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# A unified approach to Bermudan and Barrier options under stochastic volatility models with jumps

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## Abstract

Many financial assets, such as currencies, commodities, and equity stocks, exhibit both jumps and stochastic volatility, which are especially prominent in the market after the financial crisis. Some strategic decision making problems also involve American-style options. In this paper, we develop a novel, fast and accurate method for pricing American and barrier options in regime switching jump diffusion models. By blending regime switching models and Markov chain approximation techniques in the Fourier domain, we provide a *unified* approach to price Bermudan, American options and barrier options under general stochastic volatility models with jumps. The models considered include Heston, Hull-White, Stein-Stein, Scott, the 3/2 model, and the recently proposed 4/2 model and the  $\alpha$ -Hypergeometric model with general jump amplitude distributions in the return process. Applications include the valuation of discretely monitored contracts as well as continuously monitored contracts common in the foreign exchange markets. Numerical results are provided to demonstrate the accuracy and efficiency of the proposed method.

**Keywords:** American options, barrier options, stochastic volatility, regime switching, jump diffusion, frame projection

**AMS subject classifications:** 91G80, 93E11, 93E20

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