Digital Economics and AI Tutorial

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Dear Professors Chiara Farronato, Avi Goldfarb, and Catherine Tucker,

My name is Dean Li, and I am writing to apply to attend the Digital Economics and AI Tutorial. I am a fourth-year Economics Ph.D. student at MIT, and I am keenly interested in studying how digitization and data regulations can reshape the role of firms in training, and information sharing, especially in the healthcare sector. These research interests have closely informed my ongoing work, which considers the impact of digitization on both healthcare labor markets and healthcare delivery.

In my first project, I study how firm technology choices drive demand for technologically-specific worker skills, shaping how firms hire and train workers. Firm technology choices within a labor market determine the degree to which these technology-specific skills are general or firm-specific, further shaping how firms compete over workers. I study how the generality of skills affects labor market competition by exploiting variation in the timing of the healthcare industry's fragmented adoption of electronic health record systems. First, I document the importance and salience of differentiated technology choices among workplaces through hospital job postings, which increasingly contain references to system-specific worker experience. To complement this, I field a direct survey of nurses to learn about how these systems affect their work and their job search experiences.

Next, I exploit variation in the timing of technology adoption across hospitals and find that nurses become 30% less likely to move across hospitals adopting different technologies compared to hospitals adopting the same technology. Labor supply estimation suggests that these costs are roughly equivalent to an extra fifteen miles of distance between a given hospital pair. Finally, I introduce a job search model to analyze firm incentives to harmonize or differentiate technologies. Technological differentiation generates horizontal differentiation that softens labor market competition, while matching allows firms to access a larger supply of trained workers. I establish conditions under which fragmentation occurs in equilibrium and analyze its consequences for labor market power. More broadly, as technological innovations in both hardware and software continue to reshape labor markets, I provide a framework for assessing the labor market consequences for the skills and training associated with competing technologies.

In my second project, I draw from American Health Association IT Surveys and Medicare Part D data to study the effects of data sharing on opioid abuse. Many of the most common policies aimed at curbing the opioid epidemic are fundamentally built on data-sharing procedures. Both prescription monitoring programs and opioid prescribing limits for opioid-naive patients, for example, rely on the ability of medical institutions to share data. However, the effectiveness of these policies and the potential spillovers that they have on non-targeted patients may depend on whether physicians are operating in high or low-information environments. I aim to measure this relationship between policy effectiveness and informational environments by exploiting several sources of variation, including state privacy laws and the interoperability between electronic health record systems.

I would be thrilled at the opportunity to attend this tutorial, and I deeply value the breadth of interesting work and perspectives that I would have the chance to engage with. Furthermore, beyond these projects, I've worked with Sida Peng to secure possible future collaborations with a large dataset on cloud storage and computing decisions I used in work studying the impact of privacy regulation on firm input choices, and I would love the chance to meet new mentors and potential co-authors.

Thank you for your time and consideration!

Dean Li

Brief Overview of Graduate Studies

EDUCATION

MIT - GPA: 4.00/4.00; *NSF GRFP, NBER Fellowship in Health and Aging* **Cambridge, MA • Fall 2021 - Expected 2027**
Doctorate in Economics
Fields: Public Economics, Labor Economics, Industrial Organization
Advisors: Amy Finkelstein, Daron Acemoglu, Nancy Rose

Yale University - GPA: 3.96/4.00; *Summa Cum Laude, Phi Beta Kappa* **New Haven, CT • Class of 2019**
Bachelor of Arts in Economics and Mathematics
Bachelor of Arts in Computer Science

RESEARCH

"What Drives Risky Prescription Opioid Use: Evidence from Migration" with Amy Finkelstein and Matt Gentzkow (Resubmitted at QJE)

Abstract: We develop and estimate a dynamic model of risky prescription opioid use that allows us to unpack the role of person- and place-specific drivers of the opioid epidemic and to assess the impact of state opioid policies. Event studies indicate that, among adults receiving federal disability insurance from 2006to 2019, moves to states with higher rates of risky use produce an immediate jump in the probability of risky use, followed by an additional gradual increase for the next several years. Using a potential outcomes framework, we show how these results map to the person- and place-specific factors in the model. Model estimates imply large effects of place on both the likelihood of transitioning to addiction and the availability of prescription opioids; they also indicate that these place effects change significantly when state laws restricting pain clinics are enacted. A one standard deviation reduction in all place effects would have reduced risky use by about 40 percent over our study period. One particular source of place effects, pain clinic laws, reduced risky use by 5 percent, but could have reduced it by 30 percent if they had been enacted earlier, with much of this magnification operating through the dynamics of addiction.

