Mingduo Zhao **(pronounced Ming-dwo Jow)**

CONTACT INFORMATION

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EDUCATION

University of California, Berkeley

Ph.D., Economics — 2026 (expected)
M.S., Computer Science — 2025
M.A., Statistics — 2023
Graduate Certificate in Entrepreneurship & Technology
Graduate Certificate in Applied Data Science

University of Michigan, Ann Arbor

B.Sc. with High Distinction — 2018
Highest Honors in Economics
High Honors in Mathematics
Honors in Statistics

RESEARCH INTERESTS

Statement: My research explores the intersection of marketing, economics, computer science, and statistics, with a focus on how technological advancements profoundly transform society, both economically and politically

Topics: Social Media, Recommender Systems, Digital Platforms, User Generated Content, Human Computer/AI Interaction (HCI/HAII), Political Economics

Methodologies: Statistical Machine Learning, Causal Inference, Structural Model, Field/Lab Experiment, Deep Learning, Natural Language Processing (NLP)

JOB MARKET PAPER

"News Consumption, Recommender Systems, and Polarization" (sole author)

Abstract: Recommender systems shape how people consume news, possibly reinforcing political polarization. We run two field experiments to identify how user preferences and algorithms interact to amplify partisan news consumption. In the first study, 2,065 U.S. participants use blank Google accounts and a browser extension to track users' activities on Google News. The first-round recommendations are exogenous, allowing us to show that aligned content draws more clicks. A second experiment uses bots to randomly click on articles, revealing that each click leads to more ideologically aligned content. These two pieces of causal evidence establish a feedback loop between user preference and algorithmic recommendations. We also find in the field study that, after interacting with the recommender system, people's level of polarization increases. A structural model combining a discrete choice model (demand side) with a multi-armed bandit algorithm (supply side) confirms this positive-feedback mechanism. The model is then used to simulate a counterfactual âideology-blindâ recommendation policy that ignores political slant when curating content. While this policy reduces both affective and ideological polarization, it comes at the cost of likely lower engagement. Overall, the findings provide causal evidence that personalized algorithms reinforce partisan consumption and ex-

acerbate polarization. They also uncover a fundamental trade-off between mitigating polarization and sustaining engagement, which offers important insights for both platform owners and policymakers.

Publications

"Longitudinal Targeted Minimum Loss-based Estimation with Temporal-Difference Heterogeneous Transformer" (with Yi Li, Yuxuan Li, Sky Qiu, Toru Shirakawa, Yulun Wu, Hiroyasu Iso*, and Mark J. Van Der Laan*) [1] [arXiv]
- *Proceedings of the 41st International Conference on Machine Learning (**ICML 2024**)*
- A+ conference as ranked by CORE (Computing Research and Education)
- Peer-reviewed with 27.5% acceptance rate

Working Papers

"Game Against AI" (with Yahu Cong)
- Under Review at ***Marketing Science***

"Unmasking the Deception: The Interplay between Fake Reviews, Ratings Discrepancy, and Consumer Demand" (with Yunhao Huang and J. Miguel Villas-Boas) [SSRN]
- Under Review at ***Journal of Marketing Research***

"'Identity-Based Bias, Algorithm Bias, and Self-Censorship in Online Reviews"

"From Fame to Office: Electoral Advantage of Political Influencers" (with Ganesh Iyer and Yi Yu)

"Ownership Consolidation and Performance of Earned Media when Building Political Brands" (with Hulya Eraslan, Przemyslaw Jeziorski, and Gizem Kosar)

Fellowships & Awards

Doctoral Completion Fellowship, UC Berkeley	2025
The George Break and Helen Schnacke Break Endowed Fellowship, UC Berkeley	2023
Department Fellowship, UC Berkeley	2020–2024
The Ferrando Honors Prize, University of Michigan	2018
The Sims Honors Scholarship, University of Michigan	2018
James B. Angell Scholar, University of Michigan	2017
University Honors, University of Michigan	2016-2018

Grants[2]

