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Econometrics Analysis of the Impact of Fiscal Stance on Economic Growth in Nigeria (1970-2010)

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ABSTRACT

This paper examined the impact of fiscal stance on economic growth in Nigeria from 1970 to 2010 using econometrics tools such as descriptive statistics, stationarity test, co-integration test, multivariate Granger causality test in vector error correction Model (VECM), variance decompositions (VDCs), and Impulse response function (IRFs). The Co-integration results suggested that fluctuating levels of economic growth during the period correlated with trends in the revenues from sales and export of oil and productive government expenditure. Unproductive government expenditure is not co-integrated with the trend in economic growth over the long run period. The causal relationship among the variables shows that government deficit financing (GDF) and government capital expenditure (CGE) are neutral in the short-run.

Variance decompositions (VDCs), and Impulse response function (IRFs) were performed to unveil Granger causality in fiscal activity in a dynamic context. The results from the analysis shows that in the in the short-run unproductive government expenditure and Federal tax stand out economically exogenous. Productive government expenditures (PGE), government capital expenditure (CGE), Federal tax (TAX), and oil sales and export (OIL) leads output growth (GDP).

The Federal Government of Nigeria Budget breakdown from 2007 to 2010 shows that more than 60% of government total expenditures is spent on unproductive sectors, less than 15% for productive sectors, capital expenditure takes less than 25%, statutory transfer less than 5%, and Debt service less than 10%. The fiscal impulse response results revealed that fiscal stance are relatively more vulnerable to government deficit and revenues shock from oil sales and export, significant reduction in government deficit financing and unproductive expenditures would lead to economic growth and development.

Keywords: Cointegration, Granger causality, Error correction model, fiscal stance.

INTRODUCTION

The relationship between fiscal stance and economic growth has long fascinated policy makers, academicians, financial analysts, governments and economists but unfortunately, analysis of that relationship have not agreed on the choice of economy theories and econometrics model for solution whenever there is a shock in the system.

The consequences of long time disagreement on the choice of economy theories and model for fiscal balance when there is a shock in the system is very harmful to the economy as was the case with United State which caused there credit rating downgraded following the aftermath of the financial crisis.

The financial crisis that happened in the United State in 2007 revealed important fiscal vulnerabilities as financial market effects spilled over to most countries resulting into fall in real income, job-loss, fall in export demand, fall in wealth and demands for goods and services.

The severity of this effect depends on the initial fiscal balance condition of the country, the degree of interconnectedness of their economy to US and the policy responses. Most government responded with various policy measures such as tighten their local currency with exchange rate to US Dollar, cutting down unproductive expenditures, increased government expenditures on social programs and social infrastructures, reduction in taxes to reduce cost of living, provision of subsidies, larger counter-cyclical measures to save jobs.

The fiscal stance of developing and EU countries was one of the most affected by the crisis and the initial exposure shocks that uncovered the accumulated vulnerabilities made them varied importantly across the region (Dybczak and Melecky, 2011).

According to the Oxford Dictionary of Economics Fiscal Stance is the tendency of the tax and spending policies embodied in a government's budget to expand or contract the economy. Fiscal Stance measured the effect of the Public Sector on the level of Aggregate Demand, often measured by the Size of Government's Deficit (Routledge Dictionary of Economics).

The three possible stances of fiscal policy are:
Neutral
Expansionary
Contractionary
Neutral stance of fiscal policy implies a balanced economy. Government spending is fully funded by tax revenue and overall the budget outcome has a Neutral effect on the level of economic activity.

REVENUES = EXPENDITURES

An expansionary stance of fiscal policy involves government spending exceeding tax revenue.

EXPENDITURES > TAX REVENUES

A contractionary fiscal policy occurs when government spending is lower than tax revenue.

TAX REVENUES >EXPENDITURES

Tanzi and Zee (1997) stated that there are three candidates indicator of fiscal policy—government expenditures, deficit, and taxes but the literature does not systematically favour one policy option to the others. Levine and Renelt (1992) found that none of these fiscal indicators is robustly correlated with economic growth when evaluated individually. The fragility of fiscal indicators found in Levine and Renelt probably arises from the inability of any single budgetary component to fully capture the stance of fiscal policy. For example, an increase in government expenditures could be considered expansionary if it were financed by deficit spending.

However, it could also be considered contractionary if it were financed by an increase in taxes because such a policy would imply an increase in the size of the public sector. Interestingly, Martin and Fardmanesh (1990) find evidence supporting both conclusions when they simultaneously evaluate the growth effects of expenditures, taxes and deficits. Kocherlakota and Yi (1997) found that taxes effect growth only when public capital is held constant.

The Nigerian economy has been plagued with several challenges over the years. Researchers have identified some of these challenges as: gross mismanagement/ misappropriation of public funds, (Okemini and Uranta, 2008), corruption and ineffective economic policies (Gbosi, 2007); lack of integration of macroeconomic plans and the absence of harmonization and coordination of fiscal policies (Onoh, 2007); Imprudent public spending and weak sectoral linkages and other socioeconomic maladies constitute the bane of rapid economic growth and development (Amadi et al., 2006);inappropriate and ineffective policies (Anyanwu, 2007).
Despite the several fiscal and monetary measures introduced by the government, growth has not accelerated to development and the people are suffering from high level of unemployment, insecurity and poverty remains widespread both in the urban area and the rural areas.

The government fiscal budget is expansionary; billions of dollars spent have no significant impact on people standard of living and the economy. The crucial question to ask is what impact has been the government budget spending to economic growth and to which keys sectors of the economy is the money spent in order to be able to access which area of sectors is benefiting and its multiplier impacts on others. The focus of this analysis is mainly on empirical contributions, though the above question is answered by the result of our analysis.

REVIEW OF LITERATURE

This section discusses relevant literature on the relationship between fiscal policy and economic growth. The earliest school of thought is the classical economists who assume a smooth functioning market where the market does no wrong in resources allocation and distribution and there is no need for government intervention in the economy. The limitation and inefficiencies of this theory caused market failure as witnessed in 1930 during the great depression. The inability of the classical theory to solve this problem led to the evolution of Keynesian economics.

Keynes submitted that the lingering unemployment and economic depression were a result of failure on the part of the government to control the economy through appropriate economic policies (Iyoha et al., 2003).

In the Keynesian model, increase in government expenditure leads to increases in output and economic growth, contrary to the neo-classical growth models that government fiscal policy does not have any effect on the growth of national output.

However, it has been argued that government fiscal policy (intervention) helps to improve failure that might arise from the inefficiencies of the market (Abu and Abdulah, 2010).

David Turner (2006) analysed the effectiveness of fiscal policy rules for business cycle stabilisation in a monetary union using a quarterly macro-economic model of Germany. The simulation compared a deficit target and an expenditure target under a range of supply, demand and fiscal shock. The result showed that a deficit target of the stability pact leads to less stabilisation than an expenditure target.

Turrini (2008) analysed the cyclical behaviour of fiscal policy in the EA countries over the period 1980-2005. He concludes that average stance of fiscal policy is expansionary when output is above potential, thus denoting a pro-cyclical bias in good times, although no strong evidence of a cyclical bias is found in bad times.

Juraj and Timo (2010) examined the impact of both cyclical and structural change in fiscal stance on public spending composition for a panel of EU countries, including components of public investment. The results indicate that both cyclically – induced and structural changes in the fiscal stance affect the composition of public spending, with fiscal tightening of both types increasing the relative share of investment and loosing favouring consumption expenditure.

Bogunjoko (2004) examined the growth performance in Nigeria using a vector autoregressive model of three variables namely real output, federal government expenditure and state government expenditure. The empirical results showed that the overall impact of the expenditure is growth retarding. This finding complements the argument that federal and state expenditures are made without due reference to the absorptive capacity of the economy.

Karimi and Khosravi (2010) investigated the impact of monetary and fiscal policies on economic growth in Iran using autoregressive distributed approach to co-integration between 1960 and 2006. The empirical results indicated existence of long-run relationship between economic growth, monetary policy and fiscal policy. The results further revealed a negative impact of exchange rate and inflation (as proxies for monetary policy), but a positive and significant impact of government expenditure on growth.

Nurudeen and Usman (2010) analyzed the impact of government expenditure on economic growth in Nigeria over the period 1970 – 2008. The paper revealed that government total capital expenditure, total recurrent expenditures and expenditure on education have negative effect on economic growth while expenditures on health, transport and communication are growth enhancing.

Dauda (2010) examined the effect of investment spending in education on economic growth in Nigeria using thirty-one (31) years' time series data from 1977 to 2007. The study employs co-integration and error correction techniques. The result shows positive and significant effect of educational expenditure on economic growth.

Dybczak and Melecky (2011) examined the impact of macroeconomics shocks and fiscal stance within the EU using a panel regression analysis. The result indicates that fiscal stances (deficit) of EU area are relatively more vulnerable to government expenditure and revenues shocks compared to new EU member states.

