

METERED AND UNMETERED BILLING: HOW ASYMMETRIC ARE THE PHCN BILLS?

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ABSTRACT

This study provides evidence on the existence of asymmetries in the metering of electricity by the Power Holding Company of Nigeria (PHCN) between January 2005 and November, 2013. Using Chiappori-Salanie correlation statistics and data from the response of 720 electricity consumers and 524 PHCN bills within the Benin Electricity Distribution Company, the study observed that the electricity bills were asymmetric. The asymmetries were observed for both the metered and unmetered consumers over the period. For the metered consumers, the asymmetry was more prevalent for the analogue than the prepaid meter users. The asymmetry existed mainly through procurement of meter in the case of the prepaid meter users. The study argues that estimated billings by the PHCN give room for asymmetry and overprices energy consumptions. The study suggests a prepaid metering of all electricity consumers in Nigeria.

Keywords: Information asymmetry, Benin electricity distribution company, Metered billing, Unmetered billing, Prepaid meter users, Post paid meter users, Correlation test.

JEL Classification: D82, L11, O13.

Contribution/ Originality

The paper provides an empirical validation for the existence of asymmetry in the billing system of the Power Holding Company of Nigeria (PHCN). It extends the study of asymmetry from health, finance and Monetary Economics to the field of Energy Economics. The study examined popular claims that are being made by the successive heads of the PHCN and NERC as reasons for the subsistence of estimated billing of the public and the inability to meter all the consumers. The findings from the study provides evidence from the consumers' perspective to support the metering of all electricity consumers in view of the recent reforms taking place in the industry.

1. INTRODUCTION

In the Nigeria's electricity industry, majority of the consumers are unmetered. This situation has continued despite attempts¹ by the Nigerian Electricity Regulatory Commission (NERC) to reduce the metering gap in recent years. The problem of billing out-of-the-meter gave room for asymmetries² which were mostly against the consumers. The Power Holding Company of Nigeria³ (PHCN) bills consumers who were on direct connection (otherwise known as without meter) and those on post-paid meters with estimated bills. The main problem with billing by estimate had been the tendency to overcharge electricity users and provoke payment apathy. In the past five years, over 80 per cent of complaints received by NERC from consumers had been centred on issues of estimated metering, excessive tariffs with the metering methodology and poor metering infrastructure (Okafor, 2013). Defaults in payment of electricity bills by consumers arise a protest to perceived exploitation and negligence to complaints made to the PHCN authority. The problem with out-of-the-meter billing has been that its bill do not tally with the exact amount of energy consumed (Abubakar, 2009). The estimated are always dependent on the approximation of the PHCN. Under such instances, consumers who are already disconnected or had changed their metering plan continued to be billed with the old platform. The common feature of the estimated billings approach has been that the bills were always overpriced; amount charged sometimes remain constant over time even when electricity is rarely consumed and billing were sometimes discriminatory depending on the location of the consumer, the bill may merely require consumers to pay a specific monthly amount which was not dependent on the units of electricity supplied, consumed or the size of the building for which the bill was generated. Among all the classes of consumers, the bills of those that were on estimated tends to be higher compared to that of their counterparts whose consumption were read and metered. A number of evidences suggest that electricity billing in Nigeria is asymmetric. Amadi (2013b) observed that the issuance of estimated bills by the electricity distribution companies (discos) gives room to cheating the consumers. He opined that metering all electricity consumers would assist the customer to effectively monitor their electricity usage, as well as enable the discos determine their revenue. (Ogun and Ofonyelu, 2013). The prepaid metering platform was aimed at addressing the asymmetries from both the sides of the consumers and the PHCN. While the general consensus of the consumers supports the introduction of the prepaid meters, the PHCN officials seemed averse to the development, owing to their preference for the distribution of the analogue than the prepaid meters. This study examines the size of the asymmetry in the billing of both metered and

¹ For instance, ₦2.9billion was made available in 2011 by the Nigerian Electricity Regulatory Commission as metering intervention fund for the electricity distribution companies to close the huge gap of customers without meters. Subsequently, the NERC introduced a Credit Advance Payment for Metering Implementation (CAPMI) in 2013 to allow room for interested customers to advance money to the distribution companies for prepaid meters. See Amadi (2013a).

