

Relationship between Budget Deficit Financing and Macroeconomic Variables in Nigeria

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Abstract

The study investigates the relationship between budget deficit and macroeconomic variables like interest rates, inflation rates and exchange rates in Nigeria, with a view to establishing causality between the variables. Historical longitudinal data collected from CBN Statistical Bulletin, the National Bureau of Statistics (NBS) and journals covering the years 1981 to 2015 were analyzed using Augmented Dickey-Fuller (ADF) Unit Root Test, to test for the stationarity of the variables of the study, Johansen Cointegration Technique, to test for long-run integration of the data, and Granger Causality test in the Vector Auto-Regression (VAR) Model to establish the causal relationship among the variables of the study. All the variables became stationary at first difference, with the exception of inflation rates, which became stationary at levels, and there was no Cointegration in the variables of the study. All the variables were not found to Granger cause one another, except that there was a unidirectional causation from exchange rates to deficit financing to real GDP ratio, without any feedback effect. Government is advised to be mindful of the effect of exchange rates on budget deficit financing in Nigeria when it is deciding on deficit budgeting for economic development. This is based on the fact that Nigeria is an import oriented economy, and any exchange rate imbalances may defeat the objective of deficit budgeting and have an adverse effect on the economy.

Keywords: Budget Deficit Financing, Interest Rates, Inflation Rates, Exchange Rates, Macroeconomic Variables.

JEL Classification Codes: H6; E4; E31; F31; B22

INTRODUCTION

Budget deficits have attracted a great deal of attention over the past two

decades. They were blamed for the assortment of ills that beset developing countries. These ills are: high inflation, poor

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investment and growth performance and over indebtedness (Kosimbei, 2009). A careful observation of the budgets of Nigeria over the past three decades, from 1980 to 2015, shows the Nigerian Federal Government has tilted its budgetary policies toward deficit budgeting, with the exception of two years, 1995 and 1996, when surplus budgets were prepared.

Deficit budgeting comes with the attendant consequence of deficit financing, which may come from local sources or foreign sources (Kosimbei, 2009). Whether financed from local sources or from foreign sources, deficit budget finances has its effects on the economy. However, in spite of the large amount of research that has been undertaken in the area of the effect of deficit budgeting on macroeconomic variables in different countries, consensus is yet to be arrived on with regard to such an effect. While some researchers have concluded a negative effect relationship, aligning with the Neoclassical School of Thought (Huynh, 2010; Imimole & Umoru, n.d.; Arora & Dua, 1993), others have concluded an effect relationship, aligning with the Keynesian School of Thought (Aruwa, Dang & Dashol, 2013; Emmanuel, 2013; Kosimbei, 2009; Chaudhary & Shabbir, 2005). Many others still have concluded a no effect relationship, agreeing with the Ricardian School of Thought (Dalyop, 2010; Ghali, 1997).

On the basis of the Keynesian School of Thought, it is expected that budget deficit financing influences macroeconomic

variables such as interest rates, inflation rates, exchange rates, etc. Although there is much in the literature, in terms of research in the area of budget deficit, to the best of the researcher's knowledge of the information available, none has specifically looked at its relationship with interest rates, inflation rates and exchange rates, especially with reference to the Nigerian experience. Most of the studies carried out in areas close to these have looked at the experiences of other countries (Paudyal, n.d.; Kosimbei, 2009; Georgantopoulos & Tsamis, 2011). However, this study seeks to fill this gap by finding out whether there is any causal relationship between budget deficit financing and macroeconomic variables (interest rates, inflation rates, and exchange rates) in Nigeria.

