

Testing the Validity of Crowding out Effects Hypothesis on Nigeria's Economy: Vector Error Correction Model (VECM) Approach

Eze Titus Chinweuba (Ph.D)¹, Apeh Ajene Sunday(Ph.D)²

1. Department of Economics, Ebonyi state university, Abakaliki-Nigeria

2. Department of Economics &Mgt Science, Nigeria Police Academy, Kano-Nigeria

Abstract: This paper is specifically set out to confirm the existence or not of crowding out postulations in Nigeria's economy which in order words requires examining the extent at which changes in deficits financing (DF) influences changes in domestic private investment (DPI) in Nigeria using time-series data ranging from 1980 to 2018. The methodology adopted for this study is multiple regressions based on ordinary least square (OLS) techniques. The specified models were estimated using standard econometric techniques which include: Augmented Dickey-Fuller (ADF) unit root tests, Johansen co-integration tests, Vector Error Correction (VECM) Model, and systems equation complemented with Granger causality tests, aimed at determining the existence, if any, of feedback effects among the series in the model. The regression results show that at 5 percent level of significance and relevant degrees of freedom, changes in deficit financing (DF) have a positive and significant long run impact on domestic private investment (DPI) in Nigeria. However, the result revealed that deficit financing crowds out domestic private investment only in the short run. Based on the findings, the researcher made the following suggestions: government should as a matter of urgency and importance adopt fiscal management actions that aim at minimizing borrowing and capable of reducing fiscal deficits that often result in large chunk of transfer payments, and questionable extra budgetary expenses. There is need also for the government to align fiscal policies towards the objectives of macro-economic stability, promotion of domestic savings and investment and market-oriented structural reforms in order to promote domestic private investment. Efforts should therefore be made to control the excess liquidity in the economy by a combination of a good fiscal and monetary policy framework to curb the unending inflationary cases in the country. This can be done by cutting down on government expenditure, increase in investment, and reduction in corrupt practices by government officials.

Keywords: Deficit financing, Domestic private investment, Time-series Data, Error correction Model, Granger Causality, System Equation, Augmented Dickey-fuller, Co-integration Test, Unit Root Test,

Date of Submission: 06-05-2020

Date of Acceptance: 19-05-2020

I. Introduction

Economic theory holds that capital accumulation is the main factor behind long-term economic growth. It is equally believed that technological progress through capital accumulation is the catalyst for countries to escape low level equilibrium trap involving a vicious cycle of poverty. For instance, Rostow's economic development model emphasizes that for the process of economic development to actually take-off, there is the need for sustained growth in terms of ratio of investment to national income (Adegbite & Owulabi, 2017). Similarly, Lewis (1955) noted that the process of economic development involves transforming an economy from being a 5% saver and investor to that which is saving and investing at least 12% of its net income (Adegbite & Owulabi, 2017). Therefore, it becomes pertinent that for any country to achieve and sustain economic growth, such a country must dedicate substantial part of its national income to savings, which would be consequently invested to accumulate capital.

Ideally, it is the responsibility of the government to put in place policies that can increase domestic private investment in any economy. Apart from other macroeconomic variables, deficit financing has remained the most reliable policy option. Deficit financing is seen as the surplus of the entire income and investment made in addition to earnings from disequilibrium (Obinna, 2004). Admittedly, government must borrow to correct the imbalance between deficit and surplus. However, problem arises when the amount borrowed becomes severe.

The link between deficit financing and domestic private investment remains one of the inconclusive issues among researchers and policy makers in both advanced and developing countries. Nevertheless, the relationship can assume negative or positive sign. Disparity concerning these relationships can be illustrated by the style engaged by an individual country coupled with the type of data used by different scholars on the issue.

Some of these scholars made domestic private investment as a function of deficit finances or allowed deficit financing to depend on the domestic private investment.

In view of the above, Nigerian governments after the civil war sought approaches to build the country's economy and place the economy on the path of development. Thus, in an effort to build the economy, Nigerian government embarked on a massive deficit financing with the aim of accelerating domestic private investments for sustainable economic growth and development. Thus, with a tremendous increase in revenue profile through oil exports and equally, increasing capital expenditure overtime, Nigeria's economy has continued to witness a paradoxical growth process since 1980s. It does not appear as if the increase in capital expenditures has translated into increased capital formation and consequent economic growth and development, as records of the past four decades have generated some concern over the slow pace of industrial and infrastructural development. The problem becomes that Nigeria domestic investment as well as capital accumulation has not been growing but has instead declined over the years (World Bank, 2014).

From the statistics provided by the central bank of Nigeria statistical bulletin, domestic investment grew on average by 26.4 percent between 1981 and 2017 while real gross domestic product only recorded an average growth rate of 4.3 percent within the same period. Specifically, domestic investment grew from -9.7 percent in 1982 to 56.6 percent in 1992 and further declined to 4.8 and 12.8 percent in 2012 and 2017 respectively. With respect to real GDP, it grew from -1.8 percent in 1982 to 2.2 percent in 1992, 4.2 in 2012 and 0.8 in 2017 (CBN, 2017). By way of comparison, it was observed that while the domestic investment recorded a huge growth rate between 1981 and 2017, the growth rate in RGDP within the same period is little especially when one considers the theoretical postulations that investment is the only way through which growth can be achieved. The implication of the observed anomaly is that the share of domestic investment to real gross domestic product between 1981 and 2018 is only a paltry 5.5 percent (CBN, 2019). This has resulted into macroeconomic problems of high inflation rate, balance of payment disequilibrium, high external debt ratio, high rate of unemployment, etc. In fact, the recent economic recession experienced in second and third quarters of 2016 was largely blamed on the poor domestic investment nature of Nigeria's economy where oil export constitutes 90 % to Nigeria export earnings (Ainabor et al, 2014).