² Commonly occurring in form of arbitrariness in the billing system

³ The general usage generally refers to the distribution companies, who are saddled with the responsibility of billing and marketing electricity usage in Nigeria.

unmetered electricity consumers by the PHCN between January 2009 and October 2013 within the Benin Electricity Distribution Company of Nigeria (BEDCN). The rest of the paper is organized as follows: section 2 describes the patterns of asymmetry in the electricity bills in Nigeria. The methodology, result and findings are contained in sections 3 and 4. Section 5 is the conclusion.

2. THE PATTERNS OF ASYMMETRY IN THE ELECTRICITY INDUSTRY

This section provides evidence on the size and what constitutes asymmetry in the electricity bills. Asymmetry in billing relates with the type of meter (single or three phases), consumption and metering category (whether metered or unmetered), location, quantum of electricity availability and usage.

2.1. What Constitutes Asymmetry in Electricity Billing?

Asymmetry in electricity bill is used to refer to arbitrariness and lack of transparency occurring in the process of assessing and costing of consumers' energy consumed. In Nigeria, the common form of arbitrariness in PHCN billing includes charging of electricity rate outside the approved tariff⁴, irregularity in metering⁵, and estimated billing (Amadi, 2013b). Four propositions are used to define an asymmetric electricity bill. (1) Under asymmetric billing regime, consumers are faced with estimated bill, which do not depend on actual energy consumed. (2) In the bill, the charged amount of energy consumed remains same for all customers under the same classification within a district, town or state. This is irrespective of the variation in actual amount of electricity consumed by the individuals concerned or the size of the buildings/households (for instance, see table 2.3). (3) For the consumers who were unmetered (including metered but non-prepaid consumers), the bill for the current month was prepared even while the period has not ended. (4) Within the billing menu, consumers were neither required to be metered within a specified period of time, nor were immediate availability of meters provided for them. At times, consumers were charged discriminatory on a monthly basis for loss of revenue instead of being properly billed. The occurrence of the fourth proposition was common with new buildings and or tenants who had just been connected to electricity. Usually, such consumers were given hand written bills for the interim period before the consumers were properly registered and being billed as estimated pending the time that a meter will be acquired. Payment for most of such payment comes under the name such as loss of revenue, reconnection fee, etc. Experience shows that the payments made for those hand written bills are rarely remitted to the purse of the electricity company. The occurrence of the first proposition is the reason why most consumers on estimated bills see the PHCN bills as being against the law (Olusola-Obasa, 2012). The illegality arises because of their

⁴ By the federal government/regulatory authority

⁵ Such as billing over the meter record or the consumers occasionally by-passing the meter to connect directly - a criminal offence that is aimed at cheating the energy provider. Mainly, the occurrence of the later scenario is the reason why PHCN official need to frequently visit their customers to inspect their meters and ensure that payments are made for energy consumed.

disenfranchisement in the metering process. Estimated billing mainly keeps the consumers oblivious of the method and procedure applied in the computation of own bills. The first two propositions above hold true in all of the PHCN distribution companies in Nigeria. It is a norm that all of the consumers, who are without meters, are charged with estimated bills irrespective of individual amount of energy consumed. The third proposition suggests some element of prepayment for electricity that is not yet consumed even for non-prepaid consumers. The PHCN officials embark on the pre-charging of customers as a strategy to beat early distribution of bills in the new months. Pre-charging of the consumers on direct connection before actual consumption was made supports the inexactness of their estimated bills and subjects the amount to be expected to be billed for every month to gamble. While the fourth condition may differ slightly across the distribution companies, each of them operate a general conservative policy in terms of massive metering of the public (Amadi, 2013b). In addition, delay and high price for the acquisition of the meters have posted a major barrier for willing consumers wishing to be metered. One major crux with the estimated billings were that the bills were in variant with the quantum of consumptions and energy supplied. When it becomes related, the correlations were usually less than random and weak. The fixity of the bill in the face of irregular electricity supply and the subsistence of estimated billing by the distribution companies (Discos) in the industry join to point to the existence of asymmetry in the billing system.

