

Xiaoran Ma

Ph.D. Candidate | Department of Decisions, Operations and Technology | CUHK Business School

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Education

- The Chinese University of Hong Kong** 2022 – 2027 (Expected)
Ph.D. in Operations Management Hong Kong SAR, China
- Department of Decisions, Operations and Technology, CUHK Business School, GPA: 3.81/4.0.
- Hong Kong University of Science and Technology** 2021 – 2022
Master of Science in Big Data Technology Hong Kong SAR, China
- Department of Computer Science and Engineering and Department of Mathematics, GPA: 3.90/4.3.
 - Excellent Student Scholarship
- Tsinghua University** 2017 – 2021
Bachelor of Engineering in Electronic Engineering Beijing, China
- Department of Electronic Engineering, GPA: 3.68/4.0.

Research Interests

Topics: GenAI Applications in Business Research, LLM-Driven Behavioral Simulation, Strategic Decision-Making, Data-Driven Empirical Research, Economic Sanctions, Global Supply Chains.

Methodologies: Large Language Models & Generative AI, AI-Powered Experimental Simulation, Applied Econometrics, Causal Inference, Machine Learning.

Research Papers

1. Han Jiang, **Xiaoran Ma**, and Jing Wu, 2026, “[Simulating Firm Decision with LLMs: An Experimental Framework for Strategy Research.](#)” *Under Review* at *Management Science* (UTD24)
2. Andrew M. Davis, Stephen Leider, **Xiaoran Ma**, Di (Andrew) Wu, and Jing Wu, 2026, “[Project Silicon: AI-Powered Simulation in Behavioral Studies.](#)” *Preparing for Submission* to *Management Science*
3. Han Jiang, Jiatao Li, **Xiaoran Ma**, and Jing Wu, 2026, “Fixed Effects Specification in Empirical Research: Potential Issues And Practical Recommendations.” *Preparing for Submission* to *Journal of International Business Studies* (UTD24)
4. Huihui Liu, Peng Liu, **Xiaoran Ma**, and Rui Yan, 2026, “Overcoming the First-Reverse-Mile Challenge in Reverse Logistics: Evidence from a Recycling Platform.” *Reject and Resubmit* at *Production and Operations Management* (UTD24)
5. **Xiaoran Ma**, Brian Jacobs, Vinod Singhal, and Jing Wu, 2025, “National Security and Supply Chain Disruptions: Stock Market Reaction to the October 2022 US Export Restrictions of Semiconductor Technology to China.” *Preparing for Submission* to *Journal of Operations Management* (UTD24)

Teaching Experience

The Chinese University of Hong Kong:

Teaching Assistant

Machine Learning for Business (Master)	2026
Business Analytics (Undergraduate)	2026
Operations Management (Undergraduate)	2026
Operations Management (MBA)	2025
Decision Modeling and Analytics (Undergraduate)	2025
Financial Data Modeling and Analysis (FMBA)	2024
FinTech and Its Applications (Master)	2022, 2023, 2024

Guest Lecturer

Business Analytics (Undergraduate)	2026
FinTech and Its Applications (Master)	2022, 2023

Selected Presentations

“OM-Pretest: An LLM-Assisted Pre-Testing Framework for Behavioral OM Experiments”, 2026 INFORMS MSOM Conference , Boston, USA, July 13-14, 2026

“Simulating Firm Decision with LLMs: An Experimental Framework for Strategy Research”, Symposium on Statistical Challenges in Electronic Commerce Research, Tokyo, Japan, June 21-24, 2026

“Facility Location Choices Through the Supply Chain”, POMS-HK International Conference, Hong Kong, China, January 5-6, 2024

Professional Service

Referee for *Production and Operations Management* (UTD24)

Skills

Generative AI & Machine Learning: Agentic AI, Text Mining, Image Analysis, Retrieval-Augmented Generation (RAG), Model Context Protocol (MCP), PyTorch, TensorFlow

