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DOCTORAL STUDIES

Massachusetts Institute of Technology (MIT)
 PhD, Economics, Expected Completion June 2025
 DISSERTATION: "Essays on Industrial Organization"

DISSERTATION COMMITTEE AND REFERENCES

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PRIOR EDUCATION

University of Wisconsin-Madison
 B.A. in Economics (Mathematical Emphasis) and Mathematics,
with Distinction and Comprehensive Honors
 Certificates (minors) in Computer Science and African Studies

2019

CITIZENSHIP

United States

GENDER

Female

LANGUAGES

English, Spanish (advanced), Arabic (intermediate)

FIELDS

Primary Field: Industrial Organization

Secondary Fields: Innovation, Health Economics

MIT Economics

REBEKAH DIX
OCTOBER 2024-- PAGE 2

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| TEACHING EXPERIENCE | Open Source Economics (OSE) Laboratory Boot Camp, University of Chicago (Graduate Instructor) | 2019 |
| RELEVANT POSITIONS | Research Assistant to Professors Nikhil Agarwal and Daron Acemoglu Research Intern, Microsoft Research (advised by Dr. James Brand) | 2020-21 2022 |
| FELLOWSHIPS, HONORS, AND AWARDS (SELECTED) | NBER Pre-Doctoral Fellowship in Aging and Health Research Jerry A. Hausman Graduate Dissertation Fellowship NSF Graduate Research Fellowship College of Letters & Science Dean's Prize Teddy Kubly Award for Initiative and Efficiency Juli Plant Grainger Scholarship in Economics Hilldale Undergraduate/Faculty Fellowship (with Marzena Rostek) Mary Claire Phipps Scholarship in Economics UW-Madison Full Scholarship for Music Performance | 2024-25 2022-23 2019-24 2019 2019 2019 2018 2018 2015-19 |
| PROFESSIONAL ACTIVITIES | Conference Presentations: International Industrial Organization Conference Rising Stars Session (2022) Referee: <i>The Review of Economics and Statistics</i> Service: MIT Econ Application Assistance and Mentoring Program Mentor, Co-President of the MIT Graduate Economics Association, MIT Industrial Organization Field Lunch Organizer, MIT Structural Reading Group Organizer Affiliations: US Census Bureau Special Sworn Status | |
| RESEARCH PAPERS | "Combining Complements: Theory and Evidence from Cancer Treatment Innovation" (Job Market Paper) (with Todd Lensman) | |

Innovations often combine several components to achieve outcomes greater than the "sum of the parts." We argue that such combination innovations can introduce an understudied inefficiency—a positive market expansion externality that benefits the owners of the components. We demonstrate the importance of this externality in the market for pharmaceutical cancer treatments, where drug combination therapies have proven highly effective. Using data on clinical trial investments, we document several facts consistent with inefficiently low private innovation: firms are less likely than publicly funded researchers to trial combinations, firms are less likely to trial combinations including other firms' drugs than those including their own drugs, and firms often wait to trial combinations including other firms' drugs until those drugs experience generic entry. Using microdata on drug prices and utilization, we quantify the externalities that arise from new combinations and find that the market expansion externality often dominates the standard negative business stealing externality, suggesting too little innovation in combination therapies. As a result, firms may have incentives to free ride off others' innovation, which we analyze with a dynamic

structural model of innovation decisions. We use the model to design cost-effective policies that advance combination innovation. Redirecting publicly funded innovation toward combinations with high predicted market expansion or consumer surplus spillovers minimizes crowd out of private investments, increasing the rate of combination innovation and total welfare while remaining budget neutral.

“Costs of Technological Frictions: Evidence from EHR (Non-)Interoperability” (with Kelsey Moran and Thi Mai Anh Nguyen)

Interoperability—the ability of different systems to work together—is an increasingly vital component of product markets. We study the impact of interoperability frictions in the context of US hospital Electronic Health Record (EHR) systems. While use of EHR systems is widespread, interoperability of these systems remains low, particularly across those produced by different EHR vendors. We examine how interoperability affects patients by considering both a direct, technological effect of influencing health information exchange and an allocative effect of shifting the flow of patients across providers. Using an event study design in which interoperability between hospital pairs changes when one changes EHR vendors, we find evidence for both channels. When two hospitals switch to having the same EHR vendor, charges and readmissions rates for patients who are transferred and referred between them decrease by 4% and 11%, respectively. In addition, these hospitals now share 8% more inpatient transfers and 9-10% more referrals. This change in patient flows further affects patient outcomes: patient health improves when their sending hospitals switch to EHR vendors used by higher-quality hospitals in the market and worsens when the opposite occurs. To quantify the welfare gain from reducing interoperability frictions, we estimate a demand model of how patients and providers trade-off interoperability with other receiving hospital characteristics when choosing where to send patients. The model is identified by changes in patient flows following changes in hospital EHR vendors and interoperability levels. We show that eliminating all interoperability frictions would redirect 7.5% of patients to different hospitals and increase joint hospital-patient welfare by 21%, the equivalent of a 57-kilometer reduction in travel distance.

