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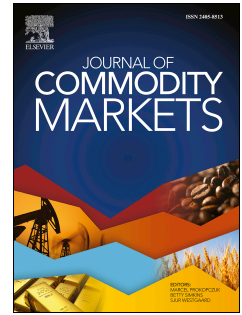
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A Particle Filtering Approach to Oil Futures Price Calibration and Forecasting

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Abstract

In this paper we propose a model for oil price dynamics for which we provide an estimation method based on a recent technique named Particle Filtering. The model we are going to introduce extends a previous model proposed by Liu and Tang (2011), including a non constant volatility and jumps in the spot price dynamics. The estimation methodology we are going to adopt is similar to the Particle Markov Chain Monte Carlo (PMCMC) method proposed by Andrieu, Doucet and Holenstein (2010), and both spot and futures quotation data related to WTI (West Texas Intermediate) are analyzed in order to perform our inference procedure. The models considered allow to obtain explicit expressions for futures prices as functions of the model parameters and this in turn makes the calibration procedure fast and accurate at the same time. A comparison between the model considered and the model proposed by Liu and Tang is provided in terms of prices forecasting ability. The inference analysis shows that the introduction of both stochastic volatility and jumps improve significantly the ability of the model in capturing the oil price dynamics features.

Keywords: Particle Filtering, Bayesian Inference, Energy Markets, Stochastic Volatility, Models with Jumps.

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