



The University of Chicago
Department of Statistics

Seminars for Fourth Year Ph.D. Students

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**Displaced Lognormal Volatility Skew Slope and Variance Reduction
in Monte Carlo Simulation of Barrier Option Price**

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110 Eckhart Hall, 5734 S. University Avenue**

ABSTRACT

The standard Black-Scholes model is inconsistent with the volatility skew observed in the market. The DispLN (displaced lognormal) model does generate a volatility skew. We gave the proof of that. However, the DispLN model cannot generate all features of the volatility skew, because it has some constraints. We gave some of its constraints. Moreover, the CEV model and SABR model fit the market data better, but there is no formulas for barrier options under the CEV and SABR model while there is formulas for barrier options under the DispLN model. So given a CEV/SABR model, we constructed a DispLN control variate to be used in the Monte Carlo pricing of a barrier option whose underlying process is CEV/SABR. What's more, we also constructed a DispHeston control variate.