The noticeable fall in the ratio of private sector investment to GDP in spite of the emphasis on private sector following the introduction of public sector reforms is even more perturbing and therefore cast doubts as regards the role of deficit financing in spurring domestic private investment and hence, economic growth in Nigeria. Several studies have been conducted in respect of this with some researchers finding either positive or negative relationship between deficit financing, domestic private investment and economic growth nexus in Nigeria, while few others found no causation between these variables. In view of the inconsistency in findings of previous researchers and the declining nature of domestic private investment in the country despite rising capital expenditure and the expected contributions of this relationship to national growth as claimed by the fiscalists, this study thus becomes compelling so as to evaluate the theoretical relevance of the avowed positive relationship between deficit financing and the domestic private investment in Nigeria.

The issues this study deals with include whether deficits financing have been the reason for dismal performance of macroeconomic variables in Nigeria, especially declining domestic private investment and the causes and impacts of these on economic growth process in Nigeria. In other words, does crowding out hypothesis prevail in Nigeria's Economy?

II. Review of Related Literature

This stage thematically presents the theoretical and empirical literature on the effect of deficits financing on domestic private investment. It discusses the various theories relating deficits financing and domestic private investment. However, criticism against the reviewed works, where necessary, was made.

Theoretical Review

2.1 Neoclassical model

When examining the effects of deficits financing on private investments, four schools of thought providing different paradigms are considered. These are: Neoclassical, Keynesian, Ricardian Equivalence (Bernheim, 2010) and Lerner's overlapping generations' model developed in 1948. The traditionalist imagines household forecasting her spending over their entire life cycle. The theory emphasizes that by extending taxes to the upcoming generations, budget deficits augment current spending. The neoclassical school was of the opinion that under full employment of resources, bigger consumption will give rise to a fall in savings. This will cause interest rate to increase in the capital markets in order for equilibrium to be achieved. As the interest rate rises, private domestic investment falls. The power of the government to control economic activity through fiscal measures will consequently reduce (George, 2009), in (Bailey, 1971; and Buiter, 1977). In a typical neoclassical macroeconomic model, as claimed by (Yellen, 1989), the ways of financing deficit influences the

level of spending, savings and net exports. Taking into consideration full employment of resources, increased current spending means equal reduction in the expenditures of others, he concluded.

The weakness of this preposition is that very few economies, including Nigeria have attained the level of full employment of resources. For instances, labour unemployment is estimated to be over 45 percent in Nigeria. This clearly shows that the standard neoclassical macroeconomic model cannot explain macroeconomic performance in Nigeria.

2.2 *The Keynesian Model*

In the opinion of Eisner (1989), “the Keynesians provided a counter argument to the crowding out effect by making reference to the expansionary effects of budget deficits”. This study recommended that rising budget deficits would result to increased household production, and this will cause businessmen hopeful about the further path of the economy, hence leading to additional domestic private investments. Furthermore, budget deficits would have the implication that the government is investing in infrastructure, aimed at lessening the capital outlay involved in running business in the future. As reported by Saleh (2004), there are two ways Keynesian view differs with the traditionalist. First, “it envisaged the likelihood that some economic capitals are idle and secondly, it foresees the survival of a larger number of liquidity constrained individuals”, he concluded. Though this theory can be said to be relevant in developed country where inflation is relatively stable and savings rate high, in developing country in other hand, its relevance becomes doubtful considering the low savings gap and high inflation rate always witnessed in the economy.

2.3 *Ricardian Equivalence Model*

The theory as postulated by Barro (1989) argued that a rise in budget deficits is usually compensated by the whole current worth in expenditure. Therefore, reduction in current assessment should be harmonized with addition in future assessment, making interest rates and consequently personal investments untouched. Nevertheless, the applicability of this preposition in less developed countries is also limited since the forecast period of households is short due to several factors, For instance, the fundamental macroeconomic variables such as inflation; unemployment and income are subject to wide fluctuations, which may reduce the predictive power of households. Furthermore, the fluctuations mean that households are not able to plan for long term due to the economic uncertainties that exist in these economies.

2.4 *Overlapping Generation's Model*

Lerner (1948) formulated a model popularly known as “overlapping generation model”. According to the model, a domestic obligation creates no suffering for the posterity. As submitted by Rose and Gayer (2008), “Members of the future generation simply owe it to each other”. As the obligation is liquidated, income is relocated from non-bond holders to bond holders. Nonetheless, the condition of the future generation as a whole is not worse off since its expenditure level is the same as it would have been. In the Lerner’s model, a generation comprises of people who is alive at a given time.

2.5 Empirical Review

Several efforts have been made by scholars to question the link between deficits financing and domestic private investment. In investigating these studies, a number of scholars focused on the impact of these variables on developed countries while other scholars focused their attention on the economies of developing countries. However, evidence from empirical literature on the nature of these relationships remains inconclusive. The empirical evidence below captures pluralistic correlation between deficits financing and the domestic private investment.

