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RESEARCH ARTICLE

EFFECT OF CRUDE OIL REVENUE ON THE SERVICES SECTOR GROWTH IN NIGERIA

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ABSTRACT

The Services sector is one of the most important sectors of the economy of every nation. In Nigeria, IT contributes more than half of the GDP and has substantial share in the country's exports and employment. The objective of this paper is to empirically examine the effect of crude oil revenue on the service sector growth in Nigeria between 1981 and 2017. Time series data were sourced from secondary sources on Service Sector Growth (SEV), Labour (LAB), Capital (CAP) and Crude Oil Revenue (COR). The data sets were analysed based on the Auto Regressive Distributed Lag (ARDL) Bounds testing approach for co-integration that estimates the long-run and short-run relationship between variables. The result of the analysis reveals that labour and capital impacts negatively on service sector growth while crude oil revenue impacts positively on service sector growth in Nigeria within the period. The paper therefore recommends that government should increase her budgetary allocation to the services in addition to introducing fiscal and monetary policy measures that will impact positively on the sector and ensure fiscal discipline regarding spending of crude oil revenue in terms of putting infrastructural facilities in place so as to boost the services sector growth which will in turn enhance economic growth and development.

INTRODUCTION

The service sector is the largest and one of the most important sectors in an economy. This is because it is growing comparatively at a faster rate than any other sector in the developing countries and is contributing a major share in terms of output, income and employment. It is made up of transportation, information and communication, utilities, Accommodation and Food Services, Finance and Insurance, real estate, Professional, Scientific and Technical Service, Administrative and Support Services, Public Administration, education, Human Health and Social Services, Arts, Entertainment and Recreation and Other Services (CBN, 2017). In order for the services sector of the economy to improve these capabilities, however, it has to be supported by the government through the provision of an enabling environment. One of the ways in which the government can do this is through the provision of revenue raised from crude oil as this constitutes the major source of government revenue in Nigeria. According to Ihua *et al.* (2010), oil revenue contributes about 80 percent of Nigeria's national income and about 83 percent of federal government revenue. The relationship between crude oil revenue and services sector growth in an economy is that when revenue are raised through crude oil, government usually applies the proceeds to provide public goods, maintenance of law and order, defense against external aggression, ensure social and economic maintenance, create an enabling environment by providing infrastructural facilities that will enhance the performance and growth of the

services sector which in turn will lead to economic growth and development. Arising from the above, since Nigeria's independence in 1960 different administrations have introduced policies targeted at not only diversifying the country's economy but making the real sector especially the services sector an engine of economic growth. Apart from these policies and programs, crude oil revenue has been on the increase over the years. Total annual crude oil revenue increased on the average from 8.57billion naira in 1981-1985 to 31.60 billion naira in 1986-1990 to 178.72billion naira in 1991/1995 to 693.20 billion naira in 1996-2000 to 2625.98 billion naira in 2001/2005 to 4973.82 billion naira in 2006-2010 and by 2011/2017 it has reached 5877.40 billion naira (CBN, 2017). It is expected that both in theory and practice, these increases in crude oil revenue should promote the growth of the services sector in Nigeria. But available data shows that despite the increase in crude oil revenue, the growth of the services sector in Nigeria over the years still remains poor and largely underdeveloped as its performance in terms of growth has declined. On the average, the growth of the services sector increased from 3.99 per cent in 1981-1985 to 13.93 per cent in 1986-1990 to 33.39 per cent in 1991-1995 and later decreased to 27.15 per cent in 1996-2000 to 27.10 per cent in 2001-2005 to 21.66 per cent in 2006-2010 to 10.54 per cent in 2011-2017 (CBN, 2017). However, Sanusi (2011) has identified that lack of access to adequate funds for investment in the sector and weak infrastructural facilities have been the major hindrance to improved productivity in the sector. Also, there is dearth of literature on the impact of crude oil revenue on the services

sector growth of countries especially in Nigeria, giving rise to the basic question: To what extent does crude oil revenue impact on the services sector growth in Nigeria. The paper is organized into five sections. First, is the introduction, followed by the literature review and theoretical frame work. Third, the method of study and model estimation is discussed. Fourth is the discussion of results, and finally, conclusion and recommendations.

