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A Two-Factor Cointegrated Commodity Price Model with an Application to Spread Option Pricing*

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Abstract

In this paper, we propose an easy-to-use yet comprehensive model for a system of cointegrated commodity prices. While retaining the exponential affine structure of previous approaches, our model allows for an arbitrary number of cointegration relationships. We show that the cointegration component allows capturing well-known features of commodity prices, i.e., upward sloping (contango) and downward sloping (backwardation) term-structures, smaller volatilities for longer maturities and an upward sloping correlation term structure. The model is calibrated to futures price data of ten commodities. The results provide compelling evidence of cointegration in the data. Implications for the prices of futures and options written on common commodity spreads (e.g., spark spread and crack spread) are thoroughly investigated.

Keywords: Commodities, Cointegration, Futures, Option Pricing, Spread Options, Spark Spread, Crack Spread

JEL classification: C61, G11, G12

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