Effect of Crude Oil Revenue and Governance on Life Expectancy Rate in Nigeria, 1990 - 2021

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Abstract

The study investigated the effect of crude oil revenue and governance on life expectancy rate in Nigeria from 1990 to 2021. The study adopted the descriptive statistics, unit root test, bound co-integration test as well as Autoregressive Distributive Lag (ARDL) modelling techniques for the data analysis. Data for the empirical analysis were sourced from secondary sources like World Data Index (WDI), Federal Bureau of Statistics bulletin and CBN Statistical Bulletin (Various-Issues) amongst others. The results of the analysis indicated that the ARDL ECM regression results showed that in short run, the coefficient of current value of Oil Revenue has a positive (0.212199) relationship with Life Expectancy rate, while the coefficient of past lag 1 value of "ORV" has a negative (-0.118138) relationship with "LER", the coefficient of Government Effectiveness has a negative (-0.328215) relationship with "LER", the coefficient of Regulatory qualities has a negative (-0.126672) relationship with "LER", in short run, the coefficient of Voice and Accountability has a negative (-0.193701) relationship with "LER", the coefficient of current value Control of Corruption has a negative (-0.013511) relationship with "LER", the coefficient of Rule of Law has a negative (-0.143941) relationship with "LER" and the coefficient of both current and past lag 1 of Exchange Rate has a positive (0.004172 & 0.001017) relationship with "LER". 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 Crude Oil Revenue increases life expectancy in Nigeria in the short run and long run and recommended that Government should implement the petroleum industry bill with alternative source of revenue for great economic performance.

Keywords: Crude oil, Governance, life expectancy rate

INTRODUCTION

The availability of Crude oil, through a number of empirical studies have shown that it is neither necessary nor sufficient for economic prosperity.

Ogunbiyi and Abina (2019) investigated the role crude oil and non-oil revenue play in the development process of Nigeria. The Error correction estimates result showed that oil revenue has a negative but significant relationship with human development index, the negative contribution arose as a result of the resource curse ideology, while non-oil revenue has a positive but insignificant relationship with human development index.

Maku et al., (2018) investigated the impact of petroleum pump price on human welfare in Nigeria for the period 1990 to 2015 using the auto regressive distributive lag (ARDL)/Bounds approach. The study concluded that for human welfare to increase there must be a drop in the price of premium motor spirit and dual-purpose kerosene and inflation rate in Nigeria. In addition, the government and relevant agencies should ensure that petroleum pump prices be regulated because they have a long way on the market.

Okonkwo and Madueke (2016) examined the impact of petroleum revenue on economic development in Nigeria. The results showed that petroleum revenue has an insignificant effect on economic development of Nigeria in the short run, in the long run there is no significant correlation between petroleum revenue and economic development of Nigeria.

The aim of the study was to determine the effect of crude oil revenue and governance on life expectancy 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. The choice of this approach emanated from its suitability in assessing the impact of multivariate explanatory variables on a single dependent variable.

Data Collection

The data for this study is 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

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

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

Where;

LER = Life Expectancy 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_o, β = Unknown Parameters

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

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

$$\Delta LER_t = \beta_0 + \Delta LER_{t-1} + \Sigma\beta_{1t}\Delta ORV_{t-1} + \Sigma\beta_{2t}\Delta GOE_{t-1} + \Sigma\beta_{3t}\Delta ROQ_{t-1} + \Sigma\beta_{4t}\Delta VOA_{t-1} + \Sigma\beta_{5t}\Delta COC_{t-1} + \Sigma\beta_{6t}\Delta ROL_{t-1} + \Sigma\beta_{7t}\Delta EXH_{t-1} + LER_{t-1} + \Sigma\Phi_{1t}ORV_{t-1} + \Sigma\Phi_{2t}GOE_{t-1} + \Sigma\Phi_{3t}ROQ_{t-1} + \Sigma\Phi_{4t}VOA_{t-1} + \Sigma\Phi_{5t}COC_{t-1} + \Sigma\Phi_{6t}ROL_{t-1} + \Sigma\Phi_{7t}EXH_{t-1} + U_t \quad 3$$

