

AN EMPIRICAL ANALYSIS OF THE IMPACT OF OIL – BENCH MARKING ON FEDERAL GOVERNMENT REVENUE IN NIGERIA

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Abstract

The study assesses the oil bench-marking fiscal rule so as to determine its impact on Federal Government Revenue in Nigeria using econometric model with ordinary least square (OLS) techniques. The study test for the order of integration of the variables that is the stationarity of the variables using Augmented Dickey Fuller (ADF) Test for stationary and Philips-Peron unit root test. The results revealed absence of serial correlation and all variables incorporated in the model were non-stationary at their levels. Chow test was applied in testing the three hypotheses formulated. The result revealed the rejection of the null hypotheses and hence the acceptance of the alternate hypotheses. In otherwise the Nigerian economy had been decoupled or delinked from the oil revenue volatility. In an attempt to establish short run and long run relationships between real government expenditure and real oil revenue. Error correction mechanism was applied. The result also reveals reduction in the percentage of the discrepancy between short-term and long term real government expenditure that is corrected within a year from 76% to 58%. Indicating the effectiveness of the Nigeria-oil-price based fiscal rule. In other words, Oil bench marking fiscal policy has impacted significantly on revenue from the oil sector. In addition, it also has a significant effect on federal Government capital expenditure. The policy also impacted significantly on Nigeria external reserves. However the following factors were also identified as contributing to Nigerian volatility challenge. Oil driven nature of the economy, small size of the economy and the degree of global integration. Discovered also were corruption and high degree of openness. We therefore recommended among other things the continued adoption of the Nigerian oil price based fiscal rule, (oil bench marking) addressing the issue of corruption and transparency, more sustained reform in the area of diversification of the economy.

Key Words: Oil Bench Mark, Federal Government Revenue, Fiscal Policy and Economy

Introduction

Nigeria is an oil producing country that begins to depend greatly on the resources in the period of the oil boom of 1970s. The dependence made the economy to become susceptible to the volatility transmission emanating from the international oil market (Adesola 2013) The volatility enters the economy primarily through the oil revenue of the country. Fiscal volatility has been transmitted to the rest of the economy, with negative implications for, in particular the real exchange rate and growth performance (Baunsgard 2003). With about 75% of revenue from oil and gas, fiscal policy in Nigeria has been heavily influenced by oil driven volatility impacting on both revenue and expenditure. Since 1970, both revenue and expenditure have been very volatile while increasing overtime. In period with high oil prices, such as in 1979-82, 1991-1992, 2000-2002, 2010-2014 etc revenue and expenditure have increased sharply (Daily Trust, 2015).

This has typically been followed by the scaling down of expenditure as oil prices subsequently decline, though at times with a lag. The implications of such boom – bust fiscal policies include the transmission of oil-volatility to the rest of the economy as well as disruptions to the stable provision of government service. This has added to the failure over the years of public spending neither facilitating the diversification and growth of the non-oil sector nor reducing poverty. The over ridding concern in 2003 was to break this pattern (Akinlo2012). An effectively implementation of fiscal rule in principle, could play a role in overcoming these constraints on fiscal policy formulation by providing a framework for a more stable and profitable budget. In 2004 Nigeria under the leadership of President Obasanjo introduced an oil price based fiscal rule. To what extent has the rule insulated Nigeria's economy against oil related volatility?

Nigeria is a member of the Organization of the Petroleum Exporting Countries (OPEC) therefore, the oil revenue of the nation comes from its sales as an OPEC player in the world oil market. On the supply side, the main players in the oil market can be categorized into OPEC producers and non-OPEC producers. Like all the other OPEC players, the country's supply in the oil market is based on the production quota set for it by the organization. Experience in Nigeria illustrates the difficulties of implementing fiscal policy in an environment with highly volatile revenue flows. Over the years, there have been a strong deficit bias and pro-cyclicality in fiscal policy driven largely by oil price development. After the volatility is transferred into the oil revenue, the usual track through which it spreads into the rest of the economy is as follows: it gets to the government expenditure, when the revenue is spent; and thereafter the rest of the economy becomes volatile, when the expenditure affects the incomes and activities of the economic agents (Adesola 2013).

To deal with the volatility challenge, the oil price-based fiscal rule was introduced in 2004 and later integrated into law of the country in 2007 when the Fiscal Responsibility ACT (FRA) was enacted. The aim of the rule was to restrain government expenditure through oil revenue smothering, which involves setting volatility absorbing reference oil price through which the revenue from the resource will be channeled into the budget. It is expected that this process will de-link government expenditure from oil revenue and limit the domestic volatility caused by the international transfer. How effective has this reform, the adopted oil price based fiscal rule in removing the volatility challenge and oil driven fiscal policy in Nigeria. Is the essence of this research paper.

Oil Growth In Nigeria.

Nigeria is a natural resource abundant country. In particular, over the past fifty years, the country's oil subsector has grown phenomenally. Both production and exports have increased enormously, since commercial production in 1958. The huge revenue from oil, of course, presented net wealth and this provided opportunity for increased expenditure and investment, however the huge revenue complicated macro economics management and also made the economy highly oil dependent. In spite of the huge rents from oil, the economy still grapples with many problems including high and rising unemployment rate, declining manufacturing production, high and rising level of poverty and poor infrastructural development (Akin 2012).

Sequel to high dependence on oil exports the share of oil revenue in federally collected revenue increased phenomenally over the study period. It increased from 26.3% in 1970 to 85.8% in 2005. The percentage dropped to 78.7% in 2009 reflecting the increasing emphasis by Government on non-oil exports since mid 2000.(Akinlo,2012) The major implication of high government dependence on oil revenues was the fluctuation of government revenue in reflection of value of oil exports in the country. The actually explain why government expenditure increased when the economy experience boom and dropped when the economy slumped. In other words, government fiscal policy became procyclical. Hence spending tends to exacerbate the ripples of oil shocks on the economy.

