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PRIVATIZATION OF THE POWER SECTOR AND ECONOMIC WELL-BEING IN NIGERIA

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Abstract

This paper examined how Nigeria's post-privatization experience in the power sector in terms of rural and urban access to electricity affects economic well-being in the country between 2005Q1 and 2020Q4. Gross national income (GNI) per capita was used as a proxy for economic well-being. Data on GNI per capita was obtained from the World Development Indicators (WDI) while data on rural and urban access to electricity was obtained from World Bank Global Electrification Database International Energy Agency (IEA) and United Nations Statistics Division (UNSD). Descriptive statistics, unit root and bounds cointegration tests, and non-linear autoregressive distributed lag (NARDL) model form the basis for data analysis. The unit root test results reveal that the variables are fractionally integrated. In addition, the bounds cointegration test result showed that GNI per capita has a long-run relationship with rural and urban access to electricity. The findings highlight that rural and urban access to electricity impacted negatively on GNI per capita during the study period. These findings imply that the expected post-privatization benefits in the power sector in terms of improved economic well-being through optimal, affordable and reliable access to electricity amongst others are yet to be achieved. Given the findings, this paper recommended for the government should build synergy with the private sector through long term funding, capital investment and adequate regulation to address the post-privatization challenges in Nigeria's power sector.

Keywords: Privatization, power sector, electricity access and economic well-being

1. Introduction

Privatization has been advocated as a process of reducing the role of the public sector in owning and managing economic assets. Many proponents of privatization, including economists and non-economists alike argue that market forces tend to promote efficient allocation of resources. In addition, it is believed that the privatization of state-owned enterprises would expand the private sector participation in the economy, boost infrastructure development, mobilize investment and engender efficient capacity utilization. In Nigeria, the Privatization and Commercialization Act of 1988 and subsequent enactment of the Privatization and Commercialization Act of 1999, which allows for the establishment of the National Council of Privatization and the Bureau for Public Enterprises, provided a roadmap for the privatization of government assets. According to Omoleke (2011), inadequate power generation, transmission and distribution, inefficient capacity utilization and infrastructure deficit triggered the structural transformation of the National Electricity Power Authority (NEPA) into the Power Holding Company of Nigeria (PHCN) for privatization.

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As noted by Idowu, Ibietan and Olukotun (2020), the abysmal performance of NEPA and the associated adverse implications of epileptic and insufficient electricity supply on economic well-being necessitated the call by key stakeholders and international organizations including the World Bank and International Monetary Fund (IMF) for its privatization. In addition to ensuring that citizens and industries have access to reliable power supply, the privatization of the power sector was targeted at creating a value chain in the energy industry through employment generation, competitiveness and partnership initiatives. Again, a privatized energy sector is considered helpful in providing an opportunity for achieving the Sustainable Development Goal seven (SDG7) of ensuring access to affordable, reliable, sustainable and modern energy. Emoron and Nwaoha (2018) equally underscore the imperativeness of a sustainable power supply system for rapid industrial and economic growth.

The post-privatization experience of Nigerians raised concern about the efficiency of the private sector in generating, transmitting and distributing electricity. With an installed capacity of 12, 000 MW (Federal Government of Nigeria, 2017) and the unbundling of PHCN into six (6) power generating companies (GenCOS), eleven (11) power distribution companies (DisCOS) and the Transmission Company of Nigeria (TCN), available statistics reveal Nigeria is only able to generate between 4000MW and 5000MW. This is a pointer to inefficient capacity utilization in the post-privatization era. Again, other challenges include inadequate metering, estimated billing, and epileptic power supply due to decayed infrastructure and transmission bottlenecks. Consequently, some Nigerians have advocated for the government to take back the power firms and harness them, while others advocate for its re-privatization by withdrawing the licenses of current operators and starting a privatization process. Given the current challenges surrounding Nigeria's power sector reform, the paper provides some insights on how the post-privatization experience in terms of rural and urban access to electricity affects economic well-being in the country between 2005 and 2020.

2. Review of Related Literature

2.1 Overview of the Privatization of the Power Sector in Nigeria

The signing of the Electric Power Sector Reform Act (EPSRA) into law in 2005 set the stage for dismantling the monopoly enjoyed by the vertically integrated state-owned NEPA to allow private sector participation in power generation, transmission and distribution. The act provided for the establishment of PHCN to take over the assets and liabilities of NEPA. As noted by Saturday (2021), the reform further provided for the unbundling of PHCN into eighteen (18) companies comprising six (6) GenCOS, eleven (11) DisCOS and a power transmission company- The Transmission Company of Nigeria (TCN). The DisCOS and their areas of coverage are provided in Table 1.

