

Valuing commodity options and futures options with changing economic conditions

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Abstract

A new model for valuing a European-style commodity option and a futures option is developed with a view to incorporating the impact of changing hidden economic conditions on commodity price dynamics. The proposed model is an extension to the Gibson-Schwartz two-factor model, where the model parameters vary over according to the hidden state of an economy. We propose a semi-analytical approach to valuing commodity options and futures options by deriving the closed-form expressions for the characteristic functions of the logarithmic commodity price and futures price. A fast Fourier transform (FFT) approach is then used to provide a practical and efficient way to evaluate the option prices. Real data studies and numerical examples are used to illustrate the practical implementation of the proposed pricing model.

Keywords Commodity options; futures options; regime-switching; Gibson-Schwartz two-factor model; fast Fourier transform.

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