

Impact of Debt Overhang and Crowding out Effects on Capital Formation

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Abstract

The deficiency of savings in Sub-Saharan Africa, as represented by especially Nigeria has led to shortages in funding capital formation, thereby necessitating external borrowing. This has slowed down and restrained economic growth and development due to the twin problems of debt overhang and crowding out effects. The objective of this study is to assess the impact of debt overhang and crowding out effects on capital formation in Nigeria. Vector Autoregressive (VAR) modeling on time series data covering three decades were employed in the study. The results have established that, debt overhang and crowding out effects have significant negative effects on capital formation. The overall implication of the research findings is that speed of capital formation has been retarded by the negative effects of external debts in form of debt overhang and crowding out effects. Measures by the government should be tailored towards improving capital formation by designing policies that will reduce the burden of debt accumulation and reducing the cost of external debt services. This can be done through enhancing the debt management process and improving efficiency in funds utilization.

Keywords: *External debts, debt overhang, crowding out effect, capital formation*

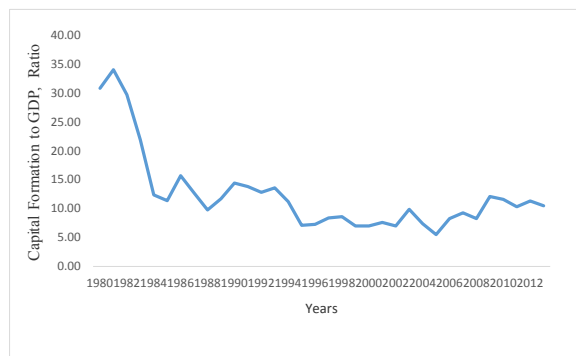
I. Introduction

It is generally acknowledged that economic development can only be achieved and maintained when the stock of capital has reached a certain threshold level whereby it will be strong enough to sustain a Capital Formation that will lead to a self-propelling economic growth. This scenario is however hardly attainable without foreign intervention in form of external funding for most of the third world nations (Hunt, 2007, Bakare, 2011); which also often lead to the twin problems of debt overhang and crowding out effects. This has inflicted an enormous damage on the economies of the third world, especially Sub-Saharan African nations by weakening their capital formation processes. Invariably, therefore, foreign loans have acted as key restraints to capital formation in Nigeria (Adegbite, et al., 2008). Fluctuations and intermittent decline in the ratios of capital formation to GDP, and its inability to reach a minimum level of 27 per cent; which is a pre requisite for sustainable development for over three decades was witnessed, and continued unabated in SSA countries in general and Nigeria in particular.

Theories and empirical evidences abound to prove that, no meaningful economic growth can take place and be sustained without maintaining capital formation at a more than 27 percent level, as measured by capital formation to GDP ratio. The average Gross capital formation ratio to GDP, in SSA countries, that have witnessed slowing growth rates was below 17 per cent, while advanced economies recorded over and above 27 per cent. The SSA countries ratio falls far below the acceptable minimum ratio throughout the period under study (Gillis, Perkins, Roemer & Snodgrass, 1987; Harnandez-Cata, 2000). This scenario, rationalizes the link between slow economic growth rates and the rate of growth of capital formation in developing economies.

Nigeria's, Capital formation to GDP, ratio has fallen below this minimum requirement as captured by Figure 1.1. A pertinent question to ask so as to give a solid foundation to this study is; to what extent has debt overhang and crowding out effects impacted on capital formation in Nigeria? It is thus the objective of the study to examine the impact of debt overhang and crowding out effects on capital formation in Nigeria. This study consists of five sections.

While theoretical and empirical literature reviews are done in Section two, Section three



deals with methodological aspects of the research, while five dealt with research findings, policy implications and conclusion of the study.

Figure 1: Nigeria's capital formation to GDP ratio, 180-2013, defined as $cao/gdp\%$

II. Literature Review

Capital Formation

Nurkse (1953) defined capital formation as that part of a resource which the society does not employ for current fruitful activity to the needs and desires of instant consumption, while Todaro (2009) defined it as the proportion of current income saved and subsequently put into profitable ventures in order to enhance future production and returns. As a result, new resources are added or existing resources upgraded with its essential feature involving a trade-off between present and future consumption giving less now in order to have more in the future (Enders & Harpers, 2013).

According to Bakare (2011), current unspent savings meant to supplement future productivity and output is known as capital formation. It is the resultant effect of acquiring of new industrial unit together with its machinery and paraphernalia which are inclusive of all useful capital possessions. It is also known as growth in assets of an economy with concentration in public and government interests. It is usually subdivided into two; private and public capital formation (Ugochukwu & Chinyere, 2013). These views were shared and buttressed by Youpoulos and Nugent (1976) and reaffirmed by Bakare (2011). In a nutshell, capital formation or accumulation of capital is referred to as the build-up or keeping of resources of value, growing of the value of wealth or more creation of same. It has been widely established by economists that capital formation plays a vital

function in economic progress modeling (Beddies 1999; Gbura & Hadjimichael 1996; Gbura, 1997).