THE ORETICAL FRAMEWORK

The empirical analysis is based on VECM framework and we adopted four different estimation techniques such as cointegration technique, Granger Causality technique, the VDCs technique and the IRFs technique in order to enhance the robustness of the findings. The cointegration technique was pioneered by the influential work of Granger and Newbold (1974), Engle and Granger (1987), Hendry (1986) and Granger (1986) for the treatment of time series data in order to avoid the problem of spurious regression especially in causality testing.

The main purpose of cointegration is to examine the existence of a long run relationship between or among variables. We employed (Johansen, 1988, and Johansen and Juselius, 1990) approach to determine whether any of the variables are co-integrated. According to Granger (1969, 1986, 1988) and Sim (1972), if two variables are co-integrated, causality must exist in at least one direction, either unidirectional or bidirectional. Co-integration indicates the presence or absence of

Granger causality but does not indicate the direction of causality between or among variables. In Granger causality, the statistical significance of the t-tests of the lagged error-correction term(s) and the F-tests indicates endogeneity of the dependent variable. The significance of the lagged error-correction term(s) will implied a long-term causal relationship while the non-significance of the lagged error-correction terms will affects the long-term relationship and may be a violation of theory. According to Thomas (1993), the non-significance of any of the differenced variables that indicates short –term relationship does not violate any theory because theory is silence on short term relationships. The non-significance of both the t-test(s) as well as the F-tests in the VECM will indicate econometric exogeneity of the dependent variables.

VECM helps to indicate the Granger exogeneity or endogeneity of the dependent variable and also gives an understanding of the Granger causality within the sample period but provide no indication of the dynamic properties of the system or relative strength of the variables beyond the sample period (M.Masih et al, 1996).

In order to analyze the dynamic properties of the system and the dynamic interaction of the various shocks in the post sample period, Variance decompositions test (VDCs) and the Impulse response functions (IRFs) were computed. Variance decompositions test (VDCs) indicates the percentage of forecast error variance for each variable that can be explained by its own shocks and to fluctuation in the other variables. VDCs may be termed as causality tests outside the estimation time period (Bessler and Kling, 1985). VDCs decompose variation in an endogenous variable into the component shocks to the endogenous variables in the VAR. The Choleski decomposition method is used to orthogonalize all innovation/error, though the method is very sensitive and depends on the order of variables. For this study, the order chosen according to the importance of variables for a less developing oil driven economy are OIL, TAX, GDP, GDF, CGE, PGE, and UGE. Since, we have identified the ordering of the variables there is no need for a generalized impulse response functions (GIRFs).

Impulse response function like the VDCs are obtained from the Moving Average (MA) model obtained from the unrestricted VAR model. Impulse response traces out the responsiveness of the dependent variables in the VAR to shocks to each of the variables. That is, the IRF shows how the future path of those variables changes in response to the shock.

The theoretical basic of this study is based on the fiscal growth model of Barro and Sala-i-Martin (1992, 1995), Ambler and Paquet (1996), and Easterly and Rebelo (1993), they all used government expenditures to capture the stance of fiscal policy. Lucas (1990) and Stokely and Robelo (1990) used taxation to capture the stance of fiscal policy. Martin and Fardmanesh (1990), and Catao and Terrones (2003) used government budget deficit for the same purpose. Previous empirical researches do not provide conclusion support for the use of one particular indicator (Tanzi and Zee, 1997).

Therefore, we used the three combinations of the fiscal policy indicators: (i) the total public sector expenditures (ii) the total public sector revenues, and (iii) the public sector budget deficit, proposed by Tanzi and Zee (1997). The total public sector expenditures is divided into two, productive expenditures and unproductive expenditures. Total public revenues are also divided into tax revenues and, revenues from sales and export of oil.

ECONOMETRIC METHODOLOGY

The research methodology of this study deals with the method of data presentation and its mode of analysis. The data set for this paper consists of annual time series from 1970 to 2010. The variables under consideration are: Real Gross domestic product (GDP), Productive government expenditure (PGE) comprises of expenditure on health, education and economic services, Unproductive government expenditure (UGE) consists of total recurrent government expenditures less recurrent expenditure on health, education and economic services, Government capital expenditure (CGE), Government budget deficit (GDF), Oil revenues (OIL) and Tax revenues (TAX). Government revenues is divided into oil revenues and tax revenues, Oil revenues are revenues accrued from domestic sales and export of oil, Tax revenues consists of total revenues less oil revenues and this includes petroleum profit tax and others. Gross domestic product is used as measurement of economic growth; (Colombage, 2009, Koch, 2005, Soli, 2008, Karran, 1985, Hahn, 2008, Butkiewicz and Yanikkaya, 2005 and Roshaiza, Loganathan and Sisira, 2011) used gross domestic product (GDP) as proxy for the measurement of economic growth.

All variables were deflated with consumer price index except real gross domestic product. The data for these variables were obtained from the Nigeria Budget office publication and statistics (BOF), Central Bank of Nigeria (CBN) statistical bulletin various years, Nigeria National Petroleum Corporation (NNPC) and Nigeria Debt Management office (NDM).

We considered the effects of fiscal shocks on economic growth, oil revenues, tax revenues, and budget deficit respectively using the impulse response from a one-standard deviation shock. The study adopts a comparative approach analysis to test for the effectiveness of fiscal stance in stimulating economic growth in Nigerian. The analysis involves descriptive statistics, stationarity test, co-integration test, multivariate Granger causality test in vector error correction (VECM) Model, variance decompositions (VDCs), and Impulse response function (IRFs).

Thus, our model expresses the logarithms of real gross domestic product (GDP) as a function of the logarithms components of government expenditures and revenues that includes productive government expenditures (PGE), Unproductive government expenditures (UGE), government capital expenditures (CGE), government budget deficit (GDF), oil revenues (OIL) and taxes (TAX).

Thus, the model is specified following the tradition of Barro and Sala-i-Martin (1992, 1995), Ambler and Paquet (1996), and Easterly and Rebelo (1993), they all used government expenditures to capture the stance of fiscal policy. Lucas (1990) and Stokely and Robelo (1990) used taxation to capture the stance of fiscal policy. Martin and Fardmanesh (1990), and Catao and Terrones (2003) used government budget deficit for the same purpose, although Previous empirical researches do not provide conclusion in support for the use of one particular indicator. (see Tanzi and Zee, 1997). Therefore, we specify our model as:

$GDP = \alpha + \beta_{X+e}$ .....(1)

Given the elements of the vector X, the final base econometric model is expressed in natural logarithms as:

$InGDP = \beta_O + \beta_1 InOIL + \beta_2 InTAX + \beta_3 InGDF + \beta_4 InCGE + \beta_5 InPGE + \beta_6 InUGE + U_t$.....(1)

TABLE 1: Descriptive Statistics of Data

Variables	Mean	St.Dev	Minimum	Maximum	Median
RGDP	267720.2	212750.4	4219.000	759966.9	265379.1
PGE	92139.07	187932.5	44.74000	897397.1	3521.570
UGE	365961.6	768398.4	653.2300	4261603.	31702.40
CGE	217664.7	349900.2	173.6000	1325019.	24048.60
OIL	668391.6	1141454.	68.90000	4530000	44050.50
TAX	519615.3	921147.5	565.1000	3336590.	53124.30
GDF	44775.03	385635.2	-1349354	1076078	2664.900

Source: Self computed

Table One, gives the descriptive analysis of variables used in the estimation. Deficit financing (GDF) share average is ♯44775.03 million and varies from ♯-1349354 million to ♯1076078 million. Government capital expenditures (CGE) average is ♯217664.7 million; it ranges from ♯173.6000 million to ♯1325019 million with standard deviation of 349900.2. Real gross domestic product (GDP) mean is ♯267720.2 million with a minimum of ♯4219.000 million and maximum of ♯759966.9 million. Tax revenues (TAX) mean is ♯519615.3 million with a minimum of ♯565.1000 million and maximum of ♯3336590 million. Government budget deficit (GDF) has the smallest average of ♯44775.03 million followed by productive government expenditures (PGE) of ♯92139.07 million. Tax revenue has the highest average of ♯519615.3 million followed by Oil revenues (OIL) of ♯668391.6 million, Unproductive government expenditures (UGE) of ♯365961.6 million, government capital expenditures (GCE) of ♯217664.7, (LGDP), (LPGE), and budget deficit (LGDF).

TABLE 2: STATIONARITY TEST RESULTS

Variables	ADF –Statistics	Critical Values	Order of Integration	Decision
LGDP	-6.1352	5%= -3.5298	1 (1)	Stationary at first Difference
LPGE	-7.0098	5%= -2.9389	1 (1)	Stationary at first Difference
LUGE	-6.2237	5%= -2.9389	1 (1)	Stationary at first Difference
LCGE	-3.1907	5%= -2.9369	1 (0)	Stationary at level
LOIL	-5.7743	5%= -2.9389	1 (1)	Stationary at first Difference
LTAX	-3.4177	5%= -2.9369	1 (0)	Stationary at level
LGDF	-3.8797	5%= -2.9369	1 (0)	Stationary at level

Source: Self Calculated.

