LIU, Shijian

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Application for the NBER Digital Economics and AI Tutorial, Stanford University, January 20–21, 2027
Hotel accommodation: requested

Education

Ph.D. in Marketing, Stern School of Business, New York University Sep. 2024 – present
Advisor: Anindya Ghose

M.S. in Economics and Computation, Duke University Sep. 2022 – May 2024

B.A. in Economics, Peking University Sep. 2018 – Jul. 2022

Graduate Coursework.

- *Industrial organization and economics:* Industrial Organization I–II (NYU Economics Ph.D. sequence); Topics in Economics: Industrial Organization (Stern); Industrial Organization, Microeconomics (Duke).
- *Econometrics and empirical methods:* Applied Microeconometrics (NYU Economics); Advanced Empirical Methods, Quantitative Applications in Marketing I–II (Stern); Econometrics I–III, Quasi-Experimental Methods (Duke).
- *Machine learning and computation:* Reinforcement Learning, Optimization and Computational Linear Algebra (NYU CDS); Foundations of Machine Learning and Deep Learning with Applications to Business (Stern); Probabilistic Machine Learning, High-Dimensional Statistics, Computer Vision, Graph-Matrix Analysis (Duke).
- *Consumer behavior:* Behavioral Research Methods, Behavioral Applications in Marketing II (Stern).

Research Interests

My research examines how artificial intelligence reshapes competition and consumer demand in digital markets. One stream studies how sellers' adoption of algorithmic pricing tools—including AI systems that select among simple repricing rules—affects prices, competition, and tacit collusion. A second stream explores how foundation models can be integrated with economic demand models to learn from high-dimensional consumer histories while supporting interpretable counterfactual analysis. Methodologically, I combine multi-agent reinforcement learning, structural econometrics, and transformer-based sequence modeling.

Research Projects

Sophisticated Learners, Simple Rules: The Strategic Selection of Simple Rules in Algorithmic Pricing SSRN
with Anindya Ghose and Qiaochu Wang (NYU Stern). Under review at *Marketing Science*. Presented at the 2025 Workshop on Information Technologies and Systems (WITS); 2026 INFORMS ISMS Marketing Science Conference.

Abstract: The widespread adoption of algorithmic pricing in e-commerce has raised antitrust concerns. Existing learning-based research examines artificial intelligence (AI) agents that choose prices, while theoretical work on committed pricing rules has focused on non-learning duopoly. Neither stream fully reflects industry practice, where commercial repricers offer simple rules, such as matching or undercutting competitors, and sellers may learn and switch among them. We study this environment using a multi-agent reinforcement learning (MARL) framework in which sellers use AI to select pricing rules rather than set prices directly. Strategic rule selection sustains near-monopoly profits with up to ten sellers. The mechanism combines rule-based price dynamics with commitment: undercutting can initiate a persistent price war that is costly to reverse before the next revision opportunity. We also identify a "Safety Net Paradox." Introducing a

Reset rule that facilitates recovery reduces tacit collusion in moderately differentiated markets. By providing an escape from price wars, Reset weakens deterrence, encourages deviation, and lowers prices. We build an analytical model to rationalize these mechanisms. We show that the competitive effect of a pricing tool depends on its mechanical rule, how it is selected and deployed, and the broader menu of rules available to sellers.

Foundation Demand: An LLM-Based Model of Consumer Basket Demand
with Xiao Liu (NYU Stern)

- Using transaction and browsing data from Yami, an online grocery retailer, we are developing an LLM-based model of consumers' basket choice and purchase timing over a large product assortment. The project explores whether foundation models can capture rich cross-category demand patterns and consumer heterogeneity while supporting economically interpretable demand analysis and counterfactuals.

Building AI Agents for Marketing Research
with Xiao Liu (NYU Stern) and co-authors.

- Developed an experimental survey AI agent with domain-specific marketing research capabilities: autonomous survey design and refinement, synthetic response generation and debiasing using LLMs, and automated data analysis and report writing.
- Presented at the 2025 Conference on AI, ML, and Business Analytics.

Counterfactual (Imputation) Estimators for Causal Inference with Panel Data
Statistical package developer, directed by Yiqing Xu (Stanford University).

- Main contributor to the `fect` package, which implements imputation-based counterfactual estimators robust to heterogeneous treatment effects; developed the computational and visualization modules for treatment-reversal analysis and hypothesis tests on pre-trend and carryover effects.
- Winner of the 2025 Political Methodology Statistical Software Award, Society for Political Methodology.

References

Name	Position	Email
Anindya Ghose	Heinz Riehl Chair Professor, NYU Stern	aghose@stern.nyu.edu
Qiaochu Wang	Assistant Professor of Marketing, NYU Stern	qw2486@stern.nyu.edu
Xiao Liu	Associate Professor of Marketing, NYU Stern	xliu@stern.nyu.edu