Stochastic Volatility and Possible Long Memory: The supOU Model

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Using positive supOU (superposition of Ornstein-Uhlenbeck type) processes to describe the volatility, we introduce a stochastic volatility model for financial data which is capable of modelling long range dependence effects and other important stylized features of financial data.

The finiteness of moments and the second order structure of the volatility, the log returns, as well as their "squares" are discussed in detail. Moreover, we give a concrete example in which long memory effects occur.

Thereafter we give conditions for the discounted stock price to be a martingale, compute the characteristic function and show that calculating option prices in this model is well possible using a Fourier approach.

Finally we show how the model can be estimated from historical data and how it can be calibrated to observed option prices. We conclude by presenting some concrete data examples and by commenting on multivariate extensions.