

## 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.