2.2. Nature of Asymmetries in Metered and Unmetered Billing

The largest occurrence of asymmetry in electricity billing occurs for consumers who were not metered. It occurs because ownership of meter gives room for consumers to monitor their consumption and know the amount of energy actually consumed. Being metered gives the consumer opportunity to be able to calculate own bill, having known the amount of energy consumed. As a result, metering essentially helps to reduce the tendencies for asymmetry. For the analogue meter users, the PHCN officials were expected to visits the places of their customers twice in a month – to distribute bills and for debt recovery/ meter inspection. Asymmetry occurs if the monthly bill was generated outside the readings of the meter. The most common form of asymmetry was the estimated billing. This was common for consumers who were unmetered, as a physical reading of their meter were impossible. Thus - leaving the PHCN officials with the option of charging them estimated bills. The unmetered pool serves as the source from which the PHCN officials met their monthly revenue target. This essentially may be connected with the general reluctance by the officials in the provision of prepaid meter to consumers. The PHCN compute the estimated bills by estimating the amount of energy supplied to the feeders and net-out the estimated collectable revenue from the metered consumers. It is the difference is eventually shared on the consumers as estimated bills. While this makes the bills to be rarely same in any two months, the bills sometime become same across consumers within the same locality. For instance between July 2010 and February 2013, estimated consumers in Ikare Akoko districts on residential (ENR2) and commercial 1 categories (ENC1) were billed at flat rate of 200D and 300D respectively as their monthly consumption. The exception in the bills was the

month of January 2012 which was 342D for the two categories (see table 2.3). The case was however different for customers in other locations within the distribution company's jurisdiction. For instance in Owo districts, electricity bills of estimated consumers within the district were varied through the periods in question while it was constant in Ikare Akoko. The constancy of the electricity bill over a 30-month period in the face of an unsteady supply in Ikare Akoko indicates that the billing system was indeed asymmetric (see table 2.3). During the period of December 2012, the electricity bills remained same despite the fact that power supply was relatively stable through the period because of the Christmas and New Year festivities. The hike in estimated billing started from March 2013 even as power supply dwindled from the peaks before the resignation of the then Power Minister, Professor Bart Nnaji. From the perspective of the PHCN distribution companies, changes in the estimated bills depend on the quantum of energy supplied to the feeders over time. Thus, the PHCN applied the shortfall from their projected monthly estimated revenue on the general consumers, especially for the metered and unmetered consumers. What this essentially implies is that equal amounts of energy were being supplied to the feeders for the 13-month periods for which the estimated bills were constant. But in reality, this was not the case.

Table-2.1. Customer classification and descriptions

Customer Classification	Description	Remarks
Residential		
R1	Life-Line (50kWh)	A consumer who uses his premises exclusively as a residence- house, flat or multi-storeyed house
R2	Single and 3-phase	
R3	LV maximum Demand	
R4	HV maximum demand (11/33KV)	
Commercial		
C1	Single and 3-phase	A consumer who uses his premises for any purpose other than exclusively as a residence or as a factory for manufacturing goods.
C2	LV maximum Demand	
C3	HV maximum demand (11/33KV)	

Source: abstracted from [Multi Year Tariff Order \(2012\)](#)

For both the private and commercial energy consumers, the forms of asymmetry were the same - through overstatement of bills or wrong meter reading. Each of the forms tends to be prevalent for those who used analogue meters than the prepaid meters. The analogue metering method became dominant since the time when electricity was under the state monopoly of the National Electric Power Authority (NEPA). The prevalence was attributed to its durability and affordability. However, its major limitation requires that the PHCN officials visit their customers' places to read their meters and enforce payment. Moreso, it imposes some challenges in terms of revenue collection and projection. The introduction of the prepaid metering platform in 2006 whereby customers have to pay for energy before they were consumed was meant to overcome the challenges of the post paid meters. The introduction of the prepaid meter in 2006 was among others things to improve revenue collection and ease the task of the PHCN agents having to go to the homes of the consumers to read their meters. Most of the analogue meter users preferred prepaid meters because they do not know how the electricity consumptions charged were arrived