Big Data & Programming Python, C++, SQL, Web Scraping, Spark, Parallel Programming

Statistical & Econometric Tools: Stata, R, Matlab

Languages: Chinese (Native), English (Fluent)

References

Jing Wu

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Han Jiang

Associate Professor and Assistant Dean, Strategy and Entrepreneurship

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Di (Andrew) Wu

Associate Professor, Technology and Operations

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Abstracts

1. **Simulating Firm Decision with LLMs: An Experimental Framework for Strategy Research.**

Abstract: A central challenge in strategic management research lies in rigorously identifying the causal links between contextual factors and firms’ strategic decisions. Observational studies are inherently constrained by the absence of credible counterfactuals, while conventional experimental approaches trade off between realism, scalability, and control. This study proposes a scalable experimental framework that leverages large language models (LLMs) as simulated corporate executives to address these limitations. The framework endows LLM agents with firm-specific contextual profiles and elicits strategic decisions that approximate those of actual firms. Since the same agent generates decisions under both the baseline condition and the treatment condition with an exogenous shock, the within-agent difference directly mirrors the average treatment effect on the treated (ATT) logic from the potential outcome framework, thereby circumventing the non-random assignment of contextual factors that challenges observational designs. We validate this framework through two experiments, on R&D investment and facility allocation decisions respectively, each employing a multi-step design: corroborating the convergence between LLM-simulated and actual firm decisions to establish face validity, introducing an exogenous shock to identify the within-agent treatment effect, and benchmarking the LLM-identified treatment effect against real-world difference-in-differences estimates. Across both experiments, the LLM-identified treatment effects converge with real-world evidence identified via quasi-experimental designs, providing external validation for the framework. These results establish the generalizability of the framework across distinct strategic contexts and demonstrate that LLM-based experimental simulations can serve as credible, scalable, and cost-effective instruments for investigating the cause-and-effect links underlying firms’ strategic decision making.

2. **Project Silicon: AI-Powered Simulation in Behavioral Studies.**

Abstract: Project Silicon is a pre-registered research initiative investigating whether LLM-based synthetic (“silicon”) samples can serve as reliable virtual pilots for behavioral-economics and behavioral-operations experiments. Departing from prior backward-looking validation work that uses published experimental results, this project adopts a forward-looking empirical strategy: we collect around 40 novel, publicly-unreleased experimental designs, run LLM simulations prior to human-subject data collection, and enforce a strict information firewall to prevent LLM training-set contamination. We systematically benchmark a broad suite of proprietary and open-source LLMs across diverse task dimensions: individual versus strategic decisions,

one-shot versus multi-round tasks with or without feedback, and distinct behavioral mechanisms. Using tailored within-experiment and cross-experiment statistical specifications, we assess model performance along two core dimensions: the fidelity of simulated treatment effects and the degree of over-precision (overly-narrow response distributions) common among LLM agents. Beyond hypothesis testing, this project delivers an open-source end-to-end toolkit for researchers to conduct LLM-powered experimental pretests, alongside practical recommendations for implementing synthetic-subject simulation in experimental research pipelines.

3. Fixed Effects Specification in Empirical Research: Potential Issues And Practical Recommendations.

Abstract: Fixed effects are the standard tool for addressing unobserved heterogeneity in panel data, but the choice of which dimensions to absorb varies considerably across studies. We systematically review 623 empirical papers published in the *Journal of International Business Studies* between 2000 and 2026, documenting substantial variation in how fixed effects are specified even within comparable panel structures. We then use Monte Carlo simulation across two panel structures to systematically investigate the role and effectiveness of fixed effects in estimation and statistical inference, under four types of confounding processes with distinct patterns. Several findings stand out. First, specifications whose fixed effects span the dimensions along which confounding operates achieve near-zero bias and substantially lower mean squared error than main-effects-only models. Second, the nature of the confounding process is an important determinant of estimation precision: trend-type confounding produces substantially larger bias than level-type confounding, because the former varies over time while the latter does not. Third, misspecification can produce deceptively significant estimates whose confidence intervals rarely cover the true parameter, so that statistical significance is an unreliable diagnostic. Across both panel structures, the conclusion is consistent: the most saturated specification delivers the lowest bias, the lowest variance, and the highest coverage of the true effect, and richer fixed effects do not harm estimation even when a dimension carries no confounding. We conclude with comprehensive practical recommendations and guidance on fixed-effect selection to better support empirical researchers.

