MIT Economics

CAROLYN STEIN

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DOCTORAL STUDIES

Massachusetts Institute of Technology (MIT)
PhD, Economics, Expected completion June 2021
DISSERTATION: "Essays on the Economics of Science and Innovation"

DISSERTATION COMMITTEE AND REFERENCES

Professor Heidi Williams
Stanford Department of Economics
579 Jane Stanford Way, office 323
Stanford, CA 94305
(650) 723-9303
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Professor Amy Finkelstein
MIT Department of Economics
77 Massachusetts Avenue, E52-442
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Professor Pierre Azoulay
MIT Sloan School of Management
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PRIOR EDUCATION

Harvard University 2013
AB in Applied Mathematics and Economics, *summa cum laude*

CITIZENSHIP United States **GENDER** Female

FIELDS

Primary Field: Labor Economics

Secondary Fields: Innovation, Economics of Science

TEACHING EXPERIENCE

14.662: Labor Economics II (graduate) 2021
Teaching Assistant to Profs. David Autor and Simon Jäger
15.S64: Competitive Strategy Bootcamp (executive MBA) 2019
Teaching Assistant to Prof. Danielle Li

	14.03/14.003: Micro Theory & Public Policy (undergrad/masters) Teaching Assistant to Prof. David Autor	2018
	14.46: Innovation Policy and the Economy (undergrad) Teaching Assistant to Prof. Heidi Williams	2018
	Statistics 110: Introduction to Probability (undergrad, Harvard) Teaching Assistant to Prof. Joe Blitzstein	2012
	Math 20: Linear Algebra & Multi. Calculus (undergrad, Harvard) Teaching Assistant to Prof. Rachel Epstein	2011
RELEVANT POSITIONS	Research Assistant to Profs. Amy Finkelstein and Matt Notowidigdo	2017-18
	Research Assistant to Profs. Josh Angrist, David Autor, and Amanda Pallais (School Effectiveness & Inequality Initiative)	2016-17
	Investment Analyst, Bain Capital Credit (formerly Sankaty Advisors)	2013-15
FELLOWSHIPS, HONORS, AND AWARDS	NBER Pre-Doctoral Fellowship in Aging and Health	2020-21
	Excellence in Refereeing Award, *AER: Insights*	2019
	George and Obie Shultz Fund	2018; 20
	National Science Foundation Graduate Research Fellowship	2017-21
	MIT Presidential Scholar	2015-17
	Harvard University Certificate of Distinction in Teaching	2012
	Phi Beta Kappa (early induction)	2012
	John Harvard Scholar	2010
	Detur Book Prize	2010
	Harvard Top Chef (with Anna Mapes Carter)	2010
PROFESSIONAL ACTIVITIES	Referee for: *American Economic Review; AER: Insights; Journal of Political Economy; Quarterly Journal of Economics*	
	MIT Labor Lunch co-organizer	2017-18
	MIT Summer Applied Lunch co-organizer	2017; 18
INVITED PRESENTATIONS	NBER Summer Institute; NBER Productivity Seminar; Rutgers Institute for Quantitative Biomedicine; SUNY Albany	2020

PUBLICATIONS

"Internalizing Externalities: Designing Effective Data Policies" (with Ryan Hill and Heidi Williams). 2020. *AEA Papers & Proceedings* 110: 49-54.

RESEARCH PAPERS

"Race to the Bottom: Competition and Quality in Science" (with Ryan Hill) **(Job Market Paper)**

This paper investigates how competition to publish first and establish priority impacts the quality of scientific research. We begin by developing a model

where scientists decide whether and how long to work on a given project. When deciding how long to let their projects mature, scientists trade off the marginal benefit of higher quality research against the marginal risk of being scooped. The most important (highest potential) projects are the most competitive because they induce the most entry. Therefore, the model predicts these projects are also the most rushed and lowest quality. We test the predictions of this model in the field of structural biology using data from the Protein Data Bank (PDB), a repository for structures of large macro-molecules. An important feature of the PDB is that it assigns objective measures of scientific quality to each structure. Consistent with our model, we find that structures with higher ex-ante potential generate more competition, are completed faster, and are lower quality. This relationship is mitigated when we focus on structures deposited by scientists affiliated with structural genomics groups. Researchers in these groups are less focused on publication and priority, which suggests that our quality results are directly linked to priority racing and cannot be explained by other factors such as project complexity.
Press coverage: MIT News

