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Macroeconomic Shocks and Fiscal Deficit Behaviour in Nigeria: A VECM Approach[1]

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Abstract

This paper focuses on establishing the links between fiscal deficit and short-term changes in major macroeconomic variables like real output, interest rate, exchange rate, inflation rate and crude oil price in Nigeria. Empirical results show that the model adequately explains the behaviour of government of fiscal deficit and that while the accumulation of deficit is not at all detrimental to the economy per se, prudence should be exercised in the financing options adopted and more so the appropriate application of such funds to self-financing projects. It is recommended that government broaden its tax-net to curb the surging borrowing as well as prevent the current fiscal challenges from cascading into a full scale fiscal crisis. Finally, budget making should not be assumed to a mere accounting exercise only, instead the process should be focused on developing both physical and human capital through a carefully thought out socio-economic development framework.

Keywords: Budget deficit, macroeconomic stability, error correction, economic growth, Nigeria

JEL Classification: H60, E62

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I. Introduction

One of the primary macroeconomic convergence criteria under the ECOWAS economic integration and monetary cooperation, is for member states to achieve a fiscal deficit (excluding grants)/GDP ratio of 5.0 per cent or less by the end of 2000, and 4.0 per cent by the end of 2002. This ratio serves two important functions, first, as a factor for measuring members' public finance sustainability and, secondly, as an indicator for member countries' level of exposure to external shocks, such as revenue decline, which might necessitate a resort to grants or foreign borrowing for financing government activities.

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Prior to the great depression of the 1930s, the indicative parameter for prudency in economic management was the attainment of a balanced budget. Under this regime, governments consciously refrained from undertaking expenditure beyond their revenue generating capabilities. However, this fiscal philosophy was jettisoned following John Maynard Keynes' strong advocacy for budget deficit as an antidote for stimulating economic recovery from depression. According to Keynes (1936), increased government spending and/or cutting taxes are instrumental tools to achieving the overall macroeconomic objectives of high economic growth rate, low inflation, low unemployment rate as well as a virile balance of payments position through increased aggregate demand and investment. For developing economies like Nigeria, achieving these objectives may remain an illusion without resorting to borrowing or contracting government debts.

Premised on Keynes' propositions, economic managers embarked on expenditure outlays far in excess of their revenue generation abilities. International institutions like the International Monetary Fund (IMF), through their country programmes, encouraged and supported governments' expanded expenditure profiles from borrowed funds from domestic and international financial markets. The result was the accumulation of huge foreign and domestic debts, with its ever increasing interest rate payment obligations that severely constrained growth and development in Africa. This probably explained why, as a development strategy, the ECOWAS deliberately enshrined deficit level criterion as one of the statutory requirements in the economic integration framework.

Empirical findings on the relationship between fiscal deficit and macroeconomic variables in the economic literature are mixed. Fiscal deficit is theoretically known for its crowding out of private sector credit as it lay more claims to the available funds in the economy. The reduced credit lines expectedly drive up interest rate, decelerate net foreign investment, depreciate the exchange rate as well as deteriorate trade deficit position. From the monetarist perspective, inflationary pressures are attributed to budget deficit owing largely to the printing of money or monetization of foreign reserves. This is not to say that budget fiscal do not have any developmental functions as affirmed by several empirical studies in the literature. In many economies, where effective macroeconomic management is the hallmark of monetary authorities, fiscal deficit is unquestionably the major driver for meaningful economic growth, generation of employment, and the reduction in poverty through the funding of viable self-sustaining social and economic infrastructure. These claims and counter claims in the literature would form the fulcrum of discourse in this paper in the literature review section.

Nigeria, like most developing countries, has over the years, depended considerably on deficit financing to stimulate economic activities, finance war and post-war reconstruction expenditures, as well as maintain the massive bureaucratic and democratic institutions. Consequently, between 1970 and 2009, the overall budget balance in Nigeria was consistently in the deficit except for 1995 and 1996, owing essentially to the dwindled revenue from crude oil export earnings. This probably explains why the nation's macroeconomic health was plagued by structural imbalances as reflected in the high inflation rate, weak currency, current account deficits, slow economic growth and high domestic and foreign indebtedness.

This study sets out to examine the sensitivity of domestic macroeconomy to fiscal deficit shocks in Nigeria using the Johansen and Juselius (1990) vector error correction model (VECM). The methodology is favoured because of its ability to circumvent the potential challenge of misspecification biases often associated with the conventional vector autoregression modeling technique. It is intended that the study will extend the frontiers of knowledge on the interdependence between budget deficit and key macroeconomic variables in Nigeria; provide new understanding of the implications and role of fiscal deficits in the design of stabilization, adjustment and intervention programmes in an economy that was severely pressured by the global economic and financial crisis. Using quarterly data up to 2011 do not only help incorporate the effect of pre- and post-global financial and economic crisis but also capture the political and socio-economic transformations within the economy in the model.

The rest of this paper is organized as follows: Following this introduction, section two reviews related theoretical and empirical literatures. Section three provides an overview of macroeconomic trends in Nigeria while section four presents the study methodology. In section five, the model specification and estimation results are presented. Section six proffers recommendations as well as summarises and concludes the paper.

II. Literature Review

Economic development literature is replete with theories and scholarly empirical researches conceptualized to examine the interactions between fiscal deficit and the overall macro stability in both developed and developing economies. While many of these studies focused on the correlations between deficit and macroeconomic variables, others were dedicated to determining the magnitude and direction of such causalities. Several early literature like Bailey (1971), Premchand (1984) and Barro (1990) were mainly motivated by the quest validate as well as contribute to the intense crowding-out crowding-in debate or

hypothesis. This school of economic thought argues that since financing government activities involve the sale of risk-free and high-returns yielding government debt instruments, the attraction of more private patronage crowding-out private sector credit. The result is the diversion of investible resources away from private spending and investment to the public sector to take advantage of the higher returns and reduced risk in the bonds market.

Refuting the crowding-out hypothesis are Aschauer (1989a), Eisner (1989), and Heng (1997), who argued strongly that such crowding-out is not counterproductive. Aschauer (1989a and 1989b) particularly identified a complementary relationship between public and private capital, concluding that higher public investment raises the marginal productivity of private capital and, instead, "crowd-in" private investment. Barro (1991) and Kelly (1997), in separate studies involving 98 and 73 countries, respectively, however, could not validate Aschauer's claims, as they observed a negative relationship between output growth and the proportion of government expenditure instead.

Though Plosser (1987) found no linkages between budget deficit and interest rate, Vamvoukas (2000), however, established a positive relationship between budget deficit and interest rate to the extent that budget deficit increases interest rate, and crowds-out private sector credit. Aisen and Hauner (2008), in a cross country analysis, observes a significant positive effect of budget deficits on interest rate in the order of about 26 basis points per 1.0 per cent of GDP for the complete panel and that the effect varies by country and time period. They concluded that the effect of budget deficits on interest rates depends on the interaction terms and is significant only under one of several conditions: when deficits are high; mostly domestically financed; interact with high domestic debt; and when financial openness is low. The effect is larger when interest rates are more liberalized and the domestic financial sector less developed.

