

OPTION VALUATION UNDER A
REGIME-SWITCHING MODEL USING THE
FAST FOURIER TRANSFORM

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Abstract

In this dissertation we consider European-style commodity options and futures options where the logarithm of the underlying commodity price dynamics is governed by the regime-switching Ornstein-Uhlenbeck model. A semi-analytical approach to value commodity options and futures options is adopted. We derived closed-form expressions for the characteristic functions of the logarithmic commodity spot price and futures price. We also extend our work to investigate the pricing of European-style commodity options and futures options with a Markovian regime-switching Hull-White stochastic interest rate model. The parameters of this model, including the mean-reversion level, the volatility of the stochastic interest rate, and the volatility of the commodity spot price, are modulated by an observable, continuous-time, finite-state Markov chain. A closed-form expression for the characteristic function of the logarithmic commodity price and futures price are derived.