

Inference on the volatility in diffusion models with noise and Le Cam theory

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Abstract

We consider discrete-time observations of a continuous martingale under measurement error. This serves as basic model for high-frequency data in finance, where an efficient price process is observed under microstructure noise. It is shown that for observation times $t_i = i/n$, $i = 1, \dots, n$, this nonparametric model is in Le Cam's sense asymptotically equivalent to a Gaussian shift experiment in terms of the square root of the volatility function σ , but with a noise level of order $n^{-1/4}$. As an application, new rate-optimal estimators of the volatility function and efficient estimators of the integrated volatility are constructed, which perform well in simulations.