Seminar Series in Management Science and Quantitative Economics

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Realizing Smiles: Option Pricing with Realized Volatility

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Colegio Universitario de Estudios Financieros
Serrano Anguita 8, Madrid, 28004
Sala de Seminarios (Aula 12)

We develop a discrete-time stochastic volatility option pricing model, which exploits the information contained in high-frequency data. The Realized Volatility (RV) is used as a proxy of the unobservable log-returns volatility. We model its dynamics by a simple but effective (pseudo) long-memory process, the Leverage Heterogeneous Auto-Regressive Gamma (HARGL) process. Both the discrete-time specification and the use of the RV allow us to easily estimate the model using observed historical data. Assuming a standard, exponentially affine stochastic discount factor, we obtain a fully analytic change of measure.

An extensive empirical analysis of S&P 500 index options illustrates that our approach significantly outperforms competing time-varying (i.e. GARCH-type) and stochastic volatility pricing models. The pricing improvement can be ascribed to: (i) the direct use of the RV, which provides a precise and fast-adapting measure of the unobserved underlying volatility; and (ii) the specification of our model, which, on the one hand, is able to accurately reproduce the volatility persistence and, on the other hand, provides the necessary smoothing of the noise present in the RV dynamics.