

Crude Oil Revenue, Governance and Literacy Rate in Nigeria, an Econometric Analysis from 1990 to 2021

Amadi, O. H. & Weke, C.

Department of Agricultural and Applied Economics,
Rivers State University Nkpolu- Oroworukwo, Port Harcourt

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Abstract

The study investigated the effect of crude oil revenue and governance on literacy rate in Nigeria from 1990 to 2021. The study adopted the Autoregressive Distributive Lag (ARDL) modelling techniques for the data analysis. Data for the analysis were sourced from secondary sources such as World Data Index (WDI) and CBN Statistical Bulletin (Various-Issues). The results of the analysis indicated as follows; the ARDL ECM regression results showed that in short run, the coefficient of current value of ORV has a positive (2.035124) relationship with LTR, the coefficient of GOE has a negative (-2.347579) relationship with LTR, the coefficient of ROQ has a positive (3.650024) relationship with LTR, the coefficient of the current value of VOA has a positive (0.554000) relationship with LTR, The coefficient of past lag 1 of VOA has a negative (-6.253304) relationship with LTR, the coefficient of COC has a negative (-0.283389) relationship with LTR, The coefficient of ROL has a positive (2.498299) relationship with LTR while the coefficient of EXH has a positive (0.021877) relationship with LTR. The Breusch-Godfrey Serial Correlation LM Test result showed that there is no serial correlation in the model. The Breusch-Pagan-Godfrey Heteroskedasticity Test result suggests that there is no evidence of heteroskedasticity in the model. The study concluded that Oil revenue increases literacy rate in Nigeria both in the short run and long run and recommended There should be accountability and transparency on the part of government and officials in the management of oil revenues for the benefit of the citizens and the economy as a whole.

Keywords: Crude oil, Governance, Literacy rate

INTRODUCTION

The natural resources of a country include: the land and sea areas, quality of the forest, quality of the soil, minerals, good climatic conditions, hydrocarbons etc. Natural resources are classified into two categories; renewable and non-renewable resources. Auty, (2001). Natural resources have been a key topic in the development literature and this concern has been grounded in the dominant perspective that they represent a “Curse” in the developing countries (Bannon & Collier, 2003). One of the main natural resources in Nigeria is crude oil. Before the discovery of crude oil in Oloibiri in the now Bayelsa state in 1956 (Usman, 2007). Regrettably the impressive export earnings did little to improve the standard of living in Nigeria and in fact may have degraded it. Even though with oil revenues, the annual real GDP growth in Nigeria was estimated to be 7.5% on the average over 2003-2011 (IMF, 2012).

Meanwhile, for oil revenue to drive the desired economic development, there has to be good governance. Governance according to World Bank is "the manner in which power is exercised in the management of a country's economic and social resources for development.

The aim of this study was to investigate the effect of crude oil revenue and governance on literacy rate in Nigeria. Governance was proxied by control of corruption, voice and accountability, regulatory qualities, rule of law, government effectiveness and exchange rate.

Methodology

Research Design

This study adopted the quasi-experimental research design.

Data Collection

The data for this study was time series data obtained from secondary sources such as Central Bank of Nigeria and Federal bureau of statistics bulletin, the World Bank database, the Nigerian national petroleum corporation statistics bulletin, National Bureau of statistics (NBS) and index Mudi for the period of 1990 to 2021.

Data Analysis

This study employed descriptive statistics, unit root test, bound cointegration, and Autoregressive Distributed Lag (ARDL) to estimate the effect of the explanatory variables on the dependent variable.

Model Specification

The model is expressed explicitly as

Model Three:

$$LTR=f(ORV, COC, VOA, ROQ, ROL, GOE, EXR) \quad 1$$

$$LTR_t = \alpha_0 + \beta_1 ORV_t + \beta_2 COC_t + \beta_3 VOA_t + \beta_4 ROQ_t + \beta_5 ROL_t + \beta_6 GOE_t + \beta_7 EXR_t + U_t \quad 2$$

Where;

LTR = Literacy Rate

ORV = Oil Revenue

COC = Control of Corruption

VOA = Voice and Accountability

ROQ = Regulatory qualities

ROL = Rule of Law

GOE = Government Effectiveness

EXH = Exchange Rate

α_0, β = Unknown Parameters

a priori; $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5 > 0$, while $\beta_6, \beta_7 < 0$.

