Zhen Xie

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Northwestern Economics

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Fields

Econometrics

Education

Ph.D., Economics, Northwestern University — 2021–2027 (anticipated)
Committee: Ivan Canay, Joel Horowitz, Federico Bugni, Eric Auerbach

M.A., Economics, Northwestern University — June 2022

B.S., Mathematical Economics and Finance, Xi'an Jiaotong University, China — 2015–2019

Fellowships & Awards

Dissertation University Fellowship, Northwestern University — 2026–2027

Distinguished Teaching Assistant Award, Northwestern University — 2024–2025

Best Paper Award Nominee, Econometric Society Winter School — 2021

Teaching Experience

Lecturer, Northwestern University

Econometrics Review for Incoming Ph.D. Students — Summer 2025

Teaching Assistant, Northwestern University

ECON 480-2 Econometrics (Ph.D. Core) — Winter 2024–2026
ECON 480-3 Econometrics (Ph.D. Core) — Spring 2024
ECON 381-2 Econometrics (Advanced Undergraduate) — Spring 2023, 2025
ECON 281 Introduction to Applied Econometrics (Undergraduate) — Winter 2023

Job Market Paper

"Adapting to Endogeneity in Nonparametric Models"

Abstract: This paper proposes a new method for estimating nonparametric structural functions by adapting to the unknown magnitude of endogeneity. Instrumental variables can address endogeneity, but their use may come at a substantial cost in estimation accuracy: nonparametric instrumental variables (NPIV) estimators can converge at very slow rates. By contrast, nonparametric least squares (NP-OLS) can estimate the conditional mean function at a much faster rate, but this function generally differs from the structural function under endogeneity. We formalize this trade-off as a minimax estimation problem over classes of data generating processes indexed by the magnitude of endogeneity. We first show that the optimal rate of convergence ranges from the faster NP-OLS rate to the slower NPIV rate as endogeneity increases. We then construct a feasible shrinkage estimator combining NP-OLS and NPIV that nearly attains the optimal rate in each regime without prior knowledge of the magnitude of endogeneity. The key to this adaptation is a one-sided downward-adjusted estimate of the endogeneity bias component. Simulations demonstrate that our adaptive estimator exploits substantial accuracy gains under limited endogeneity while performing comparably to NPIV under severe endogeneity.

Working Papers

"Nonparametric Empirical Bayes Confidence Intervals"

Abstract: Empirical Bayes methods can improve inference on unobservable individual effects by borrowing strength across units. This paper proposes nonparametric empirical Bayes confidence intervals (NP-EBCIs) for unobservable individual effects in a normal means model. The oracle intervals are constructed from posterior quantiles under a point-identified, fully nonparametric prior; feasible intervals replace these quantiles with nonparametric estimates. The NP-EBCIs are asymptotically exact in the sense that both their conditional and marginal coverage probabilities converge to the nominal level. The flexibility of this nonparametric construction has an unavoidable statistical cost. We demonstrate that posterior quantiles, unlike posterior means, inherit the severe ill-posedness of nonparametric deconvolution: the minimax optimal estimation rate is logarithmic. This logarithmic rate is minimax optimal for errors in the conditional coverage probability, and the resulting errors in the marginal coverage probability also vanish at the same logarithmic rate. Despite these slow asymptotic rates, simulations show that the NP-EBCIs remain close to nominal coverage when the prior is non-Gaussian, and deliver substantial length reductions relative to intervals that treat each unit in isolation.

"Degrees of Freedom and Information Criteria for the Synthetic Control Method", with Guillaume Pouliot and Ziyi Liu.

Revise and Resubmit (2nd round) at *Quantitative Economics*.

Abstract: We provide an analytical characterization of the model flexibility of the synthetic control method (SCM) in the familiar form of degrees of freedom. We obtain estimable information criteria, which may be used to circumvent cross-validation when selecting either the tuning parameter in penalized variants of SCM or the weighting matrix in the SCM with covariates. We assess the impact of car license rationing in Tianjin; while a natural match is available, both it and other donors are noisy, inviting the use of SCM to average over approximately matching donors. The very large number of candidate donors calls for penalized variants of SCM and we observe that model selection using information criteria outperforms that based on cross-validation.

"Discrepancy-based Inference for Observational Studies", with Eric Auerbach.

Abstract: This paper proposes a new way to infer the *historical* effect of a policy using observational time series data. Conventional methods require a statistical model of the data generating process, which can be difficult to justify in many observational settings. Our approach, by contrast, does not rely on statistical modeling. We construct an interval that characterizes the possible values of the policy effect given the data and maintained assumptions. The interval is similar to a confidence interval, but replaces the usual standard error and critical value with measures of outcome variation and treatment assignment discrepancy that are defined without reference to a statistical model. We provide a theoretical justification for our approach, building on ideas from the literature on numerical integration and bounded-variation assumptions. We demonstrate its use in an empirical illustration that measures the economic impact of monetary policy changes along the lines of Romer and Romer (2023).

Research Experience

Research Professional, Becker Friedman Institute at UChicago 2019–2021
Faculty supervisor: Guillaume Pouliot

Languages

English (fluent), Chinese (native)

References

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