



CENTRAL BANK OF NIGERIA

**MODELING THE FISCAL
SECTOR OF THE
NIGERIAN ECONOMY**

**RESEARCH DEPARTMENT
CENTRAL BANK OF NIGERIA**



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Central Bank of Nigeria

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EXECUTIVE SUMMARY

1. The importance of fiscal sustainability is underscored by government's continued attempt at balancing its inter-temporal budget constraints. Government adjusts its current fiscal policies on a regular basis and manages the associated volatility in periods of booms without exposing the economy to debt crisis. Anchored on the recent economic and financial crises and coupled with the emerging solvency problems experienced by some of the Euro countries, it has become imperative to understand, in greater details, the fiscal operations of government using a small fiscal sector macroeconometric framework. More importantly, for oil rich economies like Nigeria, the formulation and implementation of monetary policy in the face of monetization of oil revenue proceeds could be an arduous and complicated task. A small model of the sector, thus, elicit the paths that expose the economy to significant volatilities which arise from oil price oscillations and proffer suggestions on better policy design and implementation.
2. The fiscal sector model is, therefore, designed to describe the behavior of some selected fiscal variables of interest, especially as they relate to other important and relevant macroeconomic variables. The framework incorporates a fiscal reaction function equation with a view to understanding the relationship among public debt, economic volatility and primary balance. The model is intended to be a veritable tool for assessing and making forecast of fiscal policy indicators. Specifically, the model examines the effect of fiscal policy shocks on macroeconomic variables and the response of fiscal policy variables to oil price and capital expenditure shocks. The main output of the study is an operational fiscal sector model of the Nigerian economy.
3. In order to achieve these objectives, the study is structured into six sections. Following the introduction, we present an analysis of the theoretical relationships between fiscal policy instruments such as taxes, expenditures, debt, and other macroeconomic variables like output, inflation and some external sector indicators. Section three gives an overview of the fiscal operations of the Federal government of Nigeria. Section four follows with the theoretical foundation of the relationships, the methodology, model flowchart, data requirements and the results, while section five discusses the results. Section six concludes the study with some recommendations.

4. Traditionally, the specification of the government sector follows the Keynesian framework. But since the aim of this model is to mimic the fiscal sector of the Nigerian economy, a modified eclectic approach, taking into consideration the peculiar characteristics of the economy, was adopted. Furthermore, some of the equations require specific inclination to either the neoclassical or the Keynesian modeling approach. The specification incorporates government's overall role as a facilitator of growth through changes in its fiscal policy that ultimately affect employment and investment. In the literature, it has been observed that the behavior of government sector is not driven by logically known principal-agent relationship implying that explanatory variables often do not conform to *a priori* expectations.
5. The model revolved around the fiscal reaction function and contains six (6) behavioural equations and two (2) identities. The behavioural equations included primary balance, output growth, total debt stock, oil revenue, non-oil revenue and government recurrent expenditure. The identities included primary expenditure and government retained revenue. Specification and estimation of all the behavioural and linking equations were mainly in nominal forms following standard practices. In estimating this model, the ordinary least squares (OLS) technique was adopted. The choice of OLS was premised on the robustness of the technique and the size of the model.
6. An examination of the within-sample simulations indicated that the model tracked the time paths and turning points of the endogenous variables reasonably well. This was a good indication that the model captured the workings of the Nigerian economy with respect to the behaviour of the variables of interest and suggesting its suitability for policy simulation.
7. The ex-ante simulations show that:
 - i. A 10 per cent increase in the price of crude oil annually resulted in marginal increase in non-oil revenue, while the government oil revenue increased substantially. There was also an increase in government recurrent expenditure and marginal output expansion. The increment, however, worsened the primary balance. Consequently, total debt stock adjusted upward from its baseline path such that the fiscal and debt sustainability indicators increased from 3.5 per cent and 17.6 per cent in 2011 to 6.7 per cent and 30.0 per cent in 2015, respectively. This is an indication that Nigeria's debt might not be sustainable in the nearest future.

- ii. However, a 10 per cent decrease in oil price over a five-year forecast could bring about a reduction in oil revenue by 1.5 and 16.0 per cent in 2011 and 2015, respectively. In addition, non-oil revenue dropped marginally with the decline in total revenue accounting for an average of 81.4 per cent decrease in recurrent expenditure over the five year- horizon. This development caused a slump in output and deterioration in the primary balance, hence weakening the nation's fiscal sustainability.
- iii. An increase in the nominal exchange rate from ₦150/US\$ to ₦156/US\$ showed that a depreciation of the naira would raise output over the 5-year horizon, but would deteriorate primary balance gradually from 1.6 per cent in 2011 to 4.6 per cent in 2015. This would bring about increase in interest payments and total debt stock through the channel of external debt.
- iv. The depreciation in the domestic currency further culminated into higher government oil revenue and expenditure as well as total debt stock to GDP ratio over the forecast horizon.
- v. An increase in Treasury bill rate (TBR) from 3.8 per cent to 10 per cent showed that the primary deficit of the Federal Government reacted positively, deteriorating from a baseline of 3.5 to 5.8 per cent of GDP. Further down the medium-term, the forecast showed a persistent deterioration in the range of 7.0 to 9.4 per cent of GDP. A significant interest rate jump would no doubt "crowd out" the private sector from available loanable funds culminating in lower private investment and growth as evidenced by a gradual output decline through to 2015. Nominal GDP actually contracted by an average of 4.1 per cent in the period. If government fails to reduce the growth of its discretionary expenditure, the primary deficit would deteriorate, thereby undermining fiscal sustainability. The net effect of these output contraction and worsening of the fiscal position is that government's gross national debt would rise as could be gleaned from a debt/gdp ratio which rose from 17.6 to 25.5 per cent of GDP, further threatening both fiscal and debt sustainability in the long- run.

- vi. Incremental growth of 10 per cent in government capital expenditure over the five year horizon produced sustained and long lasting effects in output, government expenditure and total debt stock. The backward linkage effects were enough to result in an increase in government revenue, oil and non-oil. However, the changes in revenue were inadequate to significantly bring down the primary balance over the 5-year horizon. The primary deficit was within 7 per cent of total output, while the ratio of debt-to-GDP over the horizon fell between 17 and 30 per cent.
 - vii. Overall, the change in primary balance relative to the change in output was over 50 per cent, while that of total debt stock constituted over 900 per cent of the change in total output. The implication of the above findings is that at that level of growth in capital expenditure, the primary balance could double and except output expansion is substantial enough, fiscal sustainability could be undermined in the future.
8. Policy Implications and Recommendations are as follows:
- i. The simulation results confirmed the continued reliance of Nigeria's fiscal policy on oil revenue. Changes in oil price significantly affected not only government revenue, but also the quantum and pattern of its expenditure. This translated to large primary deficit (non-oil primary deficit would even be larger) and overall fiscal deficits that always exert so much pressure on debt sustainability and other key macroeconomic variables such as private investment, growth, the current account balance and external reserves. Thus, it is even more imperative now for government to strengthen the private sector through, among others, a complete overhaul of the infrastructure system as well as the current legal and regulatory frameworks. These should be pursued along with government's divestment from all private sector favourable productions that are outside the public goods bracket. Finally, the immediate past and present administration's resolve to tackle the menace of procyclical budget implementation with recent initiatives such as the Fiscal Responsibility Act, the sovereign wealth fund, etc. should be strengthened through judicious implementation.
 - ii. A permanent and consistent increase in government capital expenditure must be efficient enough to eliminate waste in order

to improve the quality of output. Fiscal sustainability would be undermined in the future unless the growth in national output is substantial enough to offset the increment in government primary balance.

- iii. The exchange rate and its management have been confirmed to be an important influence on fiscal policy and debt sustainability in Nigeria. The simulation results showed that changes in the domestic exchange rate, for instance, a one-off depreciation would lead to a gradual deterioration of the primary balance throughout the medium term to peak at 4.6 per cent of GDP and a similar trend was observed in the debt to GDP ratio. This is an indication of the sensitivity of government policy to the exchange rate shock and the need to ensure stringent exchange rate management policies for the country.

Chapter One: Introduction

1.1 Introduction

Central banks worldwide are faced with the task of ensuring price stability among other macroeconomic objectives. In formulating and operationalizing monetary policy necessary for achieving these objectives, econometric modeling is frequently employed at the stages of policy input, analysis and forecasting. For an oil-rich economy, monetary policy can be complicated by the monetization of resource inflows from crude oil exports. Such a path exposes the economy to significant volatility that arises from oil price shock and perhaps, adjustment challenges over the business cycle.

Fiscal sustainability becomes an important issue as the government tries to balance its inter-temporal budget constraint. In this regard, the government needs to decide whether or not it can keep its current fiscal policies without experiencing a debt crisis and, in addition, attempt to manage associated volatility in periods of boom. The recent economic and financial crises, as well as the emerging solvency problems in the euro area, has made it imperative to better understand the fiscal operations of government and their possible implications for monetary policy management.

Thus, the fiscal sector model is designed to describe the behavior of one or more fiscal variables, particularly as they relate to other important and relevant macroeconomic variables. The model also incorporates a fiscal reaction function with a view to understanding the relationship among public debt, economic volatility and the primary balance. In addition, the model will provide forecasts for key fiscal sector variables as an input into simulations within the medium-sized macroeconomic model.

1.2 Objectives of the Study

The objective of this study is to develop an operational fiscal sector model of the Nigerian economy. The model will serve as a scientific tool for simulating and making forecast of fiscal policy indicators. These will be accomplished by addressing the following issues:

- The effect of fiscal policy shocks on macroeconomic variables; and
- The response of fiscal policy variables to oil price shocks.

1.3 Expected Deliverables

The expected deliverables from this study is an operational fiscal sector's model of the Nigerian economy that tracks and forecasts fiscal policy indicators. In specific terms, it will:

- Identify fiscal relationships; and
- Produce a solved model for simulating the future time paths of selected fiscal variables.

1.4 Structure of the Study

Aside this introduction, section two presents the theoretical relationships between fiscal policy instruments (tax, expenditure and deficit financing/debt), inflation, exchange rate and output. Section three gives an analysis of the trend of the fiscal sector in Nigeria with focus on the central government. However, the other tiers of government will be added in the future as data becomes readily available. Section four follows with the theoretical foundation of the relationships, the methodology, data issues and the results, while section five discusses the results. Section six concludes the study with some recommendations on areas of further improvement.

Chapter Two: Theoretical Framework and Literature Review

2.0 Theoretical Framework

2.1 Concepts and Definitions

2.1.1 Fiscal Policy

Fiscal policy is the use of government expenditure and revenue (taxes) to influence economic activity. Its importance in economic management arises from the role of government in promoting certain macroeconomic objectives which may include price stability, economic growth and balance of payments equilibrium. Traditionally, fiscal policy is considered an instrument of demand management, as changes in expenditure and taxation can serve as counter-cyclical measures for reducing business cycle effects in the economy. In Keynesian framework which laid the foundation of modern fiscal policy, the basic assumptions are that there are price rigidity and spare capacity in the economy, such that output is determined by aggregate demand. Thus, in the simplest form,

$$GDP = A + NE \quad (1)$$

where A is domestic absorption (comprising consumption, investment and government) and NE is the net export;

A decrease in any of the other components of aggregate demand is expected to be compensated by government through an expansionary fiscal policy so as to maintain the same level of GDP. Such a policy naturally operates through the multiplier and reflects how shocks to one sector are transmitted throughout the economy (Froyen, 2005). Implicitly, government should increase expenditure and cut taxes to stimulate demand and increase economic growth during recession and vice versa during boom in order to tame inflationary pressures.

Expansionary fiscal policy, however, often leads to large budget deficits which tend to increase the tax burden in the long-run with adverse effects on consumption, investment and national output. Modern theorists such as Romer and Romer (2007) have argued that an increase in government expenditure that raises borrowing would make economic agents increase their current savings in anticipation of an increase in the future tax burden, thus, making fiscal policy ineffective. However, budget deficits can have positive effect on output and other macroeconomic variables in the long-run if the increased expenditure is used to finance productive capital expenditure. In addition, the IS-LM postulated

that fiscal expansion (contraction) is expected to raise (lower) the aggregate demand and output.

2.1.2 Government Revenue

Government revenue can be described as receipts from taxes, property income, sale of goods, voluntary transfers received from other units, and any transaction that increases the net worth of government. Traditionally, government revenue is classified into tax and non-tax revenue. Tax can be defined as a compulsory levy by the government on its citizens and all other economic agents so as to extract resources for the provision of public goods. Tax also serves as a source of accountability as it creates an incentive for the citizens to hold the government accountable for its actions (and inactions). Taxation is often actively used by government as part of the broader fiscal policy to achieve the objectives of stabilization and income redistribution (Ndekwe, 1988). To achieve the former, government tend to rely on the immediate effects taxation seem to have on consumption and hence aggregate demand, and thus, employs it as a counter-cyclical measure.

Taxes can be classified into direct and indirect taxes. Direct taxes are levied directly on income, wealth or profit, while indirect taxes are levied on goods and services. This classification can be viewed in terms of the burden borne by the taxpayers. While the burden of indirect taxes can be shifted to the final consumer, that of direct taxes can only be borne by the tax payer. The maximum revenue that can be generated from taxes is determined by the taxable capacity of the economy. Taxable capacity is a function of the tax base (the object defined by law as taxable), tax rate (the rate payable on the defined base) and tax administration (the effectiveness of the tax collection). The tax base and tax rate determine the amount of tax revenue, and are both intervening variables influenced by political and economic factors (Rose and Karan, 1987).

Non-tax revenues are payments, usually made for enjoying a service provided by the government. They include administrative revenues (mostly receipts from fees, licences etc), commercial receipts (payments from water rates, education levies) and grants. Grants are usually one-way transfer from one country's government or international organizations to another country's government. It may also occur between a higher tier of government to a lower tier of government in the same country for the purpose of providing specific public goods or just to bridge revenue gaps.

Although, tax revenue generally tends to be the major source of revenue for most countries worldwide, Nigeria's major source comes from sale of crude oil and gases. This made it convenient to classify revenue in terms of oil and non-oil.

