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Pricing and hedging path-dependent options under the CEV process. (English)

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Summary: Much of the work on path-dependent options assumes that the underlying asset price follows geometric Brownian motion with constant volatility. This paper uses a more general assumption for the asset price process that provides a better fit to the empirical observations. We use the so-called constant elasticity of variance (CEV) diffusion model where the volatility is a function of the underlying asset price. We derive analytical formulae for the prices of important types of path-dependent options under this assumption. We demonstrate that the prices of options, which depend on extrema, such as barrier and lookback options, can be much more sensitive to the specification of the underlying price process than standard call and put options and show that a financial institution that uses the standard geometric Brownian motion assumption is exposed to significant pricing and hedging errors when dealing in path-dependent options.

MSC:

91G20 Derivative securities (option pricing, hedging, etc.)

60J70 Applications of Brownian motions and diffusion theory (population genetics, absorption problems, etc.)

Cited in **118** Documents

Keywords:

path-dependent options; barrier options; lookback options; diffusion processes; Ornstein-Uhlenbeck process

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