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Undergraduate Studies:
S.B., Mathematics and Economics, Massachusetts Institute of Technology, 2013

Graduate Studies:
Harvard University, 2013 to present
Ph.D. Candidate in Economics
Thesis Title: "Essays in Industrial Organization"
Expected Completion Date: May 2019

References:
Professor Ariel Pakes   Professor Robin Lee
Harvard University   Harvard University
617-495-5320, apakes@fas.harvard.edu   617-495-2997, robinlee@fas.harvard.edu

Professor Elie Tamer
Harvard University
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Teaching and Research Fields:
Primary fields: Industrial Organization

Secondary fields: Microeconomic Theory, Econometrics, Law and Economics

Teaching Experience:

2017-2018	EC985: Senior Thesis (Advising 13 undergrad senior theses across Economics)
Spring, 2017	EC970: Sophomore Tutorial: Industry Analysis (UG), Harvard, co-taught w/ Ashvin Gandhi
Spring, 2016/7	EC1640: Industrial Organization (UG), Harvard, teaching fellow for Prof. Robin Lee
Fall, 2015	EC2110, Econometrics I (G), Harvard, teaching fellow for Prof. Max Kasey
Spring, 2014-5	CS186, Economics and Computation (UG), Harvard, teaching fellow for Prof. David Parkes

Research Experience and Other Employment:

July 2015-16	Harvard University, Research Assistant for Prof. Ariel Pakes and Prof. Robin Lee
June-Aug 2015	Microsoft Research New England, Intern
June-Aug 2014	Tel Aviv University, Research Assistant for Prof. Michal Feldman

Honors, Scholarships, and Fellowships:

2017-18	Bok Center Teaching Award recipient (two times)
2017	Taubman Center/Rappaport Institute Urban Dissertation Fellowship ($10,000)
2017	Geneva Association Dissertation Grant (10,000 CHF)
2013-2018	Harvard University Graduate Fellowship
2014,15,16,17,18	Harvard Economics Fall/Summer Travel & Research Grant

Publications and Conference Papers:

*"*Pretrial Negotiations under Optimism,*"* with Muhamet Yildiz
Forthcoming at the RAND Journal of Economics

"Implementing the Wisdom of Waze,**"** with Michal Feldman and Avinatan Hassidim
International Joint Conference on Artificial Intelligence (IJCAI). Vol. 24. Buenos Aires, Argentina, 2015

Job Market Paper:

"*Scaling Auctions as Insurance: A Case Study in Infrastructure Procurement*," with Valentin Bolotnyy

The U.S. government spends about $165B per year on highways and bridges, or about 1% of GDP. Much of it is spent through "scaling" procurement auctions, in which private construction firms submit unit price bids for each piece of material required to complete a project. The winner is determined by the lowest total cost—given government estimates of the amount of each material needed—but, critically, they are paid based on the realized quantities used. This creates an incentive for firms to skew their bids—bidding high when they believe the government is underestimating an item's quantity and vice versa—and raises concerns of rent-extraction among policymakers. For risk averse bidders, however, scaling auctions provide a distinctive way to generate surplus: they enable firms to limit their risk exposure by placing lower unit bids on items with greater uncertainty. To assess this effect empirically, we develop a structural model of scaling auctions with risk averse bidders. Using data on bridge maintenance projects undertaken by the Massachusetts Department of Transportation (MassDOT), we present evidence that bidding behavior is consistent with optimal skewing under risk aversion. We then estimate bidders' risk aversion, the risk in each auction, and the distribution of bidders' private costs. Finally, we simulate equilibrium item-level bids under counterfactual settings to estimate the fraction of MassDOT spending that is due to risk and evaluate alternative mechanisms under consideration by MassDOT. We find that scaling auctions provide substantial savings to MassDOT relative to lump sum auctions and suggest several policies that might improve on the status quo.

