EVALUATION OF THE RELATIONSHIP BETWEEN GOVERNMENT REVENUE AND PUBLIC EXPENDITURE IN NIGERIA

By

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(MSC/CC/14/0808)

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Declaration

I hereby declare that this dissertation was written by me and it is a record of my own research work. It has not been presented before in any previous application for a higher degree. All references cited have been duly acknowledged.

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Ojiya, Emmanuel Ameh **Date**

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Dedication

I dedicate this thesis to my dear wife, Mrs. Blessing E. Ojiya and our five lovely children: **Ada, Abah, Ene, Owoicho** and **Ebo.** You continually upheld me in prayers and God saw me through by His mercies and love.

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Table of Content

List of Tables

List of Figures

Abstract

This study investigated the relationship between government revenue and public expenditure in Nigeria from 1961 to 2014. The specific objectives are to examine the trend and pattern, the causal relationship as well as the effect of government revenue on public expenditure in Nigeria. Data for the study were sourced from Central Bank of Nigeria (CBN) Statistical Bulletin. Using annual time series data, the study employed Trend Analysis, Unit Root Test, Johansen Cointegration Test, Error Correction Mechanism, Granger Causality Test, Impulse-Response Functions and Variance Decomposition to analyse the data. The results from the study revealed that, there was a long-run equilibrium relationship between government revenue and public expenditure in Nigeria, while the variance decomposition output indicates that oil revenue played the most significant role in explaining the variation in government revenue, expenditure and economic growth in Nigeria within the period studied. In the same vein, empirical evidence revealed a unidirectional causality running from oil revenue and total government expenditure to non-oil revenue in Nigeria and from Oil Revenue (OREV) to Total Government Expenditure (TGEXP) within the period under reference. Major policy recommendations amongst others are that, government should as a matter of urgency take concrete steps towards diversifying the economy into other potential revenue yielding sectors like agriculture, manufacturing, the service sectors and solid minerals development of which Nigeria is naturally endowed in abundance; government should design workable fiscal policy tools aimed at harnessing all direct and indirect tax revenue sources. This is achievable by making tax administration agencies more functional through training and conducive working environment; finally, the various anti-corruption agencies like Economic and Financial Crimes Commission (EFCC), Independent Corrupt Practices and Other Related Offences Commission (ICPC) etc should be strengthened and laws promulgated to check the tendency by most Nigerian leaders and bureaucrats to pilfer and misappropriate government funds.

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Governments all over the world, whether in developed or developing nations provide a variety of services through the budget. Such include the provision of economic and social overheads, defence, maintenance of law and order, establishment of pension schemes, etc. The extent of government involvement in providing goods and services is subject to spatial-temporal variations normally associated with populations. The scope of its functions depends, among other things, on the political and economic orientation of the members of a particular society at a given point in time, as well as their needs and aspirations (Adesola, 1995). The performance or discharge of these functions and responsibilities of government engenders governmental fiscal operations.

In Nigeria, government expenditures have consistently exceeded government revenues throughout most of the past decades since 1960 except for 1971, 1973-74, 1979, and 1995-96 periods (Nurudeen and Usman (2010). Government expenditure has always been at the increase due to the flow of revenue from production and sales of crude oil. This is however accompanied by huge demand for public goods such as roads, electricity, education, health, external and internal security and so on. Within this context, statistics has it that government expenditure (capital and recurrent) have continued to rise in the last forty-five (45) years. For instance, aggregate capital and recurrent expenditure increased from N10,163.3m, N4,805.2m in 1980 to N24,048.6m, N36,219.6m in 1990 and further increased toN23,9450.9m,N46,1600m in 2000. Between 2001 to 2010, they had increased from N438,696.5m, N579,300m to N1,152,796.6b, N2,131,906b, N4,013,930b respectively (Taiwo and Agbatogun, 2011).

Similarly, the increase in expenditure featured more on education, internal and external security, health, agriculture, construction, and transport and communication. The government's commitment in pursuing rapid economic transformation as incorporated in the various developmental plans in Nigeria largely accounts for the fiscal deficits incurred. The expanded role of the public sector resulted in rapid growth of government spendings over these periods. Government budget deficits over the years have not impacted positively on the lives of the Nigerian citizenry as poverty still pervade the land. Such fiscal deficits tend to reduce national savings which invariably affect economic development (Adeleke, 2011). The options available to the government to stimulate economic growth in this situations are

to reduce government expenditures or raise revenues through increases in tax. These two options can help to reduce the budget deficit(s).

The relationship between government revenue and public expenditure over the years has generated heated debate globally among economists and other policy analysts. An understanding of this relationship is critical in the formulation of a sound or excellent fiscal policy to prevent or reduce unsustainable fiscal deficits (Eita and Mbazima, 2008). Indeed, a good understanding of the relationship between public revenue and government expenditure is of crucial importance in appreciating the consequences of unsustainable fiscal deficits and in addressing such imbalances (Hondroyiannis and Papapetrou, 1996; Eita and Mbazima, 2008). It is also highly consequential in evaluating government's role in the distribution of resources (Chang, 2009). Such evaluation paves the way for sound fiscal policy formulation and implementation to achieve rapid and sustainable socio-economic growth and development, all things remaining the same.

Furthermore, an excellent and sound fiscal policy - as noted by Eita and Mbazima (2008), Wolde-Rufael (2008), and Fasano and Wang (2002) - is very important in promoting price stability and sustainable growth in output, income and employment. Thus, a sound fiscal policy is important to promote price stability and sustain growth in output and employment. Fiscal policy is regarded as an instrument that can be used to lessen short-run fluctuations in output and employment in many debates of macroeconomic policy. It can also be used to bring the economy to its potential level. If policymakers understand the relationship between government expenditure and government revenue, without a pause, government deficits can be prevented. Hence, the relationship between government expenditure and government revenue has attracted significant interest; due to the fact that the relationship between government revenue and expenditure has an impact on the budget deficit (Oriakhi, 2004).

1.2 Statement of the problem

Empirical literature on the relationship between government revenue and government expenditure have yielded diverse results. Though over the last three decades several studies have been carried out in different countries to investigate this issue in public sector economics, findings vary from country to country and also within Nigeria, there appears mixed results amongs scholars in the field. In Nigeria for instance, there are some studies by Emelogu and Uche (2010), Aregbeyen and Mohammed (2012), Obioma and Ozughalu (2014) and Ogujiuba and Abraham (2012), which have attempted to examine the

relationship between government revenue and public expenditure with different views due in part to the various time periods analyzed, lag length specifications used, variables employed and the methodology adopted. In spite of the significance of a proper understanding of the relationship between public revenue and public expenditure in formulating sound fiscal policy, empirical study on the subject in Nigeria is still very scanty.

Furthermore, recent developments in the global economy occasioned by the sharp drop in crude oil prices, leading to a drastic drop of over 50% in oil revenue in many OPEC member states of which Nigeria is one is a new development which is yet to be researched into by most authors in Nigeria, making this research much more urgent and imperative in order to investigate the impact the drop in oil revenue have had on Nigerian revenue generation efforts. Again the introduction of Real Gross Domestic Product (RGDP), a proxy for economic growth, as control variable is novel, because studies by Emelogu and Uche (2010), Aregbeyen and Mohammed (2012), Obioma and Ozughalu (2012) and Ogujiuba and Abraham (2012) overlooked this. Given the issues raised above, this research seeks to examine the relationship between government revenue and public expenditure in Nigeria from 1961 - 2014 employing variables like Total Government Expenditure (TGEXP), Oil Revenue (OREV), Non-oil Revenue (NOREV) and Real Gross Domestic Product (RGDP) to examine this relationship and on the basis of this new reality test the validity of the famous Adolph Wagner's hypothesis.

1.3 Objectives of the study

The broad objective of this research is to evaluate the relationship between government revenue and public expenditure in Nigeria, while the specific objectives are to:

(i) examine the trend and pattern of government revenue and public expenditure in Nigeria.

(ii) examine the causal relationship between government revenue and expenditure in Nigeria.

(iii) examine the relationship between government revenue and public expenditure in Nigeria.

1.4 Research questions

This research will be guided by the following research questions:

(i) What is the trend and pattern of government revenue and public expenditure in Nigeria?

(ii) What is the causal relationship between government revenue and public expenditure in Nigeria?

(iii) What is the relationship between government revenue and public expenditure in Nigeria?

1.5 Research hypotheses

H_o1: There is no significant relationship between government revenue and public expenditure in Nigeria.

H_o2: There is no causal relationship between government revenue and expenditure in Nigeria..

1.6 Significance of the study

The study is significant to policy makers, regulatory bodies, professional institutes and associations, government agencies, planning commissions, ministries and parastatals, research institutes, institutions of higher learning, tax agencies and so on as it will serve as a reference material for decision making.

Macroeconomic variables should drive the wheels of economic development in an economy. If the economic planners are aware of the interactions and inter-relationships between and among these variables , it will be a lot easier to set macroeconomic targets that are attainable. The research findings will therefore guide the direction of government macroeconomic framework as it relates to government revenue and public expenditure taking into cognizance the new reality of drop in oil revenue..

1.7 Scope of the study

This research focuses on evaluation of the relationship between government revenue and public expenditure in Nigeria from 1970 to 2015. The choice of this period is informed by the increase in government revenue and spending experienced within the period. The research is based on time series data spanning 45 years to provide robust findings on the relationship between government revenue and public expenditure in Nigeria. The variables considered in the research are Total Government Expenditure (TGEXP) and Government

Revenue, disaggregated into Oil Revenue (OREV) and Non-Oil Revenue (NOREV) and Real Gross Domestic Product (RGDP).

1.8 Organisation of the study

This research consists of five chapters. Chapter one, the general introduction, covers background to the study, statement of the problem, objectives of the study, research questions, research hypothesis, significance of the study, scope of the study and finally organization of the chapters.

While chapter two which is literature review and theoretical framework treated theoretical literature, empirical literature and theoretical framework adopted for the research etc. Chapter three which is captioned methodology consists of the description of the study area, the sources and method of data collection, model specification and method of data analysis etc.

Chapter four which treats data presentation and analysis began with a graphical trend analysis depicting the trend of revenue and expenditure in Nigeria within the period of study. It also covers data presentation in the form of unit root test, Johansen Co-integration test, vector error correction mechanism and interpretation of the results. The last chapter, chapter five which is for summary conclusion and recommendations, centers on summary of major findings, conclusion and policy recommendations of the study.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents a conceptual review of government revenue and public expenditure. The chapter also reviewed literatures that have bearing on the research topic - relationship between government revenue and public expenditure in Nigeria (1961-2014). Under empirical literature review, attention was given to researches conducted in similar areas of interest, i.e. the impact of government revenue and public expenditure from different regions of the world. The theories underpinning the study are categorized under four major hypotheses which underscores the relevance of the various theories to the study of public finance in Nigeria. Based on the theoretical literature that were reviewed, a theoretical framework was adopted for this research as well as the gap in the literature that necessitates the present research.

2.1 Conceptual literature review

2.1.1 Government revenue

The Longman Dictionary of Contemporary English (1995), defines revenue as money or monies that a business, enterprise or an organization receives over a period of time especially from selling goods or services. It also described revenue as money that government received from tax. Advanced Learners Dictionary of Current English (1992), defines government revenue as the total annual income of the state collected for public use. It further described it as income, derived from taxation. Hepworth (1976) described revenue as an income or funds raised from the public by agents of government charged with this responsibility to meet the expenditure(s) of government to its citizens. He added further that revenue is raising resources needed to provide government services. He also stated that there are two aspect of finance – Income and Expenditure. In other words, the sources of fund and utilization. Fayemi (1991) defined revenue as all tools of income available to the government such as taxes, rates, fees, fines, duties, penalties, rents, dues, proceeds and other receipt of government to which the legislature has the power of appropriation. He further classified government revenue into two kinds – recurrent revenue and capital revenue.

From the viewpoint of national development, productive resources are broadly classified into natural, human, material, and financial. National resources refer to such endowment as land, water, etc., while human resources comprise the population, part of which constitute the labour force. Material resources, also referred to as capital, consist of

the stock of man-made equipment and machinery available to facilitate production in the economy. Financial resources relate to the monies mobilized or generated in the economy. The financial resources which accrue to the government constitute government revenue. Government revenue can therefore be defined as public receipts which the government through its tax agencies collects from all sources, except loans and borrowings (Ihimodu, 1995).

Traditional analyses of the structure of government revenue have generally proceeded along the lines of tax and non-tax revenue classifications which are consistent with budgetary and macroeconomic conventions. Due to the peculiarities of the Nigerian economy, the alternative classification, namely oil and non-oil revenue are being underscored. This latter categorization derives from the preponderance of oil revenues in government receipts. Oil has consistently accounted for over 80% of total government revenue and over 90% of foreign exchange earnings to Nigeria over the past four decades. Nonetheless, the observation that oil revenue is an integral part of tax revenue makes the traditional classification relevant to the present purpose although the second categorization would be useful at the level of decomposition (Adubi, Fajingbesi and Obioma, 1995).

2.1.2 Sources of revenue to federal government

According to Edogbanya (2013), the main sources of government revenue could be broadly classified as follows:

(i) **Petroleum profit tax:** This forms the major source of revenue to the Nigeria government. It is the revenue or income derived from crude oil which represents more that 75% of the source of revenue to the government of Nigeria, the excess proceed from crude oil are shared between the three tiers of government.

(ii) **Taxation:** Taxes are compulsory or non-voluntary payments made to the government by citizens as returns for the costs incurred in the provision of goods and services. This is also one of the important sources of government revenue. In a capitalist world like Europe, tax is the major source of their revenue. Unlike the developing countries like Nigeria, Ghana, Gambia where tax evasion and tax avoidance prevail. Therefore, tax does not form the major source of revenue to government. The tax includes – direct and indirect taxes.

(iii) **Administrative revenues**: These refer to receipts from licenses, fees, etc. Commercial receipts are monies collected as payment for government-produced

goods and services (user charges). Examples include hospital fees, education levies, water rates, etc.

(iv) **Rent, royalties and profit**: These are income derived from the use of government properties, profit from government business enterprises and income from mining right.

(v) **Fees, fines and specific charges:** These are incomes derived from payment for the use of government services like vehicle licenses, water rates, stamp duties, tax clearance etc. It is income generated by federal Inland Revenue department (FIRD).

(vi) **Grants:** grants refer to contributions made by one level of government to another, especially for specific purposes such as: provision of education, health care delivery, maintenance of roads, etc. These are income received in form of aid from other countries or from international organizations like the World Bank, IMF etc. Within a country, government may also receive grant from another government e.g. local government council receives grants from federal and state government. They also could be provided for specific reasons such as to correct differences in fiscal capacities among levels and units of government or to maintain standards. In most cases, grants flow from higher levels to lower levels of government

***** **Loans:** These are incomes generated by borrowing from private individuals or from foreign countries to finance projects.

Table 1: Functions and sources of revenue of the three tier of government

Government	Major functons	Sources of revenue
Federal Government	**Exclusive list** a. Accounts of the government of the federation b. Currency issue c. External affairs d. Defense and security **Concurrent List** a. Higher education b. Industrial development c. Agricultural development d. Road and health	1. Statutory allocation from the federal account 2. VAT 3. Independent revenue a. Personal income tax of armed forces personnel, the police, external affairs officers, FCT residents; b. Operating surpluses of parastatals c. Dividends from investments in publicly quoted companies d. Rents on government property e. Interest on loans to states and parastatals 4. Import duties 5. Excise duties 6. Export duties 7. Petroleum profit tax 8. License fee on radio/TV 9. Land registration/survey fee 10. Mining rents and royalties 11. Company income tax 12. Capital gain tax 13. Personal income tax (other than above)
State Government	1. Provision of Social Services – Education, health care, roads, water supply 2. Agricultural development 3. Industrial development	1. Statutory allocation from the federation account 2. VAT 3. Internally–generated revenue a. Personal income taxes from persons residents in the state; b. Fees for registration and licensing of vehicles; c. Charges related to land matters. 4. License fee on radio/TV 5. Motor vehicle/driver's license 6. Capital gain tax 7. Pools betting/others 8. Stamp duties 9. Entertainment tax
Local Government	1. Provision of public goods and services – primary school health care facilities, etc 2. Provision and maintenance of markets places, cemeteries, Homes	1. Statutory allocation from the federation account 2. VAT 3. Internally – generated revenue a. Property taxes; b. Licensing of bicycles, trucks (other than mechanically propelled trucks), canoes, wheel, etc 4. Entertainment tax 5. Pools betting/others

Source: *Revenue Allocation,. Mobilization and Fiscal Commission (RMFAC, 2010)*

For a lucid comprehension of the structure of federal government revenue and overall national revenue, it is useful to distinguish between a number of revenue concepts in Nigeria. According to the CBN (2014) these revenue types are: federally-collected revenue, federation account, independent revenue of the federal government and federal government retained revenue.

(i) Federally-collected revenue

Federally-collected revenues are those which fall within the federal government jurisdiction in terms of administration and collection. Items 4-7 alongside 10-13, of table 2.1 above fall within this category. But following from the problem of non-correspondence between revenue powers and fiscal responsibilities, as well as the attendant need for revenue sharing, the federal government does not have exclusive right over all the revenues it collects. It has to share some with the other levels of government. Those which are subject to sharing are pooled into the federation account (the erstwhile distributable pool account). The manner of sharing is determined by the prevailing revenue allocation formula at any point in time.

(ii) Independent revenues of the Federal Government

The Independent Revenues of the federal government are those it collects and has exclusive right to; these are not subject to intergovernmental sharing and do not pass through the federation account. They comprise revenue from interest payments, rents on government properties, personal income tax of armed forces, the police, external affairs officers and residents of the Federal Capital Territory.

(iii) Retained revenue of the Federal Government

The Retained Revenue of the federal government is the sum of its direct shares from the federation account, based on the allocation formula after all deductions for special funds and projects have been made; proceeds accruing to it from such special funds and projects which are first priority charges on the federation account; and its other independent revenue earnings.

2.2 Federal Government revenue structure since independence

2.2.1 Federal revenue structure 1970-1980

The rapid growth of petroleum revenue in the 1970s removed most of the severe constraints placed on federal and regional or state budgets in the 1960s. Total federal revenue grew from ₦612.88 million in 1966 to ₦7,791.0 million in 1977, a twenty-five fold

increase in current income in eleven years. Petroleum revenue as a %age of the total went from 26.3% in 1970 to more than 70% by 1974 to 1977. During the civil war, most of the twelve new states created in 1967 faced a revenue crisis. But a 1970 decree brought the states closer to fiscal parity by decreasing the producing state's share of export, import, and excise duties, and of mining rents and royalties, and by increasing the share allocated to all states and the federal government. Also, in 1973 the commodity export marketing boards, which had been a source of political power for the states, were brought under federal control. Other changes later in the 1970s further reduced claims to revenue based on place of origin. In the 1970s, the federal government was freed to distribute more to the states, thus strengthening federal power as well as the states' fiscal positions. Statutory appropriations from the federal government to the states, only about ₦128 million in fiscal year 1966, increased to ₦1,040 million in 1975 with the oil boom, but dropped to ₦502.2 million in 1976, as oil revenues declined (U.S Library of Congress 1991). The burgeoning revenues of the oil boom had encouraged profligacy among the federal ministries. Government deficits were a major factor in accelerated inflation in the late 1970s and the early 1980s (CBN, 2010).

2.2.2 Federal revenue structure 1980-1990

In 1978 the federal government, compelled to cut spending for the third plan, returned much of the financial responsibility for housing and primary education to state and local governments. Federal government finances especially drifted into acute disequilibrium between 1981 and 1983, at the end of President Shagari's civilian administration, with the 1983 federal government deficit rising to N5.3 billion (9.5 % of GDP) at the same time that external debt was increasing rapidly. The state governments' deficit compounded the problem, with the states collectively budgeting for a deficit of N6.8 billion in 1983 (CBN Annual Report, 2009).

Falling export prices caused the military governments between 1983 and 1988 to continue cutting real spending, especially for capital, imports, civil service and armed forces salaries and consumer subsidies. Many parastatals also had their subsidies cut, while others were sold off entirely. The result of these actions was a substantial reduction in the federal deficit. The announcement of the spending reductions that would be part of the fifth plan coincided with the military coup of August 1985. Unlike earlier plans, the fifth plan (put back to 1988-92 partly because of the coup) allocated the largest amounts of capital to agriculture and stressed the importance of private investment (CBN Annual Report, 2009).

In 1988 the federal budget was still highly dependent on oil revenues (taxes on petroleum profits, mining rents and royalties, and Nigerian National Petroleum Corporation earnings). Altogether, oil receipts accounted for 77 % of total federal current revenue in 1988. The federal government retained 62 % of the revenue it collected in 1988, while the rest of the funds were distributed to the state and local governments by a formula based on population, need, and, to a very limited extent, derivation. International aid designated for domestic Nigerian development constituted a minor source of government revenue (CBN Annual Report,2009).

In 1988 such official assistance amounted to US$408 million, or US$1.1 per capita, which placed Nigeria lowest among low-income and lower-middle-income aid recipients. This aid represented 0.4 % of Nigeria's GNP, far less than the average of 2.4 % received by all low-income countries, a group that included much states as China, India, and Zambia (U.S Library of Congress 1991).

2.2.3 Federal revenue structure 1990-2000

Nigeria's poor economic situation is further compounded by the near single source structure of its revenue earnings. Nigeria is one of the world's most striking examples of a mono-product economy. Conservatively, over 70% of the total earnings of Nigeria come from oil resources, signifying a high dependence on oil mineral resources for its survival. The consequence of this situation is that the entire operations of the governments depend on oil prices that are exogenously determined by international politics and market. The level of contribution of oil and non-oil revenues to total federally collected revenue from 1990 to 2000 has been given above (CBN Statistical Bulletin, 2009).

An analysis of the table shows that oil and non-oil revenues contributed an average of 77.74% and 22.26% respectively to total federally collected revenues between 1990 and 2000. To this extent, implementation of budgets of all levels of government in Nigeria gets distorted once there are negative signals and developments in the international market price of oil. But we can still remember fairly clearly, that in the past, agriculture formed the backbone of the Nigeria economy. Thus, apart from providing employment opportunities and incomes for the people, it was the major source of income and foreign exchange earnings for Nigeria before the discovery of crude oil. Indeed, Nigeria relied on earnings from the production and exportation of agricultural products and solid minerals such as palm produce, groundnuts, cocoa, coal, tin, bauxite, etc. to finance basic infrastructure, pay the cost of administration and other developmental projects. Today, the story is different, as

agricultural products for which Nigeria was known as the greatest world supplier, have descended to the rear in our list of foreign exchange earnings. Similarly, solid minerals in the country remain largely untapped and subjected to illegal mining. The coal and tin mines in Enugu and Jos respectively have been relegated and neglected because of oil (CBN Statistical Bulletin, 2009).

2.2.4 Federal sevenue structure 2000-2010

Between 2000 and 2009, the price of crude oil which has contributed about 80% of the country's GDP rose from $13 per barrel to a high of $125 per barrel. This also resulted in significant increase in revenue generated. The total oil revenue generated into the Federation Account from 2000 to 2009 amounted to N34.2 trillion while non-oil was N7.3 trillion, representing 82.36% and 17.64% respectively. The mean value of oil revenue for the 10 year period was N3.42 trillion compared to non-oil revenue at N732.2 billion (CBN Statistical Bulletin, 2009).

At 7,303.7 billion naira, or 24.8 per cent of GDP, the federally-collected revenue (gross) grew by 50.8 per cent above the level in 2009. The development was attributed to enhanced receipts from oil and non-oil sources. The impressive oil receipts reflected improved domestic oil production, sustained demand and favourable prices in the international market. Similarly, non-oil revenue rose by 15.4 per cent above the level in the preceding year to 1,907.6 billion naira, or 6.5 per cent of GDP (CBN Annual Report, 2010).

The sum of 3,865.9 billion naira was transferred to the Federation Account in 2010, indicating an increase of 36.5 per cent above the level in the preceding year. In order to stimulate economic recovery, the amount was augmented with substantial drawdown on the excess crude account. Thus, the total distributable revenue to the three tiers of government amounted to 5,231.2 billion naira and was added as follows: Federal Government, including Special Funds, 2,335.0 billion naira: state governments, 1,241.8 billion naira: local governments, 1,086.6 billion and 13% Derivation Fund amounting to 567.8 billion naira. Similarly, the VAT revenue of 540.3 billion naira was shared among the federal, state and local governments in the ratios of 15.50 and 35 per cent, respectively (CBN Annual Report, 2010).

The fiscal operation of the Federal Government was implemented under the revised Medium Term Fiscal Framework (MTFF) which incorporated elements of performance based budgeting. At 3,089.2 billion naira, the Federal Government-retained revenue rose by 16.9 per cent, while aggregate expenditure was 4,194.6 billion naira. The fiscal operations of the Federal Government resulted in an overall notional deficit of 1,105.4 billion naira, or

3.7 per cent of GDP. Provisional data on state government finances indicated an overall deficit of 132.1 billion naira, or 0.4 per cent of GDP, while that of the local government revealed a surplus of 2.5 billion naira, or 0.01 per cent of GDP (CBN Annual Report, 2010).

2.3 Taxation and revenue structure in Nigeria

Over the last three decades, the sources of public revenue in Nigeria are proceeds from the sale of crude oil, taxes, levies, fines, tolls, penalties and charges. Oil revenues are the main source of public revenue, accounting for about 80% to 85% of the total government revenue (AfDB, UNECA, and OECD 2010). In the period 2001-2009, oil revenues averaged 27% of GDP while tax revenues averaged 6.4%. Oil revenues have been volatile, ranging from 35.6% in 2001 to 19.6% in 2009 when oil prices dropped as a result of the global recession. In Africa, Nigeria like Algeria, Angola, Equatorial Guinea and Libya, rely almost entirely on one single type of tax, unlike Kenya, South Africa and Mauritania show a relatively balanced mix of different types of taxes.

One major characteristics of federalism is the constitutional separation of powers among the various levels of government. Drawing upon the reports of the various commissions and revisions to previous constitutions, Section 4 (second schedule) of the 1989 Constitution of the Federal Republic of Nigeria (FGN, 1989) specified three categories of legislative functions. The first is the exclusive legislative list on which only the federal government can act. The second is the concurrent legislative list on which both the federal and the state governments can act, and the third comprise residual functions consisting of any matter not included in the above first two lists. Of direct relevance to this study is the assignment of tax powers among the three tiers of government in Nigeria.