4. Overcoming the First-Reverse-Mile Challenge in Reverse Logistics: Evidence from a Recycling Platform.

Abstract: Reverse logistics systems often struggle with the “first-reverse-mile” problem, as collecting end-of-life products from dispersed households incurs prohibitive costs. To mitigate this challenge, recycling firms are supplementing on-demand home collection services with offline self-service drop-off stations. Despite this trend, empirical evidence remains limited regarding how this shift reshapes user behavior or whether it actually improves the efficiency of reverse logistics. Drawing on a unique transaction-level dataset from AiFenLei—a leading Chinese platform that pairs on-demand home pickups with strategically placed drop-off stations—we employ a difference-in-differences design, leveraging the rollout of a new facility as a quasi-natural experiment to estimate its impact. We find that proximity to the new facility significantly increases both recycling frequency and total collection weight. Crucially, it drives a distinct channel shift, nudging users away from labor-intensive home pickups toward self-service drop-offs. By simultaneously expanding collection volumes and reducing unit costs, these offline stations offer a practical solution to the first-reverse-mile bottleneck. Leveraging detailed user-level transaction records, we uncover systematic heterogeneity in the treatment effects. The facility’s impact is most pronounced among previously inactive users and those with a preference for offline interactions.

Furthermore, users residing near eco-point redemption stores show significantly amplified responses, highlighting the strategic synergy of nesting recycling infrastructure within a reward ecosystem. Finally, a station-level analysis using a gravity model further reveals that transportation accessibility, on-site parking availability, and functional integration with surrounding points of interest significantly boost facility-level recycling volumes. Taken together, our research highlights how strategic facility placement and ecosystem integration act as catalysts for efficient reverse logistics, offering actionable insights for platforms to mitigate first-reverse-mile inefficiencies while advancing circular economy objectives.

5. National Security and Supply Chain Disruptions: Stock Market Reaction to the October 2022 US Export Restrictions of Semiconductor Technology to China.

Abstract: In recent years, governments have increasingly used supply chains to address geopolitical issues such as national security, protectionism, economic growth, and ensuring access to critical resources, among others. Governmental politicization or weaponization of supply chains is an emerging source of risk that has increased the vulnerability of supply chains and can disrupt supply chains. As evidence, this paper examines the stock market reaction to the disruption of the global semiconductor supply chain from the October 2022 US export restrictions of advanced semiconductor technology to China. Our analysis of the stock market reaction is based on 829 publicly listed firms that are part of the global semiconductor ecosystem. We find that the stock market reaction to the export restrictions is significantly negative. For the sample of 829 firms, the mean market reaction was -2.77% for the seven-day period surrounding the announcement of the US export restrictions. We estimate that the impact of this event was a loss in market capitalization of \$917 billion, highlighting the significance of this event for the global economy. For the 17 US and allied firms whose exports to China were restricted, the mean market reaction was -9.25%. For the 17 targeted firms in China whose imports were restricted, the mean market reaction was -9.77%. We also find that the significant negative effects propagated both upstream and downstream from the 17 US and allied firms. Suppliers experienced a mean market reaction of -2.04%, and customers experienced a mean market reaction of -2.52%. However, the market reactions are heterogeneous across geographic regions. The bulk of the negative effects were suffered by US suppliers and customers, while Chinese customers and suppliers experienced a marginally significant positive reaction.