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Resource Curse, Institutional Quality and Economic Growth: ARDL Analysis

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Abstract- This study examines the interaction effects between resource curse, institutional quality and economic growth in Nigeria over the period 1986 – 2016 using the auto-regressive distributed lag (ARDL) approach to co-integration analysis. Controlling for the possible effects of gross capital formation, oil price, credit to private sectors and trade openness on economic activities. This study found that there is a long-run relationship among the variables in all the specifications. Second, the interaction term between oil rent and corruption index were found to be negative and significant, indicating that both reduces economic growth. This coexists with high level of poor governance resulted to a negative impact on income per capita. In general, the results highlight the importance of the institutional quality resource abundance and economic growth in Nigeria. The institutional quality could therefore be the right strategy to lessening the high level oil rent and speedy economic growth in the Nigerian economy.

Keywords: cointegration, ARDL, resource curse, institutional quality, economic growth

I. INTRODUCTION

The theoretical foundation between resource abundance and economic started with [1] [2] and [3] among many others, who found a negative relationship between growth and resource abundance or dependence. Notwithstanding, the confirmation for the resource curse hypothesis is in no way, shape or form definitive (see, for example; [4]). The linkage amongst natural resource endowment and economic is an uncertain observational baffle with various noteworthy contradicting strands: The first stand document that high endowments of oil have a positive effect on economic growth contradicting most of the empirical literature on the resource curse, while [4] find that resource dependence does not negatively affect growth and they define the resource curse as a “red herring”. Second strand however, challenge these evidence by explaining that volatility channel may lead to conclude that there is no resource curse. These authors find that while resource exports boosts growth in stable countries, they make especially volatile economies even more volatile, worsening growth opportunities in these countries see, [5].

An alternate group of writing recommends that corruption and governance assume a part in economic development and clarifies the industriousness of high salary divergence among nations as an item of disparities in organizations or administration. A current body of literature, hence, joins resource abundance with economic development through corruption and governance instruments and give mixed result.

Before now, the resource curse theory hypothesizes that economies with the wealth of natural resources, for example, oil, gas, coal and metal, can possibly perform preferable for monetary improvement over the economies with no or less regular assets. Financial development assumes an indispensable part in upgrading household generation and thus monetary development [6]. Money related advancement may help in investigating the common assets and exchange transparency encourages the characteristic assets in fortifying financial development also [7] Sound financial sector also plays a vital role in enhancing domestic production and hence economic growth [6]. Financial development may help in exploring the natural resources and trade openness facilitates the natural resources in stimulating economic growth as well [7].

Considering the above argument, we contribute to this open debate by setting up the most vigorous asset administration development nexus inside a hypothetically stable development display and reveal the reasons adding to the blended earlier confirmation. We draw our empirical motivation from the inadequacies of prior literature in our resource-governance-growth nexus. We address this important empirical puzzle within the appropriate growth equation and estimation process to provide a more robust understanding of the resource-governance-growth relation and reconcile the mixed prior evidence. We also draw our inspiration from the anecdote arguing that, had a natural resource such as oil been the primary determinant of acountry's prosperity, then oil-rich countries would have been the richest countries in the world. The remainder of this study is structured as follows: Section 1.2 presents stylized facts on energy consumption in Nigeria. Section 2 presents the data and methodology of the study. Section 3 presents and discusses the empirical results. Finally, section 4 offers some concluding remarks on the findings.

II. EMPIRICAL REVIEW

[8] for instance, find that not just institutional quality significantly affects economic growth, yet it is moreover controlled by the resource abundance of every one of the nations. [9] look at the effect of natural resource on economic development thinking about elective transmission channels ((corruption, investment, openness, terms of trade and schooling). In spite of the negative connection between common natural resource and economic development, when these transmission channels are incorporated, they get a positive relationship between resource abundance and economic development. In expansion, [10], [11] employs dataset from [1], including a connection impact between nature of foundations and resource dependence, and acquire that institutional quality is the way to comprehend the resource curse. They keep up that at the point when institutions are terrible, resource abundance is a curse, while it is a favoring when institutions are great. Moreover, [12] decomposed how public income stuns from natural resource have different long run financial impacts reliant on established outlines. Employing information from many economies isolated into fair and nondemocratic nations, they found that the type of government matters more than the just running the government. Recent scholar, [13] examined both hypothetically and experimentally whether and how the nature of the democracy influences the connection between resource abundance and corruption. They affirm that the connection between resource abundance and corruption likewise relies upon the quality of institutions.