In Nigeria, two major factors influence the assignment of tax powers or jurisdiction among the three tiers of government. These are administrative efficiency and fiscal independence. The efficiency criterion requires that a tax be assigned to the level of government that is most capable of administering it as efficiently as possible. Fiscal independence on the other hand requires that each level of government should, as far as possible, be able to raise adequate funds from the revenue sources assigned in order to meet its needs and responsibilities. Very often the efficiency criterion tends to conflict with the principle of fiscal independence. The former entails a great deal of centralization or concentration of tax powers at the higher level of government, due to the limited administrative capacity of lower levels of government. Conversely, the latter requires the devolution of more tax powers to the lower levels of government to match the functions

constitutionally assigned to them. In the Nigerian context, the scale has always been tilted in favour of the efficiency criterion.

The first Fiscal Commission in Nigeria (Phillipson, 1946) set very stringent conditions for declaring any revenue source as regional. It required revenue or taxes to be local in character for easy assessment and collection, to be regionally identifiable, and in general to have no implication for national policy. Given such above conditions, very few revenue heads (taxes) could be considered as regional and assignable to either the state or the local government levels. There is also a distinction between the ability to legislate on a particular tax and the ability to collect a particular tax. The two powers can reside with the same level of government or be separated. Available evidence from the current jurisdictional arrangement suggests that both types exist in Nigeria. Evidence will be provided in tabular form to show that all the major sources of revenue are left solely to the federal government in both respects. They include import duties, excise duties, export duties, mining rents and royalties, petroleum profit tax, and company income tax. This in part may be attributable to the bias or preference for the efficiency criterion noted earlier.

The principal tax with shared jurisdiction is the personal income tax on which the Federal Government of Nigeria legislates. In terms of its administration, the federal government collects the personal income tax of armed forces personnel and the judiciary. Each state government administers and collects personal income tax from other categories of residents in its territory. Capital gains tax is also under shared jurisdiction in which the federal government of Nigeria legislates while state governments collect the tax. Given the preference for the efficiency criterion, the state and local governments have jurisdiction over minor, low-yielding revenue sources. For example, state governments have jurisdiction over football pools and other betting taxes, motor vehicle and drivers' license fees, personal income tax (excluding the judiciary and the military), and sales tax. Local governments administer entertainment tax, radio and TV licensing, motor park fees and the potentially buoyant property tax (RMFAC, 2010).

2.4 The oil sector and the Nigerian economy

The volatility and instability in crude oil production in Nigeria and fluctuations in international oil price has brought to the front burner fears and anxieties about the future of the oil sector in the Nigerian economy. In the first quarter of 2014, the contribution of this all-important sector as a percentage of the nation's Gross Domestic Product (GDP) was put at about 14.75%, compared to 15.80% in the corresponding period in 2013 (National

Bureau of Statistics (NBS, 2014). Similarly, according to the Nigerian National Petroleum Corporation (NNPC, 2014), average daily production of crude oil was 2.29 million barrels per day (mbpd) in the first quarter, as against 2.35 mbpd in the corresponding quarter in 2013. Average daily crude oil production is less than the projected 2.53 mbpd on which the 2014 federal government budget estimates are based. In terms of growth, oil sector GDP (with associated gas components) grew at 0.74 in the first quarter of 2014. The non-oil sector on the other hand remaind a major driver of the economy, recording 7.89% growth in real terms in the same period (NBS, 2014).

The Nigerian economy as championed by the oil sector has bedeviled by diverse challenges and obstacles over the years. The sector has witnessed disruptions in recent times due to pipeline vandalization, incidents of illegal bunkering and theft of crude by militants in the oil rich Delta. These have resulted in incessant declarations of force majeure by some International Oil Companies (IOCs) such as Exxon-Mobil, Agip, Total and Royal Dutch Shell etc. Estimates of revenue loss due to oil theft and vandalization of oil facilities are about $1.23billion in the first quarter of 2013 alone (NNPC, 2014). The federal government has in several global fora and meetings sought global assistance in clampdown and actions on illicit trade in stolen crude as an antidote to oil theft. Furthermore, there is also apparent lethargy on the part of international oil companies in embarking on new investments in the country, especially in deepwater exploration as a result of uncertainties and the delayed enactment of the Petroleum Industry Bill (PIB). These somewhat less than favourable, unsavoury and gloomy scenarios together with the energy policies of the United States and the Republic of China have reinforced concerns about the long-term future of the oil sector in Nigeria and the country's near-total reliance on proceeds from oil (Uzor, 2013).

It is glaring to note that the Nigerian economy's near total dependence on oil has dire implications for the economy (Emmanuel, 2004, Gary and Karl, 1997, Sampson, 2003). To buttress this point, in 2013, the stock of the nation's external reserves and Excess Crude Account experienced severe decline as a result of fluctuations in the price and quantity of oil. According to the CBN report (2014), it was revealed that the gross external reserves as at December 31, 2013 stood at US$42.85 billion, representing a decrease of US$0.98 billion or 2.23% compared with US$43.83 billion at end-December, 2012. The excess crude account (ECA) also declined within this period. Earlier in the first quarter of 2013, external reserves had climbed to its highest level in more than four years, hitting around US$48.57 billion in May (CBN, 2014). The drop in both the stock of external reserves and the ECA

are as a result of a number of factors. First was the slowdown in foreign inflows i.e. Portfolio and Direct Foreign Investments (FDIs) flows in the fourth quarter 2013, which prompted increased funding of the foreign exchange market by the CBN to stabilize the nation's currency. Secondly, there was a drop in oil revenue inflow owing to decline in oil output – due to oil theft and pipelines vandalism by militants and agitators in the Niger-Delta region at various times in 2013 which resulted in the loss of about 300,000 – 400,000 barrels per day (NNPC, 2014). This 'quantity shock' led to depletion in both accounts – the external reserves and the ECA. While the ECA and external reserves were getting depleted, the nation's stock of public debt was on the increase all through 2013. Indeed, according to the Debt Management Office (DMO, 2014), Nigeria's total public debt stood at N10.04 trillion which is the equivalent to US$64.51 billion as at end December, 2013 – with the domestic debt standing at N8.67 trillion (US$55.69billion) – representing 86.32 % of the total debt.

It should be noted that the Nigerian economy has for the most times been unstable, a consequence of the heavy and continued dependence on oil revenue with the attendant volatility in prices. The oil boom of the 1970s led to the neglect of agriculture and other non-oil sectors, expansion of the public sector, and deterioration in financial discipline and accountability. The consequence of Nigeria's dependence on oil is her continued exposure to oil price volatility which most times threw the country's public finance into disarray. According to Sala-Martin and Subramanian (2013), waste and 'Dutch disease' manifesting in rapid capital accumulation and negative Total Factor Productivity (TFP) characterized Nigeria's 54 year post-independence development experience. While capacity utilization averaged about 77 % in 1975, it had gone down to about 50 % in 1983 and until very recently has languished at about 35 % since the mid 1980s till date.

The Nigerian economy no doubt is intricately interlinked with the oil sector and this fact remains very obvious. Crude oil receipts account for about 80% of total government revenue accruable to the federation account, 95 % of foreign exchange earnings, about 15 % to the country's GDP (14.85 % in the first quarter of 2014), and 4 % of total employment – thus making Nigeria one of the most oil-dependent economies in the world (Sampson, 2013). Consequently, any major shock in the international commodities market negatively affects Nigeria as an economy. This adverse effects was evident during the global economic and financial meltdown when crude oil prices crashed from its record high of $147.50 per barrel in July 2008 to a paltry $40 per barrel in December 2008. Certainly, but for the

Excess Crude Account (ECA) that became handy as a fiscal buffer for the economy, the consequences of total dependence on oil earnings would have been devastating.

The upside of the oil sector notwithstanding, the emphasis of the sector at the expense of other critical sectors of the Nigerian economy has been blamed for the abysmal performance and retarded growth of other sectors notably the real sector of the economy (Ehwarieme, 1999). Prior to the discovery of crude oil in commercial quantity in the country, agriculture was the major source of foreign exchange. The groundnut pyramids of the Northern region, cocoa farms of the Western region and palm plantations of Eastern Nigeria were the major sources of foreign exchange that sustained these respective regions (Taiwo, 1999; Vincent, 2001; Teriba, 1999; Sala-Martin and Subramanian, 2013). The story of Malaysian farmers who visisted Nigeira to learn the rudiments of palm cultivation in Nigeria but now exporting palm produce to Nigeria underscores the neglect that Agriculture has suffered. This all-important sector of the economy, suffered accumulated neglects from successive administrations since 1970 when crude oil revenue took the front burner in government revenue derive. It is unfortunate that Malaysia, a nation which got its seedlings of palm production from Nigeria has become the envy of the world in palm produce exports. Records have it that Malaysia for now is the world's largest producer of oil palm and the commodity is currently the country's leading agricultural export. This is evident in the pace of her rapid economic transformation. Meanwhile, Nigeria is still a net importer of food, including staples, despite having about 75 % arable land of which over 50 % is not cultivated, primarily due to the neglect and the non-challant attitude the populace has given to the sector (World Bank, 2005, 2006).

The manufacturing sector has neither fared better since Nigeria joined the 'elite league' of petro-dollar countries. The sector has been performing below expectations despite the preponderance of incentive packages and government policies geared towards growing it. Several studies have established a correlation between the decline in manufacturing and the discovery of crude oil in the country since the late 1950s (Emmanuel, 2004). It has been argued that the manufacturing sector has been ensnarled by the infamous resource curse or Dutch disease with attendant under-capacity utilization (Gravin and Hausmann, 1998). The oil sector has not broadened the productive base of the economy and has not alleviated the unemployment situation in the country because it is not a labour-intensive industry. Furthermore, the oil sector has not contributed much to alleviating unemployment in the country because of the inefficiency and lack of

transparency that has characterized its operations over the years. For instance, the various by-products that comes from processing the crude which ordinarly should have served as input for other industries is not accounted for. This is not unconnected with the fact that the refining process most times takes place beyond the shores of this country, hence no proper accountability is rendered. Although Nigeria's export trade is still tilted in favour of crude oil, recent trade figures indicate improvement in non-oil exports. According to the data from the National Bureau for Statistics (2013), non-oil export rose by 25.5 % between 2011 and 2012, while the contribution of oil to total trade decreased from 71.7 % in 2011 to 69.2 % in 2012. Statistics from the Central Bank of Nigeria (2013) also reveals that between 2009 and 2012, the non-oil export industry grew at an average rate of about 23 % annually. The trend is a noticeable departure from the past when crude oil export accounted for over 90 % of the country's total exports. These developments suggest that the strategic programmes and policies of the Ministry of Industry, Trade and Investment to promote the development of the non-oil export sector and diversify the export base of the economy are beginning to yield results. The high incidence of unrecorded exports is still a challenge to the non-oil sector and this has affected accurate reporting of the performance of the sector. The non-oil sector is however still dominated by raw commodities and few products with little value addition to the economy, as most of the yields are exported in their raw form because of the unavailability of industries to process them.

In the midst of Nigeria's internal challenges and upheavals that have culminated in reduce crude oil production, major agencies have cut their forecast for crude oil demand for 2014 (Hitchens, 2013). The downgrade in oil demand in 2014 is symptomatic of continuous unease about the challenges to the world economic recovery and the fragility of the euro-zone economies. Inspite of some positive developments, there is still pessimism over the global economic outlook, with downside risks continuing to be presented by the sovereign debt crisis in the euro-zone which could negatively impact demand for crude oil in 2014. The Organization of Petroleum Exporting Countries (OPEC) in April 2014 trimmed its forecast for global growth in oil demand in 2014 for the second time in two months. OPEC now expects that world oil demand will rise by 800,000 barrels per day (bpd) in 2014, a cut of 40,000 bpd from its previous estimate after disappointing consumption in industrialized countries in the first quarter of the year.

The 12-member OPEC cartel cited on-going bottlenecks and challenges to the world economic recovery, especially in Europe, as posing considerable uncertainties for product

demand. In March 2014, OPEC, which produces more than one in three barrels of global crude oil consumption each day reduced its overall demand numbers for crude oil by 10,000bpd. In a similar vein, the International Energy Agency (IEA) and the US Energy Informational Administration (EIA, 2013) have also reduced their forecasts for global oil demand for a third consecutive month, predicting the weakest consumption in Europe in almost three decades. The IEA cut its estimate by 45,000bpd, hoping that world crude oil consumption will increase by a subdued 795,000 barrels a day, or 0.9 % to 90.58 million barrels a day in 2014. On its part, the US Energy Information Administration (EIA) cuts its world oil demand forecast for 2014 by 50,000 bpd to 960,000 bpd.

The reduction in forecast for oil demand for 2014 is a worrisome development for Nigeria. Nigeria's crude oil production has declined consistently since December 2013 and was 1,940 bpd in April 2013 according to OPEC data, less than 2.53 mbpd estimated in the 2014 federal government budget. Although crude oil price is still well above the $79 per barrel budget benchmark, continuous weaker-than-expected crude oil demand could culminate in sharp decline in price. If this pessimistic scenario crystallizes, implementation of the 2014 budget will be in serious jeopardy with far reaching implication for the budget of the three tiers of government in Nigeria which depends largely on proceeds from the Federation Account.

It should be recalled that Nigeria has for long been the highest producer of crude oil on the African continent. However, there are threats to this decades-long dominance as some African countries are stepping up oil production and new discoveries of crude oil reserves in countries which hitherto were not members of the 'elite league' of oil producing countries. For instance, Ghana–West Africa's second biggest economy is now an oil producing country and it expects production to more than double by 2021 as output rises at is Jubilee field and as other sites commences production (OPEC, 2013). The country also has new crude discoveries at different stages of appraisal and development. The return of normalcy in North Africa after the Arab Spring has also resulted in improved crude oil production in the region especially in Algeria and Libya. Libya for instance is signing a peace pact that would lead to the formation of a government of national unity. Once this feat is achieved, crude oil production would drastically improve.

However, the most important threat to Nigeria's dominance is Angola. Angola has twice upstaged Nigeria from her decades-long perch as Africa's largest crude oil producer, first in April 2008 and secondly between May and October 2009. Although these periods

coincided with decline in Nigeria's crude oil production due to agitations in the oil-rich Niger-Delta region by militant group, the difference between Nigeria and Angola's production now stands at just 170,000 barrels per day. There is also noticeable preference for Angola as the choice destination for fresh investments by some International Oil Companies (IOCs). This development has elicited fears that Nigeria could permanently lose its position as the continent's top crude oil producer, a position held since the 1970s. Nigeria's proven crude oil reserves has remained at 37.2 billion barrels as at end 2011, representing 28.7 % of Africa's total proven reserves of 128,578 billion barrels, according to the 2013 OPEC Annual Statistical Bulletin. Nigeria's proven crude oil reserves ranks as second largest in Africa after Libya's which stood at 48.01 billion barrels as at end 2012.

Algeria with 12.2 billion barrels occupies the third spot in proven crude oil reserves while Angola, Nigeria's main rival in terms of production in the continent ranks fourth with 10.47 billion barrels. The OPEC Annual Statistical Bulletin (2013) also shows that Sudan holds the continent's fifth proven reserves with 6.7 billion barrels while Egypt has the sixth largest reserves with 4.5 billion barrels. Gabon occupies the seventh position with 2 billion barrels, while other African crude oil producers cummulatively have approximately 7.5 billion barrels in crude oil reserves. While some African countries have had accretion to their proven crude oil reserves, Nigeria's proven reserves have remained stagnant at 37.2 billion barrels since 2006, a development that is symptomatic of lack of new crude oil discoveries. This state of affairs may not be unconnected with somewhat opaque regulatory environment in the oil and gas industry in Nigeria over the years. The situation has been compounded by the non-passage of the Petroleum Industry Bill (PIB) which is intended to provide a level playing field for the operators in the oil and gas industry, the oil host communities, the government and other stakeholders in the industry.

The much awaited Petroleum Industry Bill (PIB) is presently before the National Assembly for consideration and passage into law. The PIB was first presented to the Sixth National Assembly in 2009 but it was not passed into law before the expiration of that assembly probably due to some vested interests from both divides. The bill is adjudged to be one of the most profound legislations in the history of Nigeria and the oil sector due to the importance and critical role the sector plays in the economy. Although Nigeria's upstream oil sector ranks as one of the most developed in the continent, it is yet to attain its full potentials. The PIB is expected to herald a new fiscal regime for the sustainable development of the oil sector and improved revenue for the country. As expected, the PIB

has elicited reactions from several stakeholders. While it has received groundswell of support from some quarters, others contend that it is not an all-purpose elixir that will address all the challenges of the oil sector. For instance, the International Monetary Fund (IMF) has canvassed for the early passage of the PIB to no avail as one administration to the other has not muscled the political will to see to its enactment into law.

The IMF reckons that the bill would boost investment, government revenue and fiscal transparency. International Oil Companies (IOC) on the other hand have contended that the proposed higher taxes in the PIB would make exploration of oil and gas uneconomical and less profitable in the country. They maintained that the bill will make Nigeria's Production Sharing Contract (PSC) regime among the harshest in the world. The IOCs consider the PIB as extremely unfavourable and punitive towards them and this have somewhat discouragement new entrants into the petroleum industry hence no new investments are being made. It is estimated that about $50billion worth of planned investment, particularly in deepwater explorations is on hold and could be imperiled if the controversies surrounding the bill are not quickly addressed and the bill passed into law (NNPC, 2013).

As the PIB debate rages, it is pertinent to note that the legislation is not all about higher taxes and royalties payable by IOCs, and instituting a Petroleum Host Communities Fund (PHC-Fund). The bill also among other issues seeks to make some profound changes in the oil sector by restructuring and improving the measurement of Nigeria's oil resources; providing for the dismantling and unbundling of the state-owned oil corporation-the Nigeria National Petroleum Corporation (NNPC) into nine commercially viable and profit driven agencies that do not rely on government subsides. The nine agencies will comprise two regulatory agencies, three funds, three commercial companies and one technical and support bureau. The NNPC would be restructured to operate in tandem with Saudi Arabia's Aramco, Malaysia's Petronas and Brazil's Petrobras with enhanced corporate governance. The PIB also provides for the delisting of the NNPC from the Public Enterprises Privatization and Commercialization Act. The bill also requires the government to divest up to thirty % and forty nine % of the authorized shares of the National Oil Company and the National Gas Company respectively to the public in an open and transparent manner on the Nigerian Stock Exchange. The bill seeks to optimize domestic gas supplies, particularly for power generation and industrial development, and encourage domestic refining of crude oil (PIB, 2012).

Furthermore, to reinforce our call for quick diversification of the Nigerian economy away from oil, it is important to review emerging threats arising from impending paradigm shifts in energy policies of two of the world most strongest and largest economies-the United States and China. Indeed, development in energy policies of these two giants is of strategic importance to Nigeria as discountenancing them is to our peril as a nation because of the large volume of crude oil consumption these two nations take. The United States was until recently the largest importer of the country's crude oil- a position that China has currently taken. Therefore, any major shift in energy consumption by any of these countries could have catastrophic economic consequences for Nigeria and other oil producing countries in the continent and beyond.

2.4.1 Emerging threats to Nigeria's oil dependency- United States and Chinese energy policies

The United States at present is vigorously pursuing an energy policy which seeks to move the country away from importation of crude oil from Middle East and Africa towards attaining energy independence and self-sufficiency. The United States is projected to become the world's largest producer of crude oil and other liquid fuels by 2020 and will be entirely self-sufficient by 2030, and a net exporter by 2035 according to some estimates (EIA, 2014). The international Energy Administration (IEA, 2013) believes that all things being equal, the United States will become the world's largest oil producer by 2017, overtaking current leaders Saudi Arabia and Russia. According to Powell (2013), by 2017 the US would no longer need to buy oil from any source but Canada its immediate neighbor and ally. The quest for US energy independence has been bolstered by new drilling techniques and technology-horizontal drilling and hydraulic fracturing (Hitchens, 2013).

Another major development recently in the global energy market is the move by China (the second largest oil-consuming nation on the earth) to commence production of shale oil (Powell, 2013). The imminent commencement of shale oil exploration in China has sent shock waves around the global energy market. In fact China's attempt at shale oil production if attained will virtually cripple crude oil sales from many oil producing nations of the world, and the hegemony of OPEC would finally be laid to rest. This is because, studies have it that China is estimated to have roughly 240 billion tons of accessible oil shale reserves. Acoording to estimates by the Organization of Petroleum Exporting Countries (2013), about 10 million tons of oil can be produced from these reserves annually. In obvious panic, OPEC has constituted a committee to study the likely impacts of the shale

oil exploration on the price of oil in the international commodities market and the likely economic impacts on oil producing countries. Although shale oil extraction is more costly than the production of conventional crude oil, it is nonetheless a substitute for conventional crude oil. There are also concerns about the environmental impact of shale oil production but this also is unlikely to deter China as the country is determined to embark on the project. For China, developing indigenous energy is a high priority as her continuous reliance on oil imports somewhat ties its prosperity to political turmoil in the Middle East, and Africa. China also reckons that for strategic national interest, it is expedient to limit its energy needs from sources susceptible to interdiction and disruption (Agbaeze, E.K., Udeh, S.N., and Onwuka, I.O. (2015)

Should these ambitious projections in the United States and China crystallize, Nigeria and a host of other countries that export crude to the US and China would have to look for markets elsewhere to sale their crude. This could have grave consequences for the price of crude oil and it is feared that some oil producing countries could face the threat of becoming failed states in the process as they will find it extremely difficult to meet their basic obligations even to the citizenry (Herbstt, 2013). The United States has been the largest importer of Nigeria's crude oil over the years but this is changing very fast. In the last decade, Nigeria accounted for between 9 and 11 % of US total crude oil imports. However, Nigeria crude oil has recently dropped to below 5 % share of total US crude imports. According to US Energy information Administration (EIA, 2013) data, over the past five years the United States' reliance on Nigerian crude imports has dropped 63 %, falling from a peak of 1.084 million barrels per day in 2007 to just 405,000 barrels per day in 2012. This said development is not unconnected with U.S. discovery of shale oil and its large reserves accumulated over the years.

This shocking but evident development underscores the need for the country to engage in strategic thinking aimed at quickly decoupling its revenue earnings exclusively away from oil to other non-oil sectors. The time to act is now, if we as a nation do not want to be completely enmeshed in an inevitable economic misery that will confine us to a position least imagine before.

2.5 Public expenditure

Government expenditures are the expenses which government incurs for the maintenance of the government and the society in general (Oriakhi, 2004). Government expenditures are the expenses the government incurs in carrying out its programmes (Okoh,

2008). According to Anyanwu (1997), government expenditure involves all the expenses which the public sector incurs for its maintenance for the benefit of the economy. The Longman Dictionary of Contemporary English (2003), defines expenditure as "the total amount of money that a government, organisation, or person spends during a particular period of time". It sees public expenditure as "the amount of money a government spends on services for the public". It is necessary to net out payments by one level of government to another, for example central government grants to local authorities. Government expenditure consists of spending on real goods and services purchased from outside suppliers; spending on employment in state services such as administration, defence and education; spending on transfer payments to pensioners, the unemployed and the disabled; spending on subsidies and grants to industry; and payment of debt interest (Black, 2002).

Classical economists did not analyse in-depth the effectis of public expenditure, for public expenditure throughout the nineteenth century was very small owing to the very restricted government activities. The governments followed laissez-faire economic policies and their functions were only confined to defend the country from foreign aggression and to maintain law and order within their territories. But now, the expenditure of government all over the world have greatly increased. Therefore, the modern economists have started analyzing the effects of public expenditure on production, distribution and the levels of income and employment in the economy (Ahuja, 2010).

Through the macroeonomic theory advanced by J.M. Keynes, the role of public expenditure in the determination of level of income and its distribution is now well recognized. Keynesian macroeconomics provides a theoretical basis for recent developments in public expenditure programmes in the developed countries. The public expenditure can be used as a lever to raise aggregate demand and thereby to get the economy out of recession. On the other hand, through variation in public expenditure, aggregate demand can be managed to check inflation in the economy. Public expenditure can also be used to improve income distribution, to direct the allocation of resources in the desired lines and to influence the composition of national product. In the developing countries also, the role of public expenditure is highly significant. In the developing countries, the variation in public expenditure is not only to ensure economic stability but also to generate and accelerate economic growth and to promote employment opportunities. The public expenditure policy in developing countries also plays a useful role in alleviating mass poverty existing in them and to reduce inequalities in income distribution (Keynes, 1936).

2.5.1 Classification of public expenditure

According to Ahuja (2010), the main sources of government revenue could be broadly classified as follows:

(a) Recurrent expenditure and capital expenditure

Firstly, recurrent expenditure is a current or consumption expenditure. These are generally spending on services, to maintain the existing facilities in the economy, including wages and salaries, maintenance of social services, and security incurred on civil administration (i.e. police, jails and judiciary), defence forces, public health and education. This revenue expenditure is of recurrent type which is incurred year after year. On the other hand, capital expenditure is incurred on building durable assets. It is a non-recurring type of expenditure. This includes all investment in infrastructural projects, i.e. physical assets that are for long term purpose, mainly to improve the living condition of the citizens. Expenditure incurred on building multipurpose river projects, highways, steel plants etc., and buying machinery and equipment includes housing, road construction, agriculture and water resources. These are generally productive investment.

(b) Transfer payments and expenditure on goods and services

Another useful classification of public expenditure divides it into transfer payments and non-transfer payments. Transfer payments refer to those kinds of expenditure against which there is no corresponding transfer of real resources (i.e. goods and services) to the government. Expenditures incurred on old-age pensions, unemployment allowance, sickness benefits, interest on public debt during a year etc., are examples of transfer payments because the government does not get any service or goods against them in the particular year. On the other hand, expenditure incurred on buying or using goods and services is a non-transfer payment as against such an expenditure, the government receives goods or services. It is therefore called expenditure on goods and services. It may be noted that expenditure on defence, education, health etc., are non-transfer expenditure as in return for these. Government obtains the services of army personnel, teachers, doctors etc., as well as some goods or equipments used in these activities. Investment expenditure is undoubtedly a non-transfer expenditure as through it government obtains capital goods. It is worthwhile to mention that whereas in case of transfer payments, it is the beneficiaries that decides about the use of resources, in the case of non-transferable

type of expenditure, the government itself decides about the use of real resources, especially whether they are to be used for consumption or investment purposes.