Mahmoudzeh, et al (2013) evaluated the effect of disaggregated fiscal spending (consumption, capital formation and budget deficit) on domestic private investment in both developed and underdeveloped economy using a panel data over the period of 2000 to 2009. The methodology used was multiple regressions employing ordinary least squares technique. The result indicated that the rate of change of domestic private investment with respect to government capital formation expenditures is positive in both groups (crowd in effect), but this complementary effect is greater than in the developed countries. Likewise, the rate of change of domestic private investment with respect to government consumption spending is negative in both groups (crowd out effects), but this substitution effect is larger in developed countries. Furthermore, the impact of deficit financing on domestic private investment in developed countries is negative (crowd out effect), while this effect is positive in developing countries (crowd in effect). However, these effects are marginal in both groups.

Mamatzakis (2001), investigated the links between disaggregated measures of government expenditure and domestic private investment in Greece from 1950 to 1998, by using error correction model (ECM) approach. The results revealed that government consumption affected domestic private investment negatively, while government savings had a positive impact on domestic private savings. In another study, Hemes and

Lensink (2001) analyzed the existence of a non-linear relation between fiscal policy variables and domestic private investment for less developed countries (LDCs). Their findings showed a reverse U-shape link between health expenditure and domestic private investment, while the relation between defense spending and domestic private savings was U-shaped.

In another related study, Kustepli (2005) examined the efficacy of fiscal guidelines in view of reduction of domestic private investment hypothesis in Turkey from 1967 to 2003. Applying a vector auto-regression method, the findings showed that government expenditure crowded in private savings, while budget deficits reduce it. Alfonso and St. Aubyn (2008) evaluated the macroeconomic impact of public investment and domestic private investment through vector auto-regression (VAR) analysis for 14 European Union countries plus Canada, Japan and the US from 1960 to 2005. The results mostly pointed to the existence of positive effects of both public and private investment on output. On the other hand, crowding in effects of public investment on domestic private investment vary across countries, while the crowding in effect of private investment on public investment is more generalized.

Hussain, et al (2009), investigated a long-run connection between domestic private savings and government spending in Pakistan from 1975 to 2008. Using Vector error correction model, the result showed that current expenditure such as defense and debt servicing reduce private investment, whereas growth spending such as infrastructure, health and education promotes domestic private investment in Pakistan. In a similar work, Kollamparambil and Nicolaou (2011) employed quarterly data from 1960 to 2005 to examine the nature of and link between government savings and private investment in South Africa using a vector auto-regression (VAR) model. Their findings indicated that while government savings do not reduce domestic private investment, it exerted an indirect impact on private investment through the accelerator effect. Therefore, any addition in government expenditure on infrastructure and social sectors seems likely to improve private investment in that country. As a result, it is suggested that a more proactive fiscal policy increases the investment-GDP ratio by stimulating higher growth rate.

Furthermore, Blejar and Khan (2010) carried out a study in Cote'Divore, Thailand and Argentina. They used panel data spanning from 1986 to 2008. Applying multiple regression method, the study discovered that budget deficits have an inverse impact on domestic private savings in the countries sampled. On the other hand, the impact is more significant in Thailand but showed that in Cote'diovre, the significant level is weaker. The study also revealed that deficit financing have more significant and an inverse relationship on Argentina economy. Moreover, Blejar and Khan (2010) also discovered that government spending or expenditure in the above countries reduced domestic private investment. The study therefore concluded that budget deficit and government spending reduces domestic private investment through domestic market in Argentina, Cote'diovre and Thailand.

In Nigeria, Akpokodje (2008) evaluated a long run association between deficits financing and domestic private savings in Nigeria. The study employed a time-series data in order to keep away from deriving a spurious finding that could result from non-stationarity of the data series. Applying ordinary least square technique on a data spanning from 1980 to 2007, the results established that a fiscal policy rule adversely affected by budget deficits has major negative impact on domestic private savings. The findings also established that a proportional rise in fiscal deficit is able to reduce private savings by as much as 61 percentages. This result supports the argument that deficits financing reduce domestic private investment in Nigeria.

In a similar study, Isah, (2012) examined the impacts of deficit financing on domestic private investments in Nigeria. The study also meant to establish how deficit financing can reduce domestic private investment. The study employed Secondary data collected largely from CBN statistical bulletin, Bureau of statistic bulletin for various years. The multiple regression econometric method was also adopted in determining the influence of deficit financing on domestic private savings in Nigeria. The study shows that there exist an inverse or a negative correlation between budget deficit and domestic private savings in Nigeria. The paper recommended that government should fashion out measures that would support the private investor more by reduction in the size of budget deficits. In addition, the study suggested that deficit funded from the capital market should be emphasized as this is the only sure way of minimizing the reduction of domestic private investment in Nigeria.

III. Methodology

This study adopted Ex-post-facto research Design. This design type is relevant in explaining a consequence based on antecedent conditions, as well as determining the influence of one variable on another variable.

3.1 Model Specification

To determine if budget deficits predict domestic private investment in Nigeria within the sample period, the author specified the model below to address the stated objective. The model that will capture this relationship is specified below:

$$DPI_t = \beta_0 + \beta_1 DF_t + \beta_2 RIR_t + \beta_3 GDP_t + \varepsilon_{1t} \quad (1)$$

Where;

- DPI_t = Value of Domestic private investment
- DF_t = Deficits financing at time t
- RIR_t = real interest rate at time t
- GDP_t = Gross Domestic product at time t
- $\beta_0 - \beta_3$ refers to the parameters to be estimated
- ε_t = omitted variable

A priori expectation: ($\beta_0 - \beta_3 > 0$)

Both real interest rate (RIR); and Gross Domestic product (GDP) were included in the model because they are considered as the major proximate determinants of domestic private investment (DPI) in the Nigeria. Besides, the inclusion of real interest rate becomes paramount especially as the argument on whether deficits financing reduce private investment in Nigeria as postulated by the neoclassical economists. The inclusion thus helped the author establish the existence or not of crowding out effects of private investment by budget deficits in Nigeria as confirmed by Akpokodje, (2008) in his award winning research breakthrough.

