Quantitative Finance > Pricing of Securities

Exponential Lévy models with stochastic volatility and stochastic jump-intensity

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We consider the problem of valuing a European option written on an asset whose dynamics are described by an exponential L\'evy-type model. Both the volatility and jump-intensity of the L\'evy process are allowed to vary stochastically in time through common driving factors. Using results from the spectral theory of normal operators and singular perturbation theory, we derive an explicit formula for the approximate price of any European-style derivative. Additionally, we establish the accuracy of our pricing approximation. Lastly, as an example of our framework, we extend the jump-diffusion model of \citet*{merton1976option} to include stochastic volatility and stochastic jump-intensity.

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