



The University of Chicago
Department of Statistics

MASTER'S THESIS PRESENTATION

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**Analysis of Option Pricing Models by MCMC and
Exact Algorithm**

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ABSTRACT

We investigate various option pricing models using Markov Chain Monte Carlo (MCMC) Methods. These models include the traditional Black-Scholes model (Black, 1973), two jump-diffusion models (Merton, 1976a, and Kou, 2002), and stochastic volatility model (Heston, 1993) that attempt to capture non-normal properties of stock returns. Parameter estimation is done by Metropolis-Hastings algorithm and model selection is performed based on several Bayesian criteria. Bayesian inference gives certain consideration to the distribution of parameters, or parameter uncertainty. Thus, option pricing with Bayesian approach allow us to investigate the effect of parameter uncertainty. At the end, we also discuss pricing option using the simulation by the Exact Algorithm for diffusion process (Beskos, et al, 2006) that minimizes discretization error. To implement the algorithm, we use the example of modified Cox-Ingersoll-Ross model (Comte, et al., 2007) and Black-Scholes model.

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