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CURRENT POSITION Bits and Watts Postdoctoral Fellowship (Stanford) 2020-Present

DOCTORAL STUDIES Massachusetts Institute of Technology (MIT)
PhD, Economics, September 2020
DISSERTATION: “Essays on Electricity and Matching Markets”

DISSERTATION COMMITTEE AND REFERENCES

Professor Nikhil Agarwal
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Professor Jing Li
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PRIOR EDUCATION Bilkent University 2017-2018
Visiting Student in Economics Department

Bilkent University 2014
B.A in Economics and Minor in Mathematics
Graduated as Salutatorian

CITIZENSHIP Turkish **GENDER:** Male

FIELDS Primary Fields: Energy and Environmental Economics, Industrial Organization
Secondary Fields: Market Design

TEACHING EXPERIENCE	14.76 Firms, Markets, Trade and Growth (MIT, DEDP Master's) TA to Professor Dave Donaldson and David Atkin	2020	
	15.037-8 Energy Economics and Policy (MIT Sloan, MBA) TA to Professor Chris Knittel	2020	
	ECON 204 Microeconomics II (Bilkent University, Undergraduate Level) TA to Professor Kevin Hasker	2018	
	ECON 301 Econometrics (Bilkent University, Undergraduate Level) TA to Professor Cavit Pakel	2017	
	14.04 Intermediate Microeconomics (MIT, Undergraduate Level) TA to Professor Juuso Toikka	2017	
	14.14 Strategy and Information (MIT, Undergraduate Level) TA to Professor Mihai Manea	2017	
	ECON 516 Mathematics for Economists II (Bilkent University, Graduate Level) TA to Professor Semih Koray	2014	
	ECON 439 Game Theory (Bilkent University, Undergraduate Level) TA to Professor Kevin Hasker	2012-2013	
	ECON 442 Application of Graph Theory to Economics, (Bilkent University, Undergraduate Level) TA to Professor Semih Koray	2012	
	RELEVANT POSITIONS	Research Assistant to Professor Nikhil Agarwal	2014-2017
	FELLOWSHIPS, HONORS, AND AWARDS	ExxonMobil-MIT Energy Fellow	2018-2020
		Fulbright Fellowship	2014-2016
		Bilkent University High Merit Scholarship	2009-2014
Ranked 2 nd in Turkish University Entrance Exam, ÖSS		2009	
PUBLICATIONS	“Market Failure in Kidney Exchange” (joint with Nikhil Agarwal, Itai Ashlagi, Eduardo Azevedo, Clayton Featherstone), <i>American Economic Review</i> , November 2019.		
	“What Matters for the Productivity of Kidney Exchange” (joint with Nikhil Agarwal, Itai Ashlagi, Eduardo Azevedo, Clayton Featherstone). <i>American Economic Review, Papers and Proceedings</i> . May 2018. Vol.108, No. 5. 334-340.		

**RESEARCH
PAPERS****“Large Scale Wind Power Investment's Impact on Wholesale Electricity Market” (Job Market Paper)**

Renewable subsidies have been an influential device for wind power investment. These policies help to lower emissions by offsetting high-emitting electricity generation with clean energy. For zero-emission targets, this transition towards renewable power should be accompanied by thermal generators' retirement to set clean the energy mix in the power sector. In this paper, I build a framework to quantify the offset and revenue impact of large-scale wind power investment in a wholesale electricity market and apply it to study the South Australian Electricity Market. This equilibrium framework computes a supply function equilibrium using estimated best responses from conventional sources to observed variation in the residual demand volatility. I first show that reduced-form methods are biased as the scale of the additional capacity increases. My results highlight that with different investment sizes, the substitution patterns and revenue impact of wind power differ considerably. As the penetration level of wind power increases, the electricity becomes cheaper. The offset and negative shock shifts from low-cost inflexible generators to high-cost flexible generators, while the revenue impact is the highest on existing renewable generation. I also show quite a bit heterogeneity in price impact among different potential wind power projects. These results have some policy implications on renewable targets' long-run effects on the generation mix and the project selection given the subsidy scheme.

“Economics of Grid-Scale Energy Storage”

The transition to a low-carbon electricity system is likely to require grid-scale energy storage to smooth the variability and intermittency of renewable energy. I investigate whether private incentives for operating and investing in grid-scale energy storage are optimal and the need for policies that complement investments in renewables with encouraging energy storage. In addition to arbitraging intertemporal electricity price differences, storage induces non-pecuniary externalities due to production efficiency and carbon emissions. I build a new dynamic structural equilibrium framework to quantify the effects of grid-scale energy storage and apply it to study the South Australian Electricity Market. My equilibrium framework adds key modeling features to the literature by allowing (1) storage's price impact and (2) incumbents to best response to energy storage's production. The best responses' estimation uses the best responses from conventional sources to observed variation in the residual demand volatility. We find that (1) ignoring price impact of energy storage may lead to large biases as arbitrage revenue diminish fast with the size, (2) although entering the electricity market is not profitable for privately operated storage, such entry would increase consumer surplus and reduce emissions, (3) load ownership for energy storage leads to twice as much improvement in consumer surplus, and (4) entry of energy storage reduces renewable generators' revenue by decreasing average prices at moderate levels of renewable power, however, for high renewable generation capacity levels, storage increases the return to renewable production and reduces CO₂ emissions by preventing curtailment during low-demand periods.

**RESEARCH IN
PROGRESS****“Leveling the Playing Field: Electricity Market Design with Energy Storage”** (with Jing Li)

Ambitious penetration targets of renewable but intermittent electricity generation sources, such as solar and wind, present challenges to the reliability and resilience of power systems. Energy storage can facilitate the integration of these resources. This paper studies how electricity market regulations can be updated to allow for fair and efficient energy storage entry and participation by the full range of energy storage technologies. We specify a model of electricity generation and storage competition in wholesale electricity markets with locational marginal prices (LMPs). In the model, a storage operator maximizes profit (revenue stacking) by participating in energy, ancillary services, and capacity markets. Our model allows for different technologies of energy storage to express their comparative advantage arising from different technical specifications such as fixed costs, operating costs, roundtrip efficiency, power, and energy capacity. We build on Karaduman (2021) to endogenize the impact of storage participation on prices in wholesale electricity markets. We explore applying our model to data from PJM in the United States. From our estimates and model, we compute optimal locational capacity payments for different storage technologies.

“Competition of Matching Platforms” (with Arda Gitmez)

In this project, we investigate the inclination of dynamic matching platforms to constitute natural monopolies. We present a model of dynamic matching market with multiple platforms, where agents stochastically arrive and leave. Agents’ preferences are two-dimensional, with common preferences over time and heterogeneous tastes over the matching outcome. Each matching platform picks a matching policy, which endogenously generates gains from economies of scale. Agents choose a platform or platforms to participate at a cost. We argue that, given a level of participation cost, a natural monopoly occurs if and only if the preferences over time is salient compared to heterogeneous tastes. Moreover, an equilibrium with multiple platforms is sustained if participation costs are sufficiently high or if the tastes are sufficiently diverse. The results are suggestive of policy-relevant differences between several types of dynamic matching platforms, including dating and ride-sharing platforms.

“Is Productivity Transferable: Evidence from Power Sector M&A” (with Mert Demirer)**WORK IN
PROGRESS****“Assessing the impact of large-scale EV adoption on wholesale electricity markets: A case study of Australia”** (with Nicolas Astier)