Yucheng Lu

Digital Economics and AI Tutorial Application

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Course of Graduate Study and Enrollment

I am a Ph.D. student in Economics at New York University. I am on the job market this year.

- **Years of Enrollment:** 2019–2026 (expected).
- **Dissertation Title:** *Applications of LLM in Economic Research.*
- **Fields of Study:** Applied economics, AI.

Research Interests

My research sits at the intersection of economics and artificial intelligence (AI). I study how AI transforms the production of knowledge and how economists can, in turn, use AI effectively and responsibly in a range of economic settings. My work follows two primary roles:

1. **AI as object of economic inquiry:** Examining AI as a technological shock that reshapes who produces knowledge, how ideas are generated, and how innovation is organized.
2. **AI as tool of economic inquiry:** Applying AI tools, especially modern natural language processing (NLP) techniques, to analyze economic questions, while reflecting on their methodological suitability and reliability.

My dissertation, *Applications of LLM in Economic Research*, aligns with the second theme, developing methods that are technically rigorous, policy-relevant, and grounded in economic reasoning.
By joining the tutorial, I am hoping to deepen my knowledge in in the applications of AI in economic research, particularly about potential use of agentic AIs. I am also hoping to connect with leading NBER researchers to refine my dissertation and develop new ideas. One toy idea I had in mind was to develop a "replication agent for economic research".

Current Research Projects

AI as an Object of Economic Inquiry

- **Differential Impact of Generative AI on Research: Evidence from ICLR** (Presentation Mode, Draft Forthcoming). This work studies how ChatGPT's public release in late 2022 reshaped research at the International Conference on Learning Representations (ICLR). I document a relative reallocation of submissions away from mathematically intensive work toward more empirical and expository contributions, a shift primarily

driven by new entrants to the field. I interpret these findings through a Roy model with endogenous entry.

- **From Funding to Findings (FIND): An Open Database of NSF Awards and Research Outputs** (Under review at WWW 2026, with Kazimier Smith and Qiaochu Fan). This project constructs FIND, a large-scale, open-access dataset linking NSF grant proposals to their downstream research outputs. We leverage large language models to extract scientific claims from both proposals and resulting publications, allowing us to measure the extent to which funded projects deliver on their stated goals.

AI as a Tool of Economic Inquiry (Mainstream Applications)

- **Text Embeddings and the Measurement of Monetary Policy Shocks** (Accepted at ECAI AI-FIN 25, with Man Chon Iao). This paper develops a new approach to measuring monetary policy shocks using document-level semantic representations of central bank communications. Embedding-augmented models deliver improved out-of-sample forecasts of policy rate changes relative to specifications based on macroeconomic variables or dictionary-based sentiment indicators. Using the prediction errors as instruments in a structural VAR yields monetary policy shocks that generate impulse responses closely aligned with high frequency identified shocks.
- **Do Industrial Policies Increase Trade Competitiveness?** (IMF Working Paper No. 2025/098). We leverage a novel database of industrial policies and implement an ensemble algorithm over fine-tuned LLMs (ROBERTa-Large, Qwen2-8b-instruct, Llama3-8b-instruct) to classify policies at scale. We find substantial heterogeneity in the effectiveness of industrial policies, noting that domestic subsidies and export incentives are associated with temporary and medium-term improvements in trade competitiveness, respectively. Policies targeting upstream products are also associated with larger improvements in the RCA of downstream products through value chain linkages.

Experimenting with Heterodox Modeling

- **SimCity: Multi-Agent Urban Development Simulation with Rich Interactions** (Under Review at ICLR 2026, with Yeqi Feng, Hongyu Su, and Tianxing He). This framework leverages Large Language Models (LLMs) to model an interpretable macroeconomic system with heterogeneous agents and rich interactions, enabling flexible, adaptive behavior with transparent natural-language reasoning. We validate the framework by demonstrating that it naturally reproduces canonical macroeconomic phenomena, including the Phillips Curve, Okun's Law, and Engel's Law, while remaining robust across simulation runs.

Methodological Reflections

Recognizing the limitations of AI-based methods, I also critically examine these tools to delineate boundaries for sound applications in economics.

- **Feeding LLM Annotations to BERT Classifiers at Your Own Risk** (with Kazimier Smith). We demonstrate how the curse of training on synthetic data manifests when using LLM-generated labels to fine-tune smaller encoder models. We observe increased

instability and premature performance plateaus compared to models trained on gold labels, underscoring the need for caution in high-stakes applications.

Relevant Publications

- **Tracking Green Industrial Policies with LLM: A Demonstration**
  Proceedings of the ACL 2025 Workshop on NLP for Positive Impact
  Abstract: Green industrial policies (GIPs) are government interventions that support environmentally sustainable economic growth through targeted incentives, regulations, and investments in clean technologies. We propose *GreenSpyder*, an LLM-based workflow that actively monitors, classifies, and annotates GIPs from open-source information. Benchmarking results show that LLMs can be effective for classification and coarse annotation tasks, though they still need improvement for more nuanced classification. We apply *GreenSpyder* to U.S. Legislative Records from the 117th Congress.

- **Can Reasoning LLMs Synthesize Complex Climate Statements?**
  Proceedings of the ACL 2025 Workshop on ClimateNLP
  Abstract: We evaluate state-of-the-art reasoning LLMs on two key tasks: (1) contextual confidence classification and (2) factual summarization of climate evidence, using a novel dataset constructed from the IPCC Sixth Assessment Report (AR6). We find reasoning LLMs outperform general-purpose models in confidence classification by 8 percentage points in accuracy, while performance differences are mixed for summarization tasks. This establishes reasoning LLMs as promising auxiliary tools for confidence assessment in climate evidence synthesis.

- **MetaFind: Scene-Aware 3D Asset Retrieval for Coherent Metaverse Scene Generation**
  Accepted to NeurIPS 2025, with Zhenyu Pan and Han Liu
  Abstract: We present MetaFind, a scene-aware multi-modal retrieval framework designed to enhance scene generation in the metaverse by retrieving 3D assets from large-scale repositories. Our innovation is a retrieval mechanism that enhances both spatial reasoning and style consistency by jointly modeling object-level features and scene-level layout structures, ensuring retrieved 3D assets are contextually and stylistically coherent with the existing scene.

Dissertation Committee Members

- William Easterly (Chair), Professor Emeritus of Economics, NYU
- Raquel Fernandez, Silver Professor of Economics, NYU
- Xi Chen, Professor of Technology, Operations, and Statistics, NYU Stern
- Martin Rotemberg, Associate Professor of Economics, NYU