Recommendations on SAE studies

1 – Introduction

2 – Assessing user requirements

3 – Making a successfull SAE study

4 – Assessing the quality of small area estimates

5 – Documenting the results

SAE: intro

Small area estimation is a methodology for producting estimates for a more detailed level of geography than can be reliably obtained from direct survey estimates.

Conceptually similar to these are *small domain estimates*, which are disaggregated to fineclassification levels (eg industry, income group or labour force status).

SAE: intro

SAE combines the use of survey data and auxiliary data sources such as administrativedata

SAE results are new statistics that are not otherwise available from survey or administrative data sources.

Watch out: some *administrative data* also can be used to produce statistics for small areas

SAE: intro

SAE: analytical methods may have a crucial role for producing official statistics:

- to ensure methods and assumptions are described for users
- the validity of the modelled estimates are to be assessed.

SAE: **Assessing user requirements**

1- What are the nature and context of the key planning or funding decisions that require small area data?

2 - What variables or indicators are needed to meet these decision making requirements? What disaggregations of these are important and why? What level of geography is needed?

SAE: **Assessing user requirements**

3- What level of accuracy is needed and which small area estimates have the greatest priority in terms of accuracy?

4 - What auxiliary data are available to support the modelling process? How are the data collected, for what purpose are they used, and how accurate are they likely to be?

SAE: **Assessing user requirements**

5 - What previous studies have been undertaken that are similar to the current small area problem?

Small area estimation techniques

ABS suggestion 1

“The choice of small area method depends on the availability of auxiliary data and the relationship between these data and the variables of interest at the small area level. In essence, we are looking to "borrow strength" from these auxiliary data to increase the accuracy of the estimates. Small area models range from the simple to the more complex, the latter requiring considerably more time, effort, technical skill and available data. A range of quantitative and qualitative diagnostics should be used to choose the best model for the given data.”

Small area estimation techniques

(i) direct estimator

this is a standard method for surveys where estimates are obtained by applying survey weights to those sample units selected in each small area.

- sample sizes are often too small at this level to produce reliable direct estimates.

- no sample in the areas of interest (eg not all LGAs are sampled in every survey)

Small area estimation techniques

(ii) broad area ratio estimator (BARE)

this is one of the simplest types of small area models.

It is calculated by applying the rate for a broad area obtained from a survey (eg disability rate or unemployment rate or poverty rate) to the small area populations (available from say a population census or demographic estimates).

Small area estimation techniques

(iii) broad area ratio estimator with auxiliary data

this uses information that is correlated with the variable of interest and is available at the small area level to derive an estimate that adjusts for compositional differences in small areas.