Where;

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

RESULTS AND DISCUSSION

The trends life expectancy rate is presented in Figure 1

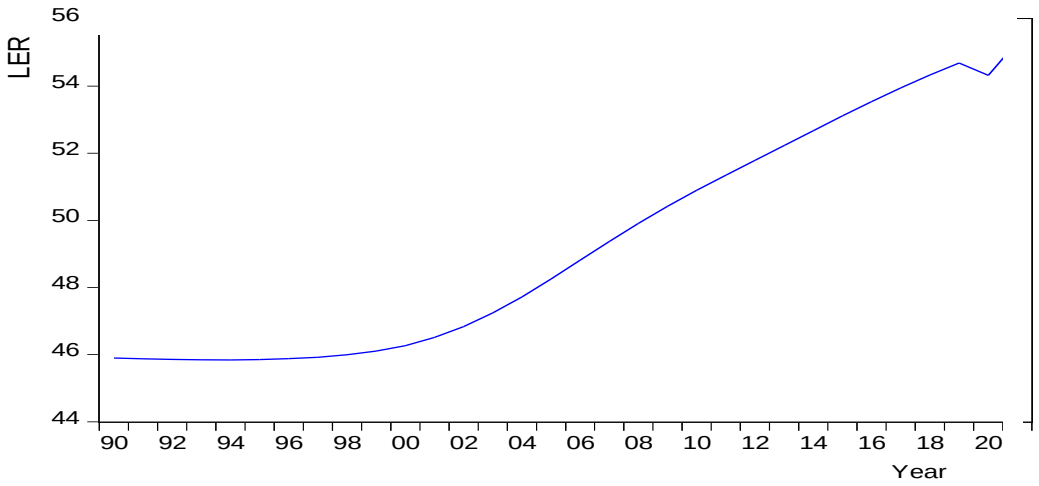

Figure 1: Time Series Plot of Nigeria's LER (1990-2021)

Figure 1 shows that the values of Nigeria's Life Expectancy Rate (LER) have been on the increase within the period of the study. The value increased steadily from 1990 to 1995 and from 2000 to 2002 down to 2010 later increased steadily in 2015 to 2021.

Unit Root Test

Table 1 present the results of the stationarity test for each of the variables 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 1st Difference	Status	Remark
LER	-1.235281	-3.749388	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 LER, 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 appropriate test to use in this study is the Bounds co-integration test.

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	8.113810	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 8.113810 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 LER 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)	9.129093	3.778553	2.416029	0.0311
GOE	-1.097177	0.170504	-6.434894	0.0000
ROQ	-7.013732	1.532082	-4.577909	0.0003
VOA	-3.324436	2.261686	-1.469893	0.1654
COC	-2.214824	1.326286	-1.669945	0.1188
ROL	-1.361829	0.159747	-8.524913	0.0000
EXH	-0.016289	0.015629	-1.042220	0.3163
C	-33.526788	33.984032	-0.986545	0.3419

Source: Author's Computation using E-view 10

Table 3 shows that in long run, the coefficient of ORV has a positive (9.129093) relationship with LER, meaning that a unit increase in ORV increases LER in Nigeria. This implies that a direct relationship exists between ORV and LER in Nigeria all things being equal. The positive sign of the coefficient of ORV in the long run conforms to the a priori expectation. The coefficient of ORV is statistically significant with LER at 5 percent level of significance.

In the long run, the coefficient of GOE has a negative (-1.097177) relationship with LER, meaning that a unit increase in GOE decreases LER in Nigeria. This implies that an indirect relationship exists between GOE and LER. The negative sign of the coefficient of GOE in the long run does not conform to the a priori expectation. The coefficient of GOE is not statistically significant with LER at 5 percent level of significance.

