Pricing and Hedging Path-Dependent Options Under the CEV Process

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Abstract

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.

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Keywords

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