A study by Ajao (2011) concluded that long-term capital formation in Nigeria was not found in the capital market alone, but also via the marginal impact of market re-capitalization and new issues. This result is linked with the findings of Sarkar (2006) which concluded that there is absence of a relationship that is considered meaningful between the stock market capitalization and gross fixed capital formation. Orji and Mba (2011), on the other hand analyzed the correlation amongst Foreign Private Investment (FPI), capital formation and growth in the country employing the Two-Stage Least Squares (2SLS) estimation procedure. Accordingly, Adegbite and Ayadi, (2008); and Adekunle and Aderemi (2012) suggested that real domestic investment be made to increase the total capital stock in the economy. It is done by employing more capital-producing and income making assets.

Other empirical findings confirmed that capital formation has encouraging and important impact on economic growth in Nigeria. These findings corroborate the findings of Bakare (2011) and Orji and Mba (2011). While stock markets have had a positive impact on capital formation, both inflation rate and interest rate had an adverse impact on economic growth even though statistically insignificant. The result further confirms an elongated correlation amongst capital formation and economic growth in the country (Bakare, 2011).

The debt overhang

Several scholars have paid close attention to the theory of the debt overhang. Fosu (1996), found strong evidence in favor of the debt overhang effect by empirically investigating the phenomenon in thirty-five SSA nations. Interestingly, Hansen (2001) found no important adverse association amongst external debt and economics growth hence the total absence of debt overhang. This was in a case of 54 underdeveloped nations. So also were conclusions from the works of Savvides (1992), who proved that the ratio of borrowings to GDP had no substantial consequence on the nation's economic development. On the other hand, nevertheless robust proofs of debt overhang outcomes and consequences were confirmed in Latin American economies (Kaminsky & Pereira 1996) and similarly as in Deshpande (1997) for

a selected set of 13 economies, just as in Elbadawi *et al.* (1997) who worked on a set of 99 underdeveloped economies.

The literature field of economic growth vis-a-vis external borrowing is awash with the perceived negative relationship between foreign debt and capital formation, which consequently results into lower economic growth. Krugman (1988) defines this negative relationship as “debt overhang” whereby the potentials of repayment of outstanding facilities fall lower than the signed value. The study defined debt overhang as being the anticipated current value of any potential resource allocation that is not up to its outstanding loan. Several scholars have supported the theoretical case for debt overhang. Some of the studies include Krugman (1988) and Sachs (1988). Others like Greene and Villanueva (1991), Elbadawi *et al.* (1997) and Chowdhury (2001) reaffirmed this by coming up with ample proof that backs the debt overhang phenomenon. There are also a number of researches that tested the debt overhang theory, which include Borensztein (1990), Cohen (1993), Sachs (1989) and Warner (1992). Others are Patillo *et al.* (2002), Clements *et al.* (2003), Elbadawi *et al.* (1997), Chowdhury (2004) and Fosu (2007). Not many studies, however, have concentrated on the channels through which borrowings influence economic growth in general and capital formation in particular. However, Patillo *et al.* (2004) concluded that the effects of external debt are felt majorly via total factor productivity and investment.

Other studies that have supported the theoretical case for debt overhang as one of the most important negative side effects of external debt include Krugman (1988) and Sachs (1988). In those economies with heavy indebtedness, “external debt overhang” is considered a leading cause of distortion and slowness of economic growth (Sachs, 1989; Bulow-Rogoff, 1990). Economic growth slows down because these countries lose their pull on private investors while servicing of debts exhausts up so much of the indebted country’s revenue to the extent that the potential of returning to growth paths is abridged (Levy-Livermore & Chowdhury, 1998).

The Crowding Out Effects Theory

Next to debt overhang is the crowding out effect that has also been established to hold strong presence in the side effects of external debts. The theory is strongly supported by studies like

Claessens *et al.* (1996) and (Patenio & Agustina, 2007). Philosophy behind the crowding out effects concept assumes that government debts expends a greater part of the national savings meant for investment due to increase in demand for savings while supply remains constant, the cost of money, therefore increases Crowding out effects sets in at a point when only government and its agencies would be able to borrow due to excessive interest charges. Individual entrepreneurs and firms are thus unable to compete and hence crowded out of the market. Capital formation is thus affected via the economies inability to generate enough capital for investment.

Crowding out effects usually occurs due to excessive real interest charges while the terms of trade of an overly indebted country become worsen while foreign credit markets may no longer be available. Claessens *et al.* (1996) identified the decline in investment as being the effect of a decrease in a country’s available assets for financing investment and macroeconomics activities. Reduction in nation’s capability of maintaining its debt resulting from the crowding out effect; and therefore, as it strives to meet some of its obligations, leaving little capital for domestic investment (Patenio & Agustina, 2007).