(c) Developmental and non-developmental expenditure

Another useful classification of public expenditure rests on whether a particular expenditure by the government promotes development. All those expenditures of government which promote economic growth are called developmental expenditure. Expenditure on irrigation projects, flood control measures, transport and communication, capital formation in agricultural and industrial sectors are described as developmental. On the other hand, expenditure on defence, civil administration (i.e. police, jails and judiciary), interest on public debt etc., are put into the category of non-developmental expenditure. It may be noted that, till recently, expenditure on education and health were regarded as non-developmental type. It has now been realized that the expenditure on education and public health promotes the growth of what is called human capital which promotes economic growth as much as physical capital, if not more.

2.5.2 Growth of public expenditure

Public Expenditure has phenomenally increased all the world over. A pertinent question is, what are the causes of this phenomenal growth in public expenditure. Two laws about the growth of public expenditure are:

(i) Wagner's law of increasing state activity: According to Wagner (1978), there are inherent tendencies for the activities of government to increase both extensively and intensively. In other words, according to this law, as an economy develops over time, the activities or functions of the government increases. With the development of the economy, new functions and activities are undertaken by the government and old functions are performed more thoroughly. The expansion in the government functions and activities lead to the increase in public expenditure. Though Wagner based his law on the historical evidence drawn from economic growth of Germany, this applies equally to other countries, both developed and developing ones.

(ii) Wiseman-Peacock hypothesis: The second hypothesis about the growth of public expenditure has been put forward by Wiseman and Peacock in their study of public expenditure of U.K. According to this Wiseman-Peacock hypothesis, government

expenditure does not increase at a steady rate continuously but in jerks and step-like manner. However, according to Ahuja (2010), both these factors, one making for a continuous increase in government activity and consequently public expenditure as emphasized by Wagner and others like war and depression causing the public expenditure to rise by jerks as emphasized by Wiseman and Peacock have been responsible for the enormous increase in public expenditure.

2.5.3 Factors responsible for growth in public expenditure

(i) **Defence**: An important factor responsible for growth in public expenditure is the mounting defence expenditure incurred by countries all over the world. It is not only during actual wars that defence expenditure has been rising but even during peace time as the countries have to remain in the state of military preparedness demanding large defence expenditure. There is arms race going on between countries. A poor country like Nigeria which is currently faced with insecurity has to safeguard its territories and this involves a lot of expenditure on building up efficient and adequate armed forces. Internally also, in view of the threat posed by the dreaded Boko Haram sect, the threat to oil facilities in the Niger-Delta by militants and other milita organisations like the O'odua Peoples Congress (OPC), the Movement for the Actualization of the Soveriegn State of Biafra (MASSOB) etc, lot of expenditure has to be incurred on maintaining internal security.

(ii) Population growth and urbanization: Population growth rate is quantitatively measured as the %age yearly net relative increase (or decrease, in which case it is negative) in population size due to natural increase and net international migration (Todaro and Smith, 2006). Urbanization, simply defined, is the shift from a rural to an urban society, and involves an increase in the number of- people in urban areas during a particular year. Urbanization is the outcome of social, economic and political developments that lead to urban concentration and growth of large cities, changes in land use and transformation from rural to metropolitan pattern of organization and governance (Nsiah-Gyabaah, 2000).

These two factors have been a reason for increase in the growth of public expenditure over the years. The scale of government activities such as providing education, public health, roads and transport facilities has to increase in harmony with the growth of population. With the progress of the economy and the growth of

population, the extent of urbanization increases hence increase in public expenditure.

(iii) **Activities of a welfare state:** The government activities and functions have been increasing due to the change in the nature of state. The modern states are no longer 'Police States' concerned mainly with the maintenance of law and order. They have now become 'Welfare States', which provides for social insurance of its citizens against old age, sickness, unemployment etc. The modern government have therefore to incur a lot of expenditure on social security measures such as old age pensions, unemployment allowances, sickness benefits.

(iv) **Maintaining economic stability:** As pointed out by Wagner (1978), state functions increase with the advancement and progress of the economy. In the nineteenth and early twentieth century, the government followed laissez-faire policy. Now, the need for active intervention of the government has been increasingly felt. According to Keynes (1936), the working of free-market mechanism does not ensure economic stability at full employment level. Lapses from full employment or depressions are caused by deficiency of aggregate demand due to the slackened private investment activity. In order to compensate for this shortfall in private investment, the government has to step up its expenditure on public works. The increase in government expenditure raises aggregate demand through the working of what Keynes has called income multiplier. This helps to push the economy out of depression and to raise levels of income and employment. This compensatory fiscal policy is being followed by all the world over, since achievement of full employment and maintenance of economic stability has become an important objective of the government.

(v) **Mounting debt service charges:** The government in all developing countries (including Nigeria) has been borrowing heavily in recent years to finance their increasing activities. Not only the debt money has to be paid back when it matures, interest payments have also to be made annually to the creditors. These debt service charges have resulted in enormous increase in public expenditure. The Nigerian government has not only been borrowing from within the country but also from abroad through foreign aid or commercial loans from private capital markets to finance her development plans. It has been estimated in the 2015 fiscal budget alone

that the sum of N953,620 Billion, representing 26.47% of the budget has been earmarked for debt servicing for the 2015 fiscal year (Vanguard, 5th March, 2015).

(vi) Mounting expenditure on subsidies: Governments, both in the developed and developing countries incur a lot of expenditure on subsidies to the various sections of population. The Nigerian government has been providing subsidies

2.6 Structure and patterns of federal government expenditure in Nigeria

Traditionally, public expenditures are often categorized into two, namely, recurrent and capital expenditures to reflect the organizational structure and the role of the different tiers of government in the planning and budgeting processes. These categorization also comes up as a basis for legislative oversight and a source of information about the end uses of each unit expenditure. Recurrent expenditures include all consumption items like salaries and wages, while capital expenditures comprise all expenses which contribute to long-term development such as spending on social and economic infrastructures. Government expenditure items, whether recurrent or capital, are usually classified into four major groups, namely: administration, economic services, social and community services, and transfers. This is to make clear distinction between "productive" and "unproductive" spending, as second and third categories are considered as more "productive" than the others (Akpan, 2005).

2.7 Empirical literature

Several studies have been conducted on the relationship between government revenue and public revenue in many countries including Nigeria. Among them are the studies conducted by Anderson, Wallace and Warner (1986), Furstenberg, Von and Jin (1986), Miller and Russek (1990), Hondroyiannis and Papapetrous (1996), Hassan and Lincoln (1997), Maghyereh and Sweidan (2004), Narayan (2005), Barua (2005), Khalid (2010), Yaya (2009), Hong (2009), Zapf and Payne (2009), Gil-Alana (2009), Afonso and Rault (2009), Stallman and Deller (2010), Wolde-Rufael (2008), Emelogu and Uche (2010), Aregbeyen and Mohammed (2012), Obioma and Ozughalu (2014), Ogujiuba and Abraham (2012).

Anderson, Wallace and Warner (1986) investigates the relationship between government revenue and expenditure for United States. Using annual time series data from 1946 to 1983, their study revealed that there is a causal association from expenditures to revenue. Though a good study, Anderson *et al* (1986) failed to state if any econometric tool

or statistical tool of analysis was utilized for their work, hence it can be concluded that the study was vague and not really relevant in establishing any true relationship between government revenue and expenditures. Furstenberg, Von and Jin (1986) examined the causal relationship between government revenue and expenditure for the United States". The study employed quarterly data for the period 1954 to 1982 by using Vector Autoregressive (VAR) model. It was revealed in their result that government spending propels government revenue.

Miller and Russek (1990) examined the relationship between tax and government expenditures for the periods 1946 to 1987 for the United States. Using both annual and quarterly data and Error Correction Model as tool of analysis, the study found a bidirectional causality between tax and expenditure for all levels of government when quarterly data was used. The findings of this study are in line with the fiscal synchronization hypothesis but was only restricted to quarterly data and neglected the annual data it earlier set out to use.

Hondroyiannis and Papapetrous (1996) investigates the relationship between government revenue and expenditure for Greece and used annual data from 1957 to 1993. This study used bivariate model, Johansen Co-integration approach and Error Correction technique. Empirical findings from the study revealed that there exists a long-run relationship prevailing between these two variables; whereas a one-way causality existed from government expenditures to government revenue. Their result is supported by earilier studies embarked upon by Provopoulous and Zambaras (1991) for Greece.

Hasan and Lincoln (1997) carried out a research on the fiscal variable: Tax-then-Spend or Spend-then-Tax for the United Kingdom. This study adopted a co-integration technique and quarterly data from 1961 to 1993 for its analysis. Empirical evidence from the study revealed that government tax revenue granger causes government expenditure and vice-versa. Their findings lend credence and support to the fiscal synchronization hypothesis which suggests a bidirectional causation between revenues and spending (Musgrave, 1996; Meltzer and Richard, 1981). The fiscal synchronization hypothesis which was suggested by Meltzer and Richard (1981), posits that there is a feedback relationship between revenue and expenditure and both interact interdependently.

Moalusi (2004) conducted his study for Botswana for the period 1976 to 2000 on the "causal relationship between government spending and government revenue". The study

adopted annual times series data and employed multivariate granger causality model and revealed a uni-directional causal link running from revenue to spending in the case of Botswana. This supports the tax-and-spend hypothesis of Friedman and Wagner. The relationship was also shown to be negative and therefore like Buchanan and Wagner (1978) suggested, government deficit can be corrected by raising taxes.

Maghyereh and Sweidan (2004) examined tax-spend, spend-tax and fiscal synchronization hypothesis for Jordan using annual time series data from 1969 to 2002. The authors used granger causality test and Error Correction Model (ECM). Real GDP was used as control variable along with real government expenditures and real government revenues. With the above econometric methods, they concluded evidence in favour of bidirectional causality between revenue and expenditure. The result also suggests that there is long-run interdependence between output and fiscal variables indicating effectiveness of fiscal policy in Jordan.

Narayan (2005) investigates the relationship between government revenue and government expenditure in nine Asian countries. The author used bound testing approach for co-integration and Vector Error Correction Model (VECM) for causality between the variables. The result revealed a short run for Indonesia, Singapore and Sri Lanka and for Nepal in both the short and long-run, he finds support for the tax-and-spend hypothesis; Indonesia and Sri Lanka are in conformity with the spend-and-tax hypothesis in the long-run. This study found out that in three out of the nine Asian countries studied, government revenue and expenditure are co-integrated. This study however, did not come out with a specific time frame and the source of data collection used is not stated.

Barua (2005) examined revenue and expenditure causality in Bangladesh. Using annual data over the period 1974 to 2004 and adopted the econometric techniques of Johansen test, Granger causality test and Vector Error Correction (VECM) model. Empirical result from the Johansen cointegration test showed that there is a long-run relationship between government expenditure, revenue and GDP while the VECM result showed that there is no causal relationship between revenue and expenditure in the short-run. It is also observed that the short-run relation extended from both the fiscal variables to GDP, and not the other way round.

Khalid (2010) investigated the causal relationship between government revenue and expenditures of the Jordan government for the periods 1980 to 2008. He made use of annual

data and econometric tools of co-integration and error correction model (ECM) in his analysis.The empirical results arising from this study revealed a unidirectional causality running from expenditures to revenues (spend-revenue or spend-tax hypothesis), suggesting the preference of controlling reducing expenditures. To say the least, if the 28 years covered by this study had been much longer, a better and more reliable result would have been realized.

Yaya (2009) examined the causal relationship between government revenues and spending in Cote d'Ivoire. Using annual times series data from the period 1960-2005, the study adopted econometric tools of co-integration test analysis. The empirical findings revealed a positive long-run uni-directional causality running from revenues to expenditures, thus supporting the spend-tax hypothesis.

Hong (2009) investigated the causal relationships between government spending and revenue for Malaysia. The study used annual time series data and employed Johansen Co-integration test and an Error Correction Model to analyse the data. The result of his finding showed that government revenue and expenditure are co-integrated while empirical results support the spend-and-tax hypothesis for Malaysia, thus, concluding that fiscal policy may not be effective enough to curb the rising budget deficits over the long-term and may even reduce private saving and investment.

Zapf and Payne (2009) evaluated the long-run association between aggregate state and local government revenue and expenditures in the case of United States. The study adopted Engle Granger Co-integration test associated with the Threshold Autoregressive (TAR) and Momentum Autoregressive (MTAR) Co-integration techniques and Error Correction Model. The result from this research indicated that states and local governments expenditures reflect the budget disequilibrium in the long-run, while in the short-run, states and local government expenditures have a significant effect on the state and local government revenues. Though a good work, Zapf and Payne (2009) is unable to state in specific terms the source of data collection and time frame adopted for their study; an oversight or omission that have made the result of their study vague.

Gil-Alana (2009) examined the relationship between the U.S. government expenditures. The study applied fractional co-integration and error correction model technique and the result showed no evidence of co-integration at any degree while at a structural break in 1973 fractional co-integration is found. This research by Gil-Alana

(2009) failed to state in specific terms the time frame and source of data collection adopted for his study.

Afonso and Rault (2009) examined causality between government spending and revenue in the EU in the period 1960 – 2006". The study used annual time series data and adopted econometric technical bootstrap panel analysis which revealed that spend-tax causality is found for the EU nation states of Italy, France, Greece, Spain and Portugal, while tax-and-spend evidence is present in EU countries of Belgium, Germany, Austria, Finland and the United Kingdom and for other several EU member states. The tax-spend hypothesis as formulated by Friedman and Wagner (1978) differed in their perspectives. While Friedman (1978) argued that changes in government revenues lead to changes in government expenditures, thereby having a positive relationship or direction, Wagner (1978) postulates that the causal relationship between revenue and expenditure is negative. The above findings by Afonso and Rault however did not indicate the direction or level of causality whether negative or positive.

Stallman and Deller (2010) examined the impact of constitutional tax and expenditure limits on growth rates of convergence". Using a descriptive panel statistical technique in analyzing in the case of U.S. data from 1987 to 2004, their study revealed that state revenue and expenditure limits have negatively affected income growth and slowed down convergence. Though a good study, Stallman and Deller (2010) restricted his study to only a seventeen (17) years analysis, a time frame too short to give a true picture of a country's performance. A long-run analysis would have been better.

The study by Payne (1998) based on time series evidence from state budgets for forty-eight (48) contiguous states in the United States of America, supports the tax-and-spend hypothesis for twenty-four (24) states; the spend-and-tax hypothesis for eight (8) states; and the fiscal synchronization hypothesis for eleven (11) states. The remaining five (5) states were reported to have failed the diagnostic tests for error correction modeling. The study applied Granger causality test and error-correction modeling framework. The study by Narayan (2005) for nine (9) Asian countries, using cointegration and Granger causality approach, supports the tax-and-spend hypothesis for Indonesia, Singapore and Sri Lanka in the short-run; and Nepal in both the short-run and the long-run. The results of the study also support the spend-and-tax hypothesis in the long-run for Indonesia and Sri Lanka; and showed neutrality for the other countries.

The study by Narayan and Narayan (2006) for twelve (12) developing counties indicated that the tax-and-spend hypothesis is valid for Mauritius, El Salvador, Haiti, Chile, Paraguay and Venezuela; the spend-and-tax hypothesis is valid for Haiti, while there is evidence of neutrality for Peru, South Africa, Guyana, Guatemala, Uruguay and Ecuador. The study utilized the Ganger causality test based on the procedure suggested by Toda and Yamamoto (1995) which allows for causal inference based on an augmented vector autoregression with integrated and cointegrated processes.

Fasano and Wang (2002) examined the relationship between government spending and public revenue based on evidence from six (6) countries of the oil-dependent Gulf Cooperation Council (GCC) namely: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates. The study, which used the Granger causality testing technique, showed that the tax- and-spend hypothesis is valid for Bahrain, the United Arab Emirates and Oman. The fiscal synchronization hypothesis is found to be true for Qatar, Sandi Arabia and Kuwait. For Kuwait and Saudi Arabia, however, the causality from revenue to expenditure showed higher significance than the reverse direction.

Wolde-Rufael (2008) analyzed the public expenditure-public revenue nexus based on the experiences of thirteen (13) African countries. The study was carried out within a multivariate framework using Toda and Yamamoto (1995) modified version of the Granger causality test. The results of the study provided evidences supporting the fiscal synchronization hypothesis for Mauritius, Swaziland and Zimbabwe; institutional separation hypothesis for Botswana, Burundi and Rwanda; the tax- and-spend hypothesis for Ethiopia, Ghana, Kenya, Nigeria, Mali and Zambia; and the spend-and-tax hypothesis for Burkina Faso.

Saeed and Somaye (2012) investigated the causality and the long-run relationships between government expenditure and government revenue in oil exporting countries during 2000-2009 using P-VAR framework. Using oil revenue as proxy for total revenue, the result emanating from the study revealed that there is a positive unidirectional long-run relationship between oil revenue and government expenditures.

From the foregoing studies, the use of time series data is found to be very popular among economic researchers in the analyses of the causal relationship between government revenue and government spending. However, pooled and or panel data can also be used in analyzing the relationship.

Ho and Huang (2009) used a panel data of thirty-one (31) Chinese provinces to analyze the interaction between public spending and public revenue. The results of the study based on multivariate panel error-correction models showed that there is no significant causality between public revenue and public expenditure for the Chinese provinces in the short run. This supports the institutional separation hypothesis for the area. But in the long-run, there exists bidirectional causality between public revenue and public expenditure in the Chinese provinces, thus, supporting the fiscal synchronization hypothesis for the provinces over the sample period.

Chang (2009) used a panel data of fifteen (15) countries in the Organization for Economic Co-operation and Development (OECD) in examining the inter-temporal relationship between government revenues and government expenditures. Among other things, the study performed panel Granger causality test and found evidence of bidirectional causality between government revenues and government expenditures, thus, validating the fiscal synchronization hypothesis for the OECD countries taken as a whole.

Emelogu and Uche (2010) studied the relationship between government revenue and government expenditure in Nigeria using time series data from 1970 to 2007. Their study employed the Engel-Granger two-step co-integration technique, the Johansen co-integration method and the Granger causality test within the Error Correction Modeling (ECM) framework and found a long-run relationship between the two variables and a unidirectional causality running from government revenue to government in Nigeria.

Aregbeyen and Mohammed (2012) examined "the long-run relationships and dynamic interactions between government revenues and expenditures in Nigeria over the period 1970 to 2008". Using annual times series data and adopting the technique of Autoregressive Distributed Lag (ARDL) bound test in their study, it was evident from results of the study that there is the existence of a long-run relationship between government expenditures and revenues when government expenditure is made the dependent variable. When revenue was made the dependent variable, no evidence of a long-run relationship was found.

Ogujiuba and Abraham (2012) also examined the revenue-spending hypothesis for Nigeria using macro data from 1970 to 2011. Applying correlation analysis, granger causality test, regression analysis, lag regression model, vector error correction model and impulse response analysis, they reported that revenue and expenditure are highly correlated

and that causality runs from revenue to expenditure in Nigeria. The vector error correction model also proved that there is a significant long run relationship between revenue and expenditure.

Obioma and Ozughalu (2014) empirically examines the relationship between government revenue and government expenditure in Nigeria, using time series data from 1970 to 2007, obtained from the Central Bank of Nigeria (2004, 2007). In particular, the study examines the validity of the four aforementioned hypotheses to Nigeria. It employs the Engel-Granger two-step cointegration technique, the Johansen cointegration method and the Granger causality test within the Error Correction Modeling (ECM) framework. Empirical findings from the study indicate, among other things, that there is a long-run relationship between government revenue and government expenditure in Nigeria. There is also evidence of a unidirectional causality from government revenue to government expenditure. Thus, the findings support the revenue- spend hypothesis for Nigeria, indicating that changes in government revenue induce changes in government expenditure.

Table 2: Summary of empirical studies on the relationship between government revenue and public expenditure in Nigeria

Author / Year	Main Objective	Variables used. (Dependent and Independent)	Method of Data Analysis	Major Findings / Result
Anderson, *et al* (1986)	The relationship between government revenue and expenditure for United States.	Government Revenue (IV and Expenditure (DV)	Descriptive statistics	The study revealed that there is a causal association from expenditures to revenue
Furstenberg, *et al* (1986)	The causal relationship between government revenue and expenditure for the United States.	Government Revenue (IV and Expenditure (DV)	Vector Autoregressive (VAR) model	It was revealed that government spending propels government revenue
Miller, *et al* (1990)	The relationship between tax and government expenditures for the periods 1946 to 1987 for the United States	Government Expenditure (DV), Tax (IV)	Error Correction Model	A bidirectional causality between tax and expenditure for all levels of government
Hondroyiannis, *et al* (1996)	The relationship between government revenue and expenditure for Greece and used annual data from 1957 to 1993	Government Expenditure (DV) and Government Revenue (IV)	Bivariate model, Johansen Co-integration approach and ECM technique	Findings from their study revealed that there exists a long-run relationship prevailing between these two variables and whereas one way causality existed from government expenditures to government revenue
Hassan, *et al* (1997)	The fiscal variable: Tax-then-Spend or Spend-then-Tax for the United Kingdom.	IV = Government tax revenue; DV = Government Expenditure	Co-integration technique	Findings revealed that government tax revenue granger causes government expenditure and vice-versa

Table 2: Summary of empirical studies on the relationship between government revenue and public expenditure in Nigeria contd

Author / Year	Main Objective	Variables used. (Dependent and Independent)	Method of Data Analysis	Major Findings / Result
Moalusi (2004)	Causal relationship between government spending and government revenue	IV = Government Spending and DV = Government Revenue	Multivariate Granger Causality Model	Revealed a uni-directional causal link running from revenue to spending the case of Botswana. This supports the tax-and-spend hypothesis of Friedman and Wagner. The relationship was also shown to be negative and therefore like Buchanan and Wagner (1978) suggested, government deficit can be corrected by raising taxes.
Maghyereh *et al* (2004)	Tax-spend, spend-tax and fiscal synchronization hypothesis for Jordan using annual time series data from 1969 to 2002.	Real GDP (DV) was used as control variable along with real government expenditures and real government revenues (IV)	Multivariate Error Correction Model (ECM).	They conclude evidence in favour of bidirectional causality between revenue and expenditure. The result also suggests that there is long-run interdependence between output and fiscal variables indicating effectiveness of fiscal policy in Jordan.
Narayan (2005)	Relationship between government revenue and government expenditure in nine Asian countries	Government Revenue (IV) and Government Expenditure (DV)	Co-integration and Vector Error Correction Model (VECM)	This study found out that in three out of the nine Asian countries studied, government revenue and expenditure are co-integrated

Table 2: Summary of empirical studies on the relationship between government revenue and public expenditure in Nigeria *contd*

Author / Year	Main Objective	Variables used. (Dependent and Independent)	Method of Data Analysis	Major Findings / Result
Barua (2005)	Revenue and expenditure causality in Bangladesh	IV=Government Expenditure, Revenue (fiscal variables); GDP (DV)	Johansen test, Granger causality test and Vector Error Correction (VECM) model	There is a long-run relationship between government expenditure, revenue and GDP while the VECM result shows that there is no causal relationship between revenue and expenditure in the short-run. It is also observed that the short-run relation extends from both the fiscal variables to GDP, and not the other way round.
Khalid (2010)	The causal relationship between government revenue and expenditures of the Jordan government for the periods 1980 to 2008	IV = Government Spending and DV = Government Revenue	Co-integration and error correction model (ECM)	This study revealed a unidirectional causality running from expenditures to revenues (spend-revenue or spend-tax hypothesis), suggesting the preference of controlling reducing expenditures.
Yaya (2009)	The causal relationship between government revenues and spending in Cote d'Ivoire.	Government Revenue (IV) and Government Expenditure (DV)	Co-integration test analysis	The empirical findings reveal a positive long-run uni-directional causality running from revenues to expenditures, thus supporting the spend-tax hypothesis.
Hong (2009)	The causal relationships between government spending and revenue for Malaysia	Government Revenue (IV) and Government Expenditure (DV)	Johansen Co-integration test and an Error Correction Model	Finding shows a preliminary test that government revenue and expenditure are co-integrated while empirical results support the spend-and-tax hypothesis for Malaysia, thus, concluding that fiscal policy may not be effective enough to curb the rising budget deficits over the long-term and may even reduce private saving and investment.

Table 2: Summary of empirical studies on the relationship between government revenue and public expenditure in Nigeria *contd*

Author / Year	Main Objective	Variables used. (Dependent and Independent)	Method of Data Analysis	Major Findings / Result
Zapf, *et al* (2009)	Long-run association between aggregate state and local government revenue and expenditures in the case of United States	Aggregate State and Local Government Revenue (i.e. DV= GREV = f(SGREV, LGREV)-IV and Expenditures	Engle Granger Co-integration test associated with the Threshold Autoregressive (TAR) and Momentum Autoregressive (MTAR) Co-integration techniques and ECM	This research indicated that states and local governments expenditures reflect the budget disequilibrium in the long-run, while in the short-run, states and local government expenditures have a significant effect on the state and local government revenues.
Gil-Alana (2009)	Relationship between the U.S. government expenditures		Co-Integration and Error Correction Model technique	The result showed no evidence of co-integration at any degree while at a structural break in 1973 fractional co-integration is found.
Afonso, *et al* (2009)	Causality between government spending and revenue in the EU in the period 1960 – 2006	Government Revenue (IV) and Government Expenditure (DV)	Econometric Technical Bootstrap Panel Analysis	Findings revealed that spend-tax causality is found for the EU nation states of Italy, France, Greece, Spain and Portugal, while tax-and-spend evidence is present in EU countries of Belgium, Germany, Austria, Finland and the United Kingdom and for other several EU member states.
Stallman, *et al* (2010)	The impact of constitutional tax and expenditure limits on growth rates of convergence	IV = State Revenue and Expenditure Income Growth (RGDP) = DV	Descriptive Panel Statistical technique	Study revealed that state revenue and expenditure limits have negatively affected income growth and slowed down convergence.