3.2 Estimation Procedure

Unit Root Tests

The following modeling procedures were adopted at the course of the study:

The first step concerned testing for Stationarity of the data used. This is a typical practice used to make sure that the variables have a stable mean and variance so that the resultant regression results are meaningful. Otherwise, if stationarity of the variables is present and not checked, the existence of drift in the data sequence will signify that the regression outcome was false. Two major procedures for testing for the existence of unit roots were the Augmented Dickey Fuller (ADF) and Phillips Peron (PP) tests. The ADF process attempts to maintain the strength of the tests based on white-noise errors in the regression model by ensuring that the errors were certainly white-noise. On the other hand, the Phillips-Peron (PP) process corrected for serial correlation through a non-parametric modification to the normal statistic (Oduor, 2008). Phillip-Peron acts to change the statistics after the evaluation in order to take into account the effects that autocorrelation errors had on the outcome. For that reason, ADF is desirable because it did not need an evaluation of other parameters that would have required extra data and also did not exhaust degrees of freedom.

The fundamental equation used in the ADF test remains identical with the one used in the PP test. The ADF tests the null hypothesis that $|P| = 0$ against an alternative that $|P| < 0$ in the autoregressive equations:

- (i) ADF without intercept and trend

$$\Delta y_t = p y_{t-1} + \sum \delta_i \Delta y_{t-i} + \mu_t \dots \dots \dots \quad (2)$$
- (ii) ADF with an intercept but no trend

$$\Delta y_t = \alpha + p y_{t-1} + \sum \delta_i \Delta y_{t-i} + \mu_t \dots \dots \dots \quad (3)$$
- (iii) ADF with both the intercept and trend

$$\Delta y_t = \alpha + \beta_t + p y_{t-1} + \sum \delta_i \Delta y_{t-i} + \mu_t \dots \dots \dots \quad (4)$$

In this study, the researcher employed Augmented Dickey-Fuller techniques to examine the existence of unit root. The null hypothesis of the presence of unit roots is rejected when the theoretical value is less than the computed ADF and the alternative hypothesis of absence of unit roots accepted.

Co-integration Analysis

Co-integration refers to a long run equilibrium link among series. The idea of long run stability implies that two or more series may drift away from one variable to the other in the short run but shift collectively in the long run (Enders, 1995). When variables wander away from each other, the process is known as a random walk. In the long run however, it may be possible that these variables shift in a similar path that is, have a long run link. In this case, present of a linear combination of these random walk processes are established. In this case, as submitted by Enders, (1995), "the variables are said to be co integrated".

Vector Error Correction Model (VECM)

If variables are co integrated, Vector Error Correction Model shall be specified and estimated using standard diagnostic tests. According to Gujarati, (2003), "the coefficient of Error Correction term measures the speed of adjustment of the short run relation to unexpected shocks". When the dependent variables are above the level indicated by the explanatory variables, the dependent variable will be expected to fall, and vice versa, in order to maintain long run equilibrium. As noted by Koutsoyannis, (2003), "the Vector Error Correction model (VECM) incorporates both the long run and short run effects simultaneously". The advantage of Vector Error Correction Model is that once variables are confirmed to be non-stationary but co-integrated, the estimates from

such Vector Error Correction model are more efficient than the OLS. The Vector Error Correction Model also saves one from the agony of endogeneity crisis.

Granger Causality Tests

The causality test was conducted to establish the existence or not of any feedback relationship, and the direction of causality (if any) among deficit financing and domestic private investment, in addition to other series used.. This was done using the system equations generated from the residual of OLS regression results and supported with the Granger causality tests.

IV. Results

Tests for stationarity

This study began by the presentation of the result as shown on the tables below: The result of the Augmented Dickey-Fuller Unit Root test showed that the whole series employed (Budget deficits (Bd), private investment (PI), broad money supply (M2), current account balance (CAB) and Gross Domestic Product (RGDP) are non-stationary, ie I(1). This is because their respective ADF test-statistics exceeded the 5% critical value. In other words, the variables are not stationary at their level form and needed to be differenced to determine their respective order of integration. They were all confirmed to be stationary only after their first differencing. The result conducted at both 1% and 5% critical values is presented in table 4.1 below:

Table 4. 1: RESULT OF THE ADF UNIT ROOTS FOR STATIONARITY

LEVELS VARIABLES	1 st DIFFERENCE						REMARKS
	ADF Statistic	1% Critical	5% Critical Value	ADF Statistic	1% Critical Value	5% Critical Value	
DPI	-3.260513	-4.273277	-3.557759	-10.36608	-4296729	-3.568379	I(1)
DF	-2.587978	-4.273277	-3.557759	-9.768997	-4.296729	-3.568379	I(1)
GDP	-1.971436	-4.273277	-3.557759	-12.14131	-4.296729	-3.568379	I(1)
RIR	-2.754740	-4.273277	-3.557759	-9.215584	-4.296729	-3.568379	I(1)

Source: Author's compilation using E-View 7 computer software

As shown on table 4.1 above, the unit root tests result indicated that all the series namely; private investment (DPI); budget deficits (Df); Gross Domestic Product (GDP); and real interest rate contained unit root and are stationary only after first differencing, at 1% and 5% significant levels. This follows the decision rule which states that when the value of the computed ADF test statistics exceeds its critical value, the null hypothesis is rejected and the alternative accepted. The stationarities of all the series in the same order was thus a motivation to run for co-integration tests. This is aimed at finding the presence or absent of any long run relationship among the series. This corroborates with the submission by Woodridge (2002) and Greene (1997) that when more than one variable is not stationary at levels, there is every need to run a co-integration test in order to verify if the series have any long run equilibrium relationship.