The literature on fiscal deficit and exchange rate relationship exist as attested to by Allen (1977), Branson (1985) , Mussa (1986), Burney and Aktar (1992) and Khan, *et al* (2002), who in their respective studies, found a relationship between budget deficit and exchange rate changes. Burney and Aktar (1992) and Khan, *et al* (2002) for instance confirmed the existence of a link between budget deficit and exchange rate through the price level with budget deficit having a bi-directional effect on real exchange rate for the Pakistani economy. Similarly, Hakkio (1996) observed from his study of 18 OECD countries that deficit reductions are often followed by exchange rate appreciation. Bisignano and Hoover (1982) further show that an increase in deficit may appreciate or depreciate the exchange rate depending on the relative importance of wealth effects as well as relative

asset substitution effects. They concluded that budget deficit, combined with tight monetary policy, will cause the exchange rate to appreciate.

A negative association between budget deficit and currency value was documented by Moreno (1995). Investigating the speculative pressures in foreign exchange markets for selected economies in the Asia-Pacific Basin, the paper found episodes of depreciation associated with larger budget deficits than with appreciation. Krugman (1979) constructed a model of balance of payment crisis that predicts a negative relationship between the budget deficit and future exchange rate. In his proposition, if a country, adopting a pegged exchange rate system, finances government deficits by increasing money supply, the increased volume of money will exert a downward pressure on its local currency exchange rate. The government, in such circumstances is compelled to use its foreign reserves to intervene in the currency market with a view to maintaining its target exchange rate level. As reserves gradually depletes, a sudden speculative attack on the currency occurs forcing the abandonment of the peg regime.

Another theoretical dimension that had received extensive consideration in the literature is the relationship between budget deficit and domestic price level. Anchored by Friedman (1968), Sargent and Wallace (1981), Miller (1983) and a host others, this strand of literature traced inflationary pressures in the economy to government deficit spending. According to this school of thought, the monetisation of deficits by the central banks usually results in an increase in the money supply and ultimately impacts the price level. Dornbusch and Fisher (1981), Choudhary and Parai (1991) and Sowa (1994) all found significant relationship between budget deficit and inflation. However, empirical evidence by Dwyer (1982) and Crozier (1976) do not find any causal relationship in the case of the US and Canadian economies, respectively.

Another argument that gained currency in literature is the twin deficit hypothesis that finds a positive correlation between budget deficit and current account deficit. Fleming (1962) and Mundell (1963), among others, have argued that an upward swing in budget deficit set in motion a string of activities, beginning with an increased interest rate to increase in capital inflows and exchange rate appreciation, and culminating in current account deficits. However, Barro (1989), under the Ricardian Equivalence Hypothesis, counters this assertion as he did not find any relationship between the two deficits. Like the connection between deficit and inflation, the link between budget deficits and the twin deficit notion is inconsistent and inconclusive.

The seminal works of Volcker (1984), Laney (1986), Eisner (1986), and Summers (1986) observed significant correlation between budget deficits and trade

deficits. They all found positive correlation between budget deficit and trade deficit through the transmission mechanism of interest rate and exchange rate. Using a VAR in his investigation of the twin deficit hypothesis, Abell (1990b) found budget deficit indirectly influencing trade deficits with the causation running through the interest rate and exchange rate. He demonstrated that while increased budget deficits exert upward pressure on interest rate, there is also evidence that higher interest rates raise the exchange rate. Kearney and Monadjemi (1990) in their study found the relationship between budget deficits varying according to countries and independence of government financing decision. Evan (1988) and Bachman (1992) found no link between budget deficit and trade deficit. Oluba (2008) also found association among fiscal deficit, national savings and domestic investment as fiscal deficits substantially reduce national saving and consequently domestic investment.

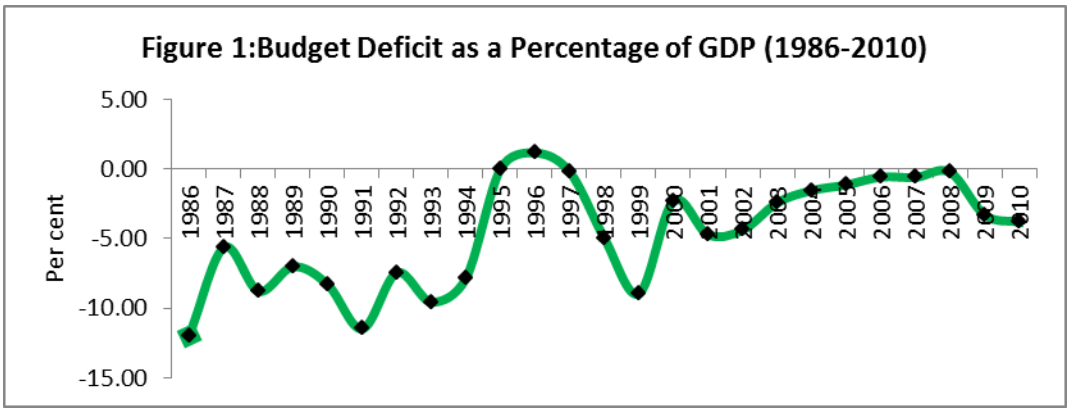
Omitogun and Ayinla (2007) examined the contributions of fiscal policy in Nigeria in the achievement of sustainable economic growth adopting the Solow growth model approach. They find fiscal policy as an ineffective tool for promoting sustainable economic growth owing largely to the structural rigidities prevalent in the economy. Oladipo and Akinbobola (2011) adopted the Granger causality technique in examining whether budget deficit operation stimulates economic growth in Nigeria. The authors observed a uni-directional causality from budget deficit to inflation and that budget deficit affects inflation directly and indirectly through fluctuations in exchange rate. Daylop (2010) also noted that fiscal deficit in Nigeria is Ricardian in nature and, therefore, have very little effect on the level of economic activity. Ezeabasili, *et al* (2012) also examined the relationship between fiscal deficits and inflation in Nigeria using a hybrid technique that incorporates cointegration technique and structural analysis. The paper finds a marginal but positive relationship between budget deficit and inflation in Nigeria as money supply was significant in the model, tended to grow at a faster rate than inflation, suggesting a procyclical movement.

III. Overview of Macroeconomic Trends in Nigeria

The overall balance of a country's budget speaks volumes about the management of its economy. For Nigeria, there are indications that all through its fiscal history until 2011, the country had achieved surplus budgets in only two years. The country's rankings in the human development index, poverty and inequality index and other development indices are worrisome and appalling for one of the most mineral-rich and human-resource endowed economies of the world. Though economic growth rate had maintained a steady average growth over time, the economy is challenged by rising unemployment, inefficient bureaucratic institutions, endemic political and economic corruption, insecurity

of life and property and weak legal system. The collapse of the international oil price in the early 1980s resulted in persistent deficits and severe financial crisis. This pressured the government into introducing the Structural Adjustment Programme (SAP) in 1986 with a view to reflating the economy through its expenditure cut and expenditure-switching programmes.

