

The best EBLUP in the Fay–Herriot model

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Abstract We show that in the case of Fay–Herriot model for small area estimation, there is an estimator of the variance of the random effects so that the resulting EBLUP is the best in the sense that it minimizes the leading term in the asymptotic expansion of the mean squared error (MSE) of the EBLUP. In particular, in the balanced case, i.e., when the sampling variances are equal, this best EBLUP has the minimal MSE in the exact sense. We also propose a modified Prasad–Rao MSE estimator which is second-order unbiased and show that it is less biased than the jackknife MSE estimator in a suitable sense in the balanced case. A real data example is discussed.

Keywords Empirical best linear unbiased prediction · Mean squared error · Small area estimation · Third-order approximation