Impact Assessment of Electricity Consumption On Economic Growth in Nigeria: 1980-2016

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Abstract: *The study investigated the impact of electricity consumption on economic growth in Nigeria over the period 36 years from 1980-2016. Electricity demand was disaggregated into Residential, Commercial and Industrial Consumption to examine their individual impact and interrelationship on Gross Domestic Product (GDP). To achieve the objective of the study, the Auto-Regressive Distributed lag (ARDL) Bound testing alongside with Granger causality test were used to estimate the impact, long run relationship and causality between electricity consumption and economic growth. The result obtained revealed that Residential (0.107185), Industrial (0.228710) and Commercial (2.23930) consumption of electricity had positive impact on Gross Domestic product. Findings from the Bound test revealed a long run relationship between Residential, Commercial and Industrial consumption on the growth of the Nigerian economy. Furthermore, the Granger Causality revealed a unidirectional causality form Gross Domestic Product to Residential and Commercial Consumption while there was no causality between Industrial Consumption and Industrial Output. Based on the findings, the study therefore recommends that government should intensify efforts to formulate a sound and robust technological and implementable energy policy that will solve the challenges of the electricity subsector and emphasis should be placed on the reconstruction and building of additional power grids or capacity generation in the electricity subsector in addition, the moribund power sector should be rejuvenated in order to curb the outflow of resources from the economy. This will go a long way in reducing the rate of exit of the firms and multinationals and ensure a steady growth path of a developing economy of Nigeria into a more robust and vibrant one.*

Keywords: Auto-Regressive Distributed Lag, Electricity Consumption, Economic, Growth
JEL Codes: P18, O44, F43.

Introduction

Electricity consumption facilitates economic growth and development by increasing productivity in key sectors, wealth creation, as well as, creating employment. According to Salam (2006), electricity is the indispensable force driving all economic activities, that is, the aim of an efficient electricity sector is to ensure adequate consumption of electricity needed to ensure power to the industrial, transport, household and service sectors of the economy. Ekpo (2013) stressed that the positive multiplier effect of constant power supply cannot be overemphasized. Furthermore, the need to determine the relationship and the impact of electricity consumption on economic growth is derived from the increasing realization of the importance of electricity to the economic development of a nation. Consequently, efforts have been made to discover the exact relationship between electricity consumption and the other factors of production as to whether electricity complements or substitutes other factors of production. It is important to note that electricity is vital for economic growth and quality of life not only because it enhances productivity of labour, capital and other factors of production, but the fact that increased in electricity consumption indicates high social - economic status of the nation's concern (Adebola, 2011). However, despite the efforts of the

Federal Government of Nigeria to ensure adequate power availability that will facilitate and enhance, and drive the economy to acme level, it supply has remained inadequate and this has affected the consumption pattern of the end users (residential, industrial and commercial). As a result of this, Ekpo (2013) emphasized that government should redouble its efforts in ensuring that power failure become history; no economy develops with generating sets.

Evidently, previous studies show that increase in electricity consumption leads to the economic growth of any nation through the utilization of high grade energy resources (electricity) that will amplify the technological progress which leads to economic growth through the increase in output level. Today, Nigeria is seen as one of the greatest developing nations in Africa with highly endowed natural resources including potential energy resources. However, increasing access to electricity in Nigeria has proved to be not only a continuous challenge but also a pressing issue with the international community.

