

# Extreme value inference for heterogeneous power law data

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We extend extreme value statistics to independent data with possibly very different distributions. In particular, we present novel asymptotic normality results for the Hill estimator, which now estimates the extreme value index of the average distribution. Due to the heterogeneity, the asymptotic variance can be substantially smaller than that in the i.i.d. case. As a special case, we consider a heterogeneous scales model where the asymptotic variance can be calculated explicitly. The primary tool for the proofs is the functional central limit theorem for a weighted tail empirical process. We also present asymptotic normality results for the extreme quantile estimator. A simulation study shows the good finite-sample behavior of our limit theorems. We also present an application to assess the tail heaviness of earthquake energies. Joint work with YI He (University of Amsterdam).