While the coefficient of ROQ has a negative (-7.013732) relationship with LER, meaning that a unit increase in ROQ decreases LER in Nigeria. This implies that an indirect relationship exists between ROQ and LER in Nigeria. The negative sign of the coefficient of ROQ in the long run does not conform to the a priori expectation. The coefficient of ROQ is not statistically significant with LER at 5 percent level of significance.

The table also shows that in the long run, the coefficient of VOA has a negative (-3.324436) relationship with LER, meaning that a unit increase in VOA decreases RPI in Nigeria. This implies that an indirect relationship exists between VOA and LER in Nigeria all things being equal. The negative sign of the with LER at 5 percent level of significance. Coefficient of VOA in the long run does not conform to the a priori expectation. The coefficient of VOA is not statistically significant at 5% level of significance.

Again, in the long run, the coefficient of COC has a negative (-2.214824) relationship with RPI, meaning that a unit increase in COC decreases LER in Nigeria. This implies that an indirect relationship exists between COC and LER. The negative sign of the coefficient of COC in the long run conforms to the a priori expectation. The coefficient of COC is not statistically significant with LER at 5 percent level of significance.

The coefficient of ROL has a negative (-1.361829) relationship with LER, meaning that a unit increase in ROL decreases LER in Nigeria. This implies that an indirect relationship exists between ROL and LER in Nigeria. The negative sign of the coefficient of ROL in the long run does not conform to the a priori expectation. The coefficient of ROL is not statistically significant with LER at 5 percent level of significance.

While the coefficient of EXH has a negative (-0.016289) relationship with LER, meaning that a unit increase in EXH decreases LER in Nigeria. This implies that an indirect relationship exists between EXH and LER in Nigeria. The negative sign of the coefficient of EXH in the long run does not conform to the a priori expectation. The coefficient of EXH is not statistically significant with LER 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(LER(-1))	-1.178151	0.261427	-4.506618	0.0006
DLOG(ORV)	0.212199	0.080835	2.625103	0.0210
DLOG(ORV(-1))	-0.118138	0.082612	-1.430032	0.1763
D(GOE)	-0.328215	0.124236	-2.641863	0.0140
D(ROQ)	-0.126672	0.035698	-3.548477	0.0015
D(VOA)	-0.193701	0.110860	-1.747265	0.1042
D(COC)	-0.013511	0.011272	-1.198619	0.2521
D(COC(-1))	0.105230	0.031021	3.392212	0.0048
D(ROL)	-0.143941	0.272867	-0.527515	0.6067
D(EXH)	0.004172	0.001053	3.961315	0.0016
D(EXH(-1))	0.001017	0.001029	0.988403	0.3410
ECM (-1)	-0.418093	0.081734	-5.115273	0.0000
R^2 = 0.875232; Adj-R^2 = 0.721671; F-stat. = 5.699585 with F-Prob. = 0.001473; and DW = 2.136899				

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 moderate adjustment speed of about 42 percent. This adjustment implies that 42 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 (LER) in this model.

Furthermore, the calculated Adj-R^2 is 0.721671. This means that about 72 per cent of the total variation in LER is caused by the explanatory variables ORV, GOE, ROQ, VOA, COC, ROL and EXH. Thus, the remaining 28 per cent of variations is caused by exogenous factors to the model but covered by the error term. In addition, the F-statistics calculated of 5.699585with F-Probability value of 0.0021473 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 2.136899 suggests that there is minimal serial autocorrelation in the model one.

Table 4 shows that in short run, the coefficient of current value of ORV has a positive (0.212199) relationship with LER, meaning that a unit increase in ORV increases LER in Nigeria while the coefficient of past lag 1 value of ORV has a negative (-0.118138) relationship with LER, meaning that a unit increase in ORV decreases LER in Nigeria in the short run. The coefficient of the current

value of ORV is statistically significant with LER at 5 percent level of significance, implying that a significant relationship exists between ORV and LER in Nigeria while the coefficient of past lag 1 value of ORV is not statistically significant with LER at 5 percent level of significance, implying that an insignificant relationship exists between ORV and LER in Nigeria all things being equal. The positive sign of the coefficient of the current value of ORV in the short run conforms to the a priori expectation while the negative sign of the coefficient of past lag 1 value of ORV does not conform to the a priori expectation in the short run.

