Effect of Energy Utilization and Financial Development on Economic Growth in Nigeria

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ABSTRACT

The necessity for rapid economic growth has not only been of great concern to global institutions and agencies but has continued to dominate discussions at major economic conferences at the national and international levels. There is an implicit assumption of positive correlation between economic growth, as measured by increase in national output, and the welfare of citizens, with the effect that governments seek to understand the real causes of output growth to aid formulation and implementation of policies that promote the welfare of their citizens. The depth of academic research in this area of knowledge is a further indication of its relevance to humanity. This study builds on existing body of knowledge on the subject by estimating the contributions of the financial and energy sectors to the Nigerian economy between 1981 and 2018. Using the estimation method of dynamic ordinary least squares (DOLS), the study reveals electricity consumption, inflation and financial development as positive predictors of growth while oil price and gross fixed capital are negative predictors. From the above findings, we conclude that robust financial and energy sectors are major influencers of growth and therefore suggest that adequate attention be given to development of these sectors through formulation and implementation of supportive policies. In addition, we see the necessity for a need assessment of the infrastructure needs of the real sector in order to ensure that infrastructure critical to its performance is identified and addressed through targeted investment.

Keywords: Energy consumption, Financial development, Economic growth, Endogenous growth theory.
JEL Classifications: C22, G21, O47, Q43

1. INTRODUCTION

Attainment of rapid and sustainable economic growth, stable prices and employment generation has remained a contentious issue among policymakers, economic and financial theorists across different jurisdictions. A popular policy thrust of most economic policies is to improve the welfare of citizens through implementation of productivity enhancing programmes. Governments seek to influence output growth through implementation of fiscal policies that accelerate the rate of capital formation and investment. On

the other hand, through adoption of policies on interest rate, credit supply, and money supply, central banks aim at price stabilization, job creation and real sector growth. Adegbite (2005) notes that from the days of early economists like Adam Smith, the question of what drives economic growth has continued to be of concern to different stakeholders in the economy. Citing World Bank research, Palei (2015) mentions factors that influence economic growth and national competitiveness to include infrastructure, health systems, institutions, macroeconomic environment, primary education, market size and technological readiness. Palei (2015) identifies

road, rail and air transport infrastructure as well as electricity supply as core components of infrastructure that promote output growth.

Basher and Sadorsky (2006) identify oil as critical for the survival of modern economies due, largely, to its role in driving the wheel of industrialization. As a critical input in the production process, pricing of this resource is critical to the competitiveness of industrial output, and by extension the performance of the entire economy. Abdelaziz et al. (2008) argue that for oil exporting nations, an increase in oil price improves the balance of payment and current account balance thereby strengthening foreign asset position. They further contend that rising oil prices enhance private disposable income, improve domestic demand and corporate profitability, raise stock price and lead to exchange rate appreciation. Although increase in oil price can enhance the capacity to fund development projects, Omojolaibi (2014) argues that this opportunity is often wasted due to inefficiency in public sector spending and procurement procedures.

Being both a major exporter and importer of petroleum products, oil price affects both revenue generation capacity and expenditure profile of the Nigerian economy. For instance, Nigeria exports crude petroleum products and imports refined products for domestic and industrial consumption. It follows therefore that low production capacity is associated with rising oil prices. This relationship has empirical support in studies like Hamilton (1983). Higher oil price distorts market stability, fuels inflationary pressure and retards economic growth (McKillop, 2004). Also, Jin (2008) identifies rapid increase in oil price and exchange rate volatility as obstacles to growth. Thus oil price and exchange rate fluctuations have continued to engage the interest of scholars, governments and policy makers in both oil producing and consuming economies.

2. REVIEW OF RELATED LITERATURE

This study builds on the endogenous growth theory which argues that expansion of economic activities could be achieved through effective deployment of domestic resources. Endogenous theorists contend that economic expansion could result from domestic investment in human capital, innovation and knowledge acquisition. Advocates of the theory such as Romer (1986) and Lucas (1988) posit that investment in initiatives like infrastructure, human capital, research and development, among other factors, spur expansion of economic activities. Similarly, the study of Kraft and Kraft (1978) provides empirical link between energy utilization and economic growth.