Literature Review

Theoretical Literature

(a) The Dutch Disease Theory: The Dutch Disease theory originated in the late 1950s when natural gas discoveries in the Netherlands eventually hurt the competitiveness of the Dutch manufacturing sector. The country faced the risk of a de-industrialization process. It is also referred to as the adverse effects on manufacturing of natural resource “discoveries”. Dutch disease theory states that, the discovery of a natural resource (primary) has negative consequences which results from any large increase in foreign currency, including foreign direct investment, foreign aid or a substantial increase in natural resource prices. The impediments of oil revenue to economic growth and development of oil-dependent states at the neglect of other sectors is what is cumulatively called Dutch Disease in the literature of development economics (Ottawa, 2001). The enormous influx of cash resulting from oil tends to foster, overzealous and imprudent expenditure. High oil revenue raises exchange rates, promotes adverse balance of payment as the cost of imports rises. In fact, it kills incentive to risk investment in non-oil sectors, the competitiveness of all non-oil sectors such as agriculture and manufacturing industries would be crowded out. Specifically, when a country experiences a resource boom due to a tradable resource discovery and/or to an increase in a resource price, it normally undergoes a real appreciation of its exchange rate and, as a result of rising wages, a relocation of some of the labour force to the resource sector. A real appreciation reduces the international competitiveness of other tradable sectors because resource-based exports crowd out commodity exports produced by those sectors (Krugman, 1987).

(b) Endogenous Growth Theory: This theory explains how factors can determine the growth rate of national output. It shows a channel through which economic development can be achieved. The theory holds that ideas, human capital and knowledge/technology are essential for the growth of an economy. The income generated from oil exports can be used for investment in human capital in form of education and training. According to endogenous growth theory, investment in human capital leads to the production of human capital, which is an important determinant in the growth process. Also workers who undertake work training become more productive and in turn increase productivity of capital and labour (workers) in the economy (Jhingan, 2007). Also revenue accruing from oil exports can be used for physical capital such as machinery and equipment, research, laboratories etc. to increase productivity. The investment in both human and physical capital will increase technology and thereby lead to economic growth. The positive externalities and spillover effects of technology will lead to economic development.

Empirical Literature: Very few studies have examined the impact of crude oil revenue on services sector growth of

countries. Egesi (2010) investigated the relationship between the petroleum industry and the socio economic development of Nigeria from 1975 to 2008. The study used the Ordinary Least Squares (OLS) method of multiple regression for the analysis. The hypothesis testing was carried out on the premise that crude oil export is a dominant contributor to GDP and the result proved this. Also, Peach and Starbuck (2010) studied oil and gas production and economic growth in New Mexico. The paper analysed the relationship between energy production and economic growth in New Mexico using cross sectional data for the state’s 33 counties in Census years 1960, 1970, 1980, 1990, and 2000. The estimated models suggest that oil and gas extraction in New Mexico Counties has had a small but positive effect on income, employment and population. Similar results were obtained when the model was estimated for 925 counties in 13 energy producing states for the year 2000. Ushie, Adeniyi and Akongwale (2012) examined oil revenues, institutions and macroeconomic performance in Nigeria. The study used the Impulse Response Functions (IRFs) and Variance Decomposition (VDC) techniques within a Vector Autoregressive (VAR) framework for the analysis. The study revealed that fluctuations in oil revenues have resulted in inflation, lower output growth and real exchange rate appreciation in Nigeria. Importantly, the institutional variable was found to be significant. The study concluded that government should offer appropriate policy recommendations, which involve a combination of economic, socio-political and institutional actions that may be adopted to enhance the management of future oil windfalls in Nigeria. Binuomote and Odeniyi (2013) examined the impact of crude oil price on agricultural productivity in Nigeria from 1981 to 2010. The study used unit root test, Co-integration and Error Correction modeling techniques for the analysis. The study revealed that exchange rate, capital, labour and trend are the major determinants of agricultural productivity in the long-run, while price of crude oil is the most important determinant of agricultural productivity in the short run. Mohammed, (2014) used non-parametric approach to find out if petroleum income reduced unemployment rate and poverty index in Sudan. Tabular and graphic illustration showed that both unemployment and poverty index reduced in the period concerned. The Chi-square non-parametric test showed that petroleum income affected the poverty index significantly.