Ironically, the SAP measures swung budget deficit from ₦8.3 billion or 0.4 per cent of GDP in 1986 to a phenomenal ₦39.5 billion and ₦107.7 billion or 7.4 and 15.8 per cent of GDP in 1992 and 1993, respectively. In 1994, fiscal deficit declined moderately to ₦70.3 billion or 7.8 per cent owing to substantial increase in government revenue arising from improved non-oil revenue (company income tax, customs and excise duties and value added tax, which came into effect that year). In 1995 and 1996, owing largely to the prudent fiscal management of the government, coupled with the increase in revenue from the sales of the nation's crude oil, the economy recorded fiscal surpluses of ₦1.0 billion and ₦32.0 billion, respectively. However, deficit once again returned in 1988 and rose to about ₦133.4 billion or 4.9 per cent of GDP relative to its corresponding period. This development was not unconnected with the general review of salaries and other emoluments and entitlements of civil servants. The cost of transiting from military to civilian administration in 1999 further deteriorated the overall fiscal position with deficit standing at a staggering ₦285.1 billion. Though in 2000, budget deficit decelerated to ₦103.8 billion or 2.3 per cent of GDP, it nevertheless increased to ₦301.4 billion or 4.4 per cent of GDP in 2002 before declining to ₦172.6 billion, ₦101.4 billion and ₦47.4 billion (1.5, 0.6 and 0.2 per cent of GDP) in 2004, 2006 and 2008, respectively. In 2009, owing largely to the huge revenue decline from crude oil export, occasioned by the global financial and economic crises, overall fiscal balance plummeted significantly to ₦810.0 billion, representing about 3.3 per cent of GDP and ₦110.5 billion or 3.8 per cent of GDP recorded in 2010. Figure 1 shows the trend of Nigeria's budget deficit as a percentage of GDP from 1986 to 2010.



Growth in Nigeria's real domestic output averaged 8.4 per cent during 1971-1975 from an average growth rate of 4.9 per cent recorded during 1960 -1965. This was occasioned by the oil boom which resulted from the increase in crude oil exploration and export in the first half of the 1970s. However, between 1981 and 1985, average real GDP growth declined phenomenally due largely to the slump in oil prices, rise in global interest rates as well as domestic policy inconsistency. While the adoption of the Structural Adjustment Programme (SAP) in 1986 moderately reversed the negative growth trend, its subsequent abandonment in the following decade saw significant deterioration in economic and income per capita growth.

In 2000, there was a rebound in output growth, driven mainly by the improved macroeconomic environment, relative stability in the goods and foreign exchange markets and the enhanced investor confidence in the economy. This improved performance peaked in 2006 with a growth rate of 9.6 per cent, with relatively better performance of the non-oil sector. Between 2006 and 2010, real output grew at an average of 6.7 per cent with the highest growth of 7.9 per cent recorded in 2010. This salutary development was attributed to the sound economic management policies coupled with vast economic reforms and improved performance of the non-oil sector, which grew at 8.5 per cent. The amnesty programme of the Federal government contributed in no small measure to increased crude oil production which enhanced the funding of critical infrastructure in the economy and increased credit to the real sector. All of these cumulatively impacted positively on economic growth.

In line with the formal and informal structures of the economy, the Nigerian foreign trade and exchange rate market aligns with the dualistic nature though dominated by the formal sector. The informal or parallel market segment of the foreign exchange market, however, continue to witness high patronage, despite prohibition by law, accounting for up to 10.0 per cent of the foreign exchange needs, especially of individuals engaged in overseas travels and trans-border trade. This is in addition to the rising volume of unrecorded trade with neighbouring countries following the implementation of the ECOWAS protocol on free movements of persons and the considerable liberalization of external trade.

Foreign trade, which is dominated by the oil sub-sector (crude oil and gas), accounted for about 75.7, 73.6 and 64.8 per cent of total trade in 2006, 2008 and 2010, respectively. Similarly, oil exports accounted for 98.2 per cent of total exports receipts in 2006. This, however, declined to 97.6 and 96.4 per cent in 2008 and 2010, respectively. The patterns and trends in external trade and balance of payments position underscored the high degree of external dependence and

vulnerability of the Nigerian economy to external shocks. Though the foreign exchange content of domestic production and consumption is very high, there have been remarkable changes in the composition of non-oil imports in favour of consumer goods over the last decade, indicating a decline in production and increase in dependence. Consumer goods, which accounted for only 19.0 per cent of total imports in 1996 swung up to 47.0 per cent of total imports in 2006, while raw materials, with a total share of 42.0 per cent in 1996, declined to constitute only 29 per cent (CBN, 2010).

Inflation rate during the review period averaged 11.7 per cent, rising from a single-digit of 6.6 per cent in 1999 to about 24 per cent in 2003, before declining to 6.6 per cent in 2007. The high inflation in 2003 was attributed to increased aggregate demand driven primarily by political activities, the depreciation of the naira, and increase in the pump prices of petroleum products. Inflationary pressure eased significantly in the following years except in 2005 where increased food export (particularly cassava and grains) and stocking of the strategic grains reserve contributed to increased pressure on food prices. Clement weather, appreciation and relative stability of the naira coupled with robust macroeconomic policies all contributed to the general downward trend in price. However, in 2008 and 2009, price level resumed its upward trend, with the inflation rate standing at 15.1 and 13.9 per cent, respectively, owing largely to the surge in food prices and seasonal effects pushing inflation in Nigeria to exceed both the national and the WAMZ single-digit target.

IV. Analytical Framework and Methodology

IV.1 Analytical Framework

The fundamental building block for the analysis of the linkages between fiscal deficits and macroeconomic variables is the government budget constraint, though it is only one of the many components that impact on the total indebtedness of the government. When government revenue falls short of its expenditure outlays, it incurs a deficit which could be financed principally from external (overseas borrowing) or internal (monetary - printing money, or non-monetary - selling bonds to the public). In Nigeria, the domestic sources consist of the banking system (the Central Bank of Nigeria (CBN) and the Deposit Money Banks (DMBs)), the non-bank public and other sources such as excess crude savings. Government budget constraints, thus, goes beyond eliciting the interrelationship between deficit and the financing options but also highlight the linkages between monetary and fiscal policy as well as the macroeconomic consequences of deficits. The standard government budget constraint is expressed as

$$\delta_g - \delta_{g-1} = \left(c_g + i_g - \tau\right) + r\delta_{g-1} \quad (1)$$

Where $\delta_g - \delta_{g-1}$ is the change in debt between two periods or better defined as the net debt position of government, c is a measure of net government consumption, i_g is net government investment, τ is taxes net of transfers; and r is the nominal interest rate. Equation (1) is an identity showing that government net debt at any point in time is equivalent to budget deficit and debt service represented by the right hand side of the equation. When a government runs a deficit, it finances such deficits through the sale of bonds or other instruments to the public and private foreign investors, domestic public and private investors, the domestic banking system and the country's central bank. In most developing economies with nascent government bonds market, the weak financial capacity of domestic private investors invariably compels the central banks to hold huge proportions of government debt instruments. In Nigeria, however, the banks and discount houses and non-bank public often constitutes the major holders of government debt, with the central bank holding only a minimal component[2]. It, therefore, implies that

$$\delta_{gc} - \delta_{gc-1} = \left(\delta_g - \delta_{g-1}\right) - \left(\delta_{gp} - \delta_{gp-1}\right) \quad (2)$$

where δ_{gc} and δ_{gp} is debt held by the central bank and the public, respectively. Equation (2) suggests that a change in the holding of government debt by the central bank is equivalent to the total debt less the portion held by the public. Since budget deficit indirectly influences the quantum of money supply in the economy through the monetary base, it therefore means that

$$\left(\varpi - \varpi_{t-1}\right) = \left(\delta_{gc} - \delta_{gc-1}\right) + \alpha\left(r_c - r_{c-1}\right) + \left(l_{cb} - l_{cb-1}\right) \quad (3)$$

where ϖ is the monetary base; r_c is foreign reserves at the central bank; α is the domestic nominal exchange rate while l_c is the stock of loans made to commercial banks through the discount window. Assuming that the discount window do not exist i.e central bank's credit to DMBs is zero, equation (3) becomes

$$\left(\varpi - \varpi_{t-1}\right) = \left(\delta_{gc} - \delta_{gc-1}\right) + \alpha\left(r_c - r_{c-1}\right) + \left(l_{cb} - l_{cb-1}\right) \quad (4)$$

