TRIMMED SUMS FROM THE DOMAIN OF GEOMETRIC PARTIAL ATTRACTION OF SEMISTABLE LAWS[1]

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We show that all possible moderately trimmed sums from a domain of geometric partial attraction of a semistable law G are asymptotically normal, along the whole sequence of natural numbers, under the necessary condition that the Lévy functions of G do not have flat stretches. We also show that asymptotic normality prevails still along the whole sequence at least for suitably chosen moderately trimmed sums from such a domain for every G. It then follows that after removing any moderately trimmed sum from the middle the remaining sums of extreme values still produce every semistable limiting distribution G that the original full sums have, along exactly the same geometrically growing subsequences of the natural numbers.

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1 Introduction

Let $X_1, X_2, \ldots$ be a sequence of independent and identically distributed random variables, and for each natural number $n \in \mathbb{N}$ consider the order statistics $X_{1,n} \leq \cdots \leq X_{n,n}$ pertaining to the sample $X_1, \ldots, X_n$. Trimmed sums $\sum_{j=l+1}^{n-m} X_{j,n}$ for $l, m \in \mathbb{N}$, $l+m < n$, are the initial basic objects in statistical theories of robust estimation, so it is not surprising that there has been considerable interest in the investigation of their asymptotic distribution. The large literature on a number of versions of the problem may be traced back from our references; see in particular the collection edited by Hahn, Mason and Weiner (1991). Here we deal only with trimming according to natural order, as in the sums $\sum_{j=l+1}^{n-m} X_{j,n}$, and not with the case when trimming is done with respect to ordering the moduli $|X_1|, \ldots, |X_n|$ of the observations.

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