

---

# Survey: Theory, Methods and Applications

Chair: Changbao Wu (University of Waterloo)

---

---

**MIN CHEN**, University of Waterloo

*Pseudo Empirical Likelihood Method for Pretest-Posttest Studies Using Survey Data*

Pretest-posttest studies are an important and popular method for evaluating a treatment effect. The empirical likelihood method is a useful inference tool for such studies wherein information on a set of baseline variables can be effectively incorporated. We extend the methodology to apply to social or psychological studies with data collected through complex longitudinal surveys. Our proposed pseudo empirical likelihood method can be used to assess change of people's behaviour or response patterns due to the implementation of new public policies or a change in data collection protocol. The method is illustrated using data from the International Tobacco Control Project.

---

**GAURI SANKAR DATTA**, University of Georgia, U.S. Bureau of the Census

*A Weighted Likelihood Approach to Model-Based Small Area Estimation with Unit-Level Data*

Small area estimation uses area-level or unit-level models. Area-level models apply to direct survey estimates that are typically design consistent, leading to design consistent model predictions. Unit-level models, however, typically apply to survey microdata ignoring the sampling weights, not leading to design consistent model predictions. Kott, Rao and others developed methods to incorporate sampling weights in the unit-level normal nested error regression model to achieve design consistency. We propose a pseudo-likelihood incorporating sampling weights that applies to normal or non-normal data, including binary and count data. Using a Bayesian approach, we apply our method to American Community Survey data.

---

**DARREN GRAY**, Statistics Canada

*A Multi-Constraint Sample Allocation for Detailed National Estimates Made Trickier by Provincial Buy-Ins*

For the Survey of Innovation and Business Strategies (SIBS), the 2009 sample allocation was designed to satisfy precision requirements for three modules of questions, each of which targeted different industry and employment size group combinations at the national level. For the 2012 iteration of the survey, this already complex system of constraints was made more complicated when provincial specifications were added to the equation. A non-linear programming method was proposed to solve this complex problem. This paper will go over the methods used to ensure that all precision requirements were satisfied, while minimizing sample size and avoiding small stratum sizes.

---

**PIERRE-OLIVIER JULIEN**, Statistique Canada

*Negative Sample Coordination: An Overview of Some Methods*

A considerable amount of data is produced by statistical agencies, which can add a significant workload on respondents. To reduce respondent's burden, a number of methods for sample coordination of surveys based on a common frame have been developed. Statistics Canada is currently putting in place a central project consisting of more than 100 surveys based on its Business Register. Coordination of these samples would be possible from a common informatics tool. We present here an overview of some sample coordination methods which could be implemented in such a tool.

---

**CHRISTIAN OLIVIER NAMBEU**, Statistique Canada

*Calibration Using Estimated Constraints*

Calibration is an estimation approach intensively used in practice because of its many advantages. Very often, calibration totals are known quantities in the population. In this paper, we study the case when some known totals are replaced by estimated

totals. The corresponding estimator is analysed and compared to standard calibration estimators in terms of bias and mean squared error both theoretically and by the means of a simulation.