The Autoregressive Distributed Lag (ARDL) Model (Bound Test Approach) for the model is specified as follows:

$$\Delta LTR_t = \beta_0 + \Delta RPI_{t-1} + \sum \beta_{1t} \Delta ORV_{t-1} + \sum \beta_{2t} \Delta GOE_{t-1} + \sum \beta_{3t} \Delta ROQ_{t-1} + \sum \beta_{4t} \Delta VOA_{t-1} + \sum \beta_{4t} \Delta COC_{t-1} + \sum \beta_{4t} \Delta ROL_{t-1} + \sum \beta_{4t} \Delta EXH_{t-1} + LTR_{t-1} + \sum \Phi_{1t} ORV_{t-1} + \sum \Phi_{2t} GOE_{t-1} + \sum \Phi_{3t} ROQ_{t-1} + \sum \Phi_{4t} VOA_{t-1} + \sum \Phi_{4t} COC_{t-1} + \sum \Phi_{4t} ROL_{t-1} + \sum \Phi_{4t} EXH_{t-1} + U_t \quad 3$$

Where;

β_0 is the constant terms, LTR, ORV, COC, VOA, ROQ, ROL, GOE, EXR, are as earlier defined, $\beta_1 - \beta_7$ are the coefficients of independent variables while μ is the error terms, Δ = first difference of the variable, U_t = white noise disturbance error term.

RESULTS AND DISCUSSION

Time Plot of Literacy Rate Presented in Figure 1

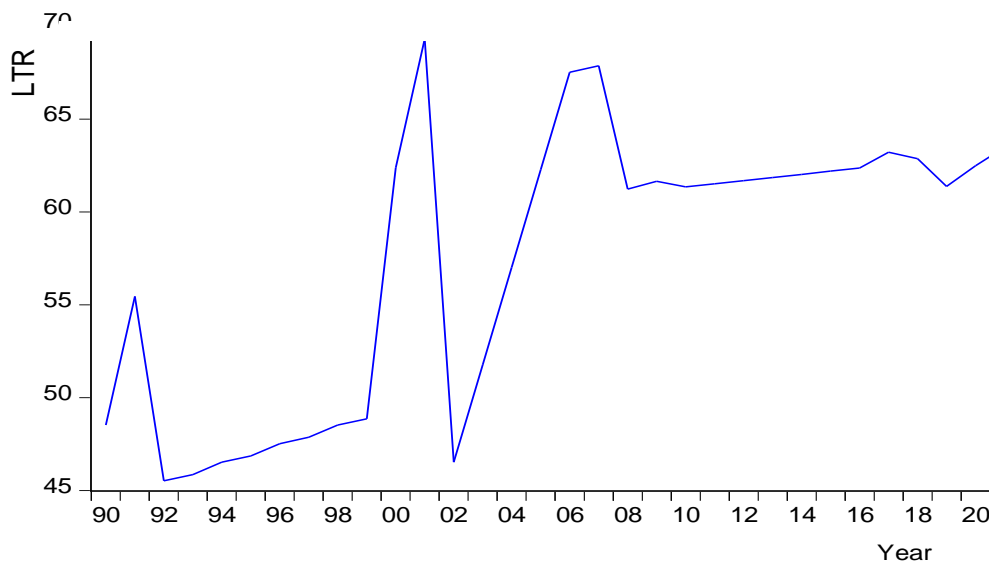


Figure 1: Time Series Plot of Nigeria’s LTR (1990-2021)

Figure 1 shows that the values of Nigeria’s Literacy Rate (LTR) maintained an increasing trend during the period chosen for this study. Literacy Rate (LTR) increased from 1990 to 1991 and dropped down to its lowest value in 1992 and later went up to its peak in 2000, came down in 2002 and moved up and down to 2006, dropped down again in 2015 and later rose again in 2021.

Unit Root Test

Table 1 present the results of the stationarity test for each of the variables used in the model using the Augmented Dickey Fuller (ADF) test. The results were conducted with intercept and no trend.