III. DATA AND METHODOLOGY

3.1. Definition of variables and data description

This study uses annual data covering the period from 1986 to 2016 to examine the dynamic relationship between the level of institutional quality, resource curse and economic growth. Economic growth is the per income capital and is taken as the dependent variable. Independent variables are the governance and corruption measures of institutional quality in Nigeria. We use oil rent to capture resource curse. A large body of the resource curse literature suggest that oil resource stimulates a significant rent-seeking activity among competing social groups shaping economic and social activities of various institutions by influencing among other things, the availability, access and distribution of public goods in the economy (see [14]; [15]). The Ibrahim Index of African Governance (IIAG) is an annually published index that provides a statistical measure of governance performance in every African country. Governance is defined by the Mo Ibrahim Foundation as the provision of the political, social and economic public goods and services that every citizen has the right to expect from their state, and that a state has the responsibility to deliver to its citizens. This definition is focused on outputs and outcomes of policy The Overall Governance score is calculated by aggregating the four categories: Safety & Rule of Law, Participation & Human Rights, Sustainable Economic Opportunity and Human Development. These categories are made up of 14 sub-categories, consisting of 100 indicators, from 36 data sources.

It is necessary in understanding the dynamic relationship between the level of governance, resource curse and economic growth in Nigeria to control for the influence of other factors that could influence the level economic growth in the Nigerian economy. This study controls for the influence of international trade, financial sector development and gross fixed capital formation.

3.2 Empirical model and Estimation Method

This study empirically examines two log-linear models to uncover the magnitude of the causal effects of governance, institutional quality and economic growth in Nigeria over the period 1981-2016. Model 1 specified in Eq. (1) below controls for the influence of economic growth, international trade, financial sector intermediary development and gross fixed capital formation

Model 1:

$$lnrgdpc = \alpha_0 + \alpha_1 lnfindep + \alpha_2 lntrade + \alpha_3 ln\text{gfcf} + \alpha_4 lnoilr + \alpha_5 gov + \alpha_6 oilp + e_t \qquad (1)$$

Rgdpc represents economic growth, Trade represents openness of the economy to international trade, findep is a measure of financial sector intermediary development, oilr represents resource curse captured using the ratio of oil rent to GDP, gfcf represents gross fixed capital formation, gov represents governance and level of corruption and e_t is the error term.

With a number of studies suggesting that the level of institutional quality and oil rent which captures resource curse hinders economic growth in oil-rich economies ([16]; [17], [18]; [13]), this study considers it meaningful to capture the influence of the interaction between oil dependence and institution quality in Nigeria. This is achieved in the log-linear model specified in Eq. (2) below:

Model 2:

$lnrgdpc = \alpha_0 + \alpha_1 lnfindep + \alpha_2 lntrade + \alpha_3 ln\text{gfcf} + \alpha_4 lnoilr + \alpha_5 gov + \alpha_6 oilp + \alpha_7 lngov * oilr + e_t$

$lngov * oilr$ is an interaction term between institutional quality and oil curse (oil rent). This interaction term is expected to captures the role of oil curse on the influence of institutional quality on economic growth. The partial derivatives of economic growth with respect to institution quality (governance) in Eq. (3) indicates how the marginal effect of governance/corruption on the amount of economic growth with the level of resource curse (oil rent).

$$\frac{\partial lnrgdp}{\partial lngov} = \beta_1 + \beta_6 lnoilr \quad (3)$$

The coefficient β_6 in Eq. (3) represents the influence of oil/resource curse in the relation between the level of institutional quality and the level of economic growth. If $\beta_6 < 0$, oil rent/curse has a negative effect on the relation between institutional quality and level economic growth in the energy consumption mix. However, the effect of oil rent on the relation between institutional quality (governance/corruption) and the level of economic growth will be positive if $\beta_6 > 0$.