"Data, Privacy Laws, and Firm Production: Evidence from the GDPR" with Mert Demirer, Diego Jiménez Hernández, and Sida Peng (Submitted)

Abstract: By regulating how firms collect and use data, privacy laws may alter firm demand for information technology inputs. We study how firms respond to privacy laws in the context of the EU's General Data Protection Regulation (GDPR) by using seven years of data from a global cloud-computing provider. Our difference-in-difference estimates indicate that, in response to the GDPR, EU firms decreased data storage by 26% and data processing by 15% relative to comparable US firms, becoming less "data-intensive." To estimate the costs of the GDPR for firms, we propose and estimate a production function where firms combine data and computation in firm production. We find that data and computation are strong complements and that firm responses are consistent with the GDPR representing a 20% increase in the cost of data. This increase translates into only a 0.1-0.5% rise in overall production costs because data plays a relatively small role in firm production compared to computation.

"Technological Fragmentation and Labor Market Competition"

Abstract: Firm technology choices drive demand for technologically-specific worker skills, shaping how firms hire and train workers. Differentiation among firm technology choices within a labor market determines the degree to which skills are general or firm-specific, further shaping how firms compete over workers. I aim to study how the generality of skills affects labor market competition by exploiting policy-induced variation in the healthcare industry's fragmented adoption of electronic health record systems. First, I document the importance and salience of differentiated technology choices among workplaces through job postings and a direct survey of nurses. Next, exploiting variation in the timing of government policy, I find that nurses are 20% more likely to move across hospitals adopting the same technology and 10% less likely to move across different technologies. I further find that, conditional on both the technology adopted and the adoption timing, hospitals facing more technologically fragmented labor markets had lower rates of wage growth post-adoption. Finally, I introduce a job search model to analyze firm incentives to harmonize or differentiate technologies. Technological differentiation generates horizontal differentiation that softens labor market competition, while matching allows firms to access a larger supply of trained workers.

"Medical Graduate Training and the Spatial Distribution of Physician" with Raymond Han

Abstract: Medicare distributes over $15 billion dollars a year to hospitals for the training of resident physicians, but the hospital-specific division of this funding has been largely frozen since 1997. Since more than half of physicians practice in the state they completed their residency, the spatial distribution of this funding may play an important role in determining the geographic distribution of physicians. This project assesses the potential for reallocation of funding for medical graduate training to redress disparities in physician access across places. To separate the effects of residency location from physician preferences, we leverage a sudden redistribution of residency slots mandated by the Medicare Modernization Act in 2004. We document that hospitals that expanded their residency programs in response to the redistribution increased the number of newly licensed physicians in their local markets, but that these effects are substantially tempered by hospitals who were inframarginal to the additional funding they received. Our results show that the effectiveness of increased residency funding in boosting local physician supply turns on the types of hospitals that are targeted; a substantial share of current funding for physician training is likely a transfer to hospitals.

"Curbing Opioid Abuse and Hospital Informational Environments: The Effects of Patient Data Sharing"

- This project studies how the effectiveness of opioid-related policies meant to curb abuse—and their potential spillovers onto other non-targeted patients—depends on the informational environments that physicians operate in, as proxied for by hospital-level exposure to electronic health record interoperability and the strictness of state privacy regulations.

"The Effect of LLMs on Clinician Note Quality, Error Rates, and Speed" (with A Jay Holmgren and Sida Peng)

- This project conducts an RCT where physicians take clinical notes across three simulated encounters and are randomly given basic transcription technology, access to an optimized LLM, and no transcription technology. We study the speed and quality of the note taking.