Following the work of Shahbaz et al. (2013), we also incorporate financial development and capital formation as positive influencers of real sector growth. The positive role of finance in economic advancement argued by scholars like Bagehot (1873), Schumpeter (1912), McKinnon (1973) and Shaw (1973) is explored in this study. Finance-led theorists posit that funding of innovative ideas enables their transformation to products, deepens markets, and contributes to the growth of the real economy.

Isibor et al. (2016) examined the effect of financial libralization on the Nigerian economy based on data for the period 1970-2016

and observe strong negative effect of deregulation and investment on economic development initiatives in Nigeria. The work of Ugwuanyi et al. (2015) which studied how major indicators of financial development affect economic growth in Nigeria did not establish any significant impact of financial development on growth.

Okwo et al. (2012) examined the link between financial sector development and economic growth in Nigeria. The study used ratios of broad money supply to GDP and private sector credit to GDP as proxies for financial development. Regression estimates based on the method of ordinary least squares (OLS) indicate negative effect of both measures of financial development on economic growth though the private sector credit did not significantly drive growth during the period. The Granger causality test did not establish causal relationship between financial development and economic growth.

In a panel investigation of the link between financial development and GDP growth, De Gregorio and Guidotti (1995) observe positive correlation between private sector credit to GDP ratio and growth in a large cross-country sample; they also report negative impact in a panel with weak regulatory system. Bist (2018) also conducted a panel estimation of the relationship between financial development and GDP growth in 16 low income countries from 1995-2014 using the framework of FMOLs and DOLS. The study reveals strong positive dependence of growth on financial development. A robustness test based on single-country analysis also reveals positive impact of financial development on growth for majority of the countries.

Afonso and Arana (2018) used a random effects model to investigate the nexus between financial development and growth. They observe robust positive effect of financial sector development on output growth. A panel analysis of the connection between financial development and real sector growth based on data from 16 low and middle income countries conducted by Hassan et al. (2011) also reveal positive correlation between economic growth and financial development. Using ratios of private sector credit to GDP, broad money to GDP, and commercial bank assets to total commercial bank assets and central bank assets as proxies for financial development, Kenza and Eddine (2016) examined the finance-growth hypothesis in a panel of 11 MENA countries over the period of 1980-2012. The study reveals financial development as a negative predictor of GDP growth.

Using the ARDL model, Jedidia et al. (2014) examined the link between financial development and GDP growth in Tunisia. They observe robust positive response of growth to private sector credit. The work of Puatwoe and Piabuo (2017) deployed ARDL in the estimation of financial sector impact on output growth in Cameroon between 1980 and 2014. The study reveals significant long-run positive impact of broad money deposit to GDP ratio, and private sector credit on growth.

Jin (2008) examined how economic growth responds to oil price shocks and exchange rate volatility in a sample of selected countries. The result indicates that while oil price correlates

negatively with growth in China and Japan, it promotes growth in Russia. In a study on post-World War II performance of the American economy based on data between 1948 and 1980, Hamilton (1983) observes strong growth-retarding effect of high oil price on economic growth.

Manasseh et al. (2019) used annual data for 1970-2013 to analyze the response of the Nigerian economy to dynamics in oil price and exchange rate. Data analysis was based on the methods of GARCH, EGARCH and Granger causality tests. The regression estimates show strong positive effect of oil price, exchange rate and interest rate as well as negative effect of external debt on Nigeria's economic performance. The study further indicates that fluctuations in oil price significantly account for exchange rate volatility in Nigeria but did not establish causal link between them. A related study by Aliyu (2009) presents empirical support for short-run negative impact of lagged oil price and exchange rate on output growth. It also shows strong causal impact of oil price shock on economic growth. With regard to the exchange rate-output growth nexus, the result shows bi-directional causality between them. It also reveals that exchange rate volatility strongly causes shocks to oil price but not vice versa. The study was based on quarterly data between 1986(Q1) and 2007(Q4).