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Table 1: DisCOS and area(s) covered

Company Name	Area(s)/State(s) Covered
Abuja Electricity Distribution Company Plc	Federal Capital Territory (FCT), Niger, Kogi, and Nassarawa
Benin Electricity Distribution Company Plc	Edo, Delta, Ondo, and parts of Ekiti,
Eko Electricity Distribution Company Plc	Lagos State (Apapa, Lekki and Lagos Island) and part of Ogun State
Enugu Electricity Distribution Company Plc	Enugu, Abia, Imo, Anambra and Ebonyi
Ibadan Electricity Distribution Company Plc	Oyo, Ogun, Osun, Kwara and part of Ekiti
Ikeja Electricity Distribution Company Plc	Lagos (Abule Egba, Akowonjo, Ikeja, Ikorodu, Oshodi, Shomolu)
Jos Electricity Distribution Company Plc	Plateau, Bauchi, Benue and Gombe
Kano Electricity Distribution Company Plc	Kano, Jigawa and Katsina
Kaduna Electricity Distribution Company	Kaduna,Sokoto, Kebbi and Zamfara
Port Harcourt Electricity Distribution Company Plc	Rivers, Cross River, Bayelsa and Akwa Ibom
Yola Electricity Distribution Company Plc	Adamawa, Borno, Taraba and Yobe

Source: Researcher's compilation based on data from Nigeria Power Sector Recovery Program Document (2018)

Eze (2018) observes that the privatization of the power sector saw the federal government selling 80 per cent of equity shares in DisCOS while retaining only 20 per cent. He further explained that 60 per cent of equity shares in DisCOS were sold to the private sector while the government retained 40 per cent, but 100 per cent equity shares in TCN was retained by the federal government for effective regulation of the power sector. The power sector reform also birthed the National Electricity Regulatory Commission (NERC) to regulate the activities of operators and other key players in the industry. Additionally, the reform created the opportunity for the establishment of the Rural Electrification Agency (REA) and Rural Electrification Fund (REF) with the latter placed under the control of the former. The rationale for REA was to facilitate the electrification of areas far from the national grid through mini-grids in accordance with the policy goal of improved energy access.

2.2 Stylized Facts on Access to Electricity and Economic Well-being in Nigeria

Starting from 2005, the percentage of rural and urban populations with access to electricity has continued to vary following the gradual implementation of the power sector privatization initiative. The trajectory of rural and urban access to electricity in Nigeria is reported in Figure 2.

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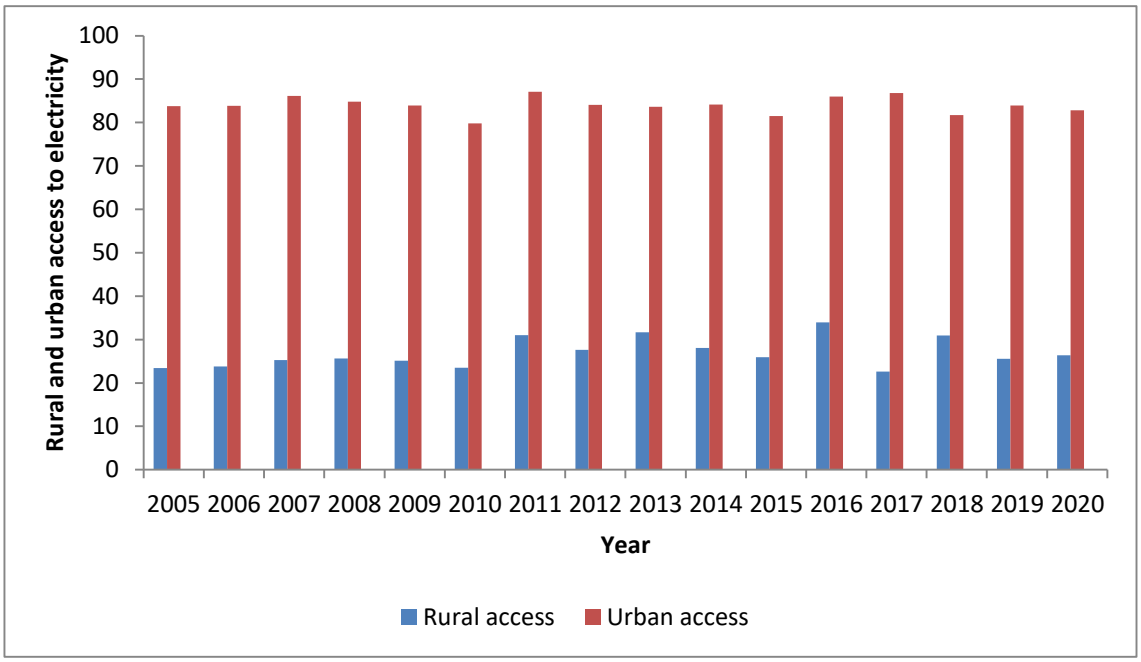
Figure 2: Trajectory of rural access to electricity (% of rural population) and urban access to electricity (% of urban population) in Nigeria (2005-2020)



