



Using a spatial econometric approach to mitigate omitted variables in stochastic frontier models: An application to Norwegian electricity distribution networks

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Abstract

An important methodological issue for the use of efficiency analysis in incentive regulation of regulated utilities is how to account for the effect of unobserved cost drivers such as environmental factors. This study combines the spatial econometric approach with stochastic frontier techniques to control for unobserved environmental conditions when measuring firms' efficiency in the electricity distribution sector. Our empirical strategy relies on the geographic location of the firms as a useful source of information that has previously not been explored in the literature. The underlying idea in our empirical proposal is to utilise variables from neighbouring firms that are likely to be spatially correlated as proxies for the unobserved cost drivers. We illustrate our approach using the data of Norwegian distribution utilities for the years 2004 to 2011. We find that the lack of information on weather and geographic conditions can likely be compensated with data from surrounding firms using spatial econometric techniques. Combining efficiency analysis and spatial econometrics methods improve the goodness-of-fit of the estimated models and, hence, more accurate (fair) efficiency scores are obtained. The methodology can also be used in efficiency analysis and regulation of other types of utility sectors.

Keywords Spatial econometrics, stochastic frontier models, environmental conditions, electricity distribution networks.

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