

# Zhaonan Qu

✉ zq2236@columbia.edu • 🌐 zhaonanq.github.io

## Current Academic Employment

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### Postdoctoral Research Scientist

2024–

Data Science Institute, Columbia University  
Mentors: Agostino Capponi, Simon Lee

## Research Interests

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I am broadly interested in topics at the intersections of Operations Research, Econometrics, Machine Learning, and Data Science, including Causal Inference, Optimization, Choice Modeling, and Networks.

## Education

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### 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

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### A Distributionally Robust Instrumental Variables Estimation Framework

Working Paper (2023)  
Kwon, Yongchan and Zhaonan Qu

### Modeling Data with Non-negative Response Variables

In preparation (2024)  
Capponi, Agostino and Zhaonan Qu

### Causal Analysis of Bail Policy Reforms

In Preparation (2024)  
Harvey, Anna, Zhaonan Qu, and Orion Taylor

### Doubly Weighted Causal Panel Estimators

In Preparation (2024)  
Athey, Susan, Guido Imbens, Zhaonan Qu, and Davide Viviano

## Published or Under Review Works

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### On Sinkhorn's Algorithm and Choice Modeling

Under Revision at *Operations Research* (2023)  
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

### **Computationally Efficient Estimation of Large Probit Models**

Under Review at *Journal of Econometrics* (2024)

Ding, Patrick, Guido Imbens, Zhaonan Qu, and Yinyu Ye

arXiv:2407.09371

### **Scalable Approximate Optimal Diagonal Preconditioning**

Revise & Resubmit at *SIAM Journal on Matrix Analysis and Applications* (2023)

Gao, Wenzhi, Zhaonan Qu, Madeleine Udell, and Yinyu Ye

arXiv:2312.15594

### **Semiparametric Estimation of Treatment Effects in Observational Studies with Heterogeneous Partial Interference**

Under Review at *Journal of Business & Economic Statistics* (2022)

Qu, Zhaonan, Ruoxuan Xiong, Jizhou Liu, and Guido Imbens

arXiv:2107.12420

### **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) [\[code\]](#)

Qu, Zhaonan, Kaixiang Lin, Zhaojian Li, and Jiayu Zhou

### **Ensemble Methods for Causal Effects in Panel Data Settings**

*American Economic Association Papers and Proceedings* 109: 65-70 (2019) [\[code\]](#)

Athey, Susan, Mohsen Bayati, Guido Imbens, and Zhaonan Qu

arXiv:1903.10079

## **Other Academic Writings**

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**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**

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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

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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

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

## Peer Review Services

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Journal of Econometrics, Journal of Scientific Computing, Journal of Artificial Intelligence Research

## Industry Experiences

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### Microsoft Research New England, Research Data Science Intern

*Robustness and Causal Inference*

*June 2021–Sept 2021*

Internship project at Microsoft Research New England. Implemented causal inference methods for testing the impact of email campaigns on the subscription of Microsoft 365 membership, and researched theoretical frameworks for robust causal inference using distributionally robust optimization.

### Uber, Data Science Intern

*Personalized Tipping Suggestions based on Trip Quality*

*June 2020–Sept 2020*

Internship project at Uber's Driver Incentives Team. Analyzed potential impacts of quality-based tipping suggestions on improving ride quality and driver income. Designed and implemented a contextual bandit algorithm on Uber's Michelangelo machine learning platform that serves personalized tipping suggestions after a trip completes in real time based on trip quality features. Product was tested in cities across the U.S.

### Cruise, Data Scientist Intern

*Learning Causal Bayesian Networks through Knockoffs*

*June 2019–Sept 2019*

Internship project at Cruise (now GM's autonomous vehicles arm). Designed and implemented a statistical decision making system in Python that applied the knockoff method to select causal stack-level variables relevant to specific types of near-accidents experienced by an autonomous vehicle. Also curated the near-accident type classification dataset combining multiple sources of data on Google BigQuery and PostgreSQL.

## Programming Languages

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Python, MATLAB, SQL, R