Source: World Bank Global Electrification Database, International Energy Agency (IEA) and United Nations Statistics Division (UNSD)

As a percentage of the urban population, urban access to electricity increased from 83.81 per cent in 2005 to 86.16 per cent in 2007. It declined to an all-time low level of 79.8 per cent in 2010 before rising to a maximum level of 87.1 per cent in 2011. Between 2012 and 2020, urban access to electricity varied from 81.7 per cent to 86.8 per cent. This indicates that more than half of the urban population has access to electricity. As shown in Figure 2, rural access to electricity increased from 23.4 per cent in 2005 to 25.62 per cent in 2008. It fluctuated before reaching a maximum level of 33.97 per cent in 2016. It trended downward to 22.62 per cent in 2017 and varied during 2018-2020. The rural access to electricity during the study period is below 50 per cent, which indicates that less than half of the rural population does not have access to electricity. It is a clear and un-distorted indication of Nigeria's energy poverty status and poor performance of the privatization of the power sector. This further explains the sub-optimal performance of the Rural Electrification Agency and Rural Electrification Fund established by the power sector in facilitating the electrification of areas far from the national grid through mini-grids. This could be partly attributed to poor inclusiveness of the power sector reform, systemic corruption that characterized the management of the Rural Electrification Fund in addition to decayed infrastructure, bottlenecks in transmission and vandalism of energy infrastructure in rural areas. In comparison, urban access to electricity more than doubled rural access, which explains that the national electrification programme in Nigeria has been tailored towards urban development.

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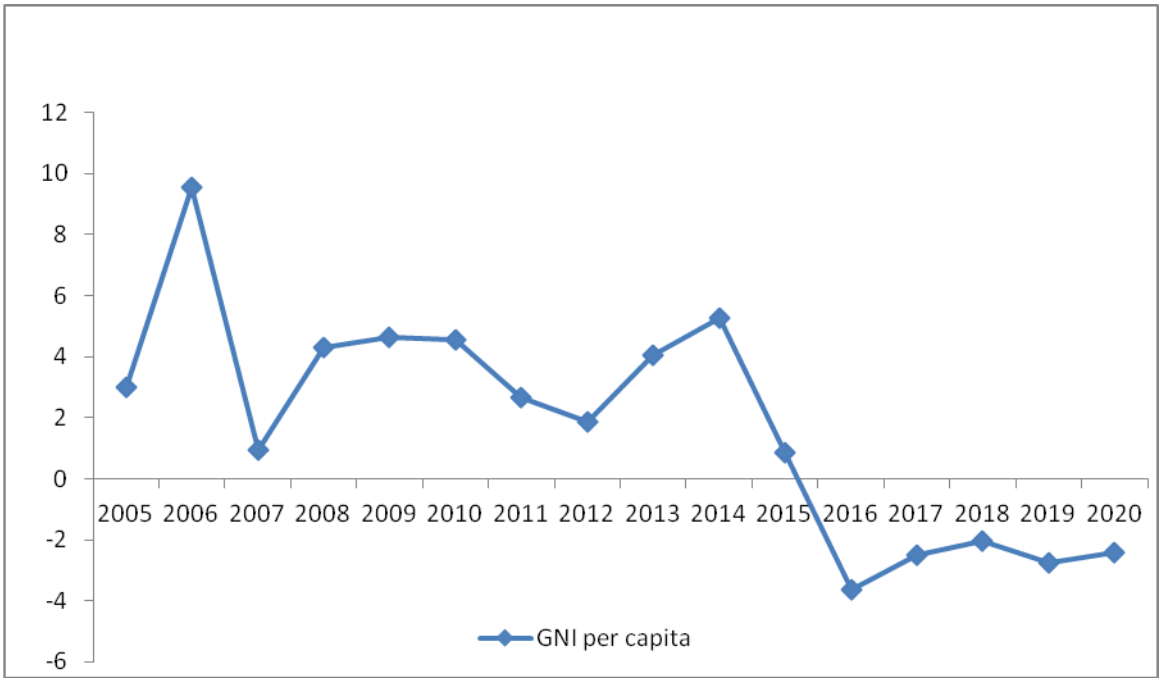
Figure 2: Trajectory of GNI per capita (annual % growth in Nigeria (2005-2020)



