Carnegie Mellon University
HeinzCollege
INFORMATION SYSTEMS • PUBLIC POLICY • MANAGEMENT

Heinz College of
Information Systems and Public Policy
Carnegie Mellon University
5000 Forbes Avenue
Pittsburgh, Pennsylvania 15213-3890

January 13, 2023

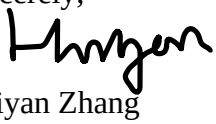
Dear review panel members,

I am writing to apply for participating in the NBER Innovation Research Boot Camp 2023. I am currently a Ph.D. candidate in technological change and entrepreneurship, a joint program from Heinz College of Carnegie Mellon University, co-hosted with Catolica Lisbon School of Business and Economics. I am currently in the final stages of finishing my dissertation under the direction of Prof. Lee Branstetter (chair), Prof. Raffaele Conti, and Prof. Daniel Armanios.

My research concentrates on the economics of innovation with a focus on intellectual property rights and firm strategy. I am particularly interested in what incentivizes firms to innovate, what factors determine innovation productivity, and how firms' innovation activities interacted with their institutional contexts. My approach to research combines the use of formal models, modern data-intensive empirical techniques. One thread of my work focuses on the controversies surrounding the Chinese innovation system and its implications on firm strategy in emerging markets. My research agenda also explores the role of information disclosure in markets for technologies.

I am excited about the opportunity of participating in the NBER innovation research boot camp, which will provide the knowledge, skills, and network in this field that I have been longing to work. **My reference letter writer will be Prof. Lee Branstetter**. My email address is huiyanz@andrew.cmu.edu. I am happy to provide any additional information or materials if needed. Thank you very much for your time and consideration.

Sincerely,



Huiyan Zhang

HUIYAN ZHANG

Email: huiyanz@andrew.cmu.edu

Hamburg Hall, 4800 Forbes Ave.
Pittsburgh, PA 15217

I am interested in economics of innovation with a focus on intellectual property rights, firm strategy, and emerging markets. I am prepared to teach microeconomics, economics of innovation, modeling and quantitative method courses (e.g., econometrics, statistics, causal inference, etc.)

EDUCATION

Ph.D. Carnegie Mellon University, Public Policy and Management, 2016-2023 (expected)
Catolica Lisbon School of Business and Economics, Business Administration, 2016-2023 (expected)

- *Committee*: Lee Branstetter (chair), Raffaele Conti, Daniel Armanios
- *Core courses*: Ph.D. microeconomics; Ph.D. economics of innovation; Behavioral Economics; Advanced econometrics II; Probability and Mathematical statistics; Econometric theory and method; Machine Learning (CMU doctoral course); Dynamic Models of Decision Making

MA Tsinghua University, Public Policy and Management, 2012

BA Peking University, Political Science, 2009
Peking University, Economics, 2009

WORKING PAPERS

"Patent Litigation, Patent Value and the Direction of Innovation: Evidence from China". *Job market paper.*

- Accepted by NBER China group workshop, October 2022.

"Who gains and who loses from more information in technology markets? Evidence from the Physician Payment Sunshine Act", with Lee Branstetter, Raffaele Conti, Samir Mamadehussene. *Revise and Resubmit, Strategic Management Journal*.

- Nominated for Strategic Management Society (SMS) Annual Conference (Toronto 2021) Best Paper Prize.

"Characteristics of litigated patents in weak intellectual property rights regimes: Evidence from China". *Under review, Research Policy*

"Unleashing the Dragon: The Case for Patent Reform in China", with Lee Branstetter and Douglas Hanley. *Submitted to Econometrica*.

BOOK REVIEWS

Armanios, D., & Zhang, H. (2021). Ann Majchrzak and Arvind Malhotra: Unleashing the Crowd: Collaborative Solutions to Wicked Business and Societal Problems. *Administrative Science Quarterly* 66 (1), NP13-NP16.

CONFERENCES AND WORKSHOPS

Paper Presentation, *"Welcome to the Jungle: an initial expedition into China's patent thicket" (renamed "Characteristics of litigated patents in weak intellectual property rights regimes: Evidence from China")*
Wharton Technology and Innovation Conference 2019, Philadelphia, US, April 2019.
17th International Schumpeter Society Conference Seoul, South Korea, July 2018

"Who gains and who loses from more information in technology markets? Evidence from the Physician Payment Sunshine Act"
Strategic Management Society annual conference Toronto, virtual, September 2021.

Academy of Management annual conference, virtual, August 2021.
Wharton Technology and Innovation Conference 2021, virtual, April 2021.

Discussant, "Patent Litigation in the Beijing Courts: The Impact of Party Nationality and Procedural Reform" 13th USPTO/Kellogg/Northwestern Conference on Innovation Economics, August 2020.

Workshop
Academy of Management 2021 STR doctoral consortium, July 2021.
NBER Economics of AI, Toronto, Canada, September 2019.

WORK EXPERIENCE

Research Centre, China's Patent Office, 2012-2016
Junior Researcher (full-time)

- Research mainly focused on patent analysis, science, and technology policymaking. Hosted four national-granted projects and participated in 7 projects.

TEACHING EXPERIENCE

Carnegie Mellon University, Pittsburgh, 2018
Teaching Assistant, Statistics for IT Managers, Heinz College

- Hold regular office hours; teach recital sessions; grade homework and tests.