3.3 ARDL approach to cointegration

This study employs the autoregressive distributed lag or Bounds testing approach to co-integration (ARDL) proposed by [19] to investigate the log-linear empirical model specified in equation 1and 2. Studies have shown that the ARDL approach offers some desirable statistical advantages over other co-integration techniques. While other co-integration techniques require all the variables to be integrated of the same order, ARDL test procedure provides valid results whether the variables are I(0) or I(1) or mutually co-integrated, allows for simultaneous testing of the long and short-run relationships between the variables in a time series model and provides very efficient and consistent test results in small and large sample sizes [19].The different order of integration of the variables (see Table 1) makes ARDL the preferred approach in this empirical analysis. The implementation of the ARDL test for Eq. (1&2) involves the estimation of the following models:

$$\Delta lnrgdp_t = a_0 + \sum_{i=1}^{n} a_{1i}\,\Delta lnrgdp_{t-i} + \sum_{i=0}^{n} a_{2i}\,\Delta lnfindep_{1_{t-i}} + \sum_{i=0}^{n} a_{3i}\,\Delta lntrade_{2_{t-i}} + \sum_{i=0}^{n} a_{4i}\,\Delta lngfcf_{3_{t-i}} + \sum_{i=0}^{n} a_{5i}\,\Delta lnoilr_{4_{t-i}} + \sum_{i=0}^{n} a_{6i}\,\Delta lngov_{5_{t-i}} + \sum_{i=0}^{n} a_{7i}\,\Delta lnoilp_{6t-i} + a_8 lnrgdp_{t-1} + a_9 lnfindep_{t-1} + a_{10} lntrade_{t-1} + a_{11} lngfcf_{t-1} + a_{11} lnoilr_{t-1} + a_{12} lngov_{t-1} + a_{13} lnoilp_{t-1} + \varepsilon_t \quad (4)$$

$$\Delta lnrgdp_t = a_0 + \sum_{i=1}^{n} a_{1i}\,\Delta lnrgdp_{t-i} + \sum_{i=0}^{n} a_{2i}\,\Delta lnfindep_{1_{t-i}} + \sum_{i=0}^{n} a_{3i}\,\Delta lntrade_{2_{t-i}} + \sum_{i=0}^{n} a_{4i}\,\Delta lngfcf_{3_{t-i}} + \sum_{i=0}^{n} a_{5i}\,\Delta lnoilr_{4_{t-i}} + \sum_{i=0}^{n} a_{6i}\,\Delta lngov_{5_{t-i}} + \sum_{i=0}^{n} a_{7i}\,\Delta lnoilp_{6t-i} + \sum_{i=0}^{n} a_{8i}\,\Delta(lnoilr * gov)_{7_{t-i}} + a_8 lnrgdp_{t-1} + a_9 lnfindep_{t-1} + a_{10} lntrade_{t-1} + a_{11} lngfcf_{t-1} + a_{11} lnoilr_{t-1} + a_{12} lngov_{t-1} + a_{13} lnoilp_{t-1} + a_{14}(lnoilr * lngov)_{t-1} + \varepsilon_t \quad (5)$$

Where Δ is the difference operator while ε_t is white noise error term. Other variables remained as previously defined in Table 1. The following hypotheses are tested to investigate the existence of co-integration among the variables: the null hypothesis of no cointegration among the variables in Eq. (4) is ($H_o: a_7 = a_8 = a_9 = a_{10} = a_{11} = a_{12} = a_{13} = 0$) against the alternative hypothesis ($H_1: a_7 \neq a_8 \neq a_9 \neq a_{10} \neq a_{11} \neq a_{12} \neq a_{13} \neq 0$).; in Eq. (5) the null hypothesis of no cointegration among the variables is ($H_o: \beta_8 = \beta_9 = \beta_{10} = \beta_{11} = \beta_{12} = \beta_{13} = \beta_{14} = \beta_{15} = 0$) against the alternative hypothesis ($H_1: \beta_8 \neq \beta_9 \neq \beta_{10} \neq \beta_{11} \neq \beta_{12} \neq \beta_{13} \neq \beta_{14} \neq \beta_{15} \neq 0$).. The decision to reject or accept H_o (no co-integration among the variables) is based on the following conditions: if the calculated F-statistics is greater than the upper critical bound, then H_o is rejected and the variables are co-integrated, if the calculated F-statistics is less than the lower bound, then H_o is accepted and the variables are not co-integrated, but if the calculated F-statistics remains between the lower and upper critical bounds then the decision is inconclusive [19].

