

The effect of transmission constraints on electricity prices

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It is a well-known fact that electricity prices in an interconnected market are influenced by the occurrence of transmission constraints. Paradoxically, however, the potentially important effects of transmission constraints on both the trajectory and volatility of electricity prices have, until relatively recently, not played a large role in empirical models of prices. Ideally, a good model for electricity prices should consider the effect of transmission constraints and the spatial relationships between regional electricity prices, but before this comprehensive modeling can be undertaken it is necessary first to understand price behavior in the presence of transmission constraints.

This paper explores the effect of transmission constraints on short-term electricity price variation in the Queensland region of the National Electricity Market (NEM), using detailed five-minute dispatch data from the operation of the NEM made available by the Australian Energy Market Operator. A number of important conclusions emerge from the empirical work reported in this paper. Transmission constraints are found to be a necessary although not sufficient condition for the occurrence of significant spikes in the spot price of electricity in Queensland. Consequently, the performance of any price forecasting model is likely to be improved by incorporating information regarding constraints. In the context of model development, the use of ordinary least squares to estimate simple linear models of electricity prices is to be avoided, because in the presence of extreme prices, the coefficient estimates of the model may be severely biased. The use of robust

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regression techniques and particularly median regression is to be recommended. While the effect of transmission constraints are well understood in theory, the results in this paper act as a timely reminder to practitioners interested in forecasting price, or in computing risk measures such as Value-at-Risk.