Table 2: Summary of empirical studies on the relationship between government revenue and public expenditure in Nigeria *contd*

Author / Year	Main Objective	Variables used. (Dependent and Independent)	Method of Data Analysis	Major Findings / Result
Fasano, *et al* (2002)	The relationship between government spending and public revenue based on evidence from six (6) countries of the oil-dependent Gulf Cooperation Council (GCC)	Government Spending (DV) and Public Revenue (IV)	Granger Causality Testing Technique	Study showed that the tax- and-spend hypothesis is valid for Bahrain, the United Arab Emirates and Oman. The fiscal synchronization hypothesis is found to be true for Qatar, Sandi Arabia and Kuwait. For Kuwait and Saudi Arabia, however, the causality from revenue to expenditure shows higher significance than the reverse direction.
Ho, et al (2009)	The interaction between public spending and public revenue	IV: Public Spending and Public Revenue (DV)	Multivariate Panel Error-Correction Models	Result show that there is no significant causality between public revenue and public expenditure for the Chinese provinces in the short run; this supports the institutional separation hypothesis for the area. But in the long-run, there exists bidirectional causality between public revenue and public expenditure in the Chinese provinces, thus, supporting the fiscal synchronization hypothesis for the provinces over the sample period.
Chang (2009)	The inter-temporal relationship between government revenues and government expenditures	IV = Government Revenues and Government Expenditures (DV)	Panel Granger Causality Test	Found evidence of bidirectional causality between government revenues and government expenditures, thus, validating the fiscal synchronization hypothesis for the OECD countries taken as a whole

Table 2: Summary of empirical studies on the relationship between government revenue and public expenditure in Nigeria *contd*

Author / Year	Main Objective	Variables used. (Dependent and Independent)	Method of Data Analysis	Major Findings / Result
Payne (1998)	Time series evidence from state budgets for forty-eight (48) contiguous states in the United States of America		Cointegration and Granger Causality Approach	Supports the tax-and-spend hypothesis for twenty-four (24) states; the spend-and-tax hypothesis for eight (8) states; and the fiscal synchronization hypothesis for eleven (11) states. Study also support the spend-and-tax hypothesis in the long-run for Indonesia and Sri Lanka; and show neutrality for the other countries
Narayan, *et al* (2006)	relationship between government revenue and government expenditure in nine Asian countries	Independent Variable = Tax; Dependent Variable = Spend	Ganger Causality test, augmented vector autoregression	Indicates that the tax-and-spend hypothesis is valid for Mauritius, El Salvador, Haiti, Chile, Paraguay and Venezuela; the spend-and-tax hypothesis is valid for Haiti, while there is evidence of neutrality for Peru, South Africa, Guyana, Guatemala, Uruguay and Ecuador.
Emelogu, *et al* (2010)	The relationship between government revenue and government expenditure in Nigeria using time series data from 1970 to 2007	IV = Government Revenues and Government Expenditures (DV)	Engel-Granger two-step co-integration technique, the Johansen co-integration and the Granger causality test, and ECM	Study found a long-run relationship between the two variables and a unidirectional causality running from government revenue to government expenditure in Nigeria.

Table 2: Summary of empirical studies on the relationship between government revenue and public expenditure in Nigeria *contd*

Author / Year	Main Objective	Variables used. (Dependent and Independent)	Method of Data Analysis	Major Findings / Result
Aregbeyen, *et al* l (2012)	The long-run relationships and dynamic interactions between government revenues and expenditures in Nigeria over the period 1970 to 2008	GEXP =Dependent Variable; GREV= Independent Variable	Autoregressive Distributed Lag (ARDL) Bound Test	There is the existence of a long-run relationship between government expenditures and revenues when government expenditure is made the dependent variable.
Obioma, *et al* (2014)	The relationship between government revenue and government expenditure in Nigeria using times series data from	IV = Government Revenues and Government Expenditures (DV)	Engel-Granger two-step Co-integration technique, the Johansen Co-integration method and the Granger Causality test within (ECM) framework	Empirical findings from the result indicates, among other things, that there is a long-run relationship between government revenue and expenditures in Nigeria. There is also evidence of a unidirectional causality from government revenue and government expenditure.
Ogujiuba, *et al* (2012)	The revenue-spending hypothesis for Nigeria using macro data from 1970 to 2011	IV = Government Revenues and Government Expenditures (DV)	Applied correlation analysis, granger causality test, regression	They report that revenue and expenditure are highly correlated and that causality runs from revenue to expenditure in Nigeria. The vector error correction model also proves that there is a significant long run relationship between revenue and expenditure.
Wolde-Rufael (2008)	Public expenditure-public revenue nexus based on the experiences of thirteen (13) African countries	GEXP =Dependent Variable; GREV= Independent Variable	Multivariate Framework using Toda and Yamamoto (1995) modified version of the Granger Causality Test	Study provided evidences supporting the fiscal synchronization hypothesis for Mauritius, Swaziland and Zimbabwe; institutional separation hypothesis for Botswana, Burundi and Rwanda; the tax- and-spend hypothesis for Ethiopia, Ghana, Kenya, Nigeria, Mali and Zambia; and the spend-and-tax hypothesis for Burkina Faso.

Source: Compiled by author

2.8 Gap in the literature

However, despite these empirical studies, there is still a gap in the empirical literature as regards studies that examine the relationship between government revenue and public expenditure in Nigeria specifically since 1961 and particularly from 1971 when crude oil revenue started flowing into the coffers of the Nigerian government. This is the focus of this study.

Though over the last three decades several studies have been carried out in different countries to investigate the issue in public sector economics, findings vary from country to country and also within the country. Considerable empirical works have been done in respect to the four hypotheses used in this study. Considering the fact that most of these studies were carried out by foreign authors, this research, therefore, is undertaken with a view to further examining from the Nigerian perspective the relationship or causality that exists between government revenue and public expenditure in Nigeria.

Moreso, in Nigeria, only few authors such as Emelogu and Uche (2010), Aregbeyen and Mohammed (2012), Obioma and Ozughalu (2012) and Ogujiuba and Abraham (2012), have attempted to examine the relationship between government revenue and public expenditure, hence this research is intended to add to existing literature on the topic in Nigeria. Furthermore, owing to recent developments in the global economy occasioned by the sharp drop in crude oil prices leading to sharp drop in oil revenue, which is a very big component of revenue to government of some nations, this research seeks to x-ray the relationship that exist between government revenue and public expenditure taking into cognizance the implications such drop in oil revenue would have on Nigeria, also an OPEC member state. This new development is yet to be researched into by most authors hence this research.

2.9 Theoretical framework

Adam Smith wrote in the "Wealth of Nations" that the government should restrict their activities to defence against foreign aggression; maintenance of internal peace and order; public development work. All other functions besides these were considered beyond the scope of the state and expenditure on them was treated as unjust and wasteful. But there had been a spectacular expansion in the functions of state and this resulted in phenomenal increase in public expenditure, hence we examine the following theories.

In view of this, economists in their quest to examine the inter-temporal/causal relationship between public revenue and public expenditure have come up with four

alternative hypotheses to explain this phenomenon. These hypotheses can be grouped into four namely: Adolph Wagner's Law of Increasing State Activity; Peacock-Wiseman spend-and-tax or spend-revenue hypothesis; Musgrave and Rostow's fiscal synchronization hypothesis; and Baghnestani and McNown fiscal independence or institutional separation hypothesis (Chang, 2009).

2.9.1 Adolph Wagner's law of increasing state activity

Adolph Wagner, the German Economist in 1883 made an indepth study relating to rise in government expenditure in the late 19th century. Based on his study, he propounded a law called "The Law of Increasing state Activity". Wagner's Law states that "as the economy develops over time, the activities and functions of the government increases". According to Adolph Wagner, "comprehensive comparisons of different countries and different times show that among progressive peoples (societies) with which alone we are concerned, an increase regularly takes place in the activity of both the central government and local government which constantly undertake new functions, while they perform both old and new functions more efficiently and more completely. In this way economic needs of the people to an increasing extent and in a more satisfactory faction are satisfied by the central and local governments".

2.9.2 The Wiseman-Peacock hypothesis

Peacock and Wiseman (1961) hereafter referred to as p-w; adopt a clearly inductive approach to explain the growth of government expenditure. When Peacock and Wiseman observed that expenditure over time appeared to outline a series of plateaus separated by peaks, and that these peaks coincided with periods of war and preparation for war, they were led to expound the "displacement effect" hypothesis. The p-w hypothesis belongs to a class of explanation for government expenditure that analyzes the time pattern of expenditure over the long term. P.W introduces suppliers into the public expenditure determination process. The three basic prepositions underlying the P-W analysis are: (i) government can always find profitable ways (in terms of votes) to expand available funds; (ii) citizens, in general, are unwilling to accept higher taxes: (iii) government must be responsive to the wishes of their citizen; from their basic tenet p-w derived the key concept of a tolerable burden of taxation.

It is assumed that notions about taxation remain fairly stable in peace time. As a consequence, the limited revenue capacity of the government in peacetime prevents major

increases in expenditure. Therefore, in settled times the desired government expenditure and the limits of taxation are likely to diverge. During periods of social upheaval such as war this divergence is likely to be narrowed, permanently displacing the burden of taxation upward. The end result is the attainment of a new expenditure plateau at a higher level than before the onset of the upheaval. In times of crisis formerly unacceptable revenue raising method will be tolerated and (it is claim) the higher tax tolerated will persist even after the crisis subsides, this enabling the government to implement expenditure programme that it previously desired but could not finance. Furthermore, p-w argued that a war bring into focus problems (requiring government spending) that were not identified before this is called the inspection effect.

2.9.3 Fiscal synchronization hypothesis

The fiscal synchronization hypothesis, associated with Musgrave (1966) and Meltzer and Richard (1981), is based on the belief that public revenue and public expenditure decisions are jointly determined. It is, therefore, characterized by contemporaneous feedback or bidirectional causality between government revenue and government expenditure (Chang, 2009). It is opined that voters compare the marginal costs and marginal benefits of government services when making a decision in terms of the appropriate levels of government expenditure and government revenue.

2.9.4 Fiscal independence or institutional separation hypothesis

The fiscal independence or institutional separation hypothesis, advocated by Baghestani and McNown (1994), has to do with the institutional separation of the tax and expenditure decisions of government. It is characterized by non-causality between government expenditure and government revenue (Chang, 2009). This situation implies that government expenditure and government revenue are independent of each other.

From the foregoing, three major reasons why the nature of the relationship between government revenue and government expenditure is very important can be deduced. First, if the revenue-spend hypothesis holds (that is, if government revenue causes government expenditure) then budget deficits can be eliminated or avoided by implementing policies that stimulate or increase government revenue. Second, if the spend-revenue hypothesis holds (that is, if government expenditure causes government revenue), it suggests that government's behavior is such that it spends first and raises taxes later in order to pay for the spending. This situation can bring about capital outflow as a result of the fear of

consumers paying higher taxes in the future (Narayan and Narayan, 2006; Eita and Mbazima, 2008). Third, if the fiscal synchronization hypothesis does not hold (that is, if there is no bidirectional causality between government revenue and government expenditure), it implies that government expenditure decisions are made without reference to government revenue decisions and vice versa. This situation can bring about high budget deficits if government expenditure increases faster than government revenue.

2.10 Theoretical linkage

All the above reviewed theories are relevant to the study of public finance in Nigeria as they have all provided the necessary and partial theoretical support to the variables in our model on the relationship between government revenue and public expenditure in Nigeria. The theoretical causal relationship between revenue and expenditure captured by Adolph Wagner and Wiseman-Peacock hypotheses of increasing government expenditure or increasing state activity is mostly adopted by researchers for Nigeria. Therefore, for the purpose of this study, the Adolph Wagner's Law of Increasing State Activity is adopted for its relevance to the current expenditure trend in Nigeria.

Since independence to date, government expenditure has been on a steady rise in Nigeria as a result of expanding population; security challenges e.g. Boko Haram insurgency, Niger-Delta militancy, O'odua Peoples Congress (OPC) and the Movement for the Actualization of the Sovereign State of Biafra (MASSOB) nefarious activities; State and Local Government creation and the establishment of new tertiary institutions and new universities by successive administrations. Furthermore, the need for the government to create employment opportunities and to stabilize the macroeconomic environment is also demanding of consistent expenditure increase on the part of government, hence this study is premise on the popular Adolph Wagner hypothesis of increasing government spending.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter explains the methodology adopted in this research. It consists of the the sources of data collection, method of data analysis, model specification etc.

3.2 Variables and sources of data collection

To investigate the relationship between government revenue and public expenditure in Nigeria, a number of variables have been taken into consideration in this study. These variables are Total Government Expenditure (TGEXP) disaggregated into Recurrent Expenditure (REC-EXP) and Capital Expenditure (CAP-EXP) and Total Government Revenue equally disaggregated into Oil Revenue (OREV) and Non-oil Revenue (NOREV) while Real Gross Domestic Product (RGDP) a proxy for economic growth is used as control variable. Data for this study were sourced from Central Bank of Nigeria (CBN) statistical bulletin for various issues.

3.3 Method of data analysis

To empirically examine the relationship between government revenue and public expenditure in Nigeria, the research adopts Unit Root test, Cointegration test, Granger Causality testing, Vector Error Correction Model, Impulse-Response Functions and Variance Decomposition respectively in addition to descriptive analysis. Essentially, for the reason of uniformity in measurement, and clarity in the interpretation of findings, the variables were transformed to their natural logarithms to eliminate any serial correlation that might be present.

3.3.1 Unit root test

The study uses Augmented Dickey-Fuller (ADF) test for unit roots, and the Phillips-Perron (PP) (non-parametric) test to identify any basic structural breaks. We examine the data to determine if the variables are non-stationary and to which order they are integrated (Asteriou & Hall, 2011:338).

This approach was adopted due to the fact that most time series have unit root as many studies indicated including (Nelson and Polsser, 1982), and as proved by (Stock and Watson, 1988) and (Campbell and Perron, 1991) among others that most of the time series

are non-stationary. Conventional regression techniques based on non-stationary time series produce spurious regression and statistics may simply indicate only correlated trends rather than a true relationship (Granger and Newbold, 1974). Spurious regression can be detected in regression model by low Durbin-Watson statistics and relatively moderate R^2. However, a non-stationary series can be made stationary by taking the lag of the series (trend stationary process) or taking the difference of the series (difference stationary process).

Unit Root tests are routine tests for time series data to ascertain if individual series are stationary to enable the application of the appropriate estimation technique. This is the most popular of tests for determining if a series is stationary or non stationary. In practice, the choice of the most appropriate unit root test is difficult. Enders (1995) suggested that a safe choice is to use both types of unit root tests —the Augmented Dickey–Fuller (ADF) (1981) test and the Phillips–Perron (PP) (1988) test. If they reinforce each other, then we can have confidence in the results. Therefore, to test stationarity, the two widely used methods of unit root tests—the ADF and the Phillips–Perron (PP) test would be applied. The unit root tests would be performed at level and at first difference for both with the intercept, and with the intercept and trend term respectively.

The model for the ADF unit root framework is as follows:

$$\Delta Y_t = \beta_{1+} \beta_2 + \beta_3 + \delta Y_{t-1} + \alpha i \sum_{i=1}^{m} \Delta Y_{t-1} + \varepsilon_t \qquad \text{……. (equ. 3.1)}$$

Where:

Y_t is the variable of interest; e_t is a pure white noise error term; t is time trend;

β_1 is a constant term, *t* is a trend; Δ is difference operator; $\beta_{1,}$ $\beta_{2,}$ β_3 and a_i are various parameters.

m is the number of lags which are included to allow for serial correlation in the residuals and e_t is the residual term

The null hypothesis is that a variable is not stationary (i.e, has unit root problem) against the alternative hypothesis that a variable is stationary. The null hypothesis of non-stationary shall be rejected if the ADF test statistic in absolute term is more than the critical test value at 5% level of significance.

Phillips Perron (PP) test is estimated by the following regression:

$\Delta Y_t = \alpha + \beta t + pY_t + \varepsilon_t$ ……. (equ. 3.2)

Where, the second equation includes a trend variable. The PP test is verified by the t-value associated with the estimated coefficient of *p*. The series are to be stationary if *p* is negative and significant. The test is to be performed for all the variables where both the original series and the differences of the series are to be tested for stationary

3.3.2 Cointegration test

In order to test for causality between the series (TGEXP) and (OREV, NOREV and RGDP) through the ECM, it's necessary to verify if the series are co- integrated. Two or more variables are said to be co-integrated if they share a common trend. In other words, the series are linked by some long-run equilibrium relationship from which they can deviate in the short-run but they must return to in long-run, i.e. they exhibit the same stochastic trend (Stock and Watson, 1988). Co-integration can be considered as an exception to the general rule which establishes that, if two series are both I(1),then any linear combination of them will yield a series integrated of a lower order. In this case, in fact, the common stochastic trend is cancelled out, leading to something that is not spurious but that has some significance in economic terms. The cointegration equation for this study is specified as follows:

$$U_t = \beta_o - \beta_1 TGEXP_t - \beta_2 OREV_t - \beta_3 NOREV_t - \beta_4 RGDP_t \quad \text{…. (equ. 3.3)}$$

Where β_o and ßi are coefficients and ut is the residual

3.4 Model specification

3.4.2 VAR equation

The vector autoregression (VAR) is used for multivariate time series. The structure is that each variable is a linear function of past lags of itself and past lags of the other variables. The vector autoregression (VAR) is commonly used for forecasting systems of interrelated time series and for analyzing the dynamic impact of random disturbances on the system of variables. Though this study employs the use of Vector Error Correction Model (VECM), the VAR model which is the platform upon which the ECM model is built is hereunder specified as follows:

$$\Delta TGEXP_t = \alpha_0 + a_i\Delta OREV_{t-1} + a_2\Delta NOREV_{t-1} + a_3\Delta RGDP_{t-1} + e_{1t} \quad \text{..... (equ. 3.4)}$$

$$\Delta OREV_t = \beta_o + \beta_1\Delta NOREV_{t-I} + \beta_2\Delta RGDP_{t-1} + \beta_3\Delta TGEXP_{t-1} + e_{2t} \quad \text{..... (equ. 3.5)}$$

$$\Delta NOREV_t = \alpha_0 + a_i\Delta RGDP_{t-I} + a_2\Delta TGEXP_{t-1} + a_3\Delta OREV_{t-1} + e_{3t} \quad \text{..... (equ. 3.6)}$$

$$\Delta RGDP_t = \beta_o + \beta_1\Delta TGEXP_{t-i} + \beta_2\Delta OREV_{t-1} + \beta_3\Delta NOREV_{t-1} + e_{4t} \quad \text{..... (equ. 3.7)}$$

Where α0 and α_1, β_o and ßi are coefficients and ut is the residual and Δ is the operator for change.

3.4.2 Vector error correction model

In this study, the key issue that is empirically investigated concerns the relationship between government revenue and public expenditure in Nigeria from 1961-2014. For this purpose, we specified a model, using Total Government Expenditure (TGEXP), Total Revenue disaggregated into Oil Revenue (OREV) and Non-Oil Revenue (NOREV), with Real Gross Domestic product (RGDP) as a proxy for output growth in the economy used as a control variable. Since the evaluation considered both the short-run and long-run simultaneously, the econometric methodology of the Vector Error Correction Mechanism (VECM) was employed. In order to undertake the empirical analysis using the VECM technique, the variables involved in the model must be stationary, integrated of the same order and as well cointegrated. Thus, both the Augmented Dickey-Fuller (ADF) (Dickey & Fuller, 1979, 1981) and Phillips-Perron (PP) (1988) unit root tests were utilized to test for the order of integration of the variables.

VECM is a dynamic system with the characteristics that the deviation of the current state from its longrun relationship will be fed into its shortun dynamics. Error Correction Models are a category of multiple time series models that directly estimate the speed at which a dependent variable 'Y' returns to equilibrium after a change in an independent variable 'X'. ECMs are a theoretically driven approach useful for estimating both short term and long term effects of one time series on another. ECMs are useful model when dealing with cointegrated data but can also be used with stationary data.

A rough long-run relationship can be determined by the cointegration vector, and then this relationship can be utilized to develop a refined dynamic model which can have a focus on longrun or transitory aspect such as the two VECM of a usual VAR in Johansen test. Similarly, the short run dynamics of the VAR model are captured with the Vector Error Correction Model which is similar to the short run adjustment.

$$\Delta Y_t = \Gamma_1 \Delta Y_{t-1} + \Gamma_2 \Delta Y_{t-2} + \ldots + \Gamma_{p-1} \Delta Y_{t-p+1} + \Omega Y_{t-1} + \varepsilon_t ; \; t = 1, \ldots, T \qquad \text{(equ. 3.8)}$$

where $\Gamma_i = -(I - \Pi_1 - \ldots - \Pi_i), \; (i = 1, \ldots, p-1)$ and $\Omega = -(I - \Pi_1 - \ldots - \Pi_p)$ $\Omega = \phi\beta^1$

where φ represents the speed of adjustment to disequilibrium and β is a matrix of long-run coefficients. Therefore, the term $\beta^1 Y_{t-1}$ embedded in equation (1) is equivalent to the error correction term in a single-equation, except that $\beta^1 Y_{t-1}$ contains up to (n-1) vectors in a multivariate model.

It should be noted that we can determine the long run and short run causality from the VECM. If φ is statistically significant and different from zero, it implies the existence of long run causality. Therefore, we can estimate both unrestricted VAR and VECM to obtain long-run and short-run causal relationships respectively in addition to other useful diagnostics.

From the discussion above, if cointegration is established then, TGEXP, OREV, NOREV and RGDP may be considered to be generated by error correction models of the form:

$$\Delta TGEXP_t = \alpha_1 + \sum_{i=1}^{p=4} a_i \Delta OREV_{t-i} + \sum_{j=1}^{p=4} \beta_j \Delta NOREV_{t-j} + \sum_{k=1}^{p=4} \gamma_k \Delta RGDP_{t-k} + \varphi_1 ECM_{1t-1} + e_{1t} \quad \ldots \text{(equ.3 9)}$$

$$\Delta OREV_t = \alpha_2 + \sum_{i=1}^{p=4} a_i \Delta NOREV_{t-I} + \sum_{j=1}^{p=4} \beta_j \Delta RGDP_{t-j} + \sum_{k=1}^{p=4} \gamma_k \Delta TGEXP_{t-k} + \varphi_2 ECM_{2t-1} + e_{2t} \ldots \text{(equ. 3.10)}$$

$$\Delta NOREV_t = \alpha_3 + \sum_{i=1}^{p=4} a_i \Delta RGDP_{t-I} + \sum_{j=1}^{p=4} \beta_j \Delta TGEXP_{t-j} + \sum_{k=1}^{p=4} \gamma_k \Delta OREV_{t-k} + \varphi_3 ECM_{3t-1} + e_{3t} \ldots\ldots \text{(equ. 3.11)}$$

$$\Delta RGDP_t = \alpha_4 + \sum_{i=1}^{p=4} a_i \Delta TGEXP_{t-i} + \sum_{j=1}^{p=4} \beta_j \Delta OREV_{t-j} + \sum_{k=1}^{p=4} \gamma_k \Delta NOREV_{t-k} + \varphi_4 ECM_{4t-1} + e_{4t} \ldots\ldots \text{(equ. 3.12)}$$

Where:

TGEXP = Total Government Expenditure

OREV = Oil Revenue

NOREV = Non-oil Revenue

RGDP = Real Gross Domestic Product

Δ = Difference operator

α = Constant term

φ = Speed or rate of adjustment

p = optimal lag length

ECM_{1t-1}, ECM_{2t-1}, ECM_{3t-1} and ECM_{4t-1} are the error correction terms respectively, while

$e_{1t,}$ $e_{2t,}$ $e_{3t,}$ $e_{4t,}$ = error terms which are identically and independently normally distributed with mean zero and constant variance,

β and γ are the error correction coefficients and are expected to capture the adjustment of ΔTGEXP, ΔOREV, ΔNOREV and ΔRGDP towards long run equilibrium, while $\Delta TGEXP_{t-1}$, $\Delta OREV_{t-1}$, $\Delta NOREV_{t-1}$ and $\Delta RGDP_{t-1}$ are expected to capture the short run dynamics of the model.

Equation (3.9) above is the Total Government Expenditure equation;

Equation (3.10) is the Oil Revenue equation;

Equation (3.11) is the Non-oil Revenue equation, while

Equation (3.12) above is the Real Gross Domestic Product equation respectively.

3.4.3 Granger causality test

The study employed granger causality testing to determine the causal links between government expenditure (TGEXP), government revenue disaggregated into oil revenue (OREV) and non-oil revenue (NOREV) and Real Gross Domestic Product, which is a proxy for economic growth for Nigeria to see the direction of causality between these variables. The Granger Causality test is a statistical hypothesis test for determining whether one time series is useful for forecasting another, first proposed in 1969 by Clive Granger. Ordinarily, regressions reflect "mere" correlations, but Clive Granger argued that causality in economics could be tested by measuring the ability to predict the future values of time series using prior values of another time series. A time series X is said to granger cause Y if it can be shown usually through a series of t-tests and F-tests on lagged values of X (and with lagged values of Y also included), that those X values provide statistically significant information about future value of Y. Granger defined the causality relationship based on two principles:

(i) The cause happens prior to its effect

(ii) The cause has unique information about the future values of its effect.

For this reason, the causality relationship can be evaluated by estimating the following four regressions:

$$TGEXP_t = \alpha_o + \alpha_1 OREV_t + \alpha_2 NOREV_t + \alpha_3 RGDP_t + u_t \quad \text{..... (equ. 3.13)}$$

$$OREV_t = \beta_o + \beta_1 NOREV_t + \beta_2 RGDP_t + \beta_3 TGEXP_t + u_t \quad \text{..... (equ. 3.14)}$$

$$NOREV_t = \alpha_o + \alpha_1 RGDP_t + \alpha_2 TGEXP_t + \alpha_3 OREV_t + u_t \quad \text{..... (equ. 3.15)}$$

$$RGDP_t = \beta_o + \beta_1 TGEXP_t + \beta_2 OREV_t + \beta_3 OREV_t + u_t \quad \text{..... (equ. 3.16)}$$

Where α_0 and $\alpha_{1,}$ β_o and ßi are coefficients and u_t is the residual

According to Granger (1988), a variable TGEXP is said to granger cause another variable: OREV, NOREV or RGDP if past and present values of TGEXP help to predict OREV, NOREV or RGDP. The rationale for conducting the Granger causality test between these variables is to determine whether Nigeria is characterized by either the tax-and-spend, spend-and-tax or fiscal synchronization or institutional separation hypothesis. The result obtained may have severe policy implications for fiscal disciplines as well as sustainability of fiscal policy. Granger (1988) points out that if there exists a cointegrating vector among variables, there must be causality among these variables at least in one direction. Thus the study seeks to determine whether the stochastic trends in the variables that contained unit root have long-run relationship. Given these two assumptions about causality, the study test the following hypothesis "the causal relationship between government revenue and expenditure in Nigeria from 1961 to 2014" for identification of a causal effect of government expenditure on government revenue and Real Gross Domestic Product (RGDP) respectively.

