

ENTROPY LOSS AND RISK OF IMPROVED ESTIMATORS FOR THE GENERALIZED VARIANCE AND PRECISION*

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Abstract. Let the distributions of $X(p \times r)$ and $S(p \times p)$ be $N(\xi, \Sigma \otimes I_r)$ and $W_p(n, \Sigma)$ respectively and let them be independent. The risk of the improved estimator for $|\Sigma|$ or $|\Sigma^{-1}|$ based on X and S under entropy loss ($= d/|\Sigma| - \log(d/|\Sigma|) - 1$ or $d|\Sigma| - \log(d|\Sigma|) - 1$) is evaluated in terms of incomplete beta function of matrix argument and its derivative. Numerical comparison for the reduction of risk over the best affine equivariant estimator is given.

Key words and phrases: Stein's truncated estimator, zonal polynomials, incomplete beta function, multivariate linear hypotheses, mixture representation of noncentral Wishart and multivariate beta distributions.