

# Estimating the quadratic covariation of an asynchronously observed semimartingale with jumps

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**Abstract** We consider estimation of the quadratic (co)variation of a semimartingale from discrete observations which are irregularly spaced under high-frequency asymptotics. In the univariate setting, results by Jacod for regularly spaced observations are generalized to the case of irregular observations. In the two-dimensional setup under non-synchronous observations, we derive a stable central limit theorem for the Hayashi–Yoshida estimator in the presence of jumps. We reveal how idiosyncratic and simultaneous jumps affect the asymptotic distribution. Observation times generated by Poisson processes are explicitly discussed.

**Keywords** Asynchronous observations · Co-jumps · Statistics of semimartingales · Quadratic covariation