



Assessing the consumers' willingness to adopt a prepayment metering system in Nigeria



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HIGHLIGHTS

- We study the willingness-to-adopt prepayment metering (PPM) by Nigerian households.
- We use a double-hurdle model.
- We find that electricity spending (not income) drives consumers' intended adoption.
- Other drivers include the split incentive problem and the current payment method.
- Government subsidies should prioritise PPM installation over electricity tariffs.

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ABSTRACT

Despite the rising popularity in the adoption and usage of prepayment meters, little is still known about the drivers of its adoption. We examine the willingness to adopt prepayment metering (PPM) for a sample of Nigerian households that were not prepayment users. Double-hurdle models were estimated to account for households' decisions concerning billing system switching behaviour and households' willingness to pay (WTP). The estimated results revealed that decisions to adopt a prepayment meter are significantly affected by current electricity spending, current billing method and the split incentive problem. Whereas current electricity spending significantly increased the tendency to adopt PPM, the split incentive problem reduced the probability of adoption. Although unmetered consumers were more likely to express a willingness to adopt a PPM system than post-paid customers, they did not intend to pay a significantly higher amount to obtain the prepayment service. Income did not play a significant role in decision-making concerning PPM adoption and the corresponding WTP amount. These results cast doubt on the validity of the widely held belief that low income may be responsible for PPM adoption, reflecting the widespread usage of PPM by low-income households.

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1. Introduction

Besides the reliable electricity service delivery, the accurate allocation of energy costs based on actual consumption is important to electricity users. This is because poor metering or inaccurate allocation of energy costs can have a significant welfare effect on consumers, especially on the low-income ones. If the utilities overbill on quantities used (e.g., putting same estimate for everyone's use, which could be at or above total average consumption) or tend to overbill on prices (i.e., putting a higher tariff than it actually is), then the most vulnerable group will be the one

(and most likely the poor) who often consume less electricity but whose energy expenditures account for the highest share in their household budget.

This study examines the households' willingness to adopt (WTA) prepayment as an effective metering system in Nigeria. Despite the significance of accurate metering of electricity to consumers, the metering rates in many developing countries remain very low. At the end of 2013, for instance, more than 50% of registered electricity users in Nigeria were unmetered.¹ The distribution of these unmetered customers ranges from 32% to 76%

¹ See the Nigerian Punch, October 10, 2013: Power: 50% consumers do not have metre, says Nebo <http://www.punchng.com/business/business-economy/over-50-electricity-consumers-still-not-metered-minister/>

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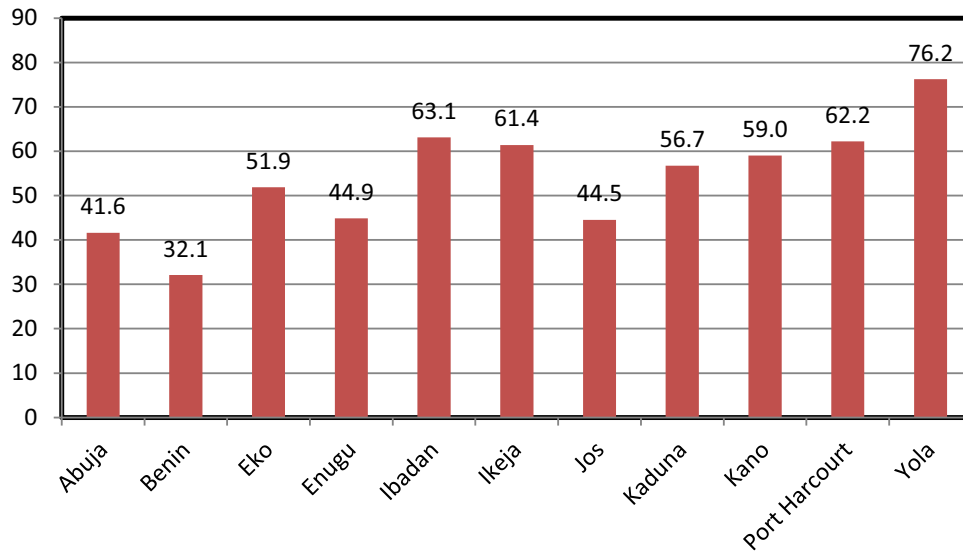


Fig. 1. Share (%) of unmetered customers, by electricity distribution company areas. Source: Author's calculations based on data from Presidential Task Force on Power (2012).

across the various distribution companies' supply areas (Fig. 1). These unmetered customers are at the mercy of estimated billing. This billing practice is widely open to corruption and often results in overbilling due to either non-compliance with the official billing procedures or non-use of the appropriate parameters, such as household size, appliance ownership, housing type, etc. (see [Ofonyelu and Eguabor, 2014](#)).