Substituting equation (2) into (4) gives

[2] *According to the CBN Financial Markets Department Activity Report for 2010, the CBN, Banks and Discount Houses and Non-Bank Public held about 7.5%, 57.3% and 29.8%, respectively, of government bonds in 2010.*

$$\left(\varpi - \varpi_{t-1}\right) = \left(\delta_g - \delta_{g-1}\right) - \left(\delta_{gp} - \delta_{gp-1}\right) + \alpha\left(r_c - r_{c-1}\right) \quad (5)$$

Rearranging equation (5) yields

$$\left(\delta - \delta_{g-1}\right) = \left(\varpi - \varpi_{t-1}\right) + \left(\delta_{gp} - \delta_{gp-1}\right) - \alpha\left(r_c - r_{c-1}\right) \quad (6)$$

Equation (6) represents the fundamental framework for financing budget deficits. First through printing of money, monetary base $(\varpi - \varpi_{t-1})$, secondly through borrowing from the public, treasury bonds $(\delta_{gp} - \delta_{gp-1})$ and thirdly, depleting the foreign exchange reserves at the central bank $\alpha(r_c - r_{c-1})$. According to Easterly and Schmidt-Hebbel (1994), each of these financing options, when used excessively, brings about macroeconomic imbalances or distortions. For instance, while money creation could lead to inflation; excessive domestic borrowing may result in credit squeeze or contraction (crowding-out), and external borrowing may result in current account deficit and exchange rate depreciation. However, a moderate mix of these options has the potency to propel economies back to the path of growth and development especially where the funds sourced are committed to economically viable and self-financing projects that have the ability to service the loans from their returns.

IV.2 Methodology

Depending on the research objective, the ordinary least squares (OLS) and the vector autoregression (VAR) approaches remain yet the most commonly applicable methodologies for the determination of inter-relationships between economic variables. Complementarily, the error correction mechanism has come to be a veritable tool for ascertaining the dynamic paths of variables as well as their ability to return to long-run equilibrium (converge) after a shock. This study adopts the VECM framework. The preference for VECM followed Phillips (1991), Gonzalo (1994) and Goswami and Jung (1997) who ascribed better properties to VECM than several other estimating techniques for long run relationship determination. Phillips (1991), for instance, prefers VECM because it gives more efficient estimators of cointegrating vectors as it allows for the testing of cointegration in a system of equations. According to Lutkepohl (2004) where a cointegrating relationship had been established among variables in the system, it becomes imperative to consider specific parameterizations that support the analysis of the cointegration structure. In this case, a VECM model set up becomes more convenient compared with a VAR.

In order to obtain reliable estimates of parameter coefficients, the series of interest were differenced to achieve stationarity where they are not stationary at levels. Also, the unit root test are carried out to determine the statistical properties of the variables and their long-run relationships before estimating the model. We find a VAR of order four (4) using the Hannan-Quinn Information Criterion (HQ) and proceeded to determine the cointegrating vectors by conducting the Johansen cointegration test. The result from the maximum eigenvalues and trace statistics indicate a cointegrating relationship at 5.0 per cent significance level. The VECM is estimated showing the long-run and short-run error correction coefficients, statistical significance, interactions and feedback across the variables of interest. This is to show the response of variables in the model to short-run evolutions with a view to eliciting useful information about the dynamics of the system.

IV.3 Data

The Central Bank of Nigeria (CBN) and the National Bureau for Statistics (NBS) serve as the major sources of data for the study. Maximum lending rate, (mlr), average nominal exchange rate (ner) and fiscal balances (fdr) of federal government were obtained from various statistical publications of the CBN. Real gross domestic product (rgdp) and consumer price index (cpi) series were sourced from the National Bureau of Statistics (NBS). The study used quarterly data from 1990Q1 to 2011Q4 for the estimation. The maximum lending rate is believed to be the most appropriate representative of interest rate in the Nigerian economy. Inflation rate is measured by the change in consumer price index in the study. Exchange rate is represented by the quarterly average nominal exchange rate *vis-a-vis* the US dollar while real GDP is the total domestic output deflated by the GDP deflator. All series, except the ratio of fiscal deficit to GDP and interest rate, entered the model in their natural logarithm form to enable the interpretation of the coefficients as elasticities.

IV.4 Unit Root

Since most macroeconomic time series data are found to be inherently non-stationary (Nelson and Plosser, 1982), pre-testing the variables helps to determine the order of integration before the application of the VECM technique. Consequently, the Augmented Dickey-Fuller (ADF) (1979, 1981) and the Phillip-Perron (PP) (1988) tests were employed to examine the stochastic properties of the series with a view to finding their level of stationarity. Where variables are not stationary, estimation results are very likely to be spurious leading to biased standard errors and unreliable correlations within the regression analysis (Yule, 1926).

IV.5 Cointegration

When several time series variables are found to be non-stationary, a cointegration test is required to determine whether they have a long-run relationship. Although there exist a number of tests/techniques for determining cointegration, this study employs the Johansen and Juselius (1990) vector error correction mechanism (VECM) approach. Using all variables as endogenous[3], a VECM investigates the long-run as well as the short-run dynamic co-movements among economic variables. We first tested for the cointegrating vectors before applying the error correction model in which deviations from the long-run equilibrium influences the short-run dynamics of economic variables.

A VECM model is specified as follows

$$\Delta Z_t = \Gamma_1 \Delta Z_{t-1} + \Gamma_2 \Delta Z_{t-2} + ... + \Gamma_{k-1} \Delta Z_{t-k+1} + \Pi Z_{t-k} + \upsilon_t \quad (7)$$

where Γi = - (I – A1 - ... -Ai) (i = 1, ... , k-1), a matrix representing short-term adjustments and Π = - (I – A1 - ... – Ak), being a coefficient matrix showing the long-run relationship between the variables in the vector. Z_t is px1 vector of stochastic variables integrated of order 1, k is the lag length and υ_t is p x 1 gaussian white noise residual factor. Johansen (1988) developed the methodology for testing the rank of Π. When Π matrix has a full rank (r = n), the variables in Z_t vector are said to be stationary at level that is I(0) implying that the model could be used without differencing the series. If the rank of Π matrix rank is null (r = 0), it indicates the absence of a long-run or cointegrating relationship between the variables at level suggesting differencing of the series before use in the VAR. However, when the Π matrix has a rank that lies between zero and one (r≤(n – 1)), it implies that there exist a n x 1 matrix of α and β each with rank r such that Π = $\alpha\beta'$ where, according to Harris (1995) α is a matrix of error correction terms measuring the coefficient of the speed of adjustment to equilibrium and β is a matrix of long-run coefficients or the cointegrating vector such that the term $\beta' Z_{t-k}$ ensures that Z_t converges with their long-run steady state. r is the number of cointegrating relationships.

Consequently, long-run cointegrating relationship was estimated implying the consideration of the rank of Π. Johansen (1988) and Johansen and Juselius (1990) developed the trace (λ trace) and the maximum eigenvalues (λ max) likelihood ratio test statistics for testing of the rank of Π or number of cointegrating vectors. Both methods involve the estimation of the matrix Π but differ only in the sense

[3] *In a VECM, all the variables enter the system endogenously particularly with the use of the maximum likelihood method which minimizes the endogeneity bias.*

that while one test against specific alternative, the other tests against general alternative. The null hypothesis for both tests is same, that is, there is no cointegration.

