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Smoothing the Hill estimator. (English) Zbl 0873.60021

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Summary: For sequences of i.i.d. random variables whose common tail $1 - F$ is regularly varying at infinity with an unknown index $-\alpha < 0$, it is well known that the Hill estimator is consistent for α^{-1} and usually asymptotically normally distributed. However, because the Hill estimator is a function of $k = k(n)$, the number of upper order statistics used and which is only subject to the conditions $k \rightarrow \infty$, $k/n \rightarrow 0$, its use in practice is problematic since there are few reliable guidelines about how to choose k . The purpose of this paper is to make the use of the Hill estimator more reliable through an averaging technique which reduces the asymptotic variance. As a direct result the range in which the smoothed estimator varies as a function of k decreases and the successful use of the estimator is made less dependent on the choice of k . A tail empirical process approach is used to prove the weak convergence of a process closely related to the Hill estimator. The smoothed version of the Hill estimator is a functional of the tail empirical process.

MSC:

60F17 Functional limit theorems; invariance principles

60G70 Extreme value theory; extremal stochastic processes

Cited in **41** Documents

Keywords:

Hill estimator; order statistics; averaging technique; empirical process

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