3.4 Error correction model

After testing for cointegration among the variables, the long-run coefficients of the variables are then estimated. The existence of cointegration between the variables implies that causality exist in at least one direction. This study uses Akaike Information Criterion (AIC) for selecting the optimal lag length. The error correction model for the estimation of the short run relationships is specified as:

$$\Delta lnrgdp_t = a_0 + \sum_{i=1}^{n} a_{1i}\,\Delta lnrgdp_{t-i} + \sum_{i=0}^{n} a_{2i}\,\Delta lnfindep_{1_{t-i}} + \sum_{i=0}^{n} a_{3i}\,\Delta lntrade_{2_{t-i}} + \sum_{i=0}^{n} a_{4i}\,\Delta lngfcf_{3_{t-i}} + \sum_{i=0}^{n} a_{5i}\,\Delta lnoilr_{4_{t-i}} + \sum_{i=0}^{n} a_{6i}\,\Delta lngov_{5_{t-i}} + \sum_{i=0}^{n} a_{7i}\,\Delta lnoilp_{6t-i} + \lambda_1 ECM_{t-1} + u_{2t} \quad (6)$$

$$\Delta lnrgdp_t = a_0 + \sum_{i=1}^{n} a_{1i}\,\Delta lnrgdp_{t-i} + \sum_{i=0}^{n} a_{2i}\,\Delta lnfindep_{1_{t-i}} + \sum_{i=0}^{n} a_{3i}\,\Delta lntrade_{2_{t-i}} + \sum_{i=0}^{n} a_{4i}\,\Delta lngfcf_{3_{t-i}} + \sum_{i=0}^{n} a_{5i}\,\Delta lnoilr_{4_{t-i}} + \sum_{i=0}^{n} a_{6i}\,\Delta lngov_{5_{t-i}} + \sum_{i=0}^{n} a_{7i}\,\Delta lnoilp_{6t-i} + \sum_{i=0}^{n} a_{8i}\,\Delta(lnoilr * gov)_{7_{t-i}} + \lambda_2 ECM_{t-1} + u_{2t} \quad (7)$$

ECM_{t-1} is the error correction term obtained from the cointegration model. The error correction coefficients (λ_1 and λ_2) indicate the rate at which the cointegration models correct previous period disequilibrium or speed of adjustment to restore the long-run equilibrium relationship. A negative and significant ECM_{t-1} coefficient implies that any short term movement between the dependent and explanatory variables will converge back to the long-run relationship.

3.5 Diagnostic test

The following diagnostic tests are conducted to ensure the acceptability of the empirical models: Breusch–Godfrey serial correlation LM test, ARCH test for heteroscedasticity, Jarque-Bera normality test and Ramsey RESET test for functional form. The stability of the long-run coefficients together with the short-run dynamics are tested using the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) tests. If the plot of CUSUM and CUSUMSQ statistics stays within the 5% range of the significance level, then all the coefficients in the error correction model are assumed to be stable, but if the plot of CUSUM and CUSUMSQ statistics crossed the 5% range of the significance level, the coefficients in the error correction model are considered unstable (Bekhet and Matar, 2013).

IV. EMPIRICAL RESULTS

4.1 Unit root tests

The ARDL-bounds cointegration testing approach allows variables to be integrated of different orders [I(0) and I(1)], but does not require any of the variables to be integrated of order 2 [I(2)] see[19] . It is therefore essential to examine the stationarity of the variables to ensure that none of the variables is integrated of order 2 [I(2)]. To determine the order of integration of the variables, the The results of the ADF and PP stationarity tests show that the variables are integrated of order one I(1) in the face of null hypothesis $H_0 = \beta = 0$ (i.e. β has a unit root) is implemented. The results in Table 2 show that the variables are integrated of different order [I(0) and I(1)]. However none of the variables is integrated of order two I(2). The integration of the variables at I(0) and I(1) makes ARDL the preferred approach in this empirical analysis.

