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Econometric Modeling: An Application to the Demand for Electricity in Nigeria

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ABSTRACT

This study investigates the nature of the demand for electricity in Nigeria using recent development in the cointegration theory. The empirical results show an inverse relationship between real appliance purchase price, the real per capita income and the demand for electricity. Also the rate of population growth rate as a proxy for electricity consumers appears to be insignificant. This reveals the clear fact that the demand for electricity is greater than its supply in Nigeria.

INTRODUCTION

The demand for electricity in Nigeria could be linked to the supply of electricity since supply and demand are two sides of the same coin. The supply and demand for electricity was traced to 1886 when the colonial government installed generators with total capacity of 60 watts in Lagos metropolis. Later on the electricity corporation of Nigeria established in 1951 along side three private power supply firms, namely Nigeria electricity Supply Company in Jos, African Timber and Ply-wood Ltd. In Sapele and Shell B. P, formed the initial electricity supply network sand source of demand for electricity in Nigeria. By 1972, the National Dan Authority was merged with the electricity corporation of Nigeria to form the National Electricity Power Authority. Which the installed generating capacity, ranges from 1368.8 GWH in 1970 to 13545.6 GWH in 1990, and made up of thermal and hydro plants (Ajayi, 1994).

Despite the growth in capacity the problem of electricity demand in Nigeria is fast becoming unmanageable and the associated economic losses, is alarming. Electricity serves as a carrier of energy to the user by means of transmission and distribution lines in all the sectors of the economy. Electricity is one of the most essential factors to effective industrialization of a nation and being the preferred energy source for household activities in the

Urban areas because of its convenience and low operation costs and the attendants benefits to its users led to increased electricity demand for economic growth (Adegbulugbe and Akinbami, 2002).

The frequent power failure in Nigeria shows that electricity demand is higher than supply and hence, there is inadequate electricity supply to match up with the daily socio economic activities (Okonkwo, 2002). Okonkwo further stated that the electricity available for the control was as low as 1000mw in the year 2000 with daily average output at 1,700mw. This also implies that electricity supply falls short of the daily demand resulting to most rural grid connected housed having black out of up to 20 hours a day and in general low socio-economic lost in the economy. In other word the rate of power failure in Nigeria had created uncertainty in the socio economic activities resulting to economic losses in Nigeria.

Some related studies conducted on Nigeria emphasized much on electricity supply, its inadequacy as it affect the manufacturing sector (Ajayi, 1994; Adegbulugbe and Akin-bami, 2002 and OKonkwo, 2002). However, the study on electricity demand was partially formed by Ajayi (1994), giving greater analysis to the supply of electricity, hence there is little or no investigation on the determinants of the demand for electricity in Nigeria. Therefore, the major objective of this paper is to attempt to identify and analyzed the determinants of electricity demand and then draws policy implications as well as proffers recommendations based on the findings of the study for result oriented electricity demand management in Nigeria. The rest of the paper is divided into five parts, part two is the theoretical and empirical issues in electricity demand, part three gives the Analytical methodology and estimation method, part four presents the empirical results and discussion while part five contains policy implications and conclusion.

Theoretical and Empirical Issues in Electricity Demand

There are four major issues involved in electricity demand studies. The first has to do with the major terms of electricity. These are the economic variables that influence the demand equation. The second is concerned with the choice of appropriate electricity demand model. While, the fourth has to do with the appropriate functional forms to be use in the estimation of the electricity demand model. These four issues together determine the results and policy implications of any electricity study. We present, below a brief discussion of the theoretical and empirical evidence of these four issues.

The determinants of electricity demand

Electricity demand is conceptually like any other demand for a commodity and thus its theoretical basis is derived from the conventional demand theory in which the quantity demanded of a commodity is assumed, ceteris paribus, to be positively related with the income of the consumers, positively related with prices of substitute, goods negatively related with prices of complement good and inversely related with its own price. These determinants of electricity demand mentioned above and others are discussed below:

Rate of Utilization of Equipment Stock (appliances)

The demand for electricity is an indirect demand through the demand for other goods and services people purchase electricity because it is used in conjunction. With equipment to produce services that are the true object of consumers demand. For example, electricity is used with freezes to cool drinks, with lamps to produce light, with machines to move and lift objects etc, (Berndt, 1991). Based on the services that electricity performed, one can therefore says that the demand for electricity is derived from the demand for services that involve electricity using equipment. Furthermore Berndt reported that the life span of durable equipment used determined the amount of electricity consumed per hour of utilization. These means that electricity consumption for most services can be altered only by changing the utilization patterns of the equipment. The rate of Utilization of equipment stock is measure by diving the total Kilowatts by the population of consumers, and since the actual population of electricity consumers cannot be ascertains we choose to use the population growth rate of the country as a proxy for total electricity consumers for the measurement of Utilization of equipment stocks.