Nigeria Volatility Challenge

Below are the factors that have contributed to the volatility problems of the country.

- (i) **The small size of the economy;** unlike large open economies like the USA, the features of the Nigerian economy indicates that it is a small open economy. Salient three of such features are (i) It is a price taker in the world market (ii) Its domestic interest rate adjusts to the world interest rate (iii) it has a small income based on the country's gross national income (GNI) per capita, the World Bank currently classifies it as a low middle income economy. Using the National income (GNP) per capital as a criterion, the World Bank classifies the countries of the world annually into low income, middle income and high income economics (world bank 2013). Small countries like Nigeria usually have difficulties on managing external shocks.
- (ii) **The high degree of openness:** there are two sides of openness, trade openness (TO) and financial openness (FO). The trade openness can be measured by the ratio of foreign trade (exports plus imports) to the GDP. The level of Nigeria's trade openness is relatively high (Obadan, 2008) on the other hand, the level of financial openness may be estimated through the ratio of equity-based foreign liabilities to GDP (Calderon et al, 2005). The financial liberalization policy pursued by the country has also made the level of financial openness to be relatively high in the economy.
- (iii) **The High Degree of Global Integration.** The degree at which the economy integrates into the global economy is high. That is, it has a great level of interconnections with the other economies of the world in the globalization process. For example, based on an evaluation of 207 countries, the nation is currently ranked 67th in the overall globalization rankings of the world (KOF Swiss Economic Institute, 2013)

their rankings are based on the globalization indices of evaluated countries, which were calculated by using the economic social and political factors of global integration.

- (iv) **The Emerging Market Feature:** the economy is one of the emerging markets of the world. The International Monetary Fund (IMF) classified the country as an emerging market in the World Economic Outlook (WEO). The IMF divides the countries of the world into the following (i) advanced economic (ii) emerging market and developing economies (IMF, 2013) Emerging markets are usually very volatile economies due to certain factors, one of which is the effect of external price shock (Mody, 2004).

The Role of Fiscal Rule

There has been a growing interest in recent years both in the academic literature and in policy circles, in the role fiscal rules may play in strengthen the conduct of fiscal policy. The key idea is that in countries with a weak regulation for fiscal prudence the introduction of fiscal rules, effectively binding the government to a certain pre announced fiscal conduct, may provide a more credible policy frame work that over time will contribute to stability and growth (Baunsgaard, 2003). Naturally, fiscal rules will only play a positive role if they are backed by firm political will and complemented by other administrative reforms strengthening the budget process and improving the quality of spending.

The political economy literature suggests that the main rationale for fiscal rules is to constrain the policy maker in order to reduce or eliminate a tendency toward generating budget deficits (Drazen, 2002). Rules can take the form of either legal restrictions or more implicit code or norms. The key requirement for the effectiveness of a rule is that there are penalties or costs of deviating from it. If so, explicit rules enhance the credibility of a preannounced fiscal policy if they raise the costs and lower the benefits to policy makers from deviating from this. Effective fiscal rules can then be used by policy makers as a signaling device to make commitment to a certain fiscal policy credible. A fiscal rule targeting a certain overall or primary fiscal balance without taking into account oil revenue volatility will not prevent pro-cyclical fiscal policies. (For example if the expenditure path is being determined by oil revenue swings) instead a rule targeting a certain non-oil fiscal deficit or enhancing the budget at a cautious oil reference price will be more successful in insulating the budget against oil market vagaries (Drazen, 2002).

Types of Fiscal Policy Rules

Fiscal policy rules; many countries apply rules when determining fiscal policy. Best known perhaps is the stability and growth pact of the European Union setting limits on the overall balance and debt. Brazil also has rules restricting the primary balance and debt. Whereas Argentina and Peru have applied limits to the overall balance and primary expenditure. New Zealand has rules for the operating balance as well as debt limit (Davies et al 2001).

Among oil producing countries some also have fiscal rules, although often, these apply only to the operation of an oil fund. A case where the oil fund is integrated into the budget frame work is that of Norway, where the petroleum fund was set up to support the achievement of inter temporal policy objectives. Net oil revenue is deposited into the fund and finances the non-oil deficit through a revenue transfer (Kopits and Symansky 1998).

Some countries have rules for stabilization purposes. Though there are not always well integrated within the budget. Kazakhstan deposits revenue in excess of the budget reference price in a mineral fund. Revenue shortfalls are compensated by transfers from the fund. Oman also deposits oil revenue in excess of the budget reference price in a fund.

Oman also deposits oil revenue in excess of a reference price into a fund, but in any given year the government may withdraw funding up to the amount of the budget deficit. Venezuela has had a mixed experience with its stabilization fund. The initial rules established that oil revenue above the threshold price should be deposited in the fund, though this has not always been done without recourse to other financing. Kuwait has a fund for savings purpose into which 10% of total government revenue is deposited, irrespective of oil or budgetary developments (Kopits, 2001).

The Nature Of The Nigeria Oil Price Based Fiscal Rule

Generally, fiscal rules consist of numerical target or procedures that governments must adhere to in dealing with the fiscal policies of their countries (Kopits et al 1998) numerical targets set certain values as limits on specified budgetary aggregates like expenditure and revenue. On the other hand procedures are compulsory, “non-numerical steps that must be followed to achieve vital objectives like increased transparency of the budgetary

process. This means that a fiscal rule may be a numerical or a procedural rule. However many countries run both together (Eden et al 2012).

In addition, fiscal rules may also be classified based on the budgetary aggregates they are designed to constrain. They lead to the following categories debt, budget balance, expenditure and revenue fiscal rules.