Omojolaibi (2014) used the structural vector auto-regression (SVAR) method to analyze the nexus between crude oil price and economic growth in Nigeria. Quarterly data over the period 1985-2010 was used for the study. Evidence from the study reveals strong positive impact of oil price volatility on output growth. Also, both the variance decomposition and impulse response results show that oil price volatility in Nigeria derives largely from domestic shocks. Employing the method of dynamic stochastic general equilibrium model, Balke et al. (2008) examined the response of US output to oil price shocks associated with demand and supply conditions at the domestic and international market arena. The authors observe that demand and supply shocks significantly account for oil price movements. They also discover that variations in US output derive mainly from domestic shocks.

Okoye et al. (2018) used the method of ordinary least squares (OLS) to study the link between exchange rate management and economic development in Nigeria between 1970 and 2016. The study presents significant negative effect of exchange rate on economic development. Further evidence from the disaggregated sample shows that the negative result largely derives from the floating rate regime. An earlier study by Okoye et al. (2017) reveals strong positive effect of exchange rate and inflation on economic growth in Nigeria. The study employed ordinary least squares (OLS) and generalized least squares (GLS) estimation methods and data from 1981-2015. In a recent study, Okoye et al. (2019) used OLS to determine factors that influence output performance in Nigeria from 1981-2017 and observe financial development as a negative predictor of growth while oil price did not significantly affect growth.

The research by Danmaraya and Hassan (2016) investigated the nexus between manufacturing sector performance and electricity consumption in Nigeria between 1980 and 2013 using the autoregressive distributed lag (ARDL) test. The result indicates strong positive impact of current movements in capital and electricity consumption as well as their lagged (lag 1) values on manufacturing performance. The causality estimates show bi-directional causal link between manufacturing sector productivity and electricity consumption. Though there is no evidence of causal impact of gross fixed capital on manufacturing, the study shows that manufacturing sector dynamics cause changes in capital consumption.

Khobai et al. (2017) studied how electricity price affect South African economy using data for the period 1985-2014. Based on the analytical method of ARDL, the authors observe that increase in energy (electricity) price retards economic growth. They also report growth-enhancing effect of electricity, trade openness, capital and employment. In Belk et al. (2010), the authors used data from 25 OECD countries to analyze causal relationships among energy consumption, energy price and economic growth. The study covered the period 1981-2007. Evidence from the study indicates causal effect of energy price on energy consumption, which suggests that higher energy prices may cause reduction in the rate of economic activity, and thereby growth. The study also shows that energy price is driven by growth in economic activities. This further suggests that increased economic activities make heighten the demand for energy thereby raising its price.

The relationship between economic growth and electricity consumption was also examined in Madhavan et al. (2010) for Malaysia based on data for 1971-2003. The authors introduced electricity price as an intervening variable. Data analysis was based on the method of ARDL. The result of the study further validates existence of long-run interaction among the components of the tri-variate model. The authors report causal link from electricity consumption to economic growth. The work of Abbas et al. (2014) used generalized least squares (GLS) and Hausman test to analyze the relationship among electricity consumption, inflation, economic growth, and employment in developing countries. The study covered the period 1990-2012 and the countries studied are India, China, Pakistan, Malaysia and South Africa. The study presents evidence that electricity consumption and employment strongly affect output performance. However, it did not produce evidence of strong effect of inflation on economic growth.

Hondroyiannis et al. (2002) investigated the relationship between energy consumption and economic growth in Greece over 1960-1996. The regression result from the vector error correction model (VECM) shows empirical support for long-run effect of energy price and energy consumption on economic growth. The Granger causality test further confirmed the growth-inducing effect of energy consumption. It did not only show causal link from energy usage to output growth, it also indicates stronger causal impact of industrial energy usage on output growth than residential or domestic consumption.

An empirical examination of the relationship among energy consumption, GDP growth, financial sector development and trade in China conducted by Shahbaz et al. (2013) over the period of 1971-2011 reveals that energy utilization, financial development,

capital and trade contribute positively to growth of national output. Using a trivariate VEC model (VECM), Iyke (2015) reports strong positive short and long-run contribution of electricity consumption to economic growth in Nigeria between 1971 and 2011. Musa et al. (2019) also report significant energy dependence of growth in Nigeria over the period 1982-2018. The authors re-examined the energy-growth nexus and observe that energy utilization is a good predictor of growth in the short and long periods.