In view of the above therefore, since the variables are stationary at difference orders, there was the need for a test for co- integration test using the Johansen (1991) co- integration technique. The result is presented in table 4.2 and table 4.3 as shown below

Table 4.2: Result of Johansen Co-integration Technique for Equation 1
Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.889212	114.7511	63.87610	0.0000
At most 1 *	0.494213	46.54682	42.91525	0.0208
At most 2	0.415167	25.41602	25.87211	0.0569
At most 3	0.246814	8.786716	12.51798	0.1939

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Source: Author's computations using Eviews 7 computer software

Table 4.3:

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.889212	68.20431	32.11832	0.0000
At most 1	0.494213	21.13080	25.82321	0.1847
At most 2	0.415167	16.62930	19.38704	0.1203
At most 3	0.246814	8.786716	12.51798	0.1939

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Source: Author's computations using Eviews 7 computer software

Series: PI, Bd, GDP, RIR

Lag intervals: No lags

Tables 4.2 and 4.3 above indicated the presence of (2) co-integrating equation for trace statistics and 1 cointegrating equation for maximum Eigenvale at 1% and 5% level of significance. Co-integration exists at those ranks where the value of the trace statistic exceeds the 1% and 5% critical value. Again, the eigenvalues all lie below 1, indicating the presence of co-integration. Having established the presence of co-integration, the researcher moved on to calculate the speed of adjustment of the model to shocks. To do this, the researcher computed the Vector Error correction model. The result is presented in Table 4.4 below:

Table 4.4: Result of Vector Error Correction Model Analysis for Equation 1

Vector Error Correction Estimates

Date: 11/18/14 Time: 05:35

Sample (adjusted): 1983 2012

Included observations: 30 after adjustments

Standard errors in () & t-statistics in []

Cointegrating Eq:	CointEq1			
DPI(-1)	1.000000			
Df(-1)	6.81E-06 (1.3E-06) [5.28206]			
RIR(-1)	-0.428150 (0.10531) [-4.06580]			
GDP(-1)	-1.69E-06 (2.1E-07) [-7.94936]			
C	-9.483362			
Error Correction:	D(DPI) D(Df) D(RIR) D(GDP)			
CointEq1	-0.380928 (0.085770)	-1158665. (351781.)	0.059412 (0.30731)	-402761.6 (71840.3)

	[-4.44127]	[-3.29371]	[0.19333]	[-5.60634]
D(DPI(-1))	-0.060947 (0.21908) [-0.27819]	536130.8 (857940.) [0.62490]	0.270302 (0.74949) [0.36065]	-7827.877 (175207.) [-0.04468]
D(DPI(-2))	0.126011 (0.21254) [0.59288]	593294.5 (832332.) [0.71281]	0.066700 (0.72712) [0.09173]	-168630.8 (169978.) [-0.99208]
D(Df(-1))	3.56E-07 (5.6E-07) [0.63165]	6.429929 (2.20610) [2.91462]	-1.48E-07 (1.9E-06) [-0.07677]	2.363092 (0.45053) [5.24518]
D(Df(-2))	5.88E-07 (6.3E-07) [0.93885]	0.334495 (2.45420) [0.13629]	-1.91E-06 (2.1E-06) [-0.89070]	2.252801 (0.50119) [4.49487]
D(RIR(-1))	-0.141173 (0.06469) [-2.18238]	-314486.6 (253323.) [-1.24145]	-0.523699 (0.22130) [-2.36646]	-63951.29 (51733.2) [-1.23617]
D(RIR(-2))	0.018216 (0.06833) [0.26660]	-154790.0 (267572.) [-0.57850]	-0.470268 (0.23375) [-2.01185]	-32987.77 (54643.1) [-0.60369]
D(GDP(-1))	-9.34E-09 (2.7E-07) [-0.03475]	0.768625 (1.05225) [0.73046]	-7.11E-07 (9.2E-07) [-0.77319]	-0.595567 (0.21489) [-2.77152]
D(GDP(-2))	-3.08E-07 (2.7E-07) [-1.15420]	-1.606648 (1.04422) [-1.53860]	-1.20E-07 (9.1E-07) [-0.13131]	0.890938 (0.21325) [4.17790]
C	-0.142566 (0.87654) [-0.16265]	-11348884 (3432607) [-3.30620]	1.704806 (2.99870) [0.56851]	-3560200. (701003.) [-5.07873]
R-squared	0.271866	0.937849	0.386809	0.879617
Adj. R-squared	-0.055794	0.909881	0.110873	0.825444
Sum sq. resids	22.27550	3.42E+14	260.7074	1.42E+13
S.E. equation	1.055355	4132879.	3.610453	844011.1
F-statistic	0.829720	33.53302	1.401807	16.23736
Log likelihood	-38.10251	-493.5207	-75.00117	-445.8638
Akaike AIC	3.206834	33.56805	5.666745	30.39092
Schwarz SC	3.673900	34.03511	6.133811	30.85799
Mean dependent	0.231583	201663.2	0.207667	1376552.
S.D. dependent	1.027092	13767173	3.828950	2020139.
Determinant resid covariance (dof adj.)	1.09E+26			
Determinant resid covariance	2.15E+25			
Log likelihood	-1045.208			
Akaike information criterion	72.61386			
Schwarz criterion	74.66895			

