

Does Weather Have an Impact on Electricity Distribution Efficiency? Evidence from South America

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Abstract This paper analyses the influence of weather variables on the efficiency of electricity distribution utilities in Argentina, Brazil, Chile and Peru. The data covers 82 firms that operate in the previously mentioned countries which represent more than 90 per cent of the distribution market of energy delivered for the period 1998-2008. The stochastic frontier analysis (SFA) is applied with a translog input distance function approach. A combination of cost and cost-quality models is proposed to create better discussions. Weather data are collected from 429 meteorological stations and lightning data (flash rate) are collected from 3,423 coordinates provided by NASA. A geographic information system (GIS) is used for locating the firms' service areas and for allocating their respective meteorological stations and coordinates. Results suggest that on average under cost models there is a significant increase in efficiency when weather is incorporated in the production function. Firms from Brazil and Peru are those which operate in less favourable weather conditions. Under the cost-quality models, on average the effect of weather is much lower. From this, it appears to be that firms have internalised the effects of weather and have adapted their networks with consideration to the environment in which they operate. A company-level analysis indicates that across models an important number of companies are affected by weather. Regulators are advised to make the case for the proper adjustments of efficiency scores when specific firms face important efficiency changes due to weather.

Keywords technical efficiency, stochastic frontier analysis, electricity distribution markets, weather, South America

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