Electricity Prices

The price schedules offers to consumers by electric utilities often contain block tariffs and increasingly include seasonal variations. This is an example of multi part or multi block rate schedule which introduce wedges between the average and marginal prices. From the point of view of economic theory the appropriate price to employ in empirical demand analysis of electricity is the marginal price. But with a multi part tariff, several different marginal prices could exits, depending on the consumer's level of consumption. In practice, some econometricians for instance have addressed this issue by using as a measure of the marginal price, the price corresponding with the average number of Kilowatt hours consumed per customer (Berndt 1991). Others have ignored the issue and have simply divided the electricity bill by the number of Kilowatt hours consumed and there by obtained the average price.

Real appliances Purchase Prices

People consume electricity as a result of their ownership of electrical and electronic appliances and this in turn depends on the market of these appliances. The law of demand states that the higher the prices of goods and services the lower the demand for them and vice versa. Therefore it the prices of appliances are high there will be a low demand for electrical and electronic appliances which in turn, reduces the demand for electricity ceteris paribus. This is so because electricity consumption depended on the stock equipment using electricity which itself depended on its own prices. Because of the difficulties in ascertaining the process of appliances, we use the real consumers price index as a proxy to measure its influence on electricity demand.

Real Per Capital Income

According to actual electricity consumption Berndt (1991) depends on the rates of utilization of the various equipment stocks which in turn are hypothesized to depend on real per capital income, besides other variables. It is expected that electricity demand will be positively related to Real Per Capital Income if income increases which other variables that affect electricity demand remains constant. According to Fajana (1977) instances abound where negative relationship occur in demand studies involving income. According to him, this happen when monetary and fiscal policies vary over time that there affect the income available for electricity demand via a reduction in the demand for equipments using electricity. For instance, if government embarks on surplus budgeting, the liquidity in the economy is reduced, thus reducing the income available for electricity demand through the purchase of electrical and electronic appliances.

Population Growth Rate

Another important variable that is often considered in modeling electricity demand is the country's population growth rate (Fisher and Kaysen, 1962, Berndt 1991). It was further revealed that the higher the population growth rate of a country, the higher the rate of electricity demand, hence, the hypothetical population growth rate to be positively related to electricity demand.

Other Variables:

Other equally important electricity determinants different from those outlined above are worthy of mention. Berndt (1991) reported that the numbers of wired houses, expected permanent income, expected prices of electricity and gas and the number of marriages influences the demand for electricity. In their long – run model, Fisher and Kaysen (1962), measured the growth rate of appliance stocks on growth rate of non-economic variables and also one economic variables. The non-economic variable of marriages shows a positive relationship with the growth of appliance stock. This is because in the early stage of married life, couples show tremendous evidence of high purchases of electrical appliances.

The Electricity Demand Model

Another important issue in electricity demand function is that appropriate of model to be used. In the short – run, variations in the demand for electricity are constrained to changes in utilization rates, given the fixed stock of electricity-using appliances. In the longer run, when the amount and characteristics of the equipment stock can be altered, more substantial possibilities exist for varying electricity consumption. This suggests a two-part model, and thus a two-equation framework, in which one stage is a short-run utilization model with electricity demand conditional on the equipment stock and the second is a long-run model of factors affecting the equipment stock. We begin with the first stage, a short-run demand for electricity.

One of the first explicitly models of the short-run demand for electricity is due to Fisher and Kaysen (1962). Focusing primarily on the residential sector, Fisher and Kaysen called the set of electricity-using appliances and fixture "white goods", and noted that household demand for electricity use is derived from the demand for the services of the households' various stocks of white goods. In the short run these stocks are fixed. Since white goods vary in their capacity to consume kilowatts of electricity per hour of normal usage, Fisher and Kaysen proposed to measure the effects of the aggregate equipment stock on electricity consumption in terms of the total kilowatt hours that could be consumed if all appliances were employed at their normal use. This was done by obtaining engineering information on kilowatts used per hour of normal use for each type of appliance and then summing over the various household appliances.

