MAXIMUM LIKELIHOOD ESTIMATION FOR LEVY DRIVEN ORNSTEIN-UHLENBECK PROCESSES

Over the last decade jump processes have been used by various authors for stochastic modeling in finance as well as the natural sciences. While the probabilistic properties of this class of processes are well understood, comparably few results are known for the statistical inference from jump processes.
We develop a maximum likelihood approach for estimating the coefficient of a Lvy driven Ornstein-Uhlenbeck process. We prove that the laws of the Ornstein-Uhlenbeck processes corresponding to different coefficients are mutually absolutely continuous if and only if the background driving Lvy process has a diffusive component and derive the Radon-Nikodym derivative. Then, we give conditions such that the maximum likelihood estimator exists uniquely, is strongly consistent and asymptotically normal. To obtain these results we show that the class of Ornstein-Uhlenbeck processes corresponding to different coefficients forms a curved exponential family of stochastic processes. We investigate the high-frequency as well as long time asymptotics, when the Ornstein-Uhlenbeck process is observed at discrete non-equidistant time points. Finally, we discuss a simulation study to asses the finite sample behavior of the estimator and demonstrate its practical tractability.