IV.6 Model Specification

The error correction formulation for the fiscal deficit function is specified as:

$$fdr_t = \alpha_0 + \alpha_1 \ln rgdp_t + \alpha_2 cpi_t + \alpha_3 \ln ner_t - \alpha_4 \ln po_t - \alpha_5 mlr_t + \varepsilon_t \quad (8)$$

Where $\alpha_0....\alpha_5$ represent the model parameters or coefficients to be estimated and are theoretically expected to be greater than zero ($\alpha_0....\alpha_5 > 0$). The variables *fdr, rgdp, cpi, ner, po* and *mlr* are the ratio of budget deficits to GDP, real gross domestic product, consumer price index (proxy for inflation), average nominal exchange rate, crude oil price and maximum lending rate, respectively. ε_t is the error term with the conventional statistical properties. Theoretically, the relationship between fiscal deficit and domestic macroeconomic variables could either be positive or negative depending on the financing method adopted. For instance, a positive real domestic output growth implies stimulation of the economy through debt acquisition while a rising inflation rate suggests the monetization of reserves or the printing of money by the central bank, all of which increases the money supply in the economy.

It is expected that deficit spending would translate into growth in gross domestic product through the financing of capital projects and infrastructure, while an inverse relationship implies the financing of more of recurrent expenditure[4], which in an import-dependent economy like Nigeria's, decelerates growth. Theoretically, interest rate relationship with budget deficit is expected to be inverse as a downward pressure is exerted on interest rates where the deficit is financed from money printing or monetization of foreign earnings. In the same vein, where the financing is done through the market, lending rates will rise as government, in a bid to woo patronage, often lower the rate of debt instruments. The ensuring patronage by the investing domestic public drives up lending rate as resources are reallocated to take advantage of the lower rate and high yield in the government instrument. This financing option is usually known to crowd-out private investment.

Nominal exchange rate exhibit a direct relationship with rising fiscal deficits, especially in an import-dependent economy like Nigeria's, where government

[4] *According to the CBN Annual Report for 2010, recurrent expenditure accounted for 74.1 per cent of total expenditure and 10.5 per cent of GDP.*

fiscal activities exert pressures on the domestic exchange rate. However, if government spending is directed at productive activities, the inverse outcome would hold as aggregate demand is stimulated and excess products exported to earn foreign exchange. The result is the appreciation of the exchange rate (as reserves build up) and worsening of the current account deficit as exports becomes less competitive and imports becomes cheaper.

V. Empirical Analysis

V.1 Unit Root Test

The unit root test results in Table 1, indicates that both the ADF and PP tests did not fail to reject the null hypothesis of unit root (or non-stationarity) in level series, but at first difference, and 1.0 per cent significance level with constant and intercept, all variables in the model are stationary. This implies that all variables are integrated of order one I(1), having been differenced once. It, thus, becomes necessary to undertake a cointegration test[5].

Table 1: Unit Root Tests

Variable	ADF Test		PP Test	
	Level	First Difference	Level	First Difference
fdr	-2.4590	-6.5063*	-2.2019	-6.5586*
*ln*rgdp	-1.9612	-9.9400*	0.9279	-12.6410*
*ln*ner	-1.6811	-9.2544*	-1.6914	-9.2591*
*ln*cpi	-0.6157	-8.6827*	-0.6362	-8.6645*
mlr	-0.6496	-8.5445*	-0.6493	-7.8195*
lnpo	0.1167	-8.5775*	-0.3973	-7.6668*
	Test Critical Values		Test Critical Values	
	*1 % level	-3.5083	*1 % level	-3.5074
	**5 % level	-2.8955	**5 % level	-2.8951
	***10 % level	-2.5849	***10 % level	-2.5847

Note: Critical values are from Mackinnon (1999)

V.2 Johansen Cointegration Test

Having established the order of integration, we proceed to test for cointegration which is used to establish the existence of long-run relationship among the

[5] *Even though the most desirable case in cointegration test is to have all the variables integrated of the same order, it is imperative to stress that cointegrating relationship still exist in cases where a mix of I(0) and I(1) exist, Kerry (2008).*

variables. The test uses the trace (λ trace) and maximum eigenvalues (λ max) statistics to determine the number of cointegrating vectors. Appropriate optimal lag length that would give standard normal error terms was selected using the Hannan-Quinn information criterion (HQ) as the Schwarz information criterion is considered too constraining given the higher penalty it imposes. The result of the cointegration tests is presented in Table 2.

Table 2: Unrestricted Cointegration Test

Trace Statistics			**Maximum Eigenvalues**		
Null Hypothesis	Trace Statistic	Critical values at 0.05%	Null Hypothesis	Maximum Eigen Statistic	Critical values at 0.05%
r = 0	115.68*	95.75	r = 0	41.93*	40.07
r ≤ 1	73.75*	69.81	r ≤ 1	32.16	33.87
r ≤ 2	41.59	47.86	r ≤ 2	21.59	27.58
r ≤ 3	19.99	29.79	r ≤ 3	12.00	21.13
r ≤ 4	7.99	15.49	r ≤ 4	7.27	14.26

Note: r represents number of cointegrating vectors; * and ** indicates rejection of the null hypothesis at 5% and 1% significance level, respectively.

Starting with the null hypothesis that there are no cointegrating vectors (r=0), the result show that at 0.05 per cent significance level, the trace and maximum tests suggest that the variables are cointegrated with r=2 and r = 1, respectively. According to Harris (1995), this feature is a common phenomenon in estimated test statistics and that when it obtains, the maximum eigenvalue test should be favoured over the trace statistic. This suggests that the variables are cointegrated and at least one factor drives the relationship toward a stable long-run convergence. The trace statistic (λ trace) at 115.68 and 73.75 are larger than their respective critical values of 95.75 and 69.81 while the maximum eigenvalue statistics (λ max) at 41.93 exceed its critical value of 40.07. This rejects the null hypothesis at 5.0 per cent level of significance in favour of the alternative hypothesis that there is cointegrating vector (r≥1). It is also indicative from the table that the null hypothesis for r≤1, r≤2, r≤3, and r≤4 cannot be rejected at 5.0 per cent level of significance, showing that there exists at least one (1) cointegrating vector among the variables of interest.

