Modeling fluctuations of financial time series using multifractal random walks

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We propose a simple solvable stochastic volatility model for return fluctuations: the log-infinitely divisible multifractal random walk. It corresponds to a multifractal continuous time process with stationary increments which can be controlled easily by very few parameters. In the log-normal case, only 3 parameters are used: the variance, a correlation length parameter T (volatility has long range dependence up to a scale T, generally of the order of a year) and a multifractal parameter (the higher this parameter the more multifractal the model is).
Estimation of these parameters are shown to be straightforward.

This model is able to reproduce most of recent empirical findings concerning financial time series, mainly, no correlation between price variations, long-range volatility correlations, pdf heavy tails and multifractal statistics (exact power law scaling of the moments of the increments are reproduced up to scale T).

This model is used both for volatility prediction and Value at Risk prediction. Let us note that the same model (with the same parameters) is used for prediction at any scale and any horizon.
Extensive comparisons with "classical" methods (including GARCH) are shown. Application to portfolio management will be discussed.