Hassan and Abdullah (2015) investigated the impact of oil revenue on the service GDP of Sudan from 2000 to 2012. The study employed unit root test, co-integration and the Ordinary least Squares (OLS) for the analysis. Regression analysis result suggests that oil revenue affects the service GDP positively. Mariot (2015) used the fixed effect dummy variable regression to find out if oil rents caused industrialization in United Arab Emirates. The contribution of the trade and industry to GDP was proxied industrialization. It was found that the regressor affected industrialization positively during period of high oil revenue as against an insignificant level during low revenue period. The study concluded that oil rents caused industrialization in the United Arab Emirates, holding other variables constant. Similarly, the ministry of Energy and Mineral Resources, the Republic of Indonesia (2008) presented a paper; Preventing Dutch Disease: the Indonesia’s Experience. It was based on macroeconomic evidences in the economy. The paper concluded that oil revenue has impacted on Indonesia’s national accounts. Umar (2015) examined the impact of petroleum on human capital development using time series data covering the period 1980-2011. It was discovered

that the variable: oil revenue impacts negatively on Real GDP per capita on the average among the Persian Gulf countries. This means that the resource curse theory is proven to be true in the Persian Gulf. Individually, countries like Saudi Arabia and Qatar experienced a high GDP per Capita Growth over the period of study. The average negative relationship appeared to be inconsistent within the period of the study as shown by the tests of structural stability. Asogwa and Okpongette (2016) used econometric method of OLS and granger causality to analyse the relationship between oil revenue and Nigeria macroeconomic performance from 1981 to 2014. The study found that oil revenue has a positive and significant effect on economic growth in Nigeria. The study also showed that oil revenue does not granger cause economic growth. The study therefore recommended the implementation of the petroleum industry bill with alternative sources of revenue for greater economic performance. Lawrence and Victor (2016) used a dynamic analysis of co-integration and granger causality to analyze the relationship between oil revenue and the Performance of the agricultural sector in Nigeria from 1981 to 2014. The study revealed that oil revenue was not statistically significant in explaining the level of economic growth. The result of the granger causality test indicates that oil revenue does not granger cause agricultural output. The study therefore recommended that government should make concerted efforts to revamp the agricultural sector through judicious use of the dwindling oil revenue and foreign investors should be encouraged to go into the agricultural sector in Nigeria.

Okonkwo and Madueke (2016) examined the impact of petroleum revenue on economic development of Nigeria between 1980 and 2013 using a single linear regression model to test the relationship. The results showed that petroleum revenue has an insignificant effect on economic development of Nigeria in the short run. There is no causal relationship between petroleum revenue and economic development of Nigeria. Government must therefore diversify the economy via promotion and creating enabling environment for non-oil sector development in Nigeria; reduce the size of the public sector and increase budgetary capital expenditure especially in the areas of providing sustainable power supply and means of transportation as well as information technology; intensify efforts aimed at combating corruption; promoting private sector development and entrepreneurship, and encouraging the federating units to contribute to the revenue of the country. Apere (2017) empirically investigated the relationship between crude oil and fiscal policy in Nigeria from 1980:1 to 2015:4. The study used vector auto regression (VAR) model to analyse the data. The result of the impulse response function and Forecast Error Variance Decomposition results shows that oil shocks exert noticeable influence on Nigeria's fiscal policy through fiscal channel of government expenditures that are funded by oil revenues. Also the impact of crude oil and natural gas on innovations in fiscal policy shock was positive from the first, second, third forecast periods and was steady throughout and did not die out in the long run. This study therefore recommends that resources should be devoted by the government to developing the non-oil sector such as the manufacturing, agriculture and the service sector.

