

## Commodities, Derivatives on Futures, and Multiscale Models

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### Abstract:

We start with a very brief overview of different well-accepted models for Commodities, in particular the classical Schwartz-Smith and Gibson-Schwartz model. In this part we shall mention some of the ongoing research developed at IMPA on the topic.

Then, we present recent research developed jointly with Y. Saporito and J-P Fouque on multiscale models for commodities. More precisely, we shall discuss a method for computing the first-order approximation of the price of derivatives on futures in the context of multiscale stochastic volatility. The central argument of our method could be applied to interest rate derivatives and compound derivatives.

The model proposed here is well-suited for commodities since it incorporates mean reversion of the spot price and multiscale stochastic volatility. It allows an effective and straightforward calibration procedure of the group market parameters to implied volatilities. Furthermore, it only requires the the first-order approximation of the underlying derivative.

Our method was validated by calibrating the group market parameters to options on crude-oil futures, and displays a very good fit of the implied volatility.