2.1.3 Government Expenditure

Government expenditure constitutes outlays for the provision of public goods and services, particularly in areas where the price mechanism fails in effectively allocating resources to maximize welfare. These public goods are usually non-excludable and non-rival in consumption, thus, making it impossible for potential producers to recover cost.

Government expenditures can be classified into recurrent, capital and transfers. Recurrent expenditures are expenses on current goods and services that do not contribute to fixed capital, but aid day to day running of the government. They include: overheads, payments of salaries and wages, etc. Capital expenditure involves government acquisition of capital goods for the purpose of creating future stream of value and they include spending on infrastructure, research and development, etc. Transfer payments are expenditures on non-compensatory payments such as subsidies, social security, etc, to individuals, businesses or lower levels of government for the purpose of improving welfare and income redistribution.

Government expenditures are often described by their economic and functional nature so as to provide adequate information on the direction of government policy. The economic component defines the form of spending and it comprises; capital and recurrent expenditure (wages and salaries, overhead, interest payments, pension and gratuity) and transfers. On the other hand, the functional component comprises the allocation of government spending by sectors and it comprises expenditures on education, health, infrastructure, food, security etc.

Government expenditure is expected to play three major functions in the economy. These are allocation, stabilization and distribution.

2.1.4 Fiscal Deficit/Public Debt

Fiscal deficit arises from government's expansionary fiscal policy that leads to revenue falling short of expenditure in a given fiscal year. The government can finance its fiscal deficits through domestic sources, which comprise the central bank, deposit money banks and the public via bond issuance. External financing can come from concessional or non-concessional aid from multilateral or bilateral creditors, including the international capital market. Expectedly,

whichever mode of financing the government chooses has various implications for key macroeconomic variables.

The act of financing government's fiscal deficits gives rise to public debt. Public debt is the total monetary obligations of government to both its citizens and foreigners. In Nigeria the domestic debt stock comprises treasury bills, treasury certificates, treasury bonds, ways and means advances, development and Federal Government Bonds, while external debt consist of Paris and London Club debts, Multilaterals debt, Bilateral debts, and promissory notes.

2.2 Theoretical Literature

The public sector plays a central role in influencing macroeconomic environment. The government is even more important in developing economies where the private sector is still developing. In these economies, the government becomes the predominant economic decision maker with various implications for other sectors of the economy. The monetary, external and real sectors are impacted by the outcome of the mode of financing large fiscal deficits arising from the fiscal sector. According to Matlanyane (2005), domestic borrowing is highly linked with credit squeeze and rising interest rates, while foreign borrowing and money creation are linked with external imbalances and inflationary pressures, respectively. He also noted that the real sector is affected through the fall in investment and economic growth induced by the erosion in the profitability of investments.

Apart, from its expenditure and budget imbalance, government could also affect the macro-economy through its tax policy.

2.2.1 Theoretical Approaches to Fiscal Policy

2.2.1.1 Marginal Utility Approach

The Marginal Utility Approach is one of the earliest theories that recommended the use of economic approach to finding out the composition of government expenditure and budgeting. According to the theory, the government spends its scarce income on alternative services in such a way that the marginal benefit is the same on all items. In other words, expenditure should be so distributed such that the last monetary unit expended yields the same real value.

The principle of Maximum Social Advantage by Dalton is the fundamental principle of public finance which states that economic welfare is achieved when the benefits derived from the marginal utility of expenditure is equal to the marginal disutility or sacrifice imposed by taxation. Thus, government is expected to incur expenditure only to the extent that the marginal social advantage of

expenditure in all directions equalizes the marginal social disadvantage of various means of raising additional public income. According to Musgrave (1959), this is the point of optimal size of the budget and at this point, the marginal net benefit is zero.

The practicability of this theory has been criticized on the following ground;

- It is difficult to measure the benefits derivable from diverse components of public expenditure quantitatively, i.e. expenditure on defense and social security;
- Deriving from the above, this theory cannot be subjected to econometric testing; and
- It does not allow for the government to take into cognizance the future need of the community

2.2.1.2 Public Goods Approach

This theory states that government expenditure is determined by the demand for public goods. Public goods are goods that once produced, can be consumed by an additional consumer at no additional cost. The market mechanism is not available for their provision because they are characterized by one or both of non-rivalry and non-excludability i.e. national defense. Rivalry is the inability of multiple consumers to consume the same good, while excludability is the ability of producers to detect and prevent uncompensating consumption of their products. Public goods, therefore, get under-produced because they are not excludable. The pricing mechanism tends to fail in the allocation of such goods because it cannot force consumers to reveal their demand for purely non-excludable goods, neither can it force producers to meet that demand.

Although, absolute non-rivalry and non-excludable does not exist in the real world, but economists think that some goods approximate the concept closely enough for the analysis to be economically useful. Thus, public goods usually relate to all goods and services provided by government and included a wide variety of goods and services. The major limitations of this theory as outlined by Holcombe, (1997) include;

- There is no reason to believe that public goods can be produced more efficiently in the public than in the private sector;

- Using the formal economic definition of a public good, government output cannot be classified as a public good because public sector production does not have the characteristic of jointness in consumption that was identified in theory by Samuelson; and
- The theory of public goods does not do a very good job of explaining what the government actually does, or should do, but can be better understood as a tool that the government employs for its own benefit.

2.2.1.3 Public Choice Approach

Public Choice theory is a body of theories that recognizes the importance of political process in revealing public preferences. The modern literature in Public Choice began with Duncan Black, whose work was later built upon by James Buchanan, Gordon Tullock, Kenneth Arrow, and Anthony Downs. The theory postulates that government expenditure is determined by self-interest rather than by public interest.

Governments determine revenues and expenditure to maximize their chances for winning elections in democratic societies. Accordingly, budgeted expenditures are determined by a chain of separate policy decisions based on estimates of gains and losses of votes. The central reality for governments is the citizen's vote and not his welfare. Thus, according to Downs, government will only provide what the voters want and not necessarily what is beneficial. In order to fulfil voters' demands, their aspirations for projects or services and promises made at election time, government expenditure has to expand, resulting in larger government, larger bureaucracies, bigger budgets and more problems in trying to find resources to finance the budgeted expenditure as the public do not want to pay taxes.

Also, special interest coalitions lobbying the government to transfer wealth to them tend to increase the size of government budgeted expenditure. People tend to lobby more for government spending that will benefits them with the concentrated interests wining at the expense of the diffuse general interest.

One major criticism of the theory is that unlike the American Society, which it was primarily developed for, it's not suitable for non-democratic countries in which the capacity of opposition groups to lobby for their policy preferences is repressed.

2.2.1.4 Wagner's Law

The Law of Increasing State Activities or increasing expansion of fiscal requirements was propounded by Adolf Wagner in 1876 from the study of the economic growth of Germany. The law states that as an economy industrializes, the share of public expenditure in national income increases "extensively" and "intensively". Wagner noted that social progress has led to increasing state activity with resultant increase in public expenditure. He predicted an increase in the ratio of government expenditure to national income as per capita income rises. According to Mohammadi et al, (2008) the reasons given by Wagner for the increases include; First, as the economy expands, the associated industrialization and urbanization would generate additional needs for government services in areas that go well beyond traditional national defense and legal system. Second, as real income grows, so does the demand for income-elastic cultural and welfare expenditures. Third, government spending may also complement the private sector funding for long-term investments as a result of economic developments and changes in technology.

Another reason is the decentralization of administration and the increase in the expenditure of local bodies. Critics have, however, argued that:

- The Wagner's law was not presented mathematically and this has led to the use of different mathematical specifications to test the law; and
- The hypothesis was not explicitly formulated and it was not clear if the share of government in national income or just absolute level of government should be used as the growth of government.

2.2.1.5 Displacement Effect Hypothesis

The Displacement effect Hypothesis was propounded by Peacock and Wiseman (1961) on the basis of their study on the "Growth of Public Expenditure in the UK, 1891-1955" to validate the Wagner's Law. According to the theory, the growth in public expenditure is determined by the growth in revenue. The hypothesis is built on the principle of tolerable taxation level, which states that maximum amount of tax revenue accruable to government is based on citizen's perception of what is the fair and equitable amount of tax. Ordinarily, the citizens are resistant to higher taxes, but in times of war they become more tolerant of tax increases. According to Henry and Olekalns (2000), after a period of exposure to the new tax regime, the maximum tolerable taxation level is raised as voters become increasingly familiar with the new arrangements. The government is then able to maintain the expenditure at historically high level even though the period of emergency or crisis has passed. This is called "displacement effect". Displacement effect is

created when the earlier lower tax and expenditure levels are displaced by new and higher budgetary levels.

Apart from war and military expenditure, other factors like "social upheavals", natural calamities-droughts and famine have also been attributed to the increase in public expenditure in the literature. These events tend to create new emergency demands on government- new social welfare scheme; war pensions etc. all leading to higher level of expenditure.

2.3 Empirical Literature

Empirical studies for distinct fiscal sector models are sparse and where available, the revenue is treated endogenously, while expenditure comes in as an exogenous variable. Matlanyane (2005) noted that in cases where it is considered appropriate to endogenize expenditure, great care is often recommended in treating the reaction functions, as they tend to exhibit high volatility over time. He further advised that different classifications should be used for expenditure where disaggregation is deemed appropriate depending on the structure of the model and economy.

Nordas and Angelsen (1998) modeled the government sector of the Tanzanian economy using a budgetary framework. They decomposed government expenditure into consumption and investment expenditures, which were exogenously determined and interest payments (domestic and foreign debts). The interest payment was taken as a function of the accumulated debt stock, exchange rates and interest rate (domestic and external). Tax revenue was decomposed into 5 and based on the respective base of the taxable revenue. It included: Income tax; other taxes; the effective ad-valorem tax on local goods; the effective ad-valorem on imports of investment goods; and the effective ad-valorem tax on imports of intermediate goods.

Assuming that the model of financing government deficit was independent of real output, they projected financing need of government as the summation of tax revenue and transfers minus government expenditures. However, the modes of financing were expected to impact on the supply of credit to the private sector on the assumption that domestic money supply does not respond to government financing requirements.

Qin et al (2006) modeled the government sector of the Chinese economy using a general simple dynamic specification approach. Government expenditure was classified into investment and non-investment expenditures with the latter being explained mainly by government revenue and linked to government

consumption on the expenditure side of the GDP. Government revenue was mainly derivable from tax revenue which was based on tariffs on trade, agricultural tax and business taxes majorly from the secondary and tertiary sectors of the economy.

Hossain and Razzaque (2003) modeled the government sector of the Bangladesh economy within an open economy framework. Government revenue endogenously entered the model and was disaggregated into tax and non-tax sources. Based on the import dependent nature of the economy, the taxes were further decomposed into trade and internal taxes. The internal and non-tax revenues were taken as functions of the nominal GDP, while the trade related taxes were depended on related import bases including custom duties, VAT and supplementary duty on imports.

Government expenditure was split into consumption and investment expenditures and was treated uniquely in the model. For instance, consumption expenditure was taken as a function of GDP, while investment expenditure entered the model exogenously as a policy variable.

Overall, they specified a set of four equations for the government sector; revenue from import based taxes, revenue from internal taxes and revenue from non-tax revenue equations as well as government consumption expenditure equation.

Srivastava et al (2009) used a much detailed and disaggregated approach to model the government sector of the Indian economy. They divided the fiscal sector into three core parts, central finances, state finances, and combined finances of the central and state governments. Furthermore, the variables which could be determined outside the core model without significant inter linkages with the core model were determined in a separate fiscal-sector sub-model.

They developed five equations for the central government tax revenues; income tax revenue, corporation tax revenue, union excise duties and import duties equations with a residual term for the remaining central taxes. The service tax equation was developed separately and this together with the remaining 'other taxes' entered exogenously into the core model. Central interest payments were taken as a function of outstanding central debt and effective interest rate, which is linked to the real-term interest rate. Central fiscal deficit and non-debt capital receipts were taken as exogenous, but central revenue deficit was determined within the model. Fiscal deficit and non-debt capital receipts taken together provide total capital receipts.

The states' taxes were divided into three parts: state sales taxes, states other major indirect taxes and a residual which entered the core model exogenously. Furthermore, states revenue from the share of central taxes was endogenous in the model; while state own non-tax revenues and grants from the central government were taken as exogenous. State revenue expenditures were divided into interest payments and primary expenditure. The latter was taken as a policy variable. Interest payments were taken as a function of the effective interest rate on state debt.

For the combined finances, those components that were included in the model had a bearing on the rest of the model. Thus, combined indirect taxes were used for determining indirect taxes net of the subsidies which link GDP at factor cost to GDP at market prices. Combined revenue deficit, combined fiscal deficit and combined debt were also determined here. Inter-governmental transfers were provided for in determining the combined revenue expenditures. A distinction was made between 'derived' fiscal deficit and 'official' fiscal deficit for central, state and combined finances. Derived fiscal deficit was obtained as the annual increment in government liabilities. The fiscal sector was closed with budget identities for central, state, and combined finances.

Pani (1984) modeled the fiscal sector within the macro model of the Indian economy for the period 1969-70 to 1981-82 using a partial adjustment framework. The fiscal sector was classified into central, state and combined government. He specified the central government's revenue receipts and revenue expenditure as a function of the nominal GDP. Capital expenditure was broken into 'current and capital' transfers which entered the model exogenously and 'other capital' expenditure which was linked with the exogenous government investment in real term. The resulting fiscal deficits fed into the monetary sector through the currency equation and it was to be financed from both domestic and external sources.

Soludo (1995) conducted an analysis of macroeconomic adjustment, trade and growth policy in Nigeria with a macroeconomic model from 1970-1999. He captured the fiscal sector of the Nigerian economy using the activities of the Federal government. Eight revenue equations were specified in the analysis to cover; (i) the petroleum profit tax (OILTAX) as a function of the nominal value of oil export receipts. Other oil revenue, domestic crude and gas sales, rents and royalties were lumped together and postulated as a function of the level of aggregate demand and domestic oil prices. Revenue from company income tax was specified as a function of nominal income (GDP), while revenues from

customs and excise duties was taken as a positive function of average tariff on imports and average tariff on non-oil exports.

