Cameron Fen

611 Tapan St. Ann Arbor, MI | 9/2023 |857-399-3505 | camfen@umich.edu | cameronfen.github.io

Education:

Ph.D. Candidate in Economics University of Michigan (Expected 2024)
M.A, Economics, University of Michigan (2020)
B.A *Magna Cum Laude*, Economics and Math, Brandeis University (2015)

Fields:

Macroeconomics, Econometrics, Computational Macroeconomics

Interests:

Bayesian Econometrics, Structural Modeling/Estimation, Deep Learning

Dissertation Chapters:

A Machine Learning Approach to Simulation-Based MLE and Bayesian Estimation of Heterogeneous and Representative Agent Models

Job Market Paper

This paper introduces a machine learning algorithm, Sequential Neural Posterior Estimation (SNPE), for estimating structural heterogeneous agent macroeconomic models. SNPE is a simulation-based algorithm that aims to approximate the joint distribution of parameters and simulated data. It then uses a conditional density estimator to obtain the posterior distribution. The algorithm offers several advantages, including the ability to handle any black box solution method, improved speed and accuracy compared to existing Bayesian algorithms, and statistically efficient simulation-based estimates. The algorithm outperforms Markov Chain Monte Carlo in estimating Bayesian posteriors for benchmark models such as Smets-Wouters (2007) and improves estimation speed for Heterogeneous Agent New Keynesian (HANK) models. An empirical application demonstrates the effectiveness of this technique in estimating a heterogeneous agent model using both aggregate time series and cross-sectional micro-data. A tutorial can be found at: https://shorturl.at/pMQ18

Simulation-Based Estimation of General Structural Network Models

Working Paper

This paper addresses the issue of estimating structural models on data from a single network/graph. For example in macroeconomics one could use the production network of the US. This is a longstanding problem in economics and related fields. While there exist methods for estimating structural models on many graphs/networks, there is limited research on a general-purpose algorithm to fit structural models on a single network. This study proposes an algorithm adapted from deep learning, SNPE, for network analysis, which enables Bayesian and likelihood estimation of arbitrary structural models given standard conditions. Simulated tests demonstrate the effectiveness and accuracy of this approach. Additionally, the algorithm is applied to estimate a homophily citation model (Bramoulle et. al. 2012) on empirical data which was not attempted by the original paper. This study presents a promising algorithm for fitting structural models on a single network, opening avenues for future research in network estimation.

Forecasting GDP with Recurrent Neural Networks with Samir Undavia

Ready for Submission

We investigate the impact of adding countries as a panel dimension to macroeconomic data for economic forecasting. We find that this approach significantly improves the generalization ability of both structural and reduced-form models, and works synergistically with machine learning methods to further outperform traditional macroeconomic forecasting models. The addition of country-specific data reduces the root mean squared error (RMSE) by 12% to 24% across horizons and models. Furthermore, excluding US data and forecasting each country individually enhances the policy invariance and performance of both structural and reduced-form models. Additionally, the study demonstrates that the use of recurrent

neural network (RNN) models and automated machine learning (AutoML) outperform baseline economic models in a data-rich regime. The findings are robust, reproducible, numerically stable, and applicable across various models.

Works in Progress:

"Variational Inference and Bayesian DSGE Estimation"
"'Thou shalt not let debt/EBITDA exceed…': Corporate Debt Restrictions and Investment over the Business Cycle" With Clay Wagar
"Imputing Data with Transformers" with Zhengyuan Cui

Teaching Experience:

Teaching Assistant, Capitalisms, Michigan Spring 2021, 2023
Teaching Assistant, Economics of Europe (Upper Level), Michigan Fall 2019, 2020, 2021, 2022
Teaching Assistant, Introductory Microeconomics, Michigan Spring 2020
Teaching Assistant, Intermediate Macroeconomics, Brandeis Spring 2014

Fellowships, Awards, and Research:

Haber Fellow, University of Michigan 2018-2019
Graduate Research Funding – 2022-2023
Summer Research Assistant, University of Michigan 2019, 2020
Research Assistant, Philadelphia Federal Reserve 2016-2018

Presentations:

2020: European Winter Meeting of the Econometric Society, Umich Political Science I3SM
2021: Midwest Economics Association Annual Conference, EcoMod, EconWorld (2 presentations)
2022: ASSA (Poster)

Media:

Financial Markets:

1. https://www.thearmchairtrader.com/palantir-technologies-stock-price-forecast-pltr/

Artificial Intelligence:

1. https://beta.informationweek.com/ai-or-machine-learning/machine-learning-basics-everyone-should-know
2. https://searchenterpriseai.techtarget.com/feature/10-AI-tech-trends-data-scientists-should-know
3. https://medium.com/authority-magazine/cameron-fen-of-ai-capital-management-on-the-future-of-robotics-over-the-next-few-years-b03a11be48c6

Service:

Referee - 2021: Journal of Econometrics, 2023 IMF Economic Review
Graduate Coordinator - Complex Systems Advanced Academic Workshop (2022-2023)
Newsletter Writer - Michigan Institute for Data Science (2018-2020)

Skills:

- Python: Scrapy/Beautiful Soup (Web Scraping), Tensorflow/PyTorch/Jax (Deep Learning); Matlab; LLM;

Personal Information

- Citizenship: US
- Language: English (Native), Chinese (Intermediate)

Dissertation Committee

John Leahy (Chair)
Department of Economics and the Ford School of Public Policy
University of Michigan
734-764-2957
jvleahy@umich.edu

Florian Gunsilius
Department of Economics
University of Michigan
ffg@umich.edu

Toni Whited
Department of Economics
University of Michigan
twhited@umich.edu

David Childers
Tepper School of Business
Carnegie Mellon University
dchilder@andrew.cmu.edu