Muritala et al. (2012) investigated the effect of crude oil price, interest rate, exchange rate and stock price on GDP growth in Nigeria from 1980 to 2010. They observe that exchange rate and stock price make significant contribution to real sector growth while oil price and interest rate did not substantially retard growth during the period. The long-run result in Chukwuigwe and George (2009) reveal substantial lag effect of GDP growth (1st lag) and foreign resolve (2nd leg) on current level of economic performance. The study also presents short-run effect oil price fluctuation and foreign exchange rate on GDP growth. However the impact of foreign exchange became only significant at 10%.

The research study by Egbichi et al. (2018) examined the extent to which energy consumption contributes to economic growth in Nigeria over the period 1986-2016 based on the method of symmetrical ARDL. It reveals significant lag effect (lag 1 and lag 4) of GDP growth on the economy at 10%. Though current electricity consumption did not substantially affect present performance of the economy, it is observed that its 1st and 3rd lags enhance growth. It further reveals that current and lagged petroleum production and gas consumption negatively affect output growth.

The study of Akinlo and Apanisile (2015) reveals significant positive effect of oil price volatility on output performance in a panel of oil exporting countries and non-substantial impact in non-oil exporting countries. On the other hand, Dogah (2015) presents strong negative impact of oil price shocks on economic performance in Ghana while Qiangian (2011) reports significant negative effect of oil price on the Chinese economy.

Enejo and Tsauni (2017) estimated the impact of inflation on GDP growth in Nigeria based on data for the period of 1970-2016 using the method of ARDL. The result indicates that inflation and exchange rate make significant positive contributions to the expansion of economic activities in Nigeria. Umaru and Zubairu (2012) report significant positive contribution of inflation to economic growth in Nigeria between 1970 and 2010.

Anidiobu et al. (2018) used ordinary least squares (OLS) method to estimate the effect of inflation on economic growth in Nigeria over the period 1986-2015. The study shows significant positive contribution of exchange rate on output growth but did not establish that inflation contributes significantly to the growth of the Nigerian economy.

Egert et al. (2009) report significant positive contribution of infrastructure to economic performance. They also observe that infrastructure effect on growth varies over time across countries and sectors. Precisely, the study reveals that deployment of financial resources to telecommunications and electricity sectors promote economic activities while investments in rail and road transportation networks do not. The study was based on a panel analysis of unbalanced data for 24 OECD countries between 1960 and 2005.

Palei (2015) investigated the effectiveness of infrastructure in driving output growth and national competitiveness. The study reveals direct effect of infrastructure on economic growth and competitiveness through increased productive capacity, reduction in the cost of production inputs and transaction costs. In addition, the study shows that infrastructure indirectly contributes to growth and economic competitiveness through improvement in the productivity of workers. The study further shows that level of institutional development and quality of infrastructure determined by roads, rails and air transport infrastructure as well as electricity supply) greatly influence national competitiveness.

3. SCOPE AND METHODOLOGY

The study aims at identifying major drivers of economic performance in Nigeria between 1981 and 2018 based on time series data obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin and BP Statistical Review of World Energy (2018). A six-variable model, composed of oil price, electricity utilization, financial sector development, gross fixed capital, inflation rate (independent variables) and GDP (dependent variable) is analyzed in the study. Model estimation is based on the method of Dynamic OLS (DOLS) adopted by Saikkonen (1991), Phillips and Loretan (1991), Stock and Watson (1993), Mark and Sul (2003) due to its favourable asymptotic and finite-sample features in estimating cointegrating vectors. DOLS is a single equation approach for resolving endogeneity issues in regressors, can correct serial correlation of errors, also suitable for small samples, and can accommodate small samples (Stock and Watson, 1993). It is also suitable for fractionally integrated series (Masih and Masih, 1996). The Phillip Perron test is used to establish the time series properties of the dataset in order to guide the selection of appropriate estimation method. The model is composed of a mix of variables that do not have the same unit of measurement. While two variables (oil price and electricity utilization) are reported in their absolute values, the others are either ratios or percentages. This informs the use of semi-log model.

