Combining sampling and model weights in agriculture small area estimation

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Abstract

This work is focussed on agriculture small area models for predicting minor crops. In the application considered here, the study domain is often poor in the crop of interest leading to irregular and sparsely distributed plots where the sampled quadrats or segments do not need to be completely included in the domain. Hence, the variability among the sampled units becomes large in those areas with a high number of segments. To date, models including weights to account for heteroscedasticity, as well as models considering sampling weights to achieve design-consistency have been proposed to derive estimators of small area means or totals. In this work, we discuss extensions of these models and the convenience of using both types of weighting. The models performance is illustrated for predicting the total area occupied by olive trees in a region of Navarra, Spain.

References

[1] Battese GE, Harter RM, Fuller WA. 1988. An Error-Components Model for Prediction of Country Crop Areas Using Survey and Satellite Data. *Journal of the American Statistical Association*, **83**, 28-36.

[2] Prasad NGN, Rao JNK. 1999. On Robust Small Area Estimation Using a Simple Random Effects Model. *Survey Methodology*, **25**, 67-72.

[3] Rao JNK. 2003. *Small Area Estimation*. Wiley Series in Survey Methodology.

[4] Stukel DM, Rao JNK. 1997. Estimation of regression models with nested error structure and unequal error variances under two and three stage cluster sampling . *Statistics and Probability Letters*, **35**, 401-407.