Evaluation of Literature Reviewed and Research Gap: It was observed from the literature review, that most of the works reviewed either examined the effect of crude oil revenue on economic growth, or on macroeconomic performance, or on the industrial output, or on agricultural productivity. Except the

work of Hassan and Abdullah (2015) who examined the effect of oil revenue on the services sector GDP of the Sudan economy by regressing services sector GDP as a function of crude oil revenue. This study deviates from these scholars by examining the effect of crude oil revenue on the services sector growth in Nigeria by regressing contribution of the services sector to GDP growth on crude oil revenue (COR), labour (LAB) and capital (CAP) from 1981 to 2017. This is the gap the study filled in literature.

MATERIALS AND METHODS

Analytical Framework: The study employed the standard baseline growth model that output growth (Y) is a function of labour (L) and capital (K) and introduced crude oil revenue variable to examine the relationship between crude oil revenue and service sector growth in Nigeria. Thus, the model is specified as:

$$SEV = f(LAB, KAP, COR) \quad (1)$$

Where;

SEV = Service sector growth

LAB = Labour Proxied by growth of labour participation force

KAP = Capital Proxied by gross fixed capital formation

COR = Crude oil revenue

Equation (1) is transformed into a log-linear form as follows:

$$\text{LogSEV}_t = \beta_0 + \beta_1 \text{Log(LAB)} + \beta_2 \text{Log(KAP)} + \beta_3 \text{Log(COR)} + \mu \quad (2)$$

It is expected that increase in these variables (LAB, KAP and COR) will promote service sector growth. Thus, a priori expectations are $\beta_1, \beta_2, \text{ and } \beta_3 > 0$

Data Sets and Estimation Techniques: Data on services sector growth (SEV), Labour proxied by growth of labour participation force (LAB), capital proxied by gross fixed capital formation (CAP) and crude oil revenue (COR) were gathered from various issues of Central Bank of Nigeria statistical bulletin between the periods from 1981 to 2017. Thereafter, the data were analysed using Auto Regressive distributive Lag (ARDL) technique of analysis (Bound testing method). The study adopted the ARDL modeling technique to estimate the model. The study adopts this method because of one major advantage the ARDL has over other estimation methods such as the OLS. The method produces reliable estimates of the parameters when the variables are $I(0)$ and $I(1)$. This simply implies that a long run association will exist among the variables (Pesaran and Shin, 1998).

RESULTS AND DISCUSSION

The empirical analysis of data in this paper was conducted in five phases. It begins with the descriptive statistics analysis of the data and thereafter conducted the unit test. Furthermore, Bound test for co-integration, the short run and long run estimation of the ARDL and diagnostic tests were conducted.

Descriptive Statistics: The result of the descriptive statistics is presented in Table 1 below. Table 1 shows that, the standard deviation calculated for capital was the most volatile in the series with a value of 4600.32 while labour was the least volatile variable with a value of 0.11. The calculated values for

the skewness statistic for all the variables – SEV, LAB, CAP and COR - were positively skewed, suggesting that their distributions have a long right tail. Again, the kurtosis statistics of SEV and COR variables were platykurtic, meaning that their distributions were flat relative to normal distribution while LAB was leptokurtic, suggesting that their distributions were peaked relative to normal distribution. Based on these observations, it therefore means that there is unit root (non-stationarity) in the series. Thus, estimating these variables at level might not give good results, hence, the need to conduct the unit root test. The unit root test is conducted to test whether or not the variables were stationary. The study adopts the Augmented Dickey Fuller (ADF) unit root tests procedures.

