

MARKOV MODULATED DIFFUSION PROCESS AND ITS APPLICATION

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ABSTRACT

In this talk, an Markov modulated diffusion process is considered. This model, also known as regime-switching model [3], can capture complex asset dynamics by permitting switching between different environments [2]. Let

$$dX(t) = \mu_{Z(t)}dt + \sigma_{Z(t)}dW(t),$$

where $\{Z(t) : t \geq 0\}$ is a continuous time Markov process with state space $\{1, \dots, m\}$ and $\{W(t) : t \geq 0\}$ is standard Brownian motion. In this talk, the joint moment generating function of $X(t)$ and $\int_0^t \mathbb{1}_{\{Z(u)=i\}}$, $i = 1, \dots, m$ is provided. Using this result, the pricing formulas for the Laplace transforms of stock options in the regime-switching model are obtained. Numerical inversion of the Laplace transforms such as Euler's algorithm [1] is used to calculate the prices of stock options.

REFERENCES

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