Clements *et al.* (2003) further confirmed the foregoing negative reviews and scenarios and the effects of excessive borrowings were further validated by this and other findings which relates that the adverse effects of foreign borrowing on economic growth can be observed through debt stock and flow of service payments facilities that most probably crowd out public investment. The findings of Taylor (1993) deduced that debt caused liquidity restraints is a resultant effect of decline in government expenditure due to the continuous servicing of outstanding debt stocks in excess of what the economy can contain. Karagol (2004), indicated that there is much interest from developing countries in the link between external loan and economic development since debt overhang has an impact on investment and thus economic growth. However, the cause and effect is not a simple matter to establish because clearly, debt overhang has a substantial influence on the rate of investment. Claessens *et al.* (1996) discuss debt overhang theory, showing that the anticipated debt burden is an increasing aspect of a nation’s productivity.

III. Method

Based on the theories of the debt overhang and crowding out effect as explained in the previous section, Equation [1.1] was established, where, DOH is debt overhang variable, and COE is the crowding out effect variable. In this model, DOH is measured by the proportion of external debt to GDP , and COE is measured by scaling external debt service to the total exports of goods and services.

$$CAP_t = \lambda_0 + \lambda_1 EDS_t + \lambda_2 DOH_t + \lambda_3 COE_t + \lambda_4 INR_t + \lambda_5 EXC_t$$

EDS represents external debt service, INR represents interest rate while EXC stands for exchange rate and, λ_0 is the intercept, $\lambda_1, \lambda_2, \dots, \lambda_5$ are the coefficients of independent variables.

The objective of the study will be archived with the results of the VAR estimation of Equation [1.1] as explained in the VAR modeling approach employing the Impulse Response Function (IRF) and the Variance Decomposition Analysis.

Secondary time series data is employed for this study. The major advantages of using secondary data, include saving of time, the reduction of research costs, and the reduced likelihood of bias (Sekaran & Bougie, 2009). This study covers a period of 30 years and was sourced majorly through an intensive library survey and search; and the use of especially the world Development indicators and the statistical bulleting of the Central Bank of Nigeria (CBN).

Method of Analysis

The Vector Autoregressive (VAR) method was adopted for the purpose of this analysis and in estimating Equation [1.1]. In the systematic procedure of the VAR, findings were sensitive to the appropriate choice of both unit root test and optimal lag selections.

Vector Autoregressive Method

The VAR method, pioneered by Sims (1980), has been widely used in macroeconomic modelling. It is an estimation approach in which every equation has the same right-hand variables, that also contains their lagged values. VAR models use observed time series of data to forecast economic variables and have confirmed effective for forecasting systems of interconnected time series variables (Lada &

Wójcik, 2007). The VAR model is also commonly used for analyzing the active impact of diverse kinds of arbitrary instability on systems of variables such as the monetary transmission mechanism.

VAR modeling was popularized in econometrics by scholars like Sims (1980) as a regular or natural generalization of univariate autoregressive models. It represents systems of regression models (with more than one dependent variable) that can be considered a kind of hybrid between the univariate time series models and the simultaneous equations models. VAR modeling has often been advocated as an alternative to large scale simultaneous equations models. The simplest scenario that can be entertained is a bivariate VAR, where there are only two variables, y_{1t} and y_{2t} , each of whose current values depend on different combinations of the previous k values of both variables. One of the advantages of the VAR method of analysis is that it allows the value of a variable to depend on more than just its own lags or combinations of white noise terms. VARs are therefore more flexible than univariate AR models; the latter can be viewed as a restricted case of VAR models. VAR models can therefore offer a very rich structure, implying that they may be able to capture more features of the data

Another advantage of the VAR method is that there is no requirement of specifying which of the variables are endogenous or exogenous. This is critical in that a compulsory prerequisite for simultaneous equations models to be estimable is that all the equations in the system are identifiable. Basically therefore, this obligation boils down to a condition that; while some variables are treated as exogenous, the equations contain different right hand side (RHS) variables.

Unit Root Test

The prerequisite for time series variables being stationarity or non-stationary is noted in econometrics. Unit root or stationarity test is thus preliminary to the analyses of time series data and is imperative for proper modelling, while it has important economic interpretations (Nuri, 2000). Time series data that are often non-stationary which is generally seen as a problem in empirical analysis (Nelson & Plosser, 1982). Using non-stationary variables may lead to spurious regression results from which further inference is worthless. Thus, the existence of a significant relationship requires the

determination of whether the series are stationary at level $I(0)$ or at first difference $I(1)$. The stationarity of the variables or otherwise is determined by applying the unit root tests of the conventional Augmented Dickey-Fuller (ADF). A Dickey-Fuller (DF) test is an econometric test that examines whether a time series data has a unit root problem otherwise known as non-stationary. It was developed by Dickey and Fuller in 1976 and subsequently by Dickey and Fuller in 1979 and 1981 which resulted into the DF (1979, 1981). DF test is a one-sided test because of the alternative proposition or hypothesis that $\delta < 0$ (or $\rho < 1$). Dickey and Fuller (1979) considered three different regression equations that can be used in testing for the presence of unit root with similar null hypothesis (Enders, 2003).