Research Problem

The importance of electricity consumption on economic growth has been a centre of scholastic debate and the electricity - economic growth nexus has been analyzed extensively by energy economists. However, empirical evidences from different scholars and researchers offer conflicting explanations for the relationship between the two variables. There are majorly four competing hypotheses on the energy (electricity) economic growth nexus namely: the growth, conservative, feedback and neutrality hypotheses. Furthermore, on policy aspect, government effort in trying to ensure adequate consumption of electricity to power and lubricate key sectors of the economy, the situation has not improved. Despite the abundant availability of energy resources convertible to electricity (wind. Water, hydro, themo, solar) yet electricity supply has remained inadequate to meet the increasing demand. The distribution of electricity also shows a great disparity between rural and urban also the industrial and residential (Ali & Pyke 2003). The poor quality of electricity consumption in recent years in terms of usage in the various subsectors especially in the industrial and manufacturing sector dues to lack or absence of high energy intensive industries, has been a major constraint on the performance of the economy. Inadequacy in electricity consumption required to power the industrial, commercial and residential sector has been traced to the inability of this industries or sectors to get the required consumption capacity resulting from frequent outage or unavailability, this has impaired economic growth and development in these sectors have resulted in a serious decline in electricity consumed this sector for the past decades. Nigeria as a nation has all it takes to produce electricity from various energy resources abundant in the country in terms of solar, thermal, wind, water etc. this underlying factors are working-gap against the upward leap of Nigerian's economy. The erratic nature has given pressure to high demand for petroleum fuel substitute (Akpan, 2013). Despite the heavy investment by the federal government to boost production of electricity, supply still falls short of projected consumption thus affecting the economy adversely. The shortage is traced to lack of maintenance of existing power stations, government failure to increase generating capacity to meet increasing demand and has led to industrial and commercial establishment to operate below production capacity. Firms has resorted to the use of diesel generators as alternative sources of power, thus translating into high cost of production and high prices of goods and services leading to inflation and price instability.

Adenikinja (2003), reported that some firms and industries have relocated to neighboring countries due to erratic supply of electricity, (Michllin's relocation to Ghana). This has reduced the foreign direct investment flow into the country and necessitated increased importation of finished goods thus affecting the foreign reserve level of the country. Furthermore, this inadequacy has reduced the standard of living of the citizens, and has also led to the scarcity

of kerosene due to high demand resulting in the use of fuel-wood as alternative source of energy for domestic cooking thus leading to deforestation and degradation of the environment and desertification. This inadequacy has made it imperative for industries and commercial establishment or even individual consumers to acquire generating plant at exorbitant cost. Also policies to correct this inadequacy in this sector remains ineffective.

Reviewed Literature

Electricity has become the dominant form of modern energy and it has been a major factor in the improvement of the standard of living and has made a significant contribution in Technological and scientific progress (Gurgul et al. 2011). Thus, electricity consumption is considered to be especially important for economic growth and as such many researchers have used electricity consumption as an indicator of access to modern energy sources (IIASA 2012, UNIDO 2007 and Ouedraogo 2012).

Industrial Utilization or Consumption of Electricity

Industrial utilization of electricity refers to the consumption of electricity by the industrial sector of the economy. It shows that electricity consumed by all industrial sub-sectors, like mining and quarrying, iron and steel, construction, etc the industrial base of an economy puts significant pressure on the demand for electricity.

Commercial Consumption of Electricity.

Commercial utility such as the services of hotels and restaurants, post and telecommunications, financial intermediation, computer are all classified under the commercial class of energy utilization. Petroleum constitutes over 80 percent of the energy consumed by commercial users in Nigeria (Sambo, 2009). The service sector is also one of the key areas that contribute heavily to GPD in Nigeria. Consequently, electricity consumption or demand in this sector is a key variable in determination of the growth of the Nigerian economy.

Residential Utilization of Electricity

Residential utilization or consumption is the use of power supply by households. In Nigeria, Primarily, residential demand or consumption for electricity is influenced by two basic variables, namely, income and electricity prices (Sa'ad, 2009).

Theoretical Literature Review

The different theoretical explanations for the efficient method available to countries of the world in their bid to grow in terms of the exploration of their natural resources and also in the export of these resources differ in what they see as the major driving force, for achieving the macroeconomic objective of positive economic performance.

