Digital Economics & AI Tutorial Application

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Summary

I am a third year economics Ph.D. student at Yale University in the microconomic theory group. My research interests include market design, auction theory, and algorithmic game theory. I am particularly interested in studying how the rise of computer-based decision makers, including AI-powered pricing algorithms, fundamentally changes market outcomes. My current ongoing research explores the limits of price-discrimination by data-rich sellers; the emergence of learning failures in repeated auctions with a dynamic auctioneer; and the ability of sellers to extract additional rent in repeated auctions using observed data. In the future, I also hope to study the extent to which learning algorithms can lead to noncompetitive outcomes even without explicit collusive intent.

I am applying for the NBER Digital Economics & AI Tutorial because I believe it would be a great opportunity for me to meet and interact with researchers and other students with similar interests to me. At Yale, there are relatively few graduate students working in microeconomic theory, and almost none interested in this particular topic. My hope is that attending this tutorial would connect me to a wider community of individuals thinking about these problems. At the same time, I believe that my experience and ongoing work in this field would make my perspective a valuable contribution to the event.

Ongoing Projects

The Limits of Non-linear Price Discrimination, with Dirk Bergemann
This project extends Bergemann, Brooks, & Morris (2015) to a non-linear pricing setting. Bergemann, Brooks, & Morris consider a monopolist selling a unit-demand zero cost good to consumers with a known value distribution. The seller has the ability to arbitrarily place consumers into segments (without changing their value) and charge the optimal price to each segment. This can be thought of as a monopolist with infinitely precise data and the ability to present individualized prices, a scenario that arises in digital markets. In the original paper, the authors show that *any* division of the efficient surplus is achievable with some segmentation. We give analogous results in a setting with increasing marginal cost of production.

Herding in repeated auctions, with Mira Frick
The classic work of Smith and Sorensen (2000) and follow-up papers have shown that herding—an outcome in which agents ignore their private signals, possibly erroneously—tends to arise whenever agents are only able to communicate their private information in a coarse manner. This would seem to describe sealed-bid repeated auctions, where participants are only able to see whether or not a sale was made in the previous period. However, in a true repeated auction game, the auctioneer may strategically adjust the winning threshold in a manner which counteracts social mislearning. We describe conditions under which traditional information cascades still arise.

Sequential screening in dynamic auctions
We consider a seller running a repeated auction who wishes to use the information contained in early period bids to modify the auction mechanism and extract additional rent. In a general prior-free setting (i.e. without assumptions on the distribution of values), this cannot be done truthfully. Courty & Li (2000) characterize the seller-optimal mechanism in the two-period monopoly sale variant of this problem in which consumer valuations are drawn from an unknown distribution, but the distribution of these value distributions is known. However, their mechanism relies on the ability to make up-front and unconditional payments, which in real-life markets are either unrealistic due to commitment prolems, or outright banned by anti-bribery laws. We remove the ability to make unconditional payments and show that by inducing intentional overbidding, sellers can achieve revenues higher than the static benchmark, but generically lower than the Courty & Li solution.

Research Experience

Yale University
Research Assistant, Dirk Bergemann — May 2023 - Aug 2023

Federal Reserve Bank of New York
Summer Research Assistant, Sebastian Heise — May 2020 - Aug 2020

Education

Yale University
Ph.D. Economics — Exp. 2026
M.A. Economics — 2023

Qualifying Exams completed:
Microeconomic theory (examiners: Ryota Iijima, Larry Samuelson)
Economics & computer science (examiners: Dirk Bergemann, Philipp Strack)

Princeton University
A.B. Mathematics, *magna cum laude* — 2021

Thesis: Eliciting Preference Intensities in Efficient Assignment Design
Advisors: Leeat Yariv (Department of Economics)
Jon Fickenscher (Department of Mathematics)

Honors & Awards

Cowles Foundation Fellowship — 2021 - 2026
U.S. Presidential Scholar — 2017