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Moving Average-Based Estimators of Integrated Variance

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Abstract

We examine moving average (MA) filters for estimating the integrated variance (IV) of a financial asset price in a framework where high-frequency price data are contaminated with market microstructure noise. We show that the sum of squared MA residuals must be scaled to enable a suitable estimator of IV. The scaled estimator is shown to be consistent, first-order efficient, and asymptotically Gaussian distributed about the integrated variance under restrictive assumptions. Under more plausible assumptions,

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Notes

- ¹Within TTS, Griffin and Oomen ([2008](#)) further distinguish two categories: In the first (transaction time sampling), $t_{i,m}$ is the time of a transaction; while in the second (for which they reserve the term, tick time sampling) $t_{i,m}$ is the time of a quote revision.
- ²Andersen et al. ([2001](#)) experiment with unfiltered and also linearly interpolated five-minute returns, finding similar dynamics in all cases. Nevertheless, sampling NYSE data at five-minute intervals, they find a median moving-average coefficient of -0.214 ($+ 0.214$ in the notation of this article), at which level, if the microstructure is an IID noise, the unscaled MA(1)-based estimator overstates IV by 62%.
- ³The main exception was σ_{H}^2 which was quite similar to σ_{L}^2 at the smaller variances. Graphs giving the



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