Mainstream Growth Theory

Ecological economists derive their view of the role of energy economic growth from the biophysical foundations of the economy discussed (e.g. Georgescu Roegen, 1971; Costanza, 1980; Cleveland et., 1984; Hall et al., 1986, 2001, 2003; Ayres & Warr, 2005, 2009; Murphy &Hall, 2010). Some geographers (e.g. Smil, 1994) and economic historians (e.g. Wrigley, 1988; Allen, 2009) also believe that energy plays a crucial role in economic growth, as well as being an important factor in explaining the industrial revolution. Ecological economists also argue that substitution between capital and resources and technological progress can only play a limited role in mitigating the scarcity of resources (Stern, 1997) Some authors such as Cleveland et al(1984), Hall et al. (1986), Hall et al 2003) also downplay the role of technological change, arguing either increased energy use accounts for most apparent productivity growth,

or that technological change is real but innovations mainly increase productivity by allowing the use of more energy. Therefore, increased energy use is the main or only cause of economic growth. A prominent tradition in ecological economics is represented by biophysical models that consider energy to be a primary factor of production and the only such primary factor.

The Neoclassical Theory

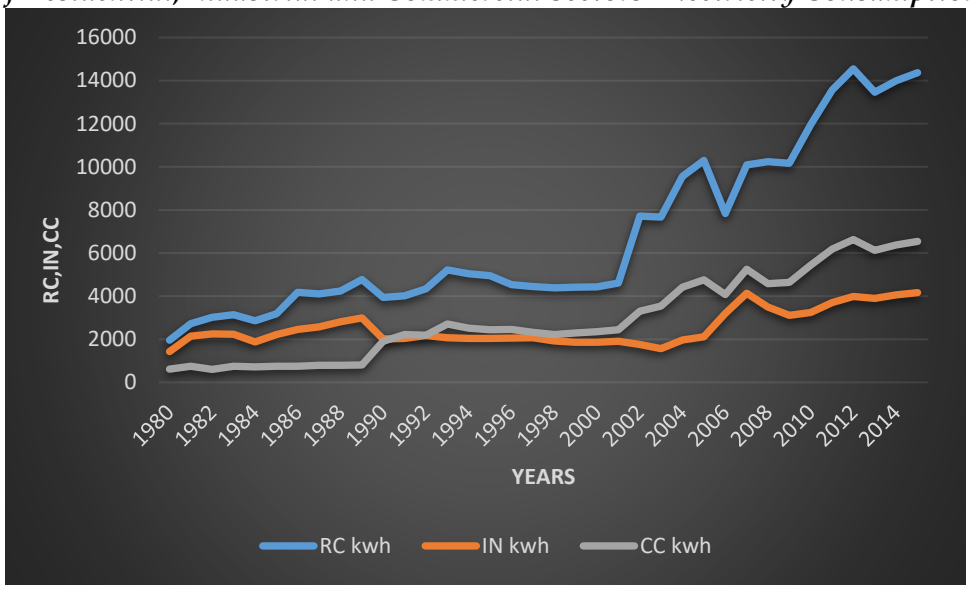
This theory was developed by Robert Solow (1960) the neoclassical construct of the economy is built on three factors of production: capital, labor and technology. Here, Production in each period begins with given amounts of capital, labor and technology, and terminates in the production of goods. Capital has its origins in prior periods.it is simply a portion of the economy's output carried forward from previous periods. The neoclassical economists are generally reticent about how labor is produced or reproduced; they assume that it grows exogenously. Technology is described as the stock of knowledge available to an economy. Knowledge may be embodied in machines, human skills, or it may take the form of social codes and arrangements. Missing from this account of the economy is the primary force that drives all economic activities: energy (which in this case is electricity). Sure enough, energy enters the neoclassical economy as the effort of labor, but this source of energy has been declining progressively over the past two centuries. Energy from non-human sources – coal, oil, electricity, food or fertilizer – enters the economy only as an intermediate input; it is incorporated into a country's national income accounts as value-added in the energy sector. Quite simply, energy is not a factor of production. In other words, neoclassical economics is built upon a disjunction between the economy and ecology. The neoclassical economy exists in splendid isolation from nature and its well-springs of energy. Among economists, Nicholas Georgescu-Roegen (1972, 1976) was one of the first to comment on the absence of energy in economic theory.

