Policy brief
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The vicious nexus of non-payment of tariffs and blackouts

Evidence from Ghana

In brief

- A vicious circle of unreliable electricity and non-payment of tariffs in sub-Saharan Africa is detrimental to increasing access to reliable electricity in the region.
- Widespread access to reliable electricity has direct and immediate implications for both the welfare of households and the productivity of firms. While some countries have made progress in extending access, reliability remains a major challenge.
- In Ghana, we find that even in periods of relatively stable power supply, customers often do not fully pay their electricity bills. A recent World Bank report suggests that tariff non-payment contributes to utilities in sub-Saharan Africa not being financially viable.
- This study measures the link between unreliable power supply and non-payment of tariffs in Ghana. We find that unreliable power supply exacerbates non-payment, thereby creating a "revenue trap" for the utility.
- Finally, the evidence implies that it is critical for policymakers to balance electricity access expansion with reliability concerns.

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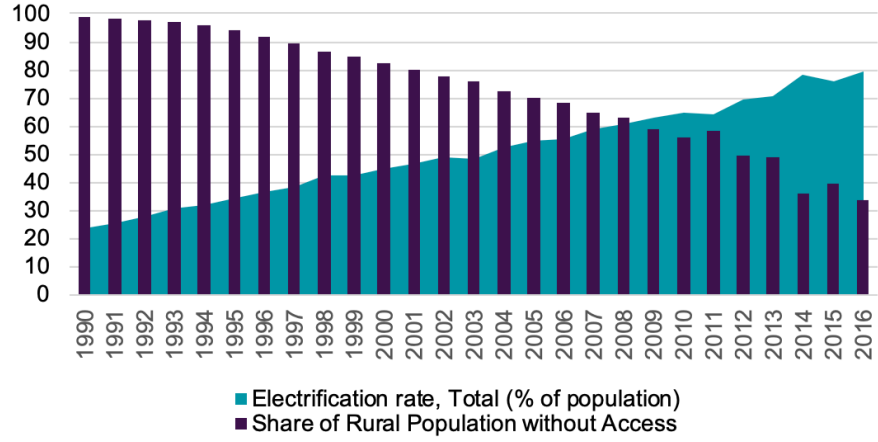
Policy and research context

Non-payment of tariffs and blackouts are common features of the electricity sector across the developing world. We find evidence to suggest that these two related phenomena reinforce each other, thereby keeping the power sector underdeveloped and inefficient. Our analysis implies that in the absence of concerted policy efforts, the vicious circle of non-payment of tariffs and blackouts will continue to undermine widespread access to reliable electricity in sub-Saharan Africa (SSA).

Electricity supply is a critical element to promote economic growth. Widespread access to reliable electricity supply has direct and immediate implications for both the welfare of households and the productivity of firms. However, much of SSA remains without widespread reliable access to electricity. According to a survey of business owners by the World Bank (2017), this is the second biggest obstacle to firm growth in the sub-region. Access to finance remains the biggest obstacle.

Accordingly, universal access has become a top priority for policymakers across SSA. In Ghana, the setting of this study, there has been a concerted effort to ensure universal access to electricity for all by 2020. As evident from Figure 1 below, access rates have improved markedly, with the share of the rural population without access falling to less than one-third as of 2016. However, in urban areas, the challenge is quite different – access rates are relatively high, but reliability is problematic.

Figure 1: Evolution of electricity access in Ghana



Source: IEA (2018).

This is emblematic of the challenges confronting the electricity sector in SSA, including non-payment of tariffs and blackouts. First, utilities are faced with large revenue shortfalls. Indeed, 37 in 39 electricity sectors in the region are not financially viable (Trimble, Kojima, Arroyo, and Mohammadzadeh, 2016). The second challenge is rolling blackouts, where utilities are

compelled to shed load because real-time power supply shortages require the utility to rotate parts of the grid to have power involuntarily cut off.

However, when a utility is compelled to implement rolling blackouts, customer tariff payment may fall further. Lower tariff payment rates could operate through several channels. The frequent blackouts could reduce customer goodwill towards the utility and erode the social norm of tariff payment. Alternatively, the rolling blackouts may reduce customers' income so that they are less able to pay their tariffs. Regardless of the reason, if this vicious circle between non-payment of tariffs and blackouts exists, then utilities could be caught in a "revenue trap" that is difficult to escape and stands in the way of providing reliable power in the long-run.

The study

In this study (see the Working Paper, Dzansi et al., 2018), we examine the negative feedback loop between non-payment of tariffs and blackouts in the context of Ghana, which suffered from widespread power shortages in 2014-2015. Amid rapid electrification throughout the country, the electric utility is experiencing both increasing rates of non-payment and decreased reliability. This begs the question: *Are low payment rates exacerbated by load shedding?*

An important institutional feature in Ghana is that the Electricity Company of Ghana (ECG) "protects" the distribution feeders that serve critical infrastructure, such as major hospitals and military installations, from rolling blackouts. If a household happens to be served by the same feeder as a critical piece of infrastructure, it will receive fewer blackouts than a household served by an "unprotected" feeder. We use the presence of "protected" and "unprotected" feeders as variation in a household's power reliability to estimate the causal impact of reliability on tariff payment.

We use household-level data on tariff payments to test if households served by protected feeders accumulated unpaid tariffs at lower rates than households served by unprotected feeders. If the vicious circle of non-payment and blackouts exists, we should find that households on protected feeders should accumulate less unpaid balances relative to their counterparts on unprotected feeders. Put differently, if load shedding exacerbated the non-payment of tariffs, households who were on unprotected feeders, and thus experience the worse of the blackouts, should accumulate more unpaid tariffs.

