

Estimability and restrictions in linear models

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In a linear model $X\beta$ for the mean vector of a multivariate random variable Y , estimable functions of β are customarily defined as those functions $P'\beta$ for which unbiased linear estimators exist. Testable hypotheses about β , on the other hand, are linear relations that restrict the model.

Statistical computing packages, like SAS and ANOVA programs in R, refuse to deal with non-estimable functions. That an estimator is not unbiased doesn't seem to be so fatal a flaw that we should be forbidden even to look at it. Then why is non-estimability so bad?

By examining the relation between estimability and restrictions, this paper will show that the mean vector carries no information at all about non-estimable functions, and that therefore any statement about a non-estimable function based on the mean vector is false. As part of this development, useful representations of linear restrictions on affine sets are shown.