Zhaonan Qu

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Current Academic Employment

Postdoctoral Research Scientist   **2024–**
Data Science Institute, Columbia University
Mentors: Agostino Capponi, Simon Lee

Research Interests

My research interests are at the intersection of econometrics, operations research, and machine learning, with a focus on causal inference, optimization, choice modeling, and networks. I leverage novel connections between these topics to investigate foundational and policy-relevant questions that arise in domains such as online marketplaces, transportation networks, corporate finance, and legal justice systems.

Education

Ph.D in Economics, Stanford University   **2017–2024**
Specialization: Econometrics, Operations Research
Dissertation: *Topics in Econometrics and Optimization*
Advisors: Guido Imbens, Yinyu Ye
Committee: Alfred Galichon, Han Hong, Johan Ugander

M.A. in Mathematics, Courant Institute, New York University   **2015–2017**
Advisor: Alfred Galichon

A.B. in Mathematics, Princeton University   **2011–2015**
Advisors: Elliott H. Lieb, Elias M. Stein

Current Research

Handling Sparse Non-negative Data in Finance
Capponi, Agostino and Zhaonan Qu

Causal Analysis of Bail Policy Reforms
Harvey, Anna, Zhaonan Qu, and Orion Taylor

Doubly Weighted Causal Panel Estimators
Athey, Susan, Guido Imbens, Zhaonan Qu, and Davide Viviano

Publications and Preprints

ECONOMETRICS & STATISTICS:

Handling Sparse Non-negative Data in Finance
Working Paper (2025)
Capponi, Agostino and Zhaonan Qu

Distributionally Robust Instrumental Variables Estimation
Under Review (2024)
Qu, Zhaonan and Yongchan Kwon
arXiv:2410.15634

Computationally Efficient Estimation of Large Probit Models
Major Revision at *Journal of Econometrics* (2024)
Ding, Patrick, Guido Imbens, Zhaonan Qu, and Yinyu Ye
arXiv:2407.09371

Semiparametric Estimation of Treatment Effects in Observational Studies with Heterogeneous Partial Interference
Major Revision at *Journal of Business & Economic Statistics* (2023)
Qu, Zhaonan, Ruoxuan Xiong, Jizhou Liu, and Guido Imbens

arXiv:2107.12420

Ensemble Methods for Causal Effects in Panel Data Settings
American Economic Association Papers and Proceedings 109: 65-70 (2019)
Athey, Susan, Mohsen Bayati, Guido Imbens, and Zhaonan Qu
arXiv:1903.10079

OPERATIONS RESEARCH, MACHINE LEARNING & AI:

On Sinkhorn's Algorithm and Choice Modeling
Forthcoming in *Operations Research* (2025)
Qu, Zhaonan, Alfred Galichon, and Johan Ugander
arXiv:2310.00260

Inferring Dynamic Networks from Marginals with Iterative Proportional Fitting
41st International Conference on Machine Learning (ICML) (2024)
Chang, Serina, Frederic Koehler, Zhaonan Qu, Jure Leskovec, and Johan Ugander
arXiv:2402.18697

Optimal Diagonal Preconditioning
Operations Research (2024)
Qu, Zhaonan, Wenzhi Gao, Oliver Hinder, Yinyu Ye, and Zhengyuan Zhou
arXiv:2209.00809

Scalable Approximate Optimal Diagonal Preconditioning
Under Review at *SIAM Journal on Scientific Computing* (2024)
Gao, Wenzhi, Zhaonan Qu, Madeleine Udell, and Yinyu Ye
arXiv:2312.15594

A Unified Linear Speedup Analysis of Federated Averaging and Nesterov FedAvg
Journal of Artificial Intelligence Research 78: 1143-1200 (2023) [code]
Qu, Zhaonan, Kaixiang Lin, Zhaojian Li, Jiayu Zhou, and Zhengyuan Zhou
arXiv:2007.05690

