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Double shrinkage estimation of ratio of scale parameters. (English) Zbl 0804.62026
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Summary: The problems of estimating ratio of scale parameters of two distributions with unknown location parameters are treated from a decision-theoretic point of view. The paper provides the procedures improving on the usual ratio estimator under strictly convex loss functions and the general distributions having monotone likelihood ratio properties.

In particular, double shrinkage improved estimators which utilize both estimators of two location parameters are presented. Under order restrictions on the scale parameters, various improvements for estimation of the ratio and the scale parameters are also considered. These results are applied to normal, lognormal, exponential and Pareto distributions. Finally, a multivariate extension is given for the ratio of covariance matrices.

MSC:

62F10 Point estimation
62H12 Estimation in multivariate analysis

Cited in **2** Reviews
Cited in **15** Documents

Keywords:

ratio of variances; shrinkage estimation; inadmissibility; Stein's truncated rule; noncentral chi-square distributions; estimation of ordered scale parameters; estimating ratio of scale parameters; unknown location; strictly convex loss functions; monotone likelihood ratio properties; double shrinkage improved estimators; order restrictions; normal; lognormal; exponential; Pareto distributions; ratio of covariance matrices

Full Text: [DOI](#)

References:

- [1] Arnold, B. C. (1970). Inadmissibility of the usual scale estimate for a shifted exponential distribution, *J. Amer. Statist. Assoc.*, 65, 1260-1264. · [Zbl 0225.62032](#) · [doi:10.2307/2284293](#)
- [2] Brewster, J. F. (1974). Alternative estimators for the scale parameter of the exponential distribution with unknown location, *Ann. Statist.*, 2, 553-557. · [Zbl 0284.62006](#) · [doi:10.1214/aos/1176342715](#)
- [3] Brewster, J. F. and Zidek, J. V. (1974). Improving on equivariant estimators, *Ann. Statist.*, 2, 21-38. · [Zbl 0275.62006](#) · [doi:10.1214/aos/1176342610](#)
- [4] Brown, L. D. (1968). Inadmissibility of the usual estimators of scale parameters in problems with unknown location and scale parameters, *Ann. Math. Statist.*, 39, 29-48. · [Zbl 0162.49901](#) · [doi:10.1214/aoms/1177698503](#)
- [5] Gelfand, A. E. and Dey, D. K. (1988). On the estimation of a variance ratio, *J. Statist. Plann. Inference*, 19, 121-131. · [Zbl 0664.62021](#) · [doi:10.1016/0378-3758\(88\)90057-2](#)
- [6] Goutis, C. and Casella, G. (1991). Improved invariant confidence intervals for a normal variance, *Ann. Statist.*, 19, 2015-2031. · [Zbl 0745.62026](#) · [doi:10.1214/aos/1176348384](#)
- [7] Kubokawa, T. (1994). A unified approach to improving equivariant estimators, *Ann. Statist.* (to appear). · [Zbl 0816.62021](#)
- [8] Kubokawa, T. and Saleh, A. K. Md. E. (1993). On improved positive estimators of variance components, *Statist. Decisions* (to appear). · [Zbl 0794.62040](#)
- [9] Kubokawa, T., Robert, C. and Saleh, A. K. Md. E. (1992). Empirical Bayes estimation of the covariance matrix of a normal distribution with unknown mean under an entropy loss, *Sankhy? Ser. A*, 54, 402-410. · [Zbl 0770.62005](#)
- [10] Kubokawa, T., Robert, C. P. and Saleh, A. K. Md. E. (1993a). Estimation of noncentrality parameters, *Canad. J. Statist.*, 21, 45-57. · [Zbl 0787.62023](#) · [doi:10.2307/3315657](#)
- [11] Kubokawa, T., Honda, T., Morita, K. and Saleh, A. K. Md. E. (1993b). Estimating a covariance matrix of a normal distribution with unknown mean, *J. Japan Statist. Soc.*, 23, 131-144. · [Zbl 0826.62041](#)
- [12] Maatta, J. M. and Casella, G. (1990). Developments in decision-theoretic variance estimation, *Statist. Sci.*, 5, 90-120. · [Zbl 0955.62529](#)
- [13] Madi, M. and Tsui, K.-W. (1990). Estimation of the ratio of the scale parameters of two exponential distributions with

unknown location parameters, *Ann. Inst. Statist. Math.*, 42, 77-87. · [Zbl 0716.62009](#) · [doi:10.1007/BF00050780](#)

- [14] Nagata, Y. (1989). Improvements of interval estimations for the variance and the ratio of two variance, *J. Japan Statist. Soc.*, 19, 151-161. · [Zbl 0715.62072](#)
- [15] Nagata, Y. (1991). Improved interval estimation for the scale parameter of exponential distribution with an unknown location-scale parameter, *Quality, Journal of the Japanese Society of Quality Control*, 21, 5-10 (in Japanese).
- [16] Perron, F. (1990). Equivariant estimators of the covariance matrix, *Canad. J. Statist.*, 18, 179-182. · [Zbl 0702.62048](#) · [doi:10.2307/3315567](#)
- [17] Sinha, B. K. and Ghosh, M. (1987). Inadmissibility of the best equivariant estimators of the variance-covariance matrix, the precision matrix, and the generalized variance under entropy loss, *Statist. Decisions*, 5, 201-227. · [Zbl 0634.62050](#)
- [18] Stein, C. (1964). Inadmissibility of the usual estimator for the variance of a normal distribution with unknown mean, *Ann. Inst. Statist. Math.*, 16, 155-160. · [Zbl 0144.41405](#) · [doi:10.1007/BF02868569](#)
- [19] Takeuchi, K. (1991). Personal communications.

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