Source: World Bank World Development Indicators (WDI)

As shown in the past one and half decades, GNI per capita witnessed positive growth between 2005 and 2015. It increased from 3.01 per cent in 2005 to a maximum value of 9.53 per cent in 2006, which showed an improvement in the standard of living of the Nigerian citizens. It declined to 0.93 per cent in 2007 and fluctuated between a minimum value of 0.85 per cent in 2015 and a maximum value of 5.27 per cent in 2014. Starting from 2016, the GNI per capita witnessed a negative growth as it stood at -3.65 per cent. This could be linked to the economic recession witnessed in Nigeria in 2016. The negative growth in GNI per capita extended through 2017-2020. This explains the non-inclusiveness of the growth process and the adverse implication of the Covid 19 pandemic on economic well-being in Nigeria. It could also be linked to the poor performance of TCN, GenCos and DisCos in terms of power generation, transmission and distribution as no significant progress have been made considering the epileptic power supply, metering and coverage amongst others which undermine economic growth and population share of the growth process.

2.3 Empirical Literature Review

Idowua, Ibietana and Olukotun (2020) explored the performance of the privatization of the power sector in Nigeria with a focus on Ibadan and Ikeja Electricity DisCos between 2005 and 2018. The study employed a survey research design, with a questionnaire administered to both residential and commercial customers of Ibadan and Ikeja Electricity Distribution companies. Multiple regression was applied for the analysis Multiple regression statistics was used for data analysis and the result shows that both distribution companies (DISCOs) have brought no significant improvement to electricity supply going by the quality, billing, coverage, metering,

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load shedding, and response to customers' indicators. Given the findings, the study recommended that DISCOs should source the fund from the capital market in order to engender customer satisfaction, inject funds for replacement or upgrade of dilapidated power equipment and provide prepaid meters.

Adopting a doctrinal research approach, Eze (2018) examines the outcome of the 2005 EPSRA on the rate and level of industrialization in Nigeria. It was found that the Act has not, in any way, significantly improved the electricity supply in Nigeria. Consequently, Nigerian industries are still groaning under the increased cost of production occasioned largely by the epileptic power supply. The absence of prepaid digital meters for the billing of many electricity consumers has also worsened the plight of industries that use electricity, and which are forced to pay for electricity supplied under an estimated billing system. Thus, the study recommended that the electricity distribution must be effectively managed to catalyze the process of better generation and transmission.

Nepal and Foster (2016) assessed the Australian post-privatization power sector experience through a comparative analysis of the privately owned and state-owned companies. The findings revealed that private companies' tariff is not worse off as they reduced network costs and improved quality of electricity supply and investment without price increase when compared to state-owned companies. In sum, the findings position privately owned firms better in terms of performance than public enterprises judging by fair pricing and quality of electricity supply. Similarly, Hashim (2017) investigated the post-privatization power sector privatization experience in Iraq and found that privatization of the sector brought about a reduction in electricity consumption, curbed energy waste and as well reduced collection fees. The study further also showed evidence of consumers' prudent usage of power as part of post-privatization benefits in addition to lesser consumption costs to the distribution companies.