Source: Author's computations using Eviews 7 computer software

As shown in the upper region of the vector error correction model (VECM) for equation 1 above as well as the normalized cointegrating coefficients for two cointegrating equations given by the long run relationship as shown below: the long run relationship which

Normalized cointegrating coefficients (*standard error in parentheses*)

DPI	DF	RIR	GDP
1.000000	6.81E-06	-0.428150	-1.69E-06
	(1.3E-06)	(0.10531)	(2.1E-07)

relates domestic private investment as a function of deficits financing, Real interest rate and Gross Domestic Product shows that co-integrating equation 1 is well behaved having possessed the expected negative signs, fractional and significant at both the VECM results and the system equations that followed below. Also, the value of the error correction coefficient -0.380928 indicates that 38% of the imbalance between the short run and long run relationship is corrected annually. The R-squared value of 0.271866 indicates that about twenty-seven (27%) of the variability in domestic private investment in Nigeria within the period under review was determined or influenced by deficits financing, real interest rate and gross domestic product. At five percent (5%) level of significance and relevant degrees of freedom, deficits financing (Df), Real interest rate (RIR) and Gross Domestic Product (GDP) as shown by their computed t-values of -5.28206, -4.06580, and -7.94936 respectively, appeared to be highly significant determinants of domestic private investment in Nigeria within the sampled stage.

As regards the expected signs, the link between domestic private investment and deficits financing is positive in the long run, while Real interest rate (RIR) and Gross Domestic Product (GDP) are negatively related with domestic private investment in the long run as can be seen in the upper region of the vector error correction model (VECM). In other hand, the relationship between domestic private investment and real interest rate is also negative in the short run.

As regards the short run effects of these variables as shown in the lower region of the vector error correction model (VECM), only real interest rate is shown to be significant in explaining changes in domestic private investment in Nigeria. The insignificance of changes in deficits financing in the short run may be attributed to the reduction of domestic private investment by public spending in Nigeria, thus confirming a crowding out syndrome in Nigerian economy in the shortrun.

The result of the system equation used to test the causality between private investment and deficits financing as shown in table 4.5 below indicates that with the ECM-1 coefficient of -0.3809928, the implication is that 38% of the disequilibrium between the short run and long run relationship is corrected annually. Moreover, the ECM-1 coefficient satisfies the required condition of being fractional, negative and significant considering the P-value of 0.0205 as shown in the system equation below. According to Gujarati, (2003), if it is not significant, it indicates that causality does not exist between deficits financing and domestic private investment in Nigeria within the period under review. Thus, since the three conditions of being fraction, negative and significant are fully satisfied; the conclusion is that there is causal relationship between private investment and deficits financing, real interest rate and gross domestic product in Nigeria.

**Table 4.5 System Equation Results
System Equation**

Dependent Variable: D(DPI)
Method: Least Squares
Date: 11/18/14 Time: 05:43
Sample (adjusted): 1983 2012
Included observations: 30 after adjustments

$$D(DPI) = C(1)*(DPI(-1) + 6.80765248141E-06*DF(-1) - 0.428149534328*RIR(-1) - 1.68897338138E-06*GDP(-1) - 9.48336233839) + C(2)*D(DPI(-1)) + C(3)*D(DPI(-2)) + C(4)*D(DF(-1)) + C(5)*D(DF(-2)) + C(6)*D(RIR(-1)) + C(7)*D(RIR(-2)) + C(8)*D(GDP(-1)) + C(9)*D(GDP(-2)) + C(10)$$

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.380928	0.085770	-4.44127	0.0205
C(2)	-0.060947	0.219080	-0.278195	0.7837
C(3)	0.126011	0.212541	0.592877	0.5599
C(4)	3.56E-07	5.63E-07	0.631648	0.5348
C(5)	5.88E-07	6.27E-07	0.938850	0.3590

C(6)	-0.141173	0.064687	-2.182378	0.0412
C(7)	0.018216	0.068326	0.266602	0.7925
C(8)	-9.34E-09	2.69E-07	-0.034750	0.9726
C(9)	-3.08E-07	2.67E-07	-1.154201	0.2620
C(10)	-0.142566	0.876537	-0.162647	0.8724

R-squared	0.271866	Mean dependent var	0.231583
Adjusted R-squared	-0.055794	S.D. dependent var	1.027092
S.E. of regression	1.055355	Akaike info criterion	3.206834
Sum squared resid	22.27550	Schwarz criterion	3.673900
Log likelihood	-38.10251	Hannan-Quinn criter.	3.356252
F-statistic	0.829720	Durbin-Watson stat	2.029440
Prob(F-statistic)	0.597317		

Source: Author's computations using Eviews 7 computer software

Moreover, Granger causality tests were also conducted to find out which variable causes the other. Thus, as indicated by the Granger causality test in table 4.6 below, there is no causal relationship between domestic private investment and deficits financing in Nigeria. This is because the F-value of 0.06008 for the numerator and 1.42976 for the denominator, with their corresponding P-values of 0.9418 and 0.2576 respectively, which are higher than the alfa level (0.05), we conclude that both are not significant for null hypotheses to be rejected.