The nominal income tax revenue net of transfers was postulated as a positive function of average tax rate on personal income, short-term domestic interest rate and a negative function of depreciation rate on capital stock. Thus, the total nominal revenue was the summation of all the other sub-revenue heads, while the federally retained revenue was specified as a given percentage of the total nominal revenue.

Nominal government expenditure was disaggregated into exogenous expenditure on goods and services and debt service payments (domestic and external). The government's nominal current budget deficit was given as the difference between federally retained revenue and total nominal expenditures. The domestic debt service payments were specified as a function of domestic debt stock and short-term domestic interest rates.

Finally, the system was closed by assuming that government target an exogenous path of debt to GNP and therefore adjusts the tax rate on personal income taxes to prevent the stock of debt from rising forever relative to GNP. This is because the central bank cannot finance government deficit from monetization. A feedback rule was therefore specified for the tax rate that made it respond to both the level of change in government total debt (domestic and external) relative to exogenous targeted level (TDEBTT) in line with Masson, et al (1990).

Central Bank of Nigeria (2010a) constructed a medium macroeconomic model for the Nigerian economy that is capable of incorporating the essential features of the economy, while making extensive use of economic theory. The model, which was highly aggregated, reflected activities of four sectors (i.e. the external, the fiscal, the monetary and the real sectors). It comprised six blocks, namely: supply, private demand, government, external, monetary/financial and price blocks. Specifically, in the fiscal/government block, Government expenditure was broken down into recurrent and capital expenditure, but only recurrent expenditure was endogenized; capital expenditure was treated as a policy variable. Variations in size and components of capital expenditure were important fiscal policy tools in terms of complementing private investment as well as determining deficits and financing options.

2.3.2 The Government Sector in a Macroeconomic Context

Modeling the fiscal sector is crucial in every macroeconomic model due to the overriding influence of the government on the remaining sectors of the economy. This is particularly so in developing countries which are resource-dependent and largely public sector-driven. The behaviours of government in terms of its taxing and spending decisions, culminating in fiscal imbalances could exert significant pressure on the general price level, private investment and economic growth as well as the magnitude of imbalances in the external sector. The literature regarding the impact of the government sector on the economy basically revolves around two broad arguments – the monetarist view and the Keynesian proposition.

The monetarists posit that there is a strong link between the fiscal actions of the government and macroeconomic activities. Specifically, they argue that the choice of how the government finances its fiscal deficit could lead to different impacts on other macroeconomic variables (Easterly and Schmidt-Hebbel (1994), Biggs (1998)). If the government chooses to finance it through borrowing in the domestic market by issuing government debt instruments or central bank financing, available credit could contract. This would raise real interest rates and crowd out private investment in the case of the former, while exerting pressure on the general price level in the case of the latter. This in turn leads to lower growth. Similarly, financing the deficit through foreign borrowing may lead to the appreciation of the real exchange rate which would raise the current account deficit. These would eventually precipitate balance of payments problems.

The Keynesian school of thought, however, disagreed with the views espoused above and forcefully argues that public investment is complementary to private investment and both work to increase the level of capital accumulation necessary for investment and growth. Thus, any increase in the fiscal deficit arising from increased expenditure is viewed as an incentive to economic agents to increase capacity utilization, provided firms are operating below capacity, which would raise output. These arguments seem to be of more practical importance to developing countries where capacity utilization is usually low with high degree of idle resources, as well as huge infrastructure gaps that require a more involved participation of government in the economy.

Although, modeling the fiscal sector of an economy varies across countries due to institutional differences, the model structure basically should mirror the inter-linkages between government budgetary operations and the rest of the economy. Pauly (2000: 8) recommends a principle for capturing available policy instruments, including crucial elements such as the expenditure patterns of

government, the components and structure of taxation activities and the budget balance or government budget constraint. While expenditure activities are treated as exogenous instruments on one hand, endogenising these activities is considered appropriate on the other (Matlanyane, 2005). However, caution should be exercised with regards to the treatment of reaction functions due to the level of volatility they exhibit over time.

Haque et al. (1990) put forth a dynamic specification describing the behavior of the public sector via government budget constraint in a macroeconomic framework for developing countries. The study assumed that the operations of the public sector were financed through the acquisition of assets from both external and domestic markets. In addition, government revenues were derived from tax receipts and interest of foreign asset holdings, while expenditure on domestic consumption goods and interest payments on domestic debt were considered components of government expenditure. The government budget constraint was a combination of these components.

Taxes are often treated as endogenous at either an aggregate or individual level. The challenging aspect in estimating tax equations is in determining appropriate tax bases for each tax aggregate. Pauly (2000:9) drew attention to the determination of an appropriate tax base for each tax aggregate as the challenging aspect in estimating tax equations points out the necessity in approximating taxable bases for income taxes, while the value added bases are adequate for value added tax revenues.

In theory, three different approaches of modeling tax revenues exist. The first involved specifying the tax base of a particular tax receipt as the only dependent variable. The approach explains tax receipt as a product of the base and the rate. Smal (1995) states that this derivation will only hold if the exact tax base, the statutory tax rate and a full tax recovery rate is known. Hall and Pauly (2001) highlight the problem of obtaining an explicit tax rate especially in developing countries and recommends the calculation of the implied tax rate as a ratio of the revenue to the base.

The second method involves specifying each particular tax receipt in terms of one or more independent variable(s). These independent variables should be highly correlated with the dependent variable.

The third approach takes into cognizance the complexities embedded in the laws and specifications of the particular tax structure. According to Hall and Pauly (2001) the dynamics of implicit rates could be captured using time series

models in the form of transfer functions. Although, the model possesses long-term advantages, its forecasting power is not far-fetched from that of the earlier two discussed (Smal, 1995:1).

Like in other macroeconomic models, the modeling of taxes could take the aggregate form or the estimation of individual tax aggregates. This is dependent on country specific characteristics and the purpose for which the model is being built. Methods used by various scholars to model the government sector are similar in such a way that government expenditures and transfers are treated as exogenous, while revenues are considered endogenous with taxes classified into direct and indirect taxes (Musila, 2002; Elliot et al, 1986; Ghartey and Rao, 1990; Nordas and Angelsen, 1998).

A study by Ghartey and Rao (1990) revealed that direct and indirect tax vary significantly with output. Musila (2002), on the other hand, finds that variation subsists between direct taxes and national output, while indirect taxes vary with the nominal export value and the import duty – explained by import bill and duty rates.

Similarly, Elliot et al (1986) related direct taxes to the wage bill, given by the product of the average annual wage in the formal sector and the total wages of employees in that sector, import duties to the import bills and duty rates, while indirect taxes were explained by nominal consumption and nominal exports.

Nordas and Angelsen (1998) presented the Tanzanian government sector in a budgetary framework within the IS-LM-BP scenario. Government expenditure, in their analysis, comprised consumption and investment expenditure as well as interest payments on domestic and foreign debt. While the first two components were exogenously determined, domestic and foreign debts depended on debt accumulated as well as the domestic and foreign rates.

Randakuwa et al. (1995) modeled the Sri Lankan government sector more explicitly where government expenditures and taxes were disaggregated and estimated by behavioural equations. The expenditure aspect of the model was divided into consumptions of central and local governments, fixed and inventory investment, and recurrent and capital expenditure. Tax comprised turnover tax, selective tax, import tax, export tax and non-tax revenue. In addition, the model examined changes in domestic and external debts. The former being related to the budget surplus and the latter to the trade and services balance in the balance of payments.

Chapter Three: Structure of the Nigerian Fiscal Sector

3.1 The Structure of Government

The government sector in Nigeria includes all the three tiers of government, comprising the Federal, State and Local governments as well as parastatals and agencies that provide public goods and services with funding from the public treasuries (CBN, 2010). The lower tiers of government consist of 36 states and 774 local governments. The 1999 federal constitution created the exclusive and concurrent legislative lists that apportion responsibilities for legislation among the federal, state and local governments. The items on the exclusive list can be legislated upon by the federal government, while the concurrent list may be legislated by both federal and state governments. A third list, the residual list which contains matters not expressly treated in the first two lists is the exclusive preserve of the states and local governments. The public sector produces public goods and services possessing the basic characteristics of non-appropriability, non-rivalry and non-excludability in consumption. These characteristics rendered efficient allocation of resources in a market economy ineffective, thus, providing the rationale for public intervention in order to ensure efficient allocation of resources, income redistribution and the attainment of stabilization objectives. The CBN (2010) opined that the tiers of government in Nigeria support the fiscal relations that facilitate the achievement of macroeconomic objectives of price stability, full employment, economic growth and balance of payment equilibrium.

3.1.1 Fiscal Federalism

It is generally believed that the devolution of certain public responsibilities to lower tiers of government still remains the best approach to the effective provision of public goods and services. This has led to an overwhelming support for the federal system of government (often taken, albeit erroneously, to be synonymous with democracy) in recent times. Simply put, federalism is a system of government where revenue and expenditure functions as well as the appropriate fiscal instruments for carrying out these functions are divided among the various levels of government. Thus, revenue generating and spending responsibilities, intergovernmental transfer and the administrative aspects of fiscal decentralization are, in fact, the real issues involved in the so-called fiscal federalism (Odoko and Nnanna, 2007).

In Nigeria, the structure of fiscal federalism involves spending and revenue-generating powers assigned to the three tiers of government, namely the federal, state and local governments. Within this arrangement, the constitution provides that all revenues accruing to the federation account (a common pool) mainly from crude oil and gas sales, taxes and royalties as well as non-recurring receipts are to be shared among the three tiers of government based on a sharing formula approved by the National Assembly. In the same vein, the constitution assigned various powers, exclusive and/or concurrent, to each tier of government to raise revenue and legislate on expenditure. More often than not, however, certain gaps created by geographical and economic forces necessitate inter-governmental transfers from higher to lower tiers of government in order to bridge such gaps.

3.1.2 Fiscal Operations of the Federal Government

Fiscal policy in Nigeria has been largely driven by the boom and bust pattern of oil prices and revenue for most of the post-independence years. Prior to the oil boom of the early 1970s, fiscal policy was basically driven by taxes from the commodity boom of the late 1940s and 1950s. Thus, with over 70 per cent of the nation's revenue coming from oil since the 1970s, the patterns of government fiscal policy has been prone to oil-driven volatility. Consequently, both revenue and expenditure tend to move in line with the increases in oil prices with revenue and expenditure increasing astronomically in periods of high oil prices, but declining marginally during oil price decline. Baunsgaard (2003) noted the implications of such boom-bust fiscal policies to include the transmission of oil-volatility to the rest of the economy as well as disruptions in the provision of government services.

Government revenue increased from ₦0.63 billion or 12.0 per cent of GDP in 1970 to ₦10.91 billion or 26.0 per cent of GDP in 1979, due to favorable developments in the international oil market occasioned by the Middle East crises of the mid-1970s. The period also witnessed a drastic shift in the country's revenue base from non-oil to oil, with the share of oil in total revenue increasing from 26.3 per cent in the 1970 to 81.1 per cent in 1979, representing an average growth rate of 75.4 per cent. In line with the movement in revenue, total expenditure increased from ₦0.90 billion or 17.1 per cent of GDP to ₦7.41 billion or 17.6 per cent of GDP at an average growth rate of 28.5 per cent with recurrent expenditure averaging 56.5 per cent of total during the period. The increase in recurrent expenditure was driven principally by the increases in transfers, which accounted for an average of 60.0 per cent of the total recurrent outlay. However, the increase in expenditure outweighed the increase in revenue such that the overall fiscal balance of government resulted in an overall average deficit of ₦0.32 billion or 1.2

per cent of GDP during the period. The deficits were financed mainly from domestic sources.

Although, the performance of revenue in the 1980s was adversely affected by the oil glut at the international market, the measures adopted under the Structural Adjustment Program (SAP), moderated the impact of reduced prices on oil revenue. Consequently, total revenue rose from ₦15.23 billion to ₦53.87 billion, representing about 39.6 and 72.6 per cent of GDP in 1980 and 1989, respectively. The share of oil in total revenue averaged 71.3 per cent or 16.5 per cent of GDP over the period. Total government expenditure increased from ₦14.97 billion or 30.2 per cent of GDP in 1980 to ₦41.03 billion or 18.9 per cent of GDP in 1989 corresponding with movements in oil revenue during the period. Although, the share of recurrent expenditure in total expenditure remained high, there was, however, a slight structural shift in line with SAP's objective of achieving macroeconomic stability and growth through expenditure reduction and expenditure switching. The policy of expenditure restructuring adopted under SAP was reflected in the capital expenditure during the first three years of the programme. The share of capital to total expenditure increased from an average of 43.5 per cent in the 1970s to 46.1 per cent in the 1980s, while the share of transfers and economic services in total capital outlay averaged 37.0 and 33.1 per cent, respectively, over the period.

The overall government balance over the 1980 -1989 decade resulted in an average fiscal deficit of ₦6.14 billion or 7.1 per cent of GDP. The deficits were mainly financed from the banking system, particularly, from the CBN, whose share of total banking system funding averaged 152.8 per cent with its attendant adverse macroeconomic implications during the period.

Total revenue continued its upward trend in the 1990s due mainly to favorable developments in the international oil market, arising from the Gulf War of 1991, the partial removal of subsidy in petroleum products in the domestic market and the introduction of a dual exchange rate system in the foreign exchange market. This generated huge fiscal surpluses in 1995. The slight boost in non-oil revenue as a result of the introduction of Value Added Tax (VAT) in 1994 and other measures aimed at achieving an effective and efficient tax administration also contributed to the notable fiscal surplus. Consequently, total revenue increased nominally from ₦98.10 billion or 36.0 per cent of GDP to ₦949.19 billion, although as a percentage of GDP, it decreased marginally from 36.0 to 29.7 per cent between 1990 and 1999.