Following Johansen and Juselius (1990) methodology, we normalise the cointegrating vector on the ratio of budget deficit to GDP (fdr) given the

evidence in favour of at least one cointegrating vector. The normalised cointegrating relationship, given one cointegrating relation (r=1), and lag length of 4 is expressed as:

$$bd_t = \underset{(-0.089)}{-0.006}\ln rgdp_t + \underset{1.506)}{0.032}\ln cpi_t - \underset{(-2.005)}{0.051}\ln ner_t + \underset{(2.08)}{0.074}\ln po_t + \underset{(4.99)}{0.015}mlr_t \quad (9)$$

Equation (9) shows that all the explanatory variables except real domestic output and exchange rate are positively related with the budget deficits financing. Apart from real output and maximum lending rate, other variables exert significant influences on deficit movement. A one per cent increase in *cpi* and *po* results in approximately 0.03 and 0.07 per cent increase in deficit financing, respectively. Exchange rate, oil price and maximum lending rate enter the cointegrating vector significantly. Equation (9) shows the coefficients for all the variables. The actual equilibrium relationship is presented as

$$ecm = bd_t + \underset{(-0.089)}{0.006}\ln rgdp_t - \underset{(1.506)}{0.032}\ln cpi_t + \underset{(-2.005)}{0.051}\ln ner_t - \underset{(2.08)}{0.074}\ln po_t - \underset{(4.99)}{0.015}mlr_t \quad (10)$$

Equation (10) mirrors the economic fundamentals of the Nigerian economy. The positive relationship between budget deficits and the real domestic output and nominal exchange rate is expected. The posting of a fiscal deficit in Nigeria is most often followed by a draw down on external reserves and excess crude account, the monetization of which impacts on monetary aggregates by increasing money supply and exerting inflationary and exchange rate pressures. The minimal impact of output points to the fact that much of the government spending (over 74.1 per cent) is dedicated to non-productive recurrent expenditures. The positive sign of oil price is counter-intuitive given that high oil price improves government revenue which ordinarily should lead to lower deficit. The huge government expenditure outlay on recurrent expenditure, added to the endemic corruption and high import component of consumables, offers a plausible explanation for this development.

High net imports serve as revenue leakages, depreciate the local currency, increase local price levels and consequently contribute insignificantly to economic growth. Though the level of development of the capital market in Nigeria is still nascent, government in the last decade, through prudent fiscal measures, had resorted to the market to finance its deficits, instead of depending on central bank Ways and Means Advances. However, the behaviour of interest rate, most times, do not represent actual economic expectations as the rate, to a large extent, is dependent on factors not correlated with market fundamentals and operations in the economy. In addition, anecdotal evidence suggests that the Nigerian government hardly takes market behaviour into consideration when

it is fixing the rate at which its instruments are to be sold. This distort the market behaviour of interest rates in the economy and hence the negative sign.

V.3 Wald Coefficient Test

The Wald coefficient test (Table 3) as described by Polit (1996) and Agresti (1990) was also conducted to ascertain the significance of the estimated parameters i.e. whether the parameters of the explanatory variables are zero. This is a joint significance test on the lagged explanatory values used to determine the short-run causality. The result shows that the parameter restrictions for all the variables, except for the maximum lending rate, reject the restriction hypothesis that each coefficient of the variable is zero. Therefore, all the variables are significant at 1.0 per cent significance level, except for *mlr*, and should be included in the model. However, the joint Wald test indicates overall significance for all variables.

Table 3: Wald Test

Estimated equation $0 = \alpha_o + \alpha_1 lnrgdp + \alpha_2 lncpi_t + \alpha_3 lnner_t - \alpha_4 lnpo_t - \alpha_5 mlr_t$

Parameter Restriction	Chi-Squared Test Statistic	Probability
αo	60.0894	0.0000
$\alpha 1$	8.2193	0.0004
$\alpha 2$	99.4429	0.0000
$\alpha 3$	27.3077	0.0000
$\alpha 4$	13.1716	0.0003
α_5	0.0972	0.7551

Note: the critical values with one degree of freedom at 1% significant level is 75

The establishment of a cointegration relationship between the variables in the model suggests that one or two of the variables in the model Granger-causes the other, making it imperative to examine more comprehensively the direction and nature of the causality. Since the cointegration test is not rejected, using the standard Granger causality test would result in misspecification (Engle and Granger, 1987), hence causality was determined by applying the error correction model on to the time series. The causal relationship is determined by the significance of the χ^2 – values.

Table 4: Granger Causality Result based on VECM

Null Hypothesis			χ^2 - Statistics	Probability
lrgdp	$\Longrightarrow$	lpo	18.2185*	0.0001
lcpi	$\Longrightarrow$	bd	4.8939***	0.0866
lcpi	$\Longrightarrow$	lner	5.4429***	0.0658
lner	$\Longrightarrow$	bd	7.0414**	0.0296
lner	$\Longrightarrow$	lcpi	5.3344***	0.0694
lpo	$\Longrightarrow$	lrdgp	22.3144*	0.0000
lpo	$\Longrightarrow$	lcpi	7.5881**	0.0225
lpo	$\Longrightarrow$	lner	7.3476**	0.0254
mlr	$\Longrightarrow$	lner	7.5149**	0.0233

Notes: the arrow $\Longrightarrow$ denotes Granger Causality, *, **, and *** denote 1%, 5% and 10% significance level, respectively.

The statistical analysis, based on the vector error correction model (VECM) of the causal relationship among the variables is reported in Table 4 above. The results show that causality runs from price level to budget deficit and exchange rate. Similarly, the estimates reveal that a causal relationship runs from oil price to output, price level and nominal exchange rate as statistically determined by the χ^2 – values reported in the Table. In addition, the hypothesis of causality from exchange rate to budget deficit, consumer price index to exchange rate and exchange rate to prices is rejected at the 10 per cent level of significance, while others are rejected at 5.0 per cent, except real output that is rejected at 1.0 per cent. The test also indicates that none of the macroeconomic variables in the model Granger causes the maximum lending rate during the sample period. This suggests that lending rate is not a strong consideration when government is contracting debt to finance expenditures, which is consistent with outcomes in most developing countries. The plausible explanation for this behaviour is the rudimentary nature of the markets.

V.4 Vector Error Correction Model without Exogenous Factors

In econometric theory, the cointegration of two non-stationary variables implies their convergence in the long-run horizon. Having established a cointegral relationship between deficit, price level, nominal exchange rate, oil price, lending rate and real output, we proceed to estimate the error correction model of equation (11), with a view to capturing the short-run dynamics of the model such as the speed of adjustment to equilibrium or convergence in the case of

any shock. The error correction equation has the advantage of easy interpretation in terms of short and long-run responses of shocks in the model. It also separates the short-run and long-run relationships between the variables. The short-run relationships are captured by the terms in first differences while the long-run relationships are captured by the terms in levels. In the literature, several techniques, such as Engle and Granger (1987) and Johansen and Juselius (1990) are often employed in the estimation of error correction mechanism (ECM). Here we adopted the VECM technique which is more useful in estimating multivariate models. We assume fiscal deficit to be endogenous while the explanatory variables are considered weakly exogenous.

The VECM takes the form:

$$\Delta bd = \phi_0 + \sum_{i=1}^{k-1}\phi_1 \Delta bd_{t-i} + \sum_{i=0}^{k-1}\phi_2 \Delta \ln rgdp_{t-1} + \sum_{i=1}^{k-1}\phi_3 \Delta \ln cpi_{t-1} + \sum_{i=0}^{k-1}\phi_4 \Delta \ln ner_{t-1} + \sum_{i=0}^{k-1}\phi_5 \Delta \ln po_{t-1}$$
$$-\sum_{i=1}^{k-1}\phi_6 \Delta mlr_{t-1} + \phi_7 ECM_{t-1} + \mu_t \qquad (11)$$

The estimates of the error correction model coefficients of equation (11) have the same signs and explanations as earlier discussed. The ECM coefficient, ϕ_7, is expected to be less than one, negatively signed and statistically significant. The negative sign of the error correction term presumes a long-run convergence of the model to equilibrium and the magnitude shows the proportion of the disequilibrium that is corrected within each period. This long-run equilibrium relationship forms the basis for the short-run dynamics of the model and shows the speed of adjustment of the system to long-run perturbations. While the estimated parameters form the long-run elasticities, the coefficients of the difference terms form the estimates of the short-run elasticities.