Using content analysis, Achimugu, Abdullahi and Yakubu (2020) examined the power sector reform and service delivery by Abuja Electricity Distribution Company. The study found that found out that, increase in the power sector finance will help to increase power supply and consequently, the level of service delivery by Abuja Electricity Distribution Company in Nigeria. An increase in power sector electricity charges brought about a decrease in power supply in Nigeria and consequently reducing the level of service delivery by Abuja Electricity Distribution Company. The result further reveals that an increase in the power sector labour force led to a fall in power supply and consequently a reduction in service delivery by Abuja Electricity Distribution Company. To this end, the study recommends that Abuja Electricity Distribution Company should ensure that adequate provision must be made to streamline the financing of Abuja Electricity Distribution Company in such a way as to increase power supply to improve the quality of service delivery.

3. Methodology

3.1 Model Specification

This paper followed an ex post facto research design and non-linear autoregressive lag model (NARDL) to examine the asymmetric effects of rural and urban electricity access on economic

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well-being. The proxy for economic well-being is gross national income (GNI) per capita which captures the distribution of national income to the population. The functional form of the model is specified as follows:

GNIPC = f (RAEC, UAEC) **(1)**

The NARDL model set up based on the notation for each of the endogenous and exogenous variables specified as follows:

$$\Delta GNIPC_t = \alpha_0 + \alpha_1 GNIPC_{t-1} + \beta_1^+ RAEC_{t-1}^+ + \beta_2^- RAEC_{t-1}^- + \beta_1^+ UAEC_{t-1}^+ + \beta_2^- UAEC_{t-1}^- + \sum_{j=1}^{p} \lambda_1 \Delta GNIPC_{t-j} + \sum_{j=1}^{q} \left(K_1^+ \Delta RAEC_{t-j}^+ + K_1^+ \Delta RAEC_{t-j}^- \right)$$

$$+ \sum_{j-1}^{q} \left(K_1^+ \Delta UAEC_{t-j}^+ + K_2^- \Delta UAEC_{t-j}^- \right) + U_t \qquad (2)$$

Where: GNIPC = GNI per capita, measure of economic well-being

$RAEC^+$ and $RAEC^-$ = partial sums of positive and negative changes in rural access to electricity.

$UAEC^+$ and $UAEC^-$ = partial sums of positive and negative changes in urban access to electricity.

β_1^+ *and* β_2^- = Long run parameters of the partial sums of positive and negative changes in the rural and urban access to electricity.

K_1^+ *and* K_2^- = shot run parameters of the partial sums of positive and negative changes in the rural and urban access to electricity.

P and q = maximum lag lengths

U_t = serially uncorrelated error term with zero mean and constant variance and covariance.

3.2 Variable Description and Source of Data

GNI per capita**,** an integral component of the Human Development Index (HDI) describes the standard of living or economic well-being of citizens of a country. It refers to GDP plus net income from abroad divided by the population. In addition, rural and urban access to electricity is measured as a percentage of the rural and urban population respectively. Data on GNI per capita was obtained from the World Bank WDI while data on rural and urban access to electricity were obtained from World Bank Global Electrificati;on Database, IEA, UNSD and WDI.

3.3 Method of Data Analysis

The Shin, Yu and Greenwood-Nimmo (2014) NARDL method is applied to ascertain the asymmetric relationship between access to electricity and economic well-being. The choice of this method follows the evidence of fractional integration in the series. This method is preferred to the conventional autoregressive distributed lag model of Pesaran, Shin and Smith (2001) as it captures asymmetries in the explanatory variables through partial sums decompositions of their positive and negative changes, and how they affect the dependent variable. In addition, the Kwiatkowski, Phillip, Schmidt and Shin, (KPSS, 1992) unit root test method was applied to

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determine if the variables are stationary or not while the bounds cointegration test forms the basis for the long-run relationship among the variables.

4. Results and Discussion

4.1 Descriptive Statistics

The basic descriptive statistics of GNI per capita, rural and urban access to electricity are summarized in Table 4.1.

