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The effects of electricity grid access on Indonesian manufacturing firms

Matching data on electricity grid access in Java, Indonesia with census data on the island's manufacturing firms, allowed for an estimate to be made of the causal impact of such access on various firm outcomes.

Preliminary results show that access to electricity increases firm revenue, capital, and investment. These results are potentially important in guiding policy and informing infrastructure investments among governments in developing countries as well as development aid agencies.

Electricity grid access: a wise investment?

Economic literature tells us that firms in developing countries are less productive than firms in developed countries. Does poor infrastructure, in particular, limited access to electricity, explain the low productivity level of firms in developing countries? As many governments and development aid agencies invest in infrastructure projects in developing countries around the world, it is important to quantify the benefits of these investments.

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Electricity grid access and Indonesian manufacturing firms: the data

Despite Indonesia's successful growth in the manufacturing sector in the 1990s, like other developing countries, it continues to struggle with electricity supply. In order to quantify the benefit access to the electricity grid has had on manufacturing firms, data was collected on the expansion of the grid in Java, Indonesia from 1990 to 2000. During this period, the number of electrical substations in Java more than doubled, total system capacity increased by a factor of four, and the household electrification ratio increased from around 60% to 92%.

The data was collected by Perusahaan Listrik Negara (PLN), the state electricity monopoly in Indonesia, using a geographic

information system (GIS), which captures and analyses spatial or geographic data. PLN GIS data on electrical substations and capacity expansion over time was matched with the ‘Indonesian Manufacturing Survey of Large and Medium-Sized Firms’. It details information on firm electricity consumption and production, as well as the village in which the firm is located. With 80% of firms being located in Jakarta, this is where the focus of the analysis lay.

The results

The dataset and census therefore allowed for an estimate to be made of the causal impact of access to electricity on various firm outcomes. Preliminary results show that access to electricity increases firm revenue, capital, and investment. Firms scale up their production, which translates into an increase in firm size, both in terms of revenue and number of employees.

“ preliminary results show that access to electricity increases firm revenue, capital, and investment ”

Firms also become more capital intensive. As the capital-labour ratio of the firm increases, access to electricity affects the number of employees only through its effect on capital. Finally, it is found that access to the grid positively affects firm productivity.

Grid access and Indonesian villages

When examining the effect of electricity grid access on all villages in Java, it is estimated that the number of firms in a village increases with access. When the grid arrives in a certain village, that village is more likely to have at least one medium or large manufacturing firm. In addition, preliminary results show that access to the grid also affect entry and exit rates, which hints at more firm selection in areas where there is access.

“ When the grid arrives in a certain village, that village is more likely to have at least one medium or large manufacturing firm ”

Conclusion

Although preliminary, these results are potentially important in guiding policy. Quantifying the effect of electrification will help compare investment in electricity supply to other types of infrastructure investments. In addition, it is important to take potential firm entry into account when comparing the option of a micro-grid, which might not attract medium or large manufacturing firms, when compared to the option of connecting an area to the national network.