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GENDER: M **CITIZENSHIP**: Indian

PRE-DOCTORAL STUDIES:

2013 – 2014 MRes Economics, London School of Economics
2011 – 2013 MSc Econometrics and Mathematical Economics, London School of Economics
2007 – 2011 B.Tech Engineering Physics, Indian Institute of Technology Delhi

DOCTORAL STUDIES: London School of Economics

DATES: 2014 - present

THESIS TITLE: "Essays on inference in econometric models"

EXPECTED COMPLETION DATE: June 2018

THESIS ADVISOR AND REFERENCES:

Prof. Taisuke Otsu (Advisor)
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DESIRED TEACHING AND RESEARCH:

Primary Fields: Econometrics

Secondary Fields: Applied Econometrics

TEACHING EXPERIENCE:

2017 - 2018	Econometrics for MRes students
2016 - 2017	Econometrics for MRes students; Principles of Econometrics
2015 - 2016	Principles of Econometrics
2014 - 2015	Introduction to Econometrics
2013 - 2014	Principles of Econometrics

RELEVANT POSITIONS HELD:

2016 - 2018	LSE Teaching Fellow
2014 - 2018	Research Assistant for Prof. Taisuke Otsu

LANGUAGES

Fluent Spoken
English, Hindi, Telugu

Fluent Written
English, Hindi, Telugu

HONORS, SCHOLARSHIPS AND FELLOWSHIPS:

2014	John Hicks prize for outstanding performance in MRes Economics
2013	Ely Devons prize for exceptional performance in MSc
2011	JN Tata endowment scholarship
2010	MITACS Globalink fellowship
2005	National Talent Search Scholarship (Govt. of India)

REFEREE SERVICE:

Econometric Reviews, Journal of Business and Economic Statistics

COMPLETED PAPERS:

Job Market Paper:

“Bootstrap inference for propensity score matching”, Working paper, October 2017

Propensity score matching, where the propensity scores are estimated in a first step, is widely used for estimating treatment effects. In this context, the naive bootstrap is invalid (Abadie and Imbens, 2008). This paper proposes a novel bootstrap procedure for the propensity score matching estimator, and demonstrates its consistency. The proposed bootstrap is built around the notion of `potential errors', introduced in this paper. Precisely, each observation is associated with two potential error terms, corresponding to each of the potential states - treated or control - only one of which is realized. Thus, the variability of the estimator stems not only from the randomness of the potential errors themselves, but also from the probabilistic nature of treatment assignment, which randomly realizes one of the potential error terms. The proposed bootstrap takes both sources of randomness into account by resampling the potential errors as a pair as well as re-assigning new values for the treatments. Simulations and real data examples demonstrate the superior performance of the proposed method relative to using the asymptotic distribution for inference, especially when the degree of overlap in propensity scores is poor. General versions of the procedure can also be applied to other causal effect estimators such as inverse probability weighting and propensity score sub-classification, potentially leading to higher order refinements for inference in such contexts.

Other Papers:

“Treatment effect estimation in high dimensions without sparsity or collinearity conditions”, Working paper, May 2017

In many studies, the identification of a treatment effect requires controlling for many possible confounders or utilizing many instrumental variables or both. Methods for estimation and inference in such contexts typically rely on two key assumptions: (i) Only a finite number of controls and instruments are truly significant, and (ii) Restrictions on the correlations between the set of instruments and/or controls in form of restricted eigenvalue, incoherence or incompatibility conditions. I show that neither of these assumptions is necessary to obtain consistent estimates, based on the LASSO, for the treatment effect in linear models. Furthermore, I demonstrate that valid inference is also possible, using sample splitting, in the context of very many instruments. I also consider extensions to many weak instruments when the number of instruments is much greater than sample size. The results rely only on the predictive properties of the LASSO estimator, which requires very few assumptions.

