Discussion: Small Area Estimation (SAE) of Poverty

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Overview

- Discussion of two papers on small area estimation of poverty
- Paper 1 by Rao and Molina: Provides a comprehensive review of SAE methods for poverty estimation
- Paper 2 by Elbers and Van der Weide: Discusses the use of normal mixtures for SAE of poverty

Introductory Remarks

- Extensive development of SAE methods to handle estimation beyond small area averages (e.g. distribution functions)
- NSIs producing official statistics tend to avoid the use of models
- SAE: One area in official statistics where models are now accepted
- Presents a small 'paradigm shift' for NSIs
- UK Office for National Statistics:
  - Estimates of income and unemployment are now accredited as National Statistics
  - Producing experimental estimates (leading to National statistics) of poverty (including child poverty) and income distributions
  - The role of SAE in producing a new Census product (Beyond 2011)

Paper by Rao and Molina

- Reviews a range of recently proposed methods for poverty estimation
- Clearly demonstrates the technical advantages of EB compared to the ELL under certain conditions
- Allows for Hierarchical Bayes (HB) estimation. Advantages for MSE prediction
- Presents an extension in case of model misspecification
- This is by allowing the level 1 error distribution to follow a Skew-Normal distribution

Paper by Elbers and Van der Weide

- Presents an alternative approach to handling model misspecification by use of mixtures
- Considers extensions to a two-fold model
- Considers extensions to EB estimation
- Gershunskaya and Lahiri (2010): Use mixture of two normal distributions for achieving outlier robustness

Discussion Points

- EB clearly superior to ELL in the presence of:
  - Strong area effects;
  - Small area-specific sample sizes
- In applications by the World Bank many small areas are out of sample ($n_d = 0$) $\rightarrow ELL = EB$
- Synthetic estimation is perhaps the only option in this case
- How does bootstrap MSE of EB estimates compare to posterior variance of HB estimates?

Discussion Points (Cont'd)

- Significant work in accounting for misspecification of model assumptions
- Skew-Normal, Mixtures, Asymmetric Laplace
- Convenient parametric assumptions
- Do all provide similar protection?
- More work is needed for understanding how these methods operate in different situations

Discussion Points (Cont'd)

- Incorporating additional levels clearly an important extension
- Missing levels $\rightarrow$ model misspecification
- Does it matter for point estimation?
- Does it matter for MSE estimation?
- Extensions to accounting for informative sampling clearly important

A Brief Aside on Robust Estimation

- Under the nested error regression model, the MQ predictor will be less efficient than the EBLUP
- Under the nested error regression model, however, the MQ predictor will be more efficient than a regression estimator
- $\hat{\beta}(\hat{\theta}_d)$:
  - $\hat{\theta}_d$ depends on q_{id} which are estimated using the whole sample
  - $\hat{\beta}(\hat{\theta}_d)$ is also estimated using the whole sample and not only the domain specific data
  - Small-scale empirical study under the nested error regression model
  - MQ has on average significantly lower RMSE than the regression estimator

General Points for Discussion - Beyond Income Deprivation

- Deprivation in many dimensions not only income
- Composite indicator of deprivation, incorporates different dimensions
- Role of glmms: Count and ordinal outcomes

General Points for Discussion - Using the Estimates

- Gap between producing the estimates and using the estimates
- How are estimates used for designing policies and allocating resources?
- How to measure the impact of policies ?
- Ordered SAE - More methodology is needed