Table 1. Descriptive Statistics

	SEV	LAB	CAP	COR
Mean	19.62541	2.494162	2838.816	2262.194
Median	17.95000	2.500000	243.0000	724.4200
Maximum	49.98000	2.830000	13600.00	8878.970
Minimum	-7.020000	2.330000	41.00000	7.250000
Std. Dev.	12.29343	0.104578	4600.322	2694.879
Skewness	0.374047	0.701757	1.381524	0.949420
Kurtosis	2.910640	4.327456	3.104775	2.628912
Jarque-Bera	0.875096	5.753487	11.78668	5.770924
Probability	0.645618	0.056318	0.002758	0.055829
Sum	726.1400	92.28400	105036.2	83701.19
Sum Sq. Dev.	5440.626	0.393715	7.62E+08	2.61E+08
Observations	37	37	37	37

Source: Author's Computation (2018)

Unit Root Test: The results of the unit root test using the ADF are reported in Table 2. The result of the variables shows that SEV was found to be stationary at level while LAB CAP and COR were stationary at their 1st difference. This can be seen by comparing the observed values of the ADF test statistics with the critical values of the test statistics at the 5 percent level of significance.

Bound test result: Since the series are of different order of integration, that is, I(0) and I(1), we cannot use the Engle-Granger and Johansen cointegration but rather the appropriate test to use is the Bound Cointegration test (Salisu, 2016). The result of the Bound Cointegration test is presented in Table 3 below. The results reveal that the computed F-statistic value of 8.190315 in the ARDL estimated model is greater than the upper critical bound test. This means that a long run relationship exist between the variables in the model within the period under review.

Short run estimation result: Table 4 shows that the short run estimated dynamic coefficients for the estimated model over the period of study. The result shows that the lagged error correction term ECM (-1) included in this model to capture the long run dynamics between the cointegrating series is rightly signed (i.e. negative) and is significant at 5 percent level. The coefficient indicates adjustment of 1.08 percent from actual changes in the previous year. This adjustment implies that errors are corrected within one year since that data were annual series. The ECM also reveals a long run relationship between the independent variables (LAB, CAP and COR) and the response variable (SEV) in this model. The findings confirmed that a short run relationship exist between the variables. Furthermore, the result showed that a direct relationship exist between COR and SEV while LAB and CAP showed an inverse relationship with SEV in the model. Also, the calculated R² is 0.514. This means that about 51 per cent of the total variations in SEV are caused by the explanatory variables

LAB, CAP and COR. Thus, the remaining 49 per cent of variations is caused by exogenous factors to the model but covered by the error term. This observation is further buttressed by the adjusted R² of about 45 per cent. Also, the F-statistics calculated of 8.190 is greater than F_{0.05,V1,V2} of 2.92. This means that the overall model is significant at 5 per cent level. The value of the D.W is 2.020. This suggests that there is absence of serial autocorrelation in the model.

Table 2. Unit Root Test Results

Variables	Augmented Dickey Fuller (ADF) Test				Status
	Level	5% Critical Values	1 st Diff.	5% Critical Values	
SEV	-3.628689	-2.945842	-	-	I(0)
LOG(LAB)	-1.619042	-2.948404	-9.294140	-2.948404	I(1)
LOG(CAP)	-0.055688	-2.945842	-5.946914	-2.948404	I(1)
LOG(COR)	-1.419280	-2.945842	-5.986497	-2.948404	I(1)

Source: Author's Computation (2018)

Table 3. ARDL Bound Test Result

F-Statistics	8.190315	
% Critical Levels	Critical Value for Bond Test	
Significance	I(0) Bond	I(1) Bond
10%	2.72	3.77
5%	3.23	4.35
2.5%	3.69	4.89
1%	4.29	5.61

