

Pricing European Equity Options Based On Vasicek Interest Rate Model

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Abstract

Options is an important part of global financial market, with great influence on national economies. While most classic option pricing models are based on the assumption of a constant interest rate, economic data show that interest rates in reality frequently fluctuated under the influence of varying economic performances and monetary policies. As interest rate fluctuation is closely related to the value and expected return of options, it is worth discussing option pricing under stochastic interest rate models. Since 1990s, scholars home and abroad have been conducting researches on this topic and have formulated price formulas for some types of options. However, because the pricing process involves two stochastic variables, the majority of previous studies employed sophisticated methods. As a result, their price formulas were too complicated to provide straightforward explanations of the parameters' influence on option prices, unable to offer investors direct assistance.

This paper selects Vasicek interest rate model to describe interest rate's stochastic movement, and discusses the pricing of European equity options whose underlying asset's price follows Geometric Brownian Motions in a complete market. The paper's value and innovation lie in the following aspects: ① It improves and simplifies the pricing methods for options under stochastic interest rate models, applies comparatively primary mathematical methods, and attains concise price formulas; ② it

conducts in-depth analysis of major parameters' financial significance, which helps investors to make better investment decisions by estimating the variations in option prices corresponding to different parameters.

Key words: Pricing European Equity Options; Expected Return; Vasicek Model; Black-Scholes Equation; Geometric Brownian Motions