Government Expenditure

Government expenditure otherwise called public expenditure is an important instrument for government to control the economy. It plays an important role in the functioning of an economy whether developed or developing economy. Public expenditure was born out of revenue allocation which refers to the redistribution of fiscal capacity between the various levels of government or the disposition of responsibilities between tiers of the Government (Okoro 2013).

In Nigeria economy, public expenditure can broadly be categorized into capital and recurrent expenditure. The recurrent expenditure are government expenses on administration such as wages, salaries, interest on loans, maintenance etc. whereas expenses on capital projects like roads, air ports, health education, communication electricity generation are referred to capital expenditure (Obinna, 2003).

Scholars argue that increase in government expenditure on socio-economic and physical infrastructures encourage economic growth, for example government expenditure on health and education causes the productivity of labour and increases the growth of National output. Similarly expenditure such as roads, communication, power, reduces production cost, increases private sector investment and profitability of firms, thus fostering economic growth. (AL – Yusuf and Cocoray, 2009). Public expenditure either recurrent or capital notably on social and economic infrastructure can be growth – enhancing. Public expenditure on infrastructure has a great role to play in the form of stimulating the economy. The mechanism in which government spending on public infrastructure is expected to affect the pace of economic growth depends largely upon the precise form and size of total public expenditure allocated to economic and social development projects to the economy, (Akpokere and Ighoroje 2013).

Government spending in Nigeria has continued to rise due to the huge receipts from production and sales of crude oil, and the increase demand for public goods like roads, communication, power, education and health. There is increasing need to provide both individual and external security for the people and the nation (Okoro 2013). Government spending as a fiscal instrument serves useful roles in the process of controlling inflation unemployment, depression, balance of payment equilibrium and foreign exchange rate. In the period of the depression and unemployment government spending causes aggregate demand to raise and production and supply of goods and services follow the same direction. As a result the increase in the supply of goods and services coupled with a raise in the aggregate demand exalt a downward pressure on unemployment and depression. In the case of persistent raise in price (inflation) and depression in value of money, it is expected that reduce in government expenditure discourages aggregate demand and inflation and falling in the value of exchange rate are controlled (Taiwo and Taiwo, 2011) it is worth to note that these two tools may be adopted simultaneously in the economy. A raise in government expenditure has the same effect as a reduction in the tax rates in aggregate demand. Similarly the effect of a reduction in the government expenditure are the same as increase in tax rates.

External Reserve

External Reserves are variously called International Reserves, Foreign Reserves or Foreign Exchange Reserves. While there are several definitions of international reserves, the most widely accepted is the one proposed by the IMF in its Balance of Payments Manual, 5th edition. It defined international reserves as “consisting of official public sector foreign assets that are readily available to, and controlled by the monetary authorities, for direct financing of payment imbalances, and directly regulating the magnitude of such imbalances, through intervention in the exchange markets to affect the currency exchange rate and/or for other purposes” (CBN, 2010) Rationale for Holding Reserves

Global official reserves have increased significantly and quite rapidly in recent years. This phenomenal growth is a reflection of the enormous importance countries attach to holding an adequate level of international reserves. The reasons for holding reserves include the following:

To Safeguard the Value of the Domestic Currency Foreign reserves are held as formal backing for the domestic currency. This use of reserves was at its height under the gold standard, and survived after the Second World

War under the Breton woods system. After the Breton Woods system, the use of foreign exchange reserves to back and provide confidence in domestic currency replaced the gold. Nevertheless, for most developed countries this is not, these days, the prime use of reserves.

Timely meeting of international payment obligations The need to finance international trade gives rise to demand for liquid reserves that can readily be used to settle trade obligations, for example to pay for imports. While this is typically done through commercial banks, in many developing countries, including Nigeria, the central bank actually provides the foreign exchange through auction sessions at which authorised dealers buy foreign exchange on behalf of importers. In industrialized countries where the manufacturing sector produces for export markets, the transaction need for holding reserves is less important. (CBN, 2010)

Wealth Accumulation some central banks use the external reserve portfolio as a store of value to accumulate excess wealth for future consumption purposes. Such central banks would segregate the reserve portfolio into a liquidity tranche and a wealth tranche, with the latter including longer-term securities such as bonds and equities and managed against a different benchmark emphasizing return maximization.

Intervention by the Monetary Authority Foreign exchange reserves can be used to manage the exchange rate, in addition to enabling an orderly absorption of international money and capital flows. The monetary authorities attempt to control the money supply as well as achieve a balance between demand for and supply of foreign exchange through intervention (i.e. offering to buy or sell foreign currency to banks) in the foreign exchange markets. When CBN sells foreign exchange to commercial banks, its level of reserves declines by the amount of the sale while the domestic money supply (in naira) also declines by the naira equivalent of the sale. Conversely, when the CBN purchases foreign exchange from the banks its level of reserves increases while it credits the accounts of the banks with the naira equivalent, thus increasing the domestic money supply.

To Boost a Country's Credit Worthiness External reserves provide a cushion at a time when access to the international capital market is difficult or not possible. A respectable level of international reserves improves a country's credit worthiness and reputation by enabling a regular servicing of the external debt thereby avoiding the payment of penalty and charges. Furthermore, a country's usable foreign exchange reserve is an important variable in the country risk models used by credit rating agencies and international financial institutions.

To Provide a fall back for the "Rainy Day" Economies of nations sometimes experience drop in revenue and would need to fall back on their savings as a life line. A good external reserves position would readily provide this cushion and facilitate the recovery of such economies.

To Provide a Buffer against External Shocks External shocks refer to events that suddenly throw a country's external position into disequilibrium. These may include terms of trade shocks or unforeseen emergencies and natural disasters. An adequate external reserve position helps a country to adjust quickly to such shocks without recourse to costly external financing.