The broad aim of this study is to empirically establish the relationship that exists between budget deficit financing and macroeconomic variables in Nigeria. The specific objectives are:

- i. To examine the causal relationship between budget deficit financing to GDP ratio and interest rates in Nigeria;
- ii. To examine the causal relationship between budget deficit financing to GDP ratio and inflation rates in Nigeria; and
- iii. To examine the causal relationship between budget deficit financing to GDP ratio and exchange rates in Nigeria;

To provide guidance to the study, the following three hypotheses, stated in their null form, have been put forward:

H₀₁: There is no significant causal relationship between budget deficit financing and interest rates in Nigeria;

H₀₂: There is no significant causal relationship between budget deficit financing and inflation rates in Nigeria;

H₀₃: There is no significant causal relationship between budget deficit financing and exchange rates in Nigeria.

REVIEW OF RELATED LITERATURE

Conceptual Framework

Governments do prepare budgets in which the expected revenue is less than the expected expenditure. The difference between the expected revenue and expected expenditure is referred to as budget deficit. Likita (1999) defines it as the excess of government planned expenditure over planned revenue. On the other hand, budget deficit financing is the manner in which the government provides funds to meet up with the deficit. It is defined as "the borrowing undertaken by the government to make up for the revenue shortfall" (Slideshare, n.d.). The Encyclopaedia Britannica refers to budget deficit financing as simply 'deficit financing' and defines it as 'practice in which a government spends more money than it receives as revenue, the balance being made up by borrowing or minting new funds'.

Governments do prepare deficit budgets as a policy referred to as

'stabilization policy' which is meant to stimulate economic growth (Aruwa, Dang & Dashol, 2013). Musgrave and Musgrave (2004) call the use of budget deficit policy to reduce unemployment, maintain a reasonable degree of price stability, increase the rate of economic growth, and pursue balance of payment equilibrium as the stabilization function of public finance.

Interest is the amount a borrower pays for enjoying the use of funds provided by another. It is the price of money borrowed. Inflation is the persistent rise in the prices of goods and services as a result of shifts in the fundamentals of an economy. The rate at which one currency exchanges with another is commonly referred to as exchange rate. Whether budget deficit has any relationship with the above macroeconomic variables is the goal of this study.

Theoretical Underpinnings

There are a number of approaches that attempt to explain the relationship between budget deficit financing and other major macroeconomic variables such as interest rates, GDP growth, current account balance, exchange rates, inflation rates, etc. These include; the neoclassical theory, the Keynesian and the Ricardian theory (Lwanga & Mawajje, 2014).

The neoclassical model, first assumes that the consumption of each individual is determined as the solution to an optimization problem, where both borrowing and lending are permitted at the

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market rate of interest. It also assumes that each consumer belongs to a specific generation, and the life spans of successive generations overlap. Again, the market is assumed to clear in all periods (Bernheim, 1989). This implies that budget deficit financing will raise current expenditure and for an economy under full employment, increased expenditure will translate into high interest rates, reduced national savings and a reduction in future investment. Consequently, budget deficit financing crowd out investment leading to reduced future capital formation. In the case of a small open economy, the increased consumption expenditure has no effect on interest rates in the world markets but may lead to increased foreign borrowing resulting into the appreciation of the local currency and consequently a reduction in export and an increase in imports. This leads to a deterioration of the current account position (Yellen 1989; Bernheim 1989). This theory, therefore, posits that budget deficit financing has adverse effects on the economy and thus it advocates for a balanced budget at all times.

The Keynesian hypothesis differs from the neoclassical hypothesis in that, it assumes the existence of unemployed resources and the existence of credit constrained individuals in the economy (Bernheim, 1989). The Keynesians theory indicates that, an increase in government spending leads to an increase in aggregate demand, which leads to the employment of the redundant resources which

subsequently leads to an increase in output (Bernheim, 1989). This paradigm therefore asserts that budget deficit financing does not necessarily have a detrimental effect on economic growth. Budget deficit financing can be used to stimulate aggregate demand during periods of economic downturns thereby shortening the recovery period. The Keynesian view recommends that budget management should follow anti cyclical economic conditions. This implies that during periods of recession, the government should run a deficit to stimulate aggregate demand whereas during periods of economic boom government should pursue a surplus budgetary policy.

