

Medium-term probabilistic forecasting of extremely low prices in electricity markets: application to the Spanish case

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Abstract-

One 1 of the most relevant challenges that have arised in electricity markets during the last years is the emergence of extremely low prices. Trying to predict these events is crucial for market agents in a competitive environment. This paper proposes a novel methodology to simultaneously accomplish punctual and probabilistic hourly predictions about the appearance of extremely low electricity prices in a medium-term scope. The proposed approach for making real ex ante forecasts consists of a nested compounding of different forecasting techniques which incorporate Monte Carlo simulation, combined with spatial interpolation techniques. The procedure is based on the statistical identification of the process key drivers. Logistic regression for rare events, decision trees, multilayer perceptrons and a hybrid approach which combines a market equilibrium model with logistic regression are used. Moreover, this paper assesses whether periodic models in which parameters switch according with the day of the week can be even more accurate. The proposed techniques are compared with a Markov regime switching model and several naïve methods. The proposed methodology empirically demonstrates its effectiveness by achieving promising results on a real case study based on the Spanish electricity market. This approach can provide valuable information for market agents when they face decision making and risk-management processes. Our findings support the additional benefit of using a hybrid approach for deriving more accurate predictions.

Index Terms- electricity markets, medium-term electricity price forecasting, probabilistic forecasting, extremely low prices, spikes, hybrid approach

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