Vector Autoregressive Model Estimation

The estimation procedure of the VAR models will be preceded by the determination or selection of the VAR order or lag length. The VAR order will be determined using appropriate model selection criteria such as AIC, SBC and/or log-likelihood ratio tests. Having established the appropriate lag length, the impact of debt overhang and crowding out effects on capital formation will then be examined using a system of equations known as VAR methodology. Following Sim, (1980) and Karim, Harif, & Adziz, (2006), the generalized VAR model is considered as represented by Equation [3.42].

$$x_{it} = A_0 + A_1x_{it-1} + A_2x_{it-2} + \dots + A_Nx_{it-n} + Bz_{it} + \varepsilon_{it}$$

where x , a vector of endogenous variables presented in debt overhang model depicted in Equation [3.15] (Capital formation, external debt service, debt overhang, crowding out effect, interest rate and exchange rate); $i = (1, 2, \dots, 6)$ and $j = (1, 2, \dots, 6)$. A_0 is a vector of intercepts, $A_1 \dots A_N$ and B are $n \times n$ vector of coefficients and ε_t is an $n \times 1$ vector of error terms correlated with each other but independent of its lagged series and lag endogenous and exogenous variables? A major conditionality of the VAR estimation is that the error terms are required to be serially uncorrelated.

Impulse Response Function

The direct interpretation of VAR models is rather difficult because it is composed of many coefficients so that it becomes difficult to understand the dynamic interactions between the variables. This study will therefore simulate the dynamic effects of the different structural shocks

by computing the impulse response function (IRF) (Hall *et al.*, 1996), that will show the effects over time of the structural shocks on the variables of concern. IRF helps this study to observe the shock effects of, for example debt overhang on capital formation over a long period of time given that the impact of debt overhang can hardly be felt instantaneously (Presbitero, 2008; Johansson, 2010). These effects can often be related to the underlying economic model and are thus at the heart of the VAR analysis, which is derived from the causal representation of the VAR process. Clearly, the IRF depends on the identification scheme chosen. There are n^2 if the system consists of n variables. Usually, the impulse response functions are represented graphically and are estimated to show the effect of shock on the adjustment path of the variables. In this case, the adjustment of capital formation as a result of debt overhang and crowding out effects. This is estimated to measure the shock effect on the future dynamic system.

Variance Decomposition

Another instrument for the interpretation of VAR models is the variance decomposition (VD), which decomposes the total forecast error variance of a variable into the variances of the structural shocks. It is based on the causal representation of the VAR model. Usually, the result is either displayed graphically or in table form. The results show which percentage of the forecast variance can be attributed to a particular structural shock and thus measure the contribution of each of these shocks to the overall fluctuations of the variables in question. VD separates the variation in an endogenous variable into the component shocks to the VAR. In other words, it provides information about the relative importance of each random innovation in affecting the variation of the variables in the VAR. The forecast error shows the magnitude of the forecast error or influence of the variables in the VAR model over time (Rusek, 1994).

In other words, VD provides information on the magnitude of the contribution of each variable in the performance of capital formation of Nigeria. The process shows how relevant, for example is debt overhang and crowding out effects compared to other variables included in the model as they relate to capital formation. It gives an insight to the researchers and policy makers alike on the variable to focus on, and manipulate in order to ensure an efficient and sustainable economic growth path.

Diagnostic Checks

Conducting the tests of stability leads to the determination of the goodness of fit of the ARDL model achieved through the diagnostic test. The test also includes the serial correlation test, functionality, normality and heteroscedasticity tests.

IV. Results and Discussion

Table 1.1 presents the unit root test output based on the ADF approach. The null hypotheses of non-stationarity failed to be rejected in all cases. All variables have established stationarity at least at five per cent level of significance employing the ADF unit root test at first difference.

Table 1: The Argument Dickey Fuller Stationarity Test Results

Variables	Constant Without Trend		Constant with Trend	
	Level	First Difference	Level	First Difference
EDS	-3.99(1)	-5.81(1) *	-4.13(1)	-5.76(1)
CAP	-3.01(0)	-4.85(1) *	-2.29(0)	-5.64(1) *
INR	-3.87(1)	-3.79(2)	-5.88(1)	-3.68(2) *
EXC	-1.12(0)	-4.62(0) *	-0.72(0)	-4.66(0)
DOH	-1.20(0)	-5.29(0) *	-2.12(0)	-5.55(0)
COE	-1.91(1)	-5.59(0) *	-3.48(0)	-5.85(0)

Notes: Figures are the *t*-statistics for testing the null hypothesis that the series are non-stationary. * denote significance at 5 per cent. Figures in parentheses are lag lengths.