Historical Background Over the past three decades, Nigeria has taken numerous policy initiatives and measures in the management of its external reserves. Although very little was achieved because the structure in place then could not support efficient reserves management, enduring lessons could be distilled from the nation's past experience. Thus, Since the 1970s, Nigerian economy has persistently depended on oil as the main source of foreign exchange earnings with the attendant cycles of economic booms and bursts.

From 1999, world oil prices began to rise again resulting in another but better managed boom and unprecedented accumulation in the level of reserves from USD4.98 billion in May 1999, to USD59.37 billion as at March 28, 2007.

The Central Bank of Nigeria Act 1991 vests the custody and management of the country's external reserves in the Central Bank of Nigeria (CBN). The Act provides that the CBN shall at all times maintain a reserve of external assets consisting of all or any of the following: a) Gold coin or bullion; b) Balance at any bank outside Nigeria where the currency is freely convertible and in such currency, notes, coins, money at call and any bill of exchange bearing at least two valid and authorized signatures and having a maturity not exceeding ninety days exclusive of grace; c) Treasury bills having a maturity not exceeding one year issued by the government of any country outside Nigeria whose currency is convertible; d) Securities of or guarantees by a government of any country outside Nigeria whose currency is freely convertible and the securities shall mature in a period not exceeding ten years from the date of acquisition; e) Securities of or guarantees by international financial institutions of which Nigeria is a member, if such securities are expressed in currency freely convertible and maturity of the securities shall not exceed five years; f) Nigeria's gold tranche at the International Monetary Fund; g) Allocation of Special Drawing Rights made to Nigeria by the International Monetary Fund (IMF).

Volatility of Foreign Exchange Inflow:

Nigeria's dependence on oil for over 90% of its foreign exchange earnings makes its capital account vulnerable to the fluctuations in crude oil prices. This, in addition to its high import bills contributed to the fluctuations in the level of reserves over the years and consequently the way the reserves are being managed. During the oil boom of the mid-seventies which has resulted in the build up of reserves, the external reserves were diversified into an array of financial instruments including foreign government bonds and treasury bills, foreign government guaranteed securities, special drawing rights (SDRs), fixed term deposits, call accounts and current accounts. This provided significant investment income as well as liquidity. However, during the glut in the global oil market which led to collapse in the crude oil prices and consequently a drawdown in the reserves, the reserves were held mainly in current accounts and treasury bills. This underscored the need to diversify the sources of foreign exchange inflow of the country.

Fiscal Federalism:

Sections 162(1) and 162 (3) of the Constitution of the Federal Republic of Nigeria made it mandatory for all revenues accruing to the nation to be paid into the Federation account and to be distributed among the Federating units in accordance with the existing revenue allocation formula. The implication of this constitutional provision is that each tier of government has the right to spend its own share of the revenue and when this happens, in view of the limited instruments for sterilization, the Bank has to sell more dollars in order to mop up the excess liquidity.

a) Development of Productive Non-oil Economy exploit

Nigeria should invest heavily in infrastructural development in order to create the enabling environment for a non-oil economy. In this regard, the provision of steady power and water supplies as well as good road and communication net works is very crucial.

It is also important for Nigeria to explore ways of reviving its huge agricultural potential which has been neglected since the discovery of oil in addition to exploiting its rich untapped solid mineral deposit in order to promote diversification of the economy away from a mono cultural product base.

Natural Challenge:

Oil is a wasting asset and would be exhausted some day, this poses a very big challenge to reserves management in Nigeria as to what would become of the economy when this single most important source of national revenue is fully depleted.

a) Training and Retention of Staff

Reserve Management task is becoming more complex as central banks are moving into new asset classes with higher risk/return profile in search of higher risk adjusted returns. In the case of CBN, we are moving from the hitherto investment in money market instruments such as time-deposits; treasury bills etc into longer dated instruments like treasury and agency bonds (having explicit guarantee of a sovereign government). Although these are default-free instruments, they however have market risk. This development has necessitated the need for highly skilled personnel who could measure and control the associated risks. Although the Bank is making efforts to develop capacity in reserves management, the challenge is how to retain these staff in view of the high demand for their skills in the private sector.

DATA PRESENTATION AND ANALYSIS

Total government revenue, revenue from oil sector, capital expenditure and external reserves are shown in table 1 below.

Data used 1970-2010

Table 1: Total Government Revenue, Real oil Revenue, Government Capital Expenditure and external reserves 1970-2010

YEAR	Total Government Revenue (TGR)	Real Oil Revenue (ROR)	Government Capital Expenditure	Government External Reserves
1970	634	166.6	187	998
1971	1168.8	510.1	173.6	167.5
1972	1405.1	764.3	457.3	1712.8
1973	1695.3	1016	565.7	2334
1974	4537.4	3724	1223.5	13525.5
1975	5514.7	4271.5	3207.7	27561.8
1976	6765.9	5365.2	4041.3	21392.9
1977	8042.4	8080.6	4004.6	23889.4
1978	7371	4555.8	5200	13055
1979	10912.4	8880.8	4219.5	14344.2
1980	15233.6	12353.3	10163.3	29946
1981	13290.5	8564.4	6567	34279
1982	11433.7	7814.9	6417.2	8305
1983	10508.7	7253	4885.7	5192.8
1984	11253.3	8269.2	4100.1	4191.1
1985	15050.4	10923.7	5464.7	9636.7
1986	12595.8	8107.3	8526.8	38232.3
1987	25595.8	19027.06	6372.5	251336.8
1988	27596.7	19831.7	8340.1	349532.9
1989	53870.4	39130.5	15034.1	325328.1
1990	98102.4	71887.1	24048.6	354468.8
1991	100991.6	82666.4	28340.9	452071.8
1992	190453.2	164078.1	39763.3	577627.3
1993	192769.4	162102.4	54501.8	1270322
1994	201910.8	160192.4	7091830	2086380.5
1995	459987.3	324547	121138.3	707907.3
1996	523597	408783	212926.3	566753.5
1997	582811.1	416811.1	269651.7	1608455.2
1998	463608.8	324311.2	309015.6	1608448.3
1999	949187.9	724422.5	498027.6	3412236.5
2000	1906159.7	1591675.8	239450.9	530594.9
2001	2231600	1707562.8	438696.5	8704619.4
2002	1731837.5	1230851.2	321378.1	8777241.8
2003	2575095.9	2074280.6	241688.3	17149733.9
2004	3920500	3354800	351300	18338765.2
2005	5547500	4762400	519500	41962093.8
2006	5963101.9	5287566.9	552385.8	66670339
2007	5715600	4462910	759323	864761542
2008	7866590.1	6530633.1	1123458	64883849.3
2009	484459234	3191937.98	1325019.4	52822088.8
2010	730367155	5396091.05	16948256	41384559.8