at. In analogue metering the PHCN official were required to read consumers' meter for consumptions made which should form the basis of the amount that would be paid in the new month. The officials most often do not read the meters, but rather mak project consumption rates which forms the basis of the bills that were eventually required to be paid. The impacts of these asymmetries worsen the difficulties in the estimation and collection of revenue. The introduction of the prepaid metering system (as against the predominant analogue meters) was a major attempt at improving the efficiency in the electricity industry. However, a greater indication from the responses showed that the PHCN officials rarely read the meters before making up their bills. Consumers using post-paid metering platform were given bills over and above their consumptions. Arbitrariness in electricity billing were worse for consumers that were without meters or are informationally captured (Sharpe, 1990). The existence of asymmetry in the electricity billing process has some implications for in the recovery of revenue in the industry. Usman (2013) linked the presence of arbitrary bills to the general low willingness by consumers to pay for their electricity bills when they become due.

2.3. Billing Regime and Asymmetry

Nigeria had implemented a number of changes in the unit cost of electricity tariff. Prior to the introduction of the multi-year tariff order (MYTO) in 2012, electricity tariff used to be higher for consumers in the domestic tariff than the commercial category. With the reform in the power sector in the year, the commercial tariffs became more costly, though still leaving the fixed cost to be cheaper. The disparity in the fixed cost between the two categories however levelled from June 1, 2012, with the tariff per unit of electricity consumed remaining higher for the commercial consumers (see table 2.2).

Table-2.2. Patterns of PHCN fixed charges and tariffs in Benin Discos (2009-2013)

Date	Fixed Charge (Residential ₂)	Fixed Charge (Commercial ₁)	Residential Tariff (N/KWH)	Commercial Tariff (N/KWH)	Meter Fee (R2)	M. Fee (C1)
01/1/2009	120	90	6.00	6.5	500	100
01/7/2009	185	138	6.60	7.4	772	153
01/7/2010	245	174	8.90	9.40	1019	193
01/7/2011	300	204	11.00	11.10	1251	227
01/6/2012	500	500	11.37	15.84	--	--
01/6/2013	750	750	11.37	15.84	--	--

Source: Compiled from past PHCN bills

Note: Meter charges became abolished from December 2011.

Before February 1, 2013, the monthly bills for customers on the estimated billing were seen as being discriminatory even within same locality; such that customers within the same consumption classification were charged different prices. It was revealed that customers within the same locality were charged same bill on the monthly basis while the bills' differs only with respect to locations. For instance, table 2.3 showed that the estimated bills of consumers in Owo were generally higher than those of most customers in Ikare Akoko. However, there exist

differences in the prices of the billing for the customers even within the two towns. Table 2.3 showed that the gaps between the electricity bills of those that were metered and the unmetered were wider in Owo than Ikare Akoko business district. The PHCN charges the estimated customers based on the amount of energy supplied and the revenue recoverable from each of the district. This study showed that the presence of larger commercial activities in Ikare Akoko, compared to Owo might have accounted for the relatively lower estimated bills among the consumers. The table 2.3 showed a widening trend in the billing system which was on the increase from July 2013, and was highest in October 2013.

Table-2.3. Asymmetric gaps between residential electricity bills in Ikare Akoko and Owo (2009-2013)

Period	Unmetered/Estimated Bill (Ikare Akoko) (a)	Unmetered/Estimated Bill (Owo) (b)	Metered Bill (c)	Asymmetric Gap (b-a)	Asymmetric Gap (a-c)
2009 February	306	380	172	74	134
July	147	220	80	73	67
October	278	322	101	44	177
December	380	386	302	6	78
2010 January	266	270	242	4	24
April	396	421	351	25	45
July	200	220	180	20	20
October	200	200	132	00	68
December	200	421	154	221	46
2011 January	200	220	150	20	50
April	200	300	190	100	10
July	200	300	123	100	77
October	200	380	132	180	68
December	200	289	140	89	60
2012 January	342	376	210	34	132
April	200	288	81	88	119
July	200	256	221	56	-21
October	200	243	200	43	0
December	200	278	140	78	60
2013 January	200	269	59	69	141
April	255	293	152	38	103
July	268	416	168	148	100
October	257	556	160	299	97
November	251	257	172	6	79

