Chad Brown

PhD Candidate · CU Boulder

University of Colorado at Boulder, 256 UCB, Boulder, CO 80309

EDUCATION

• Ph.D., Economics, University of Colorado Boulder Advisor: Dr. Carlos Martins-Filho	December 2024 (Expected)
• M.A., Economics, University of Colorado Boulder	2021
• B.G.S., Economics, University of Kansas	2017

RESEARCH INTERESTS

- Econometrics: Nonparametric Estimation, Time-Series, Neural Networks, Inference after Machine Learning
- Law and Economics: Corporate Bankruptcy, Legal Sector Labor Markets

WORKING PAPERS

• Statistical Properties of Deep Neural Networks with Dependent Data (2024)

- Job Market Paper
- Submitted to The Annals of Statistics
- Best Paper Presentation Award at the International Conference on Statistics Econometrics and Mathematics 2024: XVIII
- **Abstract**: This paper establishes statistical properties of deep neural network (DNN) estimators under dependent data. Two general results for nonparametric sieve estimators directly applicable to DNN estimators are given. The first establishes rates for convergence in probability under nonstationary data. The second provides non-asymptotic probability bounds on \mathcal{L}^2 -errors under stationary β -mixing data. I apply these results to DNN estimators in both regression and classification contexts imposing only a standard Hölder smoothness assumption. The DNN architectures considered are common in applications, featuring fully connected feedforward networks with any continuous piecewise linear activation function, unbounded weights, and a width and depth that grows with sample size. The framework provided also offers potential for research into other DNN architectures and time-series applications.

• Inference in Partially Linear Models under Dependent Data with Deep Neural Networks (2024)

• **Abstract**: I consider inference in a partially linear regression model under stationary β -mixing data after first stage deep neural network (DNN) estimation. Using the DNN results of Brown (2024), I show that the estimator for the finite dimensional parameter, constructed using DNN-estimated nuisance components, achieves \sqrt{n} -consistency and asymptotic normality. By avoiding sample splitting, I address one of the key challenges in applying machine learning techniques to econometric models with dependent data. In a future version of this work, I plan to extend these results to obtain general conditions for semiparametric inference after DNN estimation of nuisance components, which will allow for considerations such as more efficient estimation procedures, and instrumental variable settings.

PUBLICATIONS

• Forum Shopping and Legal Labor Markets: Evidence from the Court Competition Era (2024)

with Alessandro Peri and Jeronimo Carballo

 \circ The Journal of Law and Economics

[•] **Abstract**: Focusing on Chapter 11 bankruptcy reorganizations of publicly listed firms during the court competition era (1991–96), we document local legal employment effects of forum shopping, a stipulation of the law that allows firms to file for bankruptcy far from their headquarters. Bankruptcy shocks increase legal-sector employment in the bankrupt firm's locale, but forum shopping nullifies this effect. Employment gains of received forum-shopped cases are concentrated in Delaware, with no effect in other receiving forums. Quantification shows that Delaware handled these forum-shopped bankruptcies with just one-fifth of the additional legal workforce that would have been needed if the cases were handled in the firms' locales. This increase in productivity also coincides with substantial missed potential employment gains in communities where bankruptcies were diverted through forum shopping. The analysis uncovers meaningful effects of forum shopping on local legal labor markets, so far overlooked in the policy debate.

WORKS IN PROGRESS

- Uniform Convergence of Deep Neural Network Sieve Estimators
- Value Function Estimation with Deep Neural Networks with Alessandro Peri
- Semiparametric Inference with Deep Neural Networks and Dependent Data

AWARDS AND FELLOWSHIPS

• Reuben A. Zubrow Graduate Fellowship for the Research and Teaching of Economics	2022-2023
• Reuben A. Zubrow Graduate Fellowship for the Research and Teaching of Economics	2021-2022
Stanford Calderwood Student Teaching Award	2020-2021

SEMINAR AND CONFERENCE PRESENTATIONS

Midwest Econometrics Group Conference	2024
• Bernoulli-IMS 11th World Congress in Probability and Statistics (Poster Presentation)	2024
 International Conference on Statistics Econometrics and Mathematics: XVIII 	2024
 Best Paper Presentation Award 	
• 28th Finance Forum, the Annual Meeting of the Spanish Finance Association (AEFIN)	2021
Brownbag Seminars:	
 CU Boulder Econometrics (2023, 2024) 	
 CU Boulder Macroeconomics (2024) 	
 CU Boulder Leeds School of Business (2021) 	
 CU Boulder Trade Economics (2021) 	

TEACHING EXPERIENCE

Instructor of Record	CU Boulder
 Principles of Macroeconomics- Spring 2022 	
 Principles of Microeconomics- Fall 2021 	
• Teaching Assistant	CU Boulder
• Principles of Microeconomics- Fall 2018, Fall 2019, Spring 2020, Fall 2022, Fall 2023, Spring 2024	
 Principles of Macroeconomics- Spring 2019, Spring 2021 	
 Intermediate Microeconomics- Fall 2020, 	
 Math Tools for Economists II- Spring 2023 	
 Natural Resource Economics- Spring 2023 	

PROGRAMMING EXPERIENCE

• STATA

• Considerable experience with data cleaning, data analysis, and creating graphics.

- For instance, see the replication package for Forum Shopping and Legal Labor Markets: Evidence from the Court Competition Era (2024) available at https://www.journals.uchicago.edu/doi/suppl/10.1086/728370
- Proficient with complex data manipulation and developing statistical packages.
 - Coauthored the publicly available STATA package SSCI, for the paper "Short and Simple Confidence Intervals when the Directions of Some Effects are Known" (2023) by Adam McCloskey and Philipp Ketz. Available at https://ideas.repec.org/c/boc/bocode/s458986.html

PYTHON

- Extensive experience web scraping and parsing data.
 - Wrote a web scraper to collect and parse publicly available corporate bankruptcy data from 1990-2009 from SEC EDGAR, and PACER Case Locator. See Section OF of the supplementary pdf for Forum Shopping and Legal Labor Markets: Evidence from the Court Competition Era (2024) available at https://www.journals.uchicago.edu/doi/suppl/10.1086/728370

• R

• Proficient in data cleaning and data analysis.

CITIZENSHIP

• United States of America

REFERENCES

Carlos Martins-Filho, PhD

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Adam McCloskey, PhD

Associate Professor Department of Economics University of Colorado Boulder 256 UCB, Boulder, CO 80309 Email: adam.mccloskey@colorado.edu **Relationship: Committee Member**

Alessandro Peri, PhD

Assistant Professor Department of Economics University of Colorado Boulder 256 UCB, Boulder, CO 80309 Email: alessandro.peri@colorado.edu **Relationship: Committee Member, Coauthor**