Table 1: ADF at Constant for the Model

Variable	ADF at Level	ADF at 1 st Difference	Status	Remark
LTR	-2.367456	-6.003327	I(1)	Stationary
LOG(ORV)	-2.244909	-5.171234	I(1)	Stationary
COC	-5.591949	-	I(0)	Stationary
VOA	-2.366186	-5.861804	I(1)	Stationary

ROQ	-4.891003	-	I(0)	Stationary
ROL	-2.013433	-6.032527	I(1)	Stationary
GOE	-1.916496	-5.392830	I(1)	Stationary
EXH	0.013689	-5.307288	I(1)	Stationary
Critical Values				
1% level	-3.670170	-3.679322		
5% level	-2.963972	-2.967767		
10% level	-2.621007	-2.622989		

Source: Author’s Computation using E-view 10

The results of the unit root test in Table 1 reveals that COC and ROQ were stationary at level while LTR, ORV, VOA, ROL, GOE and EXH were stationary at 1st difference. Hence, the study then concludes that the independent variables used in the model were integrated of both order zero and one, that is I(1) and I(0) and the dependent variable is integrated of order one, that is, I(1). Since the ADF results indicate that the series are of different order of integration, the Bounds co-integration test was used.

Bound Co-Integration Test Result

The result of the Bound Co-integration test is presented in Table 2

Table 2: ARDL Bound Test Co-Integration Result for the Model

Test Statistic	Value	K
F-statistic	6.420711	7
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.03	3.13
5%	2.32	3.5
2.5%	2.6	3.84
1%	2.96	4.26

Source: Author’s Computation using E-view 10

From Table 2, the result of the bound co-integration test shows that the calculated f-statistic value of 6.420711 falls higher than the theoretical critical value for the upper bound I(1) bound at 5 percent. This means that there is co-integration, hence, a long run relationship exists between ORV, COC, VOA, ROL, ROQ, GOE, EXH and LTR in Nigeria within the period under review. Since there is a long run relationship among the variables, we now proceed to estimate the short run dynamics and long run models based on the ARDL approach.

Long Run Estimation Results for the Model

Table 3 shows the estimated coefficients of the long run relationship between the variables in the model.

Table 3: ARDL Long Run Estimation Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(ORV)	3.703582	0.716957	5.165695	0.0001
GOE	-1.171057	0.312322	-3.749512	0.0016
ROQ	2.619068	2.082988	1.257361	0.2278
VOA	5.060079	2.875049	1.759998	0.0988
COC	-0.891235	0.349857	-2.547428	0.0223
ROL	1.792650	3.719995	0.481896	0.6368
EXH	-0.001394	0.007172	-0.194383	0.8485
C	34.361783	9.869828	3.481498	0.0033

Source: Author's Computation using E-view 10

Table 3 shows that in the long run, the coefficient of ORV has a positive (3.703582) relationship with LTR, meaning that a unit increase in ORV increases LTR in Nigeria. The positive sign of the coefficient of ORV in the long run conforms to apriori expectation. This implies that a direct relationship exists between ORV and LTR in Nigeria all things being equal. The coefficient of ORV is statistically significant with LTR at 5 percent level of significance.

In the long run, the coefficient of GOE has a negative (-1.171057) relationship with LTR, meaning that a unit increase in GOE decreases LTR in Nigeria. The negative sign of the coefficient of GOE in the long run does not conform to apriori expectation. This implies that an indirect relationship exists between GOE and LTR. The coefficient of GOE is not statistically significant with LTR at 5 percent level of significance.

While the coefficient of ROQ has a positive (2.619068) relationship with LTR, meaning that a unit increase in ROQ increases LTR in Nigeria. The positive sign of the coefficient of ROQ in the long run conforms to apriori expectation. This implies that a direct relationship exists between ROQ and LTR in Nigeria. The coefficient of ROQ is statistically significant with LTR at 5 percent level of significance.

The table 3 also shows that in long run, the coefficient of VOA has a positive (5.060079) relationship with LTR, meaning that a unit increase in VOA increases LTR in Nigeria. This implies that a direct relationship exists between VOA and LTR in Nigeria all things being equal. The positive sign of the coefficient of VOA in the long run conform to apriori expectation. The coefficient of VOA is statistically significant with LTR at 5 percent level of significance.

