On a Pseudo-Maximum Likelihood Estimator for the Extremal Index

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The extremes of a stationary time series typically occur in clusters. A primary measure for this phenomenon is the extremal index, representing the reciprocal of the expected cluster size. Both a disjoint and a sliding blocks estimator for the extremal index, essentially due to Northrop (2015) [An efficient semiparametric maxima estimator of the extremal index. Extremes 18, 585–603], are analyzed in detail. In contrast to many competitors, the estimators only depend on the choice of one parameter sequence. We derive an asymptotic expansion, prove asymptotic normality and show consistency of an estimator for the asymptotic variance. Explicit calculations in certain models and a finite-sample Monte Carlo simulation study reveal that the sliding blocks estimator outperforms other blocks estimators, and that it is competitive to runs- and inter-exceedance estimators in various models. The methods are applied to a variety of financial time series.

Key Words: clusters of extremes, extremal index, stationary time series, mixing coefficients, block maxima.

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