By their very nature, estimating the magnitude of feedback loops is inherently challenging. We exploit the presence of protected and unprotected feeders using the generalised difference-in-differences methodology with household fixed effects, which allows us to credibly estimate the effect of blackouts on tariff payment.

Research findings

Non-payment of tariffs is prevalent

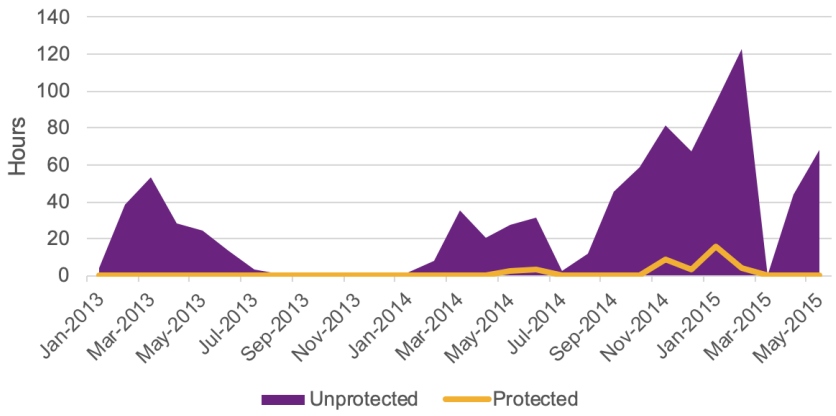
The average household in our sample consumes approximately 200 kWh of electricity per month. The corresponding monthly charge is about GHS (Ghanaian cedi) 73. *However, households do not make regular monthly payments and tend to accumulate unpaid balances.* The average unpaid balance on any given month is about GHS 200, which is almost three times the average monthly charge.

Feeder status impacts households' exposure to power outages

Households within the same neighbourhoods experienced different hours of power outages depending on the status of the feeders serving them. We study a set of households that are in similar neighbourhoods but experience different outage rates. During the sample period as a whole, unprotected feeders experienced substantially more blackouts than protected feeders.

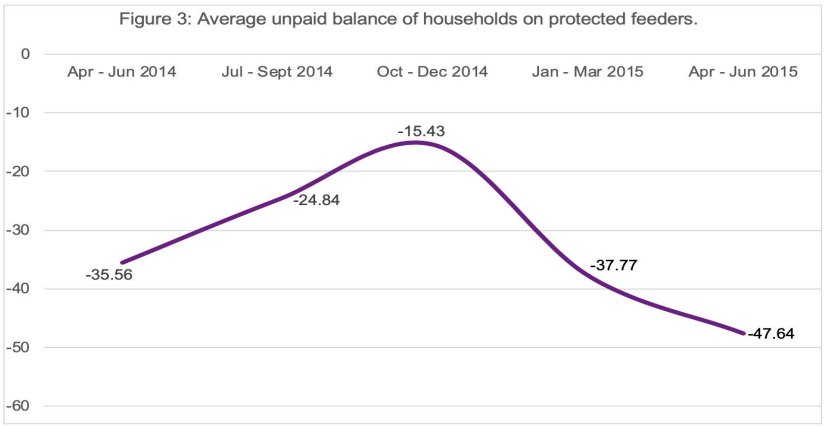
During the peak of the power crisis, beginning April 2014, the typical household in our data that was served by unprotected feeders experienced dozens of hours of load shedding per month. The experience of an average household on a protected feeder is markedly different. As shown in Figure 2, *householders located on protected feeders enjoy a relatively more stable supply of electricity*.

Figure 2: Protected feeders in our sample receive fewer outages



Unprotected households accumulate higher unpaid balances.

Figure 3 below presents the average unpaid balance of households on protected feeders relative to the control group. It shows that *being on a protected feeder reduces households' unpaid balance significantly.* Households on unprotected feeders pay 4.3% less of new charges over a 15 month period. This translates into a 16.5% increase in unpaid balances for customers served by unprotected feeders as compared to those served by protected feeders.



There is strong evidence of a negative feedback loop between power outages and non-payment

Results show that a typical household on a protected feeder has an unpaid balance that is GHS 48 less than the typical household on an unprotected feeder after 15 months. Put differently, *unreliable power causes households to owe the ECG a larger unpaid account balance.* This implies that the power crisis exacerbated the non-payment of tariffs.

Policy implications

Our results imply that power outages and non-payment of tariffs reinforce each other in a negative feedback loop. In the case of Ghana, we find that even in the periods of relative stable power supply, non-payment of tariffs is a major challenge for the utility. And when the power sector slipped into nationwide load shedding, non-payment of tariffs worsened further, thereby contributing to a possible "revenue trap".

Three key policy lessons emerge:

The government needs to guard against a revenue trap

Many utilities in SSA face severe quasi-fiscal deficits that can be exacerbated if revenue collection falls. Government intervention may well be necessary if the negative feedback loop between outages and bill payment creates a large risk that the utility falls into a revenue trap.

Address issues of tariff non-payment head-on

Utilities are considering proactive means to improve revenue collection, such as moving customers to pre-paid meters. However, the majority of customers in many areas still use post-paid meters. The benefit-cost analysis of expanding pre-paid meters should factor in the risk of entering into a revenue trap.

Balance access expansion with reliability concerns.

As countries endeavour to expand access to electricity, it is critical to ensure that it is accompanied by corresponding investments to meet the increasing demand of both existing and new customers.

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