Table 2.ADF and PP Unit root tests

	In Level I(0)		First Difference I(1)			
	ADF	PP	ADF		PP	
	t-Statistic		t-Statistic			
lngdp	-0.5512	0.3787	-2.9292	*	-2.9292	*
lnfindep	-2.4253	-2.2371	-4.834	***	-7.6324	***
lngfcf	-2.0802	-2.0159	-4.7216	***	-4.7171	***
lnoilr	0.7579	-0.5059	-5.5794	***	-5.7377	***
lnoilp	-1.2981	-1.3062	-4.8216	***	-4.8216	***
lngovdex	-1.5723	-1.6933	-5.1027	***	-5.1027	***
lntrade	-2.6208	-2.5066	-3.5318	**	-7.6549	***

lnogov	-0.3716	-1.3345	-6.106	***	-6.1865	***
lnoco	-0.7789	-2.6751	-3.5648	**	-8.5651	***
lnogov	0.5477	-0.6132	-5.45	***	-5.9326	***

* Significance at 10%. ** Significance at 5%. *** Significance at 1%. The asterisks indicate the rejection of the null hypothesis of unit root. All the variables are in the natural log form.

4.2 Results of ARDL Co-integration Test

This study tested for co-integration on four alternative specifications employing the interaction resource curse and economic growth. The results of the co-integration test based on the ARDL-bounds testing method are presented in Table 3. The results indicate that in all the specifications, the F-statistic is greater than the upper critical bound from both [19] at 1% significance level using restricted intercept and no trend. This study therefore rejects the null hypothesis of no co-integration among the variables. This shows that there is a long-run causal relationship among the variables in all the specifications.

4.3 Long-run Estimates

The estimated long-run coefficients are presented in Table 5. Specification [1] and [3] are the result from the baseline models (from equation 1 & 2), while columns [2] to [4] are those with each measure of institutional quality and their interactions with oil rent. From the baseline model oil rent is negative and statistically insignificant and corruption index in negative and statistically significant evidencing the corruption is persistence in the Nigerian economy.

Specification 2, shows the role of institutions in the relationship between oil rent and growth captured by interacting oil rent and institutional variable corruption index. The interaction term is negative and significant, indicating that the interaction effect of oil rent and corruption reduces economic growth significantly. As expected in oil-dependent country like Nigeria, oil rent indicates highly negative and statistically significant. Furthermore, the interaction effect reveals that corruption (oil rent) tends to play a more role on retarding economic growth when the level of is relatively high.

In specification 3, oil and governance are negative and statistically significant in exacting influence on economic growth. This implies that one percent increase in oil rent and governance could lead to 0.64% and 6.84% fall on economic growth respectively. Interestingly, the negative deepens in specification 4. The interpretation is that the marginal effect of change in oil rent has a negative impact on income per capita given an increase in corruption and level of governance worsened.

Controlling for the influence of oil price, gross fixed capital formation, and trade openness, these various indicate evidence of statistical significant on economic growth across all the specification.

4.3.1 ***Short-run Estimates***

The coefficients of the Short-run error correction estimates for all the specifications are presented in Table 6. The coefficient of ECT (-1) are all negative and significant at 1% level, suggesting that short-run disequilibrium is corrected in the long-run equilibrium. The short-run coefficient from the baseline model oil rent is negative and statistically insignificant and corruption index in negative and statistically significant evidencing that corruption is persistence in the Nigerian economy. Infact institutional quality remains negative and statistically significant in all the specification. Surprisingly, oil rent remain positive and insignificant in specification 1 and 2 while it shows position and statistically insignificant in specification 3 and 4. As expected from the interaction effect, it reveals that corruption (oil rent) tends to play a more role on retarding economic growth when poor institutional quality is relatively high.