Source: CBN Statistical Bulletin 2010,

The extracted figures are those of total government revenue (TGR), real oil revenue, Others are external reserve and capital expenditure with the data in table 1, the unit root test was conducted and decision on level at which stationery in the data was obtained on the Augmented Dickey fuller (ADF) method and Phillips – Peron The test summary is shown below.

Table 2: Unit Root Test

VARIABLE	ADF STATISTIC	1% CRITICAL LEVEL	5% CRITICAL LEVEL	10% CRITICAL LEVEL	ORDER OF INTEGRATION
RGEXP	3.270242	-3.6067	2.9378	-2.6069	1 (1)
ROR	-3.065648	-3.6117	-2.9399	-2.6080	1 (1)

Source: Researcher's Analysis (2015)

Table 3: Phillips – Peron Unit Root Test Trend and interception

VARIABLE	PP TEST STATISTICS	1% CRITICAL LEVEL	5% CRITICAL LEVEL	10% CRITICAL LEVEL	ORDER OF INTEGRATION	REMARK
TGR	-3.080448	-3.6067	-2.9378	-2.6069	1 (1)	Stationary
CEXP	-4.749242	-3.6067	-2.9378	-2.6069	1 (1)	Stationary
EXTR	-5.482207	-3.6019	-2.9358	-2.6059	1 (1)	Stationary

Source: Researcher's Analysis (2015)

The data on a particular variable is stationary at the point where the absolute value of the ADF statistics is first greater than the 1%, 5% or 10% critical values, whereas the order of integration shows at what point the data become stationary. In table 2, all the series or variables or stationary are the various critical levels of significance. As show by this table all the series are difference stationary process at the 1%, 5%, and 10% levels of significance.

Table 4: Pooled Regression Result (1970-2010)

Dependent Variable: LOG (TGR)

Method: Least Squares

Date: 03/18/15 Time: 01:15

Sample: 1970-2010

Included Observations: 41

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.650992	1.185574	-0.549094	0.5863
Log (ROR)	0.115847	0.385869	0.300223	0.7657
R-Squared	0.928801	Mean Dependent Var.	11.72809	
Adjusted R-Square	0.920890	S.D. Dependent Var.	3.325530	
S.E. of Regression	0.935354	Akaike info Criterion	2.818065	
Sum Squared resid	31.49590	Schwarz Criterion		3.027037
Log likelihood	-52.77033	F-Statistic		117.4067
Durbin – Watson Stat	0.614249	Prob (F-Statistic)	0.000000	

Source Researcher's Analysis (2015)

(Note the sum residual (RSS₁) is given as 31.49590)

Similarly, the results of the partial regressions of the pre and post adoption rule are shown in table 5 and 6

Table 5: Regression for the period before 2004 (1970-2003)

Dependent Variable: LOG (TGR)

Method: Least Squares

Date: 03/18/15 Time: 01:22

Sample: 1970-2003

Included Observations: 34

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.640884	0.100174	-6.397720	0.0000
Log (ROR)	0.605799	0.037315	16.23493	0.0000
R-Squared	0.999101	Mean Dependent Var.	10.66751	
Adjusted R-Squared	0.998977	S.D. Dependent Var.	2.381044	
S.E. of Regression	0.076142	Akaike info Criterion	2.177386	
Sum Squared resid	0.168130	Schwarz Criterion	.1952921	
Log likelihood	42.01555	F-Statistic		806.316
Durbin – Watson Stat	1.426058	Prob (F-Statistic)		0.000000

Sources: Researcher's Analysis (2015)

Note: the sum squared residual (RSS₂) is given as 0.168130)

Table 6: Regression for the period after 2004 (2004-2010)

Dependent Variable: LOG (TGR)

Method: Least Squares

Date: 03/18/15 Time: 01:30

Sample: 2004-2010

Included Observations: 7

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	-40.46389	10.98381	-3.683957	0.0664
Log (ROR)	-7.784453	0.999342	-7.789582	0.0161
R-Squared	0.991507	Mean Dependent Var.	16.87950	
Adjusted R-Squared	0.974522	S.D. Dependent Var.	2.283037	
S.E. of Regression	0.364418	Akaike info Criterion	0.994777	
Sum Squared resid	0.265601	Schwarz Criterion	0.956141	
Log likelihood	1.518280	F-Statistic	58.37322	
Durbin – Watson Stat	2.119325	Prob (F-Statistic)	0.016914	

Source: Researcher's Analysis (2015)

(Note the sum square residual (RSS₂) is given as 0.265601)

POOLED REGRESSION RESULT 1970 – 2010

TABLE 7: Pooled Regression

Dependent Variable: LOG(TGR)