Again, in the long run, the coefficient of COC has a negative (-0.891235) relationship with LTR, meaning that a unit increase in COC decreases LTR in Nigeria. This implies that an indirect relationship exists between COC and LTR. The negative sign of the coefficient of COC in the long run does not conform to apriori expectation. The coefficient of COC is not statistically significant with LTR at 5 percent level of significance.

The coefficient of ROL has a positive (1.792650) relationship with LTR, meaning that a unit increase in ROL increases LTR in Nigeria. This implies that a direct relationship exists between ROL and LTR in Nigeria. The positive sign of the coefficient of ROL in the long run conform to apriori expectation. The coefficient of ROL is statistically significant with LTR at 5 percent level of significance.

While the coefficient of EXH has a negative (-0.001394) relationship with LTR, meaning that a unit increase in EXH decreases LTR in Nigeria. This implies that an indirect relationship exists between EXH and LTR in Nigeria. The negative sign of the coefficient of EXH in the long run does not conform to apriori expectation. The coefficient of EXH is not statistically significant with LTR at 5 percent level of significance.

Short Run Estimation Results for the Model

The results of the short run dynamics estimation of the model is presented in equation 3

Table 4: ARDL Short Run Estimation Result for the Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LTR(-1))	0.338422	0.144136	2.347925	0.0330
DLOG(ORV)	2.035124	2.195885	0.926790	0.3687
D(GOE)	-2.347579	0.740617	-3.169762	0.0056
D(ROQ)	3.650024	3.186950	1.145303	0.2700
D(VOA)	0.554000	2.768092	0.200138	0.8441
D(VOA(-1))	-6.253304	2.530411	-2.471260	0.0259
D(COC)	-0.283389	0.121739	-2.327840	0.0260
D(ROL)	2.498299	5.081429	0.491653	0.6301
D(EXH)	0.021877	0.022675	0.964823	0.3499
ECM (-1)	-0.239251	0.105080	-2.276833	0.0290

R² = 0.807539; Adj-R² = 0.627910; F-stat. = 4.495576 with F-Prob. = 0.003240; and DW = 2.087278

Source: Author's Computation using E-view 10

From Table 4 the result shows that the ECM included in this model has the right sign (i.e. negative) and is statistically significant at 5 percent level. The coefficient indicates a low adjustment speed of about 24 percent. This adjustment implies that 24 per cent of errors are corrected within one year since that data were annual series. The ECM also reveals that a long run relationship exists between the regressors (ORV, GOE, ROQ, VOA, COC, ROL and EXH) and the response variable (LTR) in model three.

Furthermore, the calculated Adj-R² is 0.627910. This means that about 63 per cent of the total variations in LTR are caused by the explanatory variables ORV, GOE, ROQ, VOA, COC, ROL and EXH. Thus, the remaining 27 per cent of variations is caused by exogenous factors to the model but covered by the error term. Also, the F-statistics calculated of 4.495576 with F-Probability value of 0.003240 is less than 0.05 level. This means that the overall model is significant at 5 per cent level. The value of the D.W is 2.087278 suggests that there is minimal serial autocorrelation in the model three.

Table 4 shows that in the short run, the coefficient of current value of ORV has a positive (2.035124) relationship with LTR, meaning that a unit increase in ORV increases LTR in Nigeria in the short run. This implies that a direct relationship exists between ORV and LTR in Nigeria all things being equal. The positive sign of the coefficient of ORV in the short run conforms to apriori expectation in the short run. The coefficient of ORV is statistically significant with LTR at 5 percent level of significance,

In the short run, the coefficient of GOE has a negative (-2.347579) relationship with LTR, meaning that a unit increase in GOE decreases LTR in Nigeria. This implies that an indirect relationship

exists between GOE and LTR. The negative sign of the coefficient of GOE in the short run does not conform to apriori expectation. The coefficient of GOE is not statistically significant with LTR at 5 percent level of significance.

