2$ test was used purely as a measure of the explanatory power of the model. The estimated regression coefficient t-test was used to determine whether or not the estimated coefficients of each of the selected explanatory variables is significant while the F-test was used to determine the joint significant of the explanatory variables as the overall test of significant.

### Unit Roots

As indicated in the literature, most time series variables are non-stationary and using non-stationary variables in the model might lead to spurious regressions (Granger, 1969). The regressions were run for all the series at both level and first difference and, with constant and trend in the equation using the appropriate lag level in consonant with SIC criterion. The ADF test  appropriate for testing presence of unit roots in the variable was used.

## COINTEGRATION TEST

Co-integration test help to determine the existence of long run equilibrium relationship between the variables. Both the Trace and Maximum Eigen statistics were used in rejecting the null hypotheses. Dickey, et al (1991) noted that lack of co-integration suggests that such variables have no long run-relationship; they wander arbitrary far a way from each other. The co-integration equation is derive thus;

$\{\eta m \log RPC_t \ \alpha_1 + \sum_{i=0}^{n} \alpha \eta m\}$ zt- $\{ \eta m \log RPC_t - \sum_{t=1}^{n} \beta x_t = 1\}$ = the linear combination of the non-co-integrated vectors.

X =Λ vector of the non-co-integrated variables.

## ERROR CORRECTION MODEL EQUATION

When infact, co-integration is proven to exist, the next step requires the error correction mechanism (ECM) to model the dynamic relationship in order to show the speed of adjustment from the short-run equilibrium to the long-run equilibrium state. The higher the coefficients, the greater the degree of adjustment of the model from the short to long run equilibrium. This process helps to separate the individual influence of the co-integration variables.

The ECM equation is derives thus;

$\{\eta m \log RPC_t \ \alpha_1 + \sum_{i=0}^{n} \alpha \eta m\}$ zt- $(\lambda ECM_t$ -1+V$\mu$   -        -        -        6.

Where $\lambda$ ECM = The error correction mechanism.

$\lambda$    =    The magnitude of error corrected each period specified, it's a priori form to restore   ηmz$_t$ to equilibrium, where z$_t$ represents the explanatory variables.

**Table 1: ORDINARY LEAST SQUARE (OLS) REGRESSION RESULTS**

| Dependent Variable: GDP | | | | |
|---|---|---|---|---|
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| | | | | |
| | | | | |
| C | 3.900084 | 0.829689 | 4.700658 | 0.0001 |
| LOG(DS) | -0.143655 | 0.131569 | -1.091860 | 0.2845 |
| LOG(XDS) | 1.148601 | 0.128329 | 8.950457 | 0.0000 |
| | | | | |
| R-squared | 0.910442 | Mean dependent var | | 14.02548 |
| Adjusted R-squared | 0.903808 | S.D. dependent var | | 2.224141 |
| S.E. of regression | 0.689815 | Akaike info criterion | | 2.189852 |
| Sum squared resid | 12.84780 | Schwarz criterion | | 2.329972 |
| Log likelihood | -29.84779 | F-statistic | | 137.2396 |
| Durbin-Watson stat | 1.186594 | Prob(F-statistic) | | 0.000000 |

**Table 2: UNIT ROOT TEST OF VARIABLES USING ADF TEST (1980 – 2009)**

| Variables | At levels | Order of integration | 1st Difference | Order of integration |
|---|---|---|---|---|
| ΔLN(GDP) | -0.355498 | I (0) | -4.457370 | I (1) |

| Δ LN(DS) | -3.215252 | I (0) | -4.112140 | I (1) |
|---|---|---|---|---|
| ΔLN(XDS) | -1.653212 | I (0) | -5.761876 | I (1) |
| ΔLN(EX) | -0.586500 | I (0) | -6.276974 | I (1) |
| ΔLN(EXPORT) | -0.556275 | I (0) | -4.693829 | I (1) |

Critical values at levels:  1%  = -3.679322,       5% = -29067767 ,        10% = -2.622989
At 1st Differencing:     1%  = -3.689194,        5% = -2.971853 ,         10% = -2.625121

## Table 3: Johansen Co-integration Tests Result (1981 – 2009)

| Unrestricted Co-integration Rank Test (Trace) | | | | |
|---|---|---|---|---|
| | | | | |
| Hypothesized | | Trace | 0.05 | |
| No. of CE(s) | Eigen value | Statistic | Critical Value | Prob.** |
| | | | | |
| None * | 0.795491 | 78.00518 | 29.79707 | 0.0000 |
| At most 1 * | 0.573331 | 36.73942 | 15.49471 | 0.0000 |
| At most 2 * | 0.429537 | 14.59399 | 3.841466 | 0.0001 |
| | | | | |
| Trace test indicates 3 co-integrating eqn(s) at the 0.05 level | | | | |
| * denotes rejection of the hypothesis at the 0.05 level | | | | |
| **MacKinnon-Haug-Michelis (1999) p-values | | | | |
| | | | | |
| Unrestricted Cointegration Rank Test (Maximum Eigenvalue) | | | | |
| | | | | |
| Hypothesized | | Max-Eigen | 0.05 | |
| No. of CE(s) | Eigen value | Statistic | Critical Value | Prob.** |
| | | | | |
| None * | 0.795491 | 41.26577 | 21.13162 | 0.0000 |
| At most 1 * | 0.573331 | 22.14542 | 14.26460 | 0.0023 |
| At most 2 * | 0.429537 | 14.59399 | 3.841466 | 0.0001 |
| | | | | |
| Max-eigen value test indicates 3 co-integrating eqn(s) at the 0.05 level | | | | |
| * denotes rejection of the hypothesis at the 0.05 level | | | | |
| **MacKinnon-Haug-Michelis (1999) p-values | | | | |