Method: Least Squares

Date: 06/29/15 Time: 11:41

Sample: 1970 -2010

Included observations: 41

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.153539	0.681530	0.225286	0.8230
LOG(CAPEX)	0.628710	0.152728	4.116539	0.0002
R-squared	0.892717	Mean dependent var	11.72809	
Adjusted R-squared	0.887071	S.D. dependent var	3.325530	
S.E. of regression	1.117544	Akaike info criterion	3.130499	
Sum squared resid	47.45835	Schwarz criterion	3.255882	
Log likelihood	-61.17523	F-statistic	158.1017	
Durbin-Watson stat	1.230360	Prob(F-statistic)	0.000000	

Sources: Researchers Analysis (2015)

Note: The sum square residual (RSS₁) is given as 47.45835

Regression Result For The Period Before 2004 (1970 – 2003)

TABLE 8:

Dependent Variable: LOG(TGR)
 Method: Least Squares
 Date: 06/29/15 Time: 11:44
 Sample: 1970-2003
 Included observations: 34

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.454831	0.525414	2.768924	0.0094
LOG(CAPEX)	0.403077	0.120568	3.343144	0.0022
R-squared	0.913082	Mean dependent var		10.66751
Adjusted R-squared	0.907474	S.D. dependent var		2.381044
S.E. of regression	0.724267	Akaike info criterion		2.276783
Sum squared resid	1.626143	Schwarz criterion		2.411462
Log likelihood	-35.70532	F-statistic		162.8289
Durbin-Watson stat	1.583886	Prob(F-statistic)		0.000000

Sources: Researcher analysis (2015)

Note: The sum square residual (RSS₂) is given as 1.626143

Regression result for the Period after 2003 (2004 – 2010)

TABLE 9 Dependent Variable: LOG(TGR)
 Method: Least Squares
 Date: 06/29/15 Time: 11:54
 Sample: 2004 2010
 Included observations: 7

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.491370	11.93166	0.124993	0.9066
LOG(CAPEX)	1.442112	0.489469	2.946279	0.0421
R-squared	0.694613	Mean dependent var		16.87950
Adjusted R-squared	0.541920	S.D. dependent var		2.283037
S.E. of regression	1.545196	Akaike info criterion		4.005706
Sum squared resid	0.9550528	Schwarz criterion		3.982525
Log likelihood	-11.01997	F-statistic		4.549069
Durbin-Watson stat	2.786991	Prob(F-statistic)		0.093261

Sources: Researcher's Analysis (2015)

Note: The Sum squared residual (RSS₂) is given as 0.9550528

Single or pooled regression for the period, 1970- 2010

TABLE 10

Dependent Variable: LOG(TGR)
 Method: Least Squares
 Date: 07/31/15 Time: 12:40
 Sample: 2004 2010

Included observations: 41

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.153539	0.681530	0.225286	0.8230
LOG (EXTR)	0.398088	0.117202	3.396582	0.0016
R-squared	0.828866	Mean dependent var		10.72809
Adjusted R-squared	0.820890	S.D. dependent var		3,325500
S.E. of regression	0.735354	Akaike info criterion		2.71806
Sum squared resid	26.49560	Schwarz criterion		3.027637
Log likelihood	-4277030	F-statistic		111.4067
Durbin-Watson stat	0.514249	Prob(F-statistic)		0.083161

Sources: Researcher's Analysis (2015)

Note: The Sum squared residual (RSS₁) is given as 26.49560

Regression result for the period before 2004 (1970-2003)

TABLE 11

Dependent Variable: LOG(TGR)
 Method: Least Squares
 Date: 07/31/15 Time: 12:52
 Sample: 1970-2003

Included observations 34

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.454831	0.525414	2.768924	0.0094
LOG (EXTR)	0.461993	0.103302	4.466261	0.001
R-squared	0.939101	Mean dependent var		10.66751
Adjusted R-squared	0.917977	S.D. dependent var		2.481044
S.E. of regression	0.075112	Akaike info criterion		-2.17736
Sum squared resid	0.1568130	Schwarz criterion		0.952921
Log likelihood	32.01552	F-statistic		8.30316
Durbin-Watson stat	1.326058	Prob(F-statistic)		0.0001

Sources: Researcher’s Analysis (2015)

Note: The Sum squared residual (RSS₂) is given as 0.1568130

Regression Result for the period after 2003 (2004-2010)

TABLE 12

Dependent Variable: LOG(TGR)
 Method: Least Squares
 Date: 07/31/15 Time: 1:20
 Sample: 2004 2010
 Included observations: 07

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.491370	11.93166	0.124993	0.9066
LOG (EXTR)	-0.259131	0.523672	-0.494834	0.6467
R-squared	0.881507	Mean dependent var		15.77950
Adjusted R-squared	0.861307	S.D. dependent var		2.263031
S.E. of regression	0.365601	Akaike info criterion		0.994111
Sum squared resid	0.365601	Schwarz criterion		0.946141
Log likelihood	1.518281	F-statistic		54.377322
Durbin-Watson stat	2.129316	Prob(F-statistic)		0.016913

Sources: Researcher’s Analysis (2015)

Note: The Sum squared residual (RSS₃) is given as 0.365601

Test of Hypotheses

The hypotheses formulated in chapter one are hereby tested

Test Of Hypothesis One

Ho₁: Oil benchmarking fiscal policy has not impacted significantly on revenue from the Oil sector.

Chow Test Calculations

Figure I

$$F_x = \frac{RSS_c - (RSS_1 + RSS_2) / K}{(RSS_1 + RSS_2) / (n - 2k)}$$

Where K = 3 and n = 41

$$F_x = \frac{31.49590 - (0.168130 + 0.265601) / 3}{(0.168130 + 0.265601) / 41 - 2(3)}$$

$$\frac{31.49590 - 0.433731 / 3}{0.433731 / 35}$$

$$\frac{31.062169 / 3}{0.433731 / 35}$$

$$\frac{10.35405633}{0.01239231} = 835.5$$

The hypotheses is tested with Chow test statistics (See Figure 1)

Sum of square residual for period before 2004 (1970-2003) = 0.168130

Sum of square residual for period after 2003 (2004-2010) = 0.265601

Sum of square residual for period before and after 2003 (1970-2010) = 31.49590

F-Test = 835.522

The table value at 5% level and 3 degree of freedom for numerator and 2 degree of freedom for denominator

That is: F_{0.05} (3,2) = 19.16

Since the computed value of F-Test (835.522) is greater than the table value (19.16), we reject the null hypotheses that the oil bench marking fiscal policy has not impacted significantly on revenue from the oil sector, hence the acceptance of the alternate hypotheses.

