



## **OIL REVENUE AND THE PERFORMANCE OF THE NIGERIAN AGRICULTURE SECTOR (1981-2019)**

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### **ABSTRACT**

Over the years, several authors have attributed the decline in Nigerian agricultural production to the massive inflow of oil revenue that resulted from the discovery of crude oil. This paper sought to investigate the relationship between oil revenue and agricultural sector in a bid to find answers to the question “was the performance of the Nigerian agricultural sector affected by the quantum of oil revenue received by the country?” Secondary data for the period 1981-2019 were collected and analysed. Regression analysis was used to achieve the objectives of the study. Highlights of the findings of the study revealed a highly significant (P-value of 0.000) relationship between oil revenue and the performance of agriculture sector and the forestry sub-sector; highly significant (P-value of 0.003) inverse relationship between oil revenue and the performance of livestock sub-sector and no significant relationship between the oil revenue and the performance of the crop production and fishing sub-sectors in Nigeria over the study period.

**Keywords:** Agricultural Development, Dutch Disease, Natural Resource Curse, Nigeria, Oil revenue.

### **INTRODUCTION**

At independence in 1960, agriculture was the mainstay of the Nigerian economy. Peasant agricultural production for export provided the stimulus to Nigeria's overall economic growth (Ilugbuhi, 1968). Employment for over 75% of the population and more than 70% of total food consumption including raw materials for industry, export earnings to finance imports and foreign exchange were provided by agriculture (Reynolds, 1966; Alamu, 1981). However, about 20 years after Independence, it was observed that Nigeria can neither produce enough food for its fast growing population nor could the agricultural sector cope with the increasing demands of the agricultural raw materials to keep the country's oil mills, textile and other agro-based industries operating at full capacity let alone have surpluses for export (Abdullahi, 1981).

Some studies attributed the decline in Nigeria's agricultural production to the massive inflow of oil revenues (Abdullahi, 1981; Okojie, 1991; Osuntogun *et al.*, 1997; Asiabaka and Owens, 2002; Walkenhorst, 2007; Sekumade, 2009; Chukwuemeka and Nzewi, 2011; Izuchukwu, 2011). Other studies were of the position that the decline in agricultural production in Nigeria could not be attributed to the neglect of the agricultural sector resulting from oil revenue (Ammani, 2012) but to other reasons such as Dutch Disease (Jazayeri, 1986; Ebrahim-Zadeh, 2003; Olusi and Olagunju, 2005), natural resource curse (Pinto, 1987; Gelb and Associates, 1988; Sala-i-Martin and Subramanian, 2003), and rent seeking phenomenon (Lane and Tornell, 1999). This paper aimed at investigating the relationship between oil revenue and the performance of the agricultural sector in Nigeria.



**MATERIALS AND METHODS**

**Data Collection**

Time series data on aggregate oil revenue, agricultural sector GDP, crop production GDP, Livestock GDP, Forestry GDP and Fishing GDP for the period 1981-2019 were collected and used (see Appendix Table 1 for data and source). The choice of the period 1981-2019 was informed by the availability of data. GDP for agriculture and each of the 4 subsectors of the Nigerian agricultural sector were taken as proxy for the output and performance of that sector or subsector.

**Analytical Techniques**

Based on the specific objectives of this study, the following regression models were developed, estimated and used as:

$$Y_t = \beta_0 + \beta_1 X_{1t} + \mu_t \quad \dots(1)$$

where;

$Y_t$  is oil revenue in year  $t$  (measured in billions of naira), and  $X_{1t}$  is GDP of the agriculture sector in year  $t$  (measured in billions of Naira).

$$Y_t = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \beta_4 X_{4t} + \mu_t \quad \dots(2)$$

where;

$Y_t$  is oil revenue in year  $t$  (measured in billions of naira),  $X_{1t}$  is fishing GDP in year  $t$  (measured in billions of Naira),  $X_{2t}$  is livestock GDP in year  $t$  (measured in billions of naira),  $X_{3t}$  is crop production GDP in year  $t$  (measured in billions of naira),  $X_{4t}$  is forestry GDP in year  $t$  (measured in billions of Naira),

**Estimation of the models:** Empirical analysis of time series data, as noted in various literature, poses several challenges as empirical work, including causality tests of Granger and Sims based on time series data assumed that the underlying time series is stationary (Seddighi *et al.*, 2000); Enders, 1995; Patterson, 2000). Once the stationarity of the residuals from a given regression equation is established, the traditional regression methodology is applicable to data involving non stationary time series (Gujarati, 2003). Cointegration was tested on the data collected for this study using the Cointegrating Regression Durbin-Watson (CRDW) Test method as expounded by Gujarati (2003).