Other Research Papers:

"*Bargaining and International Reference Pricing in the Pharmaceutical Industry*," with Ashvin Gandhi and Pierre Dubois

The United States spends twice as much per person on pharmaceuticals as European countries, in large part because prices are higher in the US. This has led policymakers in the US to consider legislation for price controls. This paper assesses the effects of a hypothetical US reference pricing policy that would cap prices in US markets by those offered in Canada. We estimate a structural model of demand and supply for pharmaceuticals in the US and Canada, in which Canadian prices are set through a negotiation process between pharmaceutical companies and the Canadian government. We then simulate the impacts of the counterfactual international reference pricing rule, allowing firms

to internalize the cross-country impacts of their prices both when setting prices in the US and when negotiating prices in Canada. We find that such a policy results in a slight decrease in US prices and a substantial increase in Canadian prices. The magnitude of these effects depends on the particular structure of the policy. Overall, we find modest consumer welfare gains in the US, but substantial consumer welfare losses in Canada. Moreover, we find that pharmaceutical profits increase in net, suggesting that reference pricing of this form would constitute a net transfer from consumers to firms.

"*Buying Data from Consumers: The Impact of Monitoring in US Auto Insurance*," with Yizhou Jin

This paper studies the design and impact of auto-insurance monitoring programs, in which insurers offer financial incentives to consumers who choose to have their driving behavior monitored. We gather proprietary datasets from a major U.S. auto insurer that offers a monitoring program. The data is then matched with price menus of the firm's main competitors. We observe over one million drivers and fifty million insurance quotes. We then develop a tractable framework to analyze consumer demand to opt in as well as the firm's investment in the program. Overall, we find that the monitoring program improves both consumer welfare and firm profit. To support this finding, we quantify four countervailing economic forces. (i) Monitoring reduces accident claims by 29%. (ii) It reveals private information on driver risk, improving the firm's risk rating. (iii) Consumers have large costs to be monitored and face added uncertainty in future prices. This prevents unraveling but also limits the program's impact. (iv) Price competition enhances consumers' outside options and reduces the monitoring program's profitability. Taken together, introducing monitoring improves profit by 26.2% and consumer welfare by 2.3%, raising total surplus by $19.1 per capita annually. We then conduct several counterfactual simulations to explore equilibrium implications of our model. For example, required disclosure of the monitoring data reduces–but does not eradicate–the firm's investment in the program. Nonetheless, total surplus decreases as the effect of a lower monitoring opt-in rate overwhelms that of decreased price discrimination.

"*Voluntary Disclosure and Personalized Pricing,*" with S. Nageeb Ali and Greg Lewis

A concern central to the economics of privacy is that firms may exploit consumer data to engage in greater price discrimination. A common response to these concerns is that consumers should have sovereignty over their own data, and choose whether firms access it. Since the market may draw inferences whenever a consumer withholds information about her preferences, the strategic implications of consumer data sovereignty are unclear. This paper investigates whether such measures improve consumer welfare in both monopolistic and competitive environments. We consider the interaction between a consumer, whose preferences are not known to the market, and a market that makes price offers to that consumer based on verifiable disclosures about her type. We show that a consumer can optimally use verifiable information about her preference to create exclusive partial pools that guarantee gains relative to perfect price discrimination.

"*Fast Bayesian Inference on Large-Scale Random Utility Logit Models,*" with James Savage

Random coefficients logit is a benchmark model for discrete choice, widely used in marketing and industrial organization. In "conjoint analysis" conducted in experimental marketing, it has historically been estimated using a Metropolis-within-Gibbs method, or with simulated likelihoods (Train 2009). In economic problems where only aggregate data are available, it is estimated using GMM using the BLP algorithm of Berry Levinsohn and Pakes (1995). We propose a latent variable form of the model as in Yang, Chen and Allenby (2003) for both individual choice and aggregate data, which can be estimated efficiently using Hamiltonian Monte Carlo. This offers several benefits over the current standards. Relative to Metropolis-within-Gibbs, HMC allows efficient estimation of enormous parameter spaces, allowing much larger (and even context-dependent choice) models to be fit in hours (rather than days or weeks). The proposed approach models aggregate sales, not shares, and so unlike BLP, the method allows for measurement error due to differences in market size. Priors also regularize the loss surface, leading to estimates that are not sensitive to starting values.

Research In Progress:

"*Incentivized Behavioral Modification and Learning in Monitored Driving,*" with Yizhou Jin

"*Optimal Investment for Bridge Longevity: A Bayesian Multi-State Markov Approach,*" with James Savage