Despite government's efforts at diversifying the nation's revenue base, oil revenue continued to be the dominant source of revenue with its share in total revenue in the review period averaging 77.1 per cent or 20.7 per cent of GDP. Similarly, total government expenditure maintained an upward trend, increasing from ₦60.27 billion or 22.5 per cent of GDP to ₦947.69 billion or 29.7 per cent of GDP during the period. This represented an average growth rate of 41.2 per cent due to the impact of the exchange rate depreciation, high inflation rate and increase in public debt service obligations during the review period. As experienced in the 1980s, the share of recurrent expenditure declined further from an average of 53.9 per cent in the 1980s to 51.1 per cent, while capital expenditure increased to 48.9 per cent in the 90s with the share of transfers and social and community services accounting for 43.4 and 38.7 per cent, respectively. The overall fiscal balance of the Federal Government for the decade resulted in an average deficit of ₦68.74 billion or 6.0 per cent of GDP and was mostly financed from the banking system, particularly, the CBN. Although, the CBN remained the dominant holder of government financing instruments, its share of total funding, however, dropped by 101.1 percentage points in the 1980s to 51.7 per cent in the 1990s owing to the effort of government towards achieving macroeconomic stability and sustainable economic growth and development.

Growth in total government revenue continued until the global financial crises of 2008, which adversely affected international oil prices. While total revenue increased from ₦1,906.16 billion or 41.6 per cent of GDP in 2000 to ₦7,303.67 billion or 25.4 per cent of GDP in 2010, the average growth rate declined by 19.0 per cent for the period due to the slump in oil prices in 2008. However, the share of oil revenue in total revenue increased to an average of 78.9 per cent or 24.9 per cent of GDP, despite a decline in the average growth rate of oil revenue.

Total government expenditure continued to increase during this decade because of the need to enhance sustainable economic growth and development by restructuring the domestic economy into a market-oriented, technology-driven and private sector-led economy. This is in addition to the need to increase fiscal incentives in the wake of the global financial crises. Consequently, total expenditure rose from ₦701.69 billion or 15.3 per cent of GDP in 2000 to ₦4,194.22 billion in 2010 with recurrent outlays accounting for an average of 67.8 per cent of total during the period. Similarly, 40.8 per cent of the average total recurrent spending was accounted for by transfers, while administration accounted for 34.9 per cent of the total. The overall fiscal stance of the government for the period stood at a deficit of ₦324.06 billion, which was primarily financed from the banking system, particularly, the DMBs. Furthermore,

there was a structural shift towards a more vibrant non-bank public holding of government financing debt instruments as its average share of funding requirement increased by 36.2 percentage points in the 1990s to 49.0 per cent in the 2000s.

3.1.3 Public Debt

There was tremendous restructuring in the composition and holders of public debt between 1970 and 2010. Total public debt increased from an average of 27.3 per cent in the 1970s to 43.7 per cent in the 1980s with domestic debt, particularly, treasury bills constituting an average of 29.3 per cent of total public debt stock during the period. The structure of domestic debt instruments was primarily concentrated in short term securities of two years and below, with the banking system, particularly, the CBN holding the bulk of the total outstanding debt instruments.

The public debt continued to increase massively from ₦382.71 billion or 143.0 per cent of GDP in 1990 to ₦3,372.18 billion or 105.6 per cent in 1999. This development was attributed to the continued borrowing by the federal government from the domestic money market to meet its financing requirements, the constant roll-over of maturing treasuring bills, the issuance of new securities to absorb CBN ways and means advances, the capitalization of unpaid interest and charges on Paris club, and the revaluation of the entire external debt stock due to exchange rate depreciation. However, in order to mitigate the impact of heavy debt servicing on the economy, the domestic debt instruments were restructured into longer term securities. Consequently, external debt stock increased by an average of 42.5 per cent or 66.9 per cent of GDP with the share of Paris Club averaging 64.0 per cent of total. Similarly, domestic debt increased by an average of 35.1 per cent and constituted 29.1 per cent of GDP during the period. The composition of domestic debt remained in favor of short term maturity instruments, though the share declined to 58.9 per cent, while the banking system, particularly, the CBN remained the dominant holder of domestic debt instruments during the period.

The period, 2000 - 2010 was extremely remarkable in public debt analysis given some key structural changes. Over this decade, the stock of public debt grew at an average of 7.8 per cent and constituted about 42.9 per cent of GDP, with domestic debt accounting for most of the increment. In 2003, domestic debt rose significantly following the introduction of FGN Bonds. This was aimed at deepening the domestic bond market and reducing the cost of debt service burden through the concentration of government borrowing in securities with longer-term maturity. Consequently, short term securities of 2 years and below declined by 3.8

percentage points in favor of longer term securities of three years and above. There was also a structural shift in the bulk of domestic debt instrument holdings from the CBN to the DMBs, while the total holdings by the non-bank public also grew tremendously during the period. The period also witnessed a drastic reduction in external debt stock from ₦3,097.38 billion or 77.5 per cent of GDP to ₦689.84 billion or 13.2 per cent of GDP. This was brought about by the country's exit from the Paris and London Clubs in 2005 and 2006 through a debt relief initiatives of the World Bank/IMF.

3.2 Recent Fiscal Policy Reforms

3.2.1 Fiscal Responsibility Act

The Fiscal Responsibility Act was enacted in 2007 with the major objective of ensuring proper co-ordination and transparency in government financial management. This was to ensure effectiveness and efficiency in the management of the economy by committing all the tiers of government to a set of rules. The Act stands as a framework for achieving a more credible fiscal policy stance, a stable macroeconomic environment, greater investors' confidence in the economy, improved economic growth and reduction in acute poverty, greater synchronization between fiscal and monetary policy, improved environment for a more effective budget execution, guard against excessive borrowing and a shift from revenue sharing to revenue generation. The Act also provides for the Medium-Term Fiscal Framework (MTFF), Commodity Price-Based Fiscal Rule, Limits on Consolidated Debt and Borrowing, Fiscal Transparency, and Fiscal Management Council.

3.2.2 Medium Term Expenditure Framework

The Medium Term Expenditure Framework (MTEF) is a three-year integrated broad-based budgetary framework that was adopted by the Federal Government of Nigeria in 2004. It involves a top-down approach to resource allocation and a bottom-top evaluation of both current and medium-term costs of existing policies, including an annual rollover to reflect policy shifts. MTEF is expected to assist government in achieving macroeconomic balance, affordable spending by MDAs in the medium-term, informed decision and accountability, prioritization of resource allocation to key sectors, predictability of policy outcomes, and sustainability of government funding.

3.2.3 Petroleum Industry Bill

The petroleum industry Bill (PIB) is still undergoing legislative deliberations. The Bill, if passed, is intended to make the oil and gas sector more transparent so as to maximize government revenue from the sector. The Bill provides for the creation of new institutions to govern both the downstream and upstream operations.

NNPC would be converted into a fully-capitalized, accountable and profitable world-class National Oil Company (NOC), the Nigerian National Petroleum Company Limited to be jointly owned by the Federal Government and Nigerians. All existing joint venture (JVs) arrangements would be turned into Incorporated Joint Ventures (IJVs) registered as liability companies in Nigeria and self-sufficient by generating the needed funds from loans or the capital market so as to free the Nigeria government from JV cash-call obligations.

3.2.4 Public Procurement Act

The Public Procurement Act was enacted in 2007 with the objective of ensuring accountability, competitiveness, professionalism, and transparency in public procurement. To achieve this, the Act provides for the establishment of the National Council on Public Procurement and the Bureau of Public Procurement to monitor and oversee public procurement in the country by harmonizing existing government procurement policies and practices through regulation and setting of standards.

3.2.5 Sovereign wealth Fund

The Sovereign Investment Authority Act was passed in 2011 to give constitutional backing to the sovereign wealth fund as well as put an end to the existence of excess crude account. The fund is meant to provide alternative sources of revenue for development through investment; ensure the stabilization of oil revenue and provide savings for future generation. To achieve this, the fund provides for three funds, infrastructure, stabilization and intergenerational funds.

3.3 Fiscal Challenges in Nigeria

3.3.1 Diversification of Revenue Base

One of the key challenges facing the country today is the diversification of the nation's revenue base from the dominant oil sector to other sectors of the economy. The volatility inherent in the revenue from the oil sector contributed a major downside risk to fiscal sustainability and the overall macroeconomic stability in the country. Therefore, there is the urgent need to develop and enhance the contribution of the non-oil sector to the country's revenue, including foreign exchange earnings. This can be achieved by widening the tax base and promoting non-oil exports.

3.3.2 Domestic Debt Sustainability

The need to free resources from debt servicing for economic growth and development was one of the overriding objectives of the Nation's final exit from the Paris and London Club of Creditors between 2005 and 2006. The exit, thus, brought about the concentration of government borrowing requirements in the

domestic economy and this had resulted in substantial growth in domestic debt over the period, 2005-2010. The rate of increase in the domestic debt has become a source of concern in recent times considering the fact that the nation is transiting to another precarious debt situation, whereby the resources that were initially freed for economy growth and development would be diverted to debt servicing. It is, therefore, necessary for government to put in place appropriate measures to control the growth in domestic debt in line with macroeconomic fundamentals.

3.3.3 Fiscal Federalism

One of the major challenges of Fiscal Federalism in Nigeria is the fiscal imbalance among the three tiers of government. Much effort had been devoted to revenue allocation to the three tiers of government to the detriment of revenue assignment functions in the past. There is, therefore, a need to assign revenue allocation proportionately to the functions expected of each level of government so as to address the gross imbalance between assigned function and tax powers. The Revenue Mobilization and Fiscal Commission should develop an appropriate revenue formula that would minimize the problem of fiscal imbalance in the country.

Chapter Four: Methodology

4.1 Data Requirements

The two main sources of data used in the estimation of this model are the National Bureau of Statistics (NBS) and the Central Bank of Nigeria (CBN). Other sources include the Ministry of Finance, Debt Management Office (DMO), Organization of Petroleum Exporting Countries (OPEC) and International Financial Statistics (IFS). Data used for estimation and simulation span 1970 – 2010.

The choice of annual series is predicated on two crucial factors. Firstly, lack of adequate quarterly series on key fiscal variables, such as public debt stock, debt service and some components of revenue and expenditure. Secondly, the peculiar seasonal nature of government budget implementation in Nigeria that tends to lump expenditures towards the end of the year creates unrealistic fiscal balances when calculated at a less than annual frequency.

All variables, except interest rates, are in logarithmic forms. Detailed explanation on the data generation and related issues are discussed in Appendices 1 and 2.

4.2 Estimation Techniques

In estimating this model, the ordinary least squares technique is applied equation by equation and thereafter solved for a solution. The choice of OLS is premised on the robustness of the technique which performs well in simulations.

4.3 Model Specification

The specification of the government sector should strive to incorporate its overall role as a facilitator of growth in terms of revenue, expenditure, debt service, deficit financing, employment and investor. This is, however, constrained by two factors: (i) government actions in many segments of the economy do not follow any known theoretical foundations. The implication is that often, explanatory variables fail to conform to a-priori expectations. Deficit decisions for example, may simply not follow structured programme of financing based on available resources within the economy, but may reflect an independent decision or guesstimate to shore up economic activities; (ii) available data on government activities limit what can be done.

In view of the above, the specification mirrors the fiscal space of government within the revenue – expenditure framework. Theoretically, government should have a fiscal reaction function that is used to determine how it will adjust its

primary balance relative to its revenue and debt profile. This is based on the inter-temporal budget constraint following Bohn (1998) and Gali and Perotti (2003). The inter-temporal budget constraint is given by,

$$\beta_t + (R_t - G_t)D_{t-1} = \Delta D_t + \Delta M_t + (\pi_t + G_t)M_{t-1} \quad (2)$$

where β_t is the primary balance, R_t is the real interest rate, G_t is the real GDP growth, D_t is public debt, π_t is inflation rate and M_t is the reserve money.

Thus, taking into cognizance the potential for fiscal reaction, we specify six (6) behavioral equations and two (2) identities. The behavioural equations include; primary balance as a ratio of GDP (pbY), output gap (yg), domestic debt service (dds), oil revenue (or), non-oil revenue (nor) and total recurrent expenditure (tre). The identities comprise primary expenditure (pe), and total revenue (tr). The specification and estimation of all the equations are mainly in nominal forms following standard modeling practices. The description of the equations and identities are as follow.

4.3.1 Primary Balance

The primary balance is defined as revenue minus primary expenditure as a ratio of GDP (PbY), and is specified to depend on the output gap (yg), exports (XP), imports (IMP), total debt service as a ratio of GDP ($TDSY$), interest rate (proxied by the Treasury bills rate - TBR) and inflation (INF). The inclusion of the output gap in the reaction function follows from the view that government attempts to balance the inter-temporal budget over the business cycle. It has been shown that the size of the public sector is a key determinant of procyclical behavior of government and fiscal rules were counter-cyclical in nature (Erbil, 2011; Manasse, 2006).

$$PbY = \delta_{0,1} + \delta_{1,1} Yg + \delta_{2,1} IMP + \delta_{3,1} XP + \delta_{4,1} TDSY + \delta_{5,1} TBR + \delta_{6,1} INF + \mu_1 \quad (3)$$

4.3.2 Output Gap

Output gap is the difference between the actual and potential output. It reflects the demand side of the economy and captures the business cycle. The output gap is influenced by government consumption ($GCON$), exports and primary balance as a ratio of GDP.

$$Yg = \delta_{0,2} + \delta_{1,2}GCON + \delta_{2,2}XP + \delta_{3,2}PbY + \mu_2 \quad (4)$$

4.3.3 Total Debt Stock

Total debt stock is the total monetary obligations of government to both its citizens (domestic debt) and foreigners (external debt) at any particular time. It is specified as a function of its own lag ($TDSY_{t-1}$), recurrent expenditure as a ratio of GDP ($GREY$), capital expenditure as a ratio of GDP ($GCEY$) and primary balance as a ratio of GDP (PbY).

$$TDS = \delta_{0,3} + \delta_{1,3}TDSY_{t-1} + \delta_{2,3}GREY + \delta_{3,3}GCEY + \delta_{4,3}PbY + \mu_3 \quad (5)$$

4.3.4 Recurrent Expenditure

Recurrent expenditure is defined as government current consumption expenditure. Government expenditure is generally constrained by its revenue. This is particularly the case in developing countries where access to alternative finance mechanisms is restricted. But in cases where government has access to alternative funding sources, this may not apply. In Nigeria, government regularly borrows from the domestic banking system to supplement revenue or meet inter-temporal constraints in the budget. Sale of bonds is also becoming popular in helping the government offset its expenditure responsibilities. This suggests that available financing sources and total revenue (REV) impact government expenditure. Overall, given that the size of government is huge relative to other sectors of the economy, its expenditure behavior often exhibits ratchet effect and incrementalism. Government recurrent expenditure (GRE) is specified as a function of government retained revenue (GRR). Other explanatory variables include public sector employment and inflation proxied by personnel cost (PC) and consumer price index (CPI), respectively.

$$GRE = \delta_{0,4} + \delta_{1,4}GRR + \delta_{2,4}PC + \delta_{3,4}CPI + \mu_4 \quad (6)$$

Government expenditure is broken down into recurrent and capital expenditure, but only recurrent expenditure is endogenized; capital expenditure is treated as a policy variable. Variations in size and components of capital expenditure are important fiscal policy tools in terms of complementing private investment as well as determining deficits and financing options.