Electricity Consumption Patterns in Nigeria:

Electricity consumers in Nigeria are classified into three major groups namely: residential sector, commercial sector, street lighting, and industrial sector. In most countries, industrial sector constitutes the largest consumer of electricity followed by residential sector and then commercial sector and street lighting. Electricity consumption by industrial sector continues to fall while the residential sector's consumption keeps on rising. It is also observed that the commercial sector and street lighting consumption of electricity had been growing evidence, though not as rapid as residential sector's consumption of electricity. By all indications, residential sector is the largest electricity consumer in Nigeria. It is followed by the commercial sector and street lighting and then, the industrial sector (Ekpo, 2010).

Figure 1:

Trend of Residential, Industrial and Commercial Sectors 'Electricity Consumption. 1980-2016.



Source: Central Bank of Nigeria Statistical Bulletin and International Energy Agency

Empirical Literature on Electricity Consumption and Economic Growth

Bayer (2014) examines the relationship between economic growth and electricity power consumption in emerging countries during the period 1970 to 2011. The study made use of Pedroni, Kao and Johansen co-integration tests and Granger causality tests. The findings demonstrated that electricity consumption has a positive impact on the economic growth in the whole panel and electricity has the largest impact on economic growth in Hungary, Pathan et al. (2014) examine the causality between electricity consumption and economic growth in Pakistan over the period of 1991 to 2006. The study employed Granger causality and unit root test. The study found that electric power consumption Granger-causes GDP growth.

Shaari et al. (2013) investigate the relationship among population, energy consumption and economic growth in Malaysia for the period 1991 to 2011 using, cointegration test and Granger causality test. The results showed that population has an effect on energy consumption and energy consumption contributes to economic growth in Malaysia.

Mehrara et al. (2012) examine the causal relationship between electricity consumption and GDP in a panel of 11 selected oil exporting countries by using panel unit root tests and panel cointegration analysis. The results showed a strong unidirectional causality from economic growth to electricity consumption in the oil exporting countries with no feedback effect from electricity to GDP for oil dependent countries.

Aloa (2016) examined electricity consumption and economic growth in Nigeria for the period of 1980-2010. He applied the growth accounting framework of Cobb-Douglass production function, the Johansen cointergration test, granger causality test and OLS regression techniques to explain the dynamic interaction between residential and industrial electricity consumption and economic growth. The study revealed a unidirectional causality ranging from industrial electricity consumption to residential electricity and also a bi-directional causality between residential electricity consumption and per capital income growth in Nigeria.

Osundina et al (2014) investigated the causality effect of electricity consumption and economic growth in Nigeria using annual data from1980 to 2012.They adopted the Vector Auto Regressive (VAR) and Error Correction Model (ECM) to test the causality between energy consumption and economic growth in Nigeria. The order of integration of the variables was determined using and the DF-GLS test which was followed by co-integration and causality test. Our findings suggest a positive relationship between electricity consumption and economic growth.

Kehinde and Jonathan (2014) investigates whether electricity consumption has positive, negative or neutral impact on economic growth in Nigeria between 1990–2011 as well as the direction of causation in Nigeria. The study introduced capital formation and labour stock in multivariate system for the period covered. Augmented Dickey Fuller\ (ADF) test for unit roots test, Johansen test for co-integration, vector error correction model (VECM) and Granger causality were employed. The result of the findings shows unidirectional causality from electricity consumption to real gross domestic product (RGDP). The long run estimate supports the Granger causality test by revealing that electricity consumption is positively related with RGDP in the long-run. The result shows that there is unidirectional causality from capital formation to RGDP

Similar works by Akinwale et al (2013) showed the relationship between electricity consumption and real GDP growth in Nigeria during a period of thirty six years (1970-2005). They adopted the Vector Auto Regressive (VAR) and Error Correction Model (ECM) to test the causality between real GDP and electricity consumption. The order of integration of the two variables was determined using co-integration and causality test. The result shows that there is unidirectional causality from real GDP to electricity consumption without a feedback effect. Generation, which could then cause electricity consumption to have a significant impact on economic growth in Nigeria. Although many works have been carried out relating to electricity consumption and economic growth in Nigeria, just very few such as Maxwell and Nnena (2014), Ezedinma (2014), Akenikinja (2003), Ubani (2009) and Arimah (1993), have concentrated on the disaggregation of industrial, residential and commercial consumption.