The results of the stationarity test indicate that LGDF, LTAX, and LCGE are stationary at level while LPGE, LUGE, LGDP, and LOIL are stationary at first difference. The variables LPGE, LUGE, LGDP, and LOIL are integrated of order one, *1*(1). Since the variables are integrated with order *1*(1), we test whether there is a long run relationship among the four variables using the Johansen co-integration test (see table three).

TEST FOR CO-INTERGRATION

Co-integration is the statistical implication of the existence of a long – run relationship between economic variables. The test stipulates that if variables are integrated of the same order, a linear combination of the variables will also be integrated of that same order. We test for the existence of long run relationship among variables using the Johansen Co-integration Test since some of the variables are stationary at first difference.

TABLE 3: Johansen's Test Results for Co-integrating Vectors

Null Hypothesis	Alternate Hypothesis	Variables	Trace	5% Critical Values	Probability	Max. Eigen Statistic	5% Critical Values	Probability
r = 0	r > 0	LGDP	93.5279**	47.8561	0.0000	52.2461**	27.5843	0.0000
r ≤ 1	r > 1	LPGE	18.9954**	15.4947	0.0142	18.9904**	14.2646	0.0083
r ≤ 2	r > 2	LUGE	0.00493	3.84147	0.9430	0.00493	3.84147	0.9430
r ≤ 3	r = 4	LOIL	41.2819**	29.7971	0.0016	22.2865**	21.1316	0.0343

Notes: r value indicates the number of co-integrating vectors. ** indicates rejection of the Null hypothesis at 95% critical values.

The Johansen co-integration test results for both trace and maximum eigen-value statistics indicates three co-integrating vector exists among the variables. Both tests accept the Null hypothesis of no co-integration between unproductive government expenditure (LUGE) and economic growth.

There exists co-integrating vector among productive government expenditure (LPGE) revenues from sales and export of oil and economic growth. Therefore, we conclude that there are long run relationship between fiscal stance variables and economic growth. It also indicates that fiscal policy such as increases in productive government expenditure will be effective in supporting economic growth.

The result has several implications, firstly, its rules out spurious correlations and the possibility of Granger non-causality. Granger (1988) stated that when a data series are co-integrated causality must

exist either unidirectional or bidirectional. Secondly, the finding implies that Vector error correction model should be applied and rules out vector autoregression model and structural vector autoregression model. Co-integration rules out the use of modelling dynamic relationship through ordinary first differenced VARs and structural VARs (M.Masih and R.Masih, 1996).

Granger Causality Tests Based on VECM

According to Granger (1969), Y is said to "Granger-cause" X if and only if X is better predicted by using the past values of Y than by not doing so with the past values of X being used in either case. For example, if a scalar Y can help to forecast another scalar X, then we say that Y Granger causes X. The Granger (1969) approach to the question of whether fiscal stance causes Growth is to see how much of the current growth can be explained by past values of growth. Growth is said to Granger-caused by fiscal stance if fiscal stance helps in the prediction of growth.

The detection of causal relationships among a set of variables is one of the objectives of empirical research. A degree of correlation between two variables does not necessarily mean the existence of a causal relationship between them; it may simply be attributable to the common association of a third variable.

TABLE 5

Granger Causality Results Based on Vector Error – Correction Model (VCEM)

MODEL	**ΔLGDP**	**ΔLPGE**	**ΔLUGE**	**ΔLCGE**	**ΔLOIL**	**ΔLTAX**	**ΔLGDF**	**$\square_1$ ($\square_{t-1}$)**
Dependent Variables	F –Statistics and Probability values							t- statistics
ΔLGDP	-	0.5625 (0.5752)	0.5792 (0.5659)	0.8160 (0.4509)	0.5822 (0.5643)	0.5717 (0.5700)	0.0511 (0.9503)	6.6898***
ΔLPGE	0.6458 (0.5307)	-	0.6421 (0.5326)	2.3265 (0.1135)	0.4417 (0.6467)	0.1416 (0.8685)	0.7672 (0.4724)	5.2907***
ΔLUGE	0.6301 (0.5388)	1.3333 (0.2774)	-	1.2666 (0.2951)	0.4133 (0.6648)	0.4602 (0.6352)	2.1303 (0.1348)	0.3664
ΔLCGE	2.7312 (0.0799)*	1.0428 (0.3638)	1.6017 (0.2168)	-	1.3950 (0.2621)	0.2964 (0.7455)	0.3010 (0.7421)	2.1297
ΔLOIL	0.4384 (0.6487)	0.3711 (0.6928)	0.0654 (0.9368)	3.2378 (0.0520) **	-	1.2528 (0.2989)	0.9710 (0.3892)	8.1756***
ΔLTAX	1.4794 (0.2425)	0.2737 (0.7623)	0.5459 (0.5844)	1.3097 (0.2836)	0.2582 (0.7740)	-	0.6319 (0.5379)	0.2186
ΔLGDF	0.0072 (0.9928)	2.5293 (0.0951)*	2.8321 (0.0733)*	0.9552 (0.3951)	0.4298 (0.6548)	0.1472 (0.8637)	-	0.0048

Notes: All variables are in the first differences (denoted by **Δ**) with the exception of the lagged error-correction term $\square_1$ ($\square_{t-1}$) generated from the Johansen's cointegration test conducted in table four above. The error-correlation term $\square_1$ ($\square_{t-1}$) was derived by normalizing the four cointegration vectors on GDP and imposed restriction on CGE, TAX, and GDF because they do not enter the cointegration relationship. Stationarity test was conducted on the residual and the inspection of autocorrelation functions respectively. Different diagnostic tests conducted are test for multicollinearity, test for heteroscedasticity, normality test, and model specification test were found to be satisfactory (see appendix i,ii).***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively.

Cointegration indicates the presence or absence of Granger Causality but it does not indicate the direction of causality between variables (M.Masih et al, 1996). For the purpose of causality test, we analyzed the results based on vector error correction model presented in table four. The significance of the F-statistics for the lag value of the independent variables indicate that there is a unidirectional short run causal effect running from LGDP to LCGE, LCGE to LOIL, LPGE to LGDF, and from LUGE to LGDF.

The significance of the error correction term indicates that the burden of short-run endogenous adjustment (to the long term trend) to bring back the model to its long-run equilibrium has to be taken by LGDP, LPGE and LOIL variables. The VECM indicates that the variables unproductive government expenditures and revenues generated by federal taxes stand out econometrically exogenous

in the short-run as indicated by the statistical insignificance or otherwise of both F-test of the independent variables and the t-test of the lagged error correction term. Unproductive government expenditures and federal generated tax revenues are rigid and were initial receptors of exogenous shocks to the long-run equilibrium. The causal relationship detected among the variables shows that unproductive government expenditures is neutral in the short-run and can't be efficient in the stabilization of economic growth in Nigeria economy.

VECM helps to indicate the Granger exogeneity or endogeneity of the dependent variable and also give an understanding of the Granger causality within the sample period (M.Masih et al, 1996). They do not provide us with any indication of the dynamic properties of the system or relative strength of the variables beyond the sample period.

In order to analyze the dynamic properties of the system and the dynamic interaction of the various shocks in the post sample period, we conducted the Variance decompositions test (VDCs) and the Impulse response functions (IRFs). Figure one and table five reports the results of analysis of impulse response and variance decomposition respectively after 10 years, indicating the direction of the fiscal stance impact.

IMPULSE RESPONSES OF LOIL, LTAX, LGDP, AND LGDF FROM A ONE-STANDARD DEVIATION SHOCK TO LOIL, LTAX, LGDP, LGDF, LCGE, LPGE, AND LUGE AT 10 YEARS PERIOD.