Lastly, the Ricardian hypothesis asserts that budget deficit financing has no impact on economic growth and development. According to this theory, an increase in government debt as a result of the deficit will imply future taxes with a present value equal to the value of the debt. Therefore, rational agents should recognize this equivalence and proceed as if the debt did not exist, resulting in the debt having no effects on economic activity (Bernheim, 1989; Seater, 1993).

This study takes after the Keynesian paradigm, which indicates that during recession (which Nigeria is currently experiencing), a policy of fiscal expansion should be taken to increase the aggregate demand in the economy, thus boosting economic activities.

Empirical Studies

In the empirical literature, the popular exposition is that budget deficits are inflationary (Lwanga & Maweje, 2014). Various studies have explored the causal relationship between budget deficits and inflation. The results have been invariably mixed. Catão and Terrones (2005) find a strong link between fiscal deficits and inflation. Lin and Chu (2013) employed a dynamic panel quartile regression (DPQR) model following the ARDL regime to examine the extent to which fiscal deficits are inflationary. Their findings show that fiscal deficits are inflationary only in high inflation countries. Easterly and Schmidt-Hebbel (1993), analysed data from a sample of 10 countries and found strong evidence that over the medium term, money financing of the deficit leads to higher inflation, while debt financing leads to higher real interest rates or increased repression of financial markets. Makochekanwa (2008), found a significant positive impact of budget deficit on inflation in Zimbabwe. He also found a stable long run relationship between the budget deficit, exchange rate, GDP and inflation.

Ndashau (2012) uses Granger causality techniques, augmented by vector error correction modelling, to highlight the existence of a causality effect from inflation to budget deficits scaled by the money base. However, the effect of budget deficits on inflation was not statistically significant. Georgantopoulos and Tsamis (2011) investigate the causal link between budget

deficit financing and other macroeconomic variables (Consumer Price Index (CPI), Gross Domestic Product (GDP) and Nominal Effective Exchange Rate) for Greece during the period 1980-2009. Their findings revealed no link between the budget deficit financing and CPI but they found causal links between budget deficit and GDP and Nominal Effective Exchange Rate.

In a study conducted in Uganda by Mugume and Obwona (1998) to examine the interaction between fiscal deficits and other macro-level variables for Uganda in the post reform period, a negative relationship between fiscal deficits and economic growth was established. The study also revealed that fiscal deficit is linked to inflation, exchange rate depreciation and the widening of current account deficit. On the other, Odhiambo, Momayi, Othuon and Aila (2013), find a positive relationship between budget deficits and economic growth in Kenya for the period 1970 to 2007. Buscemi and Yallwe, (2012) using GMM technique, found that fiscal deficit financing results are significant and positively correlated to economic growth and saving in China, India and South Africa. However, the authors revealed that real interest rates are negatively and significantly correlated with economic growth and saving. The main conclusion by the authors was that, fiscal deficit financing affects the economic growth and saving through the means of financing the deficit.

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In all the studies highlighted above, none covers the Nigerian experience with respect to the relationship between budget deficit financing and inflation, interest rates, and exchange rates. This creates a gap that this study seeks to fill up.

METHODOLOGY

This study adopts a quantitative causal and empirical research design on the basis of the research problem. As an empirical study, it is designed to utilize econometric techniques to analyse historical time series data obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin (2015), the National Bureau of Statistics (NBS), and the International Monetary Fund (IMF). The econometric technique is adopted due to the involvement of economic theory, economic data, and economic models used in the study. The econometric techniques selected for studies of this type of data are (1) the Augmented Dickey-Fuller, to test for a stationarity in the individual data series, (2) the Johansen co-integration, to test for the integration of all the data series, and (3) and Pairwise Granger Causality, to test for causality in the dynamic system.