4.3.5 Government Revenue

Government revenue consists of public receipts from all sources, except loans and borrowings. Although, government revenue, in line with budgetary and macroeconomic conventions, is classified into tax and non-tax receipts, the fundamental drivers and peculiarities of the Nigerian economy informs the need for a different classification of government revenue into oil and non-oil revenue. This categorization is informed by the dominance of oil revenue in the basket of government receipts. Overtime, specifically from the oil crisis of the 1970s, oil revenue had consistently contributed, on the average, about 85.0 per cent of government total revenue as well as over 90.0 per cent of the economy's foreign exchange earnings. Oil revenue includes proceeds from crude oil/gas sales (domestic and exports), petroleum profit tax and royalties and others, while non-oil revenue includes company income tax, custom and excise duties, value-added tax, independent revenue of the Federal and state governments, and others. The volume of imports influences the revenue derivable from custom duties. In the same vein, oil revenue is, to a large extent, influenced by the level of oil GDP. The stochastic behavioural equations and identities are specified as follows:

4.3.5.1 Oil Revenue

Virtually all segments of oil revenue (PPT, royalties, etc) depend on production size. Earnings on oil, particularly for oil sold outside the shores of the land, depend on exchange rate and the price of oil. We then include the most prominent component of oil revenue into the equation such that oil revenue (GRV_o) is a function of oil GDP (Y_o), nominal exchange rate (NER) and oil price (P_o) as follows

$$GRV_o = \delta_{0,5} + \delta_{1,5}Y_o + \delta_{2,5}NER + \delta_{3,5}P_o + \mu_5 \quad (7)$$

4.3.5.2 Non-Oil Revenue

The most prominent components of non-oil revenue (GRV_n) include the companies' income tax, customs and excise duties and value added tax. The first and last items are functions of domestic output and consumption, respectively. Even customs and excise duties levied on capital goods and raw materials partially reflect domestic production needs and so are functions of income. But it is important that the role of imports be explicitly accounted for; with the volume of imports and the tax rate for imported products – the tariff – determining government revenue. So in the model, government non-oil revenue is determined by non-oil GDP (Y_n), imports (IMP) and tariff (TAR).

$$GRV_n = \delta_{0,6} + \delta_{1,6} Y_n + \delta_{2,6} IMP + \delta_{3,6} TAR + \mu_6 \quad (8)$$

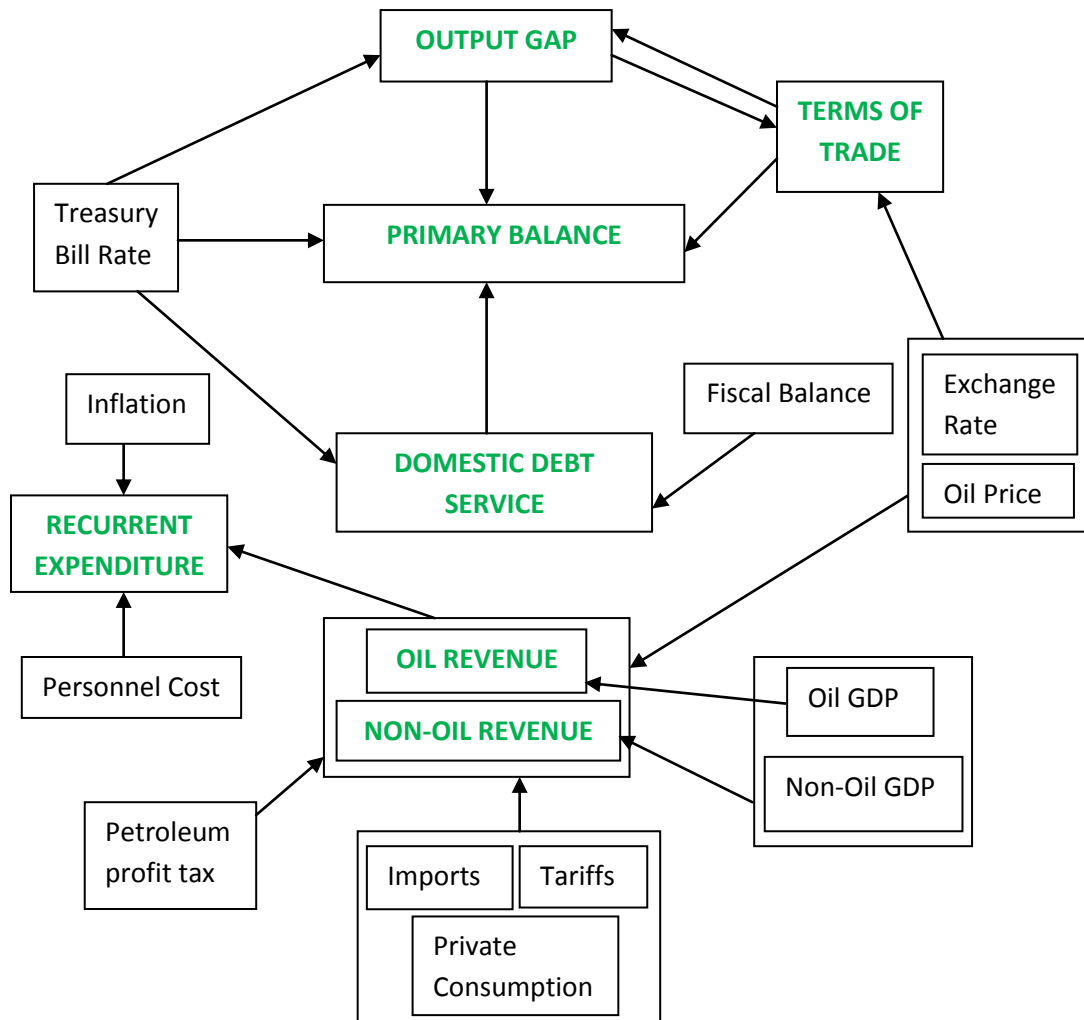
Identities

$$PE = GRE + GCE - PDS \quad (9)$$

$$GRR = GNRR + GORR \quad (10)$$

The model specification is schematically represented in the figure below.

Figure 1: Model Flowchart



Chapter Five: Empirical Analysis

5.1 Estimation Results

Primary Balance

The primary balance as a ratio to nominal GDP equation indicated that beside the output gap ratio which was not significant and also wrongly signed, other variables were significant. The adjusted R^2 indicated that about 55.7 per cent of the variation in the primary balance was explained by changes in export, import, the Treasury bill rate, total debt stock to GDP ratio, output gap and inflation rate.

Although, the coefficient of export was statistically significant, its sign did not conform to a-priori expectation. The suggestion that increase in exports culminated in the deterioration of the primary balance was inconsistent with theory. Nigeria's export was dominated by oil, but its price was volatile. Thus, given the procyclicality of government spending, it tended to move in tandem with changes in the oil price. Thus, increase in export could bring about improvement in government revenue creating an illusion of boom, which involves higher government expenditure, high enough to offset the revenue improvement, resulting in deteriorating primary balance. Similarly, higher imports would lead to an improvement in the primary balance. The channel of transmission works through the increase in international taxes that accrue from higher imports and boost revenue, thereby reducing primary deficit. The coefficient of the treasury bill rate was rightly signed and statistically significant. An increase in interest rate dampened private investment and corporate profits and hence, government revenue from taxes. This would widen the primary balance.

The coefficient of total debt stock was statistically significant and correctly signed. The intuition of this result was that government might attempt to adopt fiscal consolidation as a measure to reduce the fiscal balance. A-priori, the sign for the output gap was positive as a wider output gap could lead to a deteriorating primary balance through reduced taxes and other receipts like crude oil earnings. Finally, inflation which is a measure of macroeconomic stability was statistically significant and conformed to a-priori expectation. A higher degree of macroeconomic instability would engender deterioration in the primary balance as government expenditure increases and sources of revenue decline.

Table 1: Estimation Results of Primary Balance as a Ratio of GDP Using OLS

Dependent Variable: PB/NGDP
 Method: Least Squares
 Sample: 1970 2010
 Included observations: 41

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(XP)	0.069407	0.010311	6.731504	0.0000
LOG(IMP)	-0.073214	0.010632	-6.886036	0.0000
TBR	0.003121	0.000831	3.753068	0.0006
TDS/NGDP	-0.052359	0.010899	-4.804173	0.0000
NGDPG	0.031592	0.019436	1.625434	0.1130
INF	0.000430	0.000177	2.432742	0.0202
Adjusted R-squared	0.556912	Durbin-Watson stat	2.198249	

Output

Output was determined by government consumption, exports and the size of the primary balance. The explanatory variables jointly explained about 99.8 per cent of the variation in the model. All the three variables were significant and appropriately signed. For a percentage change in government consumption, exports and primary balance to GDP ratio, output would increase by 0.32 and 0.62 per cent, respectively, while the primary balance GDP ratio would lead to a decline of 2.1 per cent. Thus, while government consumption and export had a positive impact on output, a higher primary balance to GDP ratio hurt output.

Table 2: Estimation Results of Output Using OLS

Dependent Variable: LOG(NGDP)

Method: Least Squares

Sample: 1970 2010

Included observations: 41

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(GCON)	0.318039	0.045811	6.942439	0.0000
LOG(XP)	0.628603	0.040999	15.33203	0.0000
PB/NGDP	-2.085098	0.636100	-3.277940	0.0023
C	2.195018	0.086574	25.35433	0.0000
Adjusted R-squared	0.997610	Durbin-Watson stat	0.979996	

Government Recurrent Expenditure

Considering the fact that government expenditure over time had mimicked the pattern of growth in government revenue, it was expected that government retained revenue would be positively related to government recurrent expenditure. This hypothesis was confirmed by the results. Furthermore, the coefficients were also positive confirming that increase in the general price level and government staff strength could lead to higher recurrent bill of the government.

Table 3: Estimation Results of Government Recurrent Expenditure using OLS

Dependent Variable: LOG(GRE)

Method: Least Squares

Sample: 1970 2010

Included observations: 41

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(GRR)	0.110344	0.041522	2.657500	0.0116
LOG(PC)	0.749349	0.044442	16.86138	0.0000
LOG(CPI)	0.154877	0.043418	3.567114	0.0010
C	1.943394	0.356820	5.446427	0.0000
Adjusted R-squared	0.998485	Durbin-Watson stat	1.703146	

Government Oil Revenue

In the model, government revenue was specified as a function of nominal exchange rate, crude oil price and the level of output. Theoretically, and consistent with *a-priori* expectations, the three explanatory variables were expected to be positively related with the movement in government revenue.

All the estimated coefficients were highly statistically significant and correctly signed. The results show that the output component impacted positively on oil revenue, suggesting that higher output would on the average lead to increase in oil revenue. Similarly, depreciation in the domestic exchange rate provided government with higher oil revenue since each dollar of oil export translated into more naira revenue. Furthermore, increase in oil prices could lead to higher government oil revenue.

Table 4: Estimation Results of Government Oil Revenue using OLS

Dependent Variable: LOG(GORR)

Method: Least Squares

Sample: 1970 2010

Included observations: 41

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(EXR)	0.247374	0.040633	6.087962	0.0000
LOG(OP)	0.374728	0.138625	2.703186	0.0102
LOG(NGDP)	0.695114	0.036803	18.88739	0.0000
Adjusted R-squared	0.975671	Durbin-Watson stat	0.696995	

Government Non-oil Revenue

The specification of the non-oil government retained revenue incorporated external and real sector variables – imports, tariff and domestic output in their nominal form. This was adopted to capture the significance of international taxes to the government as a source of revenue. Tariff was found to be an important determinant of non-oil government revenue. This result confirmed the *a-priori* expectation that tariff has a positive relationship with government non-oil revenue. However, this relationship might actually be best predicted by a non-linear equation as tariff cannot indefinitely lead to higher revenue. Conversely, the results showed that the coefficient of NGDP was not statistically significant even though it was rightly signed. Given Nigeria's history of low tax effort in the non-oil sector, it was not surprising to find that the model fail to uncover a relationship.

Table 5: Estimation Results of Non-Oil Revenue using Ordinary Least Square

Dependent Variable: LOG(GNRR)
 Method: Least Squares
 Included observations: 31
 White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(NGDP)	0.272028	0.272680	0.997610	0.3273
LOG(IMP)	0.757404	0.278361	2.720942	0.0113
TAR	0.076484	0.029475	2.594919	0.0151
C	-3.469853	0.998463	-3.475193	0.0017
Adjusted R-squared	0.973721	Durbin-Watson stat	1.062033	

Debt

It could easily be conceived that several macroeconomic variables would have certain degree of influence on the national debt stock. However, since not all conceivable variables could enter into an equation that seeks to explain the behaviour of the national debt, the initial specification of the debt stock equation incorporated two sets of explanatory variables. The first set contained fiscal variables which were considered key regressors, namely, government recurrent expenditure, capital expenditure, primary balance and the one-period lag of the debt stock. A second set of control variables included the gross domestic product (GDP), exchange rate, inflation, the current account balance, real interest rates and the degree of openness.

