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Research Article

Government Expenditure and Oil Revenue in Nigeria

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Abstract: This paper analyzed and estimated the effects of oil revenue on government expenditure in Nigeria for the sample period of 1980 – 2018. The Autoregressive Distributed Lag model (ARDL) estimated with the Ordinary Least Square technique was used to examine the relationship among the variables. Findings from the model revealed that there was a direct and significant relationship between oil revenue, non-oil revenue, exchange rate and government expenditure, however, external debt exhibited a positive and insignificant relationship on government expenditure in the long run. There was a direct and significant relationship between the independent variables and government expenditure in the short run. The study therefore recommended deepening the oil and gas sector while significantly improving on the non-oil revenue for better economic outcomes.

Keywords: Government expenditure, oil revenue, non-oil revenue, exchange rate, external debt.

INTRODUCTION

Prior to the days of the classical economists, much emphasis has been laid on the revenue side of the public sector account. The government relies on revenue to meet the various obligations she undertakes in the management of the affairs of the society. The Nigerian economy has relied heavily on revenue from the oil sector, right from 1973 till date. The various oil booms occasioned by windfalls from escalated oil prices not only created tremendous changes in the pattern of consumption, investment and production but it has profoundly altered Nigeria's socio-cultural values, political aspirations, style of economic management as well as the actual policies and programs that it embarked upon through the various developmental plans implemented from 1970-1980 (Aregbeyen and Ibrahim, 2012). Oil revenue plays important role in Nigeria. Oil price and quantity produced stimulates all kinds of activities in the economy. The falling of oil price and consequent decline in oil revenue may impose fiscal constraints on government expansionary policy which may have negative impact on economic outcomes. It becomes imperative to verify the exact impact of oil revenue on expenditure. Oil revenue is the dominant source of government revenue, accounting for about 90% of total exports, and this approximates to 80% of total government revenues (Ishola, *et al* ., 2016). Available data from the World Bank sources (2019) indicated that oil price fluctuations cont inue to influence Nigeria's economic growth performance. Between the periods of 2000-2014, Nigeria's Gross Domestic Product (GDP) grew at an average rate of 7% per year. Following the oil price collapse in 2014-2016, combined with negative production variability, the (GDP) growth rate dropped to 2.7% in 2015. In 2016 during its first recession in 25 years, the economy contracted by 1.6%. Since 2015, economic growth remains stunted. Growth averaged 1.9% in 2018 and remained stable at 2% in the first half of 2019

Government expenditure has been on the increase over the years with the myriads of physical capital and the various programs as well as projects that are to be carried out which are enormous. In a nutshell, government desire to bring about rapid economic development has largely accounted for the budget deficits experienced in national accounts. The impact of budget deficit has not occasioned stellar economic performance in the Nigerian economy. Fiscal deficits tend to reduce national savings which has negative implication for economic development. The over reliance on oil revenue has made the Nigerian economy prone to external shocks (Kilishi, et. al, 2010). It is remarkable to note that establishing a long run relationship between government expenditure and oil revenue would help to trace any source of fiscal imbalance in the economy (Aregbeyen, 2013). Against this background, the objective of the study is to analyze and estimate the relationship between oil revenue and government expenditure in Nigeria for the period 1980 to 2018. To achieve this objective, the study is divided

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into five sections. Section one already introduced the study; section two presents the literature review; section three unveils the method engaged in the study; section four discusses the empirical analysis of the results and the findings of the study. Section five concludes the paper by recommending policies that will improve the impact of oil revenue on government expenditure.

LITERATURE REVIEW

Empirical Review

The relationship between the inflows from exportation of crude oil and overall economic growth has been a topical matter with great research interest since the first oil shocks of 1970s. By reason of the fact that huge revenue is realized from the sale of crude oil and the economies of most exporting countries are dependent on it, there are enormous research focus on the relationship. Aregbeyen and Ibrahim (2012) stated that there are three contending hypotheses used in describing the relationship between government expenditure and revenue these are; the fiscal synchronization hypothesis which proposes that there is a bidirectional causality between government expenditure and revenue; revenue-spend hypothesis proposes a unidirectional causality and the third is spend-and –revenue hypothesis this hypothesis suggests that government spending leads to changes in government revenue.