3.5 Descriptive analysis

To empirically examine the trend and pattern of government revenue and public expenditure in Nigeria from 1970 to 2015, this research adopts the statistical tools of graphs to succinctly depict the trend and pattern of government revenue and public expenditure in Nigeria during the period under review.

3.6 A priori expectations

Economic theory is explicit about the relationship between the dependent and independent variables in the model. On a priori expectation therefore, the independent variables (OREV, NOREV and RGDP) in the model are all expected to be positively related

to the dependent variable (TGEXP). This implies that an increase in OREV, NOREV and RGDP is expected to result in an increase in TGEXP all things being equal based on Adolph Wagner's hypothesis. This relationship can be algebraically written as:

OREV, NOREV, RGDP > 0, implying that they are all positively related.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4.1 Introduction

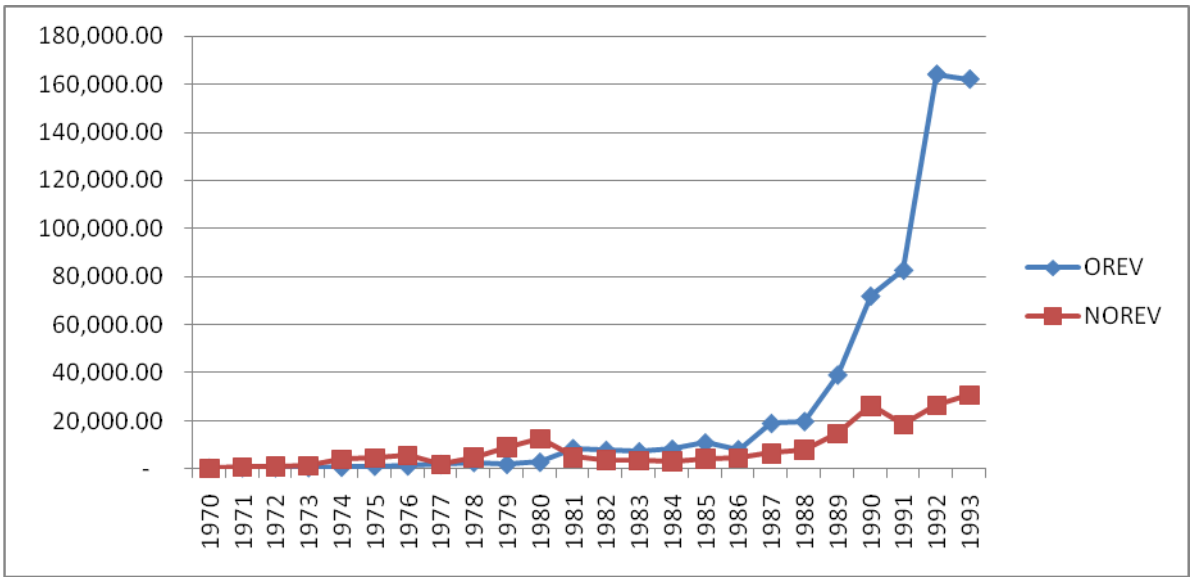
This chapter mainly focuses on various tests such as descriptive statistics analysis, normality tests, unit root test, co-integration technique, granger causality test, regression analysis as well as the vector error correction model, impulse response and variance decomposition. These tests were carried out respectively in order to achieve the objectives of the study.

4.2 Trend analysis

The trend analysis is presented in a graphical form for clarity and simplicity of understanding. This is on the trends and pattern of government revenue into oil and non-oil revenue, and total government expenditure equally disaggregated into recurrent and capital expenditure respectively.

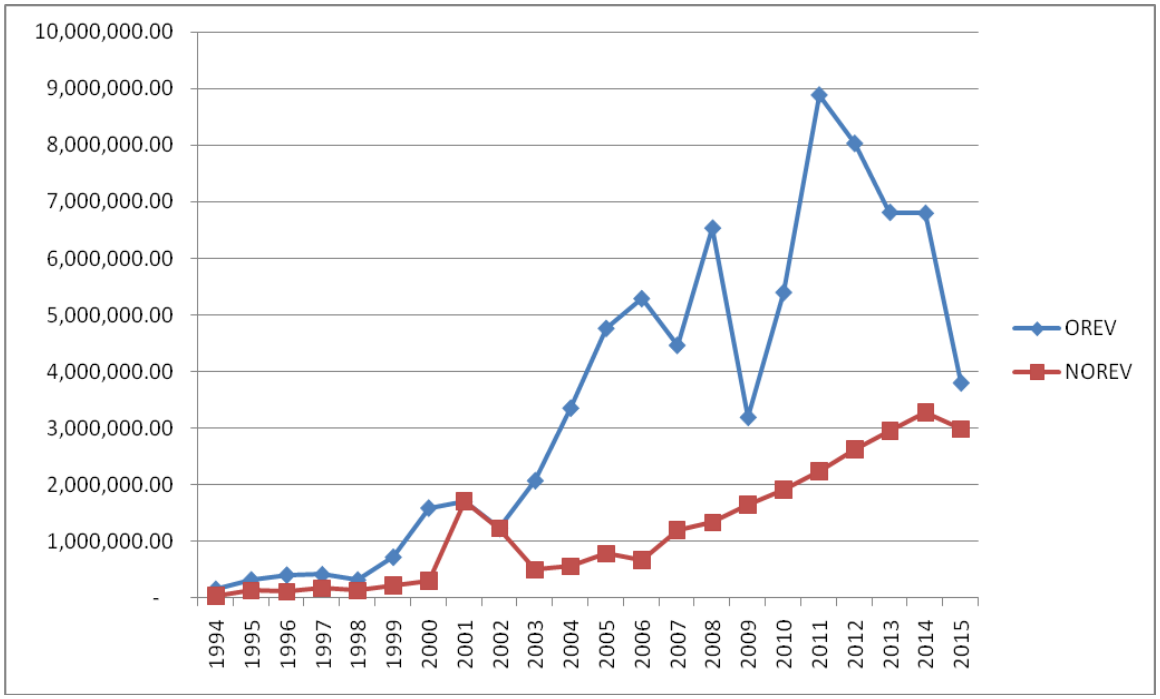
4.2.1 Analysis of oil and non-oil revenue

The graphical representation of trend and pattern of movement` is presented in figure 1.



Source: Author's computation from MS-Excel

Fig.1: Ttrend and pattern of oil revenue and non-oil revenue and in Nigeria between 1970-1993.



Source: Author's computation from MS-Excel

Fig. 2:Ttrend and pattern of oil revenue and non-oil revenue in Nigeria between 1994 – 2015.

The Nigerian economy, at independence in 1960, was an agrarian economy with agriculture contributing significantly both to the gross domestic product (GDP) and overall exports earnings. The mainstay products at that time included, inter-alia, cocoa, rubber, palm produce (palm oil and kernels) from southern Nigeria, and groundnuts and cotton from the northern part. Agriculture also provided the bulk of domestic food requirements, accounting for over 75% of employment and significantly contributing to Federal Revenues through export taxes and Marketing Boards' surpluses (Adeyemi and Abiodun, 2013). Since the discovery of oil in commercial quantity in Oloibri in the Niger-Delta region of Nigeria in 1956 and the oil boom of 1970s, oil has dominated the economy of the country to the neglect of agriculture and other non-oil tax revenue sectors. Oil accounts for more than 90% of the country's exports, 25% of the Gross Domestic Product (GDP), and 80% of government total revenues. As a result, the economy of the country has been substantially unstable, a consequence of the heavy dependence on oil revenue, and the volatility in prices (Odularu, 2008).

Figure 1 above shows the composition of revenues, that is pil revenue (OREV) and non-oil revenue (NOREV). It shows that non oil revenue was higher than oil revenue before 1972 when oil exploration began in commercial quantity in Nigeria, but since then oil

revenue has been on a steady and consistent increase, contributing about 96% of foreign exchange earning for the country before the current crash which began late 2013 and has persisted since them (The Guardian Newspaper, 3rd January, 2016).

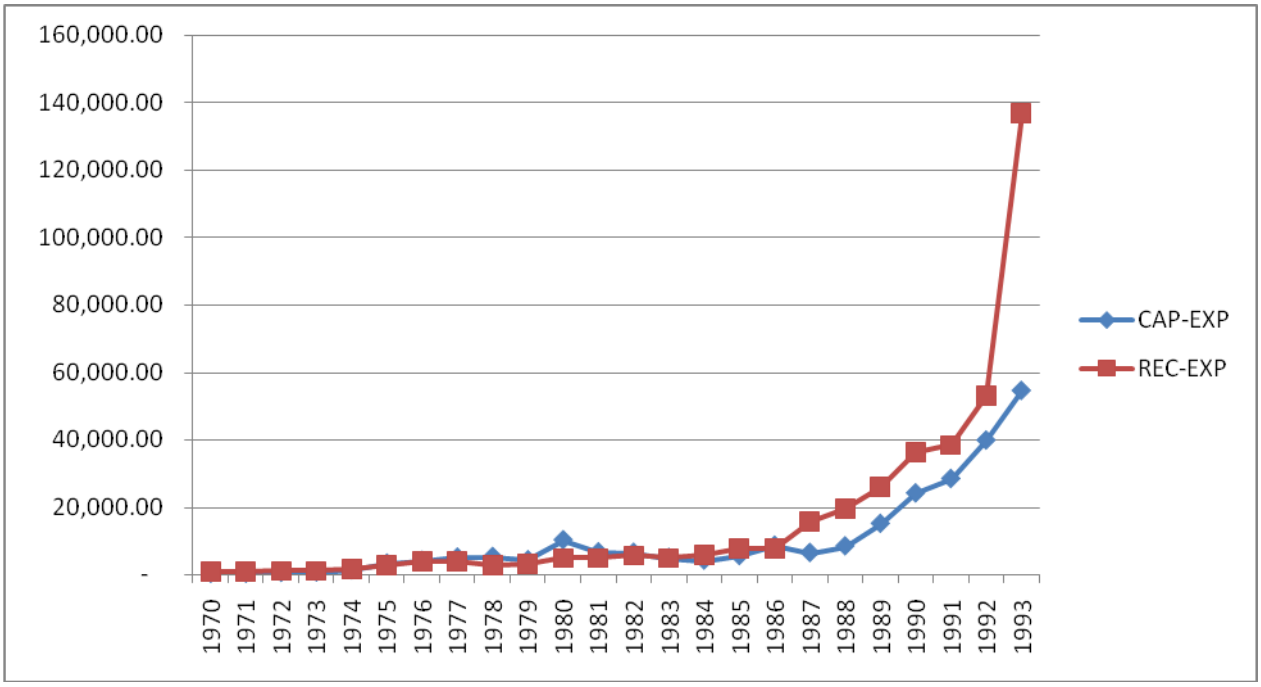
Prices began to move upwards in 1973 reaching over $4.00 and by 1974 when OPEC power was becoming manifest, oil shot above $10 for the first time ever reaching $13. In 1979 the year General Obasanjo handed power to the civilian NPN regime of President Shehu Shagari, oil prices started a new high crossing $20 and then $30 and peaking at $40.75 in November 1979. That month, Brent Oil, equivalent of Nigeria's Bonny Light peaked at $42 per barrel; then market glut set in as high prices prompted over supply and market weakening. The point here is that there is no inevitability or guarantee about high oil prices and the commodity, like others, obeys the economic laws of demand and supply (The Guardian Newspaper, 3rd January, 2016).

The oil glut stopped our seven year post-civil war oil party (1973-1980) resulting in weakening prices and by 1981 prices dropped to around $33 per barrel; by 1983 below $30; and by 1986 prices crashed to between $9.62 and $15.92. Nigeria's second experiment at democracy had multiple afflictions-weak leadership by Shagari and his colleagues; vicious competition by the second republic political parties; corruption and drift; and ambitious generals waiting not-too-patiently for them to fail; but it was simply additional bad fortune that it was under civilian rule that the oil glut happened (Adeyemi and Abiodun, 2013). The government made a half-hearted attempt at "austerity" but the political class was not going to reduce their appetite for greed and conspicuous consumption. There was insufficient sophistication to understand the link with exchange rates as Nigeria operated a fixed exchange rate system with a CBN that fixed not just exchange rates, but interest rates, sectoral lending, bank branch expansion, and even bank opening hours. The only mechanism the administration could conjure was an import license regime by which civil servants and ministers for commerce and industry determined how scarce foreign exchange would be rationed with the consequence that those officials became very rich (Odularu, 2008).

Geneerally, oil revenue has been on a steady rise since 1972 except during 1979 to 1986 when oil prices dropped drastically inspite of some incidence of price fluctuations and drastic fall in the international crude oil prices usually occurring either as a result of crises in the Middle East or major economic meltdown / recessions in world economies. Crude oil prices again rose rapidly between 2007 and 2009 before taking a downward tumble in 2009.

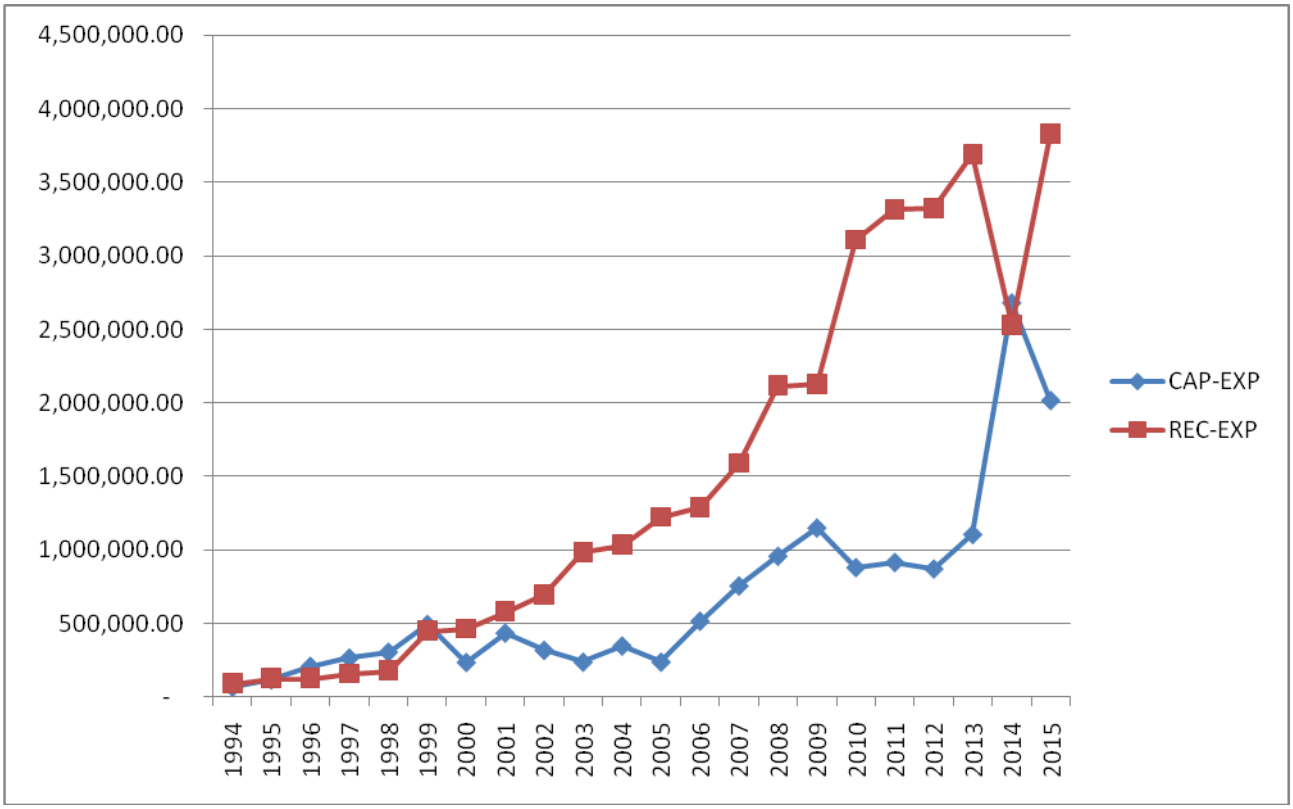
Oil prices picked up again between 2010 and got to its peak in 2011 before taking a downward trend between 2012, 2013, 2014 and 2015 respectively. From an Olympian height of above $140 (US dollars) in 2011, crude oil price dropped to a paltry $55 (US dollars) sometimes in 2015. These upward and downward plateaus are not unconnected with some factors like technological advances in car manufacture, U.S. shale oil revolution, and generally low demand for crude by hitherto big economies like the U.S.A, China and the refusal of OPEC led by Saudi Arabia to cut production output which has contributed in pushing prices down.

4.2.1 Analysis of capital and recurrent expenditure



Source: Author's computation from MS-Excel

Fig. 3: Trend and pattern of capital expenditure and recurrent expenditure in Nigeria between 1970 – 1993.



Source: Author's computation from MS-Excel

Fig. 4: Trend and pattern of capital expenditure and recurrent expenditure in Nigeria between 1994 – 2015.

Generally, government expenditure in Nigeria can be categorized into two components parts namely capital expenditure and recurrent expenditure. Capital expenditure is incurred on the creation or acquisition of fixed assets (new or second-hand) while recurrent expenditure is incurred on the purchase of goods and services, payment of wages and salaries and settlement of depreciation on fixed assets. Increase in government expenditure on socio-economic activities and infrastructural development is an impetus for economic growth in any country. Specifically, some of the reasons adduced for the increase in government expenditure overtime are: inflation; public debt; tax revenue and the population (Modebe, Okafor, Onwuemere and Ibe, 2012).

In Nigeria, evidences show that the total government expenditure in terms of capital and recurrent expenditures have continued to rise in the last three decades. Expenditures on defence, internal security, education, health, agriculture, construction, transport and communication are rising overtime. We observe from figure 3 above that Nigeria's federal government recurrent expenditures trended above capital expenditure for most part of 1970s. However, from 1974 to 1983 a greater part of government budget was tailored towards infrastructural growth (i.e.capital spending). As could be seen from the graphs

above, the growth of recurrent expenditure in total expenditure has been generally higher than that of capital expenditure, except in a few years between 1975-1983, 1986 and 1996-1999, when the reverse were the case.

For instance, government total recurrent expenditure increased from ₦716.1 million (Nigerian currency) in 1970 to ₦1517.10 million in 1974; government total recurrent expenditure increased from ₦4,805.20 million in 1980 to ₦36,219.60 million in 1990 and further to ₦1,589,270.00 in 2007 and later to ₦ 3,314,440.00, ₦3,325,160.00, ₦3,689,080.00 and ₦241,340.0 in 2011, 2012, 2013 and 2014 respectively (Oni, Aninkan, Akinsanya, 2014). Since 1999 when the present democratic dispensation started, recurrent expenditure has remained higher than capital expenditure. This is attributed to the duplication of offices and personnel cost, hence the allocation of huge resources to service and maintain them. For example the National Assembly has a total number of 109 Senators and 320 House of Representatives members as well as over forty (40) Ministers and several other creation of government that has served as a drain on government revenue over the period.

The recurrent expenditure in the Nigerian annual budget takes a substantial part of Nigerian public expenditure. Although the budget is more of an expected revenue and expenditure within a given period of time, it mirrors how our resources are managed and the areas that the different arms and agencies of government spend our money. A critical look at the budget proposal and the appropriation bills passed over time shows a rise in the recurrent expenditure. In the 2014 budget presented to the joint section of the National Assembly, a total of 2.41 trillion naira was budgeted for the recurrent expenditure and 1.24 trillion budgeted for the capital expenditure. This puts the recurrent expenditure between 70-74% of the total budget and 25 to 30% of the budget goes to the capital expenditure.

Considering the items covered in the recurrent expenditure, which includes payment of salaries, welfare and other overhead and personnel cost, it shows that less than 3% of the population will spend more than 70% of the money that will be generated in Nigeria. There are serious implications of this on an average Nigeria and also to the generation unborn. According to the statistics released by the Ministry of Finance, the data of the recurrent budget indicated as follows: 2006 = 70.1% , 2007 = 64%, 2008 = 71.4%, 2009 = 67%, 2010 = 64.7%, 2011 = 74.4%, 2012 = 71.5%, 2013 = 67.5% and the current year 74%. There are compelling needs to drastically reduce the recurrent expenditure and focus more on the capital expenditure so that the generality of Nigeria will benefit from the economy of the country (Aregbeyen and Mohammed, 2012).

In the same way, government capital expenditure also increased from 187.80 million (Nigerian currency) in 1970 to ₦5200.0 million in 1978. These figures revealed that capital expenditure started increasing immediately after the Nigerian/Biafran war of 1970 because of the need to undertake the 3R's (Reconciliation, Rehabilitation and Reconstruction), which followed the Nigerian civil war that ravaged a greater part of the Eastern Region which was worse hit by the war (Nwosu and Okafor, 2014). In addition to this, the Yakubu Gowon administration embarked upon the building of more infrastructures and universities across the country and this drastically improved capital expenditure profile during the period under review. This development continued during 1975 and 1983 as a result of the need to fund the new states created by the Murtala Mohammed administration and also the duplication of structures occasioned by the democratic dispensation of the second republic that lasted till 1983, capital expenditure rose from ₦10,163.40 million in 1980 to ₦24,048.60 million in 1990. Capital expenditure stood at ₦239,450.90 million and ₦759,323.00 million in 2000 and 2007 respectively and by 2011, it was ₦1,934,524.20 (Odularu, 2008).

In other to reverse the worsening economic conditions that emerged prior to 1985, government introduced the Fourth National Development Plan (1981-1985) which re-emphasized the need for agricultural-based self reliance. This suffered from foreign exchange shortages, which led to widespread scarcity of essential commodities and high food cost. The structural adjustment programme was put in place in 1985 because of the need to liberalize and to reduce government involvement in the economy and as such put an end to the observed hardships. Government policies towards actualizing this caused recurrent expenditure to rise above capital expenditure from 1986. This trend continued till 1994 because of the need to service the new democratic structures of the third republic and to organize the aborted presidential elections. Between 1995 and 1998, capital expenditure was higher than recurrent expenditure. The government in power faced sanctions from the international community as a result of the botched elections and the incarceration of the acclaimed winner of the June 1992 elections. The only option was to undertake some developmental projects in other to win the support of the people. However, since 1999 when the present democratic dispensation started, recurrent expenditure has remained higher than capital expenditure.

4.3 Unit root testing

Prior to the estimation of the empirical models, the unique characteristics of the data were examined. Testing the stationarity of economic time series is important since standard econometric methodologies assume stationarity in the time series while in the real sense they may not be stationary. Hence the usual statistical tests are likely to be inappropriate and the inferences drawn are likely to be erroneous and misleading. The data series are expected to be stationary to ensure the absence of unit root problems.

4.3.1 Results of the Augmented Dickey Fuller (ADF) and Phillips–Perron (PP) unit root tests

As a first step, the stationarity of the variables was tested by conducting the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests in Table 4.4(a and b). The unit root test result shows that the series Total Government Expenditure (TGEXP), Oil Revenue (OREV), Non-Oil Revenue (NOREV) and Economic Growth proxied by Real Gross Domestic Product (RGDP) respectively are non-stationary at their levels. Therefore, the null hypothesis that the series are non-stationary is accepted at 5% level of significance. But they became stationary at their first difference, hence they are all integrated of order one I(1). The E-views computer output are as presented in the appendice section.

Table 3: Augmented Dickey Fuller and Philip-Perron unit root test with Intercept

Variable		**At level**	**1st difference t-statistic value**	**5% critical value**	**Order of integration**
Log(OREV)	*ADF*	-1.305836	-7.056733	-2.929734	I(1)
	P-P	-1.465842	-7.127847	-2.929734	I(1)
Log(NOREV)	*ADF*	-1.462542	-6.997555	-2.929734	I(1)
	P-P	-1.493023	-11.94611	-2.929734	I(1)
Log(TGEXP)	*ADF*	-1.599762	-7.361337	-2.929734	I(1)
	P-P	-1.445647	-7.334577	-2.929734	I(1)
Log(RGDP)	*ADF*	2.151534	-6.956255	-2.941145	I(1)
	P-P	-2.101167	-4.707155	-2.929734	I(1)

Source: Author's computation using E-views 8.0.

4.4 VAR lag order selection criteria

Table 4: VAR lag order selection criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-2297.858	NA	4.72e+42	109.6123	109.7778	109.6730
1	-2181.696	204.6677	4.02e+40	104.8427	105.6701	105.1460
2	-2149.937	49.90652	1.94e+40	104.0922	105.5817*	104.6382
3	-2139.558	14.33288	2.69e+40	104.3599	106.5113	105.1485
4	-2105.747	40.25182*	1.29e+40*	103.5117*	106.3251	104.5430*

* indicates lag order selected by the criterion

The result of the VAR lag order selection indicates that the maximum lag length is 4 using both AIC, SIC, FPE and HQ information criteria. Based on this result, the optimum lag length is 4 and it is used for this study.

4.5 Cointegration analysis

Having found that all the variables are first difference stationary and integrated of order one, and the lag length determined, cointegration tests are conducted using Johansen (1988; 1995) full information maximum likelihood to see if there is a long-run equilibrium relationship between the variables. Based on the Akaike Information Criterion, Likelihood Ratio, Final Prediction Error, Schwartz Information Criterion, and Hannan-Quinn Information Criterion, the lag length one (1) was used and the Cointegration test results are presented in tables 4.6(a) and 4.6(b).

Table 5(a): Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**0.05 Critical value**	**Prob. Value**
None*	0.682943	94.92194	47.85613	0.0000
At most 1*	0.513364	44.38026	29.79707	0.0006
At most 2	0.230543	12.68975	15.49471	0.1267
At most 3	0.025989	1.158660	3.841466	0.2817

Trace test indicates 2 cointegrating equation at the 0.05 level of significance.

