
Probability Applications in Finance and Economics

Chair: Boxin Tang (Simon Fraser University)

VICKNESWARY TAGORE, University of Saskatchewan

Simple and Efficient Estimation Approaches for Stochastic Volatility Models

There is a long history on the estimation of the parameters of the standard stochastic volatility models. Among the existing approaches, the so-called generalized method of moments (GMM) and the quasi-maximum likelihood estimation techniques are widely used. We introduce a simpler method of moments (MM), which, unlike the existing GMM approach, does not require an arbitrarily large number of unbiased moment functions to construct moment estimating equations for the parameters involved. Furthermore, the small sample behaviour of the MM approach is examined through a simulation study. We also provide another simpler 'working' generalized quasi likelihood (WGQL) approach.

ZHONGXIAN MEN, University of Waterloo

Multivariate Stochastic Volatility Models: a Probabilistic Principal Component Analysis Approach

Many financial time series exhibit changing variance and this can have important consequences in formulating economic or financial decisions. We propose a parsimonious multivariate stochastic volatility model to describe this time varying property. The model is formulated based on probabilistic principal component analysis. Non-zero correlations are permitted among innovations and between those of the asset returns and volatility dynamics. A Gibbs method is derived under a Bayesian framework to estimate the parameters and log volatilities. Simulation studies and application to real data illustrate how the model and proposed approach work.

ZHENYU CUI, University of Waterloo

Improved Continuity Correction for Discrete Barrier and Lookback Options

Barrier and lookback options are the most popular path-dependent options traded in the derivatives market. Based on the higher order expansion of Brownian motion approximation to random walk given by Janssen and Van Leeuwaarden (2009), we extend the "continuity correction" in Broadie et al (1999) to develop a more accurate method for pricing discrete barrier options. We also extend the technique in Horfelt (2003) to the pricing of discrete lookback options and propose a highly accurate semi-analytical approximation to the covariance term to improve the continuity correction for discrete lookback options. A numerical study confirms the advantages of our method.

FRANCOIS WATIER, University of Quebec in Montreal

Goal Achieving Probability of a Mean-Variance Strategy Without Short-Selling

In a 2006 paper, Li and Zhou established that an investor, following an unconstrained mean-variance strategy, will achieve its discounted targeted wealth with a probability greater than 80%. Surprisingly, we will show that under short-selling restrictions (i.e. without the possibility of borrowing stocks) this lower bound probability still holds.

ALEXANDRE SCOTT, University of Quebec in Montreal

A Stopping Time Rule for Mean-Variance Portfolios Without Bankruptcy

In this talk, we will evaluate the probability of reaching a discounted targeted wealth based on a stopping time rule introduced by Li and Zhou (2006) and applied to mean-variance strategies with bankruptcy prohibition. To this end, we will make use of results on first passage time of Gauss-Markov processes through time-varying boundaries.