Hendry's (1986) general-to-specific modeling procedure was followed in the selection of the preferred error correction model. This approach requires the estimation of the VECM in their difference form and eliminating the lags with insignificant parameters, guided by the estimated standard errors for the coefficients, in order to achieve a parsimonious VECM. The optimal lag length for the explanatory variables was four using the Hannan-Quinn information creterion. The number of cointegrating equations in the model was also determined as one. Table 5 depicts the results of the parsimonious short-run model including some diagnostic tests.

Table 5: Parsimonious Short-Run Model

	fdr(-1)	*lrgdp(-1)*	*lcpi(-1)*	*lner(-1)*	*lpo(-1)*	*Mlr(-1)*
(A) *Cointegrating Equation*	1.000000	-0.0063 [-0.09]	0.0316 [1.51]	-0.051 [-2.00]	-0.074 [-2.08]	0.015 [4.98]
	fdr(-1)	*lrgdp(-1)*	*lcpi(-1)*	*lner(-1)*	*lpo(-1)*	*Mlr(-1)*
(B) Ecm_{t-1}	-0.11 [-2.31]*	0.18 [-1.18]	-0.29 [-0.74]	2.17 [2.98]*	1.01 [-1.85]*	-19.66[-1.99]*
Δfdr(-1)			2.67 [2.59]*			
Δlrgdp(-1)		-0.31 [-2.83]*				
Δlrgdp(-2)		-0.38 [-3.60]*				
Δlrgdp(31)		-0.38 [-3.45]*				
Δlrgdp(-4)		0.63 [5.30]*				
Δlcpi(-3)					-0.36 [-2.08]*	
Δlner(-1)				-0.29 [-2.03]*		
Δlner(-4)	0.03 [3.66]*					
Δlpo(-1)	-0.02 [1.97]*		-0.20 [-2.15]*		0.34 [2.66]*	
Δlpo(-2)					-0.27 [-1.98]*	
Δlpo(-4)			-0.33 [-2.19]*			
Δmlr(-1)				0.03 [2.37]*		0.49 [3.06]*
Δmlr(-2)				0.03 [2.08]*		
Δmlr(-3)						0.30 [2.18]*
c		0.023 [2.873]*				
Diagnostics						
Adj R^2	0.39	0.88	0.11	0.004	0.20	0.11
Sum sq resids	0.005	0.071	0.508	1.652	0.93	302.08
Log likelihood	283.18	175.33	93.67	44.76	68.43	-171.38

*Notes: Figures in * (parenthesis) are significant levels*

The parsimonious result as depicted in table 5 is very instructive and elucidating. However, the analysis requires an understanding of the fundamentals and peculiarities of the Nigerian economy. The table is divided into three sections: the cointegrating vector or long-run relationship, the error correction terms estimates and the diagnostics. Section (A) shows the cointegrating vector or long-run equation indicating that in the long-run, fiscal deficit in Nigeria is significantly cointegrated with nominal exchange rate, oil price and maximum lending rate but not with real domestic output and consumer price index.

The result of the lagged variables in their first difference form (error correction) is presented in section (B). The result of the estimate shows that the coefficient of the error correction term, which measures the speed of adjustment towards long-

run equilibrium, has the expected negative sign, less than one and is statistically significant. This implies that there exist a mean-reverting process of the variables to their long-term targets and that approximately 11.0 per cent of the disequilibrium is corrected within a quarter. It also show that the coefficients of error correction of budget deficit, nominal exchange rate, oil price and maximum lending rate are significant while that of real output and price level are insignificant. This suggest that while budget deficit, nominal exchange rate, oil price and maximum lending rate can potentially return to the long-run equilibrium, should there be a shock in the economy, in the short-run, other variables cannot revert to equilibrium.

Following Henry's general-to-specific rule, statistically insignificant variables were eliminated from the model. A cursory observation of the result indicates that nominal exchange rate and oil price influence fiscal deficit in Nigeria in the short-run. Oil price exhibits a negative relationship with fiscal deficit especially as crude oil sales comprise over 90.0 per cent of government foreign exchange earnings. A decline in prices induces fiscal deficit while increased oil prices slows government's appetite for loans. Similarly, exchange rate demonstrated a positive and significant relationship indicating the depreciation of the local currency increases fiscal deficit. However, the heavy intervention in the foreign exchange market by the central bank to stabilize the rate insulates the exchange rate from much of the dynamics of the economy, especially the depletion of reserves position or the monetisation of oil revenue earnings. Hence, its minimal impact.

The result further reveals that budget deficit and oil price significantly influence consumer price level. The result suggests that while budget deficit significantly increases price level, oil price decelerates the price level. An increase in budget deficit exacerbates inflationary pressures while favourable oil prices moderates inflation rate through a stable exchange rate and increased investment and output.

Nominal exchange rate is affected by oil price and maximum lending rate, which equally exhibits autoregressive structure. Maximum lending rate show positive and significant relationship with exchange rate. This is in consonance with the economic literature, which for instance, argues that in an economy with rudimentary money and capital market, economic agents shy away from lending to the private sector but invest in government debt instruments which are considered less risky despite their low yield and the foreign exchange market. While oil price exerts an inverse pressure on nominal exchange rate, the maximum lending rate positively affect exchange rate. Consumer price index indirectly influences oil price significantly, which also follows an autoregressive

structure. The table further reveals that real output and maximum lending rate exhibit autoregressive structures as they are not influenced by any other variable in the model except by their past behaviour. However, the statistical significance of the constant term of real output suggests the impact of other variables in the determination of real output in the short-run.

V.5 Variance Decomposition.

Variance decomposition presents a summary of the fraction of the overall forecast error variable accounted for by each of the type of innovation. It helps one to analyse the way in which the variances of each variable's innovation influences the movement (that is, variation) in each of the variable in the system. Variance decomposition is the percentage of the variance of the error made in forecasting a variable (say X) due to a specific shock (say error term of the Y equation) at a given horizon (like say 2 years). It shows which variables have relatively sizeable independent influence on other variables in the system.

The variance demposition result reported in Table 6 (see the appendix) provides additional information on the relationship between fiscal deficit and selected macroeconomic variables in the economy. It is generally observed that the variation in all the variables in the system are significantly accounted for by their own shocks by the end of the tenth period. Results from the table indicate that variation in fiscal deficit is significantly accounted for by its own shock, declining from 97.4 per cent in the third period to 96.9 per cent by the end of the tenth period. It is also shown that oil price and interest rate account for 1.6 and 1.3 per cent of the variation in fiscal deficit, respectively, while other variables had no significant impact on budget fluctuations.

Similarly, the variation in real domestic output is largely influenced by its own shock, while oil price contributed a significant 25.0 per centafter the tenth period, having risen from 16.6 and 23.3 per cent in the third and seventh quarters, respectively. Output is not meaningfully influenced by inflation rate, nominal exchange rate and maximum lending rate. The variance decomposition result also show that 80.0 per cent of varaition in inflation rate is explained by its own shock in the tenth period. While fiscal deficit contribution to variation in inflation rate rose from 9.5 per cent in the third quarter to 15.4 per cent in the tenth period, real output accounted for only 3.6 per cent in the tenth period against the 6.4 per cent obtained in the third period. No significant contribution is exhibited by other variables.

