Honors thesis
Defense

Option pricing models: Black-Scholes or hyperbolic Levy process?

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Abstract: This thesis is an investigation into two option pricing models: widely-used Black-Scholes model and a modification of it, the hyperbolic Levy model. First, we have a detailed discussion about the celebrated Black-Scholes model. However, clearly there are many deficiencies in the Black-Scholes assumptions. In order to refine the Black-Scholes model, Eberlein and Keller (1995) introduced the hyperbolic Levy motion and claimed that the new model can provide a better valuation of derivative securities. We perform several statistical tests and show that the hyperbolic distributions can be well fitted to the financial data. This observation suggests us to replace the geometric Brownian motion in the Black-Scholes model by the hyperbolic Levy process and build the hyperbolic Levy pricing model. After an introduction into the Levy process theory, we attempt to numerically calculate the value of options according to the hyperbolic Levy model.

Tuesday, April 10, 2012, 4:00 pm
Mathematics and Science Center: W304

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