

AMERICAN OPTIONS PRICING USING HJM METHODOLOGY

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Abstract

With the development of financial markets and increasing demand for managing risk exposure, researchers and practitioners have developed various financial instruments over the years. There are many financial models designed to price such derivatives and they all have one thing in common: arbitrage free valuation of these derivative contracts. In this thesis we focus on pricing mechanism of one commonly used derivatives: American option. We employ HJM forward modeling approach introduced by Heath, Jarrow and Morton (1992). HJM method models the evolution of entire yield curve to calibrate to market data. In recent years, Schweizer and Wissel (2008) and Carmona and Nadtochiy (2009) extend the forward modeling idea to equity market. Here we propose an alternative approach to value American type options in the spirit of HJM approach. Since American option is essentially an optimal stopping problem, we formulate the value process of American option using an alternative method; using the forward drift. We propose a new value function, a new stopping criteria and a new stopping time. Then numerical implementation of the new paradigm considered under additive and multiplicative models. We employ PCA, robust PCA and Karhunen Loeve decomposition.