Source: Author's Computation (2018)

Table 4. Estimated Short Run Coefficients Using the ARDL Approach

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLOG(LAB)	-8.370299	51.471689	-0.162619	0.8719
DLOG(CAP)	-8.448181	2.099464	-4.023971	0.0003
DLOG(COR)	7.421360	1.736123	4.274673	0.0002
ECM(-1)	-1.086804	0.173914	-6.249100	0.0000
R-Square= 0.514; Adj-R-Square = 0.451; F-statistic = 8.190; D.W = 2.020				

Source: Author's Computation (2018)

Table 5. Estimated Long Run Coefficients Using the ARDL Approach

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(LAB)	-7.701754	47.016502	-0.163810	0.8709
LOG(CAP)	-7.773415	1.810233	-4.294152	0.0002
LOG(COR)	6.828607	1.327765	5.142933	0.0000
C	33.981444	40.013512	0.849249	0.4023

Source: Author's Computation (2018)

Long run estimation results: Table 5 shows the estimated coefficients of the long run relationship between the variables in the model. From the result, it shows that one percent increase in labour (LAB) and capital (CAP) lead to an increase in service sector growth by 7.7 and 7.8 per cents respectively. This finding negates a priori that labour and capital enhances the growth of the economy. Again, the results indicate that one percent increase in COR increases SEV in Nigeria by about 6.8 percent within the period under review. Also, COR impact significantly on SEV in Nigeria. This finding conforms to a priori that increase in crude oil revenue promotes the economy.

Post estimation test results and analysis: The researcher also conducted a diagnostic test to ascertain whether or not the series are free from autocorrelation (Breusch-Godfrey Serial Correlation LM Test) and normality problem (Jarque-Bera Statistic). The result of the diagnostic test is presented in Table 6 below.

Table 6. Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.702463	Prob. F(2,29)	0.5036
Obs*R-squared	1.663458	Prob. Chi-Square(2)	0.4353

Source: Author's Computation (2018)

From Table 6 above, the results of the diagnostic test shows that the serial autocorrelation test using Breusch-Godfrey Serial Correlation LM Test shows that the f-statistic is 0.702463, observed *R is 1.663458, Chi-Square probability value is 0.4353. This indicates that the probability value of about 43 percent (0.4353) is greater than 5 percent (0.05) critical value; hence we confirm no serial correlation in the model.

- (i) **Normality Test:** Here we present a histogram and descriptive statistics of the residuals, including the Jarque-Bera statistic for testing the normality of the model. If the computed p-value is greater than 0.05 significant levels, then we reject the null hypothesis and conclude that residuals are normally distributed. Conversely, if the computed p-value is less than 0.05 significant levels, then we do not reject the null hypothesis and conclude that residuals are not normality distributed. The result of the normally test using Jarque-Bera test reveals that the Jarque-Bera value is 0.665896 while the probability value is 0.716807. This value of about 71percent which is higher than the 5 percent (0.05), hence, the study therefore confirmed that the model is normally distributed.

Figure 1. Jarque-Bera Normality Test

Conclusion and Policy Recommendation

This paper empirically investigated the effect of crude oil revenue on service sector growth in Nigeria between 1981 and 2017 by employing the Auto Regressive Distributed Lag (ARDL) approach. Data for the empirical analysis were sourced from secondary sources like the Central Bank of Nigeria Statistical Bulletin (Various- Issues). The results of analysis indicated both short run and long run relationship between crude oil revenue, labour, capital and service sector growth. Furthermore, the paper revealed that labour and capital impacts negatively on service sector growth while crude oil revenue impacts positively on service sector growth in Nigeria within the period. The paper therefore recommends that government should increase her budgetary allocation and ensure fiscal discipline regarding spending of crude oil revenue in terms of putting infrastructural facilities in place so as to boost the services sector growth which will in turn enhance economic growth and development.

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