For their long-run model, in which they attempted to explain changes in the stocks of seven goods, Fisher and Kaysen specified what is now often called a saturation model. The dependent variable was in $W_{i,t-1}$, In $W_{i,t-1,}$ and the regressors include percent changes (actually, first differences in logarithms) of population, number of wired households, real appliance purchase prices, and expected permanent income, as well as levels of current income per capita, the expected prices of electricity and gas, and the number of marriages. In effect, therefore, in their long-run model, Fisher and Kaysen regressed growth rates of appliance stocks on growth rate of noneconomic variables and on levels of economic variable (except marriages). Incidentally, the number of marriages in year was included as a regressor since "the first six months or so of married life are a time of very high susceptibility to … appliance purchases" Fisher-Kaysen study, however to include measures or revels the desirability equipment stocks directly into short-run demand equations and thereby to distinguish short-run utilization effects from long-run equipment stock impacts.

The weakness of the approach that directly includes equipment stock measures into electricity's demand equations has also been emphasized by Taylor, Blattenberger, and Rennhack (1983b), who have summarized a number of studies based on recent data. Taylor et al.(1983b) conclude by stating that "The results are better than might realistically have been expected, but they are clearly much poorer than might have been hoped for in general, the utilization equations are very good, whereas the capital stock equations leave much to be desired". The alternative approach that does not suffer from the disadvantage of requiring data equipment stocks was however put forward, this benefit is not gained without cost, since in the indirect approach it is no longer possible to distinguish as sharply the utilization and equipment change components of electricity demand.

Let actual electricity consumption in time period to be denoted as y and let the long-run desired or equilibrium consumption by y. The long-run desired consumption is in turn affected by the level of income, prices, and other factors as discussed above.

Simultaneity Between Electricity Price and Quantity

A number of economic studies of demand for electricity have used as a measure of price the ex post average price, computed as total expenditure on electricity divided by total kilowatt hours consumed, when rate structures have multiple blocks, the average price computed in this way depends on the quantity of kilowatt hours consumed – quantity affects price.These exist negative relationship between price and quantity which is in line with economic theory that as the electricity price increases, the quantity demanded falls (price affect quantity).

Since quantity affects price (the rate structure) and price affects quantity (the downward-sloping demand curve). Therefore a simultaneous equations problem emerges. In such a case, estimation by ordinary lease squares will yield an upward-biased (in absolute value) estimation of the demand response, since the lease squares estimate is not able to separate the effects of the declining block rate structure forms those of the downward sloping demand curve. This simultaneity problem has been addressed in a number of ways. One the most common procedure today for dealing with this simultaneity problem is to attempt to avoid average prices altogether and instead to employ an estimate of the marginal price. If the rate schedule facing customers is in fact only a two-part tariff with a fixed charge per month and a constant price per kilowatt hour consumed, then the simultaneity problem is adequately solved by utilizing the constant marginal price. For multi block rate schedules, however, a problem arises as to which marginal price to employ. In this case we still resort to using average price as a proxy to marginal price to extort our electricity demand function since the price whatever marginal or average has the same negative relationship with electricity demand.

The Choice of Functional Form

A substantial portion of the existing econometric research on demand for electricity has employed a long-linear functional form, such as that in Equation (9). This functional specification is attractive because its estimated coefficients can directly be interpreted as short – run elasticities, and long-run elasticities can be computed in a straightforward manner.

There are several important problems with such a long-linear specification, however. First, by assumption the estimated elasticities are constant. This can create complications, particularly if in the forecast period, prices and income are quite different from those observed historically. For example, if the estimated long-run elasticity is greater than I, then from the basic arithmetic it is known that the budget share will increase with income. Since budget shares can never exceed unity, however, it is not possible for the income elasticity to be perpetually above unity; eventually, it must fall. Similarly, if the estimated long-run price elasticity is less than 1 in absolute value (implying a price – inelastic demand), then the budge share must rise with price increases, but again, this cannot occur indefinitely; eventually, as prices continue to increase, demand must become price elastic. The constant elasticity specifications embodied in the long-linear functional forms cannot therefore be globally valid.

In summary, although the log-linear functional form has been employed in numerous econometric studies, it is highly restrictive and can yield constant elasticity estimates that cannot possibly be correct. For these reason, in recent years, econometricians have increasingly employed more flexible functional form specifications. Nonetheless, because of its simplicity, the log-linear functional form is still used by a substantial number of electricity demand analyst.