"Scooped! Estimating Rewards for Priority in Science" (with Ryan Hill)
The scientific community assigns credit or "priority" to individuals who publish an important discovery first. We examine the impact of losing a priority race (colloquially known as getting "scooped") on subsequent publication and career outcomes. To do so, we take advantage of data from structural biology where the nature of the scientific process together with the Protein Data Bank — a repository of standardized research discoveries — enables us to identify priority races and their outcomes. We find that race winners receive more attention than losers, but that these contests are not winner-take-all. Scooped teams are 2.5 percent less likely to publish, are 18 percent less likely to appear in a top-10 journal, and receive 20 percent fewer citations. As a share of total citations, we estimate that scooped papers receive a credit share of 45 percent. This is larger than the theoretical benchmark of zero percent suggested by classic models of innovation races. Much of the citation effect can be explained by journal placement, suggesting editors and reviewers are key arbiters of academic priority. Getting scooped has only modest effects on academic careers. Finally, we present a simple model of statistical discrimination in academic attention to explain how the priority reward system reinforces inequality in science, and document empirical evidence consistent with our model. On the whole, these estimates inform both theoretical models of innovation races and suggest opportunities to re-evaluate the policies and institutions that affect credit allocation in science.
Press coverage: Nature News, MIT News

RESEARCH IN PROGRESS

"Big Money, Small Science? Soft Money and Risk Taking in the Academic Life Sciences" (with Joey Anderson)
Tenure in the academic life sciences is often *not* accompanied by a guaranteed salary. Rather, salaries are comprised of two components: "hard money," which is paid by the university, and "soft money" which is funded by extramural grants and is therefore contingent on successful grant applications. Scientists have

expressed concern that an increasing reliance on soft money discourages scientists from pursuing risky but potentially transformative work. This project seeks to empirically test these claims. Data on the hard versus soft money composition of salaries has been notoriously difficult to find. We use detailed grant- and transaction-level data from UMETRICS, a consortium of 31 U.S. research universities, in order to reconstruct the hard/soft salary compositions for NIH principle investigators. We find that principle investigators draw about 40 percent of their salary on average from grants, although there is substantial variation across universities and departments. Assistant professors are more dependent on soft money (45 percent) than full professors (39 percent). We plan to test whether scientists who are paid more in soft money pursue less risky projects, using a variety of measures to proxy for project risk.

"The Great Pivot: How Science has Shifted in Response to the COVID-19 Pandemic" (with Ben Jones, Ryan Hill, Dashun Wang, and Yian Yin)
How have scientists responded to the COVID-19 pandemic? In this paper we aim to answer three related questions: who pivoted to work on COVID-19 topics, how large were these pivots, and how impactful has this work been? We use a database of scientific publications to identify COVID-related papers and their authors. We compare the reference lists of these papers to references in prior work to assess how "close" or "distant" these COVID papers are in idea space from the authors' typical work. Early results suggest that senior researchers working in large teams are the most likely to pivot, and that their COVID research represents a significant departure from their prior body of work. Moreover, larger pivots are associated with lower-impact research, highlighting the importance of having researchers already working in adjacent areas of science. This underscores the idea of diverse basic scientific research as a form of insurance against catastrophes.

OLDER RESEARCH

"Heat Check: New Evidence of the Hot Hand in Basketball" (with Andrew Bocskoscky and John Ezekowitz)
Much of the literature on the hot hand fallacy in basketball rests on the assumption that shot selection is independent of past performance. In this paper, we challenge that assumption using a novel dataset of over 83,000 shots from the 2012-2013 NBA season, combined with detailed optical tracking data from SportVU. We use these data to show that shot selection *does* depend on past performance: players who have exceeded their expected shooting percentage over recent shots shoot from significantly further away, face tighter defense, are more likely to take their team's next shot, and attempt overall more difficult shots. Once we attempt to control for shot difficulty, a small but statistically significant hot hand effect emerges.
Press coverage: WSJ, Boston Globe, Grantland, WBUR Only A Game

OTHER ACTIVITIES

MIT Cycling Team (co-treasurer; co-recruitment chair)	2018-
Big Brothers Big Sisters Massachusetts Bay	2017-
Non-resident tutor at Cabot House (Harvard University)	2014-18
Harvard Blackjack Team	2011-13