Methodology

This section discussed the techniques used in undertaking this research work. Specifically, ARDL Bound testing approach was employed to analyse the relationship between the dependant and independent variable and most especially, for variables that are stationary at different levels.

Model specification

Thus, the model is represented in functional form shown below

RGDP= f (EC) ……..(1)

EC = f (RC, IC, CC) ……..……....(2)

Substitute for EC in equation 1

RGDP = RC, IC, CC ----------(3)

Equation 3 is modified in stochastic form thus;

$$\mathbf{GDP_t = \alpha + \beta_1 GDP_{t-i} + \beta_2 RC_{t-i} + \beta_3 IC_{t-i} + \beta_4 CC_{t-i} + \mu \ldots\ldots\ldots\ldots (4)}$$

Where;

α = vector of the intercepts

i = 1,2 …N = maximum lag lengths

GDP = Gross Domestic Product

RC= Residential Consumption of Electricity

IC= Industrial consumption

CC= Commercial Consumption

The use of logarithms in this model rather than the raw data in the levels can be justified on the ground of both statistical and economic theories

$GDP_t = \alpha + \beta_1 \ln RC_t + \beta_2 \ln 1N_t + \beta_3 \ln CC_t + U_t$----------(5)

Diagnostic Tests and Methods of Data Analysis

Trend Analysis and Economic implication

In order to test the hypothesis, set for the study, a trend analysis for each of the variables of the study was conducted. This involves plotting of graphs or scattered diagrams using e-views 9.0 to observe the pattern of movements in the variables used as proxies for electricity demand or consumption and GDP movements in Nigeria over the period of study.

Unit Root Test

To avoid estimation of spurious regression and ensures efficacy of the results, time series properties of the data was investigated. Although there are a number of methods used to test for stationarity and the presence of unit roots, the method that will be used in this research is the Augmented Dickey-Fuller (ADF) and Phillips-Peron (PP) tests.

Δyt ao +ryt-1 $\sum_{i=2}^{p} \beta i \Delta yt - i + \Theta t$----------(6)

Δyt= ao +ryt-1 +a2t + $\sum_{i=2}^{p} \beta i \Delta yt - i + \Theta t$----------(7)

Where;

e_t = (RC, IC, CC and GDP) representing the variables used for the unit root test.

Auto Regressive Distributed Lag Bound Testing Approach

The Auto Regressive Distributed lag would be employed to estimate our equation. ARDL is suitable for estimating equations whose variables are stationary at different levels i.e. some stationary at level and some stationary at first difference (Pesaran and Shin, 1999).

$\Delta LOG(RGDP)t = a0 + \beta 0 \Delta LOG(GDP)t\text{-}1 + b1 \Delta LOG(RC)t\text{-}1 + b2 \Delta LOG(IO)t\text{-}1 + \lambda 1 LOG(CC)t\text{-}1 + Ut$ ……..(8)

After estimating the equation using ARDL we then test for the presence of cointegration using Bounds test approach popularised by Pesaran and Shin (1999) alongside granger causality test. The data that was employed are of a secondary source and gotten from the CBN data bank and the international Energy Agency (IEA).

PRESENTATION, ANALYSIS AND INTERPRETATION OF RESULTS

Table 1: Unit Root Test.

S/N	Variable	ADF Statistic	Critical value (5%)	Order of Integration	Remarks
1	RGDP	-4.212590	-2.951125	1(1)	Stationary at first difference
2	RC	-6.763650	-2.951125	1(1)	Stationary at first difference
3	IC	-5.629980	-2.951125	1(0)	Stationary at first difference
4	CC	-6.255794	-2.951125	1(1)	Stationary at first difference

Source: Residual Computation using Eviews 9.0

Decision rule:

If t* > ADF critical value, ==> do not reject null hypothesis, i.e., unit root exists.