THE MODEL

Drawing from the literature review, the starting point of our model is the popular Fisher and Kaysen model. Given the peculiarities of the power sector of the Nigerian Economy and the objective of this study, certain modification is made. Fisher and Kaysen (1962), in their studies of electricity demand in United State specified that the actual electricity demand depends on the aggregate equipment stock for the household at time measured in units of Kilowatt per hour as W_{it} equipment stocks, U_{it} which in turn are hypothesized to depend on real per capital income Y_{it} and the real price of electricity, P_{it}.

That is $q_{it} = U_{it}.\ \ W_{it} = (Y_{it}\ P_{it}).\ \ W_{it}$ (1)

In a functional form, equation (1) becomes

$qit = P_{\alpha it}\ Y_{it}^{\beta}\ \ W_{it}$

(2)

A logarithm transformation of equation (2) yields

$\text{In}\ q_{it} = P_{\alpha it\ x}\ \beta\ \text{In Yit x In}\ W_{it}$

(3)

Due to inadequate explanation on the total residential electricity consumption by the explanatory variables used, it becomes impossible to estimate stocks for other goods, hence they postulated that the stock of equipment goods in the "state grew at a constant rate of γ percent per year.

Therefore, $W_{it}/W_{it}\text{-}1 = \exp(\gamma_i)$ or $\text{In } W_{\ i,t-1} = \ \ \gamma_I$ (4)

Equation (4) was then lagged one time period. This was subtracted from equation (3) above, and then equation (4) was substituted in, resulting to the

first difference equation of the form In $q_{it} - q_{i,t-1} = \gamma_i$ x $_{\alpha I}$ (In P_{it} – In P_{it-1}) + β_I (In Y_{it} –In Y_{it-1})
(5)

The weakness of the direct approach of imputing the equipment stock into the electricity demand equations above leave much to be desired. This weakness led to a modification of equation (5) by way of specifying a logarithm long-rum equilibrium equation of the form.

$$\text{In } y_t = \alpha + \beta_I \text{ In } \chi_{it} + \beta_I \chi_{2t} + \ldots\ldots\ldots\ldots + \beta_k \text{ In } \chi_{t\,k} + \varepsilon_t \quad (6)$$

Where ε_t is an independently and identically normally distributed disturbance term with mean zero and variance r^2.

Equation (6) is the long-run, desired electricity consumption level that corresponds with an equipment stock that is fully adjusted to its equilibrium level.

If our deterministic electricity demand in equation (6) is re-written so that actual electricity consumption in time period t depends on expected real electricity prices and expected real income in time period $_{t+1}$ (denoted $\chi_{1,t+1}$ and $\chi_{2,t+1}$, respectively) and on other observe exogenous variables χ_{3t} through χ_{kt} and on a random disturbance term ε_t

$$y_t = \alpha + \beta_1 \chi_{1,t+1} + \beta_2 \chi_{2,t+1} + \beta_3\chi_{3,t} + \beta_k\chi_{k,t} + \varepsilon_t \quad (7)$$

Where equation (6) is substituted directly into equation (7) for both $\chi_{1,t+1}$ and $\chi_{2,t+1}$ the resulting expression would have an infinite number of lagged values χ_1 and χ_2 and so it could not feasibly be estimated econometrically given a finite number of observations.

This problem can be solved by employing the Koyck transformation repeatedly for each expectation variable and then lag the equation in one time period, multiply through by λ1 and subtract the resulting equation from equation (7). This yield

$$y_t = \alpha\ (1-\lambda_1) + \lambda_1 y_{t-1} + \beta_1 (1-\lambda 1)\ \chi_{1t} + \beta_t (1-\lambda_1)\ \{\chi_{2t} + (\lambda_2 - \lambda_1) + \lambda_{2(}\lambda_{2-}\lambda_1)\ \chi_{2t-1}\chi_{2t-1}\} + \beta_3 (\chi_{3t} + \lambda_1\chi_{3t-1}) + \ldots + \beta_k (\chi_{kt} - \lambda_1\chi_{kt-1}) + \varepsilon_t - \lambda_1\ \varepsilon_{t-1,} \quad (8)$$

Which still have an infinite number or lagged values of χ_2 and so cannot feasibly be estimated econometrically?