3.1. Model Specification
In this research, we modify the model developed by Solarin and Ozturk (2016) to analyze the extent to which economic growth is predicted by natural gas consumption *(NGC)*, gross fixed capital formation *(GFCF),* and oil revenue *(OR)*. The basic model in Solarin and Ozturk (2016) is presented as:

$$GDP_t = f(NGC_t, GFCF_t, OR_t) \qquad (1)$$

By introducing electricity consumption in place of natural gas consumption *(NGC)*, oil price in place of oil revenue *(OR)*, and incorporating inflation *(INF),* we modify equation (1) to align with the objectives of the study. Implicitly the modified model (2) is presented as:

$$GDPR_t = f(LnOPR_t, LnELCN_t, INF_t, FNDT_t, GFCF_t) \quad (2)$$

Where: $GDPR$ = GDP growth rate
$LnOPR$ = Natural log of oil price
$LnELCN$ = Natural log of energy utilization
$FNDT$ = Financial development (proxied as ratio of private sector credit to GDP)
$GFCF$ = Gross fixed capital formation
INF = Inflation rate

The functional form of the model is specified as follows:

$$GDP_t = \lambda_0 + \sum_{i=-m}^{i=m} \lambda_1 \Delta LnOPR_t + \sum_{i=-n}^{i=n} \lambda_2 \Delta LnELCN_t + \sum_{i=-0}^{i=O} \lambda_3 \Delta INF_t$$
$$+ \sum_{l=-p}^{i=p} \lambda_4 \Delta FNDT_t + \sum_{l=-p}^{i=p} \lambda_5 \Delta GFCF_t + \mu_t$$

$$(3)$$

Where: λ_0 = Intercept; $\lambda_1, \lambda_2, \lambda_3, \lambda_4, \lambda_5$, = Cointegrating vectors of long-run co-efficients of the explanatory variables; m, n, o, p, q = leads of 1st difference of explanatory variables; -m, -n, -o, -p, -q = lags of 1st difference of explanatory variables; Δ = 1st difference operator; $\propto_t$ = Error/disturbance term. Other symbols/acronyms are as defined previously.

3.2. Presentation and Discussion of Results
The result of the unit root, Phillip Perron (PP) and dynamic ordinary least squares (DOLS) tests as well as Wald cointegration and diagnostic tests are presented and discussed subsequently.

3.3. Unit Root Test
The result of the Phillip Perron (PP) unit root test conducted to check for stochastic trends in the time series data is presented in Table 1 (Appendix Tables 1a – 1f). The result shows that the variables are fractionally integrated. The result indicates that GDP growth (GDPR), gross fixed capital formation (GFCF) and inflation (INF) are integrated of order zero [$I(0)$] while oil price (OPR) electricity utilization (ELCN) and financial sector development (FNDT) are integrated of order one [$I(1)$].

3.4. Wald F-Test
The Wald statistics shown in Table 2 (Appendix Table 2) tests was employed to determine the existence of a long-run relation among the variables captured by the model. The F-statistic (52.101) and the Chi-squared (260.504) outcome was observed to be notably significant at 1%. The result indicates that the

exogenous variables are significantly different from zero. The null hypothesis

3.5. Regression Estimates
Model estimation based on dynamic ordinary least squares (DOLS) method, presented in Table 3 (Appendix Table 3), shows all the explanatory variables (crude oil price, gross fixed capital, inflation, financial development and electricity utilization) as strong predictors of economic growth. An impact assessment of individual variables on economic performance reveals that oil price retards economic activities. The negative result may be a clear demonstration of Dutch disease effect, which is an economic condition that describes the paradox abundant natural resource endowments exhibiting unexpected repercussions on the economy. This condition manifests in high import dependence, with massive exchange rate depreciation, job losses, and human and capital migration to other jurisdictions. The observed growth-retarding impact of oil price on real sector performance supports the finding of Jin (2008), Hamilton (1983), Dogah (2015), Qiangian (2011) but it is in conflict with the positive result observed in Omojolaibi (2014) and Jin (2008) Akinlo and Apanisile (2015), and the neutral result reported by Muritala et al. (2012), Akinlo and Apanisile (2015), Egbichi et al. (2018). The panel study of Akinlo and Apanisile (2015) indicates mixed results.