If t* < ADF critical value, ==> reject null hypothesis, i.e., unit root does not exist.

The result in Table 1 reveals that IC is stationary at I(0) while the other variables (i.e RGDP, RC and CC) became stationary at the first difference

Table 2: Summary of ARDL Regression Result

Variable	Coefficient	Std Error	t-Stat	Prob*
LRGDP(-1)	0.846860	0.075577	11.20533	0.0000
RC	0.107185	0.061569	1.740888	0.0920
IC	0.228710	0.005077	1.715542	0.0966
CC	2.239030	0.029059	2.343160	0.03422
C	1.360213	0.750047	1.813504	0.0798
R-squared=0.892418 Adjusted=R-squared=0.871407, F-statistic=981.694				
Prob(F-statistic)=0.00000, Durbin-Watson-stat=1.579227				

Source: Researcher's computation using Eviews 9

The model of this research work as stated in the previous section is given as:

$$\textbf{Log GDP}_t = \alpha + \beta_1 \textbf{logRC}t + \beta_2 \textbf{logIC}_t + \beta_3 \textbf{logCC}_t + \beta_4 \textbf{logGDP}_{t-i} + \mu$$

Thus, substituting the regression result

$$RGDP = 1.360213 + 0.10718I5RC + 0.228710IC + 2.23930CC + 0.846860GDP_{t-1} + U$$

S.E = (0.7501) (0.06157) (0.0051) (0.0291) (0.0756)

The figures in the model indicate the various coefficients of the variables.

Interpretation of Result

The result in Table 2 presented the ARDL regression between the dependent variable (RGDP)and the independent variables (RC, IC, CC) and the lag value of the dependent variable i.e $RGDP_{t-1)}$. In Examining the influence of Residential consumption of electricity (RC) on Gross Domestic Product, it was revealed that the coefficient RC is positive (0.107185). This is in agreement with a priori expectation. This implies that, as Residential consumption of electricity increase, the Gross domestic product increases. Thus, a 1% increase in RC will lead to about approximately 0.12% increase in GDP. This result is statistically insignificant at 5%, because the probability of obtaining the t-value (1.74088) is greater than 5% (0.0920>0.005).

Industrial output has a positive coefficient of 0.228710 however it is not statistically significant at 5%. This implies that an increase in industrial output will lead to an increase in Gross Domestic Product. Precisely, when industrial output increases by 1%, the Gross Domestic product will increase by approximately 0.2287%. Moreover, commercial consumption has a positive effect on gross domestic product. This implies that a percentage increase in commercial consumption will lead to approximately 2.23% increase in gross domestic product. This result is statistically significant at 5% because the probability of obtaining the t-statistic (2.343160) is less than 5% (i.e 0.03422<0.005). This means that commercial consumption of electricity is an important determinant of Gross Domestic product in Nigeria. The constant term is 1.360213. This shows the amount of the Gross Domestic Product when other factors i.e (RC, IC, CC) are held constant or not taken into consideration, in other words, it is the autonomous value of Gross Domestic Product. The lag value of Real Gross Domestic Product (RGDP) is positive (0.846860) and this is in conformity with the a priori expectation. This means that the value of Gross Domestic Product is an increasing function of its past value. Precisely, a 1% increase in past value of RGDP will lead to a about 0.846860 increase in the present value of GDP. The statistical test of hypothesis reveals that the result is statistically significant at 5%. This also means that the past value of GDP is an important determinant of the current gross domestic product.