Model Specification

The model specification for the hypotheses stated earlier are based on endogenous lag models and are stated below:

VAR Model of DEFINRGDP and INTR for HO₁

$$LDEFINRGDP_t = \alpha_0 + \alpha_1 LDEFINRGDP_{t-1} + \alpha_2 LINTR_{t-1} + \mu \dots\dots\dots (1)$$

$$LINTR_t = \beta_0 + \beta_1 LINTR_{t-1} + \beta_2 LDEFINRGDP_{t-1} + \mu \dots\dots\dots (2)$$

VAR Model of DEFINRGDP and INFLR for HO₂

$$LDEFINRGDP_t = \alpha_0 + \alpha_1 LDEFINRGDP_{t-1} + \alpha_2 LINFLR_{t-1} + \mu \dots\dots\dots (3)$$

$$LINFLR_t = \beta_0 + \beta_1 LINFLR_{t-1} + \beta_2 LDEFINRGDP_{t-1} + \mu \dots\dots\dots (4)$$

VAR Model of DEFINRGDP and EXCHR for HO₃

$$LDEFINRGDP_t = \alpha_0 + \alpha_1 LDEFINRGDP_{t-1} + \alpha_2 LEXCHR_{t-1} + \mu \dots\dots\dots (5)$$

$$LEXCHR_t = \beta_0 + \beta_1 LEXCHR_{t-1} + \beta_2 LDEFINRGDP_{t-1} + \mu \dots\dots\dots (6)$$

Where LDEFINRGDP is the Natural Logarithm of Budget Deficit Financing; LINTR is the Natural Logarithm of Interest Rates; LINFLR is the Natural Logarithm of Inflation Rates; and LEXCHR is the Natural Logarithm of Exchange Rates. α_0 , β_0 are constants (or intercepts), while α_1 , α_2 , β_1 , and β_2 are the coefficients of the VAR models, μ is the error term and t is time.

RESULTS AND DISCUSSIONS

Unit Root Test using Augmented Dickey-Fuller Method

Having converted the individual time series data into their natural logarithms, they are investigated for stationarity. The Augmented Dickey-Fuller

(ADF) unit root test is carried out to investigate the properties of each natural logarithm of the time series data via the Eviews statistical software. Lag lengths for this test were selected automatically based on Schwarz Information Criterion (SIC) in

the Eviews system. Three models of the ADF (constant, constant and intercept, and no constant and no intercept) are tested at levels and first difference. Table 1 below presents the results of the test.

Table 1: Augmented Dickey-Fuller Unit Root Test Results

VARIABLE	INTERCEPT			INTERCEPT & TREND			NONE		
	t-Stat.	Critical value	Prob.	t-Stat.	Critical value	Prob.	t-Stat.	Critical value	Prob.
LEVEL									
LDEFINRGDP	-2.1065	-2.9678	0.2436	-4.0794	-3.5742	0.0169*	-2.5714	-1.9529	0.0121*
LINTR	-2.8482	-2.9540	0.0626	-2.8570	-3.5530	0.1886	0.1895	-1.9513	0.7349
LINFR	-4.8353	-2.9511	0.0004*	-4.8419	-3.5485	0.0023*	-0.9667	-1.9513	0.2915
LEXCHR	-1.8917	-2.9511	0.3321	-1.1022	-3.5485	0.9139	1.7030	-1.9510	0.9762
1ST DIFF.									
LDEFINRGDP	-7.1548	-2.9763	0.0000	-7.0096	-3.5875	0.0000	-7.1586	-1.9539	0.0000
LINTR	-6.6071	-2.9571	0.0000	-6.6098	-3.5578	0.0000	-6.6882	-1.9517	0.0000
LINFR	-8.8821	-2.9540	0.0000	-8.7427	-3.5530	0.0000	-9.0254	-1.9513	0.0000
LEXCHR	-4.5445	-2.9540	0.0010	-4.8513	-3.5530	0.0023	-3.6893	-1.9513	0.0006
STATIONARITY			Order			Order			Order
LDEFINRGDP			I(1)			I(0)			I(0)
LINTR			I(1)			I(1)			I(1)
LINFR			I(0)			I(0)			I(1)
LEXCHR			I(1)			I(1)			I(1)