“Input-Price Responses to Horizontal Mergers and the Bargaining-Leverage Defense”

(with Todd Lensman)

In several recent antitrust cases, defendants have argued that a horizontal merger would allow them to negotiate reduced input prices with suppliers and pass on the resulting savings to consumers. This input price effect is often supported by models in which firms simultaneously set goods prices and bargain with suppliers over input prices, because a downstream merger can reduce suppliers’ outside options. We study new forces that arise when input prices are set before goods prices, and we show that they often tend to increase input prices after a merger. Generalizing the first-order approach to merger analysis, we derive a measure of incentives to adjust input prices after a downstream merger, Input Pricing Pressure. We use this measure to show that mergers often incentivize higher input prices, and that these incentives hinge on

changes in downstream pass-through rates, marginal cost efficiencies generated by the merger, and input-output linkages. By implication, consumer surplus-maximizing antitrust policy may be too lax when input prices are assumed fixed, and it should be biased against claims that input prices will fall after a downstream merger. In an empirical application to local retail beer markets, endogenizing input prices substantially raises the consumer harm from mergers of retailers.

“Market Power Spillovers Across Airline Routes” (with Roi Orzach)

Airlines operate complicated flight networks, often utilizing hub-and-spoke systems to efficiently route connecting travelers and optimize costs. Despite the prevalence of connecting travelers—accounting for approximately one-third of passenger itineraries—most analyses of the welfare effects of changes in competition focus on nonstop routes. We show that when firms face capacity constraints or adjustment costs, a price decrease on a direct route may incentivize firms to decrease prices on indirect routes using this route as a leg. We document that this pass-through is positive using the price effects of low-cost carrier entry and airline mergers: connecting fares decrease after low-cost carrier entry on one of the legs and increase after a merger of carriers that competed on one of the legs. Our findings demonstrate that ignoring these network effects leads to significantly underestimating changes in consumer surplus—by up to 115%—in response to changes in competition. Thus, considering full airline networks is essential to accurately estimating the impact of changes in competition on consumers.

RESEARCH IN PROGRESS

“How On-Demand Inputs Change Firm Production and Business Dynamism: The Case of Cloud Computing” (with James Brand and Mert Demirer) **(slides available)**

Dynamic frictions in adjusting firm inputs are an important source of misallocation inefficiencies in firm production. The emergence of “on-demand” inputs has the potential to reduce these dynamic frictions and increase firms' flexibility. In this paper, we study one such technology: cloud computing, which has fundamentally changed how firms access IT by turning it from a high fixed-cost input to a highly elastic variable-cost one. We measure the economic implications of cloud computing by developing a model of industry dynamics with cloud computing and combining firms' daily IT usage. Using our model, we simulate economies with and without cloud technology and find that cloud computing can increase output by as much as 30% in the software industry. Most of the gain comes from increased business dynamism by increasing the speed with which firms can respond to shocks and reducing entry costs.

“The US Manufacturing Labor Share Decline: Demand, Technology, or Automation?”

(with Daron Acemoglu, Nikhil Agarwal, and Pascual Restrepo)

This paper studies the causes and consequences of the decline in the manufacturing labor share over the last three decades. We develop a semi-parametric method to estimate production functions that allow for changes in the capital intensity of production (e.g., due to automation) as well as for factor-augmenting technological changes. Using this estimation strategy and data from US manufacturing Census as well as price data from exports for a subset of firms, we decompose observed changes in firm outcomes into (i) changes in demand, (ii) changes in factor-augmenting technology, and (iii) shifts towards more capital-intensive production techniques. Our results quantify the relative importance of these channels for the decline in the manufacturing labor share.

“Interoperability and Competition in Electronic Health Records”

(with Kelsey Moran and Thi Mai Anh Nguyen)

While electronic health record (EHR) systems are widely used by US hospitals, interoperability—the ability to easily share patient data between different EHR systems—is limited. Advocates argue that increasing interoperability benefits patient health while reducing healthcare costs. However, the trend towards greater concentration in the EHR market introduces a potential trade-off between interoperability and EHR system costs. In this project, we examine the role of interoperability in EHR vendor competition. At the core of our analysis is a model of hospital demand for EHR systems that incorporates the effects of interoperability on patient flows and outcomes (Dix, Moran, and Nguyen, 2024), EHR system costs, and EHR system functionalities. We will estimate this model using data on hospital finances, EHR system choices, interoperability, and patient flows and outcomes. This demand model allows us to infer vendor incentives for setting interoperability levels, functionalities, and prices. Specifically, the model enables us to quantify the incentives for EHR vendors to improve within-system interoperability, which strengthens their market power, versus across-system interoperability, which has positive spillovers on the rest of the market. Our results are informative on the design of technology adoption subsidies and interoperability regulations in industries with large adjustment costs and interoperability concerns.