Asymptotic results for time-changed Lévy processes sampled at hitting times

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We provide asymptotic results for time-changed Lévy processes sampled at random instants. The sampling times are given by first hitting times of symmetric barriers whose distance with respect to the starting point is equal to d. This setting can be seen as a first step towards a model for tick-by-tick financial data allowing for large jumps. For a wide class of Lévy processes, we introduce a renormalization depending on d, under which the Lévy process converges in law to an alpha-stable process as d goes to 0. The convergence is extended to moments of hitting times and overshoots. These results can be used to build high frequency statistical procedures. As examples we construct consistent estimators of the time change and, in the case of the CGMY process, of the Blumenthal-Getoor index. Convergence rates and a central limit theorem are established under additional assumptions. This is joint work with Peter Tankov.