Table 4. ARDL bounds cointegration test results

Specifications		ARDL		F-statistic	Result
1. F_{rgdp} (*ln*Rgdp| *lnfindep*, *ln*trade, *ln*gfcf, *ln*oilr, *ln*codex, *ln*oilp)		(2, 0, 1, 2, 2,0,2)		6.0961***	Cointegration
2. F_{rgdp} (*ln*Rgdp| *lnfindep*, *ln*trade, *ln*gfcf, *ln*oilr, *ln*govdex, *ln*oilp)		(1,0, 0, 1, 0, 2,0)		5.1249**	Cointegration
Critical Value Bounds (k = 6)	**1%**		**5%**	**10%**	
I(0) Bound	3.90		2.804	2.331	
I(1) Bound	5.49		4.013	3.417	
4. F_{rgdp} (*ln*Rgdp| *lnfindep*, *ln*trade, *ln*gfcf, *ln*oilr, *ln*codex, *ln*codex* *ln*oilr, *ln*oilp)		(2,2,1,2,2,0,2,2)		4.6732**	Cointegration
5. F_{rgdp} (*ln*Rgdp| *lnfindep*, *ln*trade, *ln*gfcf, *ln*oilr, *ln*govdex, *ln*govdex* *ln*oilr, *ln*oilp)		(1,2,1,1,2, 2, 2)		4.8988**	Cointegration
Critical Value Bounds (k = 7)	**1%**		**5%**	**10%**	
I(0) Bound	3.713		2.685	2.254	
I(1) Bound	5.326		3.960	3.388	

ARDL Models selected on Akaike info criterion (AIC)

*** indicate significance at 1% level respectively.

Source of critical value bounds: Narayan (2005) Appendix: Case II Restricted intercept and no trend for

Table 5. Long-run estimates

	Spec1		Spec 2		Spec 3		Spec 4	
	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
C	8.4265	0.0000	9.7167	0.0000	36.5310	0.0212	19.3157	0.0000
LFINDEP	0.0635	0.2080	0.1403	0.0145	0.1955	0.2687	0.1501	0.0121
LTRADE	-0.0073	0.9406	0.1025	0.0481	-0.1937	0.4437	0.2963	0.0000
LGFCF	-0.3204	0.0009	-0.2960	0.0001	-0.5017	0.0512	-0.2851	0.0001
LOILR	-0.1180	0.2172	-0.3803	0.0055	-0.1371	0.5036	-1.3510	0.0000
LOILP	0.6393	0.0000	0.5887	0.0000	0.6436	0.0000	0.4600	0.0000
CODEX	-0.6719	0.0062	-0.3727	0.0412				
LOCO			-0.1783	0.0242				
GOVDEX					-6.8458	0.0764	-2.0785	0.0006
OGOV							0.0007	0.0001

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LFINDEP	0.063456	0.04789	1.325045	0.208

Variable	Coefficient
LFINDEP	0.140314
LTRADE	0.102524

LTRADE	-0.007283	0.095854	-0.075982	0.9406	LGFCF	-0.29604
LGFCF	-0.320375	0.075317	-4.253686	0.0009	LOILR	-0.38027
LOILR	-0.117959	0.090961	-1.296815	0.2172	CODEX	-0.37267
CODEX	-0.671875	0.206182	-3.258644	0.0062	LOILP	0.588727
LOILP	0.639317	0.050132	12.752725	0	LOCO	-0.17826
C	8.42652	0.485418	17.359317	0	C	9.716698

Note: *, **, and *** indicate significance at 10%, 5% and 1% respectively; t-statistics in [ ]

Table 6. Short-run estimates

Variable	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
D(LFINDEP)	0.01837	[1.3886]	0.0605***	[4.4432]	0.019379	[1.3812]
D(LTRADE)	-0.0524*	[-2.1335]	-0.0258	[-1.4489]	-0.019194	[-0.9468]
D(LGFCF)	-0.04226	[-2.0114]	-0.0239	[-1.3408]	-0.016516	[-0.7434]
D(LOILR)	0.03721	[1.2828]	0.0571	[1.4490]	-0.013589	[-0.6053]
D(CODEX)	-0.1945***	[-4.0471]	-0.1582***	[-3.3867]		
D(LOILP)	0.04519**	[2.4317]	0.0398*	[2.2792]	0.022475	[1.0454]
D(LOCO)			-0.0099	[-0.6269]		
D(LOCO(-1))			0.0781***	[4.2503]		
D(GOVDEX)					-0.6784***	[-4.2075]
CointEq(-1)	-0.2895***	[-4.9238]	-0.4247***	[-5.7469]	-0.0991**	[-2.240]
Adj R2	0.703515		0.999354		0.998004	
D-W stat	2.373462		2.218898		2.447906	
Het ARCH $x^2(1)$	0.9006		0.4486		0.1401	
SC $x^2(1)$	0.1703		0.1212		0.115	
JB	0.40568		0.4559		0.22557	
RESET	0.9203		0.6813		0.7667	

Note: *, **, and *** indicate significance at 10%, 5% and 1% respectively ; t-statistics in [ ] and p-values in ( ); Adj R2 means Adjusted R-squared; SC means Breusch–Godfrey serial correlation LM test; Het is the ARCH test for heteroscedasticity; RESET is the Ramsey RESET test; JB is the Jarque-Bera Normality test.