The parsimonious model showed that only the one-period lag of the debt stock, recurrent expenditure and the primary balance turned out to be statistically significant. The one-period lag turned out positive, confirming the hypothesis of the persistence of Nigeria's debt. This implied that government debt policy always take into cognizance the level of debt attained in the previous period. Recurrent expenditure surprisingly came up significant and positive implying that increasing recurrent expenditure could lead to higher debt. This result might be unconnected with Nigeria's long history of non-service of its external debt which crystallized into unpaid interest payments by creditors. Primary balance was also significant with a negative coefficient. This inverse relationship suggested that the government had deliberately lowered its debt accumulation whenever its primary deficit increases, by resorting to other non-debt creating financing, such as drawdown on its excess crude oil savings, privatization and divestment of share

holdings. In this equation, causation was assumed to run from primary balance to debt, while their relationship might in fact be bidirectional.

Table 6: Estimation Results of Total Debt Stock using Ordinary Least Square

Dependent Variable: LOG(TDS)
 Method: Least Squares
 Included observations: 41
 White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(TDS(-1))	0.988432	0.009051	109.2042	0.0000
GRE/NGDP	2.471981	1.075368	2.298730	0.0273
GCE/NGDP	0.932296	0.761095	1.224939	0.2283
PB/NGDP	-2.466636	1.181113	-2.088400	0.0437
Adjusted R-squared	0.994324	Durbin-Watson stat	1.941489	

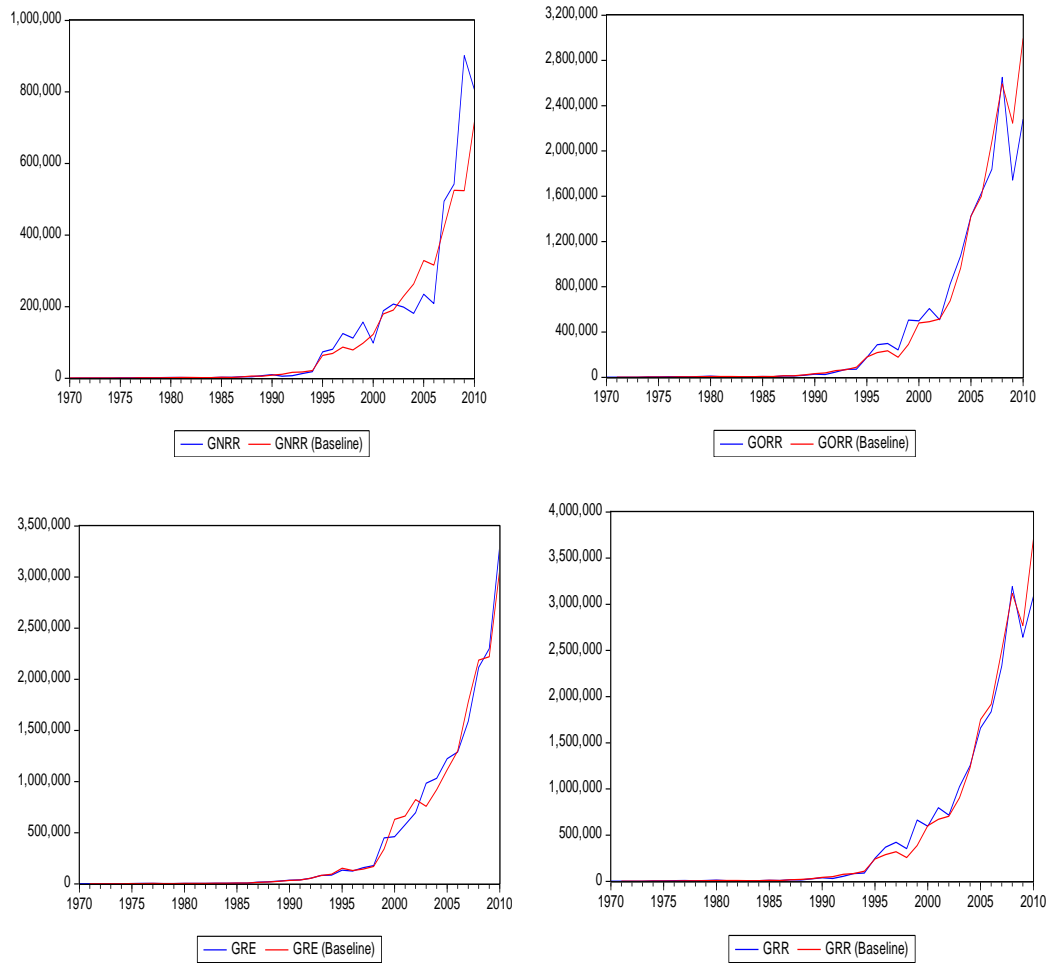
5.2 Model Appraisal and Simulation

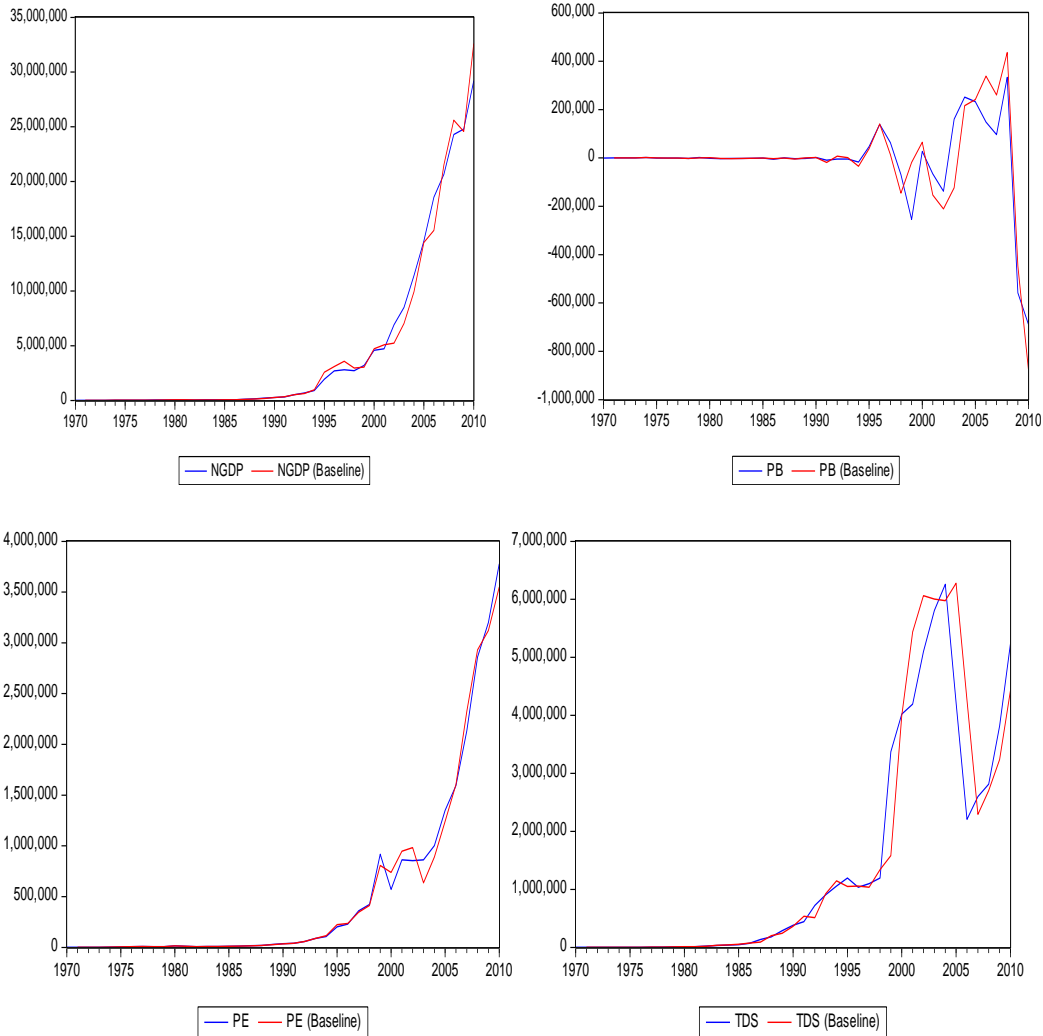
5.2.1 Model Appraisal

Within-sample simulations were conducted to test the reliability of the model in predicting the movement of the endogenous variables. While assessment of the examination of the goodness of fit of the models and coefficient estimates of individual variables were important for good macroeconomic modeling, good statistical properties in individual equations do not necessarily implied a good performance of the model as a whole. Rather, good forecasting performance of the model depended on the quality of data, how well the behavioral equations were linked and how economically meaningful the coefficient estimates were. Figure 2, which showed the actual and simulated values of endogenous variables, provided evidence for the good performance of the model.

A cursory examination of the graphs indicated that the model tracked the time paths and turning points of the endogenous variables reasonably well. This was a good indication that the model captured the workings of the Nigerian economy with respect to the behaviour of the variables of interest thus, suggesting its suitability for policy simulation.

Figure 2: Actual and Simulated Values of the Endogenous Variables





5.2.2 Model Simulation

Given the above tests and the level of satisfactory performance observed in all of the variables and equations, this section attempts to provide simulation on possible outcomes of changes in some selected variables. The process is to introduce shocks in selected policy variables and trace their impact given the relationships in the model. The aim is to examine what would happen to selected macroeconomic variables if a particular policy instrument is altered. There are two approaches to answer this type of questions: ex-post and ex-ante impact simulation.

In ex-post forecasts, observations on both the endogenous and exogenous variables were known with certainty during the forecasting period, while an ex-

ante predicted values of the dependant variable beyond the estimated period, using explanatory variables that may or may not be known with certainty. This study focuses on ex-ante simulation. Some of the issues for which some alternative scenarios were considered included:

- The response of selected fiscal variables to oil price shocks.
- The effect of exchange rate shocks on selected fiscal macroeconomic variables.
- The response of selected fiscal variables to Treasury bill rate shocks.
- Impact of capital expenditure on debt sustainability

5.2.2.1 Simulation Scenarios

- Scenario 1:- an increase in the price of crude oil by 10%;
- Scenario 2:- an increase in the nominal exchange rate from ₦150/US\$ to ₦156/US\$;
- Scenario 3:-an increase in Treasury bill rate (TBR) from 3.84% to 10%;
- Scenario 4:- an increase in government capital expenditure by 10%; and
- Scenario 5:- A decrease in in crude oil price by 10% .

5.2.2.2 Simulation Results

There were four policy variables used for the simulation: crude oil prices, nominal exchange rate, Treasury bill rate and government capital expenditure. The results of the four scenarios are presented in Tables 7 to 11.

Table 7: Scenario 1:-10 per cent increase in Oil Price

Variables	2011		2012		2013		2014		2015	
	Baseline ₦ million	Δ in Scenario 1	Baseline ₦ million	Δ in Scenario 1	Baseline ₦ million	Δ in Scenario 1	Baseline ₦ million	Δ in Scenario 1	Baseline ₦ million	Δ in Scenario 1
Primary Balance (PB)	-1253579	-473	-1808342	-1534	-2356246	-3591	-2745298	-7368	-3423324	-13979
Output (Y)	35338410	920	39088320	2920	43196820	6720	46378830	13670	51277920	25580
PB/Y		-0.0354		-0.0463		-0.0546		-0.0593		-0.0670
Total Debt Stock	6202775	8572	7557529	27273	9390889	63054	11842320	128750	15123050	241910
TDS/Y		0.1758		0.1940		0.2188		0.2580		0.2995
Govt. Rec. expenditure	3381213	19399	3846925	34296	4312523	52234	4763497	73754	5231742	98073
Govt. oil revenue	3076463	203692	3299876	346538	3537276	513822	3716428	695034	3985107	917978
Govt. Non-oil revenue	751414.6	5.3	837670.6	17.0	920114.5	38.9	936185.6	75.1	1023572	139

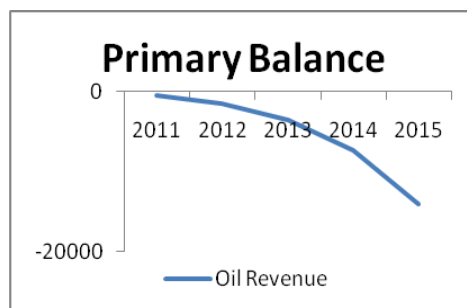
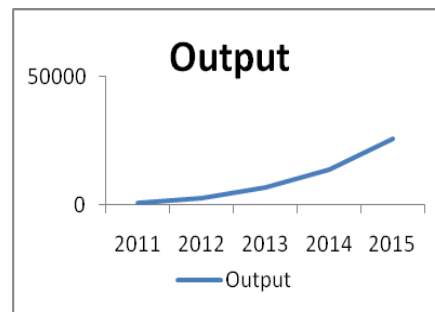
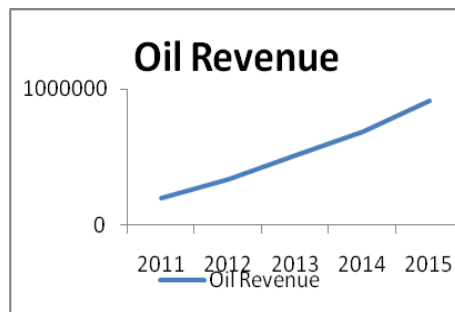


Table 8: Scenario 2:- Depreciation in Nominal Exchange Rate from N150/US\$ to N156/US\$

Variables	2011		2012		2013		2014		2015	
	Baseline ₦ million	Δ in Scenario 2	Baseline ₦ million	Δ in Scenario 2	Baseline ₦ million	Δ in Scenario 2	Baseline ₦ million	Δ in Scenario 2	Baseline ₦ million	Δ in Scenario 2
Primary Balance	-1253579	-68	-1808342	-170	-2356246	-325	-2745298	-561	-3423324	-920
Output	35338410	130	39088320	320	43196820	610	46378830	1040	51277920	1680
PB/Y		-0.0163		-0.0267		-0.0346		-0.0386		-0.0455
Total Debt Stock	6202775	1222	7557529	3023	9390889	5708	11842320	9810	15123050	15940
TDS/Y		0.1760		0.1869		0.2025		0.2292		0.2549
Govt. Rec. expenditure	3381213	2766	3846925	3125	4312523	3488	4763497	3880	5231742	4248
Govt. oil revenue	3076463	28477	3299876	30556	3537276	32768	3716428	34449	3985107	36969
Govt. Non-oil revenue	751414.6	0.8	837670.6	1.8	920114.5	3.5	936185.6	5.7	1023572	9