In a study on the relationship between oil revenue, government expenditure and economic growth Aregbeyen and Kolawole (2015) investigated whether oil revenue impacted on government spending and economic growth. Time series data over the period of 1980 to 2012 were used. Cointegration and vector error correction model as well as granger causality were used to determine the magnitude of impacts and the direction of causality. Findings from the analysis indicated that oil revenue granger cause both total government spending and growth. There was no causality between government spending and growth in the country.

In the same vein, Ademola, *et al*. (2015) examined the relationship between government expenditure, oil revenue and economic growth in Nigeria. The variables used are growth rate of GDP, adult literacy rate, life expectancy, growth rate of labor, growth rate of capital. Total health expenditure, oil revenue, primary school enrolment and tertiary school enrolment. The Ordinary Least Squares (OLS) method of analysis was employed and the estimation results indicated that changes in crude oil price have had significant effect on inflation. Other findings are that inflation has been influenced by exchange rate changes and changes in broad money supply and maximum lending rate.

Ayinde, *et al*. (2015) modelled government expenditure, revenue and economic growth. Cointegration and error correction mechanism were used to analyze the data. Results from the analysis indicated positive impact of capital expenditure, oil revenue, federation account and federal retained revenue on economic growth.

Using time series data from1970 to 2007 (Emelogu and Uche, 2015), investigated the relationship between government revenue and government expenditure in Nigeria using time series data. The Engel-Granger two steps cointegration and error correction mechanism were employed for analysis. The study found a long run relationship between the two variables and a uni-directional causality running from government revenue to government expenditure in Nigeria.

Obioma and Ozughalu (2010) examined the relationship between government expenditure and government revenue. Using time series data from 1970-2007. The study employed the Johansen cointegration and error correction mechanism. The result indicated a long run relationship between government revenue and government expenditure in Nigeria and evidence of a unidirectional causality from government revenue to government expenditure.

Using the autoregressive distributed lag approach to cointegratrion, variance decomposition and rolling regression method to determine the relationship between expenditure and revenue of government in Romania, Hye and Jalil (2010) examined the relationship between government revenue and expenditure. The findings revealed a bidirectional long run relationship between government expenditure and revenue.

Ahmed and Musan (2015) examined the dynamic relationship between oil revenue, government spending and economic growth in Oman between 1980 and 2013. The study employed the cointgeration method and error correction mechanism. The findings revealed that government expenditure appears to be the main source of economic growth. in the long run and short run variation in government expenditure are generally derived by oil revenue shocks.

Mahare, *et al*. (2012) examined the relationship between revenue and expenditure in eleven oil exporting countries between 1980 and 2009. The variables used for the study are real government expenditure, real government revenue and gross domestic product. Panel data analysis was used in the data analysis. The result showed a strong causality from gross domestic product and non-oil revenue to government expenditure in the oil exporting countries. However, spending does not have any significant effects revenue, both in the short run and in the long run.

Alkehateb, *et al*. (2017) examined the relationship between oil revenue, public spending, GDP and employment in Saudi Arabia. For analysis, the study employed the ADF and KPSS unit root tests, Johansen Cointegration and vector error correction mechanism based causality test with sample period between 1991 and 2016. The study found that oil revenue and public spending impacted positively on employment level. Thus the study recommended investment in other sector of the economy to enable more employment to be generated.

Overview of Government Expenditure and Oil Revenue in Nigeria: Some Stylsized Facts.

In this subsection, we present the trends of oil prices, oil revenue and government expenditure in Nigeria over the period 2009-2018. In figure 2.1, the trend in oil price is depicted. There was consistent rise in oil price in 2009, 2010 and 2011. Oil price was relatively stable in 2012 but it began to fall in 2014 and sharply fell to its lowest ebb in 2016. Oil price rose gradually through 2016 to 2018. At the outset of the corona virus pandemic, oil prices began to free fall and as at date stood at $25.04 per barrel. The fall in oil prices spell doom for the Nigerian economy.