Test Hypothesis Two

HO₂: the Nigerian oil bench marking has no significant effect on federal government capital expenditure

Chow Test Calculations

Figure II

$$F_x = \frac{RSS_1 - (RSS_2 + RSS_3) / K}{(RSS_2 + RSS_3) / n - 2k}$$

Where K = 3 and n = 41

$$F_x = \frac{47.45835 - (1.626143 + 0.955028) / 3}{(1.626143 + 0.955028) / 41 - 2(3)}$$

$$\frac{47.45835 - 2.5811951 / 3}{2.5811951 / 35}$$

$$\frac{44.877154 / 3}{2.5811958 / 35}$$

$$\frac{14.9590514}{0.07374845} = 202.8$$

The hypotheses is tested with Chow test statistics (See Figure 2)

Sum of square residual for period before 2004 (1970-2003) = 1.626143

Sum of square residual for period after 2003 (2004-2010) = 0.9550528

Sum of square residual for period before and after 2003 (1970-2010) = 47.45835

F-Test = 202.8

The table value at 5% level and 3 degree of freedom for numerator and 2 degree of freedom for denominator

That is: F_{0.05} (3,2) = 19.16

Since the computed value of F-Test (202.8) is greater than the table value (19.16), we reject the null hypothesis and accept the alternate hypothesis that the Nigerian oil bench marking has significant effect on federal government capital expenditure.

Test of hypothesis Three

HO₃: Oil bench marking fiscal policy has not impacted significantly on Nigerian External reserves

Chow Test Calculations

Figure III

$$F_x = \frac{RSS_1 - (RSS_2 + RSS_3) / K}{(RSS_2 + RSS_3) / (n - 2k)}$$

Where K = 3 and n = 41

$$F_x = \frac{26.4956 - (0.156803 + 0.365601) / 3}{(0.156803 + 0.365601) / (41 - 2(3))}$$

$$\frac{26.4956 - 0.522404 / 3}{0.522404 / 35}$$

$$\frac{25.973196 / 3}{0.522404 / 35}$$

$$\frac{8.99106533}{0.01492582}$$

= 602.4

The hypotheses is tested with Chow test statistics (See Figure 3)

Sum of square residual for period before 2004 (1970-2003) = 0.156803

Sum of square residual for period after 2003 (2004-2010) = 0.365601

Sum of square residual for period before and after 2003 (1970-2010) = 26.4956

F-Test = 602.4

The table value at 5% level and 3 degree of freedom for numerator and 2 degree of freedom for denominator

That is: F_{0.05} (3,2) = 19.16

Since the computed value of F-Test (602.4) is greater than the table value (19.16), we reject the null hypotheses that the oil bench marking fiscal policy has not impacted significantly on revenue from the oil sector, hence the acceptance of the alternate hypotheses.

Error Correction Mechanism

The error connection analysis is done to examine the changes the introduction of the oil-price based fiscal rule has caused in the short and long-run between real government expenditure and real oil revenue. The results are presented in tables 7-8 below

Table 13: Error correction model for the 1970-2003 period.

Depended variable Din (RGE)

Method: Least squares

Sample (adjusted) 1971-2003

Method objections: 33 after adjustments

Variable	Co efficient	Std. error	t. Statistic	Prob
C	0.031206	0.053381	0.584603	0.5632
Din (ROR)	0.555810	0.101739	5.463076	0.0000
ECM (-1)	-0.761531	0.152918	-4.979980	0.0000
R – Squared	0.645699			
Adjusted square	0.622079			
F - Statistic	27.33692			
Prob. (F-Statistics)	0.00000			
Durbin Watson stat	1.651377			
Source: Researcher’s Analysis				

Sources; Researcher’s Analysis (2015)

Table 14: Error correction model for the 1970-2010 periods

Depended variable Din (RGE)

Method: Least Square

Sample (Adjusted): 1971 – 2010

Included observations 40 after adjustment

Variable	Co efficient	Std. Error	t-Statistic	Prob
C	0.035902	0.048925	0.733825	0.4677
DinROR	0.505625	0.098093	0.098093	5.154534
ECm (-1-)	0.577027	0.132206	-4.364617	0.0000
R- Squared	0.545850			
Ajusted R-Squared	0.521302			
R-square	0.521302			
F. statistic	22.23547			
Prob (F – Statistic)	0.000000			
Durbin Watson stat	1.659557			

Sources; Researcher’s Analysis (2015)

According to table 7-8, the explanatory variables and the error correction terms in the two sample periods are statistically significant. The co-efficient of the error correction term changes from -0.76 in the 1970-2003 period to -0.577. Approximately -0.58 in the 1970 – 2010 periods.

This indicates a reduction in the percentage of the discrepancy between short-term and long term real government expenditure that is corrected within a year from about 77% to about 58%. The slower rate of adjustment to equilibrium suggests that the oil- price based fiscal rule has been effective in limiting the dependence of oil revenue on government expenditure. Thus the null hypothesis (2) which states that there is no significant relationship between Nigerians oil revenue and government expenditure after the adoption of the rule in 2004 is accepted the over dependence of government expenditure on oil revenue is reduced.

