

Linear regression of drift in continuous semimartingale models

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We consider a simple problem of estimating a linear parameter appeared in the drift, that is, the bounded variation part of a continuous semimartingale from high-frequently sampled data. In financial context it corresponds to the linear regression of the expected returns in a continuous-time price process model from high-frequency asset price data. The process is not necessarily of Itô type and sampling times can be endogenous stopping times. We give a central limit theorem for discretized maximum likelihood estimator, in other words, the least square estimator as the sampling frequency goes to infinity. In particular we show that the natural discretization of the maximum likelihood estimator is biased when the data exhibit a certain skewness. A bias-correction method is proposed and shown to work.

Keywords: stochastic differential equation; central limit theorem; skewness