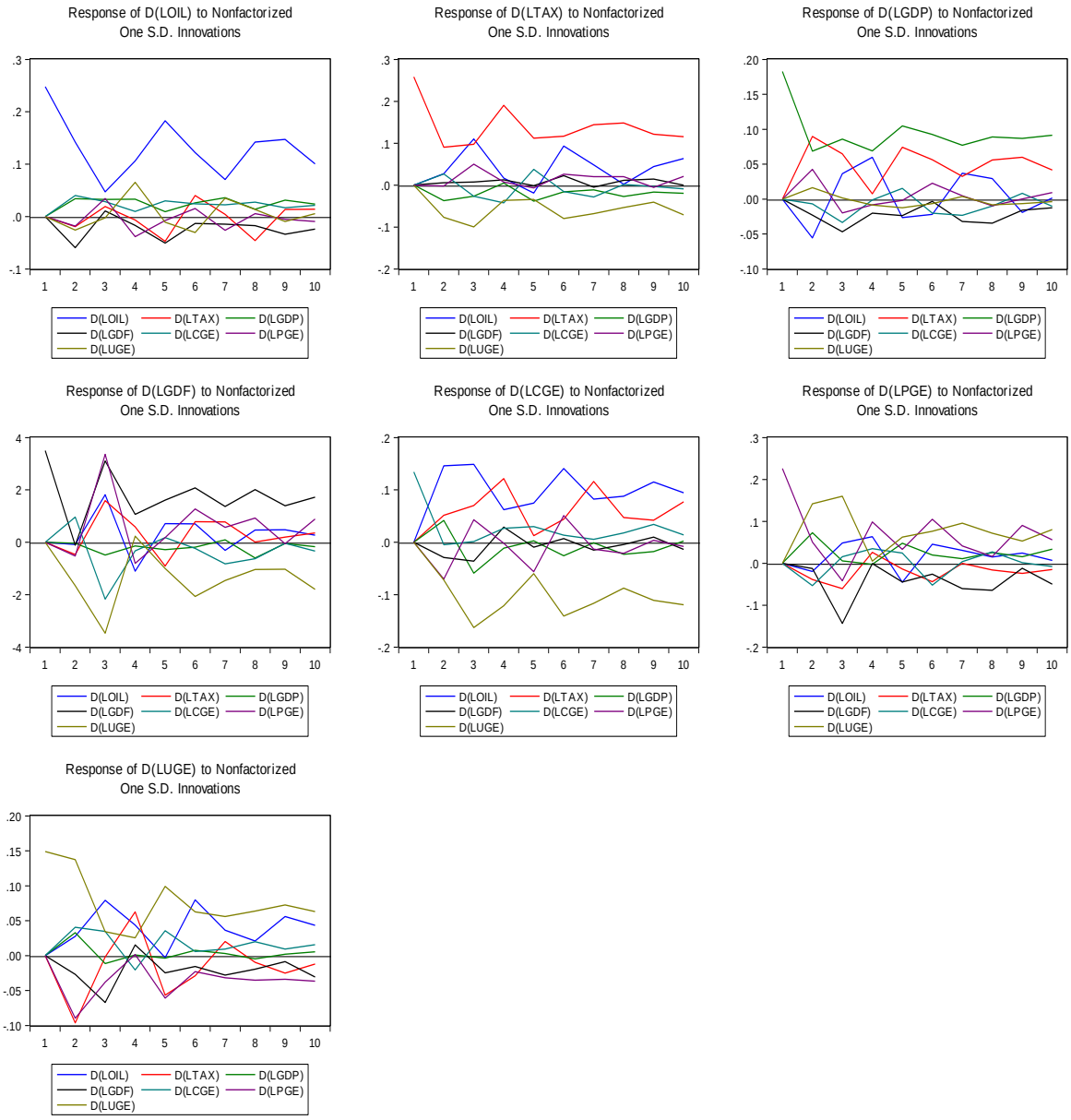


Figure 1. Impulse Responses of LOIL, LTAX, LGDP, and LGDF from a one-standard deviation shock to all variables at 10 years period.

A positive shock in the oil revenues has a significant impact on economic growth, government tax revenues, government capital expenditures, and unproductive government expenditures. One standard deviation shock to government tax revenues for the fifth periods decreases OIL, GDP, GDF, PGE, and UGE. Revenues from oil sales and export, and productive government expenditures increases respectively after the fifth periods and these caused decreases in government budget deficit (0.00) to a neutral fiscal stance at the end of ten periods.

A shock on economic growth has a significant positive impact on government tax revenues, productive expenditures, and revenues from oil but the impact on oil revenues is not persistence when compared to others during the ten years period. The response of budget deficit to a shock shows that productive government expenditures has a strong positive impact followed by revenues from taxes, and oil revenues at the ten periods.

The results of the impulse response functions for all the variables are consistent with cointegration constraints in our VECM, impulse response function in the graph gradually decline to the steady state in all cases. We therefore, concluded that fiscal stance are relatively more vulnerable to government deficit and revenues shock from oil sales and export, significant reduction in government deficit financing and unproductive expenditures would lead to economic growth and development.

TABLE V

Decomposition of Variance for DLOIL, DLTAX, DLGDP, DLGDF, DLCGE, DLPGE, and DLUGE

Table 5.1 shows the variance decomposition computation for oil sales and export (OIL). The variance of OIL explained by GDP is 8.21 percent with lag of five periods increased to 10.25 percent at the end of ten periods. Government deficit (GDF) account for 6.17 percent of the variation in the forecast error of oil sales and export (OIL) with lag of five periods and decreased to 5.90 percent at the end of the ten periods. Finally, oil sales and export (OIL) variance is not significantly influenced by both PGE, and UGE.

TABLE 5.1: Variance Decomposition of Government oil revenues (OIL)

Variance Decomposition of OIL								
Relative Variance in	S.E.	ΔLOIL	ΔLTAX	ΔLGDP	ΔLGDF	ΔLCGE	ΔLPGE	ΔLUGE
1ΔLOIL	0.1825	96.9499	0.0000	3.0501	0.0000	0.0000	0.0000	0.0000
2	0.2183	87.7878	0.6668	5.6891	4.6327	0.3663	0.6567	0.2005
3	0.2518	84.5131	0.8006	7.3246	4.3050	1.6710	1.2082	0.1775
4	0.2689	80.8883	1.5764	9.3153	4.7587	1.3804	1.0046	1.0764
5	0.2991	79.9010	2.6315	8.2054	6.1713	1.3165	0.8827	0.8917
6	0.3174	80.2410	2.4917	8.7636	5.4797	1.3591	0.7567	0.9081
7	0.3333	78.4937	2.7599	9.9474	5.7188	1.3332	0.7270	1.0201
8	0.3540	78.6419	2.9480	9.4135	5.8676	1.5040	0.6912	0.9337
9	0.3701	78.7754	2.6413	9.9553	5.7817	1.3677	0.6398	0.8388
10	0.3847	78.4976	2.6050	10.2457	5.9023	1.3507	0.6089	0.7898

Notes:the figures in the first column refer to the time horizons (i.e., number of years). All figures are approximated to four decimal places, rounding errors may prevent a perfect percentage decomposition in some cases. The alternation of the fiscal variables appearing prior to output did not change the results because the variance –covariance matrix of residual are near diagonal, estimated through the Choleski decomposition in order to orthogonalize the innovations across equation.

TABLE 5.2: Variance Decomposition of Government tax revenues (TAX)

Variance Decomposition of TAX								
Relative Variance in	S.E.	ΔLOIL	ΔLTAX	ΔLGDP	ΔLGDF	ΔLCGE	ΔLPGE	ΔLUGE
1ΔLTAX	0.2480	25.6866	69.5488	4.7646	0.0000	0.0000	0.0000	0.0000
2	0.2837	26.2688	64.8896	4.9505	0.6881	0.0408	1.2454	1.9168
3	0.3029	37.1626	50.8357	3.8502	2.9069	0.2595	0.9702	4.0150
4	0.3335	34.2413	52.3715	4.2668	3.9566	1.0928	0.7907	3.2803
5	0.3707	32.5733	53.9796	4.2618	3.6950	1.2742	0.9690	3.2470
6	0.4004	37.9488	47.6092	3.7159	4.9430	1.1879	0.8981	3.6970
7	0.4145	38.6060	46.5750	3.5156	5.0761	1.3753	0.8808	3.9713
8	0.4385	37.8749	47.7388	3.2445	5.0238	1.2685	0.8282	4.0213
9	0.4654	38.5472	47.2369	3.0410	5.1265	1.2272	0.9377	3.8834
10	0.4807	40.0455	45.6676	2.8577	5.1289	1.1869	0.9396	4.1738

The forecast error variance of government tax revenues due to economic growth (GDP) decreases from 4.76 percent in the first period to 4.26 percent in the fifth periods and falls further to 2.86 percent at the end of the tenth periods. Though, the forecast error variance of economic growth (GDP) due to government tax revenue (TAX) increases from 0.0 percent in the first period to 11.37 percent in the fifth periods and decline to 10.93 percent in the tenth periods (see table 5.3). Government deficit (GDF) with a lag of five periods explained the government tax revenues (TAX) by 3.69 percent and increases further to 5.13 at the end of ten periods. A significant portion of government tax revenues (TAX) is caused by sales and export of oil (OIL) with a five period lag of 32.57 percent and increased further to 40.05 percent at the end of the ten periods. Finally, the analysis shows that the variance of government tax revenues (TAX) is not significance influenced by government productive expenditures (PGE).

