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Fields	Econometrics	
Education	Northwestern University Ph.D. Economics	2017–2023 (expected)
	London School of Economics and Political Science M.Sc. Econometrics and Mathematical Economics (Distinction) B.Sc. Econometrics and Mathematical Economics (First Class Honours)	2016–17 2013–16
Fellowships & Awards	Distinguished Teaching Assistant Award Economics Department Prize Economics Examiners' Prize Singapore LSE Trust Study Award	2021 2016 2014 2013–16
Teaching Experience	Teaching Assistant, Northwestern University ECON 201 Introduction to Macroeconomics ECON 381-1 Econometrics ECON 480-3 Econometrics Course Instructor, Northwestern University Econometrics Review for Incoming Ph.D. Students Teaching Assistant, London School of Economics EC210 Intermediate Macroeconomics	2018–21 2021 2019–20 2019 2016–17
Research Experience	Research Assistant, Northwestern University Professor Eric Auerbach Professor Ivan Canay Research Assistant, London School of Economics Professor Shengxing Zhang Professor David Baqaee Behavioural Research Lab	2020–21 2017–18 2017 2016 2014–17
Refereeing	Journal of Business and Economic Statistics	

Job Market Paper**“Linear Regression with Network Centrality Measures”**

To understand the relationship between an agent’s network position and their economic outcomes, researchers commonly conduct linear regression with network centrality measures as explanatory variables. However, economic networks may be measured with error and may be sparse, with many more agents than links between them. Consequently, OLS estimators may have poor statistical properties. In a setting with measurement error, we characterize the level of sparsity at which OLS estimators become inconsistent and find that regression on eigenvector centrality is less robust to sparsity than that on degree or diffusion. Additionally, we show that OLS estimators can be subject to bias even when they are consistent and that bias can be of larger order than the variance. We provide bias-corrected estimators and propose methods for inference, clarifying the settings under which the heteroskedasticity-consistent/robust t -statistics are appropriate for testing. A simulation study confirms our theoretical findings. Finally, we demonstrate the utility of our results in an application inspired by De Weerd and Dercon (2006), in which we consider consumption smoothing and social insurance in Nyakatoke, Tanzania.

Working Papers**“On the Implementation of Approximate Randomization Tests in Linear Models with a Small Number of Clusters” with Ivan Canay, Deborah Kim and Azeem Shaikh**

Accepted, Journal of Econometric Methods.

This paper provides a user’s guide to the general theory of approximate randomization tests developed in Canay et al. (2017a) when specialized to linear regressions with clustered data. An important feature of the methodology is that it applies to settings in which the number of clusters is small – even as small as five. We provide a step-by-step algorithmic description of how to implement the test and construct confidence intervals for the parameter of interest. In doing so, we additionally present three novel results concerning the methodology: we show that the method admits an equivalent implementation based on weighted scores; we show the test and confidence intervals are invariant to whether the test statistic is studentized or not; and we prove convexity of the confidence intervals for scalar parameters. We also articulate the main requirements underlying the test, emphasizing in particular common pitfalls that researchers may encounter.

“A Modified Randomization Test for the Level of Clustering”

R&R, Journal of Business and Economic Statistics.

Suppose a researcher observes individuals within a county within a state. Given concerns about correlation across individuals, at which level should they cluster their observations for inference? This paper proposes a modified randomization test as a robustness check for their chosen specification in a linear regression setting. Existing tests require either the number of states or number of counties to be large. Our method is designed for settings with few states and few counties. While the method is conservative, it has competitive power in settings that may be relevant to empirical work.

“On the Performance of the Neyman Allocation with Small Pilots” with Ahnaf Rafi

The Neyman Allocation and its conditional counterpart are used in many papers on experiment design, which typically assume that researchers have access to large pilot studies. This may not be realistic. To understand the properties of the Neyman Allocation with small pilots, we study its behavior in a novel asymptotic framework for two-wave experiments in which the pilot size is assumed to be fixed while the main wave sample size grows. Our analysis shows that the Neyman Allocation can lead to estimates of the ATE with higher asymptotic variance than with (non-adaptive) balanced randomization, particularly when the population is relatively homoskedastic. We also provide a series of empirical examples showing that the Neyman Allocation may perform poorly for values of homoskedasticity that are relevant for researchers. Our results suggest caution when employing experiment design methods involving the Neyman Allocation estimated from a small pilot study.

“Heterogeneous Treatment Effects for Networks, Panels, and other Outcome Matrices” with Eric Auerbach

We are interested in the distribution of treatment effects for an experiment where units are randomized to treatment but outcomes are measured for pairs of units. For example, we might measure risk sharing links between households enrolled in a microfinance program, employment relationships between workers and firms exposed to a trade shock, or bids from bidders to items assigned to an auction format. Such a double randomized experimental design may be appropriate when there are social interactions, market externalities, or other spillovers across units assigned to the same treatment. Or it may describe a natural or quasi experiment given to the researcher. In this paper, we propose a new empirical strategy based on comparing the eigenvalues of the outcome matrices associated with each treatment. Our proposal is based on a new matrix analog of the Fréchet-Hoeffding bounds that play a key role in the standard theory. We first use this result to bound the distribution of treatment effects. We then propose a new matrix analog of quantile treatment effects based on the difference in the eigenvalues. We call this analog spectral treatment effects.

“It’s not always about the money, sometimes it’s about sending a message: Evidence of Informational Content in Monetary Policy Announcements” with Santiago Camara and Nicholas Capel

This paper introduces a transparent framework to identify the informational content of FOMC announcements. We do so by modelling the expectations of the FOMC and private sector agents using state of the art computational linguistic tools on both FOMC statements and New York Times articles. We identify the informational content of FOMC announcements as the projection of high frequency movements in financial assets onto differences in expectations. Our recovered series is intuitively reasonable and shows that information disclosure has a significant impact on the yields of short-term government bonds.

“Panel Data with Unknown Clusters”

Clustered standard errors and approximate randomization tests are popular inference methods that allow for dependence within observations. However, they require researchers to know the cluster structure *ex ante*. We propose a procedure to help researchers discover clusters in panel data. Our method is based on thresholding an estimated long-run variance-covariance matrix and requires the panel to be large in the time dimension, but imposes no lower bound on the number of units. We show that our procedure recovers the true clusters with high probability with no assumptions on the cluster structure. The estimated clusters are independently of interest, but they can also be used in the approximate randomization tests or with conventional cluster-robust covariance estimators. The resulting procedures control size and have good power.

“Some Finite Sample Properties of the Sign Test”

This paper contains two finite-sample results about the sign test. First, we show that the sign test is unbiased against two-sided alternatives even when observations are not identically distributed. Second, we provide simple theoretical counterexamples to show that correlation that is unaccounted for leads to size distortion and over-rejection. Our results have implication for practitioners, who are increasingly employing randomization tests for inference.

Languages

English (native), Mandarin Chinese (fluent)

Programming

R, Python, Matlab, Stata

References

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