Source: Authors' Computation from past PHCN bills

3. MEASUREMENT

Two perspectives were important. Firstly, from the consumer's perspective, a bill is regarded as asymmetric if it was overcharged, estimated or non reflective of the amount of energy consumed. Secondly, from perspective of the PHCN officials, billing asymmetry reflects the extent to which there were shortfalls in the estimated revenue receivable from the quantum of electricity supplied. But the consumers see the PHCN as the main cause of the asymmetries. While the PHCN estimated bill reflected the average spread of the shortfall on the revenue, it was an indication of the extent to which estimated consumers were cheated by the PHCN to augment their revenue targets. This study revealed that using the prepaid meter reduced billing asymmetries.

3.1. Data

The data used for the study were obtained from PHCN bills and structured questionnaires administered to 720 electricity consumers and 524 samples of PHCN bills obtained from consumers within Ikare Akoko and Owo business districts, both within Benin Electricity Distribution Company (BEDC). in Nigeria. The sample frame includes the payee of electricity bill for the households and firms within the districts under BEDC, with the main attention focused on Ikare Akoko and Owo. The electricity bills span between February 2009 and November, 2013. The study period cover the years in which active reforms had taken place in the PHCN. Over 90% of the electricity bills considered was from consumers on residential 2 categories. The rest were from consumers on commercial 1 category. Of the whole, 82 percent of the questionnaires were administered within Ondo State, with the districts falling under the jurisdiction of the Benin Distribution Company (Benin Disco). Of the 85 percent of the metered consumers who use analogue meters, over 50 percent had been installed over ten years ago. For the prepaid consumers, it took between 6 and 24 months to procure the meter, but less than 15 months for the analogue/digital consumers. The price of the meter ranged between ₦25,000 and ₦35,000 for the digital analogue meters, and between ₦35,000 and ₦50,000 for the prepaid meters.

3.2. Methodology

The two most prominent tests in the literature for the test of asymmetries is the correlation test methodology (see (Chiappori and Salanié, 2000; Edelberg, 2004; Ogun and Ofonyelu, 2012; Ofonyelu and Alimi, 2013; Ogun and Ofonyelu, 2013)). The positive correlation test implies a positive relationship between two (conditional) distributions, which in this study referred to the characteristics of each consumer, drawn from the questionnaire (and the bills) in comparison with the metering system being operated. The presence of asymmetry suggests that a direct relationship exists between people's response in the questionnaires (and their electricity bills) and the type of metering system adopted. In the experiment that follows, we categorise consumers into three metering groups of (i) analogue/digital (ii) direct (iii) prepaid, and compare their responses to a set of benchmark characteristic variables. The categorization allows separating out the levels of asymmetries. The causal relationship between the consumers' responses (and their bills) with the set of benchmark variables defining asymmetry were estimated. The equation for estimation is represented following Dobbie and Skiba (2012):

$$\Phi_i = b_0 + b_1\tau + b_2\Pi_{1-3} + b_6\rho + \epsilon_i \quad (1)$$

Where the parameters τ , Π , and ρ represents asymmetries; in terms of how much the consumer agrees with the bills given him (Q30), how much is spent to procure the meter (Q14), the quantum of electricity enjoyed in a day (or week), Q16/17, how well the consumer could read the meter by self (Q27), and if actually the meter was read before the bills were generated (Q28). Φ_i is the dependent (composite) variable, from which all other responses are mapped into, and represent the consumers extent the bill reflect actual consumptions (Q30). The empirical counterpart of equation (1) is presented in tables 4.3. Positive correlations between the

coefficients suggest the electricity bills were at variance (asymmetric) with the actual consumptions of the consumers.

