Inverse problem of implied integrated variance, implied correlation coefficient, and implied interest rate

Ruth Kaila

Aalto University

Abstract / Resumo:
The volatility skew observed in markets has been explained by many factors, such as a stochastic volatility, a correlation between stock prices and volatility, and a risk premium due to big jumps in the underlying, to a risk of default etc. We present a Bayesian statistical inverse problem to estimate simultaneously three option implied quantities related to these factors: the implied integrated variance, the implied correlation coefficient between stock prices and volatility, and the implied interest rate. The implied integrated variance can be seen as a stochastic extension of the commonly known Black-Scholes implied variance, the integrated variance being the time-average of a stochastic variance. The implied interest rate consists of the riskless interest rate and of an excess return due to the risk premium present in option prices. We suggest that the implied integrated variance and the implied excess return could be used in pricing and hedging options, in the same way than the implied variance or volatility.