

Opportunities for PhD Study in Social Statistics

3. Small area estimation and spatial analysis

Sample surveys provide a cost effective way of obtaining estimates for characteristics of interest at both population and subpopulation (domain) level. In most practical applications, however, domain sample sizes are not large enough to allow direct estimation; the term 'small areas' is typically used to describe such domains. When direct estimation is not possible, one has to rely upon alternative methods that depend on the availability of population level auxiliary information and are commonly referred to as indirect or model-based methods. The study of methods for tackling the small area-specific sample sizes is more commonly referred to as small area estimation.

In recent years there have been important methodological developments in small area estimation research. Such developments include the development of semi-parametric models for small area estimation, small area models that make use of the spatial information and methods for estimating the mean squared error of small area parameters. In addition small area methodology has recently been applied to poverty mapping and the estimation of income and consumption distributions at localized levels.

Examples of potential methodological and applied PhD topics in small area estimation and spatial analysis include:

- a) Borrowing strength over space in small area estimation using robust geographical weighted regression models
- b) Applications of small area models and spatial small area models in poverty mapping and the estimation of small area income and consumption distributions
- c) Multilevel geographical weighted regression models
- d) Applications with geographical weighted regression models and other spatial regression models

References:

Anselin, L. (1992). *Spatial econometrics: Method and models*, Kluwer Academic Publishers, Boston.

Chambers, R. and Tzavidis, N. (2006). M-quantile Models for Small Area Estimation, *Biometrika*, **93**, 255-268.

Cressie, N. (1993). *Statistics for spatial data*, John Wiley & Sons, New York.

Fotheringham, A.S., Brunson, C. and Charlton, M. (2002). *Geographically Weighted*

Regression, John Wiley & Sons, West Sussex.

Rao, J.N.K. (2003). *Small Area Estimation*. New York: Wiley.