4. RESULTS AND FINDINGS

Table 4.1 showed the distribution of the consumers based on their metering categories. Majority of the consumers captured in the study use the post paid meters (analogue and/or digital). Among the consumers, only 19.72 used the prepaid meters. 20.28 of the consumers do not have their energy consumption measured in any form. For the consumers on the direct consumption, the majority of them had requested to be metered.

Table-4.1. Classification of the electricity consumers based on their meter categories

Meter Type	Frequency	Percentage
Analogue/Digital Consumers	432	60.0
Prepaid Consumers	142	19.72
Directly Connected Consumers	146	20.28
Total	720	100

Source: Authors' survey (2013)

Table-4.2. Cross correlation results among the metered and unmetered PHCN consumers

Sources of Asymmetries	Analogue/Digital consumers (7a)	Direct/unmetered consumers (7c)	Prepaid consumers (7b)
Asymmetry in meter procurement (14)	0.013	0.044	-0.007
Hours of electricity per day (16)	0.055	0.145	0.078
Hours of electricity per week (17)	0.0723	0.035	0.124
Inability to read meter (27)	0.059	0.067	-0.111
Meters not read before bill (28)	0.019	0.000	-0.109
Bill unreflective of consumption (29)	0.057	0.104	-0.119
Asymmetry in actual consumption (30)	0.090	0.008	-0.060

Source: Authors' computation

Note: values in the bracket represent the corresponding questions in the questionnaire. The results were obtained based on the categories within each of the questions.

The persisted of the directly connected consumers was because of unavailability and lack of any provisional law which required them to them to be compulsorily metered. The prevalence is likely to continue as the majority of the consumers constitute potential source of additional revenue for the electricity company. Table 4.2 is the positive cross correlation result between the benchmark risk variables used to represent billing asymmetry. The result suggests a deep presence of information asymmetry in the PHCN bills of the metered and the unmetered consumers but not in the case of the prepaid meter consumers. The consumers on the analogue meters were the major victim of asymmetry in terms of the disparity between actual consumption and bill brought to them. For the analogue meter users, ownership of meter is a limitation to being asymmetric since the meter can be read any time, and when so high could trigger up the future bills. For the consumers on the prepaid meter platform, asymmetry tends to reduce as the hours of electricity consumption increases. For instance, there will be a reduction in asymmetry of about 7.8% for every supply day that they enjoy electricity for over 6 hours. The same group of consumers (prepaid) will have their asymmetry intensity reduce by 12.4% if they

have electricity between 4-6 days out of every week. For the prepaid meter, inability to read the meter is not a problem as the consumer will barely be cut off once the loaded electricity unit is exhausted. For all categories of the consumers, their hours of electricity consumptions per day (and weekly) were the most asymmetric. Table 4.3 show the coefficients of the probit regressions.

Table-4.3. Result of probit regression for all categories of the PHCN consumers

Benchmark asymmetric variables/Dependent variable (Q30)	Analogue/Digital Consumers	Direct Consumers	Prepaid Consumers
Asymmetry in meter procurement (Q14)	-0.209(0.109)*	-0.208(0.109)*	-0.241(0.110)*
Hours of electricity per day (Q16)	0.185(0.106)*	0.199(0.106)*	0.183(0.106)*
Hours of electricity per week (Q17)	-0.251(0.107)*	-0.239(0.107)**	-0.239(0.107)**
Inability to read meter (Q27)	0.866(0.101)***	0.872(0.101)***	0.857(0.101)***
Meters not read before bill (Q28)	0.059(0.104)	0.080(0.103)	0.059(0.104)
Constant	-0.129(0.108)	-0.050(0.101)	0.057(0.105)
Prob.> R2	0.000	0.000	0.000
Pseudo R2	0.103	0.099	0.106
No. of observations	720	720	720

Source: Authors' computation

Note: (i) ***= 1% significant level; **=5% significant level; *=10% significant level.

