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Using Daily Range Data to Calibrate Volatility Diffusions and Extract the Forward Integrated Variance

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Abstract

Acommon model for security price dynamics is the continuous-time stochastic volatility model. For this model, Hull and White (1987) show that the price of a derivative claim is the conditional expectation of the Black-Scholes price with the forward integrated variance replacing the Black-Scholes variance. Implementing the Hull and White characterization requires both estimates of the price dynamics and the conditional distribution of the forward integrated variance given observed variables. Using daily data on close-to-close price movement and the daily range, we find that standard models do not fit the data very well and that a more general three-factor model does better, as it mimics the long-memory feature of financial volatility. We develop techniques for estimating the conditional distribution of the forward integrated variance given observed variables.

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