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Intraday periodicity and intraday Lévy-type jump detection

Abstract. Financial market volatility displays cyclical patterns particularly at the intraday level. In this paper, we investigate the impact of intraday periodicity in the detection of Lévy-type jumps. To do so, we first design a Monte Carlo simulation to estimate periodicity in a robust way. We then propose a filtered Lévy jump test that accounts periodic volatility.

The results show that truncated maximum likelihood (TML) periodicity estimator has high relative efficiency and low bias in the presence of alpha-stable or Cauchy type Lévy jumps. The TML estimator performs even better at the very high-frequencies such as 30-seconds. With a particular focus on the size of the tests, our simulation study shows that accounting for periodicity via TML substantially reduces the number of spurious jumps. Neglecting the periodic volatility leads to an overdetection (underdetection) of jumps at times of high (low) periodicity. We correct such patterns.

(This is joint work with Sébastien Laurent and Christopher J. Neely)

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