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Abstract

We investigate the effect of discrete sampling and asset price jumps on fair variance and volatility swap strikes. Fair discrete volatility strikes and fair discrete variance strikes are derived in different models of the underlying evolution of the asset price: the Black-Scholes model, the Heston stochastic volatility model, the Merton jump-diffusion model and the Bates and Scott stochastic volatility and jump model. We determine fair discrete and continuous variance strikes analytically and fair discrete and continuous volatility strikes using simulation and variance reduction techniques and numerical integration techniques in all models. Numerical results show that the well-known convexity correction formula may not provide a good approximation of fair volatility strikes in models with jumps in the underlying asset. For realistic contract specifications and model parameters, we find that the effect of discrete sampling is typically small while the effect of jumps can be significant.

Keywords: Variance swaps ▪ volatility swaps ▪ VIX ▪ stochastic volatility ▪ jump models

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