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Efficient asymptotic variance reduction when estimating volatility in high frequency data*

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Abstract

This paper shows how to carry out efficient asymptotic variance reduction when estimating volatility in the presence of stochastic volatility and microstructure noise with the realized kernels (RK) from [Barndorff-Nielsen et al., 2008] and the quasi-maximum likelihood estimator (QMLE) studied in [Xiu, 2010]. To obtain such a reduction, we chop the data into B blocks, compute the RK (or QMLE) on each block, and aggregate the block estimates. The ratio of asymptotic variance over the bound of asymptotic efficiency converges as B increases to the ratio in the parametric version of the problem, i.e. 1.0025 in the case of the fastest RK Tukey-Hanning 16 and 1 for the QMLE. The impact of stochastic sampling times and jump in the price process is examined carefully. The finite sample performance of both estimators is investigated in simulations, while empirical work illustrates the gain in practice.

Keywords: high frequency data ; jumps ; market microstructure noise ; integrated volatility ; quasi-maximum likelihood estimator ; realized kernels ; stochastic sampling times
JEL codes: C01; C02; C13; C14; C22; C58

1 Introduction

Over the past decades, the availability of high frequency data has led to a better understanding of asset prices. The main object of interest, the quadratic variation, can be used for example as a proxy

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