The R^2 which is the coefficient of determination, also known as the measure of goodness of fit stands at 0.892418, this means that 89% variation in the Gross Domestic Product can is explained by RC, IC, CC and the lag value of GDP. Therefore, given the value of Adjusted R^2

of 87%, it can concluded that the difference of about 13% is attributable to other external factors that cause variations in the RGDP not captured in the model. The Durbin Watson of 1.57 which is approximately 2, therefore we can conclude that there is no autocorrelation. . The absence of auto correlation shows that the independent variables are truly independent and therefore reliable in making forecasting, policy recommendations in the growth of Nigerian economy. The F – statistics is a measure of the overall significance of the independent variables in explaining the variation in RGDP, i by how much the independent variables jointly or simultaneously influence the dependent variable. However, the lower the probability value of obtaining the f-statistic, the better the overall significance of the regression. The result obtained from the regression result reveals that the Prob (F-statistic) =00000 at 5% level of significance. The null hypothesis can therefore be rejected and accept the alternative hypothesis. This implies that electricity consumption in Nigeria significantly impact the Gross Domestic Product. Thus, the explanatory variables are simultaneously significant in explaining the variation in RGDP.

Table 3: Bounds Test for Cointegration

TEST STATICTIC	**VALUE**	**K**
F Statistic	4.791076	3
Critical value Bond Significance	**I0 Bound**	**I1 Bound**
10%	2.72	3.77
5%	3.23	4.35
1%	4.29	5.61

Source: *Output from ARDL Bounds test for cointegration using E-views 9*

Table 3 shows that the calculated value of the F-statistic (i.e. 4.791076) for the bounds test for cointegration exceeds the upper bound critical value of 3.23 at 5% level. Hence, the null hypothesis was rejected, as there is no cointegration relationship. Based on the result in table 3 it was concluded that there is strong support for a long-run relationship between electricity consumption and economic growth in the model for Nigeria.

Table 4: Heteroscedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.270112	Prob. F(4,30)	0.3035
Obs*R-squared	5.068797	Prob. Chi-Square(4)	0.2803
Scaled explained SS	13.54595	Prob. Chi-Square(4)	0.0089

Source: *Author's computation using E-views 9*

The decision rule is if the p value is less than 0.05(5% level of significance), H_0 is rejected; otherwise, accept H_0 and reject H1. From the heteroscedasticity test result, the p values was 0.2802 this is greater than 0.05(5% level of significance) and is significant, therefore accepting H0 and rejecting H_1, i.e., there is no heteroscedasticity in the model, thus indicating that the residual are normally distributed.

Table 5: Granger Causality Test
Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
RC does not Granger Cause GDP	34	1.64498	0.2105
GDP does not Granger Cause RC		5.21996	0.0116

Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
INO does not Granger Cause IO	34	0.15419	0.8578
IO does not Granger Cause INO		0.22485	0.8000

Pairwise Granger Causality Tests

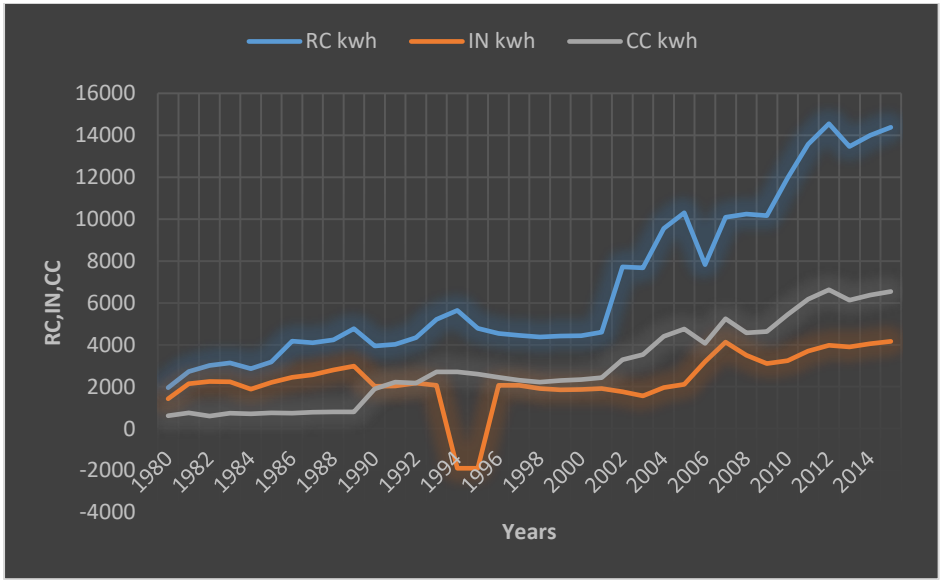
Null Hypothesis:	Obs	F-Statistic	Prob.
GDP does not Granger Cause CC	34	0.65158	0.5287
CC does not Granger Cause GDP		0.58606	0.0363