In order to avoid reporting of spurious presence or absence of causal relations, it is important to determine the optimal lag length to be used for the estimations. A combination of AIC, SC, Likelihood Ratio (LR), HQ, Final prediction error (FPE) and other lag selection criterion were adopted and ran for the optimal lag length. The lag length selection criteria results are as presented in Table 1.2.

Table 2: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	154.29	NA	0.00090	10.019	10.294	10.110
1	6.872	251.829 *	3.78e-07*	2.196	4.120*	2.83 3*
2	46.270	46.785	3.94e-07	1.983*	5.556	3.167

Note: “*” indicates lag order selected by the criterion

LR: Sequential modified LR test statistic (each test at 5 % level of significance)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

From the table LR, FPE, SC and HQ selected lag 1 as the optimal lag, AIC selected lag 2 as the optimal lag for Nigeria’s series. Thus, lag 1 was slated for the estimation procedure as presented in the table. In the VAR, all variables are treated as basically endogenous while importance is laid on the conditionality that the error terms should be serially uncorrelated as earlier discussed. An extract of the estimates is presented in Table 1.3.

Table 3: VAR Estimates

Dependent Variable LCAP	LCAP
LCAP (-1)	0.488 (0.155)
LCOE (-1)	-0.215 (0.101)
LDOH (-1)	0.0331 (0.057)*
LEDS (-1)	0.248 (0.125)
LEXC (-1)	-0.119 (0.053)**
LINR (-1)	0.074 (0.138)
C	-3.470 (2.520)

Note: Figures in parenthesis are standard errors. * and ** indicate rejection of the null hypotheses that a parameter estimate is not statistically significant at 5 percent and 10 percent respectively.

The results of the test indicate that there is the presence of long term relationship amongst the variables. These findings have a significant role to play in understanding the dynamics of debt overhang and crowding out effects.

Impulse Response Function

In the panels of Figure 1.2 it is shown that successive response or reaction to one standard deviation in *DOH* by capital formation. It can be traced that the response was generally negative for the ten-year period under observation. From initial stage the reaction was rapidly negative up to the second period which marked the highest negative reaction before it starts decreasing and reaching a peak at the sixth period. Therefore, in the short run a shock on *DOH* leads to a negative reaction in *CAP*. In the long run however thought the response remains negative and relatively constant in subsequent periods, the model was statistically significant. The *DOH* effects on capital formation were more severe on the Nigerian economy in the short run. Due to debt relief around the seventh period and improved debt management policies put in place the speed of the negative relationship was normalized.