The coefficient of ROQ has a positive (3.650024) relationship with LTR, meaning that a unit increase in ROQ increases LTR in Nigeria in the short run. This implies that a direct relationship exists between ROQ and LTR in Nigeria. The positive sign of the coefficient of ROQ in the short run conforms to apriori expectation. The coefficient of ROQ is statistically significant with LTR at 5 percent level of significance.

The table 4 also shows that in short run, the coefficient of the current value of VOA has a positive (0.554000) relationship with LTR, meaning that a unit increase in VOA increases LTR in Nigeria, implying that a direct relationship exists between VOA and LTR in Nigeria all things being equal. The positive sign of the coefficient of VOA in the short run conforms to apriori expectation. The coefficient of VOA is statistically significant with LTR at 5 percent level of significance. The coefficient of past lag 1 of VOA has a negative (-6.253304) relationship with LTR, meaning that a unit increase in VOA decreases LTR in Nigeria, implying that an indirect relationship exists between VOA and LTR in Nigeria all things being equal. The negative sign of the coefficient of past lag 1 of VOA in the long run does not conform to apriori expectation. The coefficient of past lag 1 of VOA is not statistically significant with LTR at 5 percent level of significance.

Again, in the short run, the coefficient of COC has a negative (-0.283389) relationship with LTR, meaning that a unit increase in COC decreases LTR in Nigeria, implying that an indirect relationship exists between COC and LTR. The negative sign of the coefficient of COC in the short run does not conform to apriori expectation. The coefficient of COC is not statistically significant with LTR at 5 percent level of significance.

The coefficient of ROL has a positive (2.498299) relationship with LTR, meaning that a unit increase in ROL increases LTR in Nigeria, implying that a direct relationship exists between ROL and LTR in Nigeria. The positive sign of the coefficient of ROL in the short run conforms to apriori expectation. The coefficient of ROL is statistically significant with LTR at 5 percent level of significance.

While the coefficient of EXH has a positive (0.021877) relationship with LTR, meaning that a unit increase in EXH increases LTR in Nigeria, implying that a direct relationship exists between EXH and LTR in Nigeria. The positive sign of the coefficient of EXH in the short run conforms with the a priori expectation. The coefficient of EXH is statistically significant with LTR at 5 percent level of significance.

Post Estimation Tests

The researcher also conducted a diagnostic test to make certain that the series are free from autocorrelation (Breusch-Godfrey Serial Correlation LM Test), heteroscedasticity (Breusch-Pagan-Godfrey Test).

The result of the diagnostic test is presented in Table 5.

Table 5: Serial Correlation LM Test and Homoscedasticity Test Results

	F-Statistic	Prob. Value
Breusch-Godfrey Serial Correlation LM Test	1.397245	0.2676
Breusch-Pagan-Godfrey Heteroskedasticity Test	0.354518	0.9618

Source: Author's Computation using E-view 10

From Table 5, the results of the diagnostic test show that the serial or autocorrelation test using Breusch-Godfrey Serial Correlation LM Test shows that the f-statistic is 1.397245, and a Chi-Square probability value is 0.2676. This indicates that the probability value of about 27 percent (0.2676) is greater than 5 percent (0.05) critical value; hence we confirm no serial correlation in the model.

The result of the heteroscedasticity test using Breusch-Pagan-Godfrey test shows that the f-statistic is 0.354518 with a Chi-Square probability value of 0.9618. The result suggests that there is no evidence of heteroskedasticity in the model since the probability Chi-square value is more than 5 percent ($p > 0.05$). So, residuals do have constant variance which is desirable in regression meaning that residuals are Homoscedastic.

Conclusion

The study concluded that Oil revenue increases literacy rate in Nigeria both in the short run and long run; Government effectiveness reduces literacy rate in Nigeria both in the short run and long run; Regulatory quality increases literacy rate in Nigeria both in the short run and long run; Voice and Accountability reduces literacy rate in Nigeria in the short but it increases literacy rate in the long run; Control of Corruption decreases literacy rate in Nigeria both in the short and long run; Rule of Law increases literacy rate in Nigeria both in the short and long run; exchange rate increases literacy rate in Nigeria in the short but in the long run it causes a reduction.

Recommendations

There should be accountability and transparency on the part of government and officials in the management of oil revenues for the benefit of the citizens and the economy as a whole.

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