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Risk Propagation in Electricity Markets: Measuring the Asymmetric Transmission of Downside and Upside Risks in Energy Prices

Authors : Montserrat Guillen, Stephania Mosquera-Lopez, Jorge Uribe

Abstract : An empirical study of market risk transmission between electricity prices in the Nord Pool interconnected market is done. Crucially, it is differentiated between risk propagation in the two tails of the price variation distribution. Thus, the downside risk from upside risk spillovers is distinguished. The results found document an asymmetric nature of risk and risk propagation in the two tails of the electricity price log variations. Risk spillovers following price increments in the market are transmitted to a larger extent than those after price reductions. Also, asymmetries related to both, the size of the transaction area and related to whether a given area behaves as a net-exporter or net-importer of electricity, are documented. For instance, on the one hand, the bigger the area of the transaction, the smaller the size of the volatility shocks that it receives. On the other hand, exporters of electricity, alongside countries with a significant dependence on renewable sources, tend to be net-transmitters of volatility to the rest of the system. Additionally, insights on the predictive power of positive and negative semivariances for future market volatility are provided. It is shown that depending on the forecasting horizon, downside and upside shocks to the market are featured by a distinctive persistence, and that upside volatility impacts more on net-importers of electricity, while the opposite holds for net-exporters.

Keywords : electricity prices, realized volatility, semivariances, volatility spillovers
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