Table 4.6 Granger causality Tests Result

Pairwise Granger Causality Tests

Date: 11/18/14 Time: 05:38

Sample: 1980 2012

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
Df does not Granger Cause DPI	31	0.06008	0.9418
DPI does not Granger Cause Df		1.42976	0.2576
RIR does not Granger Cause DPI	31	3.51472	0.0446
DPI does not Granger Cause RIR		0.93845	0.4041
GDP does not Granger Cause DPI	31	0.18753	0.8301
DPI does not Granger Cause GDP		0.68777	0.5116
RIR does not Granger Cause Df	31	1.05357	0.3631
Df does not Granger Cause RIR		2.71684	0.0848
GDP does not Granger Cause Df	31	99.6468	6.E-13
Df does not Granger Cause GDP		4.90552	0.0156
GDP does not Granger Cause RIR	31	0.44097	0.6481
RIR does not Granger Cause GDP		1.57779	0.2256

Source: Author's computations using Eviews 7 computer software

Evaluation of Working Hypotheses

Hypothesis 1: Changes in deficits financing do not have any long run significant impact on domestic private investment in Nigeria within the period under investigation.

This hypothesis was evaluated with the Vector Error correction model technique. Based on the result of the Vector error correction model as shown in table 4.4 above, with the t-statistics of 5.28206 read from the upper region of the vector Error correction model, the evidence indicates that budget deficit has a positive and long run considerable effect on domestic private investment in Nigeria within the period under investigation. However, in the short run, effect as shown from lower region of the VECM result, deficits financing is not statistically significant in predicting private investment in Nigeria. This result corroborates with the result of Akpokodje, (2008) who confirmed using a data spanning from 1980 to 2007 that fiscal rule weakened by budget deficits has a major unfavorable effect on private investment in the long run in Nigeria.

V. Summary

The focus of this study is to examine if deficits financing significantly predict or crowds out domestic private investment in Nigeria within the sample period. The selected time series variables (DF, DPI, RIR, and GDP) were subjected to unit root tests in order to determine their long run characteristics. Thus, subjecting the variables to unit root tests, using Augmented Dickey-Fuller (ADF) statistic, the result established that the series have no common trend. However, they all became stationary after first differencing.

Since the variables attained stationarity at the same order 1(1), the researcher was motivated to run for co integration tests. As a result, Johansen and Juselius co integration test were applied. Both the trace statistics and maximum eigen values at 2 co integrating equations for trace and 1 co integrating statistics maximum eigen value at 5 percent level of significant were confirmed.

The Vector Error Correction Model (VECM) which showed the long run and short run relationships exhibited a relationship in which deficits financing showed a positive and strong long run considerable impact on domestic private investment in Nigeria. However, the results show an inverse but significant long run relationship between domestic private investment, real interest rate and GDP. The signs of both the deficits financing and real interest rate conform to the a priori criteria. This means that in the long run, a percentage rise in deficits financing in Nigeria increased domestic private investment to about 8 percent. In the other hand, a percentage fall in real interest rates in the long run increased private investment by 43 percent in Nigeria within the sample period. However, the sign of GDP is contrary to the a priori criterion. With a negative sign, a unit rise in GDP in the long run decreased private investment in Nigeria by about 69 percent.

The estimated vector error correction (VECM) model also shows that in the short run, all the variables appeared with their correct a priori signs, except real interest rate which exerted significant impacts in the short run; all the other variables are not significant in the short run. The insignificant nature of the deficits financing to domestic private investment confirms that in the short run, deficits financing crowds out private domestic investment in Nigeria.

The system equation conducted indicated that changes in deficits financing do cause change in domestic private investment in Nigeria within the period under observation. This was however, disproved by the result of Granger causality test, which confirmed no causal connection between deficits financing and domestic private investment in Nigeria.

VI. Conclusions

The study verified the existence or not of crowding out hypothesis in Nigerian Economy as well as the impacts of deficits financing on domestic private investment in Nigeria. Deficit financing was defined by Wosowei (2014) as "excess of the sum total of revenue expenditure, capital outlay and net lending over revenue receipts and non-debt capital receipts including the proceeds from disinvestment". Naturally, government must borrow in order to fund its investments. However, it becomes worrisome when the amount borrowed becomes staggering. Deficits financing play a leading function in the maintenance of economic growth and macroeconomic strength.

The study concludes that budget deficits have a long run significant effect on domestic private investment in Nigeria. This findings have gone a long way in supporting Keynesian hypothesis as well as the current empirical works done on this area such as studies by; (Wosowie, 2013; Onuorah, 2013; Ibrahim, *et al.*, 2012). From the empirical results, Deficits financing has a significant long run impact on domestic private investment in Nigeria. Moreover, the application of system equation tests established that changes in deficit financing do Granger cause changes in domestic private investment in Nigeria, though the Granger causality tests revealed no causation between the series. Moreover, deficit financing crowds out domestic private investment in Nigeria only in the short run.

VII. Recommendations

In view of the foregoing, the following policy prescriptions were proffered.

