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A Local Stable Bootstrap for Power Variations of Pure-Jump Semimartingales and Activity Index Estimation*

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Abstract

We provide a new resampling procedure - the local stable bootstrap - that is able to mimic the dependence properties of realized power variations for pure-jump semimartingales observed at different frequencies. This allows us to propose a bootstrap estimator and inference procedure for the activity index of the underlying process, β, as well as bootstrap tests for whether it obeys a jump-diffusion or a pure-jump process, that is, of the null hypothesis $\mathcal{H}_0 : \beta = 2$ against the alternative $\mathcal{H}_1 : \beta < 2$. We establish first-order asymptotic validity of the resulting bootstrap power variations, activity index estimator, and diffusion tests for $\mathcal{H}_0$. Moreover, the finite sample size and power properties of the proposed diffusion tests are compared to those of benchmark tests using Monte Carlo simulations. Unlike existing procedures, our bootstrap tests are correctly sized in general settings. Finally, we illustrate the use and properties of the new bootstrap diffusion tests using high-frequency data on three FX series, the S&P 500, and the VIX.

Keywords: Activity index, Bootstrap, Blumenthal-Getoor index, Confidence Intervals, High-frequency Data, Hypothesis Testing, Realized Power Variation, Stable Processes.

JEL classification: C12, C14, C15, G1

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