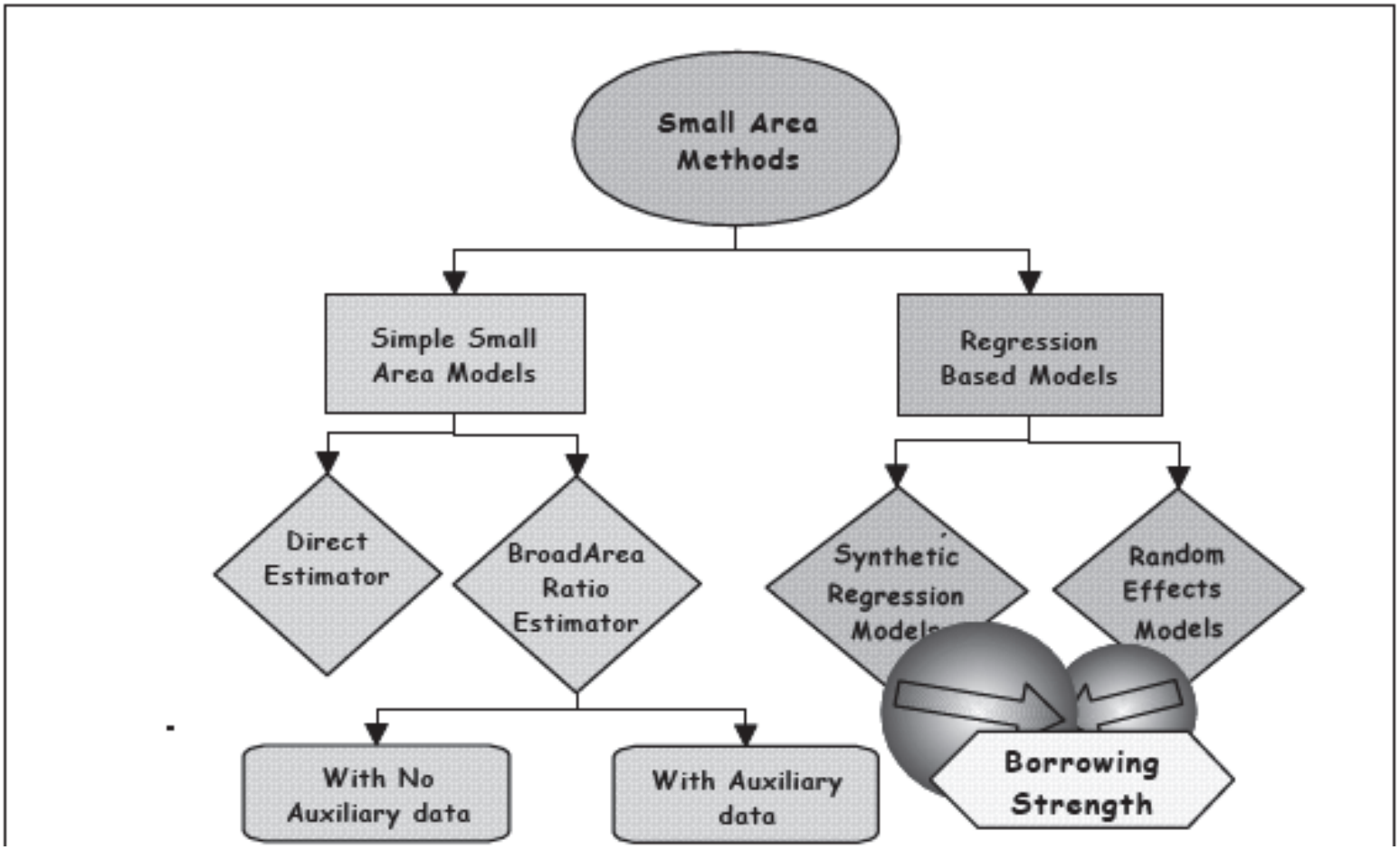
Small area estimation techniques

(iv) regression based models

See previous lectures!!!!!

Model based SAE – Model assisted SAE

Small area estimation techniques



What makes for a successful small area study

- ***User commitment and client interaction*** **-** ability to work closely with users
- ***Variable(s) of interest*** **-** the variables of interest should be a reasonably common population characteristic.
- ***Population size of the small area*** **-** when small areas contain some sample, even if inadequate for accurate direct estimation, the modelled estimates will be more reliable (if the model fits!).

What makes for a successful small area study

- ***Auxiliary data*** **-** the availability of administrative, census or other survey data with a significant relationship to the variable of interest is crucial

Assessing the quality of small area estimates

Choice of the model for SAE

- plausibility of the model in light of previous studies or accepted wisdom;
- how well the model fits the observed data;
- accuracy of the small area estimates predicted from the model.

Assessing the quality of small area estimates

Diagnostics:

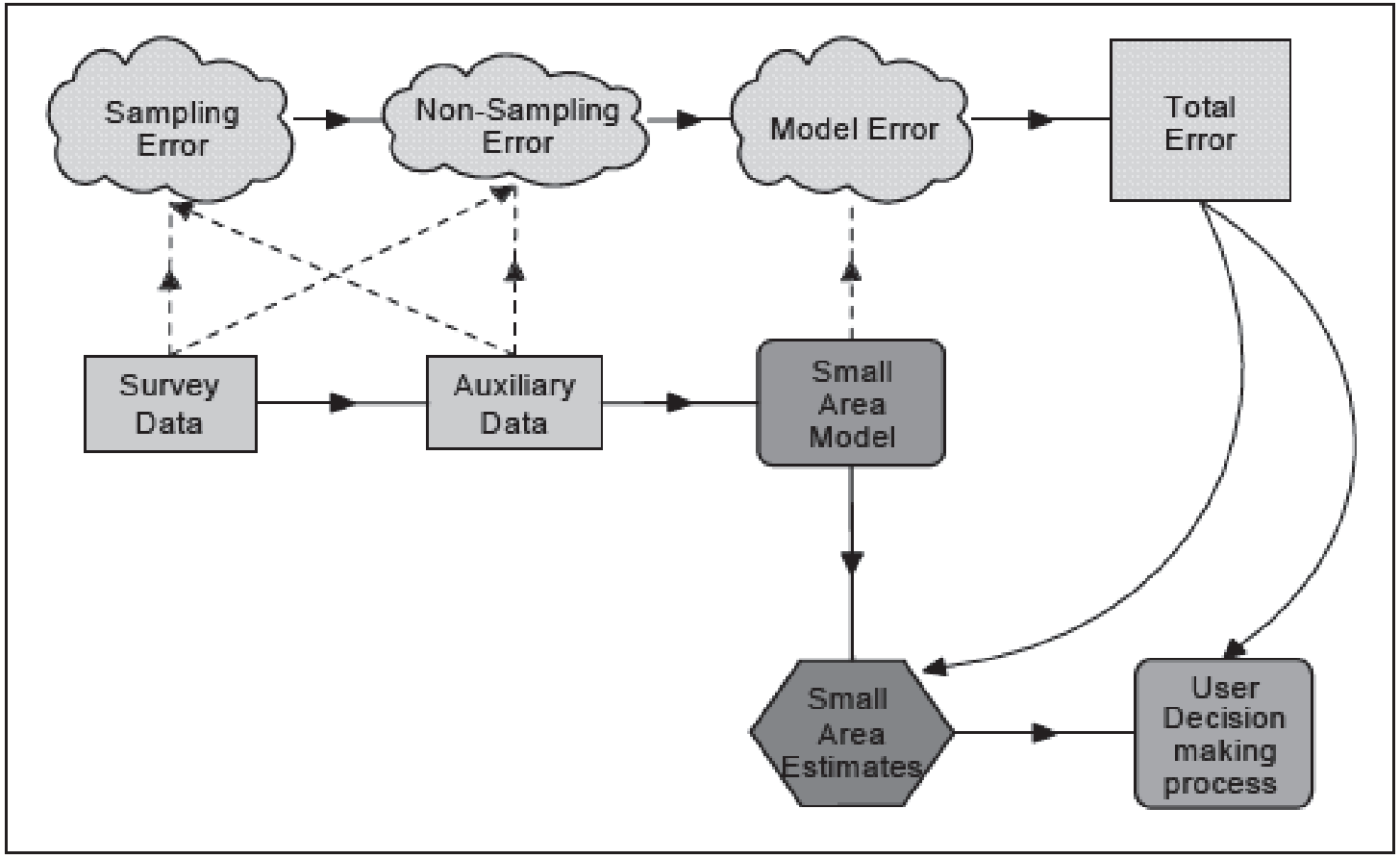
- a bias test that compares the small area predictions with direct estimates;
- testing whether model assumptions are met and that the model is a good fit;
- checking that small area estimates add to published state or national estimates;
- local knowledge and expert advice on the spread of estimates across small areas;
- relative root mean squared errors (RMSE) - analogous to sampling errors calculated for survey estimates.

Assessing the quality of small area estimates

ABS suggestion 1

"Although these diagnostics are crucial in terms of assessing the relative performance of competing small area models, they have to be supported by good judgement from practitioners and expert advice from users"

Quantifying the quality of small area estimates



Documenting results

- underlying problem, scope and applicability ofthe estimates;
- small area estimation procedure (the specific modelused, variables included, main assumptions, etc);
- quality issues specific to different sets of small area estimates;
- guidelines on how to use the small area output;
- a summary of key issues and recommendations (eg, aggregation of small area estimates, the need for local knowledge, etc.).

Documenting results

- models used plus their plausibility, validity and goodness of fit;
- how each set of small area estimates performed against specific quality diagnostics;
- other quality issues (sensitivity of the spatial model (if any), Modifiable Area Unit Problem , shrinkage effect, robustness against outliers, treatment of zero values in the study variable).

Summary and Conclusions

- Careful assessment of SAE.
- Communication with stakeholders.
- Relevant auxiliary variables.
- Documentation on models, quality of the outputs.

GOOD WORK!

Thank you!