The result also shows strong negative impact of gross fixed capital on economic activities, which implies that investments in domestic infrastructure retard output growth. Though this is an unintended consequence, it suggests a misalignment in investment pattern. It indicates that the investments may not have addressed the critical needs of the real economy. The mismatch leads to closure of production facilities amid increase in infrastructural spending. Though it does appear that not many studies have analyzed this relationship, the finding of this research aligns with Isibor et al. (2016) but contradicts the outcome of Danmaraya and Hassan (2016), Shahbaz et al. (2013), Okoye et al. (2019), Egert et al. (2009), Palei (2015) which show dependence of growth on capital consumption.

Further evidence from the study is that inflation significantly supports economic growth. It shows an increase in output by about 0.07% if inflation rate rises by 1%, indicating that inflation spurs expansion of economic activities. For economies operating at less than full employment, though monetary growth may be inflationary, it also transmits spill-over effect to economic expansion thereby stimulating job creation and output growth. The observation that inflation supports economic expansion confirms the result of Enejo and Tsauni (2017), Umaru and Zubairu (2012). It however varies from Anidiobu et al. (2018), Abbas et al. (2014) which did not establish statistical significance in inflation-growth nexus.

Table 1: Unit root test result

Variables	PP@ 5% levels	PP@5% First Difference
GDPR	−3.85767 (−2.948404)***	-
LnOPR	−1.611287 (−2.943427)	−6.370950 (−2.945842)***
LnELCN	−0.305360 (−2.943427)	−8.697059 (−2.945842)***
FDPT	−1.585484(-2.943427)	-4.523929(-2.945842)***
GFCF	−4.136302(-2.943427) ***	-
INF	−2.998500 (−2.943427) **	-

*** and ** connotes stationarity at 1% and 5 % significance level; Critical values in parenthesis. Source: Authors Computation, 2019

Table 2: Wald F-Test

Test Statistic	Value	Degrees of Freedom (df)	P-value
F-statistic	52.10069	(5, 7)	0.0000
Chi-square	260.5035	5	0.0000

Source: Authors Computation, 2019

The study also provides strong support for finance-led hypothesis which argues that financial sector development offers the push action required for growth. Major advocates of the finance-led hypothesis include Bagehot (1873), Schumpeter (1912), McKinnon (1973) and Shaw (1973). The result indicates that the economy grows at a rate of about 0.43% following an increase of 1% in financial development (measured as ratio of private sector credit to total credit). The observed positive impact transmission from the financial to the real sector is documented in Hassan et al. (2011), Shahbaz et al. (2013), Jedidia et al. (2014), Puatwoe and Piabuo (2017), Bist (2018), Afonso and Arana (2018). On the other hand, it contradicts the finding of De Gregorio and Guidotti (1995) that the financial sector constitutes an impediment to growth in countries with weak regulatory system as well as result of Isibor et al. (2016), Kenza and Eddine (2016) which also identify the sector as growth inhibitor. In addition, our result did not support the finding of non-significant effect reported in Okwo et al. (2012), Ugwuanyi et al. (2015).

Finally, the study presents strong empirical support for growth-enhancing capacity of energy consumption. It shows that an increase of 1% in electricity utilization generates 1.21% increase in output growth. This implies a more than proportionate response of the real sector to energy use. This result validates the positive or growth-dependence on energy hypothesis and aligns with the reported findings in Shahbaz et al. (2013), Iyke (2015), Danmaraya and Hassan (2016), Khobai et al. (2017), Musa et al. (2019).

The estimated power of the model revealed that about 84.73% of the variations in economic growth process were explained by the model, indicating that the model is of good fit.

3.6. Diagnostic Tests
To enhance the robustness and validity of the outcome of this research, we further examine the series for multicollinearity and autocorrelation.

3.7. Variance Inflation Factors
With the coefficient variance of <1 for all the explanatory variables in the multivariate model, the variance inflation factor test, presented in Table 4 (Appendix Table 4), confirms absence of multicollinearity among the exogenous variables.

