

Forecasting hourly supply curves in the Italian day-ahead electricity market with a double-seasonal SARMAHX model

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Abstract- This paper is devoted to the short-term forecasting of the hourly aggregated supply curves in Day-Ahead electricity markets. The time series of supply curves can be considered as a functional time series, which is the realization of a stochastic process where each observation is a continuous function defined on a finite interval. In order to forecast these time series, models that operate with continuous functions are required. The standard approach for estimating these supply curves relies on dimensionality reduction techniques, hence losing some information in the process. This paper proposes a functional forecasting model that uses the continuous supply curves as inputs and does not require turning the curves to a limited number of components, thus avoiding the corresponding information loss. The proposed model is based on a double-seasonal functional SARMAHX model which extends the classical ARMA models and it is able to capture the daily and weekly seasonality of the series of supply curves. In addition, exogenous variables can be included to account for the external factors that influence the offering behavior of the agents. The effectiveness of the proposed model is illustrated by forecasting the hourly aggregated supply curves of the competitors of the main Italian generation company and is compared to other reference models found in the literature.

Index Terms- Supply curve forecasting; Functional SARMAHX model; Functional data analysis; Functional time series

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