Table 4.1: Summary of descriptive statistics

Statistic	GNIPC	RAEC	UAEC
Mean	1.769908	26.90499	83.99452
Median	2.268897	25.76264	83.91264
Maximum	9.539047	33.97046	87.10000
Minimum	-3.654338	22.61744	79.80000
Std. Dev.	3.689034	3.363356	1.960562
Jarque-Bera	0.362685	1.593693	0.274277
Probability	0.834150	0.450748	0.871850

Source: Researcher's computation with data obtained from World Bank Global Electrification Database, IEA, UNSD and WDI

The descriptive statistics revealed that GNI per capita varied between a minimum negative growth of -3.6543 per cent and a maximum positive growth of 9.539 per cent with an average growth of 1.7699 per cent between 2005 and 2020. The variations in GPN per capita partly explain the widening income among the Nigerian population. Rural access to electricity fluctuated between a minimum level of 22.617 per cent and a maximum level of 33.970 per cent. It averaged 26.904 per cent, which explains the high energy poverty level among rural dwellers and Nigeria's poor achievement in SDG 7 despite the power sector reform. The descriptive statistics further reveal that urban access to electricity varied between a minimum level of 79.80 per cent and a maximum level of 87.100 per cent with a mean value of 83.994 per cent during the study period. This suggests an appreciable proportion of the urban population have access to electricity. The standard deviation for GNI per capita is greater than the associated mean, which indicates the observations deviated from the mean value. With relatively low standard deviations, the observations for rural and urban electricity access clustered around their respective mean values. Furthermore, the probability values associated with the Jarque-Bera statistics for all the variables indicate that their residuals are normally distributed at 5 per cent level. This provides impressive statistical evidence for estimating the model.

4.2 Unit Root Test Results

The unit root test was conducted using the KPSS method and the results are reported in Table 4.2.

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Table 4.2: KPSS unit root test results

Null hypothesis: Variable is stationary					
Variable	Levels test results		First difference test results		Order of Integration
	LM statistic	5 Percent Critical value	LM statistic	5 Percent Critical value	
GNIPC	0.1098	0.146	NA	0.146	I(0)
RAEC	0.1698	0.146	0.0197	0.146	I(1)
UAEC	0.0389	0.146	NA	0.146	I(0)

Source: Researcher's computation with data obtained from World Bank Global Electrification Database, IEA, UNSD and WDI

Note: NA denotes not available due to evidence of stationarity at the levels test result

The KPSS unit root test results revealed that GNI per capita and urban access to electricity are stationary at levels given that their computed LM statistics are less than the corresponding critical value at 5 per cent level. This finding indicates that the two variables are integrated of order zero [I(0)]. However, rural access to electricity is not stationary at levels, but become stationary upon transformation via first differencing. In other words, the data for rural access to electricity is integrated of order one [I(1)]. It, therefore, follows from the KPSS unit root test results that the variables are fractionally integrated, which corroborates with the findings of Ozigbu (2021) and Rafindadi and Usman (2021). With evidence of fractional integration in the series, the use of the bounds cointegration test is justified in this paper.

4.3 Bounds Test Cointegration Results

The bounds cointegration method was necessitated by the fractional integration [I(0) and I(1)] of the variables in the model. The results are summarized in table 4.3.

Table 4.3: Bounds test cointegration result

Null Hypothesis: No evidence of long relationships exist		
Series: GNIPC RAEC_POS RAEC_NEG UAEC_POS UAEC_NEG		
Test Statistic	Value	K
F-statistic	5.028	4
Critical Value Bounds		
Significance Level	Lower Bound I(0)	Upper Bound I(1)
10 per cent	2.45	3.52
5 per cent	2.86	4.01
1 per cent	3.74	5.06

Source: Researcher's computation with data obtained from World Bank Global Electrification Database, IEA, UNSD and WDI

Note: K denotes number of explanatory variables in the model

The application of the bounds test for cointegration in this paper was informed by the establishment of fractional integration in the series. Specifically, the bounds test was performed

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at 5 per cent level of significance using F-statistic. The result indicates that the calculated F-value (5.028) is greater than the upper bound critical value (4.01) at 5 per cent level. This provides the empirical basis for rejecting the null hypothesis of no cointegration among the variables. In other words, GNI per capita has a long-run relationship with rural and urban access to electricity. This result conforms to previous findings by Mhaka *et. al.* (2020); Musa and Maijama'a (2020) and Musibau, Shittu & Ogunlana (2020) and satisfies the pre-condition for fitting the NARDL to capture the asymmetric effects of rural and urban access to electricity on GNI per capita.

4.4 Model Estimation

The NARDL method was applied to estimate the asymmetric long and short effects of rural and urban electricity access on economic well-being. The results are presented in Table 4.4.

