MICHIGAN STATE UNIVERSITY
Department of Statistics and Probability

COLLOQUIUM

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Semiparametric Approach to a Random Effects Quantile Regression Model

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Refreshments 10:00 am
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Abstract

We consider a random effects quantile regression analysis of clustered data and propose a semiparametric approach using empirical likelihood.
The random regression coefficients are assumed independent with a common mean, following parametrically specified distributions.
The common mean corresponds to the population-average effects of explanatory variables on the conditional quantile of interest, whereas the random coefficients represent cluster-specific deviations in the covariate effects. We formulate the estimation of the random coefficients as an estimating equations problem and use empirical likelihood to incorporate the parametric likelihood of the random coefficients.
A likelihood-like statistical criterion function is proposed that, which we show is asymptotically concave in a neighborhood of the true parameter value and motivates its maximizer as a natural estimator. We use Markov chain Monte Carlo samplers in the Bayesian framework, and propose the resulting quasi-posterior mean as an estimator. We show that the proposed estimator of the population-level parameter is asymptotically normal, and that the estimators of the random coefficients are shrunk toward the population-level parameter in the first-order asymptotic sense. These asymptotic results do not require Gaussian random effects, and the empirical likelihood-based likelihood-like criterion function is free of parameters related to the error densities. This makes the proposed approach both flexible and computationally simple. We illustrate the methodology with two real data examples.

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