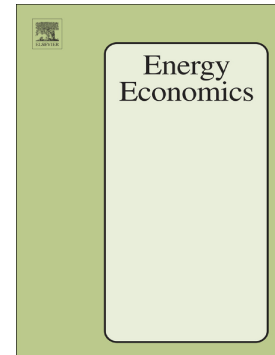


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Component estimation for electricity market data: Deterministic or stochastic?

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Abstract

Electricity market time series include several systematic components describing the long-term dynamics, the annual, weekly and daily periodicities, calendar effects, jumps, etc. As a result, modelling electricity variables requires the estimation of these components. For this purpose two main approaches have been proposed in the literature: the deterministic and the stochastic. Although an inappropriate modelling of systematic components could have important consequences on the prediction of loads and prices, in the literature it has not yet been assessed, which approach is more appropriate for electricity markets time series.

This work aims at filling this gap by comparing the deterministic and the stochastic approach in a systematic way and in a homogeneous framework, both for loads and prices. In the deterministic case, components are represented by smoothing splines and dummy variables, while in the stochastic case they are described by stochastic processes common to the unobserved component modelling literature. As systematic components are not observable, the comparison is based on the prediction implications of the two procedures. This allows us to account for possible compensations among estimated components on the final result.

Predictive performance is mainly assessed with respect to the one-day-ahead horizon, but also seven-day-ahead predictions are considered. The two approaches are evaluated on loads and prices of four important wholesale electricity markets: the Italian IPEX, the Scandinavian Nord Pool, the British EPEX SPOT UK and North American PJM.

Keywords: electricity loads, electricity prices, component estimation, Nord Pool electricity market, Italian electricity market, British electricity market, Pennsylvania-New Jersey-Maryland electricity market.

1. Introduction

In the literature, there is a wide agreement that the time series of electricity prices and loads include several components describing the long-term dynamics, several periodic

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