Joseph Fry

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University of Colorado: Boulder
Department of Economics

Education

Ph.D., Economics, University of Colorado: Boulder — May 2025 (Expected)

- Advisor: Adam McCloskey

B.S., Economics, University of Wisconsin: Madison — May 2019

Research Fields

Primary: Econometrics

Secondary: Mathematical Economics

Publications

A Method of Moments of Approach to Asymptotically Unbiased Synthetic Controls

Journal of Econometrics, Volume 244, Issue 1, 2024.

Working Papers

Robust Inference when Nuisance Parameters are Partially Identified with Applications to Synthetic Controls (Job Market Paper)

A General Approach to Conducting Inference when the Parameter is Near and at the Boundary

Works in Progress

Robust Inference with Many Instruments in Time Series Settings

Inference after Pre-Testing for Regression Discontinuity Designs

Honors and Awards

Summer Graduate School Fellowship, University of Colorado: Boulder — 2023

Reuben A. Lubrow Graduate Fellowship for the Teaching of Economics, University of Colorado: Boulder — 2022

Third Year Paper Prize, University of Colorado: Boulder — 2022

Bacon Family Economics Scholarship, University of Colorado: Boulder — 2021

Prize in Macroeconomics, University of Colorado: Boulder — 2020

Teaching Experience

Graduate Instructor, University of Colorado Boulder — Boulder, CO
August 2021 - May 2023

- Courses taught: Introduction to Statistics with Computer Applications (Fall 2021, Fall 2022, Spring 2023), Math Tools for Economists 2 (Spring 2022, Summer 2022)

Teaching Assistant, University of Colorado Boulder — Boulder, CO
August 2019 - May 2021, August 2023 - Present

- Courses taught: Principles of Microeconomics (Fall 2019, Spring 2020), Natural Resource Economics (Fall 2023), Graduate-level first-year economics courses (Fall 2020, Spring 2021)

Presentations

Annual Conference of the International Association for Applied Econometrics at Thessaloniki, Greece — 2024

North American Summer Meeting of the Econometrics Society at Nashville, Tennessee — 2024

Brown University, Econometrics Seminar — 2023

Professional Services

Referee for Journal of Econometric Methods

Software Skills

Proficient: R, Stata, LaTeX

Intermediate: Python, Java, Matlab

Citizenship

United States of America

References

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Publications with Abstracts

A Method of Moments of Approach to Asymptotically Unbiased Synthetic Controls

Journal of Econometrics, Volume 244, Issue 1, 2024.

Abstract: A common approach to constructing a Synthetic Control unit is to fit on the outcome variable and covariates in pre-treatment time periods, but it has been shown by Ferman and Pinto (2021) that this approach does not provide

asymptotic unbiasedness when the □t is imperfect and the number of controls is □xed. Many related panel methods have a similar limitation when the number of units is □xed. I introduce and evaluate a new method in which the Synthetic Control is constructed using a General Method of Moments approach where units not being included in the Synthetic Control are used as instruments. I show that a Synthetic Control Estimator of this form will be asymptotically unbiased as the number of pre-treatment time periods goes to in□nity, even when pre-treatment □t is imperfect and the number of units is □xed. Furthermore, if both the number of pre-treatment and post-treatment time periods go to in□nity, then averages of treatment e□ects can be consistently estimated. I provide a model selection procedure for deciding whether a unit should be used as an instrument or as a control. I also conduct simulations and an empirical application to compare the performance of this method with existing approaches in the literature.

Working Papers with Abstracts

Robust Inference when Nuisance Parameters are Partially Identi□ed with Applications to Synthetic Controls (Job Market Paper)

Abstract: When conducting inference for the average treatment e□ect on the treated with a Synthetic Control Estimator, the vector of control weights is a nuisance parameter which is often constrained, high dimensional, and may be only partially identi□ed even when the average treatment e□ect on the treated is point-identi□ed. All three of these features of a nuisance parameter can lead to failure of asymptotic normality for the estimate of the parameter of interest when using standard methods. I provide a new method yielding asymptotic normality for an estimate of the parameter of interest, even when all three of these complications are present. This is accomplished by □rst estimating the nuisance parameter using a regularization penalty to achieve a form of identi□cation, and then estimating the parameter of interest using moment conditions that have been orthogonalized with respect to the nuisance parameter. I present high-level su□cient conditions for the estimator and verify these conditions in an example involving Synthetic Controls. In simulations, this Orthogonalized Synthetic Control inference method has desirable size and power properties relative to existing inference methods.

A General Approach to Conducting Inference when the Parameter is Near and at the Boundary

Abstract: Asymptotic normality approximations often fail to hold for extremum estimators when the true value of the parameter is at or close to the boundary of a parameter space. I develop and extend Wald, Likelihood Ratio, and Lagrange Multiplier tests using the quasi-unconstrained estimator of Ketz (2018), which is asymptotically normal even when the true parameter vector is near or at the boundary. I show the Wald test provides uniform asymptotic size control and is asymptotically similar in a uniform sense. I also show that the Likelihood Ratio test for full vector inference and Conditional Likelihood Ratio and Conditional Lagrange Multiplier tests for subvector inference control asymptotic size in a uniform sense. These results impose weaker conditions on the parameter space than previous work, allowing the method to be applied to new estimators, such as correlated random coe□cient models.