Source: *Author's computation using E-views 9*

The causality test using the pairwise approach shows the causal relationship between Residential consumption and GDP with f-stat of 1.64498 and probability of 0.2105, due to the insignificance of the probability; it was concluded that Residential consumption does granger cause GDP for the observed period. Also, the result indicates that GDP with 0.0116 which is less than 5% indicates that GDP does granger cause residential consumption. In this case, the null hypothesis is rejected which says GDP does not granger Residential Consumption. This signifies a unidirectional causality running from GDP to residential consumption. This implies that as the economy drives its growth path and residential consumption becomes enhanced. Therefore, we can say that Granger causality runs one-way from GDP to RC and not the other way. Also in respect to the causality between industrial output and industrial consumption, the result shows that the null hypothesis cannot be rejected in both cases, this is because the p-value of 0.8578 and 0.8000 at 5% level of significance does not provide a strong evidence against the null hypothesis. Thus we fail to reject the null hypothesis which says INC (industrial consumption) does not granger cause IO (industrial output) and IO does not granger cause INC. this means that neither The causality test between GDP and commercial consumption reveals that GDP does granger cause CC, rather CC granger cause GDP. This implies that there only exists a one-way relationship or a unidirectional relationship between GDP and commercial consumption.

Trend Analysis and Policy Implication

Figure 2:
Trend of Residential, Industrial and Commercial Sectors 'Electricity Consumption. 1980-2016.



Source: *Output of data from Central Bank of Nigeria Statistical Bulletin and International Energy Agency Trend of Residential, Industrial and Commercial Sectors 'Electricity Consumption. 1980-2016.*

The graphs show the trend in residential, industrial and commercial consumption in Nigeria over the period of analysis. It is very clear that electricity consumption in the residential sector is far greater than that of the industrial sector and the commercial sector. This reveals the fact that electricity supply in the industrial sector has been very low and epileptic in nature. This could be traced to ageing infrastructure, vandalization low water level as a result of climate change. The economic implications are it somehow account for the high rate of unemployment and the dwindling GDP (in terms of output per unit) growth in the nation due to downsizing of most organizations capacity as a result of high cost of production which emanated from low and epileptic electricity supply to the sector.

Summary, Conclusion and Recommendations

The study investigated the relationship between electricity consumption and economic growth in Nigeria using the Auto Regressive Distributed Lag alongside with bound testing and co-integration test. Though just very few existing literatures have empirically examined the impact of sectorial electricity consumption and their various interactions or influences on economic growth in Nigeria. To achieve the stated objective, three hypotheses were formulated to assess the impact of electricity consumption in Nigeria, the relationship between electricity consumption on economic growth in Nigeria and the direction of causality of the variables and the policy implication to the Nigerian economy.The positive relationship between electricity consumption and economic growth was obtained from the analysis and this strengthens the justification as to what other past authors have also obtained in their findings. The findings of this research work revealed the peculiar nature of the Nigerian economy where it is an energy store house and energy resources are poorly utilised or harnessed. Consequently, the government should set out policy of diversification of energy resources that will enhance and ensure adequate supply of electricity rather than from a single source and encourage investment in infrastructure in the electricity sector. This will ensure adequate supply of electricity in the various subsectors that will ensure

economic growth and development in the Nigerian economy, and re-strategize investment in the power sector by strengthening agencies saddled with the responsibility of production and distribution.

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