Discussion of Findings

The analysis above have revealed the following

It was indicated that Nigeria economy was among the most volatile in the world between 1970-2003 the nature of the country’s volatility shows that the following two factors have significant contribution to it (i) the price volatility attribute of oil (ii) the tie between public expenditure and oil revenue in the country caused by the oil-driven nature of the economy.

Secondly, the small size of the Nigeria economy was seen as a serious threat. This is because small economies like Nigeria usually have difficulties on managing external shocks. This is in line with World Bank (2013) which based on the country’s (GNI) per capital classified Nigeria as a small economy.

In 2004 the country adopted oil-price based fiscal rule which according to the findings has been effective in delinking government expenditure from oil revenue and limit the domestic volatility caused by the international transfer. The resultant effect of this is that Nigeria fiscal policy is no longer pro-cyclical but counter cyclical The introduction of the oil- price-based fiscal rule in 2004 had a structural break. It went a long way to reduce volatility of oil revenue. The oil bench mark have affected revenue from oil sector, capital expenditure and external reserve significantly. This were indicated from the analysis of the hypotheses.

In general it was revealed that the oil price-based fiscal rule has save Nigeria from oil price volatility and limited the dependence of oil revenue on government expenditure. This is because the country is rigid and transparent in applying the rules. The above findings is line with the recommendation of Baunsgaard (2003) on the IMF working paper on fiscal policy in Nigeria. He posited that a quantitative fiscal rule will not change the impact of government activities on the economy unless measures are taken to combat corruption and to strengthen transparency and accountability of fiscal operation.

Conclusion

Following the 1973 Arab-Israeli war, there was a period of sustained oil price increase until when there was an oil glut in the international market. Prices started to decline gradually from almost USD40 in 1980 with a crash to below USD10 in 1986. About 22yrs later, the global economic and financial crisis, which started with the sub-prime mortgage crisis in the US in 2008 resulted, in credit crunch, declining asset values and a decrease in economic activities and output, prominently in the advanced economics of the world. The decline in economic activities resulted in reduced demand for oil and price fall from USD 147 in July 2008 to below USD45 by December 2008. (Nwankwo, 2015). Since the last quarter of 2014, there has been a decline in demand for oil as a result of(i) the slowdown of economic activities in China, India and Europe;

- i. Increase supply of oil with higher exploration levels, including shale oil and gas in the united states, Canada and other countries and
- ii. The theory of geopolitical manipulation by the West in reaction to claimed Russian aggression in the Ukraine war a bid to hurt Russian economy by depressing its oil export income. The higher supply and

lower demand have led to declining prices and, the decision of the OPEC in November 2014, to retain production levels, has resulted in a sharp fall in prices (USD115 in June 2014 to USD45 in January 23, 2015 (Daily Trust Jan. 2015)

Compared to its start during the oil price crash of 1986, the Nigeria economy has undergone sustained reforms, consolidated and advanced with initiatives contained in the transformational agenda which have helped it to withstand the current crash in oil prices.

The effectiveness of the Nigeria oil price-based fiscal rule and other reforms would be best appreciated how much better Nigeria has coped with the current oil price shock, by observing the ongoing experiences of other major oil exporting and oil dependent countries like Venezuela and Russia.

- Venezuela: shortage of basic items like milk, coffee, sugar, meat and tissue paper. Long queues for essential item leading to public protests and riots, inflation at 63.61% as at November 2014, ratings downgraded by Moodys and Fitch, using oil exports to repay Chinese loans and debt default expected (Nwankwo, 2015).

Russia: inflation rate has risen from 6.1 % in January 2014 to 11.4% as December 2014, many as a result of food inflation which is about 16.4%. Scarcity of meat, poultry products and sugar. Ruble devalued by 52% in 2014 Central Bank interest rate increased from 10.5% to 17% in December, 2014 and later in 2015 brought down to 15% which is still relatively high and Russian bonds downgraded to junk. Shocks from crashes in the price of oil, impact negatively on oil-export dependent economics, including Nigeria. A comparison of the impact of oil revenue crash shows that Nigeria is coping better with the current 2014/2015 oil price crash than it did with earlier occurrence. The reason why the country is now more resilient and coping better is that the country has been on a path of sustainable reforms and structural transformation.

However, it is critical to point out that resilience does not mean invincibility of the economy to oil price crash shock. If the shock is prolonged. It only means that we have the advantage of some time to adjust without panic.

Recommendations

Before 2004 the fiscal sector in Nigeria has been the main mechanism for transmitting oil volatility to the rest of the economy. With a pro-cyclical budget as expenditure tends to be correlated with oil revenue, the fiscal sector has provided no cushion against oil-related volatility. Nigeria fiscal rule has broken this cycle by following a more stable expenditure path, the budget becomes counter-cyclical in the face of oil price swings. The adoption of the Nigeria oil price based fiscal rule in 2004 has been proved to be effective in isolating and insulating oil revenue volatility effect from the budget in particular and the economy in general

To this effect the following factors are recommended

- (i) The continued adoption of the rule in the Nigerian economy.
- (ii) Since fiscal rule is no panacea for all fiscal –related ills in Nigeria, the issue of corruption and transparency should be re-emphasized not just in the application of fiscal policy but in all aspect of the economy. Little real improvement will be achieved in an environment where credibility has been undermined by past fiscal profligacy.
- (iii) The economy need more sustained reforms and structural transformation especially in the area of electricity and diversifying the economy in order to make Nigeria economy a multi-facet one and avoid over-dependence on oil revenue
- (iv) Nigeria economy from World Bank classification is a small one (world bank 2013) this is because Nigeria is a price taker in the world market, it has a small income and its domestic interest rate adjusts to the world interest rate. Small economies like Nigeria usually have difficulties on managing external shock, it is vital that Nigeria economy should be expanded to compare with large economic like USA, Japan and China.

If the above factors are effectively implemented Nigeria would be among the world best economy in no distant time.

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