Once again, if one applies the Koyck transformation, this time lagging equation (8) by one time period multiplying through by λ_2. And then subtracting the resulting product from equation (8) one obtain the estimable but complicated equation.

$$y_t = \alpha (1-\lambda_1) + (\lambda_1 \lambda_2) + (\lambda_1 + \lambda_2) - \lambda_1)y_{t-1} - \lambda_1\lambda_2 y_{t-2} + \beta_1 (1-\lambda_1)$$
$$(\chi_{1t} - \lambda_2\chi_{1t-1}) + \beta_2 (1-\lambda_2)(\chi_{2t} - \lambda_1\chi_{2t-1}) + \beta_3 (\chi_{3t} -(\lambda_1 + \lambda_2)(\chi_{3t-1} +(\lambda+\lambda \chi_{3t-2})$$
$$+\ldots\beta_k (\chi_{kt} - (\lambda_1 + \lambda_2) \chi_{kt-1} +\lambda_1\lambda_2 \chi_{kt-2}) + \varepsilon_t - (\lambda_1 + \lambda_2) \varepsilon_{t-1} +\lambda_1\lambda_2 \varepsilon_{t-2} \quad (9)$$

Equation (9) depicts that current electricity demand is a function of electricity demand lagged one and two time periods, current and once-lagged values of each of the variables (such as real electricity price and real income) and current, once and twice-lagged values of each of the other explanatory variables. Thus, within a dynamic analytical framework, the estimation model for this study can be expressed in log-linear form as:

$\beta(L)L_nEDM = \beta_o + \beta_1(L)\ L_n\ RPe + \beta_2\ (L)\ L_n\ RPy + \beta_3(L)\ I_n\ Rap + \beta_4(L)$ In Pnr $\beta_5(L)$ (10)
L_n Rus + e

Where:

EDM	=	Demand for electricity
RPe	=	Real price of electricity
RPy	=	Per capita income
Rap	=	Real appliances Purchase price
Pnr	=	Population growth rate, depicting electricity consumers.
Rus	=	Rate of utilization of equipment stock
β(L)	=	Lag specification
Ln	=	Natural logarithm

RESULTS AND DISCUSSION

Unit Root Test

This section presents the results of unit root tests. This was followed with the cointegration test. Table 1 summarizes the results of the ADF test applied to the variables. When tested at levels, only population growth rate *(PNR*) was found to be stationary while the others were not. At first difference, however, the others, that is, L*EDM, LPNR, LRAP, LRPE, LRPY* and *LRUS* were stationary at 5 percent level using ADF test with a constant.

Table1a: Unit Root Test Result at Levels.

Variables	ADF Value	5% Critical Value	Order of Integration
ΔLN(EDM)	-2.109890	-2.9472	I(0)
ΔLN(PNR)	-3.609805	-2.9472	I(0)
ΔLN(RAP)	-0.077120	-2.9472	I(0)
ΔLN(RPE)	-1.083887	-2.9472	I(0)
ΔLN(RPY)	0.314806	-2.9472	I(0)
ΔLN(RUS)	-2.434981	-2.9472	I(0)

Source: Authors' Computation, 2010

Table 1b: Unit Root Test Result at First Difference.

Variables	ADF Value	5% Critical Value	Order of Integration
ΔLN(EDM)	-4.907581	-2.9499	I(1)
ΔLN(PNR)	-6.773576	-2.9499	I(1)
ΔLN(RAP)	-3.981548	-2.9499	I(1)
ΔLN(RPE)	-3.586369	- 2.9499	I(1)
ΔLN(RPY)	-3.732826	-2.9499	I(1)
ΔLN(RUS)	-4.827448	-2.9472	I(1)

Source: Authors' Computation, 2010

Cointegration Test

We now turn to determine the existence of long run equilibrium relationship between our variables. Non-stationary time-series can be cointegrated if there is a linear combination of them that is stationary, that is, the combination does not have a stochastic trend. The linear combination is the cointegration equation. The cointegration tests are based on the Johansen and Juselius (1990) test. Tables 2 below shows that all the variables are cointegrated using the likelihood test ratio at 1 percent. In other words, there is a long term equilibrium relationship among the variables at 1 percent level.

Table 2: Johansen cointegration test result.

Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.909734	240.8280	94.15	103.18	None **
0.893803	161.4630	68.52	76.07	At most 1 **
0.632853	87.46177	47.21	54.46	At most 2 **
0.574474	54.39599	29.68	35.65	At most 3 **
0.410381	26.19979	15.41	20.04	At most 4 **
0.233296	8.766605	3.76	6.65	At most 5 **

*(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 6 cointegrating equation(s) at 5% significance level

Source: Authors' Computation, 2010

Result of Error Correction Model

The confirmation of the existence of a cointegrating vector among our series gives us enough background for carrying out short run dynamic adjustment. Therefore adopting the general-to-specific framework, we proceed to estimate an over-parameterized error correction model from where a parsimonious error correction model is obtained as shown below

Table 3: The parsimonious error correction model.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.475847	5.049600	-0.292270	0.8190
Δ LN(EDM(-1)))	0.833532	0.165014	5.051277	0.0001
ΔLN(EDM(-3)))	0.377738	0.129916	-2.907562	0.0098
ΔLN(PNR))	-0.008233	0.009156	-0.899143	0.3811
Δ (LN(RAP))	0.117624	0.084257	1.396008	0.1807
ΔLN(RAP(-1)))	0.138492	0.056718	2.441757	0.0258
ΔLN(RAP(-2)))	-0.228758	0.112857	-2.026982	0.0586
Δ LN(RAP(-3)))	0.217876	0.085921	2.535789	0.0213
ΔLN(RPE))	-0.291628	0.195687	-1.490284	0.1545
ΔLN(RPY))	-0.122895	0.076165	-1.613546	0.1250
ΔLN(RPY(-2)))	0.124948	0.101405	1.232172	0.2347
ΔLN(RPY(-3)))	-0.173354	0.087485	-1.981521	0.0639
ΔLN(RUS))	0.920936	0.025236	36.49308	0.0000
ΔLN(RUS(-1)))	-0.897108	0.152364	-5.887939	0.0000
ΔLN(RUS(-2)))	0.211102	0.033097	6.378257	0.0000
ΔLN(RUS(-3)))	0.296776	0.118874	2.496552	0.0231
ECM(-1)	-0.150983	0.093182	-1.620310	0.0236
R-squared	0.990794	Mean dependent var		0.060958
Adjusted R-squared	0.982671	S.D. dependent var		0.176696
S.E. of regression	0.023261	Akaike info criterion		-4.377716
Sum squared resid	0.009198	Schwarz criterion		-3.652137
Log likelihood	-7.093341	F-statistic		8.012248
Durbin-Watson stat	2.079777	Prob(F-statistic)		0.000048

Source: Authors' Computation, 2010

The above result confirms that electricity demand in Nigeria has an automatic mechanism and that it responds to deviations from equilibrium in a balancing manner. A value of -0.150983 for *ecm(-1)* coefficient suggests a fast speed of adjustment of roughly one and half year. The current demand for electricity appears not to follow the past demand trend and construction of inverters.

Also electricity consumers proxied by population growth appear to be insignificant in explaining changes in demand for electricity. The result further reveals that both the current and accumulated (lag1&3) values of the real appliances purchase price (*RAP),* has a direct relationship with demand for electricity. Both RPE and RPY also were not significant in explaining changes in the demand for electricity. Furthermore, both the current and past (lag 3) value of RUS has a direct relationship with the demand for electricity.

5.

SUMMARY

The findings of the study are as follows:

(i) The inverse relationship between real appliance purchase price and demand for electricity at lag 2 is not surprising since increase in real appliance purchase price (RAP) is expected to reduce the demand for electricity.

(ii) Also the rate of population growth as a proxy for electricity consumers appears to be insignificant in explaining changes in the demand for electricity. This reveals the clear fact that the demand for electricity is greater than its supply in Nigeria.

(iii) The real per capita income (RPY) shows an inverse relationship with the demand for electricity. The same reason above can be deduced for this since the supply for electricity fall short of the demand which why people opt for the adoption of an alternative sources of power supply in the form of the purchase of private generators.

(iv) The rate of utilization of equipment stock (RUS) impact directly on the demand for electricity. The a priori expectation here is met since increase in equipment stock utilization would increase the demand for electricity in Nigerian.

RECOMMENDATIONS

Based on our findings outlined above two major recommendations can be deduced there from these are:

(i) The government should work towards actualizing the proposed 10,000 megawatts of electricity supply in the country by 2011 as promised since it has been found that the supply for electricity fall short of its demand in Nigeria.

(ii) The need to adopt the prepayment system of paying electricity bills is inevitable if efficiency is desired in the (power) sector as it is in the communication sector.

CONCLUSION

The study has sought to shed lights on the magnitude, direction and the determinants of the demand for electricity in Nigeria. The findings show that there exist along-run relationship among the variables and that policy options in the short-run required efforts to be directed towards actualizing the 10000 megawatts of electricity supply in the country by 2011 since it has been found that the supply of electricity fall short of its demand in Nigeria.

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