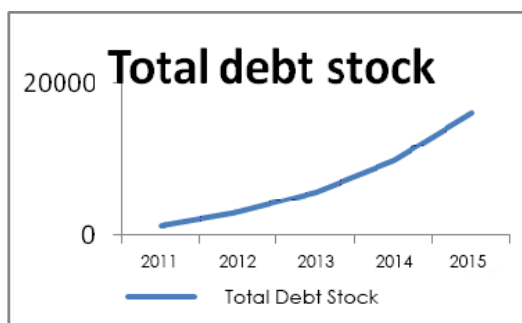
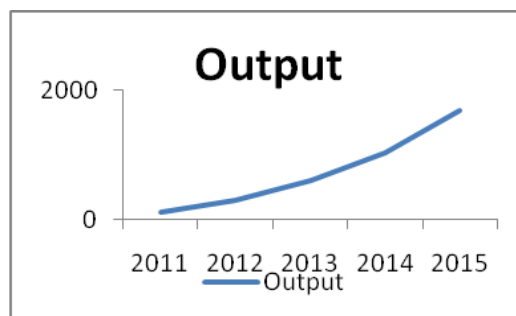
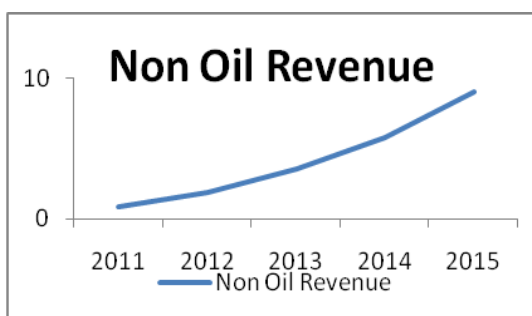


Table 9: Scenario 3:-

Increase in Treasury Bill Rate (TBR) to 10 per cent

Variables	2011		2012		2013		2014		2015	
	Baseline ₦ million	Δ in Scenario 3	Baseline ₦ million	Δ in Scenario 3	Baseline ₦ million	Δ in Scenario 3	Baseline ₦ million	Δ in Scenario 3	Baseline ₦ million	Δ in Scenario 3
Primary Balance	-1253579	700124.3	-1808342	805350	-2356246	923879	-2745298	1029046	-3423324	1193147
Output	35338410	-1384890	39088320	-1560290	43196820	-1762380	46378830	-1946830	51277920	-2226910
PB/Y		-0.0355		-0.0463		-0.0547		-0.0595		-0.0673
Total Debt Stock	6202775	-227449	7557529	-544795	9390889	-1000360	11842320	-1658950	15123050	-2620730
TDS/Y		0.1759		0.1947		0.2203		0.2609		0.3044
Govt. Rec. expenditure	3381213	-9109	3846925	-10514	4312523	-12018	4763497	-13715	5231742	-15561
Govt. oil revenue	3076463	-84316	3299876	-92128	3537276	-100952	3716428	-109147	3985107	-121112
Govt. Non-oil revenue	751414.6	-8127.4	837670.6	-9231.2	920114.5	-10367.2	936185.6	-10857.5	1023572	-12289

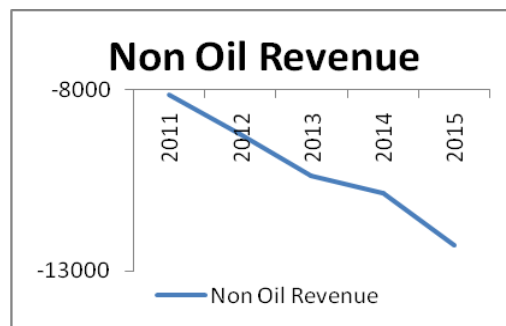
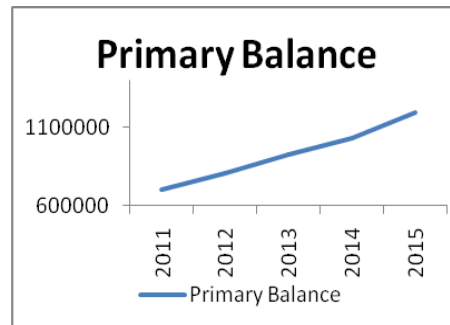
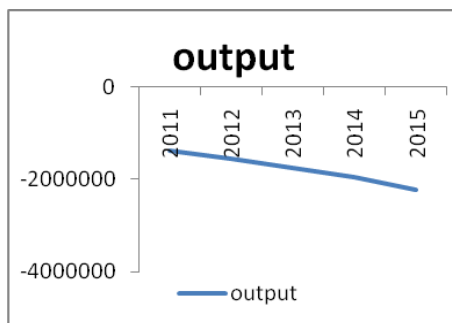
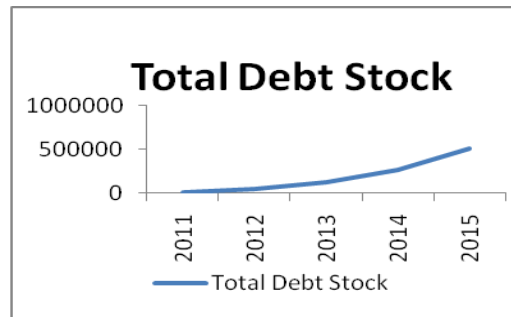
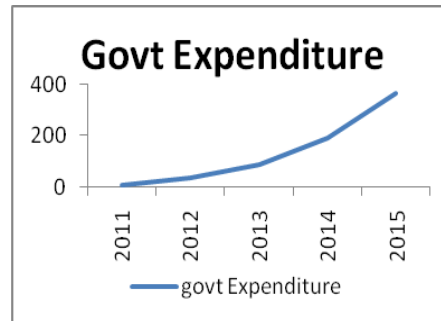
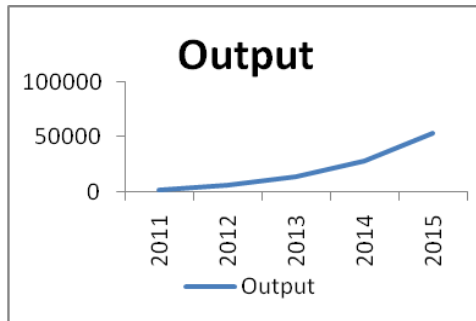


Table 10: Scenario 4:- A 10 per cent increase in Government Capital Expenditure

Variables	2011		2012		2013		2014		2015	
	Baseline ₦ million	Δ in Scenario 4	Baseline ₦ million	Δ in Scenario 4	Baseline ₦ million	Δ in Scenario 4	Baseline ₦ million	Δ in Scenario 4	Baseline ₦ million	Δ in Scenario 4
Primary Balance	-1253579	-814	-1808342	-2945	-2356246	-7233	-2745298	-15129	-3423324	-29113
Output	35338410	1580	39088320	5600	43196820	13540	46378830	28070	51277920	53260
PB/Y		-0.0355		-0.0463		-0.0546		-0.0592		-0.0668
Total Debt Stock	6202775	14741	7557529	52378	9390889	126985	11842320	264370	15123050	503840
TDS/Y		0.1756		0.1934		0.2175		0.2555		0.2952
Govt. Rec. expenditure	3381213	10	3846925	37	4312523	91	4763497	194	5231742	365
Govt. oil revenue	3076463	95	3299876	329	3537276	770	3716428	1563	3985107	2877
Govt. Non-oil revenue	751414.6	9.2	837670.6	32.6	920114.5	78.4	936185.6	154.1	1023572	289



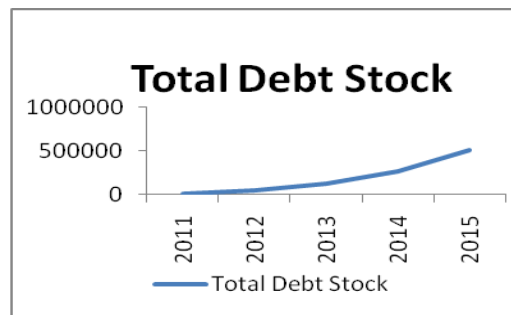
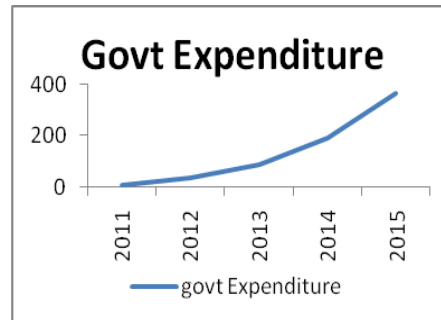
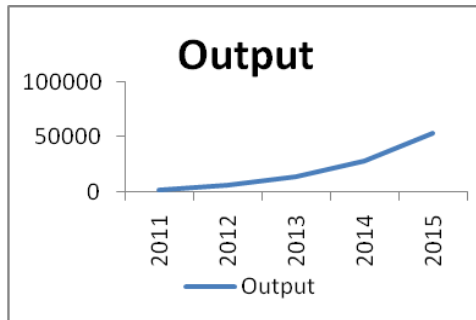
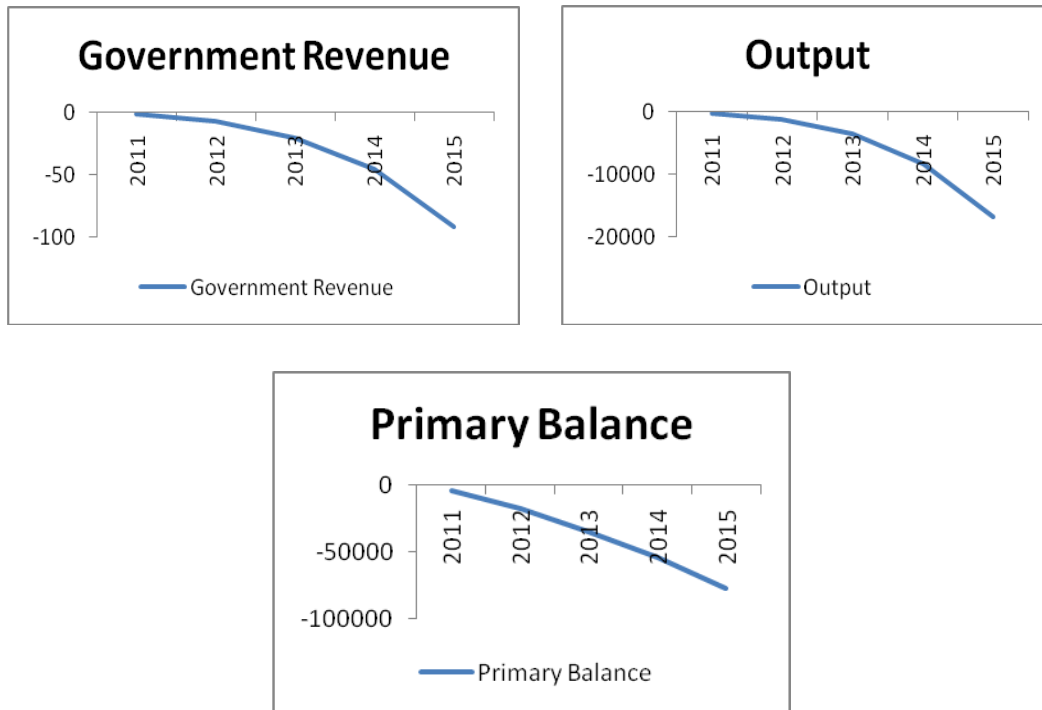


Table 11: Scenario 5:- A 10 per cent decrease in Oil Price

Variables	2011		2012		2013		2014		2015	
	Baseline N million	Δ in Scenario 4	Baseline N million	Δ in Scenario 4	Baseline N million	Δ in Scenario 4	Baseline N million	Δ in Scenario 4	Baseline N million	Δ in Scenario 4
Primary Balance (PB)	-1253579	111	-1808342	643	-2356246	1915	-2745298	4488	-3423324	9232
Output (Y)	35338410	-220	39088320	-1220	43196820	-3590	46378830	-8330	51277920	-16900
PB/Y		-0.0354		-0.0462		-0.0545		-0.0591		-0.0666
Total Debt Stock (TDS)	6202775	-2021	7557529	-11440	9390889	-33619	11842320	-78430	15123050	-159750
TDS/Y		0.1755		0.1931		0.2166		0.2537		0.2919
Govt. Rec. expenditure	3381213	-4579	3846925	-18405	4312523	-35170	4763497	-55077	5231742	-77775
Govt. oil revenue	3076463	-46716	3299876	-175969	3537276	-318792	3716428	-465366	3985107	-635642
Govt. Non-oil revenue	751414.6	-1.2	837670.6	-7.2	920114.5	-20.8	936185.6	-45.8	1023572	-92



Scenarios 1 – An Increase in the Price of Crude Oil by 10% Annually

From scenario 1, while non-oil revenue was projected to increase marginally by ₦139 million in 2015 as a result of an increase in the price of crude oil by 10%, the government oil revenue increased substantially to ₦917,978 million in 2015. This reflected in the growth in government recurrent expenditure by ₦19,399 million and ₦98,073 million in 2011 and 2015, respectively. However, the growth does not translate into substantial output growth; output will only grow, by ₦920million and ₦25,580 million in 2011 and 2015, respectively.

With respect to primary balance, an increase in oil price by 10% would lead to a negative growth in the primary balance of ₦1,254,052 million and ₦3,437,303 million by 2011 and 2015, respectively, which translated into a respective increase in the total debt stock of ₦6,211,347 million and ₦16,877,265 million in 2011 and 2015.

