



## Efficient Small Area Estimation When Covariates Are Measured With Error Using Simulation Extrapolation

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Small area estimation methods typically combine direct estimates from a survey with predictions from a model in order to obtain estimates of population quantities such that the mean squared error of the predictor is minimized. The Fay-Herriot model, which uses area level auxiliary information to develop such a predictor is a popular choice among the practitioners. But covariates may be measured with error and in such situations predictors will have enhanced mean square error and may be even worse than the direct domain predictor. Recently, improved predictors have been proposed for small areas incorporating the mean squared error of the auxiliary variables measured with error. We propose an alternative strategy to improve the predictor of the parameter of interest in the small area and increase their efficiency by considering an additive measurement error model and applying the well-known bias correction technique called simulation-extrapolation (SIMEX). The performance of this corrected predictor is compared empirically with that of other predictors and our proposed predictor is shown to perform better. We also empirically illustrate the performance of the predictors under mild departures from normality of measurement error.

**Keywords:** Fay-Herriot model; Mean squared error; Jackknife estimator.