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Pricing of long-dated commodity derivatives: Do stochastic interest rates matter?

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Abstract

Does modelling stochastic interest rates, beyond stochastic volatility, improve pricing performance on long-dated commodity derivatives? To answer this question, we consider futures price models for commodity derivatives that allow for stochastic volatility and stochastic interest rates and a correlation structure between the underlying variables. We examine the empirical pricing performance of these models on pricing long-dated crude oil derivatives. Estimating the model parameters from historical crude oil futures prices and option prices, we find that stochastic interest rate models improve pricing performance on long-dated crude oil derivatives, when the interest rate volatility is relatively high. Furthermore, increasing the model dimensionality does not tend to improve the pricing performance on long-dated crude oil option prices, but it matters for long-dated futures prices. We also find empirical evidence for a negative correlation between crude oil futures prices and interest rates that contributes to improving fit to long-dated crude oil option prices.

Keywords: Futures options pricing; Stochastic interest rates; Correlations; Long-dated crude oil derivatives;

JEL: C13, C60, G13, Q40

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