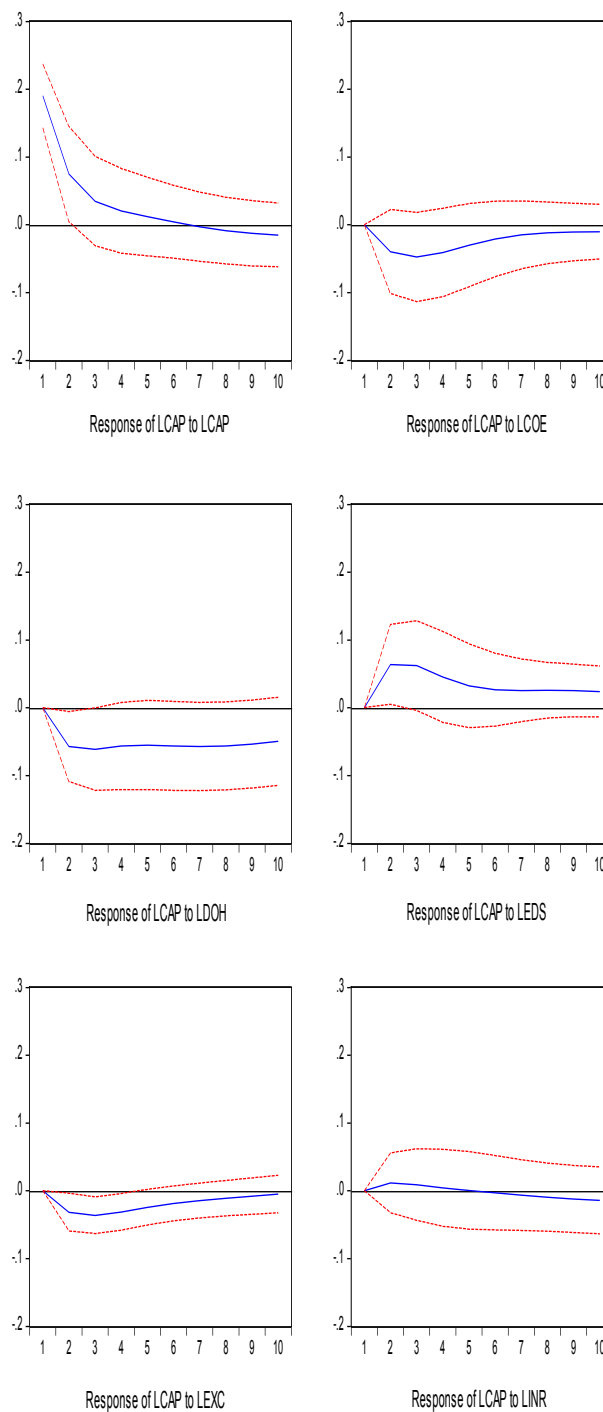


Figure 2: Impulse Response Function output

The figure displays the traces of the responses of capital formation as a result of a shock on crowding out effect (*COE*) variable. The results show that capital formation reacted negatively to changes in *COE*. The highest response was seen in periods two and three from which it moves back to zero in period four and ultimately becomes positive in period seven. In the long run, as represented by the last three periods

however the response reverts to negative. This is not surprising given the state of the *CAP* status in Nigeria. It was so weak that the slightest negative shock effect resulting from innovation in *COE* will have serious consequences on *CAP*. Similar patterns were recorded also resultant effects of innovations in other variables like exchange rate and interest rate.

Variance Decomposition

Table 1.4 shows the variance decomposition results of the effect of *DOH* and *COE* on capital formation. The results in this table plainly show that the *DOH* and *COE* factors have a strong and significant influence on capital formation. The sequence of variables in the VD are arranged based on the Cholesky decomposition order. In the table, results of the variance decomposition is shown, representing the proportion of forecast error variance, in the first instance, in capital formation as depicted by its own innovations and innovations in the independent variables.

Variance decomposition for 10 periods was calculated in order to establish the effects of the independent variables on capital formation. In the first year, it is given that all of the variance in capital formation is explained by its own innovations. Capital formation explains about 84 per cent of its innovations in the second year, 73 per cent, and 68 per cent in the third and fourth year respectively. The remaining contribution out of a hundred is explained by the independent variables. The two variables of interest explained in the model (i.e. *DOH* and *COE*) put together contribute much greater proportions than the remaining explanatory variables and contribute even more as time progresses.

Table 4: Variance Decomposition of LCAP

Per iod	S.E.	LCAP	LDOH	LCOE	LEDS	LEXC	LINR
		100.000	0.00000	0.00000	0.00000	0.00000	0.00000
1	0.190280	0	0	0	0	0	0
		80.5543	7.77374	1.57257	7.89092	1.94032	0.26805
2	0.227779	7	5	0	7	9	5
		66.8184	13.6140	3.24833	12.3613	3.61379	0.34406
3	0.253704	6	3	7	1	5	6
		59.7441	17.5122	4.10838	13.7672	4.53607	0.33193
4	0.269603	8	3	4	0	7	9
		55.5685	20.7592	4.30181	14.1010	4.96127	0.30798
5	0.280010	6	9	9	7	5	3
		52.4601	23.7834	4.18972	14.1636	5.10112	0.30198
6	0.288245	2	2	8	2	1	5
		49.8308	26.5567	4.00053	14.1973	5.08079	0.33369
7	0.295781	5	8	6	5	2	6
		47.5944	28.9360	3.81674	14.2611	4.97492	0.41672
8	0.302912	3	7	4	1	4	9
		45.7725	30.8462	3.65776	14.3384	4.83092	0.55399
9	0.309448	8	6	5	8	0	4
		44.3531	32.3115	3.52688	14.3914	4.67941	0.73757
10	0.315183	5	1	7	7	1	3

Note: SE stands for Standard Errors; *LCAP* *LCOE* *LDOH*, *LEDS*, *LEXC* & *LINR* represents capital

formation, crowding out effects, debt overhang, external debt services, exchange rates and interest rate respectively. All the series are in Natural log form.

Conclusively, therefore, even though the level of contribution to the changes in capital formation increases over successive periods by the other three explanatory variables, the magnitude is not as much as the two variables of interest. Any policy on capital formation should therefore take cognizance of external debt whose consequences results and explains *COE* and *DOH* collectively and individually. Efforts should be geared towards proper and more effective external debt management as to give a proper guide towards the twin's negative effects of debt overhang and crowding out effects.

Diagnostic Checks

Diagnostic checks were further applied and appropriate lags levels determined to ensure a better model. Diagnostics tests applied included serial correlation test, normality test and heteroskedasticity test. The results from these tests point out that the estimated VAR system is generally free from serial correlation. In other words, the residuals are not correlated. Additionally, no evidence of heteroskedasticity was found on the errors of the estimated system. To put it differently, the errors were found to be homoskedastic. On the normality of the errors, it was confirmed that they are normally distributed. Therefore, it can be concluded that the results are not affected by the white noise distribution process, hence efficient and consisted.