Source: Author's Computation Using Eviews Version 9. * Stationary at level

Table 1, above, shows that all the variables for all the models became stationary at different levels. The order of stationarity may influence the causality test to be carried out, that is, whether to use unrestricted VAR model or restricted VAR model. If the variables are of order I(1), it means they can cointegrate in the long-run and the Vector Error Correction (VEC) Model will be the appropriate model to test for causality. If, on the other hand, the variables are not of the order I(1) and cannot cointegrate in the long-run, the unrestricted

VAR model will be the appropriate model to use in testing for causality (Dang, 2016). Since the incorporated variables are not of the same order of integration, it is assumed the same level of stability in the data distribution pattern, that is, the same order of integration for the subsequent tests. Otherwise, the long-run relationship would not be established excluding the short-run analysis which does not require the same order of integration (Abidemi & Maliq, 2010).

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Cointegration Test using Johansen Cointegration Method

The Johansen Cointegration method is utilized to test for long-run relationship between the time series variables in the study. Both the Trace and Max-Eigen statistics are considered in deciding on the test of causality to be carried out on endogenous lag models, as used by Dang (2016). Table 2, below, shows the result of the Johansen Cointegration test.

Table 2, below, also shows that at the 5% critical level, there is no Cointegration between LDEFINRGDP and LINTR. At that

level, there also is no Cointegration between LDEFINRGDP and LINFR, which is also applicable between LDEFINRGDP and LEXCHR. For this reason the unrestricted VAR is appropriate for carrying out the causality test. The Lag order, used in testing for Cointegration and in the VAR models, was selected based on VAR Order Selection considering Akaike Information Criterion, Schwarz Information Criterion, Hannan-Quinn Information and others as used in (Dang, 2016).

Table 2: Johansen Cointegration Test Result

VARIABLES	LAG ORDER SELECTED	TRACE STATISTICS	0.05 CRITICAL VALUE	P-VALUE	DECISION ON COINTEGRATION	TEST OF CAUSALITY
LDEFINRGDP LINTR	1	5.797025	15.49471	0.7194	No Cointegration	VAR
LDEFINRGDP LINFR	1	9.851989	15.49471	0.2923	No Cointegration	VAR
LDEFINRGDP LEXCHR	1	13.71303	15.49471	0.0912	No Cointegration	VAR
VARIABLES	LAG ORDER SELECTED	MAX-EIGEN STATISTICS	0.05 CRITICAL VALUE	P-VALUE	DECISION ON COINTEGRATION	TEST OF CAUSALITY
LDEFINRGDP LINTR	1	4.617658	14.26460	0.7891	No Cointegration	VAR
LDEFINRGDP LINFR	1	8.428768	14.26460	0.3368	No Cointegration	VAR
LDEFINRGDP LEXCHR	1	11.45212	14.26460	0.1330	No Cointegration	VAR

Source: Author's Computation Using Eviews Version 9.

Test of Causality using the Granger Causality Test from the Unrestricted Vector Autoregression (VAR) Model

The hypotheses of this study are tested based on the probability values of the Wald Statistics Test results computed using the Granger Causality Tests from the VAR models, using EViews Software Version 9. The equations are estimated using the Ordinary Least Squares (OLS) on an individual basis to ascertain the p-values of the coefficients.

Systems Made from VAR Models using Eviews version 9:

$$LDEFINRGDP = C(1)*LDEFINRGDP(-1) + C(2)*LINTR(-1) + C(3)*LINFLR(-1) + C(4)*LEXCHR(-1) + C(5)..... Equation 7$$

$$LINTR = C(6)*LDEFINRGDP(-1) + C(7)*LINTR(-1) + C(8)*LINFLR(-1) + C(9)*LEXCHR(-1) + C(10)..... Equation 8$$

$$LINFLR = C(11)*LDEFINRGDP(-1) + C(12)*LINTR(-1) + C(13)*LINFLR(-1) + C(14)*LEXCHR(-1) + C(15).....Equation 9$$

$$LEXCHR = C(16)*LDEFINRGDP(-1) + C(17)*LINTR(-1) + C(18)*LINFLR(-1) + C(19)*LEXCHR(-1) + C(20).....Equation 10$$

These systems equations were used as the basis for computing the Wald Statistics Test of Causality, which results are shown in Table 3 below:

