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**CROSS-HEDGING OPPORTUNITIES IN OTC EUROPEAN
ELECTRICITY MARKETS**

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Abstract: This paper uses a unique database of European electricity forward prices from a major energy trader in London to provide a first analysis of the efficiency of wholesale markets in Europe. Resorting to OTC prices is essential in the study of market efficiency because of the low contribution of organized markets to the spot price formation except in NordPool.

We first examine the relation existing between spot, forward and futures prices in Austria, Belgium, France, Germany, the Netherlands, the Nordic area, Spain, and the UK using Johansen (VECOintegration) likelihood-based procedures. Estimated coefficients are then used with GARCH-error models (cf. Baillie and Myers, 1991) to determine the optimal hedge ratios in each market. Estimation of optimal hedge ratios is useful to assess the predictive accuracy of derivatives markets, which is often confounded with the concept of efficiency when speaking about derivatives (see Hull, 2005).

We then compute optimal hedge ratios allowing for cross-hedging à la Anderson and Danthine (1981). The risk on each spot price is significantly reduced by adopting a hedge using a linear combination of derivatives on several markets. The intuition behind this result is that characteristics about different powers sources (hydro, nuclear, coal, etc.), which are mechanically present in each spot price in Europe because of cross-boarder trades, are better captured using financial instruments on several places. This result may explain, in addition to higher transaction costs, the difficulties encountered by new power exchanges (cf. Powernext) when the domestic risk is still well hedged with foreign liquid contracts.

Keywords

OTC power markets, optimal hedging, volatility, GARCH models, VEC.

JEL Classification: D21, G11, G14, Q40.