1. Government should urgently implement budgetary management measures aimed at reducing borrowing and able to cut down the size of deficits financing that frequently create huge amount of transfer payment and doubtful additional budgetary operating cost. For example, government should make sure that unwarranted wasteful expenditure does not enter into the proposed budget of the federal government.
2. Furthermore, government should also ensure that its budgetary policies should be in line with the objectives of macro-economic stability, encouragement of savings habit and investment and market-oriented structural changes that will spur domestic private investment. It is believed that when this is done effectively, private-sector participation in the growth and development of the economy will be enhanced.
3. Finally, efforts should be intensified on revenue generation drive to strengthen government income generation and investment in such areas as economic and social infrastructural needs. There is need also for more effort from the government to improve on the budgeting processes and fiscal forecast as well as supervision practices to usher in a significant fall in the level of deficits financing and transfer public spending from extravagant expenditure to fruitful human and material infrastructural investment. To achieve this, it will require openness in budgetary process.

References

- [1]. Afonso, A. and St. Aubyn, M. (2008). Macroeconomic rates of return of public and private investment: Crowding in and crowding out effects: Working paper series No 864: European Central Bank.
- [2]. Akpokodje, I. (2008). Macroeconomic environment, investment stimulation and economic growth and development: The Nigerian experience. Selected paper for 2008 annual conference, Nigeria Economic Society NES).
- [3]. Barro, R. (1989). New classicals and Kenysians, or the good guys and the bad guys: Swiss Journal of Economics and Statistics. 125(3).
- [4]. Bailey, M. (1971). National income and price level: New York: McGraw-hill inc.
- [5]. Berhein, B.D. (2010). A neoclassical perspective on budget deficits: Journal of Economic Perspective: 3(2).
- [6]. Blejar, N. and Khan, P. (2010). Government policy and private investment in developing Countries: IMF Staff Papers
- [7]. Buiter, W.H. (1977). Crowding out and the effectiveness of fiscal policy: Journal of Public Economics.
- [8]. Central bank of Nigeria (CBN) Statistical bulletin (2017)
- [9]. Central bank of Nigeria (CBN) Statistical bulletin (2019)
- [10]. Enders, W. (1995). Applied econometric time series: New York: John Wiley and Sons Inc.
- [11]. Eisner, R. (1989). Budget deficits: rhetoric and reality: Journal of Economic Perspectives, Vol.3.
- [12]. George, K. K. (2009). Budget deficits and macroeconomic performance in Kenya: An empirical analysis. A Thesis Submitted to the School of Humanities and Social sciences, Kenyatta University Paper: 06/07.
- [13]. Granger, C.W.J. (1981). Investigating causal relations by econometric models and cross- spectra method: Econometrica: Vol: 37.
- [14]. Greene, W. (1997). Econometric analysis: New York, Macmillan: 3rd edition.
- [15]. Gujarati, D.N. (2003). Basic econometrics: (3rd ed.) New York: Macgraw-Hill Inc
- [16]. Hemes, N. and Lensink, R. (2001). Fiscal policy and private investment in less developed countries: [17] World Bank Institute for Development Economics Research (WIDER). Discussion paper No: UNU-WIDER DP2001/32
- [17]. Hussain, A; Muhammad, S; Akram, K. and Lal, I. (2009). Effectiveness of government expenditure crowding in or crowding out: Empirical evidence in case of Pakistan. European journal of economics, finance and administrative science 16 - 32
- [18]. Iyoha, M.A. (2004). Applied econometrics: (2nd ed.) Minder Publishing, Benin City
- [19]. Johansen, S. (1991). Likelihood based inference in cointegration vector autoregressive models. New York: Oxford university press.
- [20]. Kustepeli, Y. (2005). Effectiveness of fiscal spending: crowding out and or crowding in? Yonetim ve etonimi. 2(1).
- [21]. Lerner, I. (1948). The challenges of implementing a performance-based budget system: Indonesia, International Monetary Fund
- [22]. Mahmoudzadeh, M.; Sadeghi, S. and Sadeghi, S. (2013). Fiscal spending and crowding out effect: a comparison between developed and developing countries. Institutions and Economies. Vol 5(1)
- [23]. Mamatzakis, E.C. (2001). Public spending and private investment: evidence from Greece. International Economic Journal: 15(4).
- [24]. Obinna, B. (2004). Literature note on economic Developmen: Uturu: Abia State University. Nigeria.
- [25]. Odour, J. (2008). Impacts of real exchange rate misalignments on trade creation and diversion within regional trading blocs: The case of COMESA, Ph.D Thesis. Bielefeld University.
- [26]. Rosen, H.S. and Gayer, T.(2008). Applicability of Lerner's theory to developing countries: American Journal of Social Sciences: 4(5).
- [27]. Saleh, A.S. (2004). Public sector deficits and macroeconomic performance in Lebanon: Unpublished Ph.D Thesis: University of Wollongong.
- [28]. Johansen, S. (1995). Likelihood-based inference in co-integrated vector autoregressive models: Oxford: Clarendon Press.
- [29]. Wosowe, E. (2014). Fiscal deficits and macroeconomic aggregates in Nigeria: Journal of Developing Countries: 3(4).
- [30]. Wooldridge, M.J. (2002). Econometric analysis of cross section and panel data: The MIT press: Cambridge, Massachusetts: London, England. World Bank (2004). African database CD-ROM. Washington DC
- [31]. Yellen, J.I (1989). Symposium on the budget deficit: Journal of Economic Perspectives: 3(2).

Eze Titus Chinweuba (Ph.D). "Testing the Validity of Crowding out Effects Hypothesis on Nigeria's Economy: Vector Error Correction Model (VECM) Approach." *IOSR Journal of Economics and Finance (IOSR-JEF)*, 11(3), 2020, pp. 60-71.