* denotes rejection of the hypothesis at the 0.05 level of significance

** represents Mackinnon-Haug-Michelis (1999) P-values.

Source: Author's Computation Using E-views 8.0.

Table 5(b): Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical value	Prob. Value
None*	0.682943	50.54169	27.58434	0.0000
At most 1*	0.513364	31.69050	21.13162	0.0012
At most 2	0.230543	11.53109	14.26460	0.1295
At most 3	0.025989	1.158660	3.841466	0.2817

Max-eigenvalue test indicates 2 cointegrating equation at the 0.05 level of significance.

* denotes rejection of the hypothesis at the 0.05 level of significance

** represents Mackinnon-Haug-Michelis (1999) P-values.

Source: Author's Computation Using E-views 8.0.

Based on the statistical results, the maximum eigenvalue statistics and the trace test rejects the null hypothesis at 0.05 % level of no cointegration, stating otherwise, that there exist two cointegrating vectors or equations. Both tests (trace and maximum engenvalue) reinforces and or supports each other thus suggesting that there indeed exists a long-run relationship between the fiscal variables Total Government Expenditure (TGEXP), Oil Revenue (OREV), Non-Oil Revenue (NOREV) and Economic Growth proxied by Real Gross Domestic Product (RGDP) respectively.

4.6 Vector error correction model results

The VECM result is meant to help achieve the third objective of the study which is to show the relationship between Total Government Expenditure (TGEXP) and Government Revenue (i.e. NOREV and OREV) and RGDP. The VECM test was conducted and the result is shown overleaf.

Table 6: Error Correction Model (ECM) Test

Error Correction	D(Ln(OREV)	D(Ln(NOREV)	D(Ln(TGEXP)	(Ln(RGDP)
CointEq1	-0.302036	0.258759	0.219028	0.000417
	(0.36462)	(0.08013)	(0.05730)	(0.00128)
	[-0.82835]	[3.22919]	[3.82261]	[0.32641]
Constant	28738.17	132040.1	130593.8	755.5027
	(265344)	(58313.3)	(41697.2)	(929.168)
	[0.10831]	[2.26432]	[3.13196]	[0.81310]
R-squared	0.168416	0.445645	0.570375	0.134329
Adj. R-squared	-0.058380	0.294458	0.453205	-0.101763
S.E. equation	1119500	246026.2	175922.2	3920.203
F-statistic	0.7412589	2.947630	4.867917	0.568969

Source: Author's Computation Using E-views 8.0.

4.6.1 The ECM result

As per Ahmed (2001), the main feature of the ECM (Error Correction Model) is it capability to correct for any disequilibrium that may shock the system from time to time. The error correction term picks up such disequilibrium and guides the variables of the system back to equilibrium.

Judging from the VECM result above, the ECM coefficient for oil revenue (OREV) is the only rightly signed coefficient with the value -0.302036. It is meant to correct any deviations from long-run equilibrium. Specifically, if actual equilibrium value is too high, the ECM will reduce it, while if it is too low, the ECM will raise it. The The coefficient of -0.302036 indicates that about 30% of the disequilibrium or distortion in the Nigerian economy is yearly being corrected for in the economy. This means that for long run equilibrium to be restored in the system, it would take the Nigerian government three (3) years and three (3) months (terminating by 2018) to bring the economy back to an equilibrium level again. This suggests that there will be a convergence within this period to equilibrium path regarding oil revenue and economic growth.

4.7 Granger causality test

The causal relationship between government expenditure and revenues known as Granger causality is concerned with the relevance of past information of a variable in predicting the value of the other (Granger, 1969, 1988). To be able to realize the connection between government revenue and public expenditure, and to achieve our second objective,

the Granger causality test was conducted using the VEC Granger Causality/Block Exogeneity Wald Tests, and the result is presented in Table 7. The second objective of our study is to investigate empirically the existence and direction of causal relationship between federal government revenue and government expenditure.

The aim of the econometric testing is to determine which of the following relations is valid:

- whether the growth of federal government revenue affects the growth of government expenditure or vice versa;
- whether there is a mutual influence between government revenue and expenditure;
- whether the growth of the variables are independent of each other so as to ascertain the validity of the various theories employed.

Table 7: VEC Granger Causality/Block Exogeneity Wald test

Dependent variable: D(OREV)

Excluded	Chi-sq	df	Prob.
D(NOREV)	3.802938	2	0.1493
D(TGEXP)	0.889003	2	0.6411
D(RGDP)	0.231026	2	0.8909
All	4.126240	6	0.6596

Dependent variable: D(NOREV)

Excluded	Chi-sq	df	Prob.
D(OREV)	5.620807	2	0.0602
D(TGEXP)	9.831266	2	0.0073
D(RGDP)	0.052849	2	0.9739
All	11.37639	6	0.0774

Dependent variable: D(TGEXP)

Excluded	Chi-sq	df	Prob.
D(OREV)	30.50188	2	0.0000
D(NOREV)	1.020729	2	0.6003
D(RGDP)	0.201992	2	0.9039
All	32.16573	6	0.0000

Dependent variable: D(RGDP)

Excluded	Chi-sq	df	Prob.
D(OREV)	0.440624	2	0.8023
D(NOREV)	0.064767	2	0.9681
D(TGEXP)	0.251314	2	0.8819
All	1.243632	6	0.9747

Source: Eviews 8 estimation result

The result in the first section of the table shows no causality running from neither Non-Oil Revenue (NOREV), Total Government Expenditure (TGEXP) or Real Gross Domestic Product (RGDP) to Oil Revenue (OREV). The probability values were used as the criteria for judging the significance of the causality.

In the second section of the table, there appears to be two variables (oil revenue and total government expenditure) that is ccausing non-oil revenue in Nigeria. This section revealed a unidirectional causality from Oil Revenue and Total Government Expenditure (TGEXP) to Non-oil Revenue (NOREV) at 10% and 1% significant level respectively.

Likewise the third section also reveals a unidirectional causality from Oil Revenue (OREV) to Total Government Expenditure (TGEXP) at 1% significant level. The unidirectional causal relationship from oil revenue to government expenditure is a factual backing of goverment's over reliance on oil revenue to finance the yearly budget. This is in support of the Adolph Wagner's theory of increasing state activity. All the results generated above, except the one in the first and third section is in line with popular Adolph-Wagner Tax-Spend and Wiseman-Peacock Spend-Tax Hypothesis earlier enunciated in the literature.

The results therefore agrees with Ogujuiba *et al*. (2012), Emelogu *et al*. (2010), Aregbeyen et al. (2012) and Obioma et al. (2012) findings for Nigeria. The unidirectional causality from government expenditure to non-oil revenue is equally a proof of governemt's long term effort at revitalising the non oil sectors particularly agriculture, manufacturing and the mining sector in order to diversify its revenue source. This result supports the spend-tax hypothesis of Wiseman-Peacock. Furthermore, the finding is in line with Narayan et al. (2006) which found the spend-tax hypothesis to be valid for Haiti; Afonso et al. (2009) for EU states of France, Spain, Greece, Portugal and Italy. Similarly, the unidirectional causality from oil revenue to non-oil revenue (NOREV) is also true of the Nigerian economy. This is because since 1970 when oil commercialization began to date, the other sectors in the economy rely on proceeds from crude oil sale to develop, which in turn create the needed outputs in these sectors that stimulate employment of factors of production and boost aggregate demand. This result is in tune with the *a priori* expectation of increasing state activity as postulated by Wagner.

4.8 Impulse-Response analysis

The Impulse Response Function (IRF) result as contained in the appendice page uses ten quarter horizons representing each model specified in this study. The IRF analysis is employed to study the dynamic interactions of the variables. These functions trace out the effect of a one standard deviation shock to the orthogonalized residuals of each equation on current and future values of the endogenous variables in the system. An unexpected shock in Total Government Expenditure (TGEXP) exerted a positive shock on itself from the first quarter to the tenth quarter. A one-time standard deviation shocks in oil revenue (OREV) led to a slight increases in total government spending all the quarters.

Though the positive impact of oil revenue on government spending was negligible, it still implies that the response of government expenditure to oil revenue was positive

throughout the tenth horizons. An unexpected shock in non-oil revenue equally exerted a positive impact on government spending. Hence government expenditure responded positively to the unepected shock in non-oil revenue. The response of government expenditure to the shock in economic growth was negative from the first quarter to the tenth quarter. Economic growth showed no any positive impact of government expenditure.

The response of oil revenue (OREV) to the shock in total government spending was positive throughout the period of analysis. The response of oil revenue to the shocks in oil revenue in the first quarter was positive and this remained on the positive note throughout the rest of the period. The response of oil revenue to a shock in non-oil revenue was positive in the first quarter and up to the tenth quarter it remained positive. The response of oil revenue to shock in real gross domestic product (a proxy for economic growth) in the first quarter through the tenth quarter was negative.

The response of non-oil revenue (NOREV) to a shock in government spending was positive and remained stable in that condition throughout the horizons. The response of non-oil revenue to a shock in oil revenue was positive throughout the remaining period. The response of non-oil revenue to a shock in economic growth was positive in the first quarter but became negative in the second to tenth quarters of the period.

The response of real gross domestic product (RGDP) proxied by economic growth to the shock in government expenditure in the first to tenth quarter was all negative. The response of economic growth to a shock in oil revenue in the first quarter was negative but immediately became positive from the second to the remaining quarters. The response of economic growth to the shock in non-oil revenue in the first quarter was positive and remained negative throughout the remaining nine quarters.

4.9 Variance Decompositions analysis

The variance decomposition indicates the amount of information each variable contributes to the other variables in the autoregression. It determines how much of the forecast error variance of each of the variables can be explained by exogenous shocks to the other variables (Lutkepohl, 2007). The variance decomposition results in the appendice page is based on disturbing each variable in the system with one standard deviation.

Forecast error variance decomposition of Total Governemnt Expenditure (TGEXP) revealed that, in the first quarter "own shock" explained about 100% and 94.08%and 93.18% respectively of the total variation in total government expenditure in the second and tenth quarters of the study period. Innovations in oil revenue (OREV) explained less than one %age variation in government spending with slight increases of 4.003 in the second quarter throughout the tenth horizons. Innovation in non-oil revenue (NOREV) explained about 0.00%, 0.33% and 0.23% of the changes in total government spending in the first, fifth and tenth quarters respectively. Oil revenue (OREV) is the most important variable in explaining the variation in government spending apart from the "own shock". This support the Wagner's Law of increasing state activity. Economic Growth proxied by Real Gross Domestic Product (RGDP) has explained about 0.00%variation in total government spending in the first quarter, 1.83% in the fourth quarter, 2.01%in the seventh quarter and 2.08% in the tenth quarter. Economic growth decreases in explaining variation in government expenditure though it is the second most important variable in explaining the variation in government expenditure. Economic growth is one important variable that influence government expenditure apart from oil revenue.

The variance decomposition of oil revenue (OREV) revealed that in the first quarter "own shock" has explained about 89% in the first quarter. It also explains about 91.63 % and 89.59 % in the second and tenth quarters respectively of the total variations in oil revenue. Innovations in total government expenditure has explained about 10.02% and 2.85% variation in oil revenue or oil revenue itself in the tenth quarter. Innovations in non-oil revenue explained about 0.00%variation in oil revenue in the first quarter, 2.24% in the third quarter and 5.68%in the tenth quarter. Non-oil revenue is not really important in explaining the variation in oil revenue though it increases from the first quarter to the tenth quarter.

The variance decomposition of the non-oil revenue (NOREV) revealed that, in the first quarter "own shock" has explained about 85.6%, 51.50%in the first and third quarter and 27.89%in the seventh quarter of the total forecast error variance of non-oil revenue. Oil revenue explained about 35.21% and 37.92% variation in third and sixth quarters forecast error variance of the non-oil revenue. Total Government Expenditure (TGEXP) explained about 9.81% variation in non-oil revenue in the first quarter. 31.37% in the seven quarter and 34.65% in the tenth quarter.

Government spending is more important in explaining the variation in non-oil revenue apart from the "own shocks". Innovations in oil revenue (OREV) has explained about 4.51%in the first quarter, 36.72% in the eight quarter and 39.69%in the tenth quarter of the total error variance in non-oil revenue. Oil revenue is not so important in explaining the variation in the non-oil revenue. Economic growth proxied by Real Gross Domestic Product (RGDP) accounts about 0.00% in the first quarter quarter, 3.42% variation in oil revenue in the third quarter and 4.23% variation in government expenditure in the tenth quarter of the forecast error variance of non-oil revenue.

Variance decomposition of economic growth proxied by Real Gross Domestic Product (RGDP) revealed that, "own shock" has accounted for about 98.3% 94.05%, 92.46% and 92.46% of the total variation in economic growth in the first, second and tenth quarters respectively. Innovations in non-oil revenue (NOREV) has explained about 0.41%, 0.27% and 0.93% variation in the error variance of economic growth proxied by real gross domestic product.

Total government spending has explained about 0.79% in the first quarter, 1.84 % in the second quarter and 1.11% in the tenth quarter of the variation in economic growth (real gross domestic product). Innovations in oil revenue (OREV) has explained about 0.00% in the first quarter, 4.98% in the third quarter and 5.48%in the tenth quarter of the total forecast error variance of economic growth. Oil revenue (OREV) therefore is the most important variable in explaining the variation in economic growth in Nigeria apart from the "own shock". This is not unexpected because oil revenue accounts for over 80% of government revenue in Nigeria.

4.10 Test of hypotheses

H_o1: *There is no significant relationship between government revenue and public expenditure in Nigeria*.

The Johansen Cointegration result reveals that there is long-run equilibrium relationship between government revenue and other series in the model during the period under reference. The null hypothesis is therefore rejected.

H_o2: *There is no causal relationship between government revenue and expenditure in Nigeria..*

Furthermore, the VEC granger causality output revealed that there is a unidirectional causality from oil revenue to government expenditure between 1970 – 2015 hence the null hypothesis formulated is rejected, thus concluding that there is causal relationship between government revenue and public expenditure in Nigeria between 1970 to 2015.

4.11 Robustness checks

We performed certain diagnostic tests to ensure that our models yield robust estimates. These results are presented in the Appendice section. Based on the diagnostic tests, we can conclude that the modelling and results of all our models, including the VECM are robust and as such, we can make inference with greater certainty. The residual stability and autocorrelation test are presented hereunder.

4.11.1 Residual stability test

The inverse roots of Auto-Regressive characteristic Polynomial in appendice page suggest that the residuals of the models are stable. This is because the residual values do not fall outside the acceptance region. Base on the aforementioned, we conclude that the residuals are stable for the study period.

4.11.2 Autocorrelation test

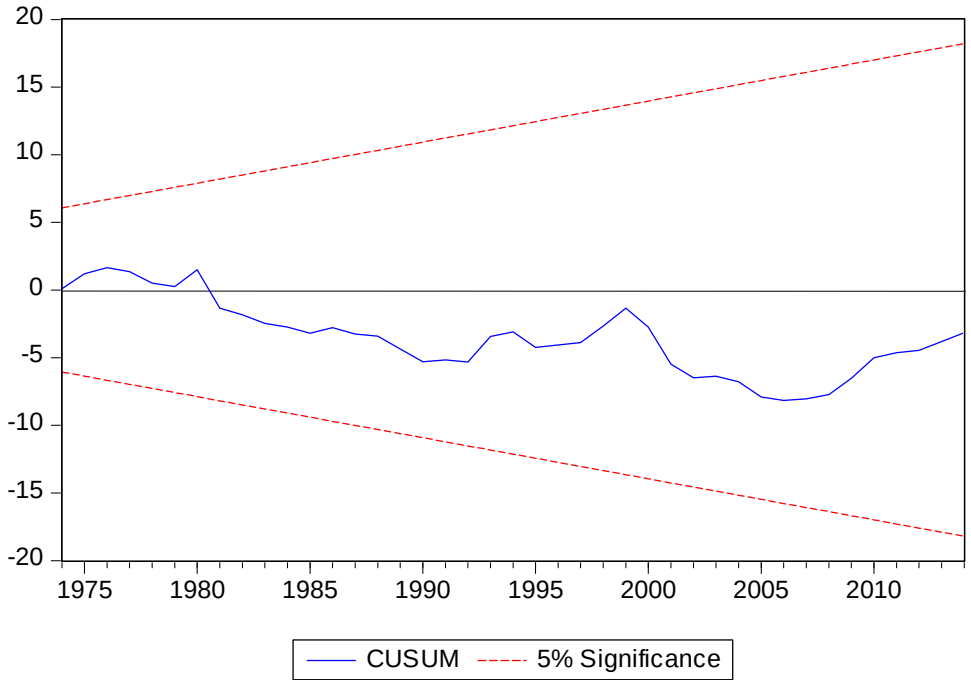
The VEC residual portmanteau test for autocorrelation was used to test for autocorrelation of the residuals. The result as contained in the appendice page accepts the null hypothesis of no residual autocorrelation up to lag h (lag maximum of 12). The decision was reached based on the insignificant values of the probability values.

4.11.3 Testing for structural breaks in the model

To bring this study to completion, it is important to test whether the short and long-term relationships found previously are stable over the entire period of the study. To do this, we must test for the stability of the model parameters. The methodology we use here is based on the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMSQ) tests proposed by Brown et al. (1975). Contrary to the Chow test which requires the breakpoints to be specified, the CUSUM tests may be used even when the breakpoints are not known. The CUSUM test uses the cumulative sum of recursive residuals based on the first *n* observations, and it is recursively updated and plotted against the breakpoint.

The CUSUMSQ test uses the recursive residuals squared and follows the same procedure. If the plots of the CUSUM and CUSUMSQ remain within the critical limits of the 5 per cent significance level, the null hypothesis that all the coefficients are stable cannot be rejected. However, if one or another of the parallel lines crosses, then the null hypothesis (of parameter stability) is rejected at the 5 per cent significance level. Figures 1 and 2 below present the respective results of the CUSUM and CUSUM of squares tests. In both Figures 3 and 4, the red lines colours represent the critical lower and upper bounds of the region indicating the 5 per cent significance level. The visual inspection of these graphs show no evidence of instability in the regression parameters over the study period, since both the cumulative sum of residuals and the cumulative sum of squared residuals lie within the critical limits of the 5 per cent level of significance.

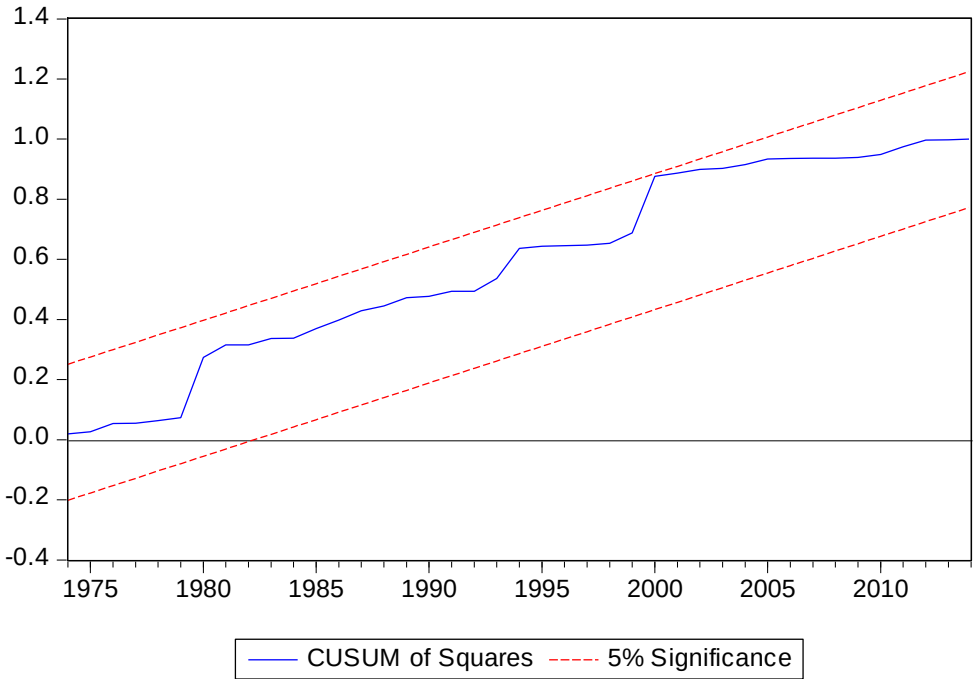
Fig. 5: CUSUM test for structural break



Source: Author's Computation using E-Views 8.0.

The straight lines represent critical bounds at 5% significance level

Fig. 6: CUSUMSQ test for structural break



Source: Author's Computation using E-Views 8.0

The straight lines represent critical bounds at 5% significance level.

Conclusively, since the plots of the CUSUM and CUSUMSQ remain within the red lines coloured critical limits of the 5 per cent significance level, the null hypothesis that all the coefficients are stable cannot be rejected, hence we conclude that the short and long-term relationships found previously are stable over the entire period of the study.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter summarizes the entire study as well as the conclusions and recommendations reached, based on the empirical findings of the study.

5.1 Summary

The purpose of this study is to examine the relationship between government revenue and government expenditure in Nigeria from 1970 to 2015. The broad objective of this research is to evaluate the relationship between government revenue and public expenditure in Nigeria, while the specific objectives are to examine the trend and pattern, the causal relationship as well as examine the effect of government revenue on government expenditure in Nigeria, with data sourced from the various issues of the Central Bank of Nigeria (CBN). Government revenue was disaggregated into Oil Revenue (OREV) and Non Oil Revenue (NOREV). Total Government Expenditure (TGEXP) which is the summation of both Capital expenditure and Recurrent expenditure, was also used. While Real Gross Domestic Product (RGDP) which is a proxy for economic growth was used as a control variable. The study employed descriptive analysis, unit root test, Johansen cointegration test, error correction mechanism, granger causality test, input response function and variance decomposition to analyse the data.

Using annual time series data, the fiscal variables were not stationary at level but became stationary at first difference. The Johansen Cointegration technique reveals the presence of two cointegrating equations indicating the existence of a long-run equilibrium relationship among Total Government Expenditure (TGEXP), Oil Revenue (OREV), Non-oil Revenue (NOREV) and economic growth proxied by Real Gross Domestic Product (RGDP) at 5% level of significance. The VECM results indicate that it is only the coefficient of oil revenue (OREV) that is correctly signed. The result above indicate that about 30% of the disequilibrium or distortion in the Nigerian economy is yearly being corrected for in the economy. This means that for long-run equilibrium to be restored in the system, it would take the Nigerian government three years and three months to bring the economy back to equilibrium path again.

Similarly, the granger causality result revealed the presence of causality running from oil revenue and total government expenditure to non-oil revenue in Nigeria. Likewise the

third section equally revealed a unidirectional causality from Oil Revenue (OREV) to Total Government Expenditure (TGEXP) at 1% significant level. The unidirectional causal relationship from oil revenue to government expenditure is a factual backing of goverment's over reliance on oil revenue to finance the yearly budget. This is in support of the Adolph Wagner's theory of increasing state activity. All the results are in line with Wagner Tax-Spend and Wiseman-Peacock Spend-Tax Hypothesis earlier enunciated in the literature.

These results are in agreement with findings by Ogujuiba *et al*. (2012), Emelogu *et al*. (2010), Aregbeyen et al. (2012) and Obioma et al. (2014) for Nigeria. Furthermore, the unidirectional causality from government expenditure to non-oil revenue is a factual proof of governemt's long term effort at revitalising the non oil sectors particularly agriculture, manufacturing and the mining sector in order to diversify its revenue source. This result supports the spend-tax hypothesis of Wiseman-Peacock. Furthermore, the finding is in line with Narayan et al. (2006) which found the spend-tax hypothesis to be valid for Haiti; Afonso et al. (2009) for EU states of France, Spain, Greece, Portugal and Italy. Similarly, the unidirectional causality from oil revenue to non-oil revenue (NOREV) is also true of happenings in the Nigerian economy. This is because since 1970 when oil commercialization began to date, the other sectors in the economy rely on proceeds from crude oil sale to develop.

Under variance decomposition it was discovered that economic growth (Real Gross Domestic Product (RGDP) has explained about 0.00% variation in total government spending in the first quarter, 1.83% in the fourth quarter, 2.01 % in the seventh quarter and 2.08 % in the tenth quarter. Oil revenue is the most important variable in explaining the variation in government expenditure and economic growth apart from their "own shocks". This further explains the importance oil revenue holds in driving the economy of Nigeria.

An interesting result emanating from the impulse-response analysis showed that response of oil revenue (OREV) to the shock in total government spending was positive throughout the period of analysis. The response of oil revenue to the shocks in oil revenue in the first quarter was positive and this remains on the positive note throughout the rest of the period. The response of oil revenue to a shock in non-oil revenue was positive in the first quarter and up to the tenth quarter it remained positive. The response of oil revenue to shock in economic growth proxied by real gross domestic product in the first quarter through the tenth quarter was negative, implying that revenue accruing to the nation from

crude oil sales is not judiciously utilized to grow the Nigerian economy hence the negative response from oil revenue to economic growth.

5.2 Conclusion

Conclusively, there is long-run equilibrium relationship between government revenue and public expenditure in Nigeria at 5% level of significance. In the same vein, empirical evidence revealed a unidirectional causality running from oil revenue and total government expenditure to non-oil revenue in Nigeria and from Oil Revenue (OREV) to Total Government Expenditure (TGEXP) within the period under reference.

The negative response of oil revenue to shock in economic growth throughout the quarters implied that revenue accruing to the nation from crude oil sales is not judiciously utilized to grow the Nigerian economy. Furthermore, oil revenue remained the most important variable in explaining the variation in government expenditure and economic growth apart from their "own shocks". This goes to explain the importance oil revenue holds in driving the economy of Nigeria.

5.3 Policy Recommendations

Major policy recommendations among others include:

(i) Owing to the prolonged and sustained drop in crude oil revenue, government should as a matter of urgency take concrete steps towards diversifying the economy into other potential revenue yielding sectors like agriculture, manufacturing, the service sectors and solid minerals development of which Nigeria is naturally endowed in abundance;

(ii) Government should design workable fiscal policy tools aimed at harnessing all direct and indirect tax revenue sources. This is achievable by making tax administration agencies more functional through training and conducive working environment;

(iii) Attention should be given to capital spending more than recurrent expenditure as this is more growth enhancing;

(iv) Government should consolidate on the gains of the Sovereign Wealth Fund (SWF) as that will provide a vehicle for excess crude oil revenue to be prudently invested and managed to yield returns for sustaining government expenditure in the rainy days.