## Table 4: Error Correction test

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| | | | | |
| C | 0.676444 | 0.142877 | 4.734453 | 0.0052 |
| D(LOG(GDP(-1))) | 0.826465 | 0.231447 | 3.570860 | 0.0160 |
| D(LOG(GDP(-2))) | -0.622767 | 0.267564 | -2.327546 | 0.0674 |
| D(LOG(GDP(-3))) | -0.474643 | 0.148800 | -3.189808 | 0.0243 |
| D(LOG(GDP(-4))) | 0.451483 | 0.252672 | 1.786829 | 0.1340 |
| D(LOG(GDP(-6))) | -0.634933 | 0.207425 | -3.061018 | 0.0281 |
| D(LOG(DS)) | -0.099104 | 0.059462 | -1.666682 | 0.1565 |
| D(LOG(DS(-1))) | 0.303968 | 0.057914 | 5.248637 | 0.0033 |
| D(LOG(DS(-2))) | -0.139773 | 0.062478 | -2.237145 | 0.0755 |

| | | | | |
|---|---|---|---|---|
| D(LOG(DS(-3))) | 0.343007 | 0.082477 | 4.158827 | 0.0088 |
| D(LOG(DS(-6))) | -0.175983 | 0.087757 | -2.005340 | 0.1012 |
| D(LOG(XDS)) | -0.303693 | 0.054723 | -5.549624 | 0.0026 |
| D(LOG(XDS(-1))) | -0.329515 | 0.091281 | -3.609895 | 0.0154 |
| D(LOG(XDS(-2))) | -0.274472 | 0.115682 | -2.372638 | 0.0637 |
| D(LOG(XDS(-3))) | -0.377878 | 0.121168 | -3.118640 | 0.0263 |
| D(LOG(XDS(-4))) | -0.154967 | 0.077935 | -1.988415 | 0.1035 |
| D(LOG(XDS(-6))) | -0.091966 | 0.046428 | -1.980838 | 0.1045 |
| ECM(-1) | -0.285080 | 0.097187 | -2.933312 | 0.0325 |
| | | | | |
| R-squared | 0.958908 | Mean dependent var | | 0.244611 |
| Adjusted R-squared | 0.819195 | S.D. dependent var | | 0.179125 |
| S.E. of regression | 0.076166 | Akaike info criterion | | -2.272646 |
| Sum squared resid | 0.029006 | Schwarz criterion | | -1.383998 |
| Log likelihood | 44.13543 | F-statistic | | 6.863415 |
| Durbin-Watson stat | 3.124553 | Prob(F-statistic) | | 0.021341 |

## RESULTS AND DISCUSSION

The argument in equation 1,2 and 3 above were tried with both linear and log linear specification and the one that suits our specification judged in terms of goodness of fit, precision of estimates and a tolerate level of multi-co linearity was chosen. Also the relative statistics and global utility of the log linear model shows superiority over the linear, hence our choice of the log linear model for this study.

The OLS regression test, test the short run relationship among the variables. The result indicates that the explanatory variable explains 91% variation in GDP and was significant at 1% level. The coefficient of D.W. statistics confirm presence of serial correlation hence call for unit root test. The ADF test is used to test for stationarity of the variable. The result shows that log DS was stationary even at level with 3.21525 while XDS was found to be stationary at first difference with 5.761876 differences. The Johansen co-integration test shows that all the variables were co-integrated at 5% level indicating a linear combination of the series using both Maximum Eigen and trace statistics.

The confirmation of the existence of a co-integrating vector among the series gives enough background to carry out the short run dynamic adjustment. Adopting the general to specific frameworks, we estimate an over paramertized error correction mechanism from where a parsimonious error correction model is obtained (OPECM), the result indicates that GDP adjust fairly to the influence of DS and XDS. The ECM coefficient of 95% shows that there exists a long-run equilibrium relationship among the studied variables which was also significant at 5% level.

## SUMMARY, CONCLUSION AND RECOMMENDATION

### Summary and Conclusion

This paper explores the dynamics of external debt stock and servicing on the Nigeria economic growth rate between the periods 1981 to 2010. The estimated results shows that both external debt stock (DS) and external debt servicing has a negative effect on economic growth rate in Nigeria. The result further indicates the existence of both short and long-run

equilibrium relationship in a positive direction. Implying that increase in external debt stock and servicing is capable of retarding economic growth in Nigeria judge by the influence of DS and XDS on GDP as our overall regression model was significant at 1%.

## POLICY RECOMMENDATIONS

Based on the results, it is pertinent that Nigeria governments deploys contracted loans for the desire purpose and reap the gains of external finance.

There is need to improve the competitiveness of the economy in order to improve macro-imbalance to help mobilize domestic resources rather than dependent on external loan. Given that greater percentage of our national budget goes for external debt servicing, there is need to argument domestic resources locally instead of external funds which had been found to impede economic growth rate.

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