Application for NBER Tutorial on Digital Economics and AI

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1. Course of Graduate Study & Enrollment Timeline

- **Current Enrollment:** 6th-year Ph.D. Candidate in Marketing, Mays Business School, Texas A&M University (Enrolled: Fall 2021; Expected Completion: Spring 2027).
- **Coursework & Training:**
    - *Seminars on Marketing & Operations:* Marketing Models, Theory Construction & Knowledge Development, Marketing Strategy Research, Consumer Behavior, Platform Supply Chain Management.
    - *Economics & Econometrics:* Econometrics I & II, Applied Microeconometrics, Game Theory, Industrial Organization I & II, Experimental Economics, Causal Machine Learning.
    - *Computer Science:* Statistical Machine Learning, Machine Learning Engineering, Reinforcement Learning, Stochastic Systems

2. Research Interests

- **Core Focus:** Substantively, my work centers on **platform strategy, digital marketplace design, and new product development**. Methodologically, I combine **machine learning and deep learning (including Large Language Models), structural economic modeling, measurement-error models, and game theory**.
- **Agenda:** My research investigates how digital platforms and firms can turn abundant but imperfect market activity (e.g., user reviews, ratings, clicks, experimental choices, and crowdsourced submissions) into reliable economic intelligence and optimal marketplace architecture. This spans two complementary streams:
    1. *Economic Measurement with AI:* Correcting measurement error and behavioral frictions in AI/LLM-generated market intelligence and preference elicitation.

2. *Marketplace Design & Governance:* Designing discovery algorithms, activity-based visibility feeds, and crowdsourcing incentive structures that balance quality, consumer search, and welfare.

3. Dissertation Summary & Committee

- **Working Dissertation Title:** *Essays on Platform Design and Economic Measurement in the Digital Economy*
- **Co-Chairs & Committee:**
    - **Yan "Lucy" Liu (Co-Chair):** Professor of Marketing, Mays Business School, Texas A&M University
    - **Venkatesh Shankar (Co-Chair):** Professor of Marketing, Cox School of Business, Southern Methodist University
    - **Lan Luo:** Professor of Marketing, Marshall School of Business, University of Southern California
    - **Bani Mallick:** Professor of Statistics, College of Arts and Sciences, Texas A&M University
- **Dissertation Overview:** The dissertation examines how digital intermediaries and product managers should operate under noisy, high-dimensional consumer signals. The first essay develops deep learning measurement-error models that guide LLMs to recover latent, actionable product attributes from unstructured text and coarse reviews. The second essay provides reduced-form and structural evidence on how activity-based discovery mechanisms alleviate consumer search frictions and redistribute attention toward long-tail cultural goods.

4. Current Research Projects & Working Papers

Digital Platforms & Marketplace Architecture

- **Information Feed Design and Discoverability in Cultural Product Marketplaces** *(with Yan "Lucy" Liu)*
    - *Overview:* Using high-frequency data from a direct-to-fan digital music marketplace, we estimate a continuous-time structural model of consumer encounter and purchase to evaluate activity-based discovery mechanisms. We show that both marketplace-wide broadcasts and social network transmission expand total demand rather than merely reallocating sales, improving consumer welfare by directing attention toward higher-value

consumer-artist matches. Finally, we evaluate alternative discovery architectures through counterfactual simulations to offer actionable insights for platform design.

- **Rejection Design for Crowdsourcing Platforms** *(with Xuying Zhao)*
    - *Overview:* We develop a game-theoretic model micro-founded on heterogeneous worker effort to study optimal rejection governance in crowdsourcing markets. We find that both unrestricted rejection rights and complete bans reduce worker welfare, platform profit, and the profitable market boundary. Instead, imposing an optimal minimum acceptance quota aligns requester and platform incentives, achieving the first-best outcome of a vertically integrated system.

AI, Machine Learning & Economic Measurement

- **Identifying and Measuring Sales-Related Underlying Product Attributes with a New Deep Learning Approach** *(with Venkatesh Shankar*, Revise & Resubmit at the *Journal of Marketing Research*)
    - *Overview:* To recover unobservable, sales-driving product attributes from noisy and biased secondary data like reviews and ratings, we propose the Non-Latent Variational Autoencoder (NLVAE). By embedding measurement-error correction within a variational autoencoder framework and integrating a large language model (LLM), NLVAE extracts interpretable, debiased attribute-level scores from structured and unstructured data. Applied to the video game market, our model outperforms existing alternatives in sales prediction and provides actionable insights for product development.
- **Recovering True Customer Preferences Through Varying Realization Probabilities** *(Solo-authored)*
    - *Overview:* Although incentive-aligned choice experiments balance cost efficiency with external validity, behavioral frictions can still distort observed choices from true customer preferences. We develop a framework combining a measurement-error model with machine learning that leverages variation in incentive realization probabilities to theoretically identify true underlying preferences. Simulations confirm that our approach accurately recovers true market shares and granular behavioral patterns.