Quantitative Finance > Statistical Finance

Robust Estimators in Generalized Pareto Models

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(Submitted on 10 May 2010 (v1), last revised 24 Aug 2010 (this version, v2))

We study global and local robustness properties of several estimators for shape and scale in a generalized Pareto model. The estimators considered in this paper cover maximum likelihood estimators, skipped maximum likelihood estimators, Cram\'er-von-Mises Minimum Distance estimators, and, as a special case of quantile-based estimators, Pickands Estimator. We further consider an estimator matching the population median and an asymmetric, robust estimator of scale (kMAD) to the empirical ones (kMedMAD), which may be tuned to an expected FSBP of 34%. These estimators are compared to one-step estimators distinguished as optimal in the shrinking neighborhood setting, i.e.; the most bias-robust estimator minimizing the maximal (asymptotic) bias and the estimator minimizing the maximal (asymptotic) MSE. For each of these estimators, we determine the finite sample breakdown point, the influence function, as well as statistical accuracy measured by asymptotic bias, variance, and mean squared error - all evaluated uniformly on shrinking convex contamination neighborhoods. Finally, we check these asymptotic theoretical findings against finite sample behavior by an extensive simulation study.

Comments:	28 pages, 5 figures
Subjects:	**Statistical Finance (q-fin.ST)**
MSC classes:	62F35
ACM classes:	G.3
Cite as:	**arXiv:1005.1476v2 [q-fin.ST]**

Submission history

From: Nataliya Horbenko [view email]
[v1] Mon, 10 May 2010 09:06:38 GMT (105kb)
[v2] Tue, 24 Aug 2010 10:02:25 GMT (105kb)

Which authors of this paper are endorsers?