The computed DW  $d$  values (0.492) and (1.264) obtained from the cointegrating regression of equation 1 and 2, respectively, are both greater than the critical value of 0.386 at the 5% level, thus it was concluded that the regression residuals are stationary for both equations. However, the estimated DW  $d$  value of 0.492 is lower than the critical DW  $d_L$  value of 1.427 for regression equation 1, indicating an evidence of positive first order serial correlation. The estimated DW  $d$  value of 1.264 is between the critical DW  $d_L$  value of 1.261 and  $d_L$  value of 1.722 for regression equation 2, suggesting the existence of inconclusive evidence of positive first order serial correlation. Therefore, both equations are not without evidences of autocorrelation. The first-order difference transformation method was used to remedy the autocorrelation detected in both equations which served the dual purpose of getting rid of first order autocorrelation and ensuring the stationarity of time series data. (see Appendix Table 2 and 3 for the results of Regression Analyses (level models) equation 1 and 2, respectively).

**RESULTS AND DISCUSSION**

The regression equation 1 and 2 were estimated using the transformed time series data. The F-value of 35.623 computed for equation 1 with a p-value of 0.000 is highly significant. This implies that the explanatory variable (agriculture GDP) significantly explain the variation in oil revenue. The F-value of 3.415 computed for equation 2 with a p-value of 0.019 is



significant at the 5% level suggesting that the explanatory variables (crop production GDP, livestock GDP, Fishing GDP and Forestry GDP) significantly explain the variation in oil revenue.

**Relationship between oil revenue and performance of agriculture sector in Nigeria**

The results of the Relationship between oil revenue and performance of agriculture sector in Nigeria (1981-2019) based on analysis of regression equation 1 is presented in Table 1. The value of the estimated coefficient of agriculture performance,  $\beta_1$ , which measures the slope of the line, is 0.452. This suggests that as the quantity of oil revenue increase by one US Dollar (US\$1), the estimated increase in the output of the agriculture sector amounts to 45 cents. This finding contradicts Abdlaziz *et al.* (2018) who reported that a 1% increase in oil revenue causes 25% contraction in the agricultural sector. The computed t-value of 5.969 calculated for the coefficient of agricultural performance is found to be highly significant when viewed in relation to the computed p-value of 0.000, hence the null hypothesis is rejected and it is concluded that there is a highly significant relationship between the oil revenue and the performance of agriculture sector in Nigeria over the study period. This finding is in agreement with that of Omgba (2011) where it was reported that oil revenue had a positive effect on agriculture and non-oil sectors in Cameroon. The finding is also consistent with Mehdi (2011) and Pei *et al.* (2013) who reported a significant relationship between oil revenue and agriculture performance in Iran and Malaysia, respectively.

**Table 1:** First Difference (no intercept) Regression Analysis of the relationship between oil revenue and the performance of the agriculture sector in Nigeria (1981-2019)

<b>Independent Variables</b>	<b>Coefficients</b>	<b>t-value</b>	<b>p-values</b>
Agriculture Sector GDP	0.452*	5.969 <sup>a</sup>	0.000
R <sup>2</sup>	0.491		
Adjusted R <sup>2</sup>	0.477		
R	0.700		
F <sub>(model)</sub>	35.623		
p-value for F <sub>(model)</sub>	0.000		
DW <i>d</i>	1.456		

<sup>a</sup> Statistically significant statistics at  $\alpha = 5\%$  \*Standardized