Xlab Research Grant (with Yahu Cong)	2025
Behavioral Lab Mini Grant (with Yunhao Huang, J. Miguel Villas-Boas)	2024
Xlab Research Grant	2023
MITRE Research Award (with Mu Zhang)	2023
EGAL Research Grant (with Yunhao Huang, J. Miguel Villas-Boas)	2023
Junior Development Research Fund (with Xuan Teng)	2023
National Institutes of Health (NIH) Grant (with coauthors of the ICML paper)	2023
Xlab Research Grant (with Yunhao Huang, J. Miguel Villas-Boas)	2023
Behavioral Lab Mini Grant (with Yunhao Huang, J. Miguel Villas-Boas)	2022

[1] * denotes corresponding authors
[2] include coauthor grants on our projects

	UC Berkeley Public Health Research Grant (with coauthors of the ICML paper)	2022

Conference Presentations[3]	*Marketplace Innovation Workshop (MIW)*, virtual	2025
	Paris Conference on Digital Economics, Polytechnic Institute of Paris	2025
	AI in Management Conference, University of Southern California	2025
	FTC Conference on Marketing and Public Policy, Federal Trade Commission	2024
	AI in Management Conference, University of Southern California	2024
	Rising Scholars Conference, MIT (virtual)	2023
	INFORMS Annual Meeting, Phoenix	2023
	California Quantitative Marketing Ph.D. Student Conference, Stanford University	2023

Teaching Experience	*Teaching Assistant*, Industrial Organization (undergraduate)	2024
	Teaching Assistant, Behavioral Economics (undergraduate)	2024
	Teaching Assistant, Financial Economics (undergraduate)	2023
	Teaching Assistant, Game Theory (undergraduate)	2023
	Teaching Assistant, Econometrics (undergraduate)	2022
	Teaching Assistant, Econometrics (PhD)	2022
	Teaching Assistant, Econometrics (PhD)	2021
	Teaching Assistant, Econometrics (PhD)	2021

References

Ganesh Iyer
Edgar F. Kaiser Professor of Business Administration
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Przemyslaw Jeziorski
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University of California, Berkeley
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Steven Tadelis
Professor of Economics & Sarin Chair in Strategy and Leadership
Business & Public Policy Group, Haas School of Business
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Nano Barahona
Assistant Professor of Economics
Department of Economics

[3] include coauthor presentations on our papers

updated June 2025

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Professional Experience & Service

I.O. Seminar Coordinator, Department of Economics, *UC Berkeley*
Research Assistant, Department of Economics, *UC Berkeley*
Research Professional, Department of Economics, *Princeton University*

Skills

Programming: Python, C++, R, Stata, Java, C++, SQL
Hobbies: tennis, golf, basketball, cello
Language: English (fluent), Mandarin Chinese (native)

Selected Coursework

Marketing & Industrial Organization:
Marketing: Choice Modeling; Behavioral Economics, AI, and Marketing; Marketing Strategy; Topics in Game Theory
Industrial Organization: Industrial Organization I, II, III; Topics in Industrial Organization; Algorithmic Revenue Management

Economics:
Theory: Microeconomics I, II; Macroeconomics I, II; Game Theory; Mechanism Design; Information Design; Contract Theory; Matching Theory; Comparative Statics; Mathematical Economics
Topics: Behavioral Economics; Labor Economics; Economic History; International Economics I, II; Corporate Finance

Econometrics & Statistics:
Econometrics: Econometrics I, II; Applied Econometrics; Time Series; Semiparametric Efficiency Bound
Statistics: Probability Theory; Theoretical Statistics; Causal Inference; Bayesian Statistics; Survival Analysis and Causality; Computational Statistics; Experimental Design; External Validity, Sensitivity Analysis, and Survey Weighting

Computer Science:
Methodologies Natural Language Processing; Deep Reinforcement Learning; Large Language Model Agents; Computer Vision; Machine Learning Systems; Deep Unsupervised Learning; Statistical Learning Theory; Experimental Design for Machine Learning
Topics: Design of Algorithmic Media (e.g., recommender system); Social Justice in EECS (e.g., algorithmic fairness); Polarization and Social Media; Human-Computer Interaction; Gamification; AI in Education
Miscellaneous: Zero Knowledge Proofs; Blockchain and Decentralized Finance; Decentralized Intelligence; Entrepreneurship in Web3

