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Nonlinear Time Series Models in Mathematical Finance

In mathematical finance both continuous and discrete time models are used. Continuous time models, in particular geometric Brownian motion (GBM), are easy to implement and use. However they have certain assumptions. The log of GBM is Brownian motion with drift and so has independent Gaussian increments and is Markov. Discrete time series models may still have conditional Gaussian or other driving noise, but might not be Markov. However they are not as simple to implement, for option pricing or hedging etc. In this talk we consider GARCH models, which are non Markov except for ARCH(1). In particular we compare some properties of GARCH in mean and ARMA GARCH for options.

If time permits we some non linear multivariate time series models.

The main part of this work was done with a recent student Yi Xi. Some other parts of this work were done with Hao Yu, Alex Badescu, Weibin Jiang and Zi Zhen Liu.