

The generalized hyperbolic model: financial derivatives and risk measures

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Statistical analysis of data from the financial markets shows that generalized hyperbolic (GH) distributions allow a more realistic description of asset returns than the classical normal distribution. GH distributions contain as subclasses hyperbolic as well as normal inverse Gaussian (NIG) distributions which have recently been proposed as basic ingredients to model price processes. We derive an option pricing formula for GH based models using the Esscher transform as one possibility to determine prices in an incomplete market. The GH option pricing model is a generalization of the hyperbolic model developed by Eberlein and Keller (1995). We compare this model with the classical Black-Scholes model. We also propose a general recipe for comparison of models to price derivatives with market reality. The objectives of this research are to examine the consistency of our model assumptions with the empirically observed price processes and the performance of option pricing models from a practitioner's point of view. Due to the difficulty to construct a test in a strict statistical sense for pricing models, we compare the models focussing on practically relevant criteria. Finally, we present a simplified approach to the estimation of high dimensional generalized hyperbolic distributions and their application to measure risk in financial markets.

Key words: generalized hyperbolic distributions, option pricing, market risk

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