Electricity Price Forecasting in European Day Ahead Markets: A Greedy Consideration of Market Integration

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Abstract

In this manuscript we explore European feature importance in Day Ahead Market (DAM) price forecasting models, and show that model performance can deteriorate when too many features are included due to over-fitting. We propose a greedy algorithm to search over candidate countries for European features to be used in a DAM price forecasting model, that can be applied to several regression and machine learning modelling methodologies. We apply the algorithm to build price forecasting models for the Dutch market, using candidate countries selected through an integrated analysis based on open-source European electricity market data. Feature importance is visualised using an Auto Regressive and Random Forest model. We explain these results using cross-border flow and DAM price data. Two types of models (LEAR and the Deep Neural Network) are considered for the DAM price forecasting with and without European features. We show that in the Dutch case, taking European market integration into account improves the Mean Absolute Error (MAE) of the best performing DAM price forecasting model by 3.1%, the relative MAE (rMAE) by 3.85%, and the Symmetrical Mean Absolute Percentage Error (sMAPE) by 0.31 p.p., compared to the best forecasting model without European features. Through statistical testing we show that European features improve the accuracy of the forecasts with statistical significance.

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