The relationship between oil revenue and the performance of the crop production, livestock, fishing and forestry sub-sector in Nigeria over the study period (1981-2019). The results of the analysis of regression equation 2 is presented in Table 2. The computed t-value of -1.345 calculated for the coefficient of the performance of the crop production sub-sector is found to be not significant when viewed in relation to the computed p-value of 0.187, hence the null hypothesis is not rejected and it is concluded that there is no significant relationship between the oil revenue and the performance of the crop production sub-sector in Nigeria. However, the value of the estimated coefficient of crop production performance,  $\beta_1$ , which measures the slope of the line, is - 0.623. This suggests that as the quantity of oil revenue increase by one US Dollar (US\$1), the estimated the output of the crop production sub-sector decrease by 62 cents. Considering the report that between 1960-2011, an average of 83.5% of agriculture GDP was contributed by the crop production sub-sector (Otedola and Etumnu, 2013). This finding could be explained to be as a result of increase in the volume of revenue coming into the economy from non-agriculture sources which gradually reduces the



proportionate contribution of the crop production subsector to the National GDP. Noticeable decline in agriculture share of the Nigerian GDP has been reported since the 1970s (Ekpo and Umoh, 2003; Umaru and Zubairu, 2012; Itodo, 2012; Mogues et al., 2008).

The value of the estimated coefficient of livestock production performance,  $\beta_2$ , which measures the slope of the line, is -28.346. This suggests that as the quantity of oil revenue increase by one US Dollar (US\$1), the estimated output of the livestock sub-sector decrease by more than US\$28. The computed t value of -3.174 calculated for the coefficient of livestock performance is found to be highly significant when viewed in relation to the computed p-value of 0.003, hence the null hypothesis is rejected and it is concluded that there is a highly significant inverse relationship between oil revenue and the performance of livestock sub-sector in Nigeria. This finding is consistent with Apergis et al. (2014) that oil revenue negatively affects agricultural output for selected oil exporting countries. The finding is also in agreement with Fardmanesh (1991) who reported that oil revenue contracts the agriculture sector in developing oil exporting economies.

The value of the estimated coefficient of forestry production performance,  $\beta_3$ , which measures the slope of the line, is 279.288. This suggests that as the quantity of oil revenue increase by one US Dollar (US\$1), the estimated output of the forestry sub-sector increase by more than US\$279. The computed t value of 3.599 calculated for the coefficient of forestry performance is found to be highly significant when viewed in relation to the computed p-value of 0.001, hence the null hypothesis is rejected and it is concluded that there is a highly significant relationship between oil revenue and the performance of forestry sub-sector in Nigeria. This finding is consistent with that reported in the preceding section of this paper on the relationship between oil revenue and agricultural performance and the studies cited to support the finding.

The value of the estimated coefficient of fishing performance,  $\beta_4$ , which measures the slope of the line, is 2.103. This suggests that as the quantity of oil revenue increase by one US Dollar (US\$1), the estimated output of the fishing sub-sector increase by more than US\$2. The computed t value of 0.386 calculated for the coefficient of forestry performance is found to be not significant when viewed in relation to the computed p-value of 0.702, hence the null hypothesis is not rejected and it is concluded that there is no significant relationship between oil revenue and the performance of fishing sub-sector in Nigeria.

**Table 2:** Results of Regression Analysis of First Difference (no intercept) the relationship between oil revenue and the performance of the crop production, livestock, fishing and forestry sub-sector in Nigeria over the study period (1981-2019)

Independent Variables	Coefficients	t-values	p-values
Crop Sector GDP	- 0.623	-1.345	0.187
Livestock Sector GDP	-28.346	-3.174	0.003
Forestry Sector GDP	279.288	3.599	0.001
Fishing Sector GDP	2.103	0.386	0.702
R <sup>2</sup>	0.287		
Adjusted R <sup>2</sup>	0.203		
R	0.535		
F <sub>(model)</sub>	3.415		
p-value for F <sub>(model)</sub>	0.019		
DW d	2.362		

<sup>a</sup>Statistically significant statistics at  $\alpha = 5\%$  \*Standardized



## CONCLUSION AND RECOMMENDATIONS

This paper seeks to investigate the relationship between oil revenue and agricultural sector in a bid to find answer to the question “was the performance of the Nigerian agricultural sector affected by the quantum of oil revenue received by the country?”. Highlights of the findings of the study revealed a highly significant relationship between oil revenue and the performance of agriculture sector and the forestry sub-sector; highly significant inverse relationship between oil revenue and the performance of livestock sub-sector and no significant relationship between the oil revenue and the performance of the crop production and fishing sub-sectors in Nigeria over the study period. Based on the findings of this study it was recommended that the federal government should continue to vigorously pursue policies and programmes directed at the diversification of the Nigerian economy away from oil with a view towards expanding output from non-oil sectors like agriculture

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