Rebekah Dix
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Dear Professors Bryan, Ganguli, and Myers:

Please find my application for the Innovation Research Boot Camp 2023 included in this pdf. The first two pages consist of the essay describing my research and interest in attending the boot camp and references, the next three include my curriculum vitae, and the final page includes a list of all current and completed PhD courses. The contact information for my recommendation letter writer is:

Professor Nikhil Agarwal
MIT Department of Economics
The Morris and Sophie Chang Building
50 Memorial Drive, E52-440
Cambridge, MA 02142
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(617) 324-6804

Thank you for for considering my application.

Sincerely,
Rebekah Dix

Innovation Research Boot Camp 2023 Application Essay: Rebekah Dix

Current Research: My main research project studies innovation incentives, externalities, and policy in the presence of complementary goods. An important line of work in innovation research is estimating innovation externalities, focusing on two opposing externalities (e.g., Bloom et al., 2013): a negative business stealing externality that arises when there are substitutable products (innovation that improves the quality or decreases the price of one good may steal business from substitutes) and a positive externality due to knowledge spillovers (firms use knowledge that was developed by another firm). A setting where we do not have evidence about the sign and magnitude of innovation externalities is the case of complementary goods. Business stealing becomes *market expansion*: innovation that improves the quality or decreases the price of one good may increase business for complementary products.

My empirical approach to measuring these externalities (joint with Todd Lensman) focuses on the pharmaceutical industry. I study combination therapies (i.e., treatments that require taking multiple drugs simultaneously) in oncology. I use data on clinical trials to show that trials for oncology combination therapies are more likely to be funded by non-industry sponsors, such as the NIH or universities. I use Medicare data about drug usage to show the prevalence of combination therapies for treating cancer. I am working now to show reduced form evidence of market expansion after new drug introductions. I will provide an estimate of the net pecuniary externality, taking into account both market expansion for complementary goods and business stealing for substitutes.

This project also explores policy recommendations for correcting innovation externalities in the presence of complementary goods. I develop a structural model of pharmaceutical innovation decisions and patient demand for drugs, including combination therapies. I explore how exclusivity regulation contributes to industry and non-industry incentives to run clinical trials for combination therapies.

Future Research: I am broadly interested in topics in the intersection of innovation and industrial organization. As one example, I am interested in understanding how the prospect of gathering data from patented products affects firms' innovation decisions and how patent protection of such products affects industry dynamics and consumer welfare. For example, patent protection of a product that provides a firm with valuable consumer data might serve as an additional barrier to entry and reduce incentives for other firms to innovate similar products. The idea of *data-generating patents* has been defined recently in the law literature (Simon and Sichelman, 2016), but I am not aware of work that attempts to quantify the prevalence of such patents or their effects.

Innovation Bootcamp: I hope to attend the Innovation Research Boot Camp for a number of reasons. First, since I have not taken an innovation field course, the boot camp is an excellent way to survey the innovation literature and get direct advice about where the frontier of the field is at. Second, I would be very excited to interact with other students and younger scholars attending the boot camp to get/give advice about ongoing work. Finally, I would be excited to participate in the NBER SI Innovation Policy meeting as a part of the boot camp in order to gain exposure to current innovation research.

References

Bloom, N., Schankerman, M., & Van Reenen, J. (2013). Identifying Technology Spillovers and Product Market Rivalry. *Econometrica*.

Simon, B., & Sichelman, T. (2016). Data-generating patents. *Northwestern University Law Review*.

Rebekah A. Dix

Curriculum Vitae
January 2023

rebekahanne.github.io
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Education

2019– Ph.D. in Economics
Massachusetts Institute of Technology (MIT)
Advisors: Nikhil Agarwal, Michael Whinston, Nancy Rose

2015–19 B.A. in Economics (Mathematical Emphasis) and Mathematics
University of Wisconsin-Madison
Graduated with Distinction and Comprehensive Honors
Certificates (minors): Computer Science and African Studies
Senior Honors Thesis: "Games in Contracts: A Theory of Formal and Informal Institutions"
Advisor: Professor Marzena Rostek, Economics

Research Interests

Industrial Organization, Antitrust, Innovation, Productivity, Open-Source Science

Working Papers

1. Limits to Buyer Power: Input Prices and Pass-Through in Horizontal Merger Policy (with Todd Lensman)
2. Market Power Spillovers Across Airline Routes (with Roi Orzach)

Works in Progress

1. Innovation and Competitive Destruction in a Complementary World (with Todd Lensman)

Published Conference Proceedings (Peer-Reviewed Computer Science)

1. Myopia in Dynamic Spatial Games (with Shane Auerbach). WSC 2018.

Conference Presentations

2022 International Industrial Organization Conference Rising Stars Session

Research Grants

2021 George and Obie Schultz Fund
2019-24 NSF Graduate Research Fellowship
2018 Trewartha Undergraduate Honors Research Grant

UW-Madison Letters and Science Honors Program
Advisor: Professor Marzena Rostek

2018-19 Hilldale Undergraduate/Faculty Research Fellowship
Advisor: Professor Marzena Rostek

2018 Student Research Grant, Open Source Macroeconomics Laboratory (now OSE)
Becker Friedman Institute, University of Chicago

2017 Welton Sophomore Summer Research Apprenticeship Grant
UW-Madison Letters and Science Honors Program
Mentors: Shane Auerbach and Professor Daniel Quint

2017 BRITE Lab Research Grant (with Shane Auerbach)

2016 International Learning Community Research Grant

Research Experience

2022 Microsoft Research, Research Intern to James Brand

2020- Research Assistant to Professors Nikhil Agarwal and Daron Acemoglu (MIT)