“Empirical Likelihood for random sets”, (joint with Taisuke Otsu) *Journal of the American Statistical Association*, 2017

In many economic and statistical applications, the observed data take the form of sets rather than points. Examples include bracket data in survey analysis, tumor growth and rock grain images in morphology analysis, and noisy measurements on the support function of a convex set in medical imaging and robotic vision. Additionally, in studies of treatment effects, nonparametric bounds for the effects can be expressed by means of random sets. This article develops a concept of nonparametric likelihood for random sets and its mean, known as the Aumann expectation, and proposes general inference methods by adapting the theory of empirical likelihood. Several examples, such as regression with bracket income data, Boolean models for tumor growth, bound analysis on treatment effects, and image analysis via support functions, illustrate the usefulness of the proposed methods.

"Nonparametric instrumental regression with errors in variables", (joint with Taisuke Otsu) Forthcoming, *Econometric Theory*

We consider nonparametric instrumental variable regression when the endogenous variable is contaminated with classical measurement error. Existing methods are inconsistent in the presence of measurement error. We propose a wavelet deconvolution estimator for the structural function that takes into account both endogeneity and measurement error. We establish the convergence rates of our estimator for the cases of mildly/severely ill-posed models and ordinary/super smooth measurement errors. We characterize how the presence of measurement error slows down the convergence rates of the estimator. We also study the case where the measurement error density is unknown and needs to be estimated, and show that the estimation error of the measurement error density is negligible under mild conditions as far as the measurement error density is symmetric.

"Inference on distribution functions under measurement error", (joint with Taisuke Otsu & Yoon-Jae Whang) Submitted

We study inference on the cumulative distribution function (CDF) in the classical measurement error model. We suggest both asymptotic and bootstrap based uniform confidence bands for the estimator of the CDF under measurement error. We allow the density of the measurement error to be ordinary or super smooth, or to be estimated by repeated measurements. The proposed techniques can also be used to obtain confidence bands for quantiles, and perform various CDF-based tests such as goodness-of-fit of parametric models of densities, two sample homogeneity tests, and tests for stochastic dominance; all for the first time under measurement error. We apply the new test of stochastic dominance to study welfare changes of different population sub-groups using potentially mis-measured income data.

RESEARCH IN PROGRESS:

"The JAB: Jackknife Assisted Bootstrap for asymptotically nonlinear statistics"

In many econometric examples, such as least squares regression with high dimensional controls and semi-parametric models with sub-optimal bandwidth choice (for example due to undersmoothing), classical bootstrap inference fails to be valid. This is because such estimators cannot be linearized asymptotically, due to non-negligible quadratic or even cubic factors. Formally, this is due to the presence of non-negligible higher order influence functions. This paper proposes a general method of inference for such estimators using the `Jacknife Assisted Boostrap', which combines aspects of both jackknife and bootstrap techniques. In particular, the influence functions are estimated using jackknife methods. The bootstrap procedure then proceeds by perturbing the ANOVA decomposition of the estimator (Efron and Stein, 1981), which utilizes the estimated influence functions. This can be construed as a natural extension of the bootstrap to higher statistical orders.

"Jackknifing sparse networks"

Stochastic network models are routinely used to analyse network data in economic, social and bio-medical applications. Many properties of such networks can be summarized by the empirical distribution of various count features (e.g. the number of triads or tetrads), termed the `moments' of the network by Bickel, Chen and Levina (2011). While consistent estimators for the variances of count features have been proposed for dense networks, i.e. networks with high average degree, no corresponding estimator exists for the arguably more prevalent case of sparse networks, i.e. networks with low average degree. This paper employs higher order jackknife pseudovalues to obtain consistent variance estimates for the count features of sparse networks. The technique is based on a generalized version of the ANOVA decomposition (Efron and Stein, 1981) for estimates of count features.

“Shrinkage estimators for random sets”

Random sets arise naturally in many economic applications such as survey analysis, partial identification, and game theoretic models. Estimates of random sets are typically obtained by taking the sample average of the support functions for the set valued observations. However, such an estimate can be dominated in efficiency if one measures the loss in terms of an integrated mean square error criterion. This paper presents an alternative, shrinkage based estimator for random sets. Analogous to the classical James-Stein estimators, the proposed estimator shrinks the estimate of the random set to a pre-specified value, for instance to a point. It is shown that the proposed estimator can achieve greater accuracy than one based on sample averages.