(v) The various anti-corruption agencies like Economic and Financial Crimes Commission (EFCC), Independent Corrupt Practices and Other Related Offences Commission (ICPC) etc should be strengthened and laws promulgated to check the tendency by most Nigerian leaders and bureaucrats to pilfer and misappropriate government funds;

(vi) Finally, for government to succeed in its diversification campaign, it must also strengthen the various security agencies towards curtailing the mounting security challenges plaguing the nation. Foreign investors can only invest in the economy when they are sure that their lives and investments will be protected.

5.4 Contribution to Knowledge

The study aims at enriching the literature on this area of study. In addition, the study would guide policy makers to formulate policies that will take the nation out of its present economic challenges occasioned by the fall in oil revenue and encourage the diversification of the nation's economy. For the academics, it is a stepping stone for future research. It is to serve as a reference material for students in public sector economics and other related field in the management science.

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APPENDIX I:

YEAR	CAP_EXP	REC_EXP
1970	187.8	716.1
1971	173.6	823.6
1972	451.3	1012.3
1973	565.7	963.5
1974	1223.5	1517.1
1975	3207.7	2734.9
1976	4041.3	3815.4
1977	5004.6	3819.2
1978	5200.0	2800.0
1979	4219.5	3187.2
1980	10163.4	4805.2
1981	6567.0	4846.7
1982	6417.2	5506.0
1983	4885.7	4750.8
1984	4100.1	5827.5
1985	5464.7	7576.4
1986	8526.8	7696.9
1987	6372.8	15646.2
1988	8340.1	19409.4
1989	15034.1	25994.2
1990	24048.6	36219.6
1991	28340.9	38243.5
1992	39763.3	53034.1
1993	54501.8	136727.1
1994	70918.3	89974.9
1995	121138.3	127629.8
1996	212926.3	124491.3
1997	269651.7	158563.5
1998	309015.6	178097.8
1999	498027.6	449662.4
2000	239450.9	461600.0
2001	438696.5	579300.0
2002	321378.1	696800.0
2003	241688.3	984300.0
2004	351300.0	1032700.0
2005	241688.3	1223700.0
2006	519500.0	1290202.0
2007	759323.0	1589270.0
2008	960900.0	2117400.0
2009	1152800.0	2127970.0
2010	883870.0	3109440.0
2011	918550.0	3314440.0
2012	874840.0	3325160.0
2013	1108390.0	3689080.0
2014	2681080.0	2530340.0
2015	2018350.0	3831098.0

Source: World Bank Development Indicators (2015)

APPENDIX II:

LOG DATA

YEAR	OREV	NOREV	TGEXP	RGDP
1970	6.147185	5.115596	6.806719	8.347353
1971	6.490268	6.234607	6.904951	8.458610
1972	6.462717	6.638960	7.288654	8.495520
1973	6.521063	6.923629	7.332500	8.577347
1974	6.701223	8.222554	7.915932	9.675313
1975	7.125444	8.359720	8.689902	10.20994
1976	7.244727	8.587689	8.969122	10.28009
1977	7.581618	7.467257	9.085208	10.35839
1978	7.942789	8.424156	8.987197	10.28235
1979	7.616579	9.091647	8.910140	10.30722
1980	7.965615	9.421679	9.613710	10.35923
1981	9.055369	8.460856	9.342570	9.632860
1982	8.963787	8.193898	9.386241	9.614810
1983	8.889170	8.088163	9.173313	9.536021
1984	9.020293	8.001053	9.203074	9.530920
1985	9.298690	8.325233	9.475861	9.612728
1986	9.000520	8.409274	9.694228	9.631547
1987	9.853614	8.756777	9.999661	9.633248
1988	9.895037	8.957382	10.23097	9.693715
1989	10.57466	9.598313	10.62202	9.758154
1990	11.18285	10.17410	11.00656	9.868152
1991	11.32257	9.816032	11.10623	9.862617
1992	12.00810	10.18018	11.43817	9.884314
1993	11.99598	10.33094	12.16123	9.899881
1994	11.98413	10.63870	11.98850	9.902443
1995	12.69019	11.81628	12.42428	9.920994
1996	12.92094	11.65107	12.72908	9.960714
1997	12.94039	12.06876	12.96738	9.989165
1998	12.68946	11.84437	13.09625	10.01381
1999	13.49313	12.32281	13.76178	10.01902
2000	14.28030	12.65869	13.46034	10.07274
2001	14.35058	14.35058	13.83335	10.13728
2002	14.02322	14.02322	13.83353	10.27359
2003	14.54512	13.12399	14.01926	10.36437
2004	15.02590	13.24582	14.14049	10.46369
2005	15.37626	13.57357	14.19763	10.53143
2006	15.48087	13.42622	14.40867	10.59652
2007	15.31131	13.99850	14.66933	10.66715
2008	15.69201	14.10516	14.93989	10.73667
2009	14.97614	14.31789	15.00359	10.81690
2010	15.50134	14.46135	15.20013	10.90801
2011	15.99920	14.62104	15.25842	10.95973
2012	15.89819	14.78203	15.25060	11.00093
2013	15.73379	14.89751	15.38360	11.05436
2014	15.73151	15.00187	15.46636	11.11473
2015	15.15060	14.90758	15.35238	11.14221

Source: World Bank Development Indicators (2015)

APPENDIX III:

RAW DATA

YEAR	OREV	NOREV	TGEXP	RGDP
1970	467.4	166.6	903.90	4219.000
1971	658.7	510.1	997.20	4715.500
1972	640.8	764.3	1463.60	4892.800
1973	679.3	1016.0	1529.20	5310.000
1974	813.4	3724.0	2740.60	15919.70
1975	1243.2	4271.5	5942.60	27172.02
1976	1400.7	5365.2	7856.70	29146.51
1977	1961.8	1749.8	8823.80	31520.34
1978	2815.2	4555.8	8000.00	29212.35
1979	2031.6	8880.8	7406.70	29947.99
1980	2880.2	12353.3	14968.60	31546.76
1981	8564.4	4726.1	11413.70	15258.00
1982	7814.9	3618.8	11923.20	14985.08
1983	7253.0	3255.7	9636.50	13849.73
1984	8269.2	2984.1	9927.60	13779.26
1985	10923.7	4126.7	13041.10	14953.91
1986	8107.3	4488.5	16223.70	15237.99
1987	19027.0	6353.6	22019.00	15263.93
1988	19831.7	7765.0	27749.50	16215.37
1989	39130.5	14739.9	41028.30	17294.68
1990	71887.1	26215.3	60268.20	19305.63
1991	82666.4	18325.2	66584.40	19199.06
1992	164078.1	26375.1	92797.40	19620.19
1993	162102.4	30667.0	191228.90	19927.99
1994	160192.4	41718.4	160893.20	19979.12
1995	324547.6	135439.7	248768.10	20353.20
1996	408783.0	114814.0	337417.60	21177.92
1997	416811.1	174339.9	428215.20	21789.10
1998	324311.2	139297.6	487113.40	22332.87
1999	724422.5	224765.4	947690.00	22449.41
2000	1591675.8	314483.9	701050.90	23688.28
2001	1707562.8	1707563.0	1017997.00	25267.54
2002	1230851.2	1230851.0	1018178.00	28957.71
2003	2074280.6	500815.3	1225988.00	31709.45
2004	3354800.0	565700.0	1384000.00	35020.55
2005	4762400.0	785100.0	1465388.00	37474.95
2006	5287566.9	677535.0	1809702.00	39995.50
2007	4462910.0	1200800.0	2348593.00	42922.41
2008	6530630.1	1335960.0	3078300.00	46012.52
2009	3191940.0	1652650.0	3280770.00	49856.10
2010	5396900.0	1907580.0	3993310.00	54612.26
2011	8878970.0	2237880.0	4232990.00	57511.04
2012	8025970.0	2628780.0	4200000.00	59929.89
2013	6809230.0	2950560.0	4797470.00	63218.72
2014	6793720.0	3275120.0	5211420.00	67152.79
2015	3800320.0	2980435.0	4650000.33	69023.93

Source: World Bank Development Indicators (2015)

APPENDIX IV: AUGMENTED DICKEY FULLER UNIT ROOT TEST

RGDP AT LEVEL

Null Hypothesis: LOG(RGDP) has a unit root
Exogenous: Constant
Lag Length: 7 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		2.151534	0.9999
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOG(RGDP))
Method: Least Squares
Date: 06/06/17 Time: 16:12
Sample (adjusted): 1978 2015
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(RGDP(-1))	0.081557	0.037907	2.151534	0.0399
D(LOG(RGDP(-1)))	-0.241139	0.123454	-1.953265	0.0605
D(LOG(RGDP(-2)))	0.086574	0.114819	0.753997	0.4569
D(LOG(RGDP(-3)))	0.006515	0.104562	0.062305	0.9507
D(LOG(RGDP(-4)))	-0.081023	0.070957	-1.141861	0.2629
D(LOG(RGDP(-5)))	0.018664	0.069127	0.269995	0.7891
D(LOG(RGDP(-6)))	-0.047235	0.069122	-0.683352	0.4998
D(LOG(RGDP(-7)))	-0.474970	0.069464	-6.837691	0.0000
C	-0.770071	0.380779	-2.022357	0.0524

R-squared	0.683506	Mean dependent var	0.020627
Adjusted R-squared	0.596198	S.D. dependent var	0.132229
S.E. of regression	0.084026	Akaike info criterion	-1.911994
Sum squared resid	0.204749	Schwarz criterion	-1.524144
Log likelihood	45.32788	Hannan-Quinn criter.	-1.774000
F-statistic	7.828628	Durbin-Watson stat	2.109202
Prob(F-statistic)	0.000015		

RGDP AT 1ST DIFFERENCE

Null Hypothesis: D(LOG(RGDP)) has a unit root
Exogenous: Constant
Lag Length: 6 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.956255	0.0000
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOG(RGDP),2)
Method: Least Squares
Date: 06/06/17 Time: 16:06
Sample (adjusted): 1978 2015
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOG(RGDP(-1)))	-1.397320	0.200872	-6.956255	0.0000
D(LOG(RGDP(-1)),2)	0.258767	0.163867	1.579135	0.1248
D(LOG(RGDP(-2)),2)	0.426619	0.128616	3.316999	0.0024
D(LOG(RGDP(-3)),2)	0.491520	0.105037	4.679474	0.0001
D(LOG(RGDP(-4)),2)	0.413516	0.096973	4.264234	0.0002
D(LOG(RGDP(-5)),2)	0.460753	0.081284	5.668423	0.0000
D(LOG(RGDP(-6)),2)	0.436616	0.071082	6.142421	0.0000
C	0.048518	0.016292	2.978057	0.0057

R-squared	0.801848	Mean dependent var	-0.001337
Adjusted R-squared	0.755613	S.D. dependent var	0.179957
S.E. of regression	0.088963	Akaike info criterion	-1.816530
Sum squared resid	0.237432	Schwarz criterion	-1.471775
Log likelihood	42.51406	Hannan-Quinn criter.	-1.693868
F-statistic	17.34271	Durbin-Watson stat	1.867696
Prob(F-statistic)	0.000000		

OREV AT LEVEL

Null Hypothesis: LOG(OREV) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.305836	0.6189
Test critical values:	1% level	-3.584743	
	5% level	-2.928142	
	10% level	-2.602225	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOG(OREV))
Method: Least Squares
Date: 06/06/17 Time: 16:12
Sample (adjusted): 1971 2015
Included observations: 45 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(OREV(-1))	-0.022922	0.017554	-1.305836	0.1986
C	0.461648	0.208422	2.214970	0.0321

R-squared	0.038143	Mean dependent var	0.200076
Adjusted R-squared	0.015775	S.D. dependent var	0.389347
S.E. of regression	0.386264	Akaike info criterion	0.978833
Sum squared resid	6.415582	Schwarz criterion	1.059129
Log likelihood	-20.02375	Hannan-Quinn criter.	1.008767
F-statistic	1.705208	Durbin-Watson stat	2.182247
Prob(F-statistic)	0.198551		

OREV AT 1ST DIFFERENCE

Null Hypothesis: D(LOG(OREV)) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.056733	0.0000
Test critical values:	1% level	-3.588509	
	5% level	-2.929734	
	10% level	-2.603064	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOG(OREV),2)
Method: Least Squares
Date: 06/06/17 Time: 16:07
Sample (adjusted): 1972 2015
Included observations: 44 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOG(OREV(-1)))	-1.132697	0.160513	-7.056733	0.0000
C	0.225730	0.069013	3.270822	0.0021

R-squared	0.542471	Mean dependent var	-0.021000
Adjusted R-squared	0.531578	S.D. dependent var	0.576677
S.E. of regression	0.394685	Akaike info criterion	1.022934
Sum squared resid	6.542617	Schwarz criterion	1.104033
Log likelihood	-20.50454	Hannan-Quinn criter.	1.053009
F-statistic	49.79748	Durbin-Watson stat	1.942615
Prob(F-statistic)	0.000000		

NOREV AT LEVEL

Null Hypothesis: LOG(NOREV) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.462542	0.5432
Test critical values:	1% level	-3.584743	
	5% level	-2.928142	
	10% level	-2.602225	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOG(NOREV))
Method: Least Squares
Date: 06/06/17 Time: 16:13
Sample (adjusted): 1971 2015
Included observations: 45 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(NOREV(-1))	-0.041642	0.028472	-1.462542	0.1509
C	0.664289	0.315449	2.105852	0.0411

R-squared	0.047388	Mean dependent var	0.217600
Adjusted R-squared	0.025234	S.D. dependent var	0.536157
S.E. of regression	0.529349	Akaike info criterion	1.609091
Sum squared resid	12.04907	Schwarz criterion	1.689387
Log likelihood	-34.20454	Hannan-Quinn criter.	1.639024
F-statistic	2.139031	Durbin-Watson stat	2.031556
Prob(F-statistic)	0.150864		

NOREV AT 1ST DIFFERENCE

Null Hypothesis: D(LOG(NOREV)) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.997555	0.0000
Test critical values:	1% level	-3.588509	
	5% level	-2.929734	
	10% level	-2.603064	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOG(NOREV),2)
Method: Least Squares
Date: 06/06/17 Time: 16:07
Sample (adjusted): 1972 2015
Included observations: 44 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOG(NOREV(-1)))	-1.046594	0.149566	-6.997555	0.0000
C	0.207582	0.086656	2.395465	0.0211

R-squared	0.538288	Mean dependent var	-0.027575
Adjusted R-squared	0.527295	S.D. dependent var	0.770621
S.E. of regression	0.529829	Akaike info criterion	1.611865
Sum squared resid	11.79019	Schwarz criterion	1.692964
Log likelihood	-33.46102	Hannan-Quinn criter.	1.641940
F-statistic	48.96578	Durbin-Watson stat	2.036017
Prob(F-statistic)	0.000000		

TGEXP AT LEVEL

Null Hypothesis: LOG(TGEXP) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.599762	0.4743
Test critical values:	1% level	-3.588509	
	5% level	-2.929734	
	10% level	-2.603064	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOG(TGEXP))
Method: Least Squares
Date: 06/06/17 Time: 16:14
Sample (adjusted): 1972 2015
Included observations: 44 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(TGEXP(-1))	-0.023171	0.014484	-1.599762	0.1173
D(LOG(TGEXP(-1)))	-0.161646	0.152862	-1.057466	0.2965
C	0.493732	0.177758	2.777547	0.0082

R-squared	0.077254	Mean dependent var	0.191987
Adjusted R-squared	0.032242	S.D. dependent var	0.254441
S.E. of regression	0.250305	Akaike info criterion	0.133475
Sum squared resid	2.568763	Schwarz criterion	0.255125
Log likelihood	0.063540	Hannan-Quinn criter.	0.178589
F-statistic	1.716308	Durbin-Watson stat	1.930917
Prob(F-statistic)	0.192389		

TGEXP AT 1ST DIFFERENCE

Null Hypothesis: D(LOG(TGEXP)) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.361337	0.0000
Test critical values:	1% level	-3.588509	
	5% level	-2.929734	
	10% level	-2.603064	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOG(TGEXP),2)
Method: Least Squares
Date: 06/06/17 Time: 16:08
Sample (adjusted): 1972 2015
Included observations: 44 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOG(TGEXP(-1)))	-1.142414	0.155191	-7.361337	0.0000
C	0.220015	0.049088	4.482022	0.0001

R-squared	0.563361	Mean dependent var	-0.004823
Adjusted R-squared	0.552965	S.D. dependent var	0.381254
S.E. of regression	0.254909	Akaike info criterion	0.148571
Sum squared resid	2.729106	Schwarz criterion	0.229670
Log likelihood	-1.268555	Hannan-Quinn criter.	0.178646
F-statistic	54.18928	Durbin-Watson stat	1.902859
Prob(F-statistic)	0.000000		

PHILIP-PERRON UNIT ROOT TEST

RGDP AT LEVEL

Null Hypothesis: LOG(RGDP) has a unit root
Exogenous: Constant
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.101167	0.2452
Test critical values:	1% level	-3.584743	
	5% level	-2.928142	
	10% level	-2.602225	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.040684
HAC corrected variance (Bartlett kernel)	0.058821

Phillips-Perron Test Equation
Dependent Variable: D(LOG(RGDP))
Method: Least Squares
Date: 06/06/17 Time: 16:14
Sample (adjusted): 1971 2015
Included observations: 45 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(RGDP(-1))	-0.097148	0.047039	-2.065247	0.0450
C	1.035775	0.472456	2.192323	0.0338

R-squared	0.090241	Mean dependent var	0.062108
Adjusted R-squared	0.069083	S.D. dependent var	0.213859
S.E. of regression	0.206339	Akaike info criterion	-0.275163
Sum squared resid	1.830764	Schwarz criterion	-0.194867
Log likelihood	8.191170	Hannan-Quinn criter.	-0.245230
F-statistic	4.265244	Durbin-Watson stat	1.377450
Prob(F-statistic)	0.044961		

RGDP AT 1ST DIFFERENCE

Null Hypothesis: D(LOG(RGDP)) has a unit root
Exogenous: Constant
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.707155	0.0004
Test critical values:	1% level	-3.588509	
	5% level	-2.929734	
	10% level	-2.603064	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.041267
HAC corrected variance (Bartlett kernel)	0.041559

Phillips-Perron Test Equation
Dependent Variable: D(LOG(RGDP),2)
Method: Least Squares
Date: 06/06/17 Time: 16:09
Sample (adjusted): 1972 2015
Included observations: 44 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOG(RGDP(-1)))	-0.689319	0.146617	-4.701483	0.0000
C	0.041451	0.032674	1.268609	0.2116

R-squared	0.344814	Mean dependent var	-0.001904
Adjusted R-squared	0.329214	S.D. dependent var	0.253871
S.E. of regression	0.207925	Akaike info criterion	-0.258894
Sum squared resid	1.815770	Schwarz criterion	-0.177794
Log likelihood	7.695668	Hannan-Quinn criter.	-0.228818
F-statistic	22.10394	Durbin-Watson stat	1.984423
Prob(F-statistic)	0.000028		

OREV AT LEVEL

Null Hypothesis: LOG(OREV) has a unit root
Exogenous: Constant
Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.465842	0.5416
Test critical values:	1% level	-3.584743	
	5% level	-2.928142	
	10% level	-2.602225	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.142568
HAC corrected variance (Bartlett kernel)	0.089688

Phillips-Perron Test Equation
Dependent Variable: D(LOG(OREV))
Method: Least Squares
Date: 06/06/17 Time: 16:15
Sample (adjusted): 1971 2015
Included observations: 45 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(OREV(-1))	-0.022922	0.017554	-1.305836	0.1986
C	0.461648	0.208422	2.214970	0.0321

R-squared	0.038143	Mean dependent var	0.200076
Adjusted R-squared	0.015775	S.D. dependent var	0.389347
S.E. of regression	0.386264	Akaike info criterion	0.978833
Sum squared resid	6.415582	Schwarz criterion	1.059129
Log likelihood	-20.02375	Hannan-Quinn criter.	1.008767
F-statistic	1.705208	Durbin-Watson stat	2.182247
Prob(F-statistic)	0.198551		

OREV AT 1ST DIFFERENCE

Null Hypothesis: D(LOG(OREV)) has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-7.127847	0.0000
Test critical values:	1% level	-3.588509	
	5% level	-2.929734	
	10% level	-2.603064	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.148696
HAC corrected variance (Bartlett kernel)	0.116642

Phillips-Perron Test Equation
Dependent Variable: D(LOG(OREV),2)
Method: Least Squares
Date: 06/06/17 Time: 16:11
Sample (adjusted): 1972 2015
Included observations: 44 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOG(OREV(-1)))	-1.132697	0.160513	-7.056733	0.0000
C	0.225730	0.069013	3.270822	0.0021

R-squared	0.542471	Mean dependent var	-0.021000
Adjusted R-squared	0.531578	S.D. dependent var	0.576677
S.E. of regression	0.394685	Akaike info criterion	1.022934
Sum squared resid	6.542617	Schwarz criterion	1.104033
Log likelihood	-20.50454	Hannan-Quinn criter.	1.053009
F-statistic	49.79748	Durbin-Watson stat	1.942615
Prob(F-statistic)	0.000000		

NOREV AT LEVEL

Null Hypothesis: LOG(NOREV) has a unit root
Exogenous: Constant
Bandwidth: 10 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.493023	0.5280
Test critical values:	1% level	-3.584743	
	5% level	-2.928142	
	10% level	-2.602225	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.267757
HAC corrected variance (Bartlett kernel)	0.216670

Phillips-Perron Test Equation
Dependent Variable: D(LOG(NOREV))
Method: Least Squares
Date: 06/06/17 Time: 16:15
Sample (adjusted): 1971 2015
Included observations: 45 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(NOREV(-1))	-0.041642	0.028472	-1.462542	0.1509
C	0.664289	0.315449	2.105852	0.0411

R-squared	0.047388	Mean dependent var	0.217600
Adjusted R-squared	0.025234	S.D. dependent var	0.536157
S.E. of regression	0.529349	Akaike info criterion	1.609091
Sum squared resid	12.04907	Schwarz criterion	1.689387
Log likelihood	-34.20454	Hannan-Quinn criter.	1.639024
F-statistic	2.139031	Durbin-Watson stat	2.031556
Prob(F-statistic)	0.150864		

NOREV AT 1ST DIFFERENCE

Null Hypothesis: D(LOG(NOREV)) has a unit root
Exogenous: Constant
Bandwidth: 35 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-11.94611	0.0000
Test critical values:	1% level	-3.588509	
	5% level	-2.929734	
	10% level	-2.603064	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.267959
HAC corrected variance (Bartlett kernel)	0.032737

Phillips-Perron Test Equation
Dependent Variable: D(LOG(NOREV),2)
Method: Least Squares
Date: 06/06/17 Time: 16:10
Sample (adjusted): 1972 2015
Included observations: 44 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOG(NOREV(-1)))	-1.046594	0.149566	-6.997555	0.0000
C	0.207582	0.086656	2.395465	0.0211

R-squared	0.538288	Mean dependent var	-0.027575
Adjusted R-squared	0.527295	S.D. dependent var	0.770621
S.E. of regression	0.529829	Akaike info criterion	1.611865
Sum squared resid	11.79019	Schwarz criterion	1.692964
Log likelihood	-33.46102	Hannan-Quinn criter.	1.641940
F-statistic	48.96578	Durbin-Watson stat	2.036017
Prob(F-statistic)	0.000000		

TGEXP AT LEVEL

Null Hypothesis: LOG(TGEXP) has a unit root
Exogenous: Constant
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.445647	0.5516
Test critical values:	1% level	-3.584743	
	5% level	-2.928142	
	10% level	-2.602225	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.059449
HAC corrected variance (Bartlett kernel)	0.049793

Phillips-Perron Test Equation
Dependent Variable: D(LOG(TGEXP))
Method: Least Squares
Date: 06/06/17 Time: 16:16
Sample (adjusted): 1971 2015
Included observations: 45 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(TGEXP(-1))	-0.019037	0.013869	-1.372586	0.1770
C	0.409622	0.164338	2.492561	0.0166

R-squared	0.041975	Mean dependent var	0.189904
Adjusted R-squared	0.019695	S.D. dependent var	0.251921
S.E. of regression	0.249428	Akaike info criterion	0.104131
Sum squared resid	2.675209	Schwarz criterion	0.184427
Log likelihood	-0.342948	Hannan-Quinn criter.	0.134065
F-statistic	1.883993	Durbin-Watson stat	2.292880
Prob(F-statistic)	0.176998		

TGEXP AT 1ST DIFFERENCE

Null Hypothesis: D(LOG(TGEXP)) has a unit root
Exogenous: Constant
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-7.334577	0.0000
Test critical values:	1% level	-3.588509	
	5% level	-2.929734	
	10% level	-2.603064	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.062025
HAC corrected variance (Bartlett kernel)	0.069205

Phillips-Perron Test Equation
Dependent Variable: D(LOG(TGEXP),2)
Method: Least Squares
Date: 06/06/17 Time: 16:09
Sample (adjusted): 1972 2015
Included observations: 44 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOG(TGEXP(-1)))	-1.142414	0.155191	-7.361337	0.0000
C	0.220015	0.049088	4.482022	0.0001

R-squared	0.563361	Mean dependent var	-0.004823
Adjusted R-squared	0.552965	S.D. dependent var	0.381254
S.E. of regression	0.254909	Akaike info criterion	0.148571
Sum squared resid	2.729106	Schwarz criterion	0.229670
Log likelihood	-1.268555	Hannan-Quinn criter.	0.178646
F-statistic	54.18928	Durbin-Watson stat	1.902859
Prob(F-statistic)	0.000000		

APPENDIX V:

VAR Lag Order Selection Criteria
Endogenous variables: OREV NOREV TGEXP RGDP
Exogenous variables: C
Date: 06/09/17 Time: 08:42
Sample: 1970 2015
Included observations: 42

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-2297.858	NA	4.72e+42	109.6123	109.7778	109.6730
1	-2181.696	204.6677	4.02e+40	104.8427	105.6701	105.1460
2	-2149.937	49.90652	1.94e+40	104.0922	105.5817*	104.6382
3	-2139.558	14.33288	2.69e+40	104.3599	106.5113	105.1485
4	-2105.747	40.25182*	1.29e+40*	103.5117*	106.3251	104.5430*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