In the short run, the coefficient of GOE has a negative (-0.328215) relationship with LER, meaning that a unit increase in GOE decreases LER in Nigeria. The coefficient of GOE is not statistically significant with LER at 5 percent level of significance, implying that a significant relationship does not exists between GOE and LER. The negative sign of the coefficient of GOE in the short run does not conform to the a priori expectation.

The coefficient of ROQ has a negative (-0.126672) relationship with LER, meaning that a unit increase in ROQ decreases LER in Nigeria in the short run. The coefficient of ROQ is not statistically significant with LER at 5 percent level of significance, implying that an insignificant relationship exists between ROQ and LER in Nigeria. The negative sign of the coefficient of ROQ in the short run does not conform to the a priori expectation.

The table 4 also shows that in short run, the coefficient of VOA has a negative (-0.193701) relationship with LER, meaning that a unit increase in VOA decreases LER in Nigeria. The coefficient of VOA is not statistically significant with LER at 5 percent level of significance, implying that an insignificant relationship exists between VOA and LER in Nigeria all things being equal. The negative sign of the coefficient of VOA in the short run does not conform to the a priori expectation.

Again, in the short run, the coefficient of current value COC has a negative (-0.013511) relationship with LER, meaning that a unit increase in COC decreases LER in Nigeria while past lag 1 of COC has a positive (0.105230) relationship with LER, meaning that a unit increase in COC increases LER in Nigeria. The coefficient of current value of COC is not statistically significant with LER at 5 percent level of significance while past lag 1 of COC is statistically significant with LER at 5 percent level of significance. The negative sign of current value COC in the short run does not conform to the a priori expectation while the positive sign of the past lag 1 of COC conforms to the a priori expectation.

The coefficient of ROL has a negative (-0.143941) relationship with LER, meaning that a unit increase in ROL decreases RPI in Nigeria. The coefficient of ROL is not statistically significant with LER at 5 percent level of significance, implying that an insignificant relationship exists between ROL and LER in Nigeria. The negative sign of the coefficient of ROL in the short run does not conform to the a priori expectation.

The coefficient of both current and past lag 1 of EXH has a positive (0.004172 and 0.001017) relationship with LER, meaning that a unit increase in EXH increases LER in Nigeria. The coefficient of current EXH is statistically significant with LER at 5 percent level of significance while past lag 1 of EXH is not statistically significant with LER at 5 percent level of significance. The positive sign of the coefficient of EXH in the short run conforms to the a priori expectation.

Post Estimation Tests

The researcher also conducted a diagnostic test to ascertain whether the series are free from autocorrelation (Breusch-Godfrey Serial Correlation LM Test), heteroscedasticity (Breusch-Pegan-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	2.255069	0.1511
Breusch-Pagan-Godfrey Heteroskedasticity Test	1.744528	0.1583

Source: Author's Computation using E-view 10

From Table 5, the results of the diagnostic test shows that the serial or autocorrelation test using Breusch-Godfrey Serial Correlation LM Test shows that the f-statistic is 2.255069, and a Chi-Square probability value is 0.1511. This indicates that the probability value of about 15 percent (0.1511) 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-Pegan-Godfrey test shows that the f-statistic is 1.744528 with a Chi-Square probability value of 0.1583. The result suggests that there is no evidence of heteroskedasticity in the model since the probability Chi-square value is more than 5 percent ($p>0.05$). Therefore, residuals do have constant variance, which is desirable in regression meaning that residuals are Homoscedastic.

Conclusion

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

Recommendations

Government should implement the petroleum industry bill with alternative source of revenue for great economic performance.

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