Figure 2.2 showed the trend in oil revenue. It can be clearly seen that there was consistent increase in oil revenue from 2009-2011. Oil revenue began to decline thereafter. Firstly, the rate of decline was not steep from 2012-2014. Between 2014 to 2016 the rate of oil revenue decline was very steep and was at its lowest ebb in 2016. This was when the economy went into recession. There has been a gradual improvement in oil revenue between 2016-2018. The year 2019 was relatively calm and the 2019 budget was hinged on $57 per barrel benchmark. As can be seen from the relationship in the trends of oil prices and oil revenue, it is easily seen that once oil prices began to fall, the first casualty is oil revenue.

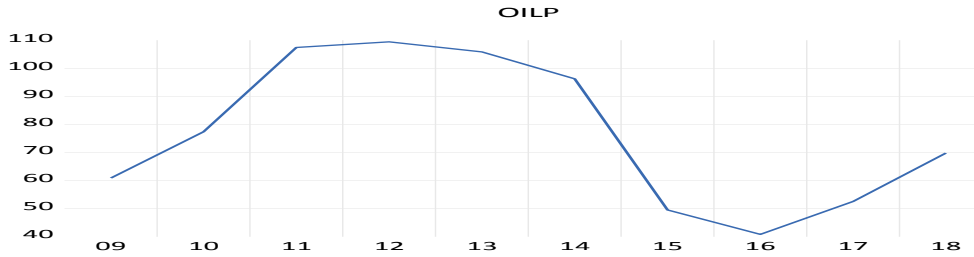

Figure 2.1:

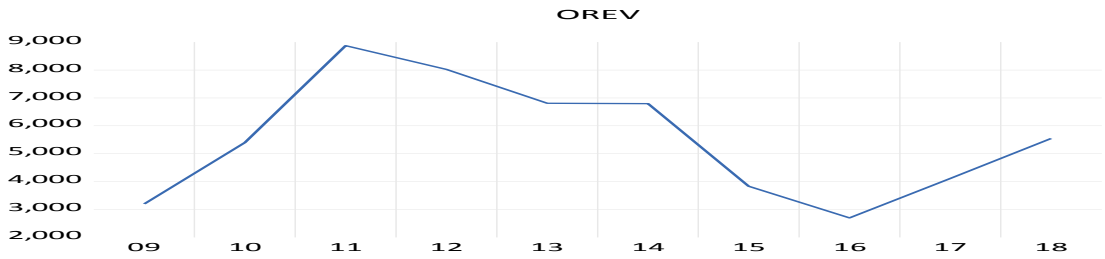

Figure 2.2:

A look at figure 2.3 shows that government expenditure has been increasing from 2009 to 2010. It recorded marginal increase in 2011, 2012, 2013 and 2014 there was steady increase in government expenditure in 2015, 2016, 2017 and 2018. Though oil revenue fell in those years of sharp decrease in oil prices, the government had to stimulate the economy with borrowings to take the economy out of recession.

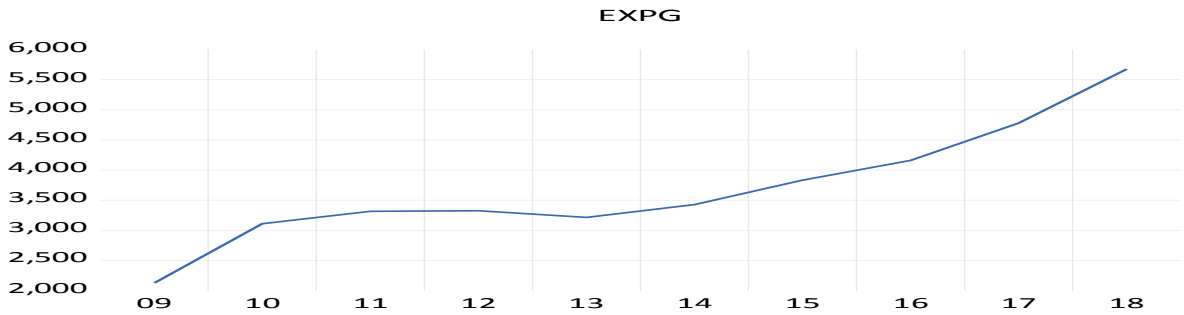

Figure 2.3:

METHOD OF STUDY

The Data

Annual time series data covering 1980-2018 were collected and employed for the analysis of this paper. The data were sourced from National Bureau of Statistic (NBS) Annual Abstract of Statistics (Various issues). National Bureau of Statistics (NBS) quarterly Reports, CBN Statistical Bulletin (various volumes) and (BN Annual Accounts and Reports (various years).

Model Specification

In this study, government expenditure is the dependent variable while the independent variables are oil revenue, non-oil revenue, external debt, exchange rate.

To measure the effect of the independent variables on government expenditure, we specify:

GEXPR = f (OREV, NOREV, EDEBT, EXR) (3.1)

Where

GEXPR = Government expenditure
OREV = Oil revenue
NOREV = Non-oil revenue
EDEBT =External debt
EXR =Exchange rate

The model in its econometric linear form can be expressed as;

$GEXPR = a_0 + a_1OREV + a_2NOREV + a_3EDEBT + a_4EXR) + U$ (3.2)

Where

α_0 to α_7 = the parameters to be estimated and U_t = the error term.

The theoretical expectations about the signs of the coefficients of the parameters are as follows;

$\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5 > 0$

Estimation Technique

The ADRL model specification is used to empirically analyse the above functional forms. The Autoregressive Distributed Lag (ARDL) co-integration test popularly known as the bound test shows the long-run relationship and dynamic interactions between government spending and oil revenue. This method is adopted for this study for three reasons. First, compared to other multivariate co-integration methods (i.e Johansen and Juselius (1990)), the bounds test is a simple technique because it allows the co-integration relationship to be estimated by OLS once the lag order of the model is identified. Second, adopting the bound testing approach means that pre-test such as unit root test is not required. This implies that the regressors can be either I(0), purely I(1) or mutually co-integrated. Third, the long-run and short-run parameters of the models can be simultaneously estimated.

The ARDL model specifications of the functional relationship between government spending and oil revenue as expressed by equation (1) is:

GEXPR = f (OREV, NOREV, EDEBT, EXR)

$\Delta GEXPR = \alpha_0 + \alpha_1 GEXPR_{t-1} + \alpha_2 OREV_{t-1} + \alpha_3 NOREV_{t-1} + \alpha_4 EDEBT_{t-1} + \alpha_5 EXR_{t-1} + U_t$

$\Delta GEXPR = \alpha_0 + \alpha_1 GEXPR_{t-1} + \alpha_2 OREV_{t-1} + \alpha_3 NOREV_{t-1} + \alpha_4 EDEBT_{t-1} + \alpha_5 EXR_{t-1} + \sum GEXPR_{t-1} + \sum OREV_{t-1} + \sum NOREV_{t-1} + \sum EDEBT_{t-1} + \sum EXR_{t-1} + E_t$

The bound test approach for the long-run relationship between oil revenue and government expenditure is based on the Wald test (F-statistic), by imposing restrictions on the long-run estimated coefficients of one period lagged level of the government spending and revenue to be equal to zero, that is Ho; $b_1 = b_2 = b_3 = b_4 = 0$ for equation 3. Then calculated F-statistic is compared to the tabulated critical value in (Pesaran (2001). The explanatory variables are assumed to be integrated of order zero, or I(0) for values of the lower bound, while the upper bound values assumed that they are integrated of order one, or I(1). Therefore, the decision rules is that if computed F-statistic falls below the lower bound value, I(0), the null hypothesis (no co-integration) cannot be rejected. Contrarily, if the computed F-statistic exceeds the upper bound value, I(1) then it can be concluded that government spending and government revenue are cointegrated.

