Washington Statistical Society Webinar

Title: Bregman projection for calibration estimation in survey sampling
Speaker: Jae-kwang Kim, Department of Statistics, Iowa State University
Chair: Pushpal Mukhopadhyay, WSS Methodology Section Chair
Date: April 2, 2026
Time: 12:00 noon – 1:00 PM ET

Abstract:

Calibration weighting is a fundamental technique for integrating auxiliary information into survey estimation and for mitigating selection bias. This paper develops a unified framework for calibration weighting based on the Bregman divergence, operating directly in the weight space rather than on weight ratios as in the classical Deville–Särndal approach. The proposed formulation reveals calibration as a Bregman projection onto the constraint manifold and establishes a primal–dual symmetry in which both the weight-space and multiplier-space problems minimize Bregman divergences. Unlike the Deville–Särndal framework, the resulting estimator is asymptotically equivalent to a debiased prediction estimator whose regression coefficient depends explicitly on the choice of generator, enabling efficiency tuning; under Poisson sampling, a contrast-entropy generator achieves design-optimality. The framework accommodates bounded weights via truncated generators and combined with cross-fitting, yields doubly robust estimation under misspecification of either the outcome or propensity model. For high-dimensional covariates, a regularized calibration extension replaces exact balance with l_q-norm tolerance constraints, yielding a Hölder-conjugate penalized dual that performs data-adaptive variable selection. Simulation studies and a real data analysis using NOAA's Large Pelagics Intercept Survey demonstrate the practical advantages of the proposed methods.

About the speaker:

Jae-kwang Kim a LAS Dean's professor in the Statistics department at Iowa State University (ISU). He is a fellow of ASA and IMS. He has published more than 100 papers in peer reviewed journals and two textbooks: "Statistical Methods for Handling Incomplete Data" (Second edition, coauthored with Jun Shao) and "Statistics in Survey Sampling". He is a recipient of Gertrude M. Cox award in 2015 from the Washington Statistical Society and RTI international.

For additional information, please contact Pushpal Mukhopadhyay (pushpalm@gmail.com), WSS Methodology Section Chair.

How to join:

WSS have partnered with Instats for seminars and workshops, as well as connecting with the research community more broadly through free community forums, social networking, Q&A boards, and job postings. Use the following link to register and join the seminar: [Bregman Projection for Calibration Estimation in Survey Sampling (Free Seminar)](#)