4.4 Diagnostic and Stability tests

From the diagnostic test results (see results in Table 6), there is no evidence of serial correlation, heteroscedasticity and functional form misspecification in each of the ARDL models specified. Figures 2 - 6 show the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares (CUSUMSQ) stability test results. The CUSUM and CUSUMSQ are within the critical boundaries for the 5% significance level indicating that the coefficients of the ARDL model in each of the specifications are stable.

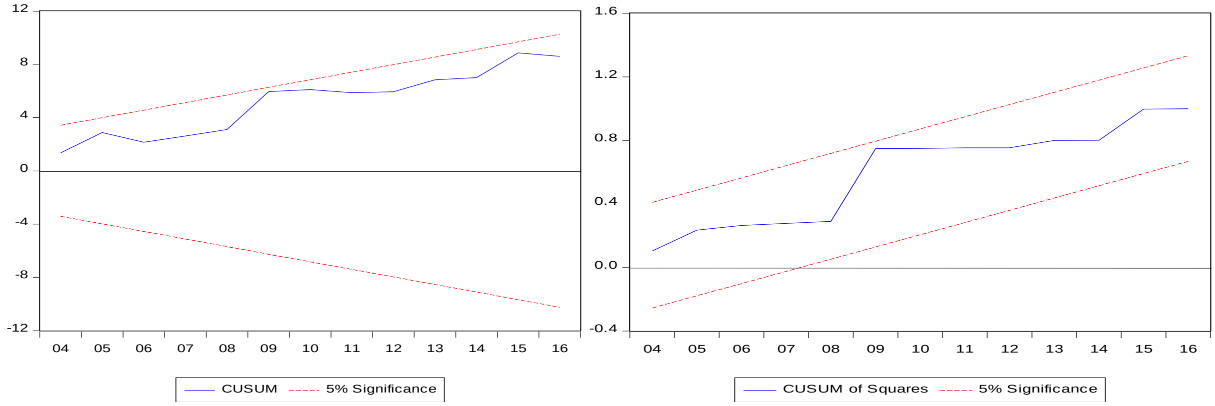

Figure 1: CUSUM and CUSUM of Squares for specification 1

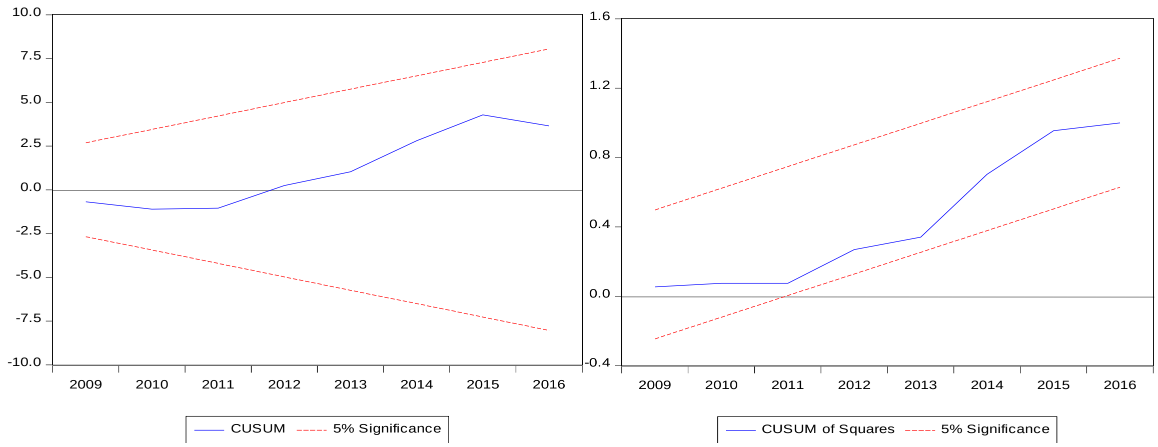

Figure 2: CUSUM and CUSUM of Squares for specification 2

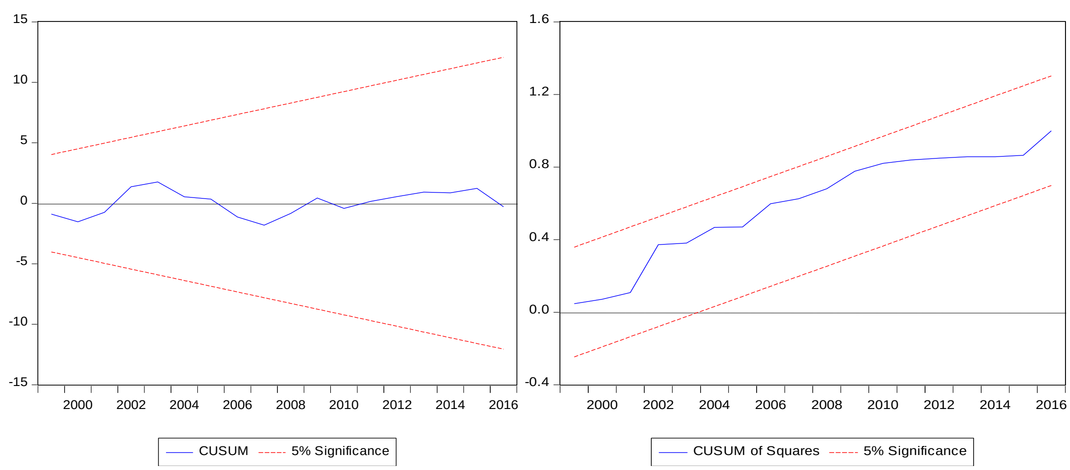

Figure 3: CUSUM and CUSUM of Squares for specification 3

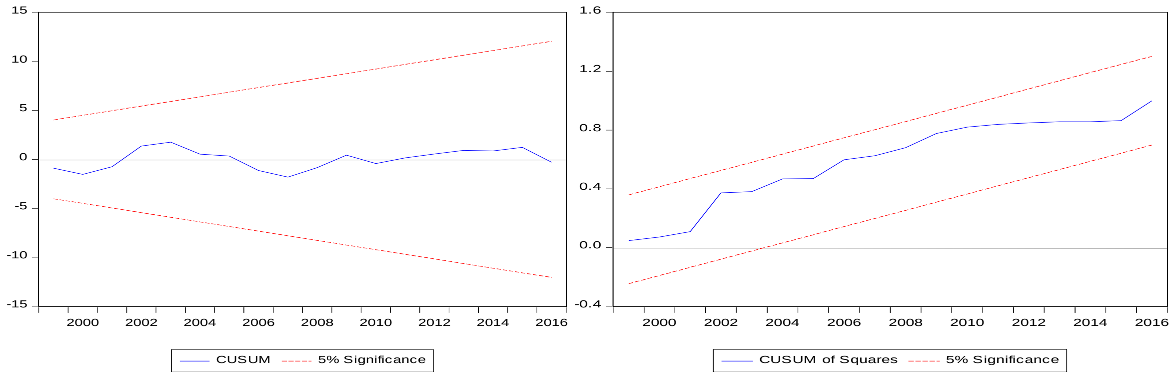

Figure 4: CUSUM and CUSUM of Squares for specification 4

V. SUMMARY AND CONCLUSION

Inspired by the growing interest among researchers and policy makers in understanding the interaction effects of oil rent and institutional quality on economic growth and the limited attention that has been given to the special oil-dependent economies like Nigeria, this study empirically examines the interaction of resource curse, institutional quality and economic growth in Nigeria using the auto-regressive distributed lag (ARDL) approach to co-integration analysis, controlling for the possible effects of credit to private sector, gross fixed capital formation and trade openness on economic activities in Nigeria. The results show that there is a long-run causal relationship among the variables in all the specifications. Second, the interaction term is negative and significant, indicating that the interaction effect of oil rent and corruption reduces economic growth significantly.Third, the interpretation is that the marginal effect of change in oil rent has a negative impact on income per capita given an increase in corruption and level of governance worsened. Therefore this recommend that existing public institutions such as judicial, legislative and political (i.e., electoral) established to promote justice, governance, transparency and accountability.

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