Efficient estimation of integrated volatility in presence of infinite variation jumps

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We propose new nonparametric estimators of the integrated volatility of an Itô semimartingale observed at discrete times on a fixed time interval with mesh of the observation grid shrinking to zero. The proposed estimators achieve the optimal rate and variance of estimating integrated volatility even in the presence of infinite variation jumps when the latter are stochastic integrals with respect to locally "stable" Levy processes, i.e., processes whose Levy measure around zero behaves like that of a stable process. On a first step we estimate locally volatility from the empirical characteristic function of the increments of the process over blocks of shrinking length and then we sum these estimates to form initial estimators of the integrated volatility. The estimators contain bias when jumps of infinite variation are present and on a second step we estimate and remove this bias by using integrated volatility estimators formed from the empirical characteristic function of the high-frequency increments for different values of its argument. The second step debiased estimators achieve efficiency and we derive a feasible central limit theorem for them.

Keywords: Quadratic variation; Itô semimartingale; integrated volatility; central limit theorem.