Table 4.4: Asymmetric short and long run regression results

Dependent Variable: GNIPC				
Short run equation				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GNIPC(-1))	0.282482	0.124430	2.270210	0.0275
D(RAEC_POS)	-0.038128	0.106510	-0.357980	0.7219
D(RAEC_NEG)	0.089541	0.066419	1.348129	0.1837
D(UAEC_POS)	-0.629447	0.193549	-3.252136	0.0021
D(UAEC_NEG)	-0.112638	0.118069	-0.953999	0.3447
CointEq(-1)	-0.595715	0.128638	-4.630959	0.0000
Long run equation				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
RAEC_POS	-0.064004	0.026443	-2.420451	0.0063
RAEC_NEG	0.150309	0.106785	1.407580	0.1654
UAEC_POS	-0.329094	0.237172	-2.399133	0.0144
UAEC_NEG	-0.189080	0.188495	-1.003104	0.3206
C	5.669930	0.715940	7.919559	0.0000

Source: Researcher's computation with data obtained from World Bank Global Electrification Database, IEA, UNSD and WDI

As observed from the results, one period lag of GNI per capita has a significant positive effect on the current value. This implies that past innovations in the growth process have the potential of improving the standard of living or economic well-being in the future. It was also found that GNI per capita responds negatively to positive changes in urban and rural access to electricity in both the long and short term. This result corroborates with the findings of Idowua, Ibietana and Olukotun (2020) and Eze (2018) and suggests that despite the increasing level of urban access to electricity, the intended and desired benefits of the privatization of the power sector have remained a mirage in Nigeria. This could be attributed to unstable power supply, low current and distribution bottlenecks among others, which undermine the equitable spread of the expected post-privatization benefits. Thus, growth in urban electricity access has not translated into

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improved economic well-being as many households and businesses in urban areas do not enjoy reliable and sufficient electricity supply due to substandard infrastructure and operational inefficiency.

The results further showed that the short term implication of rural access to electricity on GNI per capita is not statistically significant. This could be attributed to the high incidence of energy poverty in rural areas as evidenced by poor rural electricity access. Again, GNI per capita responded negatively to positive changes in rural electricity access in the long, indicating that rural electricity access has an adverse effect on the standard of living in Nigeria. This finding implies that poor coverage and quality of electricity supply in rural areas undermine the post-privatization benefits of the power sector reform. It equally casts doubt on the capacity of the private sector to drive the process of structural transformation in the Nigerian power sector given that the World Bank (2020) report revealed that businesses in Nigeria incur an annual loss of US$29 billion due to unstable electricity supply. The error correction coefficient (-0.596) is negative and significant at 5 per cent level, which satisfies the sufficient condition for the error correction term as well as corroborates the fact that there is a long-run relationship among the variables. Its coefficient of -0.596 indicates that short-run disequilibrium in the system can adjust to the long-run equilibrium position at a speed of 59.6 per cent.

Table 4.5: Post-estimation diagnostics tests results

Test type/Null Hypothesis (H_0)	Test-statistic	Prob. value	Decision
Breusch-Godfrey Serial Correlation test H_0:No serial correlation in residuals	Chi-square stat. (6.563)	0.0872	Accept H_0
ARCH heteroscedasticity test H_0:Residuals are homoscedastic	Chi-square stat. (9.367)	0.4041	Accept H_0
Ramsey's RESET H_0: No functional form misspecification	F-stat. (1.414)	0.2532	Accept H_0

Source: Researcher's computation with data obtained from World Bank Global Electrification Database, IEA, UNSD and WDI

As evidenced in Table 4.5, the Breusch-Godfrey LM test was conducted to examine if there is a serial correlation in the residuals. The result showed that the Chi-square statistic (6.563) is associated with a probability value of 0.0872, which is above 0.05. This finding indicates that the residuals are not serially correlated. Similarly, White's heteroscedasticity test result revealed that the probability value (0.4041) of its chi-square statistic (9.367) is greater than 0.05. This is a pointer that the variance of the residuals is constant over time. Consequently, the null hypothesis that the residuals are homoscedastic is accepted at 5 per cent level. Additionally, the Ramsey RESET test result offered enough empirical evidence for accepting the null hypothesis of no functional misspecification in the model. This is because the corresponding probability value (0.2532) of the F-statistic (1.414) is greater than 0.05. Based on the outcomes of the diagnostics tests, the model is reliable for policy formulation and long term predictions. Thus, the outcomes of these tests are very impressive and provide enough empirical evidence for the justification of the estimated NARDL model for policy formulation and long term prediction.

