

LABOR SUPPLY AND WELFARE EFFECTS OF ELECTRICITY IN GHANA: DOES GEOGRAPHY MATTER?

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Overview

Electricity demand is a good indicator of a country's economic growth and development. Whenever countries experience expansion in various economic activities as a result of improved access to public infrastructures (for instance electricity, clean water, road, public transport services, hospital, school), earnings and demand for labor in the traditional sectors may equally be affected (see for instance Dinkelmann, 2011; Khandker et al., 2012; Lipscomb et al., 2013; Lee et al., 2020).

The main objective of this paper is to investigate effects of electricity on employment, earnings of wage and salaried workers, as well as employment shift in the agriculture and service sectors. In Ghana, like other developing countries experiencing services sector boom, the manufacturing sector has been leapfrogged by the service sector with limited labor capacity. This has caused employment shift to be directly from the agricultural sector into the service sector justifying the focus on these two sectors. This study contributes to an emerging literature analyzing the impact of public infrastructure on different outcomes in Ghana (Mensah et al., 2014; Akpandjar and Kitchens, 2017; Adu et al., 2018; Adusah-Poku and Takeuchi, 2019).

The paper also examines complementarities between access to electricity, water and public transport as an alternative to electricity in the analysis. Considering this, we argue that access to electricity may lead to contemporaneous expansion of other public infrastructures such as access to water grid and public transport services among others, thereby generating interactive effects on household outcomes. For instance, it is possible that access to electricity may lead to household's connection to water grid or use of electric water pumps, which in turn saves time from going to fetch water from the well or river.

Also, we analyze how access to electricity and an increase in the composite index have been welfare-improving in terms of individuals' demand for durable goods such as television, sewing machine, flush toilet, car, shares, among others. Additionally, this paper investigates the prevalence of power outages ("dumsor" as it is called in Ghana) on the outcome variables. Specifically, we contribute to the strand of the literature by analyzing the effect of quality of electricity supply on various outcomes. As documented earlier, researchers have found outages and inadequate supply of power to weaken or reduce the actual developmental effect of electricity since households and firms must incur additional cost by resorting to private generators, among others. For this reason, we estimate and discuss the implications of dumsor on the various outcome variables.

Methods

The core of empirical work is identification and data after making sense of the theory to be tested. From the above observations, this paper uses the Ghana living Standard Survey on individuals and again contributes by resolving the empirical difficulty in the literature on Ghana in correcting for endogeneity in access to public infrastructure. We do this in an instrumental variable (IV) estimation approach, by using the median slope of land at the community level as an IV to correct for endogeneity in both access to electricity and the composite index. This slope of land variable is taken from EarthEnv which is a part of the suite of topographical variables derived by Amatulli et al. (2018). This ready-to-use slope of land variable is fully standardized and based on the digital elevation model products of 250m Global Multi-resolution Terrain Elevation Data (GMTED) 2010 which is of higher resolution compared to what is mostly taken from the 90m Shuttle Radar Topographic Mission (SRTM). In using the slope of land as an IV, we argue that, conditional on a set of controls at the individual, household, and regional level, the probability of having access to electricity reduces as slope of land increase even before individuals decide to connect to the available grid in a community. It is possible that, based on engineers' initial assessments countries that are monetary constrained, may choose to supply communities where it is less costly to carryout developmental projects than others – causing supply to be non-random. For the composite index, we do not disentangle the effect of the IV on electricity from access to water grid and public transport services for the above same reason.

Results

The main findings of the can be summarized as follows. In general, the results do not suggest significant employment effect because of having access to electricity nor an increase in the composite infrastructure index in Ghana. On the contrary, access to electricity and a one standard deviation increase in the infrastructural index affects earnings of wage and salaried workers positively by 42.9 and 16.9 percent, respectively. When investigating employment shift, we find that access to electricity and a one standard deviation increase in the overall index reduces employment in the agriculture sector by 64.6 and 37.2 percentage points, respectively. On the other hand, access to electricity and a one standard deviation increase in the composite index increases employment in the service sector by 41.1 and 23.6 percentage points, respectively. This employment shift is only significant for females. On investment in durable goods, we find access to electricity and the infrastructural leads to significant increase in the demand of durable goods such as television, refrigerator, mobile phone, flush toilet, car, and motorcycle while reducing demand in sewing machine with no significant effect for shares. Moderate levels (averaging between 6 -12 hours daily) of power outages have positive effect on employment and the agriculture sector employment with negative effect on service and earnings. Higher levels (between 18-24 hour, for instance) of power outages have no employment effect except it still has a negative impact on wages.

Conclusions

From all indications we observe the costs involved in public infrastructural projects do not seem to match the intended benefits especially in improving agribusinesses, job creation, among others. Aside individuals investing in durable goods which improves standard of living, policymakers should be concern about expanding and making the agriculture sector attractive to provide employment for the growing population of Ghana. Utilities should work at providing adequate and reliable supply of electricity, and water since access without utilization does not contribute to socioeconomic development. While the people of Ghana may rejoice over expansion in electricity access, the government of Ghana should regulate the prices of other sources like solar pv's to make installation affordable as a step towards the fight against pollution. Also, policy makers and engineers should take advantage of the expansion in electric grid and extend other infrastructures both directly and indirectly. Finally, our findings and recommendations can be extended to other developing countries.

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