TABLE 5.3: Variance Decomposition of Economic Growth (GDP)

Variance Decomposition of GDP								
Relative Variance in	S.E.	ΔLOIL	ΔLTAX	ΔLGDP	ΔLGDF	ΔLCGE	ΔLPGE	ΔLUGE
1ΔLGDP	0.2581	0.0000	0.0000	100.0000	0.0000	0.0000	0.0000	0.0000
2	0.2734	0.0286	9.9378	83.5772	2.8583	0.5568	2.9061	0.1353
3	0.3103	1.6879	10.9242	79.9216	2.7787	2.1023	2.4824	0.1028
4	0.3574	4.6700	9.5838	78.8031	2.6431	1.8903	2.2955	0.1142
5	0.3712	3.7805	11.3662	78.4092	2.8090	1.6041	1.8972	0.1339
6	0.4034	3.3780	11.2978	79.3470	2.5115	1.4605	1.8760	0.1293
7	0.4240	4.2552	10.5843	79.1742	2.6364	1.5071	1.7226	0.1202
8	0.4415	4.6886	10.5931	78.8507	2.6719	1.4664	1.6099	0.1195
9	0.4608	4.3140	11.2643	78.8276	2.6416	1.3589	1.4767	0.1169
10	0.4764	4.1740	10.9341	79.6476	2.4793	1.2694	1.3853	0.1104

The variance decomposition of GDP indicates that 79.6 percent of economic growth variance is due to its own shock at the end of the ten periods. The forecast error variance of economic growth due to government oil revenues (OIL) increases from 0.03 percent in the second period to 3.78 in the five periods and increases further to 4.17 at the end of the ten periods. The forecast error variance of economic growth due to government deficit (GDF) decreases from 2.85 percent in the second period to 2.47 percent at the end of the ten periods. The forecast error variance of economic growth due to productive government expenditures (PGE) is at his peak of 2.90 percent at the second periods and declined to 1.38 percent at the end of ten periods.

Finally, economic growth (GDP) in Nigeria is not significantly influenced by unproductive government expenditure.

TABLE 5.4: Variance Decomposition of Government Deficit (GDF)

Variance Decomposition of GDF								
Relative Variance in	S.E.	ΔLOIL	ΔLTAX	ΔLGDP	ΔLGDF	ΔLCGE	ΔLPGE	ΔLUGE
1ΔLGDF	3.4966	13.0975	1.4788	0.0127	85.4110	0.0000	0.0000	0.0000
2	3.9664	15.7356	5.7937	0.8675	66.6442	0.2464	6.4823	4.2302
3	7.0253	20.3449	3.9109	0.6168	62.1096	1.1133	4.5920	7.3126
4	7.2734	20.0101	4.9713	0.6318	61.1768	1.6093	4.7538	6.8469
5	7.6031	18.7792	6.3495	0.9884	61.2591	1.4755	4.4611	6.6872
6	8.1995	18.9068	5.6388	0.9046	62.1175	1.2699	3.8636	7.2987
7	8.5285	17.4969	5.2351	0.8383	63.7046	1.6628	3.5987	7.4635
8	8.9542	16.8395	5.1090	1.3365	64.6799	1.5757	3.3613	7.0983
9	9.1707	16.4721	4.8917	1.2792	65.2922	1.5612	3.4269	7.0768
10	9.5206	15.5943	4.8867	1.2908	66.1415	1.4764	3.1808	7.4295

Table 5.4 reveals that with a lag of five years 4.46 percent and 6.69 percent of government deficit (GDF) variance is caused by PGE and UGE respectively, PGE declined to 3.18 percent while UGE increases to 7.43 percent at the end of the tenth years. The forecast error variance of government deficit (GDF) due to economic growth is relatively very low. The forecast error variance of government deficit (GDF) due to economic growth increases from 0.01 percent to 0.99 percent in the fifth periods. Furthermore, after the tenth years, the forecast error of government deficit (GDF) attributed to economic growth declines to an elasticity of 1.29 percent. Finally, a significant percent of government deficit (GDF) is caused by revenues from sales and export of oil (OIL) with a peak of 20.34 percent recorded in the third years and minimum of 15.59 percent at the end of the tenth years.

TABLE 5.5: Variance Decomposition of Government Capital Expenditures (CGE)

Variance Decomposition of CGE								
Relative Variance in	S.E.	ΔLOIL	ΔLTAX	ΔLGDP	ΔLGDF	ΔLCGE	ΔLPGE	ΔLUGE
1ΔLCGE	0.1341	13.0419	3.7294	0.2379	29.8678	53.1230	0.0000	0.0000
2	0.2068	28.4562	2.5972	10.3376	14.0901	27.2035	14.3524	2.9629
3	0.2583	38.4467	2.9040	9.3577	9.6164	17.5156	10.5976	11.5622
4	0.2963	38.4523	5.74273	7.2086	11.7671	13.3183	10.6395	12.8715
5	0.3079	37.2571	5.3188	6.7868	11.1647	12.4981	14.1287	12.8457

6	0.3454	43.1947	5.2428	5.5245	10.3195	9.9925	11.4621	14.2639
7	0.3691	42.6547	6.1611	5.1546	9.9040	9.0708	12.1512	14.9035
8	0.3826	42.9915	5.7686	4.8648	9.7806	8.5240	12.9209	15.1497
9	0.4039	45.2343	5.2186	4.3746	9.5045	7.6896	12.5500	15.4284
10	0.4205	45.1465	4.9116	4.2123	9.2986	7.1903	13.0516	16.1892

The results of forecast error variance of government capital expenditures are presented in table 5.5. These results shows that with a lag of five periods 37.26 percent of CGE variance is caused by sales and export of oil (OIL), which significantly increased to 45.15 percent at end of the tenth years period. The forecast error variance of CGE due to economic growth was at his peak in the second period of 10.34 percent and declined to 4.21 percent at the end of the tenth year's period. The forecast error variance of CGE due to unproductive government expenditure (UGE) increases from 2.96 percent in the second years to 16.19 percent at the end of the tenth year's period. However, the forecast error variance of CGE due to productive government expenditures in the second periods was 14.35 percent and declined to 13.05 percent at the end of the tenth year's period.

TABLE 5.6: Variance Decomposition of Productive Government Expenditures (PGE)

Variance Decomposition of PGE								
Relative Variance in	S.E.	ΔLOIL	ΔLTAX	ΔLGDP	ΔLGDF	ΔLCGE	ΔLPGE	ΔLUGE
1ΔLPGE	0.2263	15.3652	4.6184	0.0024	8.6523	18.6105	52.7512	0.0000
2	0.2725	11.0248	3.2913	8.7105	10.0857	12.8944	47.4168	6.5766
3	0.3480	7.2171	2.2454	5.8306	37.4262	8.2446	29.8481	9.1878
4	0.3883	16.8014	1.8620	4.8761	31.7717	9.7548	27.5503	7.3837
5	0.4081	15.4288	1.7345	5.7508	33.5958	9.9173	26.3184	7.2544
6	0.4355	15.9910	2.2842	5.4518	31.2441	8.9187	28.9870	7.1234
7	0.4646	16.1457	2.3643	5.2309	32.9900	8.4630	27.5148	7.2912
8	0.4841	15.2588	2.2516	5.3768	35.4395	8.4407	25.9856	7.2470
9	0.5036	15.8284	2.1915	5.1806	34.1719	8.7509	26.9134	6.9633
10	0.5222	15.1649	2.0444	5.5119	34.8361	8.5102	26.8844	7.0480

A significant part of Productive Government Expenditures (PGE) variance is caused by government deficit (GDF) since 33.59 percent of PGE from a five years period lag is explained by GDF while 34.84 percent of Productive Government Expenditures variance is caused by government deficit at the end of the ten years lag.

TABLE 5.7: Variance Decomposition of Unproductive Government Expenditures (UGE)