3.8. Correlogram
Table 5 presents the correlogram test which was executed to check for autocorrelation (Appendix Table 5). The presence of autocorrelation was not confirmed since the probability of the Q-statistics was found greater than 5 and 10% significance level. Thus the null hypothesis of no autocorrelation was therefore validated.

4. CONCLUSION AND RECOMMENDATIONS

The study investigated the extent to which Nigeria's GDP growth is predicted by crude oil price, electricity utilization, financial development, gross fixed capital, and inflation rate using a single equation model. Estimates obtained from the dynamic ordinary least squares (DOLS) regression shows that oil price dynamics and gross fixed capital retard growth while financial development

Table 3: Dynamic ordinary least squares result

Variable	Coefficient	Std. error	t-statistic	Prob.*
LnOPR	−5.295510	0.676106	−7.832370	0.0001
GFCF	−1.943020	0.297698	−6.526818	0.0003
INF	0.072498	0.022652	3.200521	0.0151
FDPT	0.429248	0.179103	2.396658	0.0477
LnELCN	1.210978	0.324136	3.736023	0.0073
C	44.21467	4.071218	10.86031	0.0000
R-squared		0.847253		

Source: Authors' computation (2020). *, **, *** 1%, 5%, 10% significance level

Table 4: Variance inflation factors

Variable	Coefficient variance	Uncentered VIF	Centered VIF
LnOPR	0.457119	725.3313	15.74210
GFCF	0.088624	393.4867	125.5510
INF	0.000513	8.719886	2.238810
FDPT	0.032078	204.0604	40.54498
LnELCN	0.105064	810.9101	44.19443

Table 5: Correlogram Test for Autocorrelation

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
. |**		. |**		1	0.219	0.219	1.7239	0.189
.*|.		.*|.		2	−0.138	−0.195	2.4303	0.297
. |.		. |.		3	−0.028	0.055	2.4611	0.482
.*|.		.**|.		4	−0.167	−0.219	3.5677	0.468
.*|.		. |.		5	−0.084	0.023	3.8570	0.570
. |.		.*|.		6	−0.016	−0.078	3.8684	0.694
. |.		. |.		7	−0.040	−0.023	3.9383	0.787
. |.		. |.		8	0.001	−0.029	3.9384	0.863
. |*.		. |*.		9	0.144	0.142	4.9305	0.840
. |.		.*|.		10	−0.045	−0.160	5.0329	0.889
. |.		. |.		11	−0.041	0.071	5.1209	0.925
.*|.		.*|.		12	−0.073	−0.174	5.4171	0.943
.*|.		.*|.		13	−0.201	−0.089	7.7470	0.860
. |.		. |.		14	−0.056	−0.064	7.9410	0.892
. |.		. |.		15	−0.009	−0.040	7.9465	0.926
. |**		. |**		16	0.254	0.286	12.344	0.720

*Probabilities may not be valid for this equation specification.

(measured as ratio of private sector credit to GDP) stimulate growth of economic activities. The observed influence of oil price on real growth demonstrates ample evidence of Dutch disease in Nigeria while the growth-stimulating effect of financial sector development provides affirmation for the hypothesis of dependence of the economy on the financial sector. The study further shows strong positive effect of inflation and electricity utilization on economic performance.

Against the back-drop of the above observations, this study sustains the argument that the energy and financial sectors are critical to the attainment and sustenance of economic growth in Nigeria. We therefore suggest that adequate attention be given to development of these sectors through formulation and implementation of supportive policies. A need assessment of the infrastructure needs of the real sector is advocated in order to ensure that infrastructure critical to real sector is identified and addressed through targeted investment.

5. ACKNOWLEDGEMENT

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APPENDIX

Appendix 1a: Null Hypothesis: GDPR has a unit root

Exogenous: Constant			
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel			
		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.385767	0.0184
Test critical values	1% level	-3.632900	
	5% level	-2.948404	
	10% level	-2.612874	

*MacKinnon (1996) one-sided p-values

Appendix 1b: Null Hypothesis: D(LOPR) has a unit root

Exogenous: Constant			
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel			
		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-6.370950	0.0000
Test critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

*MacKinnon (1996) one-sided p-values

Appendix 1c: Null Hypothesis: GFCF has a unit root

Exogenous: Constant			
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel			
		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.136302	0.0026
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