The error correction model was used to capture the speed of adjustment of government expenditure model and oil revenue model. This is because to immediately restore equilibrium may not be possible due to the lags and adjustment process used as capture changes in any of the factors affecting government expenditure or oil revenue overtime. Thus, these models are expressed below

$\Delta GEXPR = \beta_0 + \sum \Delta GEXPR_{t-1} + \sum \Delta OREV_{t-1} + \sum \Delta NOREV_{t-1} + \sum \Delta EXR_{t-1} + \sum \Delta EDEBT_{t-1} + E_t$

Result Presentation and Analysis

Unit root test was carried out using the Augmented Dickey Fuller (ADF) and the Philips Perron to check the stationarity of the variables. The result is reported in Table 4.1

Table 4.1: Summary of Unit Root Tests

Variables	ADF	PP	Decision
GEXPR	5.98*	5.99*	I(0)
OREV	4.91*	6.21*	I(0)
NOREV	2.76	2.76	
D(NOREV)	7.67*	7.67*	I(1)
EXDT	5.97*	5.97*	I(0)
EXR	1.95	1.12	
D(EXR)	4.54*	4.37*	I(1)

Source: Researchers' computation using Eviews

Note: (i) D is the first difference operator, (ii) Critical values: ADF and PP at 1% (5%) are 4.24 (3.54) respectively. (iii) * means significant at 1%. (iv) All values were reported in their absolute terms.

From the result in Table 4.1, the growth rate of government expenditure (GEXPR), oil revenue (OREV), and external debt (EDEBT) were stationary at level {I(0)}, while the growth rate of non-oil revenue (NOREV), and exchange rate (EXR) were stationary at first difference {I(1)}. The combination of variables which are stationary at level and at first difference gives the foundation for the use of Auto-regressive Distributed Lag Model (ARDL). ARDL with cointegrating bounds was adopted and with this approach, a generic ARDL, from which coefficient diagnostics were carried out, was first estimated. First, coefficient diagnostic was conducted to check for the existence of long-run equilibrium relationship among the variables of the model. The result of the Bound test is presented in table 4.2.

Table 4.2: Summary of Bound Test

	1 % Critical Value		5% Critical Value	
F-statistic	Upper Bound	Lower Bound	Upper Bound	Lower Bound
5.26	4.37	3.29	3.49	2.56

Source: Researchers' computation using Eviews

The result in Table 4.2 is an indication of the existence of long run equilibrium relationship among the variables of the model. This because, F-statistic of 4.98, is higher than the upper bound at both 1% and 5% critical values. With this outcome, further coefficient diagnostics were carried out to obtain the short-run estimate, which is the Error Correction Regression (ECM), and the long-run estimates, and their results are as presented in Table 4.3 and Table 4.4 respectively.

Table 4.4: Long run Estimate

Variable	Coefficient	Std. Error	t-Statistic	Prob.
OREV	0.348715	0.119549	2.916924	0.0120
NOREV	0.341868	0.157885	2.165295	0.0496
ER	0.223160	0.084336	2.646095	0.0202
EDEBT	0.177222	0.137249	1.291245	0.2191
C	-34.45411	14.24208	-2.419177	0.0310

Source: Researchers computation using Eviews

In the long run, oil revenue, non-oil revenue and exchange rate have positive significant impact on government expenditure, while external debt has positive insignificant impact. A unit change in oil revenue will bring about 0.35 change in government expenditure, while a unit change in non-oil revenue will induce 0.34 change in government expenditure. Furthermore, a unit change in exchange rate and external debt will lead to 0.22 and 0.18 change in government expenditure respectively.