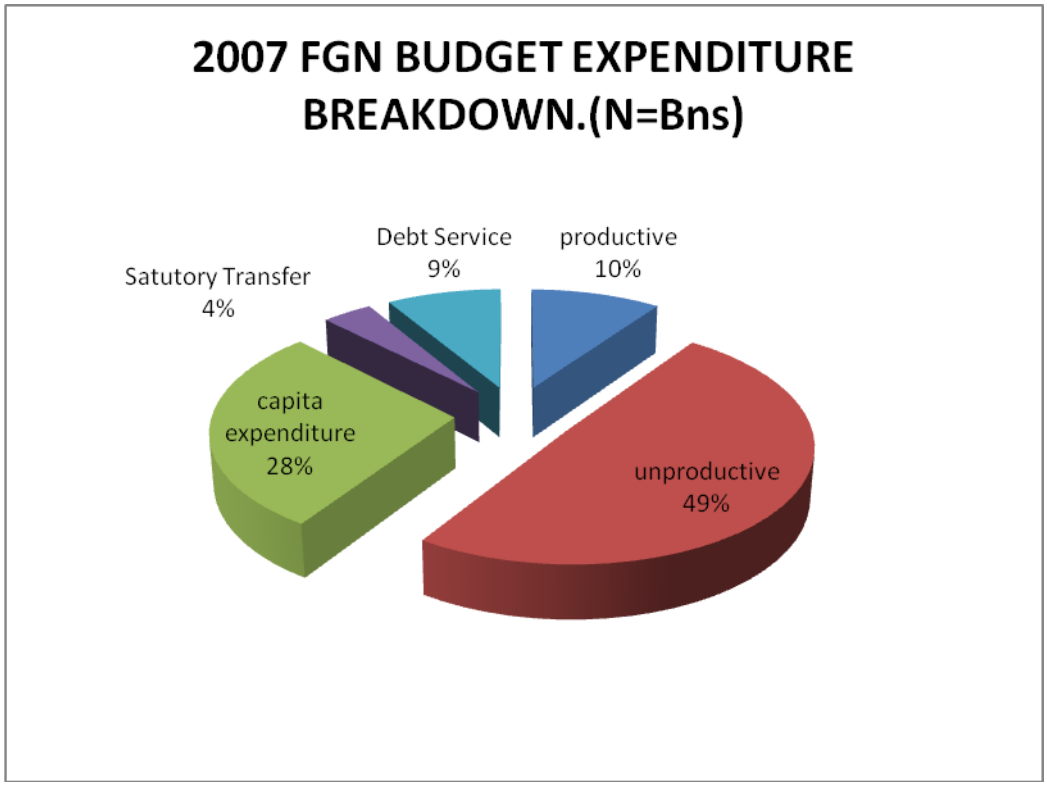
Variance Decomposition of UGE								
Relative Variance in	S.E.	ΔLOIL	ΔLTAX	ΔLGDP	ΔLGDF	ΔLCGE	ΔLPGE	ΔLUGE
1ΔLUGE	0.1490	18.6533	20.5566	2.3798	16.7358	2.8248	14.4843	24.3654
2	0.1862	12.1201	13.2707	5.8909	27.7058	2.3716	9.7609	28.8800
3	0.2171	17.8355	10.6594	4.4719	35.3620	2.1971	7.6277	21.8464
4	0.2434	26.2585	14.7966	4.6312	28.4836	1.9173	6.2685	17.6443
5	0.2577	23.5331	13.5193	4.1295	31.7253	2.1082	5.6556	19.3291
6	0.2750	28.8110	11.9683	4.4338	29.6198	1.8826	5.0372	18.2473
7	0.2894	29.1329	13.5071	4.6047	29.1050	1.7078	4.5532	17.3893
8	0.2977	28.5068	13.7745	4.4109	29.7314	1.7246	4.3039	17.5479
9	0.3089	30.3397	13.2147	4.4205	28.7490	1.6235	4.0082	17.6444
10	0.3196	30.2351	12.9981	4.5421	29.4865	1.5539	3.7515	17.4328

Finally, the results from table 5.7 above indicates that with a lag of five periods 23.53 percent of UGE variance is caused by sales and export of oil (OIL) , which significantly increased from 18.65 in the first period to 30.24 percent at the end of the ten years period.

Nigeria Budget breakdown

The 2007 government budget expenditure was N2.450 trillion compared with N1.938 trillion of 2006, representing 37.4 per cent increased. Both capital expenditure and recurrent expenditure for 2006 are N552.3billion and N1.290 trillion and increased to N75s9.3 billion and N1.589 trillion respectively for

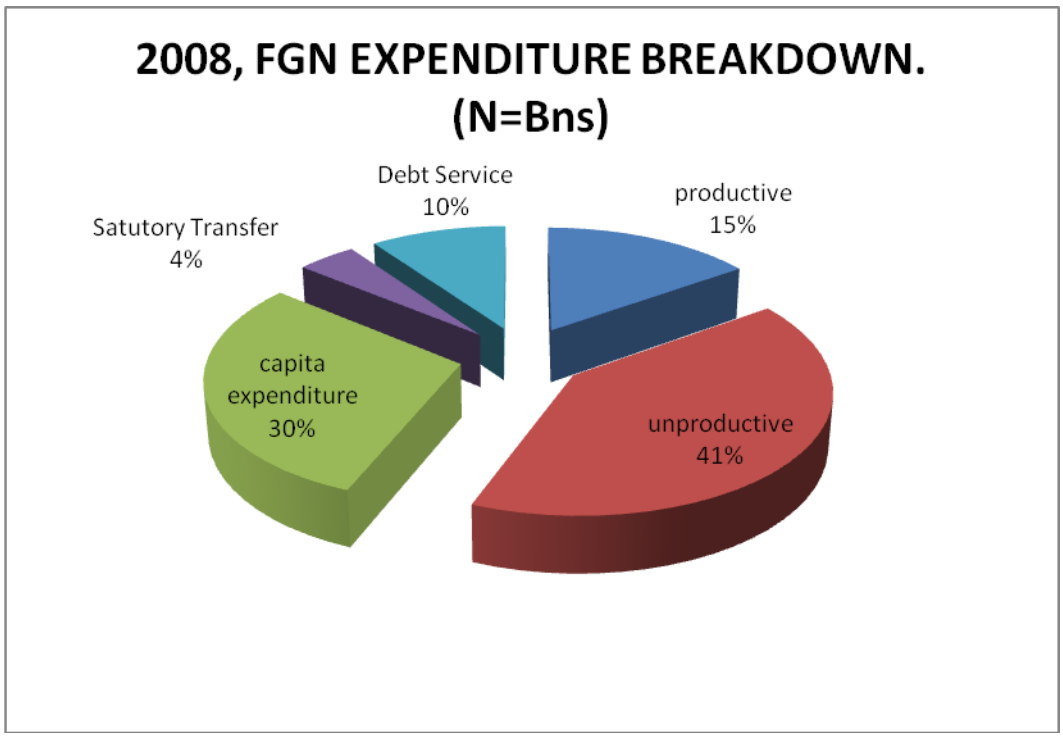
2007. Government spending for 2007 are Productive expenditure N263.3 billion, Unproductive expenditure N1.325 trillion, Statutory transfer N102 trillion and Debt Service N232 billion. The 2007 government fiscal breakdown showed that 49% is spent on Unproductive expenditure compared with 10% for Productive expenditure, Capital expenditure represent 28%, Debt Service 9% and Statutory Transfer 4%.



Source: CBN, BOF, and Self Calculated.

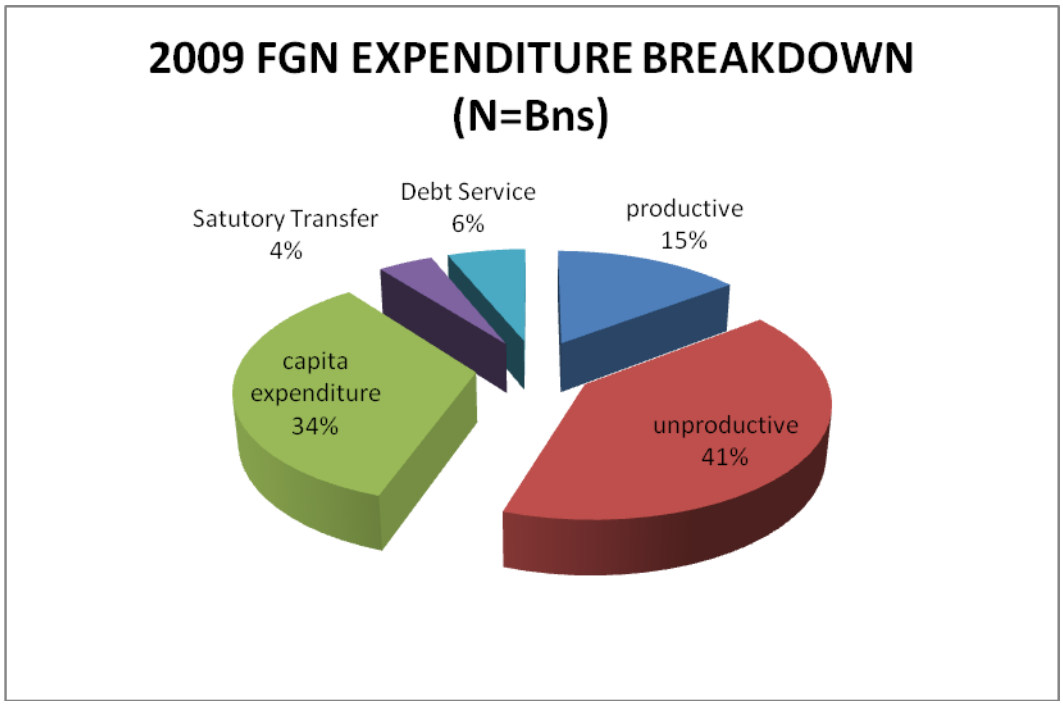
The 2008 aggregate government expenditure was N3.240 trillion, representing a 32.2% growth in the level of expenditure compared to N2.450 trillion recorded in 2007. Capital spending increased from N492 billion in 2007 to N1.123 trillion in 2008, representing about 48 per cent increases. Total recurrent expenditure increased from N1.589 in 2007 to N2.117 trillion for 2008, representing a 33% increases.

Productive government expenditure in 2007 was N263.3 billion and increased to N576.0billion in 2008 representing 118.7% increased but productive government expenditure represent 15% of budget government expenditure for 2008. . Unproductive government expenditure in 2007 was N1.325 trillion and increased to N1.541 trillion in 2008. Statutory transfer and Debt service increased from N102 billion and N232 billion spent in 2007 to N163 billion and N372 billion respectively for 2008 budget. Unproductive government expenditure represent more than 51% of the total government spending for the fiscal year of 2008 while productive government spending represent 15%, Capital expenditure 30%, Statutory transfer 4% and Debt service 10%.



