

EFFICIENCY EFFECTS OF QUALITY OF SERVICE AND ENVIRONMENTAL FACTORS: EXPERIENCE FROM NORWEGIAN ELECTRICITY DISTRIBUTION

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ABSTRACT

Since the 1990s, efficiency and benchmarking analysis has increasingly been used in network utilities research and regulation. A recurrent concern is the effect of environmental factors or observable heterogeneity as well as unobserved heterogeneity and the choice of model on measured cost and quality performance of the utilities. This paper presents an empirical analysis of the effect of geographic and weather factors on the performance of the Norwegian electricity distribution utilities. We analyze a balanced panel data of 129 Norwegian electricity distribution utilities for the 2001-2004 period and data on over 100 geographical and weather factors to identify real economic inefficiency while controlling for observable and unobserved heterogeneity. We use Factor Analysis to reduce the number of environmental factors into few composite variables and to avoid the problem of multicollinearity. We then estimate the established stochastic frontier models of Battese and Coelli (1992, 1995) and the recent True Fixed Effects (TFE) models of Greene (2005) without and with environmental variables. The results indicate that some composite environmental variables have a significant effect on utility performance. We also find that the TFE models controlling for unobserved heterogeneity show significantly higher average efficiency scores, while there is little difference in average scores of the TFE models. Overall, we conclude that while environmental factors have statistically significant influence on average efficiency this effect is not economically significant.

Keywords: Efficiency, quality of service, input distance function, stochastic frontier analysis.

JEL: L15, L51, L94