Table 3: Wald Statistics Test of Causality of the VAR Models (Equations 1 to 4)

Hypothesis		Test Statistics		
		Chi-Square		
		Value	DF	Prob.
HO ₁	Interest Rate does not granger cause Budget Deficit Financing	0.038328	1	0.8448
	Budget Deficit Financing does not granger cause Interest Rate	0.904408	1	0.3416
HO ₂	Inflation Rate does not granger cause Budget Deficit Financing	0.061110	1	0.8048
	Budget Deficit Financing does not granger cause Inflation Rate	0.000427	1	0.9835
HO ₃	Exchange Rate does not granger cause Budget Deficit Financing	10.60762	1	0.0011
	Budget Deficit Financing does not granger cause Exchange Rate	2.243119	1	0.1342

Source: Author's Computation Using Eviews Version 9.

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The Wald Statistics Test of Causality of the VAR Model in Table 3, above, shows a 'p' value of 0.8448 for the causal relationship between LINTR and LDEFINRGDP and a 'p' value 0.3416 for the causal relationship between LDEFINRGDP and LINTR. This means that at the 5% level of significance, H_{O_1} is not rejected. The implication is that there is no causal relationship between budget deficit financing to RGDP and interest rates in Nigeria. This finding supports the Ricardian hypothesis of no effect.

The above Table further shows a 'p' value of 0.8084 for the causal relationship between LINFLR and LDEFINRGDP and another 'p' value of 0.9835 for the causal relationship between LDEFINRGDP and LINFLR. This means that at the 5% level of significance, H_{O_2} is also not rejected, with the implication that there is no causal relationship between deficit financing to RGDP and inflation in Nigeria, again confirming the Ricardian Hypothesis.

On the other hand, Table 5 shows that there is a 'p' value of 0.0011 for the causal relationship between LEXCHR and LDEFINRGDP, although it shows a 'p' value of 0.1342 for the causal relationship between LDEFINRGDP and LEXCHR. It means that at the 5% level of significance H_{O_3} is rejected, to imply that there is a causal relationship. However, the relationship is unidirectional as the result shows that exchange rates Granger Cause budget deficit to RGDP, without any

evidence of feedback effect. This finding, on the other hand is in agreement with the Keynesian hypothesis of the presence of a relationship.

CONCLUSION AND RECOMMENDATIONS

From the findings of the study, it is concluded as follows:

- i. There is no significant causal relationship between budget deficit financing to real GDP ratio and interest rates in Nigeria over the years 1981 to 2015;
- ii. There is also no significant causal relationship between budget deficit financing to real GDP ratio and inflation rates in Nigeria over the years 1981 to 2015;
- iii. There is a unidirectional significant causal relationship between budget deficit financing to real GDP ratio and exchange rates in Nigeria over the years 1981 to 2015.

While the first two conclusions are in agreement with the Ricardian 'no effect' Hypothesis, the last one agrees with the Keynesian 'effect' hypothesis.

As a policy improvement measure, the following recommendations are put forward:

- i. Government should be mindful of the effect of exchange rates on budget deficit financing in Nigeria when it is deciding on deficit budgeting. Given the fact that Nigeria is an import oriented

- country, any exchange rate imbalances may defeat the objective of deficit budgeting and have an adverse effect on the economy;
- ii. Fiscal discipline should be enhanced in order to achieve the aims of budget deficit in the country;
 - iii. The fight against corruption should be intensified and carried to its logical end as there is the likelihood that a large portion of the deficit financing of the budget may be going into the private pockets of the opportune few who hold political and appointive offices.

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