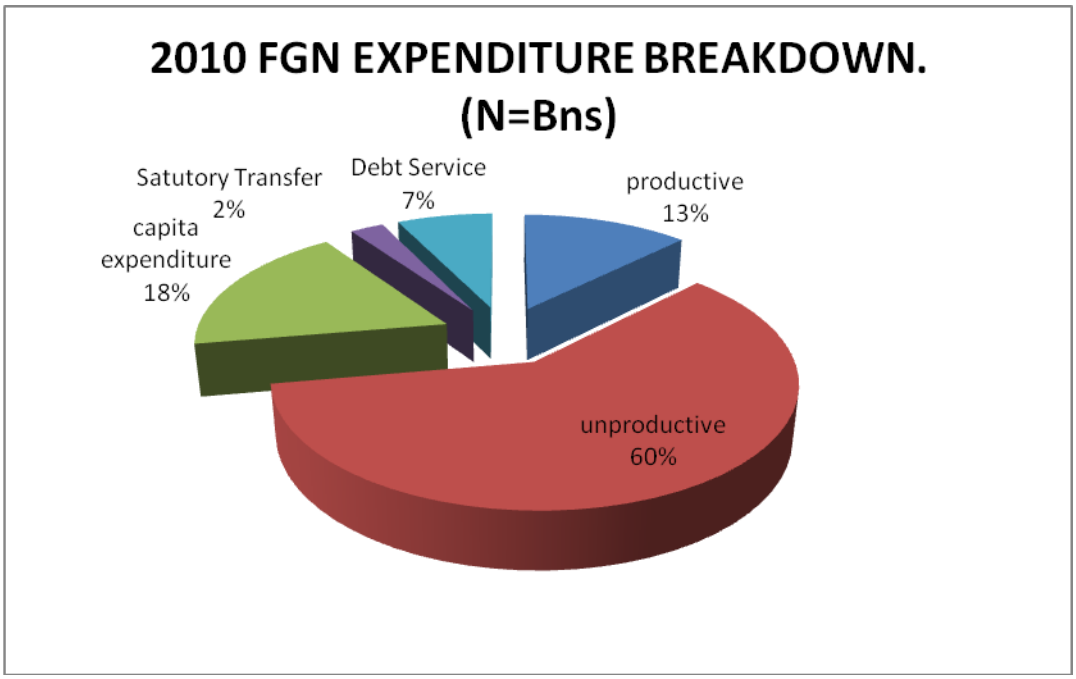
Source: CBN, BOF and Self Calculated.

The Federal Government of Nigeria aggregate expenditure for 2009 was N3.456 trillion comprising of N2.131 trillion for recurrent expenditure and N1.325 for Capital expenditure, 168 billion was spent on statutory transfer and N283 billion for Debt service. Productive government expenditure represents N567.4 billion while Unproductive represent N1.564 trillion. The 2009 expenditure breakdown shows that unproductive expenditure of government is 41% same rate with 2008 budget, productive expenditure 15% also same rate, capital expenditure increased from 30% of 2008 to 34% for 2009, Debt service 6% and transfer 4%.



Source: CBN, FOB and Self Calculated

The 2010 government expenditure breakdown indicates that more than 60% of the total government expenditure for the year is spent on unproductive government expenditure, the highest rate since 2007. Productive expenditure represents 13% and falls from 15% recorded in 2008, Capital expenditure 18% falls from 34% in 2008 while both debt service and statutory transfer are 2% and 7% respectively.



Source: CBN, FOB and Self Calculated

CONCLUSION

This paper examined the impact of fiscal stance on economic growth in Nigeria from 1970 to 2010 using econometrics tools such as descriptive statistics, test for stationarity, co-integration test, Multivariate Granger causality test on vector error correction (VECM) Model, variance decompositions (VDCs), and impulse response function (IRFs). The results from the analysis showed a positive relationship exist between productive government spending, tax revenues, oil revenue, and capital expenditure on economic growth. Unproductive government expenditure and budget fiscal deficit have a negative relationship with economic growth.

The Federal Government of Nigeria Budget breakdown from 2007 to 2010 shows that more than 60% of government total expenditures is spent on unproductive sectors, less than 15% for productive sectors, capital expenditure takes less than 25%, statutory transfer less than 5%, and Debt service less than 10%.

Impulse response functions (IRFs) and (VDC) were computed in order to analyse the dynamic properties of the system. The results of the contribution of the explanatory variables in explaining the variation in the dependent variable in the post-sample period confirm the conclusion obtained within the sample VECM analysis. The Granger causality direction was detected through the vector error correction model (VECM). The VECM shows that in the short-run unproductive government expenditure and Federal tax stand out economically exogenous.

Productive government expenditures (PGE), government capital expenditure (CGE), Federal tax (TAX), and oil sales and export leads output growth, significant reduction in government deficit financing would contributes to economic growth. Nigeria fiscal position is based on deficit financing and sustainable economic growth and development is only achievable with investment in government capital expenditures and productive investment.

The following recommendation are made by the author's firstly, General percentage cuts in all unproductive government spending especially on administrative expenses of government. Secondly, reduction in the administrative expenses and salaries of Legislatures, Governors, political officers, and the saving generated to be invested in the productive sector of the economy.

Thirdly, reduction in the numbers of Ministries, merging co-ordinating small ministry with big ministry would brings about efficiency and productivity. Fourthly, Release of fund quarterly to agencies and ministries within limits of specified resources. Adjustment within those ceiling should be decides by the spending agencies.

Finally, the government needs to strengthen their tax policy, laws and regulation, the analysis results shows that more revenues can be generated from taxes inclusive petroleum taxes than the revenues from export sales of oil. Government needs to open up investment in the oil and gas industry for new investors and focus more on taxes because it's not vulnerable to shock compared with export sales of oil and government deficit financing.

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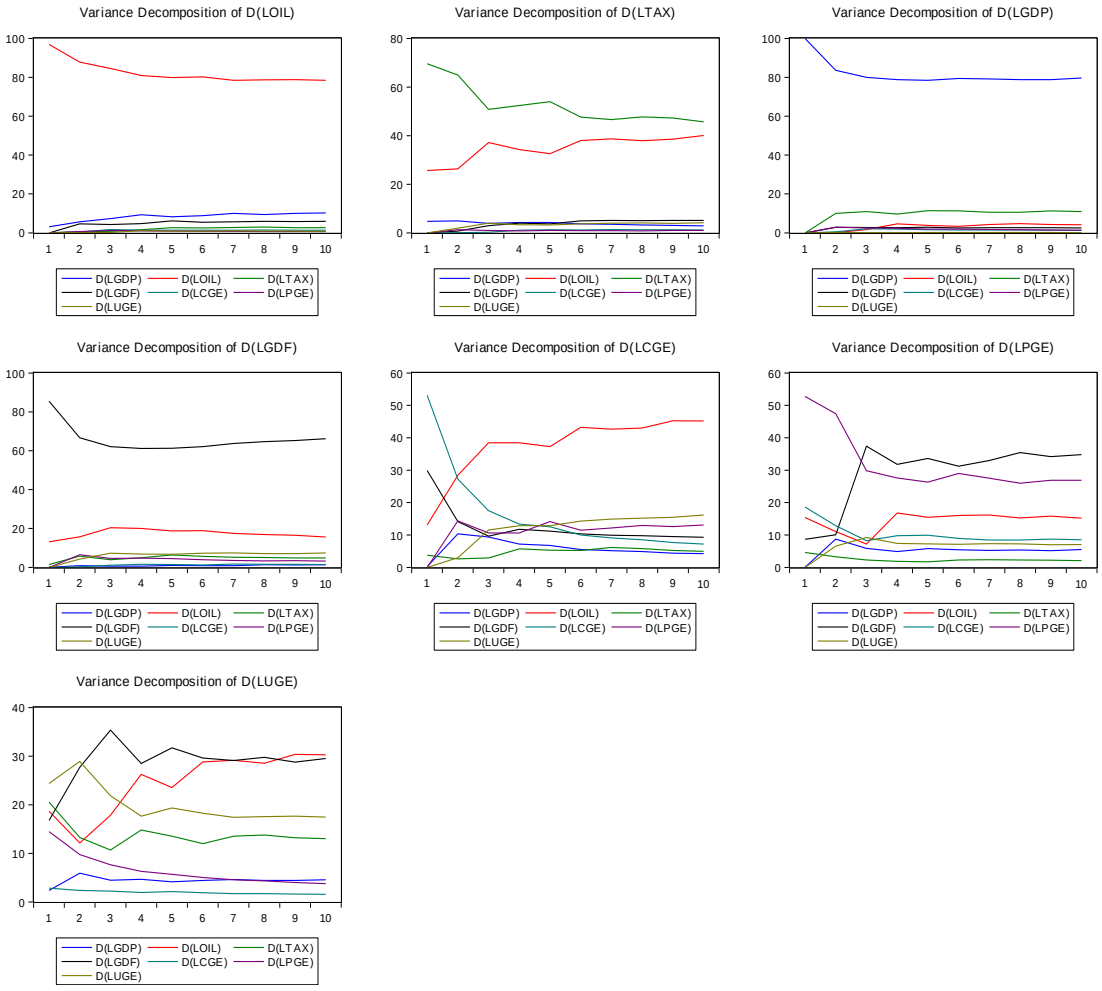
Summary of Fiscal Techniques and Measures

