Multivariate Dickman distribution and its applications

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Preprint no. 2024-01

Abstract

In this dissertation, we develop multivariate Dickman distribution and explore its properties. In addition, we utilize the Dickman distribution to model the small jumps within a broad class of Levy processes. Our central theorem establishes that the limit distribution of an appropriately transformed truncated Levy process with finite variation exhibits a Dickman-type Levy measure. We also provide equivalent conditions to further characterize this result. Drawing inspiration from this, we partition the Levy process into small and large jumps. Small jumps are effectively modeled by the Dickman distribution, while the remaining large jumps follow a compound Poisson distribution. Further, we extend our findings to Ornstein-Uhlenbeck (OU) processes. Our investigation encompasses two scenarios: the truncated OU process and the OU process driven by a truncated Levy process. In general, employing the same transformation outlined in our main theorem, we observe that the limit distribution of the truncated OU process aligns with a Dickman-type Levy measure. Notably, for the OU process with a truncated driving process, the limit distribution remains consistent with that of the OU process with a truncated driving process having a Dickman-type Levy measure.

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