Costly 'Throw-Ups': Electricity Theft and Power Disruptions

An investigation of the link between electricity theft and power disruptions simultaneously provides a rare and contemporary cross-country assessment of electricity theft. The findings suggest that electricity theft in Haiti ranked first overall, and that extensive power theft has risen internationally since 1980. The direct cost of electricity disruptions ranged from US$0.43 to US$9.91 per kWh.

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I. Introduction

Rampant electricity theft is a worldwide predicament even among developed countries. Power theft is manifested in several ways, including illegal connections, non-payment of bills for electricity utilized and fraud on the part of some employees of utility companies. Despite the pervasiveness of electricity theft, there is a surprising dearth of empirical studies that provide any comparative assessment of the issue in an international context or even with emphasis on a particular country. To our knowledge, Smith (2004) is the notable exception. However, while Smith (2004) specifically explored the issue of electricity theft in a global context, the author did not simultaneously estimate the damage caused by power disruptions. Consequently, one of the main contributions of this article is that we attempt to reduce this gap by providing an update and extension to Smith's (Smith, 2004) rare comparative analysis of power theft globally.[1] Additionally, we examine the

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evolution of electricity theft internationally while estimating the direct cost of power interruptions to Jamaica and 95 other countries.

Electricity is a key input in many production processes and hence its continuous supply is crucial (Jamil, 2013). Theft of power is a major challenge because it affects the distribution of electricity from power companies by overloading/short-circuiting their systems. This often results in a disruption (i.e. a partial or complete loss) in the electricity supply to legitimate customers. As a result, curtailing power theft is an important policy objective for power utility providers. In this article, our general research problem is as follows: Electricity theft partly by ''throw-ups''[2] (also called ''spider webs'') sporadically cause power systems to overload and lead to power disruptions (''blackouts'' and ''brownouts'').[3] Such interruptions in turn, result in *inter alia* a loss of productive output. In other words, the central theme throughout our article is that electricity theft is costly and contributes to power disruptions, which in turn lead to costs for an overall economy and its various sectors. In our research, we use Jamaica as an interesting case study on power theft because its theft level is relatively high compared with other countries and the island is also frequently affected by power interruptions.[4]

Reliable electricity supply is crucial because the world is becoming increasingly dependent on electronic devices connected to the grid (Coll-Mayor et al., 2012). Disruptions in electricity supply (whether planned or unplanned) are undesirable because they lead to *inter alia* a loss in value that would have otherwise been created. During an electricity disruption, the output of some firms for example, is directly lost when the production process is halted. This value of lost load (VoLL) essentially represents the losses per hour of electricity not supplied (Coll-Mayor et al., 2012) or alternatively, the cost of unserved energy (Bose et al., 2006). Estimating the value of lost load is important because power supply interruptions can have adverse consequences especially to sectors that are extremely reliant on electricity to produce output. Additionally, estimates of the VoLL by sector can assist power companies to determine priority areas for disrupting power when supply shortage arise (de Nooij et al., 2007).

These estimates are useful in particular because they can help to approximate the direct losses faced by the respective economies due to electricity disruptions.

The major objectives of this article are to (1) analyze the phenomenon of power theft over an extended period, (2) present a comparative analysis of electricity theft in an international context and (3) estimate the value of lost load due to power disruptions for Jamaica and several other economies internationally. Hitherto, no study, as far as we are aware, simultaneously provides a detailed comparative analysis of electricity theft globally while computing the value of lost load (as a result of power disruptions) for almost 100 countries. As mentioned earlier, these estimates are useful in particular because they can help to approximate the direct losses faced by the respective economies due to electricity disruptions. While de Nooij et al. (2007), Leahy and Tol (2011), Coll-Mayor et al. (2012), and Linares and Rey (2013) all estimate the value of lost load due to power interruptions, they do not specifically explore the issue of electricity theft in an international context. As a result, our research presents a potentially useful contribution by addressing this lacuna.

Approximately 97 percent of the Jamaican population has access to electricity. The Jamaica Public Service Company Limited (JPS); Jamaica's national light and power company, is the only licensed distributor of electricity in the island, though it also engages in the generation and transmission of power.[5] It also purchases electricity generated by independent power providers (IPPs) under various power

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