Mathematics Department

Clustering of extreme values

CMA/Statistics and Risk Management

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Objectives

➢ Analyzes a risk related to extreme values of a stationary time series, then the clustering behavior of extremes can be important.

➢ Extremal index may be interpreted as the reciprocal value of a limiting cluster size – Fig. 1

➢ Due to the large bias of the extremal index estimators, the resulting estimates are usually very sensitive to the choice of the threshold and thus difficult to estimate in real data set. Procedures for the choice of the threshold are required – Fig. 2 and 3
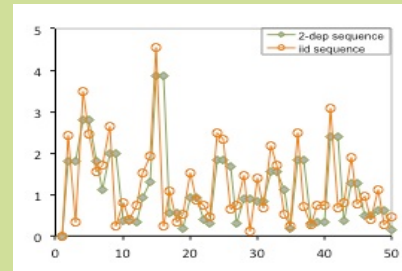
Methodology

➢ Bootstrap and Jackknife methods in the context of dependence to obtain more stable estimators of the extremal index

➢ Monte Carlo simulation studies give us the possibility of analysing the behavior of our results, given that the true values of the parameters are known.

➢ An heuristic algorihm is applied to the adaptive choice of the threshold.

➢ Applications to daily returns of the S&P 500 stock are presented. - Fig. 4
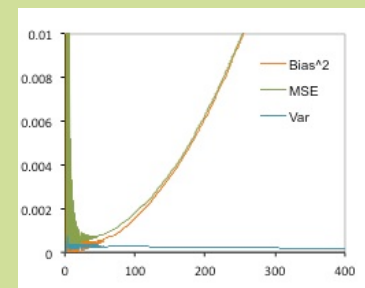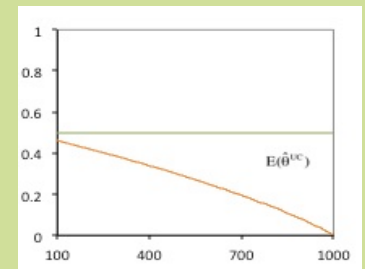
Expected Results

➢ To obtain more stable estimators around the target value of the extremal index– Fig. 5

➢ To improve the adaptive algorithm for the estimator of k, the largest order statistics to be used in the estimation. For the estimated k choose among several estimators that one which provides a "good" estimate of extremal index.