Table 5: Diagnostic tests

Types of Tests	Results	
	χ^2	p-value
Exogeneity test	14.946	0.134
Serial Correlation test	31.729	0.672
Heteroskedasticity test	500.229	0.539
Normality test (Jack-bera)	30.968	0.002

Note: Serial correlation test is conducted based on LM statistics values

Conclusion

Using the *VAR* approach, the results of *IRF* show that, a one standard deviation shock in *DOH* leads to a substantial negative reaction by *CAP* successively with a statistically significant result over the thirty-year period. The trace of the

response of capital formation over a period of time, as a result of a shock on crowding out effect variable also reacted negatively as a whole but fluctuates over time from negative to positive. Variance Decomposition (*VD*) was also calculated in order to establish the effects of the independent variables on the dependent variable. The two variables of interest explained in the model; *DOH* and *COE*, put together contribute much greater proportions than the remaining explanatory variables. Thus it can be concluded that *DOH* and *COE* contributes much more to the changes in capital formation than any of the remaining variables put together. It is worth nothing however that, there is a bidirectional causality running between *SAV* and *CAP* in the examined model. While there is a causal relation between *COE* and *CAP*, there is no causality between *CAP* and *COE*; just as there is zero causality between *CAP* and *DOH*.

Based on the above policy implications, the study provides some policy recommendations for consideration. In general, therefore, it is the view of this study that, apart from government cutting down on its expenditures especially on recurrent and maintaining fiscal discipline, political stability should also be considered paramount, for no investment prospers without conducive and enabling business environment. In addition, since long outstanding facilities contribute to large repayment requirements that ultimately translate to the fact that other resources meant for investments are diverted to loan servicing and repayment. The facilities should not be allowed to go bad or remain outstanding in order to minimize the impact of debt servicing and maintenance cost. In addition, emphasis should be placed on concessionary aid derivation from multilateral donor agencies and foreign direct investors.

References

- Ajao, M. G. (2011). Stock market development, capital formation and growth in Nigeria. *International Journal of Current Research*, 33(6), 382-388.
- Ajayi, L. B. & Oke, M. O. (2012). Effect of external debt on economic growth and development of Nigeria. *International Journal of Business and Social Science*, 3(12), 297-304.
- Ajayi, S. I. & Khan, M. S. (2000). External debt and capital flight in Sub-Saharan Africa. *International Monetary Fund, IMF Institute, Washington, from* <http://www.imf.org/external/pubs/nft/2000/extdebt/>.
- Ajayi, Samuel I. (1991). Macroeconomic approach to external debt: The case of Nigeria. African Economic Research Consortium, Nairobi Kenya. December, 1991.
- Ajisafe, R. A., Nassar, M. L., Fatokun, O., Soile, O. I. & Gidado, O. K. (2006). External debt and foreign private investment in Nigeria: A test for causality. *African Business Review*, 4(1), 1109-5609.
- Akpokodje, G. (1998). Macroeconomic policies and private investment in Nigeria, in "rekindling investment for economic development in Nigeria", by Ben E.
- Arslanalp, S. & Henry, P. B. (2004). Helping the poor to help themselves: Debt relief or Aid. <http://gsbapps.stanford.edu/researchpapers/library/RP1838.pdf>
- Ashinze, J. O. & Onwioduokit, E. A. (1996). Economic growth and foreign debt: a case study of Nigeria. *CBN Economic and Financial Review*. 34, 523-40.
- Audu, Isa (2004). The Impact of External Debt on Economic Growth and Public Investment: The Case of Nigeria. African Institute for Economic Development and Planning (IDEP) Dakar Senegal., <http://www.unidep.org>.
- Azam, J. P. & Daubree, C. (1997). Bypassing the State: Economic growth in Kenya, 1964-90. Development Centre, O.E.C.D., Paris.
- Bakare, A. S. (2011). A theoretical analysis of capital formation and growth in Nigeria. *Far East Journal of Psychology and Business*. 3(1), 12-24.
- Beddies, C. (1999). Investment, capital accumulation and growth: some evidence from Gambia: 1964-1998; *IMF Working Paper*, 99/117, August.
- Ben-David, D. (1998). Convergence clubs and subsistence economies. *Journal of Development Economics*. 55, 155-171.
- Borensztein, E. (1990). Debt overhang, credit rationing and investment. *Journal of Development Economics*, 32,315-335.
- Bulow, J. & Rogoff, K. (1990). Cleaning up third-world debt without getting taken to the cleaners. *Journal of Economic Perspectives*. (4) 31-42.