Inferring Networks from Marginals Using Iterative Proportional Fitting
The Second Learning on Graphs Conference (2023)
Chang, Serina, Zhaonan Qu, Jure Leskovec, and Johan Ugander

Growth Independent Morphometric Machine Learning Workflow for Single-Cell Antimicrobial Susceptibility Testing of Klebsiella pneumoniae to Meropenem
Frontiers in Imaging (2024)
Tjandra, Kristel C., Nikhil Ram-Mohan, Manuel Roshardt, Elizabeth Zudock, Zhaonan Qu, Kathleen E. Mach, Okyaz Eminaga, Joseph C. Liao, Samuel Yang, Pak Kin Wong
bioRxiv:2022.11.03.515093

Federated Learning's Blessing: Fedavg has Linear Speedup
ICLR 2021 Workshop on Distributed and Private Machine Learning (DPML) (2021)
Qu, Zhaonan, Kaixiang Lin, Zhaojian Li, and Jiayu Zhou

Other Academic Writings

Identifying Causal Components in Medical Imaging Data for Disease Outcomes (2021) [code] [report]
Interpretable Personalization via Policy Learning with Linear Decision Boundaries by Qu, Zhaonan, Isabella Qian, and Zhengyuan Zhou (2020)
Demand Prediction of Bike Share Systems (2018) [code] [report]
Rating Inflation and Fairness on the Yelp Platform (2017) [report]
Appendices G and J to "The Dynamics of Inequality" by Gabaix, Xavier, Jean-Michel Lasry, Pierre-Louis Lions, and Benjamin Moll *Econometrica 84.6 (2016): 2071-2111.*
Quantum Entanglement of Fermions Undergraduate Thesis (2015) [paper]
Towards a Lithium Radiative/Vapor-Box Divertor by Goldston, Robert, Marius Constantin, and Zhaonan Qu *APS*

Division of Plasma Physics Meeting Abstracts. Vol. 2014.

Teaching

MS&E 311 Optimization (Prof. Yinyu Ye), Stanford Winter 2021
ECON 292 Quantitative Methods for Empirical Research (Prof. Guido Imbens), Stanford Autumn 2020
Preparation Sessions for Qualifying Exams, NYU 2016

Invited Presentations and Poster Sessions

Statistics Seminar, NJIT Department of Mathematical Sciences	March 2025
INFORMS 2024 Annual Meeting Session on Financial Analytics and Technology	October 2024
Yinyu Ye Retirement Celebration	July 2024
2024 American Causal Inference Conference Session on Instrumental Variables	May 2024
2024 Banff Research Center Workshop on Optimal Transport and Distributional Robustness	March 2024
INFORMS 2023 Annual Meeting Session on Econometric, Big Data Methods and Applications to Finance	October 2023
INFORMS 2023 Annual Meeting Poster Session on Operations Research and Optimization Methodologies	October 2023
2023 Stanford Data Science Conference Poster Session	May 2023
2022 North American Summer Meeting of the Econometric Society	June 2022
2022 American Causal Inference Conference Poster Session	May 2022
2022 California Econometrics Conference Poster Session	May 2022
INFORMS 2020 Annual Meeting Session on Stochastic Optimization (virtual)	November 2020

Research Affiliations, Honors, and Awards

Arnold Ventures Research Fellowship in Jail Data Initiative Social Science Research Council	2024–2026
Postdoctoral Research Assistant Professor Johan Ugander's Lab	2023–2024
Stanford Interdisciplinary Graduate Fellowship Stanford University	2019–2022
Provost's Global Research Initiative Fellowship, New York University	2016
Magna Cum Laude in Mathematics and Phi Beta Kappa, Princeton University	2015
Smith-Newton Scholar, Princeton Environmental Institute	2013

Peer Review Services

Journal of Econometrics, Decision Sciences Journal, Journal of Scientific Computing, Journal of Artificial Intelligence Research, Journal of Computational and Graphical Statistics, SIAM Journal on Financial Mathematics

Programming Languages

Python, MATLAB, SQL, R