APPENDIX VI: COINTEGRATION TEST

Date: 06/06/17 Time: 16:17
Sample (adjusted): 1972 2015
Included observations: 44 after adjustments
Trend assumption: Linear deterministic trend
Series: OREV NOREV TGEXP RGDP
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.682943	94.92194	47.85613	0.0000
At most 1 *	0.513364	44.38026	29.79707	0.0006
At most 2	0.230543	12.68975	15.49471	0.1267
At most 3	0.025989	1.158660	3.841466	0.2817

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.682943	50.54169	27.58434	0.0000
At most 1 *	0.513364	31.69050	21.13162	0.0012
At most 2	0.230543	11.53109	14.26460	0.1295
At most 3	0.025989	1.158660	3.841466	0.2817

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

OREV	NOREV	TGEXP	RGDP
-1.39E-06	-2.11E-07	1.91E-06	1.36E-05
-3.77E-07	-4.93E-06	3.76E-06	-4.51E-07
-5.32E-08	-3.23E-07	-1.54E-06	0.000171
-5.63E-07	1.49E-06	5.28E-07	3.96E-05

Unrestricted Adjustment Coefficients (alpha):

D(OREV)	270526.9	198409.3	76775.47	-149151.6
D(NOREV)	-69743.86	189937.9	-6135.118	3138.647
D(TGEXP)	-135019.4	52480.86	16563.68	-17998.44
D(RGDP)	-568.9514	-64.78360	-1559.061	-142.9606

1 Cointegrating Equation(s): Log likelihood -2273.666

Normalized cointegrating coefficients (standard error in parentheses)

OREV	NOREV	TGEXP	RGDP
1.000000	0.151587	-1.367396	-9.734482

	(0.40402)	(0.28287)	(13.7319)

Adjustment coefficients (standard error in parentheses)

D(OREV)	-0.377261		
	(0.22534)		
D(NOREV)	0.097261		
	(0.06115)		
D(TGEXP)	0.188290		
	(0.03750)		
D(RGDP)	0.000793		
	(0.00077)		

2 Cointegrating Equation(s): Log likelihood -2257.820

Normalized cointegrating coefficients (standard error in parentheses)

OREV	NOREV	TGEXP	RGDP
1.000000	0.000000	-1.266679	-9.862620
		(0.15589)	(13.9103)
0.000000	1.000000	-0.664414	0.845311
		(0.06397)	(5.70800)

Adjustment coefficients (standard error in parentheses)

D(OREV)	-0.452079	-1.035975
	(0.22876)	(0.78188)
D(NOREV)	0.025637	-0.922253
	(0.04508)	(0.15407)
D(TGEXP)	0.168500	-0.230355
	(0.03685)	(0.12596)
D(RGDP)	0.000818	0.000440
	(0.00079)	(0.00271)

3 Cointegrating Equation(s): Log likelihood -2252.055

Normalized cointegrating coefficients (standard error in parentheses)

OREV	NOREV	TGEXP	RGDP
1.000000	0.000000	0.000000	-128.7333
			(19.3715)
0.000000	1.000000	0.000000	-61.50623
			(9.82649)
0.000000	0.000000	1.000000	-93.84435
			(14.2768)

Adjustment coefficients (standard error in parentheses)

D(OREV)	-0.456163	-1.060805	1.142772
	(0.22820)	(0.78113)	(0.70787)
D(NOREV)	0.025963	-0.920269	0.589729
	(0.04508)	(0.15432)	(0.13985)
D(TGEXP)	0.167619	-0.235712	-0.085881
	(0.03667)	(0.12553)	(0.11376)
D(RGDP)	0.000901	0.000944	0.001072
	(0.00071)	(0.00242)	(0.00219)

APPENDIX VII

Vector Error Correction Estimates
Date: 06/06/17 Time: 15:56
Sample (adjusted): 1973 2015
Included observations: 43 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
OREV(-1)	1.000000
NOREV(-1)	-1.194532 (0.49528) [-2.41183]
TGEXP(-1)	-0.622481 (0.35161) [-1.77038]
RGDP(-1)	-7.504264 (13.7680) [-0.54505]
C	-199002.5

Error Correction:	D(OREV)	D(NOREV)	D(TGEXP)	D(RGDP)
CointEq1	-0.302036 (0.36462) [-0.82835]	0.258759 (0.08013) [3.22919]	0.219028 (0.05730) [3.82261]	0.000417 (0.00128) [0.32641]
D(OREV(-1))	-0.082614 (0.30720) [-0.26892]	-0.125477 (0.06751) [-1.85857]	-0.218041 (0.04828) [-4.51662]	-0.000430 (0.00108) [-0.40013]
D(OREV(-2))	0.059663 (0.36288) [0.16442]	-0.186664 (0.07975) [-2.34069]	-0.040248 (0.05702) [-0.70580]	0.000153 (0.00127) [0.12044]
D(NOREV(-1))	-0.763333 (0.79979) [-0.95441]	0.231680 (0.17577) [1.31812]	0.062743 (0.12568) [0.49922]	0.000511 (0.00280) [0.18241]
D(NOREV(-2))	-1.172295 (0.66518) [-1.76237]	-0.285183 (0.14618) [-1.95086]	0.095194 (0.10453) [0.91069]	0.000442 (0.00233) [0.18962]
D(TGEXP(-1))	1.225295 (1.41675) [0.86486]	-0.649915 (0.31135) [-2.08740]	-0.006087 (0.22263) [-0.02734]	0.002248 (0.00496) [0.45309]
D(TGEXP(-2))	0.121401 (1.02687) [0.11822]	0.638803 (0.22567) [2.83072]	0.016436 (0.16137) [0.10185]	0.000284 (0.00360) [0.07901]
D(RGDP(-1))	19.74567 (49.5322) [0.39864]	-0.639411 (10.8854) [-0.05874]	2.797601 (7.78366) [0.35942]	0.232623 (0.17345) [1.34116]

D(RGDP(-2))	8.097979	-2.199883	1.357577	0.050017
	(49.7787)	(10.9396)	(7.82241)	(0.17431)
	[0.16268]	[-0.20109]	[0.17355]	[0.28694]
C	28738.17	132040.1	130593.8	755.5027
	(265344.)	(58313.3)	(41697.2)	(929.168)
	[0.10831]	[2.26432]	[3.13196]	[0.81310]
R-squared	0.168416	0.445645	0.570375	0.134329
Adj. R-squared	-0.058380	0.294458	0.453205	-0.101763
Sum sq. resids	4.14E+13	2.00E+12	1.02E+12	5.07E+08
S.E. equation	1119500.	246026.2	175922.2	3920.203
F-statistic	0.742589	2.947630	4.867917	0.568969
Log likelihood	-654.2443	-589.0908	-574.6688	-411.1011
Akaike AIC	30.89509	27.86469	27.19390	19.58610
Schwarz SC	31.30467	28.27427	27.60348	19.99568
Mean dependent	88364.63	69294.67	108105.5	1491.422
S.D. dependent	1088186.	292900.3	237907.7	3734.775

Determinant resid covariance (dof adj.)	1.37E+40
Determinant resid covariance	4.74E+39
Log likelihood	-2208.238
Akaike information criterion	104.7552
Schwarz criterion	106.5574

APPENDIX VIII:
VEC Granger Causality/Block Exogeneity Wald Tests
Date: 06/06/17 Time: 15:57
Sample: 1970 2015
Included observations: 43

Dependent variable: D(OREV)

Excluded	Chi-sq	df	Prob.
D(NOREV)	3.802938	2	0.1493
D(TGEXP)	0.889003	2	0.6411
D(RGDP)	0.231026	2	0.8909
All	4.126240	6	0.6596

Dependent variable: D(NOREV)

Excluded	Chi-sq	df	Prob.
D(OREV)	5.620807	2	0.0602
D(TGEXP)	9.831266	2	0.0073
D(RGDP)	0.052849	2	0.9739
All	11.37639	6	0.0774

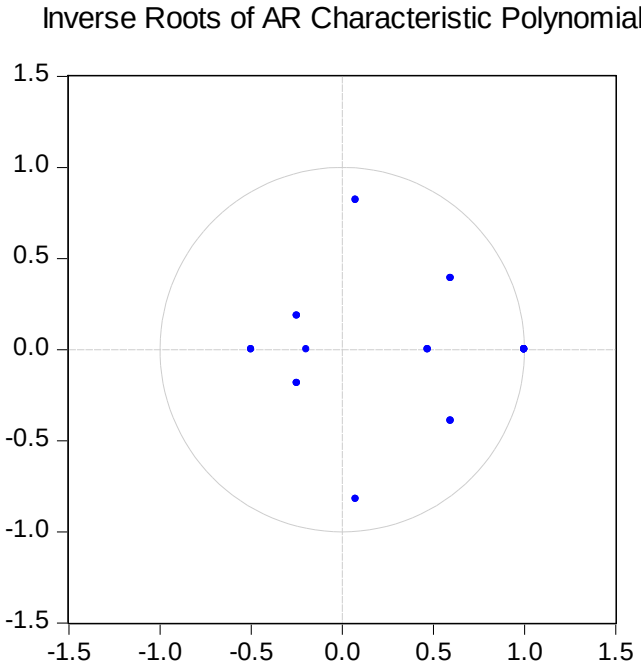
Dependent variable: D(TGEXP)

Excluded	Chi-sq	df	Prob.
D(OREV)	30.50188	2	0.0000
D(NOREV)	1.020729	2	0.6003
D(RGDP)	0.201992	2	0.9039
All	32.16573	6	0.0000

Dependent variable: D(RGDP)

Excluded	Chi-sq	df	Prob.
D(OREV)	0.440624	2	0.8023
D(NOREV)	0.064767	2	0.9681
D(TGEXP)	0.251314	2	0.8819
All	1.243632	6	0.9747

APPENDIX IX:


Inverse Roots of AR Characteristic Polynomial
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-1.5
-1.0
-0.5
0.0
0.5
1.0
1.5

APPENDIX X:

VEC Residual Serial Correlation LM Tests
Null Hypothesis: no serial correlation at lag order h
Date: 06/06/17 Time: 15:59
Sample: 1970 2015
Included observations: 43

Lags	LM-Stat	Prob
1	15.76702	0.4693
2	51.11687	0.0000
3	16.85265	0.3952
4	17.97154	0.3256
5	36.34732	0.0026
6	23.17869	0.1090
7	37.38452	0.0019
8	29.56023	0.0204
9	43.12631	0.0003
10	25.89647	0.0555
11	32.65177	0.0082
12	30.47217	0.0157

Probs from chi-square with 16 df.

APPENDIX XI:

VEC Residual Portmanteau Tests for Autocorrelations
Null Hypothesis: no residual autocorrelations up to lag h
Date: 06/06/17 Time: 16:02
Sample: 1970 2015
Included observations: 44

Lags	Q-Stat	Prob.	Adj Q-Stat	Prob.	df
1	1.907756	NA*	1.952123	NA*	NA*
2	28.66489	0.4297	29.98340	0.3640	28
3	31.04690	0.9296	32.53971	0.8988	44
4	39.38312	0.9818	41.70955	0.9653	60
5	45.51252	0.9979	48.62477	0.9939	76
6	62.56373	0.9920	68.36828	0.9691	92
7	78.93055	0.9840	87.83152	0.9225	108
8	99.41523	0.9490	112.8684	0.7538	124
9	117.3242	0.9186	135.3825	0.5945	140
10	128.1861	0.9496	149.4391	0.6327	156
11	131.0187	0.9913	153.2159	0.8452	172
12	137.8058	0.9977	162.5482	0.9102	188

*The test is valid only for lags larger than the VAR lag order.
df is degrees of freedom for (approximate) chi-square distribution

APPENDIX XII:

VEC Residual Serial Correlation LM Tests
Null Hypothesis: no serial correlation at lag order h
Date: 06/06/17 Time: 16:03
Sample: 1970 2015
Included observations: 44

Lags	LM-Stat	Prob
1	17.63577	0.3457
2	34.92987	0.0041
3	4.012607	0.9989
4	10.14454	0.8590
5	6.130871	0.9866
6	23.82817	0.0933
7	20.44894	0.2007
8	49.25505	0.0000
9	35.76461	0.0031
10	36.05488	0.0028
11	15.17084	0.5122
12	17.97796	0.3252

Probs from chi-square with 16 df.

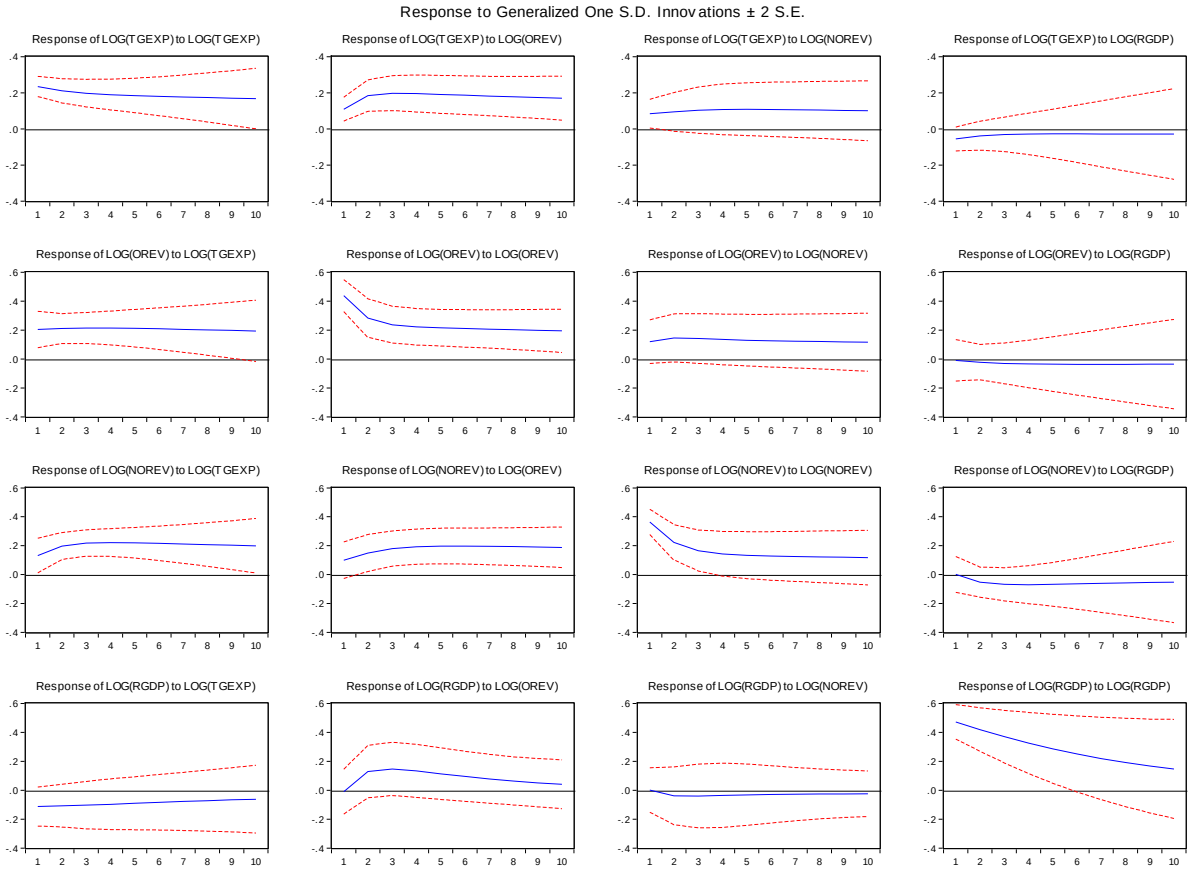
APPENDIX XIII:

Dependent Variable: LOG(RGDP)
Method: Least Squares
Date: 06/09/17 Time: 09:46
Sample: 1970 2015
Included observations: 46

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.686035	0.345824	19.33364	0.0000
LOG(OREV)	-0.474209	0.097301	-4.873636	0.0000
LOG(NOREV)	0.130260	0.093680	1.390487	0.1717
LOG(TGEXP)	0.636719	0.170284	3.739168	0.0006

R-squared	0.805517	Mean dependent var	10.04689
Adjusted R-squared	0.791625	S.D. dependent var	0.674423
S.E. of regression	0.307861	Akaike info criterion	0.564604
Sum squared resid	3.980691	Schwarz criterion	0.723616
Log likelihood	-8.985893	Hannan-Quinn criter.	0.624171
F-statistic	57.98570	Durbin-Watson stat	0.539830
Prob(F-statistic)	0.000000		

APPENDIX XIV: IMPULSE RESPONSE FUNCTIONS



Results of Impulse-Response Functions

Response Of LOG(TGEXP)

Period	LOG(TGEXP)	LOG(OREV)	LOG(NOREV)	LOG(RGDP)
1	0.234519	0.108947	0.084559	-0.056400
2	0.210297	0.184019	0.093624	-0.038478
3	0.196916	0.197271	0.103120	-0.030892
4	0.189293	0.195453	0.107457	-0.028292
5	0.184277	0.190785	0.108320	-0.027740
6	0.180351	0.186030	0.107476	-0.027902
7	0.176868	0.181614	0.105911	-0.028239
8	0.173573	0.177497	0.104077	-0.028555
9	0.170371	0.173599	0.102163	-0.028789
10	0.167229	0.169867	0.100243	-0.028928

Response Of LOG(OREV)

Period	LOG(TGEXP)	LOG(OREV)	LOG(NOREV)	LOG(RGDP)
1	0.203438	0.437921	0.119100	-0.009817
2	0.209734	0.282259	0.144676	-0.022640
3	0.213545	0.236487	0.140990	-0.030692
4	0.213569	0.221800	0.134478	-0.034627
5	0.211379	0.215254	0.129473	-0.036315
6	0.208175	0.210618	0.125817	-0.036940
7	0.204576	0.206376	0.122908	-0.037080
8	0.200858	0.202229	0.120361	-0.036989
9	0.197134	0.198152	0.117988	-0.036776
10	0.193446	0.194157	0.115709	-0.036487

Response Of LOG(NOREV)

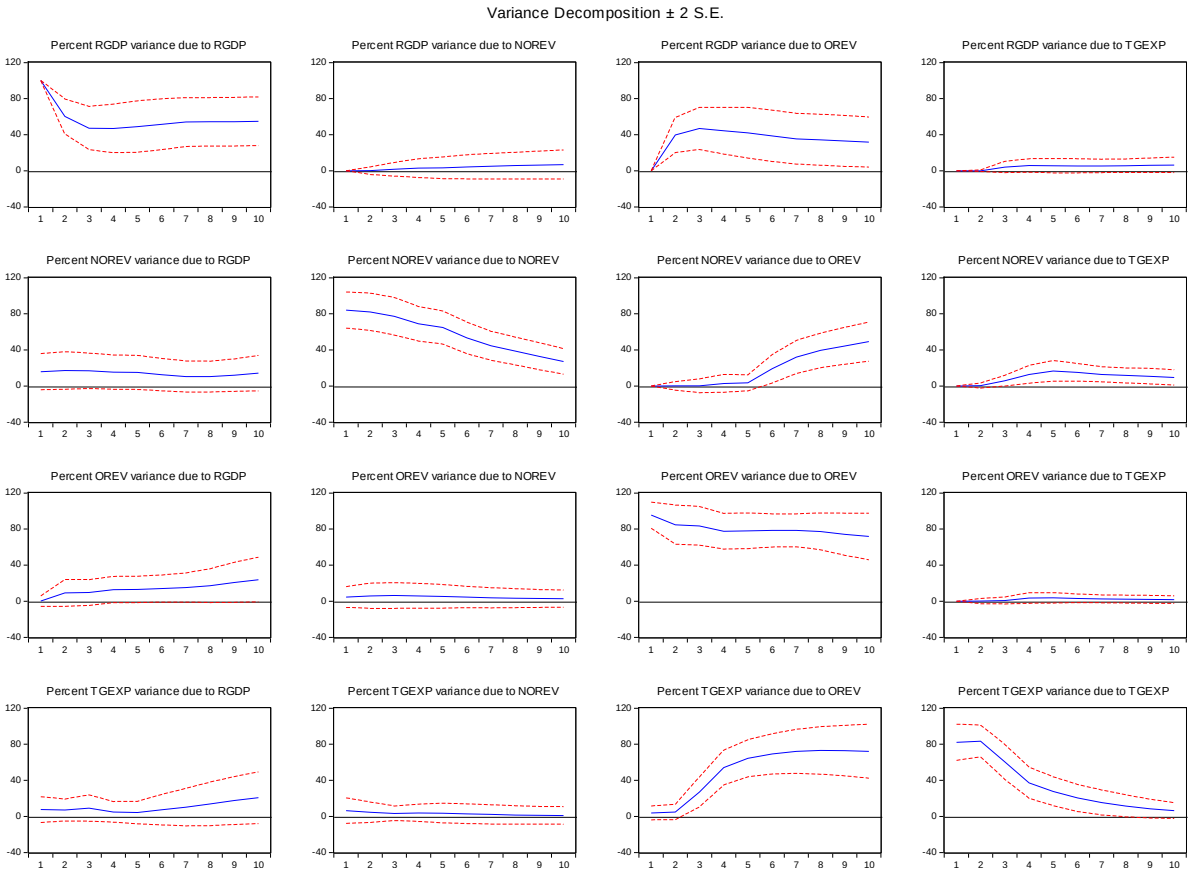
Period	LOG(TGEXP)	LOG(OREV)	LOG(NOREV)	LOG(RGDP)
1	0.131233	0.098987	0.363965	0.000698
2	0.197061	0.149229	0.222367	-0.052662
3	0.217506	0.179067	0.165608	-0.068171
4	0.221359	0.192221	0.142899	-0.070321
5	0.219450	0.196516	0.133153	-0.068146
6	0.215680	0.196754	0.128156	-0.064819
7	0.211397	0.195252	0.124858	-0.061393
8	0.207046	0.193011	0.122169	-0.058182
9	0.202767	0.190443	0.119713	-0.055257
10	0.198595	0.187715	0.117365	-0.052612

Response Of LOG(RGDP)

Period	LOG(TGEXP)	LOG(OREV)	LOG(NOREV)	LOG(RGDP)
1	-0.113489	-0.010579	0.000905	0.471904
2	-0.107414	0.128025	-0.039140	0.417946
3	-0.103392	0.146548	-0.040226	0.369886
4	-0.097639	0.133101	-0.035742	0.325549
5	-0.090945	0.113482	-0.032086	0.285412
6	-0.084216	0.094574	-0.029669	0.249734
7	-0.077915	0.077847	-0.028027	0.218361
8	-0.072202	0.063360	-0.026794	0.190924
9	-0.067093	0.050868	-0.025778	0.166991
10	-0.062546	0.040102	-0.024887	0.146136

Generalized Impulse

APPENDIX XV: VARIANCE DECOMPOSITION GRAPH



Variance Decomposition of LOG(TGEXP):

Period	S.E.	LOG(TGEXP)	LOG(OREV)	LOG(NOREV)	LOG(RGDP)
1	0.249984	100.0000	0.000000	0.000000	0.000000
2	0.339496	94.08418	4.003180	0.401374	1.511268
3	0.411472	93.95954	4.128447	0.346014	1.566002
4	0.466805	93.63993	4.217203	0.311346	1.831521
5	0.515428	93.43624	4.288069	0.331083	1.944613
6	0.559817	93.33250	4.359357	0.315876	1.992264
7	0.601384	93.28637	4.407380	0.288978	2.017272
8	0.640431	93.24999	4.442539	0.266329	2.041138
9	0.677214	93.21687	4.469425	0.250220	2.063485
10	0.712043	93.18773	4.491267	0.238616	2.082391

Variance Decomposition of LOG(OREV):

Period	S.E.	LOG(TGEXP)	LOG(OREV)	LOG(NOREV)	LOG(RGDP)
1	0.461240	10.02557	89.97443	0.000000	0.000000
2	0.597484	7.539584	91.63734	0.029991	0.793086
3	0.689669	6.047917	90.66539	2.243460	1.043231
4	0.777158	4.890504	89.59798	4.326114	1.185402
5	0.855182	4.188860	89.37454	5.028230	1.408369
6	0.925569	3.757917	89.45590	5.202298	1.583887
7	0.990763	3.456546	89.54422	5.305705	1.693527
8	1.052036	3.216640	89.58140	5.435717	1.766242
9	1.110020	3.018360	89.58814	5.570234	1.823270
10	1.165141	2.854723	89.59020	5.683147	1.871930

Variance Decomposition of LOG(NOREV):

Period	S.E.	LOG(TGEXP)	LOG(OREV)	LOG(NOREV)	LOG(RGDP)
1	0.337213	9.810866	4.513665	85.67547	0.000000
2	0.416580	10.34501	21.02331	67.54877	1.082907
3	0.477178	17.90922	27.16298	51.50712	3.420684
4	0.531399	23.86689	30.74438	41.53480	3.853933
5	0.578571	27.62237	33.26763	35.21392	3.896077
6	0.620674	29.81703	35.21094	31.04115	3.930874
7	0.659790	31.37010	36.72025	27.89607	4.013579
8	0.696860	32.64721	37.92543	25.32324	4.104114
9	0.732225	33.73911	38.89817	23.18518	4.177537
10	0.765999	34.65871	39.69953	21.40971	4.232046

Variance Decomposition of LOG(RGDP):

Period	S.E.	LOG(TGEXP)	LOG(OREV)	LOG(NOREV)	LOG(RGDP)
1	0.516270	0.795013	0.006355	0.859738	98.33889
2	0.771560	1.840389	3.685007	0.418702	94.05590
3	0.962745	1.759438	4.980647	0.277075	92.98284
4	1.120455	1.601830	5.119916	0.418925	92.85933
5	1.259901	1.418725	5.199402	0.672704	92.70917
6	1.383518	1.301025	5.284448	0.810812	92.60371
7	1.496192	1.230528	5.357040	0.863732	92.54870
8	1.601056	1.184934	5.411399	0.889825	92.51384
9	1.699698	1.149645	5.451491	0.912600	92.48626
10	1.793004	1.119995	5.482182	0.935021	92.46280

Cholesky Ordering: LOG(TGEXP) LOG(OREV) LOG(NOREV) LOG(RGDP)