Political Economics & Political Science:
Political Economics: Political Economics I, II
Political Science: Political Behavior; Ethnic Politics

updated June 2025

Consumer Behavior & Psychology:
Consumer Behavior: Topics in Consumer Behavior; Topics in Open Science
Psychology: Social Psychology; Cognitive Psychology; Neuropsychology; Developmental Psychology; Industrial-Organization Psychology

Abstracts of Papers

"Longitudinal Targeted Minimum Loss-based Estimation with Temporal-Difference Heterogeneous Transformer" (with Yi Li, Yuxuan Li, Sky Qiu, Toru Shirakawa, Yulun Wu, Hiroyasu Iso, and Mark J. Van Der Laan)

Abstract: We propose Deep Longitudinal Targeted Minimum Loss-based Estimation (Deep LTMLE), a novel approach to estimate the counterfactual mean of outcome under dynamic treatment policies in longitudinal problem settings. Our approach utilizes a transformer architecture with heterogeneous type embedding trained using temporal-difference learning. After obtaining an initial estimate using the transformer, following the targeted minimum loss-based likelihood estimation (TMLE) framework, we statistically corrected for the bias commonly associated with machine learning algorithms. Furthermore, our method also facilitates statistical inference by enabling the provision of 95% confidence intervals grounded in asymptotic statistical theory. Simulation results demonstrate our method's superior performance over existing approaches, particularly in complex, long time-horizon scenarios. It remains effective in small-sample, short-duration contexts, matching the performance of asymptotically efficient estimators. To demonstrate our method in practice, we applied our method to estimate counterfactual mean outcomes for standard versus intensive blood pressure management strategies in a real-world cardiovascular epidemiology cohort study.

"Game Against AI" (with Yahu Cong)

Abstract: AI systems for dynamic pricing, targeted promotions, and individualized recommendations typically assume that observed consumer behavior truthfully reveals underlying preferences. However, when consumers recognize that their actions influence future targeting decisions, behavior becomes strategic rather than preference-revealing, undermining the validity of standard machine learningâbased targeting. In order to address this challenge, we introduce Structural Transfer Learning (STL), a new framework that incorporates structural economic modeling into machine learning pipelines to account for strategic responses induced by policy interventions. STL constructs policy-dependent instance weights that adjust for endogenous domain shifts, enabling firms to learn targeting policies that remain effective even when consumers actively game the system. Furthermore, we demonstrate the practical value of STL through a stylized online experiment in a consumer research setting. While simplified, the design captures a core strategic response common to many personalization environments, where targeting rules shape behavior. In this setting, naive behavioral targeting rules lead to substantial misallocation of incentives. Applying STL improves expected profits by up to 35% relative to the naive machine learning benchmark that ignores strategic responses, depending on the relative cost of incentives. These findings highlight the need for a fundamental shift in firmsâ personalization strategiesâfrom solely optimizing predictive models to designing incentive mechanisms that are robust to strategic consumer behavior.

"Unmasking the Deception: The Interplay between Fake Reviews, Ratings Discrepancy,

and Consumer Demand" (with Yunhao Huang and J. Miguel Villas-Boas)

Abstract: In online marketplaces, consumers rely on reviews to make informed purchase decisions, making the presence of fake reviews detrimental. Previous literature implies that products with fake reviews can display some patterns in review distribution, such as a higher discrepancy in ratings. Consumers might take this pattern into account when making their purchase decisions. In this paper, we explore the interplay between fake reviews and ratings discrepancy, and their impact on consumer demand, while controlling for average product ratings. First, using a data set with fake review labels, we find that product ratings discrepancy is positively correlated with the probability that the product has fake reviews. Second, through an identification strategy exploiting ratings discrepancy changes due to rating distribution rounding, we find evidence consistent with a negative causal impact of ratings discrepancy on consumer demand. Then, we conduct two experiments to establish and quantify the mechanism of the impact of ratings discrepancy on consumer demand through consumer suspicion of fake reviews. The first experiment shows that higher ratings discrepancy increases consumer suspicion of fake reviews, and the second experiment shows that heightened suspicion reduces consumer willingness to pay. Together, these findings reveal that consumers use ratings discrepancies as a signal of fake reviews, and this suspicion impacts their purchase decisions. The findings highlight the importance of understanding the relationship between fake reviews, ratings discrepancies, and consumer demand in online marketplaces.