- Chowdhury, A. R. (2001). External debt and growth in developing countries: A sensitivity and causal analysis. Discussion paper 95. World Institute for Development Economics Research (WIDER), United Nations University, Helsinki.
- Chowdhury, A. R. (2004). External debt, growth and the HIPC initiative: Is the country choice too narrow? In Debt Relief for Poor Countries. Tony Addison, Henrik Hansen and Finn Tarp. Chapter 8.
- Chowdhury, K. (1994). A structural analysis of external debt and economic growth: Some evidence from selected countries in Asia and the Pacific. Applied Economics. 26, 1121-1131.
- Claessens, S., Detragiache, E., Kanbur, R. & Wickham, P. (1996). Analytical aspects of the debt problems of Heavily Indebted Poor Countries, Washington, DC, World Bank Policy Research Working Paper No. 1618, World Bank.
- Clements, B., Gupta, S. & Inchauste, G. (2003). Fiscal policy for economic development: an overview: <http://www.imf.org/external/pubs/nft/2004/hcd/ch01.pdf>.
- Cohen, D. (1993). Low investment and large LCD debt in the 1980s. The American Economic Review, 83(3), 437-449, cointegration tests. Applied Economics, 37 (17), 1979-1990.
- Deshpande, A. (February 1997). The Debt Overhang and the Disincentive to Invest. Journal of Development Economics, 52, 169-187
- Elbadawi, I. A., Ndulu, B. J. & Ndung'u, N. (1997). Debt overhang and economic growth in Sub-Saharan Africa, in Zubair Iqbal and Ravi Kanbur eds. external finance for low- income countries, International Monetary Fund. Washington DC.
- Fosu, A. K. (1996). The impact of external debt on economic growth in Sub-Saharan Africa. Journal of Economic Development. 12(1).
- Fosu, A.K. (2007). The external debt-servicing constraint and public expenditure composition: evidence from African economies. Helsinki, Research Paper No. 2007/36, UNU-WIDER,
- Greene, J. & Villanueva, D. (March 1991). Private investment in developing .IMF Staff Papers 38, 33-58.
- Hansen, H. (2001). The impact of aid and external debt on growth and investment: Insights from cross-country regression analysis. Presented at the wider Conference on Debt Relief, United Nations University Helsinki, Finland.
- Herandez-Cata, E. (2000). Raising growth and investment in Sub-Saharan Africa: What can be done? Policy Discussion Paper: PDP/00/4, International Monetary Fund, Washington DC.
- Hunt, S. D. (2007). Economic growth: should policy focus on investment or dynamic competition? European Business Review, 19(4), 279-91.
- Karagol, E. (2004). External debt and economic growth relationship using simultaneous equations, University of Balikesir, Turkey.
- Krugman, P. (1988). Financing vs. forgiving a debt Overhang: Some Analytical Notes. Journal of Development Economics. 29. 253-268.
- Levy-Livermore, A. & Chowdhury, K. (1998). Handbook on Globalization of the World Economy, Edward Elgar Publishing Limited. Cheltenham, UK.
- Orji, A & P. N. Mba (2011), "Foreign Private Investment, Capital Formation and Economic Growth in Nigeria: a two stage least square approach" *Journal of Economics and Sustainable Development*, ISSN 2222-1700 (Paper) ISSN 2222-2855 (Online)
- Patenio J. A. S. & T. Agustina (2007). Economic growth and external debt servicing of the Philippines: 1981-2005: 10th National Convention on Statistics (NCS), October 1-2.
- Sachs, J. (1988). The debt overhang of developing countries, in debt, stabilization and development: Essays in Memory of Carlos Diaz Alejandro. Calvo, A. Gillermo et al. (Eds.). Oxford: Basil Blackwell, 80-102.
- Sachs, J. (1989). Developing country debt and the world economy. National Bureau of Economic Research. The University of Chicago. United State of America.
- Sarkar, P. (2006). Stock market development and capital accumulation in less

- developed countries. Mimeograph
Jadavpur University, Kolkata India
- Savvides, A. (1992). Investment slowdown in developing countries during the 1980s: Debt overhang or foreign capital inflows, *Kyklos*, 45(3), 363-378.
- Taylor, L. (1993). *The Rocky Road to Reform: Adjustment, Income Distribution and Growth in the Developing World*. MIT Press, London.
- Ugochukwu, U. S. & Chinyere, U. P. (2013). The impact of capital formation on the growth of Nigerian economy. *Research Journal of Finance and Accounting Research*, 4, (9), 2222-2847
- Ugochukwu, S., Judith, N. & Edith, O. (2014). The impact of foreign direct investment on capital formation in Nigeria: A cointegration approach, *the International Journal of Finance and Management*. 2(2), 188-196.
- Wang, F. (2009). The effects of foreign borrowing policies on economic growth: Success or Failure? *Journal of Economic Policy Reform*. 12(4), 273-284.
- Warner, A. M. (1992). Did the debt crisis cause the investment crisis? *The Quarterly Journal of Economic*, 107(4), 1161-1186.
- Were, M. (2001). The impact of external debt on economic growth and private, investments in Kenya: An Empirical Assessment. Wider Development Conference on Debt Relief 17-18 August 2001, Helsinki.
- Wijeweera A., Dollery B. & Pathberiya P. (2005). Economic growth and external debt servicing: A Cointegration analysis of Sri Lanka. Working Paper Series in Economics. School of Economics; University of New England. 1442-2980.
- Yotopoulos, P. & J. Nugent. (1976), *Economics of Development: Empirical investigations*. Harper and Row New York.