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Master Thesis Defense

Entitled

Valuation of variance swaps in volatile markets with regime switching

by

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Abstract

Stochastic differential equations (SDEs) are extensively used to model various financial quantities. In the last decades, financial modeling by SDEs under regime-switching have been utilized to allow moving from an economic state to another. The aim of this research work is to tackle the pricing of variance swaps in a volatile market under regime switching model. SDEs under regime-switching models are more realistic but the solution is more complicated and may not exist analytically. Therefore, numerical methods for finance are explored. The study proposes a new SDE under regime-switching with high volatility model for the prices of the underlying financial asset. The suggested model combines two existing models, the first one is on high volatile situations and the second is on regime-switching. Under these setting, the valuation of variance-swaps is investigated. As an application, a study of two states is developed: state A when the economy is going well and state B when the economy is under stress. Numerical techniques for finance are employed to obtain a solution for the pricing problem. Several illustrations of the solution are provided and show the efficiency of the used methods.

Keywords: Variance swaps, regime switching, Brownian motion, increased volatility, Markov chain.