MIT Economics

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DOCTORAL STUDIES

Massachusetts Institute of Technology (MIT)
PhD, Economics, Expected completion June 2026
DISSERTATION: "Essays in Industrial Organization and Environmental Economics"

DISSERTATION COMMITTEE AND REFERENCES

Professor Nikhil Agarwal
MIT Department of Economics
77 Massachusetts Avenue, E52-440
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Professor Tobias Salz
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Professor Ben Olken
MIT Department of Economics
77 Massachusetts Avenue, E52-542
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PRIOR EDUCATION

Princeton University — 2020
AB, Economics, *summa cum laude*

CITIZENSHIP

USA

FIELDS

Industrial Organization, Environmental and Energy Economics

TEACHING EXPERIENCE

Introductory Macroeconomics (Princeton) — 2018-2019
Undergraduate Teaching Assistant to Dr. Elizabeth Bogan

Honors Analysis (Princeton) — 2018-2019
Undergraduate Teaching Assistant to Prof. Javier Gómez Serrano

RELEVANT POSITIONS

Research Assistant to Prof. Tobias Salz (MIT) — 2021
Research Assistant to Prof. Glenn Ellison (MIT) — 2020

	Research Assistant to Dr. Marco Del Negro (FRBNY)	2019
	Research Assistant to Prof. Gianluca Violante (Princeton)	2018

FELLOWSHIPS, HONORS, AND AWARDS

Martin Family Sustainability Fellowship (MIT)	2024
Society of Energy Fellowship (MIT)	2023
George and Obie Shultz Fund (MIT)	2022-2024
Robert M. Solow Fellowship (MIT)	2021
National Science Foundation Graduate Research Fellowship	2020
Halbert White ’72 Prize in Economics (Princeton)	2020
Phi Beta Kappa (Princeton)	2019

PROFESSIONAL ACTIVITIES

Refereeing: *Journal of Human Resources*
Conferences and Seminars: Microsoft Research (2024), IIOC (2023)
Service: MIT-Harvard Application Assistance and Mentorship Program

RESEARCH PAPERS

“Environmental Regulation with Irreversible Investments: Evidence from High Plains Aquifer Depletion” (Job Market Paper)
(with Aaron Berman)

Many of the world’s major aquifers are being rapidly depleted from agricultural irrigation, generating dynamic common-pool externalities by raising future extraction costs. Entry restrictions are commonly used to limit depletion because well drilling is easily monitored, but they are second-best compared to Pigouvian taxes that directly target the intensive margin of water use. When policies cannot be tailored to heterogeneous users, however, the relative effectiveness and political feasibility of entry fees and water-use taxes become theoretically ambiguous, depending crucially on the correlation between water users' productivity and externalities. To study this question, we develop a dynamic model of farmers’ joint well-drilling and water-use decisions, integrated with a physically realistic model of groundwater flows, and estimate it using field-level data on aquifer levels, water use, and crop production in the Kansas High Plains Aquifer from 1959 to 2022. We find that field-level productivity and water-use externalities are strongly positively correlated due to the spatial concentration of high-productivity fields, leading uniform taxes to outperform entry fees in terms of aggregate welfare. Nevertheless, entry fees are preferred by most users because the optimal uniform tax exceeds the marginal social cost of water use for all but the most productive fields. However, driven by irreversible well investments that lock in depletion from high-externality early entrants, the effectiveness and popularity of entry fees decline rapidly over time. These findings highlight how heterogeneity and irreversibility jointly shape the efficiency and political feasibility of environmental regulation.

“Optimal Urban Transportation Policy: Evidence from Chicago”
(with Milena Almagro, Felipe Barbieri, Juan Camilo Castillo, and Tobias Salz)
Revise and Resubmit, *Econometrica*, August 2024

We characterize and quantify optimal urban transportation policies in the presence of congestion and environmental externalities. We formulate a framework in which a municipal government chooses among transportation equilibria through its choice of

public transit policies—prices and frequencies—as well as road pricing. The government faces a budget constraint that introduces monopoly-like distortions and the potential need to cross-subsidize modes. We apply this framework to Chicago, for which we construct a new dataset that comprehensively captures transportation choices. We find that road pricing alone leads to large welfare gains by reducing externalities, but at the expense of travelers, whose surplus falls even if road pricing revenues are fully rebated. The optimal public transit price is near zero, with reduced bus and increased train frequencies. Combining transit policies with road pricing slackens the budget constraint, allowing for higher transit frequencies and lower prices, thereby increasing consumer surplus after rebates.

"Algorithm Design Meets Information Design: Price Recommendation Algorithms on Online Platforms"

Platforms often use price recommendation algorithms to suggest prices to firms based on the platform's private information about consumer demand. I develop a theoretical model and algorithmic experiments to study the impact of platform price recommendations under three types of firm conduct: collusion, competition, and algorithmic pricing. When firms behave either collusively or competitively, I prove that the platform's optimal price recommendation system is fully informative, and that this outcome is consumer-pessimal over the space of possible recommendation system designs. When firms instead use pricing algorithms, simulated algorithmic experiments show that the introduction of a price recommendation system reduces average consumer surplus by 31%.

"Out with the Old, In with the New: Equity and Efficiency of Secondary-Market Subsidies for Electric Vehicles"
(with Aaron Berman and Dam Linh Nguyen)

We study the cost-effectiveness and distributional impacts of consumer subsidies for electric vehicles in both the primary and secondary markets. In a stylized theoretical framework, we show that their relative cost-effectiveness is ambiguous: while new-vehicle subsidies always generate more overall adoption than used-vehicle subsidies, they can also entail greater inframarginal government spending due to consumer selection into resale. To analyze the equilibrium consequences of the two subsidy designs, we develop and estimate a dynamic empirical model of the vehicle market using granular data on vehicle registrations and transactions in Texas from 2015 to 2022. The model captures consumer sorting into resale through the endogenous scrappage and replacement decisions of forward-looking consumers. Counterfactual results show that secondary-market subsidies (i) are more cost-effective than primary-market subsidies due to large reductions in inframarginal spending, and (ii) deliver more progressive distributional impacts. Overall, our results highlight the role of secondary markets in shaping the equity and efficiency of subsidies for technology adoption.