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5. Concluding Remarks

Achieving a private sector-led growth and efficiency in the Nigerian power sector has remained the priority of the 2005 electric power reform and pre-occupations of the successive governments. However, the progress achieved so far in the post-privatization era in terms of access to reliable and sufficient electricity, improved metering and billing, infrastructure development, transmission and distribution efficiency as well overall customer experience has remained a source of concern in both policy and academic circles. Thus, this paper deepened the understanding of how the post-privatization experience in terms of rural and urban access to electricity affects economic well-being in Nigeria. The findings highlight that the proportions of rural and urban access to electricity do not improve the level of economic well-being in Nigeria. In other words, the post-privatization benefits in the power sector in terms of improved economic well-being through optimal, affordable and reliable access to electricity are yet to be achieved. Based on the findings, this paper recommends that government should build synergy with the private sector through long term funding, capital investment and adequate regulation to address the post-privatization challenges in Nigeria's power sector. Again, the government should mitigate the issue of vandalism of power assets and improve the ease of doing business in Nigeria to mobilize more private investments locally and internationally to the Nigerian power sector for improved service delivery and overall post-privatization experience.

References

Achimugu, H., Abdullahi, A., & Yakubu, S.A. (2020). Power sector reform and service delivery by Abuja Electricity Distribution Company in Nigeria. *KIU Interdisciplinary Journal of Humanities and Social Sciences*, *1*(1), 60-80.

Emovon, I., & Nwaoha, T. C. (2018). Power generation problems ranking using a combination of AHP AND MOORA techniques. *Research in Logistics & Production*, *8*, 155-168.

Eze, T. C. (2018). An appraisal of the impact of the electricity power sector reform project on industrialization in Nigeria. *UNIZIK Journal of Business*, 1(2), 14-16.

Hamza, K., Esew, N. G., & Sani, B. (2020). Interrogating the State, Public Policy and the Electricity Power Sector in Nigeria (1999–2019). *KIU Journal of Social Sciences*, *6*(2), 55-62.

Hashim, A. (2017). An assessment of electricity sector reforms in Iraq. (Online) Retrieved from www.bayancenter.org/en/ wp-content/uploads/2017/09/909865676600pdf

Idowu, S. S., Ibietan, J., & Olukotun, A. (2020). Privatization of power sector in Nigeria: An evaluation of Ibadan and Ikeja electricity distribution companies performance (2005–2018). *International Journal of Public Administration*, *43*(16), 1413-1420.

Mhaka, S., Runganga, R., Nyagweta, D. T., Kaseke, N., & Mishi, S. (2020). Impact of rural and urban electricity access on economic growth in Zimbabwe. *International Journal of Energy Economics and Policy*, *10*(6), 427.

Nepal, R., & Foster, J. (2016). Electricity networks in Australia: An overview of the debate. Retrieved from www.uq.edu.au/economic/abstract/54.pdf

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Omoleke, I. I. (2011). Management of electricity generation and supply in Africa: The Nigerian experience. *Journal of Public Administration and Policy Research, 3*(10), 266–277.

Ozigbu, J. C. Modeling the Asymmetric Effects of External Reserve Accumulation on Exchange Rate Stability in Nigeria. *American Journal of Humanities and Social Sciences Research (AJHSSR), 5*(5), 324-330

Pesaran, M. H. & Shin, Y. (1999). An autoregressive distributed lag modelling approach to cointegration analysis. Chapter 11 in S. Strom (ed.), Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium. Cambridge University Press, Cambridge.

Rafindadi, A. A., & Usman, O. (2021). Toward sustainable electricity consumption in Brazil: the role of economic growth, globalization and ecological footprint using a nonlinear ARDL approach. *Journal of Environmental Planning and Management*, *64*(5), 905-929.

Saturday, E. G. (2021). Nigerian Power Sector: A new structure required for effective and adequate power generation, transmission and distribution. *Global Journal of Engineering and Technology Advances*, *7* (1), 006-018.

Shin, Y., Yu, B., & Greenwood-Nimmo, M. (2014). Modelling asymmetric cointegration and dynamic multipliers in a nonlinear ARDL framework. In Festschrift in honor of Peter Schmidt (pp. 281- 314).Springer, New York, NY.