	Techniques Measures	**Decreases in Budget Spending**	**Techniques Measure**
Supplementary Budget/Emergency Budget	Emergency Public Works, Large investment in Capita project and Productive Investment, establishment of research institute for education, science, Art and Medicine in all federal institutions to provide employment for graduates' youth.	Across the Board cuts in expenditures except on Productive investment on education, health and economic services	General percentage cuts in all unproductive government spending especially on administrative expenses of government.
Extended Grants	Flexibility to spend beyond the fiscal year without further legislative approval. Fiscal year is not necessary to start in January of every year. It could be a day within 90 days after a new Government.	Specific sector cuts	Reduction in administrative expenses and salaries of legislatures, governments and political officers.
Cyclical equalization	Gradual release of funds to specific project, funds and project should be monitor by different ministries in Government for efficiency and accountability.	Reduction in expenditure on personnel	Reduction in the numbers of Ministries by merging co-ordinating small ministry with big ministry for efficiency and productivity.
Quarterly cash management budgets and appraisal	Establishment of agencies to monitor government spending and projects.	Quarterly cash management budgets and appraisal	Release of fund quarterly to agencies and ministries within limits of specified resources. Adjustment within those ceiling should be decides by the spending agencies

FIGURE TWO


Variance Decomposition of D(LOIL)
Variance Decomposition of D(LTAX)
Variance Decomposition of D(LGDP)
Variance Decomposition of D(LGDF)
Variance Decomposition of D(LCGE)
Variance Decomposition of D(LPGE)
Variance Decomposition of D(LUGE)
D(LGDP) D(LOIL) D(LTAX)
D(LGDF) D(LCGE) D(LPGE)
D(LUGE)

APPENDIX I

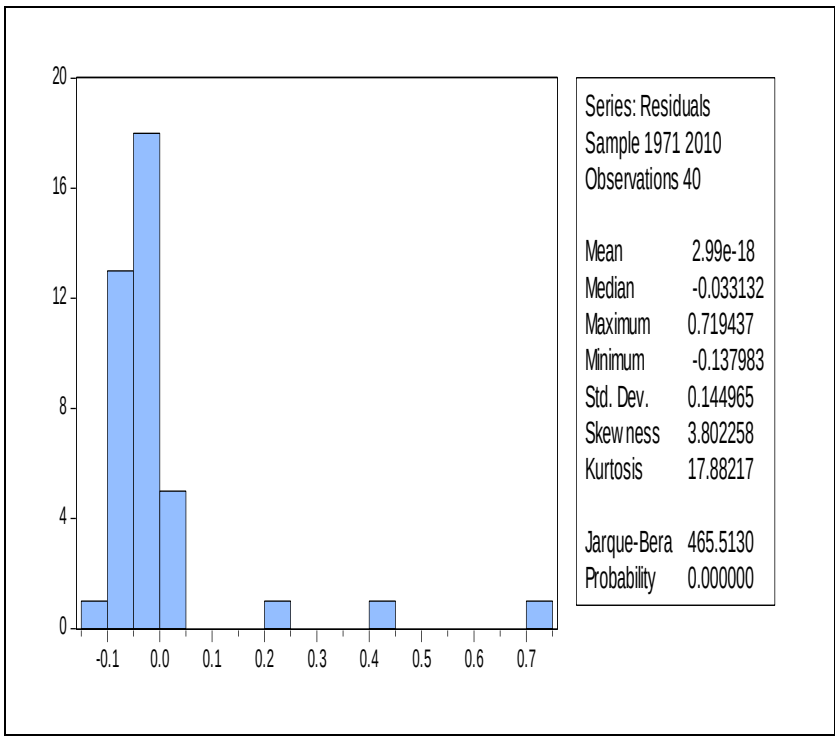
MULTICOLLINEARITY
USING CORRELATION MATRIX METHOD

	LPGE	LUGE	LCGE	LOIL	LTAX	LGDF
LPGE	1.000000	0.803432	0.182901	0.643152	0.324482	-0.349015
LUGE	0.803432	1.000000	0.243602	0.459657	0.342597	-0.305345
LCGE	0.182901	0.243602	1.000000	0.086245	0.278806	0.432081
LOIL	0.643152	0.459657	0.086245	1.000000	0.682780	0.040705
LTAX	0.324482	0.342597	0.278806	0.682780	1.000000	0.395631
LGDF	-0.349015	-0.305345	0.432081	0.040705	0.395631	1.000000

Source: Self Calculated

From the matrix correlation box the largest observed correlation is between LPGE and LUGE, the correlation between LPGE and LUGE is 0.8034 and can be ignored.

Normality Test



The Jargue –Bera statistic rejects the hypothesis that the errors are normally distributed, the JB statistics is 465.513 very high and the p value is practically zero. The skewness and kurtosis coefficients for normally distributed variables are 0 and 3 respectively.

APPENDIX ii

Heteroskedasticity Test: White

F-statistic	8.999746	Prob. F(27,12)	0.0001
Obs*R-squared	38.11760	Prob. Chi-Square(27)	0.0760
Scaled explained SS	218.9938	Prob. Chi-Square(27)	0.0000

Test Equation:, Dependent Variable: RESID^2
Method: Least Squares, Sample: 1971 2010, Included observations: 40

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.012395	0.012061	-1.027656	0.3244
D(LPGE)	0.267653	0.129144	2.072527	0.0604
(D(LPGE))^2	2.079816	0.583915	3.561849	0.0039
(D(LPGE))*(D(LUGE))	-6.549726	1.804471	-3.629721	0.0035
(D(LPGE))*(D(LOIL))	-2.438549	0.645407	-3.778313	0.0026
(D(LPGE))*(D(LTAX))	2.884663	0.766977	3.761082	0.0027
(D(LPGE))*(D(LGDF))	0.045231	0.026517	1.705756	0.1138
(D(LPGE))*(D(LCGE))	-3.074932	1.031998	-2.979590	0.0115
D(LUGE)	-0.588581	0.180790	-3.255603	0.0069
(D(LUGE))^2	4.628156	0.979823	4.723459	0.0005
(D(LUGE))*(D(LOIL))	3.261900	0.947376	3.443089	0.0049
(D(LUGE))*(D(LTAX))	-2.826467	1.013293	-2.789388	0.0164
(D(LUGE))*(D(LGDF))	0.033542	0.055233	0.607278	0.5550
(D(LUGE))*(D(LCGE))	6.091369	1.615326	3.770984	0.0027
D(LOIL)	-0.099422	0.083308	-1.193432	0.2558
(D(LOIL))^2	1.051580	0.486757	2.160379	0.0517
(D(LOIL))*(D(LTAX))	-1.036950	0.347280	-2.985919	0.0114
(D(LOIL))*(D(LGDF))	0.065941	0.044517	1.481250	0.1643
(D(LOIL))*(D(LCGE))	0.278401	0.488298	0.570146	0.5791
D(LTAX)	0.244178	0.067249	3.630969	0.0034
(D(LTAX))^2	0.184839	0.363844	0.508017	0.6206
(D(LTAX))*(D(LGDF))	0.004253	0.024997	0.170152	0.8677
(D(LTAX))*(D(LCGE))	-2.340400	0.513588	-4.556959	0.0007
D(LGDF)	-0.003820	0.004853	-0.787119	0.4465
(D(LGDF))^2	-0.002060	0.000808	-2.548845	0.0255
(D(LGDF))*(D(LCGE))	-0.049300	0.044252	-1.114070	0.2871
D(LCGE)	-0.079938	0.065320	-1.223780	0.2445
(D(LCGE))^2	0.008770	0.348343	0.025177	0.9803

R-squared	0.952940	Mean dependent var	0.020489
Adjusted R-squared	0.847055	S.D. dependent var	0.085259
S.E. of regression	0.033343	Akaike info criterion	-3.767887
Sum squared resid	0.013341	Schwarz criterion	-2.585672
Log likelihood	103.3577	Hannan-Quinn criter.	-3.340435
F-statistic	8.999746	Durbin-Watson stat	2.133298
Prob(F-statistic)	0.000147		

Note: n . R2 = 40(0.9529) = 38.117

Chi-Square distribution with 27 df, the 5% critical Chi-Square value for 27 df is 40.1133 on the basis of the white test. Therefore, we accept the null hypothesis of no heteroscedasticity.