HONORS AND AWARDS

Daniel and Rise Nagin Fellowship, 2022-2023
FCT (Fundação para a Ciência e a Tecnologia) doctoral scholarship, 2016-2021
FCT Covid-19 relief scholarship, 2021-2022
Tsinghua University Superior Scholarship, 2010
Peking University "May Fourth" Scholarship, 2007
Peking University SK Scholarship, 2006

COMPUTER SKILLS

Programming: Stata, Matlab, Python

REFERENCES

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Ph.D. course list:

- Ph.D. microeconomics;
- Ph.D. economics of innovation;
- Behavioral Economics; Advanced econometrics II;
- Probability and Mathematical statistics;
- Econometric theory and method;
- Industrial organization;
- Machine Learning (CMU doctoral course);
- Dynamic Models of Decision Making;
- Organization theory;
- Statistics theory of social policy;
- Entrepreneurship and growth;
- Introduction to Python;
- Foundation on social network methods;

My research concentrates on the economics of innovation with a focus on intellectual property rights and firm strategy. I am particularly interested in what incentivizes firms to innovate, what factors determine innovation productivity, and how firms' innovation activities interacted with their institutional contexts. My approach to research combines the use of formal models and modern data-intensive empirical techniques.

My research has mainly been inspired by my work as a full-time researcher at the Chinese Patent Office. I noticed that while China has experienced a patent explosion in recent years, patent owners rarely make efforts to defend their patented inventions against infringement. These initial observations eventually translated into my job market paper. This paper investigates the role of patent litigation in the private value of patents and firm innovation strategy. By constructing a finite-horizon stochastic dynamic model, I structurally estimate key parameters of China's patent litigation process and recover the distribution of the private value of patents. The structural estimation and counterfactual simulations show that a "one-size-fits-all" enhancement in patent remedies might overcompensate the owners of low-value utility model patents relative to the owners of high-value invention patents. A series of difference-in-differences analyses on a comprehensive dataset of Chinese patenting firms confirm this intuition. Indeed, I find that the firms most affected by the institutional change tend to patent more utility models when the patent reform enhances damage awards. I presented the paper at the NBER China Economy workshop (October, 2022) and received valuable comments.

How will the proliferation of low-value patenting in China impact economic growth? In joint work with Lee Branstetter and Douglas Hanley, I build a formal growth model to explore this question. I show that insufficient patent protection tends to divert firms' innovation efforts away from valuable innovations and toward incremental ones. This shift slows technological progress and impedes economic growth. However, the model points to policy shifts that could restore incentives for more substantive innovations, with significant benefits for China and the world. This paper is currently under review in *Econometrica*.

A distinct but related research stream focuses on the role of information in markets for technologies. The second chapter of my dissertation (joint work with Lee Branstetter, Raffaele Conti, and Samir Mamadehussene) explores how information on participants and transactions affects the quantity in markets for technological collaboration and the quality of these collaborative innovations. We examine the impact of information disclosure on collaboration between medical device manufacturers and physicians required by the Affordable Care Act. We find that this required disclosure, including information on both physicians and transactions, discourages some experienced physicians from participating in these markets (due to reputation concerns) but creates more collaborative opportunities for physicians with less developed reputations. This paper is being revised for resubmission to the *Strategic Management Journal*.

These studies open venues for my future research agenda, which will continue focusing on innovation. However, the increasing importance of innovation stands as contrast to the segmented status quo of doctoral training in this field. Therefore, I believe the NBER innovation research boot camp which helps participants to engage the foundational ideas, institutions, empirical evidence, and frontier questions in this filed will be extremely helpful for me.

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Lee G. Branstetter
Professor of Public Policy and Economics

Letter of recommendation for Huiyan Zhang for the NBER Innovation Research Boot Camp

January 28, 2023

To Whom It May Concern:

I am delighted to write this letter of recommendation on behalf of my Ph.D. student, Huiyan Zhang. My high regard for Huiyan's potential is shared by my colleagues at Carnegie Mellon who awarded her our prestigious Nagin Doctoral Dissertation Fellowship. Huiyan's research inquiry concentrates on the economics of innovation with a focus on intellectual property rights and firm innovation strategy. Guided by these interests, Huiyan is doing pathbreaking work on one of most important topics in this area: China's intellectual property (IP) regime. For most of my professional life, China's trading partners have criticized the inadequacies of its IP system, and the alleged shortcomings of this system were a major part of the justification for the trade war launched by the Trump Administration (and continued by the Biden Administration) against China. Nevertheless, foreign criticism of China's IP system has suffered from a lack of analytical rigor and specificity. As a former patent examiner within China's National Intellectual Property Administration (CNIPA), Huiyan possesses a deep understanding of China's distinct laws and practices. Over the course of her doctoral studies, she has diligently assembled a rich combination of data sets describing exactly how Chinese law and practice deviate from advanced economy norms, and she has skillfully combined formal theoretical models, structural estimation, and data-intensive statistical techniques to explore the consequences of these deviations for innovating firms inside and outside of China. Huiyan has been invited to present papers at the International Schumpeter Society Conference, the Wharton Technology and Innovation Conference, the NBER China Economy Working Group, and the NBER Productivity, Innovation, and Entrepreneurship Group. Her work spans the boundaries of economics and strategy, and one of her thesis chapters is currently a revise and resubmit at the *Strategic Management Journal*. For personal reasons, Huiyan focused her academic job search on Chinese universities, and has recently accepted a tenure track offer from Shanghai Jiao Tong University's prestigious Antai College of Economics and Management. I believe she has an extremely bright future and could benefit greatly from participation in the NBER Innovation Research Boot Camp. Please feel free to reach out with any questions at branstet@cmu.edu.

Best regards,



Lee Branstetter