Table 4.3: ARDL Error Correction Regression

Dependent Variable: D(GEXPR)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GEXPR(-1))	-0.301423	0.119306	-2.526460	0.0253
D(OREV)	0.078787	0.037832	2.082554	0.0576
D(OREV(-1))	0.250457	0.070711	3.541997	0.0036
D(OREV(-2))	0.171971	0.044849	3.834434	0.0021
D(OREV(-3))	0.126856	0.033491	3.787714	0.0023
D(NOREV)	0.141272	0.028483	4.959928	0.0003
D(NOREV(-1))	0.147511	0.045537	3.239401	0.0065
D(NOREV(-2))	0.061541	0.031328	1.964388	0.0712
D(ER)	0.384039	0.124142	3.093537	0.0086
D(ER(-1))	0.268886	0.185973	1.445833	0.1719
D(ER(-2))	0.481738	0.172837	2.787243	0.0154
D(ER(-3))	0.734288	0.187248	3.921478	0.0018
D(EDEBT)	0.143238	0.037347	3.835309	0.0021
D(EDEBT(-1))	-0.157044	0.040277	-3.899067	0.0018
D(EDEBT(-2))	-0.137799	0.028020	-4.917905	0.0003
CointEq(-1)*	-1.110455	0.168049	-6.607932	0.0000

R^2 = 0.91%, DW = 1.66

Source: Researchers' computation using Eviews

In the short-run, the one period lag of government expenditure has a negative significant impact on the current level of government expenditure. A unit change its value can induce 0.3 change in the dependent variable. Oil revenue has positive significant impact on government expenditure. A unit change in oil revenue can induce about 0.07 to 0.25 change in government expenditure. The current value and one period lag of non-oil revenue exert positive significant impact on government expenditure, while its second period lag has positive insignificant impact. This is in consonance with (Aregbeyen and Ibrahim, 2012; Alkhateeb et. Al, 2017). A unit change in the current value of non-oil revenue, its one period lag, and its two period lag can induce 0.14, 0.15, and 0.06 change on government expenditure respectively. The impact of exchange rate is mixed, while that of its current value, second period lag, and third period lag are positive and significant, that of its first period lag is positive but insignificant. A unit change in exchange rate can induce about 0.28 to 0.73 change in government expenditure. External debt has significant impact on government expenditure. However, while this impact is positive for its current value, it is negative for its first period lag and second period lag. A unit change in its current value, first period lag, and second period lag can induce 0.14, 0.16, and 0.14 change on the dependent variable respectively. The error correction term {CointEq(-1)*} is negative and significant, and this is an indication of satisfactory speed of adjustment. R^2 of 0.91 is an indication that 91% change in the dependent variable is accounted for by change in the independent variables taken together.

Furthermore, residual diagnostics indicate that the residual is normally distributed (see Appendix I) and that the model is free from serial correlation and is homoscedastic (see Appendix II and III). Also, stability tests indicate that the model is stable and free from misspecification error (see Appendix IV and V).

CONCLUSION AND POLICY IMPLICATIONS

The study analyzed and estimated the effects of oil revenue on government expenditure in Nigeria over the period 1980 to 2018. Specifically, oil revenues, non-oil revenue, external debt, and exchange rate are the explanatory variables.. The analysis was carried out using the Autoregressive Distributed Lag (ARDL) model developed by Pesaran *et al*. (2001).

The result of the cointegration test based on the bounds testing approach showed that the variables are co-integrated which suggested a long-run relationship between them. The results of the long-run estimates showed that all the regressors had positive and significant long-run relationship with government expenditure except external debt whose result indicated a positive but insignificant relationship. The results of the short-run effects of oil revenue on government expenditure indicated that all the regressors had positive and significant relationship. We conclude that government expenditure is highly responsive to changes oil revenue, non-oil revenue, external debt and exchange rate both in the short and long runs.

The afforestated findings have some implications for policy formulations. First, the positive and significant relationship between government expenditure and oil revenue on the hand one and the

relationship between government expenditure and non-oil revenue on the other hand gives clear indication both are important for moving the economy forward. Efforts should be intensified to expand and deepened the oil and gas sector especially the gas sector for optimal generation of revenue but more efforts should be exerted on improving revenue from the non-oil sector. With price oscillations in the oil sector and the associated shocks, it has become more imperative than ever to start diversifying aggressively from the oil and gas sector.

Secondly, contracted external facilities are judiciously used to prosecute life touching projects that will improve the social optimum bliss. When the economy is experiencing financial hiccups external debt can be contracted to boost the national economy.

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