Ensuring accurate metering of consumption is imperative in Nigeria considering the poor quality of electricity supply and widespread extortion of (both post-paid metered and unmetered) customers by utilities through arbitrary billing, such as charging consumers within the same locality and consumption classification different tariffs contrary to the tariff system in Nigeria² ([Ofonyelu and Eguabor, 2014](#); [Opara and Asu, 2014](#)). Although the ideal and global practice is to charge unmetered customers based on the average consumption of all unmetered households in an area, such practice is often jettisoned by utility companies in Nigeria.³ According to the Nigerian Electricity Regulatory Commission, utility providers often resort to arbitrary billing of customers which often deviates significantly from actual consumption adjusting for margin of error ([The Nigerian Punch, 2014](#)). The most common forms of arbitrariness in electricity billing in Nigeria include charging of electricity tariff over the rates approved by the regulator, billing over the meter records (i.e., overbilling on quantity) and inconsistent estimated billing ([Amadi, 2013](#)).

Although the regulator is aware of the arbitrary billing of consumers by utility providers and has expressed its disapproval of such corrupt practices ([The Nigerian Punch, 2014](#)), inappropriate billing continues to exist ([Ofonyelu and Eguabor, 2014](#); [Opara and Asu, 2014](#)), probably due to lack of sanctions by the regulator. Given the poor billing practices in Nigeria, issues related to inaccurate estimated billing, excessive tariffs in the estimated metering methodology and poor metering infrastructure constitutes over 80% of complaints received by the regulator – the

Nigeria Electricity Regulatory Commission ([Okafor, 2013](#)).

We investigate the determinants of Nigerian households' willingness to adopt prepayment metering (PPM) as an option for achieving effective electricity metering. As the most newly introduced metering system in Nigeria, it is of interest. Moreover, PPM could be an interesting option for Nigerian households to avoid overbilling. PPM is not (or less) susceptible to illegal billing practices because consumers only pay for energy units they intend to consume prior to consumption and any unused energy units would be available for later consumption. Also, PPM can help consumers conserve energy and reduce energy spending because it is capable of increasing their awareness of their energy use ([Boyd, 2008](#); [Faruqui et al., 2010](#)).

Furthermore, the poor electricity situation in Nigeria is generally attributed to the inadequate financing of generation and distribution capacities due to poor patronage by private investors ([Nnaji, 2010](#); [Presidential Task Force on Power, 2011](#)). Private investors are reluctant to invest in the power sector because the highly subsidised tariff system currently operating in the country does not guarantee a return on investment. Thus, the assumption is that if households pay more, investment in the sector will rise and the service will improve. Findings from a recent study on the Nigerian households' willingness to pay (WTP) for electricity service reliability has suggested that having many consumers on PPM can increase consumers' acceptance of optimal tariffs. Prepaid customers tended to express higher WTP for service reliability than post-paid households ([Oseni, 2015](#)). The reason for this stated WTP was that the PPM users spent smaller amount on electricity than the non-prepayment users (probably because they were not affected by overbilling). Thus, they were more willing to pay for a reliable electricity service than the non-prepayment users. This finding suggests that having many consumers on prepayments may reduce public protest if a cost-reflective electricity tariff is introduced in order to spur private investments and ensure adequate electricity provision. Thus, the relevant policy questions are should government support the use of prepayment? Would Nigerian households be willing to adopt prepayment metering? And what are the main drivers of consumers' willingness to switch to and pay for PPM?

Unlike in many other countries where PPM is often installed by utility companies when a customer is considered a credit risk ([Boardman and Fawcett, 2002](#); [Howat and McLaughlin, 2012](#); [Speak, 2000](#)), the installation of PPM in Nigeria is based on

² In Nigeria, electricity prices are set by the regulator and consumers in the same classification are charged the same tariff regardless of location. The majority of residential consumers fall under classification R2 and are charged N13 (US\$0.08) per kWh. For further information on the Nigerian electricity market, see Appendix A.

³ As stated previously, charging customers based on overall group average consumption can also be disadvantageous to the low-income customers whose energy use is far below the overall group average.

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