Primary balance as a ratio of GDY (PB/Y) and total debt stock as a ratio of GDP measure the degree of fiscal and debt sustainability, respectively, in Nigeria. It is glaring from the tables that fiscal and debt sustainability would increase by 3.5 and 17.6 per cent in 2011 and by 6.7 and 30.0 per cent in 2015, respectively. This implied that the Nigerian debt might not be sustainable in the nearest future if expenditure should rise in consonance with an increase in crude oil prices.

Scenario 2 – An Increase in the Nominal Exchange Rate from ₦150/US\$ to ₦156/US\$

An increase in the nominal exchange rate by ₦6.00 is depreciation in the value of the Naira. This action could lead to increase in output of ₦130.0 million, ₦320.0 million, ₦610.0 million, ₦1,040.0 million and ₦1,680.0 million in 2011, 2012, 2013, 2014 and 2015, respectively, over the base line.

Exchange rate depreciation produces a negative primary balance of 1.6 per cent in 2011 and increase gradually to 4.6 per cent in 2015. This development would bring about a rise in interest payments and total debt stock via the external debt.

With regard to government oil revenue, the depreciation in the domestic currency culminates into ₦ 3.1 billion of oil revenue for the country in 2011 from baseline. The rise in oil revenue was witnessed throughout the simulation period. This was expected as more foreign exchange earned through exports of oil gave additional funds into the Federation Account. In consonance with the increases in the oil revenue profile, government expenditure follows a similar trend as oil revenue. The impact of depreciation on the expenditure side was expected to be large if government imports are substantial and if there were large interest payments on foreign debt. The depreciation in exchange rate translates to rise in the total debt stock ratio of 17.6 per cent, 18.7 per cent, 20.3 per cent, 22.9 per cent and 25.5 per cent in 2011, 2012, 2013, 2014 and 2015, respectively, compared with the baseline level.

Scenario 3:-An Increase in Treasury Bill Rate (TBR) from 3.84% to 10%.

In this scenario, a substantial jump in the interest rate was assumed from 3.84 per cent in the baseline year of 2010 to 10.00 per cent in 2011 and was maintained at that level throughout the forecast years. Such an increase in interest rate could be as a result of deliberate monetary policy such as raising the policy rate so as to reduce pressure on the domestic exchange rate or to curtail a depletion of the external reserves.

The simulation results showed that the primary deficit of the Federal Government reacted positively by deteriorating from a baseline of 3.5 to 5.8 per cent of GDP. Further down the medium-term, the forecast showed a persistent deterioration in the range of 7.0 to 9.4 per cent of GDP. A significant interest rate jump would no doubt “crowd out” the private sector from available loanable funds, culminating in lower private investment and growth as evidenced by a gradual output decline through to 2015. Nominal GDP actually contract by an average of 4.1 per cent in the period. If government failed to reduce the growth of its discretionary

expenditure, (which is always the case due to ratchet effect) in the face of dwindling non-oil revenue which was simulated to decline throughout the period, primary deficit would have deteriorated, thereby undermining fiscal sustainability. The net effect of these output contraction and worsening of the fiscal position was that government's gross debt would rise as can be gleaned from a debt/gdp ratio, which rose from 17.6 to 25.5 per cent of GDP, further threatening both fiscal and debt sustainability in the long-run.

Scenario 4:- An Increase in Government Capital Expenditure by 10%.

Incremental growth of 10 per cent in government capital expenditure over the five-year horizon produced sustained and long lasting effects in output, government expenditure and total debt stock. The backward linkage effects were enough to result in an increase in government revenue, oil and non-oil. However, the changes in revenue were inadequate to significantly bring down the primary balance over the 5-year horizon. The primary balance deficit was within 7 per cent of total output, while the ratio of debt-to-GDP over the horizon fell between 17 and 30 per cent. The evidence clearly suggested that the change in primary balance relative to the change in output was over 50 per cent, while the change in total debt stock constituted over 900 per cent of the change in total output. Two reasons explained this explosive phenomenon in the debt profile of the country. First, the delay in the implementation of the capital budget undermined the effective transmission of public investment into output and revenue. Second, the country has a historical explosive external debt which was reversed by the debt relief of 2005-06. However, almost immediately the share of domestic debt in total debt assumed an explosive profile due to government resolve to deepen the domestic debt market and the appetite for loose debt policy.

The implication of the above finding is that a permanent and consistent increase in capital expenditure must be efficient enough to eliminate waste to improve the quality of output. At that level of growth in capital expenditure, we have the doubling of the primary balance and except output expansion is substantial enough, fiscal sustainability could be undermined in the future.

Scenario 5:- A Decrease in Crude Oil Price by 10% Annually.

A decrease in the price of oil by 10 per cent over a five – year forecast brings about a reduction in oil revenue by 1.51 and 15.95 per cent in 2011 and 2015, respectively. Non – oil revenue dropped marginally by ₦1.2 million in 2011 to ₦9.2 million in 2015. This negative shock also influenced government recurrent expenditure adversely, accounting for a reduction of ₦4579 million in 2011 and ₦77,775 million in 2015.

Output also decreased over the 5-year horizon. This decrease ranged from ₦220 million in 2011 to ₦16900 million in 2015, while primary balance deteriorated by an average of ₦3277.8 million over the selected years of forecast. Debt sustainability, which was reflected by the primary balance – output ratio broadened by 3.5 per cent in 2011 to 6.7 per cent in 2015.

Chapter Six: Summary and Conclusion

6.0 Summary and Conclusion

6.1 Major Findings

- Nigeria public debt stock might become unsustainable in the near future if government maintains its current debt policy even with consistent increase in crude oil prices in the international market.
- Though, a slight depreciation of the Naira exchange rate will boost government revenue, it will also concomitantly increase government expenditure. Similarly, the debt stock will go up if the increase in government revenue is not enough to offset the increase in expenditure.
- An increase in interest rate would reduce output and deteriorate government fiscal balance position. This will worsen public debt stock profile and further intensify the unsustainability problem.
- A consistent increase in government capital expenditure produced sustained and long-lasting adverse effects on output, government expenditure and total debt stock. This was due to the delay in the implementation of capital budget and undermines the effective transmission of public investment into output and revenue.

6.2 Policy Implications

- The simulation results confirmed the continued reliance of Nigeria's fiscal policy on oil revenue. Changes in oil price significantly affected not only government revenue, but also the quantum and pattern of its expenditure. This translated to large primary deficit (non-oil primary deficit would even be larger) and overall fiscal deficits that always exerted so much pressure on debt sustainability and other key macroeconomic variables such as private investment, growth, the current account balance and external reserves. Thus, it is even more imperative now for government to strengthen the private sector through, among others, a complete overhaul of the infrastructure system as well as the current legal and regulatory frameworks. These should be pursued along with government's divestment from all private sector favourable productions that are outside the public goods bracket. Finally, the immediate past

and present administration's resolve to tackle the menace of procyclical budget implementation with recent initiatives such as the Fiscal Responsibility Act, the sovereign wealth fund, etc. should be strengthened through judicious implementation.

- A permanent and consistent increase in government capital expenditure must be efficient enough to eliminate waste in order to improve the quality of output. Fiscal sustainability would be undermined in the future unless the growth in national output is substantial enough to offset the increment in government primary balance.
- The exchange rate and its management have been confirmed to be an important influence on fiscal policy and debt sustainability in Nigeria. The simulation results show that changes in the domestic exchange rate, for instance, a one-off depreciation would lead to a gradual deterioration of the primary balance throughout the medium term to peak at 4.6 per cent of GDP and a similar trend is observed in the debt to GDP ratio. This is an indication of the sensitivity of government policy to the exchange rate shock and the need to ensure stringent exchange rate management policies for the country.

6.3 Conclusions and Directions for Further Study

In recent time, policy makers have given more attention to the fiscal sustainability of government operations due to the need to balance its inter-temporal budget constraint. In this connection, the study attempts to construct a fiscal sector model of the Nigerian economy that incorporates fiscal reaction function with a view to understanding the inter-relationships between public debt, output gap, domestic debt servicing and the primary balance. The data used for the estimation and simulation span 1970 – 2010.

The model presented the key variables of government operations, such as revenue, expenditure and public debt in order to examine the inter-linkages and the essential features of these variables. It addressed the effect of fiscal policy shocks on macroeconomic variables and the response of fiscal policy variables to oil price shocks. The behavioural equations were specified according to economic theory and estimated within the eclectic macroeconomic framework using the ordinary least squares technique for the systems of equations. The focus was limited to the central government in order to minimize data challenges.

The model contained six endogenous variables - primary balance, output gap, total debt stock ratio, recurrent expenditure and government revenue (oil and

non-oil) as well as two identities – primary expenditure and government retained revenue. The linkages of the six equations were identified and the model solved simultaneously to incorporate those linkages. The complete model was then simulated over the historical period and standard model evaluation tests were performed. The graphs indicated that the model tracks the time paths and turning points of the endogenous variables reasonably well, suggesting its suitability for policy simulation. The in-sample performance is good. The results of the dynamic simulation indicated that the simulated data reproduce most of the turning points of the time series in the actual data well. Furthermore, the dynamic simulation of the model produces satisfactory results, as they showed that the economic variables behaved in accordance with a priori expectations.

It was found from the simulated forecast that with an annual increase of 10.0 per cent in the price of crude oil, government oil revenue increased substantially by ₦203,692.0 million in 2011 to ₦4,903,085.0 million in 2015, translating to a positive growth in government recurrent expenditure. This development also translated to substantial output growth, which grew from ₦920.0 million in 2011 to ₦25,580.0 million in 2015. Meanwhile, primary balance grew negatively from ₦1,254,052.0 million in 2011 to ₦3,437,303.0 million in 2015. In the same vein, fiscal and debt sustainability rose from 3.5 and 17.6 per cent in 2011 to 6.7 and 30.0 per cent in 2015, respectively. This development indicated that Nigerian debt portfolio may not be sustainable in the nearest future.

The flip side to the above policy action, led to a reduction in oil revenue by 1.5 and 16.0 per cent in 2011 and 2015, respectively. Government recurrent expenditure similarly declined by about 0.8 per cent, on the average, over the 5-year horizon. In the same vein, output, primary balance and debt sustainability widened over the period of study.

A depreciation of the nominal exchange rate from ₦150/US\$ to ₦156/US\$, resulted in a negative primary balance of 1.6 per cent in 2011, which widened gradually to 3.5 and 4.6 per cent in 2013 and 2015, respectively. This could lead to a rise in interest payments and total debt stock, both of which would deteriorate the balance of payment position.

An increase in treasury bill rate from 3.84 per cent to 10.0 per cent would deteriorate primary deficit from 3.5 to 5.8 per cent of GDP in 2011. An increase in interest rate would no doubt lead to the crowding out of the private sector credit from available loanable funds, culminating in reduced private investment and growth as witnessed by a gradual output decline through the period 2011 to 2015. Nominal GDP actually contracts by an average of 4.1 per cent in the

period. The government might need to reduce the growth of its expenditure in the face of dwindling non-oil revenue which was simulated to decline throughout the period in order not to undermine fiscal sustainability. The debt to GDP ratio rose from 17.6 to 25.5 per cent of GDP, which would further threaten both fiscal and debt sustainability in the long-run.

An incremental growth of 10.0 per cent in government capital expenditure over the five-year horizon produced sustained and long lasting effects in output, government expenditure and total debt stock. The backward linkage effects resulted in an increase in government revenue. However, the changes in revenue are inadequate to significantly bring down the primary balance over the five-year horizon.

6.4 Limitations and Directions for Future Study

In the course of the study, the following challenges were identified:

- With the recent fiscal stimulus in the wake of the global financial crisis, it will be important to examine the fiscal multipliers in the future so that the impact of fiscal policy can be assessed.
- The peculiar seasonal nature of government budget implementation in Nigeria that tends to lump expenditures towards the end of the year creates unrealistic fiscal balances when calculated at a less than annual frequency. Thus, data usage was constrained to annual.

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APPENDIX 1
Variables Definitions, Types and Units

	Notation	Definition	Type	Unit
3	CPI	Consumer price index	Exogenous	Index
4	DDS	domestic debt stock	Endogenous	million naira
5	DOP	Degree of Openness	Exogenous	Fraction
6	EDS	external debt stock	Exogenous	USD
7	EXR	Exchange Rate	Exogenous	Per cent
9	GCE	Government Capital expenditure	Exogenous	million naira
10	GCON	Government Consumption	Exogenous	Million naira
12	GNRR	Government Non-Oil Retained Revenue	Endogenous	Million naira
13	GORR	Government Oil Retained Revenue	Endogenous	Million naira
14	GORV	General Government Oil Revenue	Exogenous	Million naira
15	GRE	Government Recurrent expenditure	Endogenous	million naira
16	GRR	Government Retained Revenue	Identity	Million naira
18	GTE	Government Total Expenditure	Identity	Million naira
20	IMP	Imports	Exogenous	Million naira
21	INF	Inflation	Exogenous	per cent
22	MLR	Maximum Lending Rate	Endogenous	Million naira
23	MPR	Monetary policy rate	Exogenous	per cent
24	NGDP	Nominal Gross Domestic Product	Endogenous	Million naira
25	NNGDP	Nominal Non-Oil Gross Domestic Product	Endogenous	Million Naira
26	NOGDP	Nominal Oil Gross Domestic Product	Exogenous	Million Naira
27	OP	Oil Price	Exogenous	USD
28	PB	Primary Balance	Endogenous	Million Naira
29	PC	Personnel Cost	Exogenous	Million Naira
30	PCON	Private Consumption	Endogenous	Million Naira

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31	PDS	Public Debt Servicing	Endogenous	Million Naira
37	TAR	Import tariff	Exogenous	Per cent
38	TBR	Treasury bill rate	Exogenous	per cent
39	TDS	Total debt stock	Endogenous	million naira
43	XP	Exports	Exogenous	million naira
44	Yg	Output gap	Exogenous	million naira

The image features a complex, abstract graphic design. It consists of several overlapping, curved bands in various shades of teal, green, and light blue. The bands are layered, creating a sense of depth and movement. The colors range from dark, rich teal to bright, vibrant green, with some lighter, almost white, highlights. The overall composition is dynamic and modern, with a focus on organic, flowing shapes. The background is a light, neutral color, which makes the vibrant colors of the bands stand out.

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