(ii) The values in the bracket are the standard errors

Based on the probit results in table 4.3., the trend of asymmetry across the three categories of electricity consumers were not significantly different. The pattern of the asymmetries based on the probit results suggests that all consumers' bills were asymmetric. Based on the result, the asymmetries in the bill derive from irregularities in the daily energy supply, lack of knowledge on how to read own meters and non reading of the meter by the PHCN officials. A fixed regular supply of a quantum of electricity on a daily (weekly) basis will help the consumers in predicting average consumption over time, and as a result reduce asymmetry. For all categories of the consumers, their hours of electricity consumptions per day (and weekly) were the most asymmetric considering both the probit and correlation results.

5. CONCLUSION

This paper provides evidence on the existence of asymmetry in the PHCN bills distributed to electricity consumers in Nigeria using Chiappori and Salanie correlation statistics. The study examined various patterns through which asymmetries occur in PHCN bills. The analysis showed that estimated billing overprices consumption for both the metered and unmetered electricity consumers. Based on a correlation analysis between factors causative to asymmetries for the metered and unmetered consumers, the result showed the presence of asymmetry to be more in the billing of the metered and unmetered consumers compared to that of the prepaid meter users. Non-reading of the meter, consumer inability to read meter and irregularities in supply of electricity were rightly signed variables causing asymmetry across the categories of consumers based on the probit results. The study suggests a prepaid metering of electricity consumption in Nigeria to reduce billing asymmetry.

REFERENCES

- Abubakar, S.M., 2009. Design and construction of a computer based power billing system. Published dissertation, federal university of technology, Minna, Niger State, Nigeria. Amadu Bello Univeristy Journal of Technology, 13(1): 39-46.
- Amadi, S., 2013a. NERC threatens distribution firms on prepaid meters. Available from <http://www.nigeriancurrent.com/business-news/item/3531-nerc-threatens-distribution-firms-on-prepaid-meters.html> [Accessed 23/10/2013].
- Amadi, S., 2013b. FG cautions new power firms owners against crazy bills. Available from <http://www.nigeriancurrent.com/business-news/item/4915-fg-cautions-new-power-firms-owners-against-crazy-bills.html> [Accessed 23/10/2013].
- Chiappori, P. and B. Salanié, 2000. Testing for asymmetric information in the insurance markets. The Journal of Political Economy, 108(1): 56-78.
- Dobbie, W. and P.M. Skiba, 2012. Information asymmetries in consumer credit markets. Evidence from Payday Lending. Available from www.people.fas.harvard.edu/~dobbie/.../InfoAsym_Feb2012.pdf [Accessed 28/01/2013].
- Edelberg, W., 2004. Testing for adverse selection and moral hazard in consumer loan markets. Federal Reserve Working Paper.
- Multi Year Tariff Order, 2012. Available from <http://www.nercng.org/index.php/document-library/func-startdown/50/> [Accessed 25/10/2013].
- Ofonyelu, C.C. and R.S. Alimi, 2013. Perceived loan risk and ex post default outcome: Are the banks' loan screening criteria efficient? Asian Economic and Financial Review, 3(8): 991-1002.
- Ogun, O. and C.C. Ofonyelu, 2012. Determinant of asymmetric risks in Nigerian loan market: Any dichotomy between the banks and borrowers' perspectives? African Journal of Economic Policy, 19(2): 27-40.
- Ogun, O. and C.C. Ofonyelu, 2013. Asymmetric information problems in the Nigerian banking industry: Any scope for institutional reforms? Paper Presented at the 54th Annual Conference of the Nigerian Economic Society, between September 17-19, at Sheraton Hotel and Towers, Abuja.
- Okafor, C., 2013. Metering accounts for 80% of consumer complaints. Thisday. [Accessed 29 October].
- Olusola-Obasa, B., 2012. Ccus to address complaints over-estimated billing. Available from <http://www.punchng.com/feature/power-talkback/ccus-to-address-complaints-of-over-estimated-billing> [Accessed 06/11/2013].
- Usman, A., 2013. Determinant of electricity consumer satisfaction in selected electricity distribution zones in Nigeria: Implications for regulatory activities. Journal of Asian Business Strategy, 3(6): 103-124.
- Sharpe, S.A., 1990. Asymmetric information, bank lending and implicit contracts: A model of consumer relationships. Journal of Finance, 45: 1069-1087.

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