2020 Research Assistant to Professor Maryam Farboodi (MIT Sloan)

2017-19 Research Assistant to Professor Marzena Rostek (UW-Madison)

Teaching

2019 Open Source Economics (OSE) Laboratory Boot Camp (6 weeks)
University of Chicago, Graduate Student Instructor

Summer Schools and Training

2022 BFI Price Theory Summer Camp

2019 Econometric Society Summer School in Dynamic Structural Econometrics
Booth School of Business and the Becker Friedman Institute at the University of Chicago

2018 Open Source Macroeconomics (OSM, now OSE) Laboratory Boot Camp
Becker Freidman Institute at the University of Chicago
My work for the camp is available on GitHub

Academic Honors and Awards

2022-23 Jerry A. Hausman Graduate Dissertation Fellowship

2019-21 MIT Department of Economics Fellowship

2019 MIT Presidential Fellowship (declined due to NSF Fellowship)

2019 College of Letters & Science Deans Prize
Awarded to Top 3 graduating seniors in the College of Letters & Science

2019	Teddy Kubly Award for Initiative and Efficiency Awarded to one graduating senior woman for academic achievement, significant social contributions through extracurricular activities, degree of self-support, and ability to communicate
2019	University Book Store Academic Excellence Award
2019	Juli Plant Grainger Scholarship in Economics
2017,18	Mary Claire Phipps Scholarship in Economics (awarded twice)
2017,18	William F. Vilas Merit Scholarship (awarded twice)
2017	Scan Design Foundation Study Abroad Scholarship
2016	Foreign Language and Area Studies (FLAS) Fellowship for Arabic
2016	Donald C. Leidel International Business Scholarship
2016	Great People International Studies Scholarship
2015-19	Thermo Fisher Scientic STEM Scholarship for Mathematics
2015-19	UW-Madison Full Tuition Scholarship for Music Performance
2015-19	Wisconsin Academic Excellence Scholarship
2015-19	Wisconsin Covenant Scholarship
2015-19	Deans List (8 semesters)
2015	Herb Kohl Excellence Scholarship

Service

2020-	MIT Econ Application Assistance and Mentoring Program Mentor
2021-22	Co-President, MIT Graduate Economics Association
2021-22	MIT Industrial Organization Field Lunch Organizer
2021-22	MIT Structural Reading Group Organizer

Skills

Programming	Python, Julia, R
Software & Tools	Matlab, Mathematica, LaTeX, git, Stata, NetLogo
Languages	English (native), Spanish, Arabic (MSA, Gulf, Levantine)

Other Affiliations

2021-	US Census Bureau, Special Sworn Status Researcher
2021-	MIT Cycling
2020-	MIT Triathlon

Ph.D. Coursework

Core Classes (tested out of microeconomic theory core classes)

Fall 2019	Statistical Methods in Economics
Fall 2019	Applied Econometrics
Fall 2019	Dynamic Optimization Methods
Fall 2019	Economic Growth
Spring 2020	Econometrics
Spring 2020	Economic Fluctuations
Spring 2020	Economic Crises

Field Courses

Fall 2019	Industrial Organization I
Fall 2019	Labor Economics I
Spring 2020	Behavioral Economics
Spring 2020	Advanced Topics in Industrial Organization
Fall 2020	Contract Economics
Fall 2020	Advanced Macroeconomics I
Fall 2020	Nonlinear Econometric Analysis
Fall 2020	Advanced Research & Communication
Spring 2021	Industrial Organization II
Spring 2021	Advanced Corporate Finance
Spring 2021	Advanced Research & Communication

Department of Economics

Massachusetts Institute of Technology
The Morris and Sophie Chang Building
77 Massachusetts Avenue, E52-406
Cambridge, Massachusetts 02139-4307

Nikhil Agarwal
Associate Professor of Economics

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January 19, 2023

Letter in support of Rebekah Dix's Application for the NBER Innovation Bootcamp

To Whom it may concern:

It is my utmost pleasure to write in support of Rebekah Dix's application for the NBER Innovation Bootcamp. Rebekah is a fourth-year PhD student in the MIT Department of Economics. I am a co-chair of her thesis committee. Rebekah is an extremely promising PhD student interested in various aspects of Industrial Organization, ranging from mergers to innovation and productivity.

For her thesis, Rebekah is studying how incentives to innovate and introduce a new product depends on the portfolio of other products that a firm has. Specifically, complementarities of substitutability of potential new products would influence these incentives. The empirical setting she has chosen for this work is innovation in cancer therapies that are usually provided as a cocktail. She has put together a remarkable plan that combines data from clinical trials and insurance claims from Medicare. I'm very excited to see how this project evolves.

I should also mention Rebekah's remarkable research output. She already has two completed working papers. One of these working papers is a theoretical investigation of the effects of buyer market power on downstream post-merger prices, and another working paper is an empirical study of airline pricing and competition. Rebekah started after her PhD, and has already submitted the second project for publication.

In addition to these projects and papers, Rebekah is working with Daron Acemoglu, Pascual Restrepo and me on understanding how automation in US manufacturing has affected productivity, markups and the labor share. For this project, Rebekah is working with census data and is doing amazing work. We have brought her on as a co-author because her intellectual input into the project is indispensable. She has repeatedly solved key problems that we have faced.

To summarize, Rebekah is amongst the most productive PhD student that I have encountered. She has a broad range of skills and is equally comfortable with theoretical and empirical approaches to a question. She has a strong interest in mergers, innovation and productivity.

The NBER Innovation Bootcamp will expose her to research and areas that will be very valuable for her as she develops her thesis. I also think that she will add a lot in terms of participation and discussion. She was one of the best students to have in my graduate class.

Sincerely



Nikhil Agarwal