Exchange rate variation is significantly accounted for by its own shock (95.34 per cent in the tenth period against 97.1 per cent in the third quarter). Except for fiscal deficit influence of about 2.70 per cent in the variation in exchange rate,

other variables in the system did not casue any variation in exchange rate. The variance decomposition of oil price reveals an interesting result as all other variables in the model contributed meaningfully to its variation. Oil price accounted for 75.0 and 40.6 per cent of its shock in the third and tenth periods, respectively while real output, maximum lending rate, fiscal deficit and inflation rate accounted for 23.7, 12.9, 10.4 and 9.6 per cent of the variation in oil price in the tenth period, respectively. Real output and exchange rate accounted for 5.8 and 4.1 per cent of the variation in maximum lending rate while 88.6 per cent was explained by its own shock. Fiscal deficit, inflation rate and oil price exhibited insignificant influence on maximum lending rate in the system.

VI. Policy Recommendations and Conclusion

This paper focused on establishing the link between fiscal deficit and short-term changes in key macroeconomic variables. The consistency and stability of the empirical results show that the model adequately explains the behaviour of government in financing its expenditures and should be closely monitored in the process of policy formulation. The result points to the critical roles of real GDP, nominal exchange rate, inflation rate and interest rate and oil price in influencing the financing of government expenditures in Nigeria.

Fiscal deficit was found to be significantly influenced by oil price and exchange rate. This is not unexpected since oil accounts for a quantum of government revenue while exchange rate in an import-dependent economy like Nigeria is a critical determining factor. However, since oil price is an exogenous factor that is beyond the purview of government control, government should assiduously pursue its intervention policies in the foreign exchange market with a view to stabilizing the exchange rate. Though oil price is externally determined, the model reveals its impact on price level which is one of the most critical economic variables of interest to the monetary authorities. The monetization of the crude oil revenue should be strategically sequenced to militate against excess liquidity, a primary factor for inflationary pressures. In that regard, the prudent and judicious management of the excess crude account becomes crucial. This account should be an intervention tool to stabilize prices and exchange rate when the international price of crude oil dips. The current practice where proceeds of this account are shared among the tiers of government is counterproductive and negates the *prima facie* objective for which it was established. Though the Sovereign Wealth Fund (SWF) concept is applauded, its success depends on the public confidence and trust in government, the absence of which has been the reason behind the agitation for the sharing of the accumulated revenue among the tiers of government over the time. In order to forestall the situation where the custodian has undue access to the fund, we recommend that other stakeholders

be made signatories to the account to prevent abuses. This will, in no small measure, restore the waned confidence.

There is also the need to keep watch of the movements in other variables of interest in the system as interactions between them were also established in the model. For instance, the maximum lending rate was found to significantly influence exchange rate movement. In as much as government is encouraged to make concerted effort to reduce its vulnerability and dependence on oil revenue by harnessing other complementary export earning sources, the central bank has the greater role in the adjustment of its monetary policy rate. The MPR, which serves as the anchor rate in the economy influences the quality and quantity of credit flow to the private sector, the engine of growth. A credible monetary policy rate will not only deepen the credit market but also ensure the efficient allocation of resources in the economy. It is, thus, expected that the sustainability of the present policy stance would bring about the desired impact on the economy as the market now responds to the movement in the rate than before. It has been theoretically argued that effectively managing the exchange rate and interest rate would invariably stabilize inflation rate, bring about the much desired economic growth and development as well as enable the country meet and comply with the West African Monetary zone (WAMZ) convergence criteria.

This study has shown that while the accumulation of deficit is not at all detrimental to the economy per se, government should exercise prudence in the financing options adopted and more so the appropriate application of such funds in economically-viable projects that have the ability to service the loans from their returns. It is imperative that government revisit the ever increasing expenditure and low tax collection syndrome which are the major factors fuelling the widening fiscal deficit in the country. In essence, government should broaden its tax net to reduce the surging borrowing as well as curb the current fiscal challenges from cascading into a full scale fiscal crisis. Finally, budget making should not be restricted to a mere accounting exercise, instead the process should be focused on growing human capital through a carefully thought out socio-economic development framework.

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Appendix A: Table 6: Variance Decomposition

Variance Decomposition of FDR:

Period	S.E.	FDR	LRGDP	LCPI	LNER	LPO	MLR
3	0.026173	97.42386	0.093325	0.005636	0.169348	1.960093	0.347739
5	0.036737	97.22225	0.065490	0.003934	0.107062	1.865591	0.735669
7	0.045118	97.03181	0.074312	0.006819	0.097147	1.693302	1.096614
9	0.052160	96.89275	0.068282	0.007808	0.096506	1.651791	1.282861
10	0.055350	96.85308	0.066541	0.008118	0.095512	1.633534	1.343212

Variance Decomposition of LRGDP:

Period	S.E.	FDR	LRGDP	LCPI	LNER	LPO	MLR
3	0.141692	0.321161	82.46098	0.090382	0.381136	16.56192	0.184419
5	0.170356	0.232284	76.13603	0.215770	0.276612	22.46212	0.677182
7	0.197115	0.178931	75.41514	0.210151	0.209096	23.32289	0.663787
9	0.220133	0.143696	74.24966	0.216489	0.168018	24.54713	0.675012
10	0.230743	0.131088	73.86304	0.219468	0.152935	24.94894	0.684528

Variance Decomposition of LCPI:

Period	S.E.	FDR	LRGDP	LCPI	LNER	LPO	MLR
3	0.191403	9.472773	6.351935	82.83587	0.524584	0.804945	0.009894
5	0.258073	12.66973	4.772204	81.46243	0.418107	0.646933	0.030594
7	0.311589	14.21494	4.028126	80.74144	0.403414	0.563802	0.048280
9	0.357306	15.09111	3.713739	80.21220	0.395222	0.537286	0.050449
10	0.378070	15.38566	3.602148	80.04485	0.391002	0.525447	0.050890

Variance Decomposition of LNER:

Period	S.E.	FDR	LRGDP	LCPI	LNER	LPO	MLR
3	0.294893	1.075052	0.870903	0.224308	97.06084	0.672619	0.096274
5	0.377414	2.007909	0.574361	0.319734	96.18547	0.513510	0.399016
7	0.446794	2.407359	0.417286	0.381252	95.69790	0.448626	0.647579
9	0.506693	2.622972	0.336778	0.410444	95.43436	0.422390	0.773051
10	0.534095	2.702051	0.307511	0.421245	95.34044	0.410635	0.818118

Variance Decomposition of LPO:

Period	S.E.	FDR	LRGDP	LCPI	LNER	LPO	MLR
3	0.246161	7.809995	5.902667	5.335265	3.470076	75.01750	2.464501
5	0.336855	10.07327	19.02339	7.969774	3.508592	50.95430	8.470685
7	0.406954	10.18497	21.79168	8.914597	3.024959	44.89631	11.18748
9	0.465126	10.37089	23.14141	9.400949	2.885569	41.78298	12.41820
10	0.491952	10.43360	23.70429	9.572272	2.830648	40.59222	12.86698

Variance Decomposition of MLR:

Period	S.E.	FDR	LRGDP	LCPI	LNER	LPO	MLR
3	4.945999	1.045350	2.670398	0.068209	3.056479	0.082343	93.07722
5	6.502496	1.233634	4.613938	0.068335	3.702331	0.168531	90.21323
7	7.733198	1.260660	5.266011	0.069190	3.911529	0.172000	89.32061
9	8.796838	1.276198	5.622708	0.069344	4.039788	0.178502	88.81346
10	9.282741	1.281661	5.753090	0.069550	4.083019	0.181110	88.63157

Cholesky Ordering: FDR LRGDP LCPI LNER LPO MLR