"'Identity-Based Bias, Algorithm Bias, and Self-Censorship in Online Reviews" (sole author)

Abstract: Are individuals from marginalized groups perceived as less persuasive? Does this perception lead to their underrepresentation in visible, influential roles? Does it also contribute to their reluctance to share their views? These are important questions that require further investigation. Amazon reviews provide a valuable and quantifiable context to explore these questions. This paper investigates how the perceived identity of reviewers influences helpfulness votes, the ranking of their reviews, and their willingness to post new reviews on Amazon. Utilizing a data set of over 1.8 million reviews, we apply advanced natural language processing and computer vision tools to infer the gender and ethnicity of reviewers based on their user aliases and avatars. Combined with experimental data, our analysis shows causal evidence that reviews perceived as authored by women, non-binary individuals, or ethnic minorities are rated as less helpful than those associated with men or white individuals. Furthermore, we show that Amazonâs review ranking algorithm amplifies initial disparities in helpfulness recognition. Because reviews from marginalized groups receive fewer votes, they are ranked lower and receive less exposure, which in turn leads to even fewer votesâcreating a self-reinforcing loop that perpetuates the underrepresentation of marginalized voices. We also find evidence of self-censorship: reviewers are less willing to continue contributing after receiving fewer helpfulness votes on their previous reviews. To address these disparities, we propose two platform-level interventionsâidentity-blind review displays and affirmative action mechanisms within the review ranking algorithm. To evaluate their impact, we further estimate a structural model that captures both the supply and demand sides of the review "market" to assess the welfare implications of these interventions.

"From Fame to Office: Electoral Advantage of Political Influencers" (with Ganesh Iyer and

Yi Yu)

Abstract: In recent years, numerous political candidates achieved electoral success after first becoming well-known as influencers in non-political fields. Famous examples include Donald Trump, Ronald Reagan, Arnold Schwarzenegger, and others. This study explores the relationship between one's fame as an influencer and their performance in U.S. gubernatorial elections from 1865 to 2020. With a dataset of 3,942 candidates and their Wikipedia biographies, we used Large Language Models (LLMs) to identify influencers as individuals who achieved public prominence through roles such as entrepreneurs, professional experts, or athletes before entering politics. The findings reveal that influencer candidates hold a significant and substantial advantage and in some cases are 20% more likely to win governor elections. This effect is particularly pronounced in three cases: Republican candidates in general, especially those running in swing states, and individuals making their first run for office and/or lacking prior experience as a governor. As is common in much of the existing literature in this field, establishing causality presents a common challenge. To address this, we conduct a voting experiment with approximately 1,800 participants. The results show that the estimated advantage of being an influencer closely aligns with findings from the observational analysis, reinforcing the causal interpretation. This research provides important insights into the dynamics of American democracy, indicating that public recognition and celebrity status can serve as pathways to electoral success.

"Ownership Consolidation and Performance of Earned Media when Building Political Brands" (with Hulya Eraslan, Przemyslaw Jeziorski, and Gizem Kosar)

Abstract: This study examines how media ownership consolidation influences the effectiveness of earned media in shaping political brands in U.S. mayoral elections. Using data from over 300 local radio markets between 1945 and 2006, we link radio station ownership records and news programming to local election outcomes. We find that increased market concentration strengthens the re-election prospects of incumbent mayors while hindering the performance of challengers. The effect of increased concentration is primarily driven by a reduction in the number of news-producing stations, and it disproportionately benefits lower-quality incumbents. We theoretically model this phenomenon within an oligopoly framework, demonstrating how ownership structure affects news quality, and ultimately, electoral outcomes. To address potential endogeneity in market structure, we leverage a novel instrument based on multi-market mergers. From both managerial and policy perspectives, our results underscore the broader consequences of media consolidation: it not only weakens the informative performance of earned media but also lowers the quality of decision-making, which poses serious risks to the electoral process, as it may prevent the most qualified candidates from winning. Additionally, for firms, more concentrated media ownership reduces opportunities for visibility through earned media, diminishing the impact of superior offerings and limiting entry of new products.