*MacKinnon (1996) one-sided p-values

Appendix 1d: Null Hypothesis: INF has a unit root

Exogenous: Constant			
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel			
		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.998500	0.0443
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

*MacKinnon (1996) one-sided p-value

Appendix 1e: Null Hypothesis: D(FDPT) has a unit root

Exogenous: Constant			
Bandwidth: 0 (Newey-West automatic) using Bartlett kernel			
		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.523929	0.0009
Test critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

*MacKinnon (1996) one-sided p-values

Appendix 1f: D(LELCN) has a unit root

Exogenous: Constant			
Bandwidth: 4 (Newey-West automatic) using Bartlett kernel			
		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-8.697059	0.0000
Test critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

*MacKinnon (1996) one-sided p-values

Appendix 2: Wald Test

Equation: EQ01			
Test Statistic	Value	Df	Probability
F-statistic	52.10069	(5, 7)	0.0000
Chi-square	260.5035	5	0.0000
Null Hypothesis: C(1)=C(2)=C(3)=C(4)=C(5)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(1)		-5.295510	0.676106
C(2)		-1.943020	0.297698
C(3)		0.072498	0.022652
C(4)		0.429248	0.179103
C(5)		1.210978	0.324136

Restrictions are linear in coefficients

Appendix 3: Dynamic OLS

Dependent Variable: GDPR				
Method: Dynamic Least Squares (DOLS)				
Date: 07/01/20 Time: 19:55				
Sample (adjusted): 1985 2017				
Included observations: 33 after adjustments				
Cointegrating equation deterministics: C				
Fixed leads and lags specification (lead=1, lag=2)				
HAC standard errors & covariance (Bartlett kernel, Newey-West automaticbandwidth = 68.7501, NW automatic lag length = 3)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOPR	-5.295510	0.676106	-7.832370	0.0001
GFCF	-1.943020	0.297698	-6.526818	0.0003
INF	0.072498	0.022652	3.200521	0.0151
FDPT	0.429248	0.179103	2.396658	0.0477
LELCN	1.210978	0.324136	3.736023	0.0073
C	44.21467	4.071218	10.86031	0.0000
R-squared	0.847253	Mean dependent var		5.330909
Adjusted R-squared	0.301730	S.D. dependent var		3.670939
S.E. of regression	3.067531	Sum squared resid		65.86823

Appendix 4: Variance Inflation Factors

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
Date: 07/01/20 Time: 19:53			
Sample: 1981 2018			
Included observations: 33			
LOPR	0.457119	725.3313	15.74210
GFCF	0.088624	393.4867	125.5510
INF	0.000513	8.719886	2.238810
FDPT	0.032078	204.0604	40.54498
LELCN	0.105064	810.9101	44.19443
C	16.57481	265.1485	NA

Appendix 5: Correlogram of Residual Squared

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
Date: 07/12/20 Time: 15:22						
Sample: 1981 2018						
Included observations: 33						
. |**		. |**		1	0.219	0.219	1.7239	0.189
. *| .		. *| .		2	-0.138	-0.195	2.4303	0.297
. | .		. | .		3	-0.028	0.055	2.4611	0.482
. *| .		.**| .		4	-0.167	-0.219	3.5677	0.468
. *| .		. | .		5	-0.084	0.023	3.8570	0.570
. | .		. *| .		6	-0.016	-0.078	3.8684	0.694
. | .		. | .		7	-0.040	-0.023	3.9383	0.787
. | .		. | .		8	0.001	-0.029	3.9384	0.863
. |*.		. |*.		9	0.144	0.142	4.9305	0.840
. | .		. *| .		10	-0.045	-0.160	5.0329	0.889
. | .		. | .		11	-0.041	0.071	5.1209	0.925
. *| .		. *| .		12	-0.073	-0.174	5.4171	0.943
. *| .		. *| .		13	-0.201	-0.089	7.7470	0.860
. | .		. | .		14	-0.056	-0.064	7.9410	0.892
. | .		. | .		15	-0.009	-0.040	7.9465	0.926
. |**		. |**		16	0.254	0.286	12.344	0.720

*Probabilities may not be valid for this equation specification