Cover Letter

Jieun Shin
January 20, 2022

Dear Members of the Reviewing Panel:

I am delighted to submit my application for this exciting opportunity – the NBER Innovation Research Boot Camp 2022. I am a PhD student in Strategic Management at the Rotman School of Management, University of Toronto, and my research interests lie in the intersection of innovation, productivity, and environmental sustainability.

I believe that this boot camp will be a valuable opportunity to expand and deepen my understanding of the economics of innovation by allowing me to learn the insights from top researchers in the field and other participants. Moreover, the insights gained from them as well as the exchange of ideas with them will be an invaluable feedstock for my own research agenda and help me broaden my perspectives.

Please find below the information requested for the application:

Contact Information
Applicant: Jieun Shin
Email: js.shin@rotman.utoronto.ca
Address: Joseph L. Rotman School of Management at the University of Toronto
105 St. George Street, Toronto, ON, Canada, M5S 3E6
Phone: +1-647-200-3888

Recommendation Letter Writer: Alberto Galasso
Email: A.Galasso@rotman.utoronto.ca
Address: Joseph L. Rotman School of Management at the University of Toronto
105 St. George Street, Toronto, ON, Canada, M5S 3E6
Phone: +1-416-946-0287

Thank you very much for your time to review my application packet.

Best regards,
Jieun Shin

Jieun Shin

Department of Strategic Management
Joseph L. Rotman School of Management | University of Toronto
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EDUCATION

Rotman School of Management, University of Toronto **9/2018 – Present**
PhD Candidate in Strategic Management
Committee: Alberto Galasso (Chair), Mitchell Hoffman, Nicola Lacetera, Joanne Oxley

Massachusetts Institute of Technology **9/2015 - 8/2017**
M.S. in Technology and Policy
Thesis: "*Biological Conversion of Organic Municipal Solid Waste to Lactic Acid: A Techno-Economic Performance Assessment Study for Commercialization*"

The University of Tokyo **4/2008 - 3/2012**
B.Eng. in Chemical System Engineering
Thesis: "*Development of Catalysts for the Hydrodeoxygenation of Pyrolysis Oil*"

WORKING PAPERS

[1] "Workers and Green Innovation: The Role of Labor Unions"

RESEARCH EXPERIENCE

Harvard Business School **MA, USA**
Research Associate (Advisor: Prof. Karim Lakhani) **8/2017 - Present**
- Designing the contents of a massive open online course (MOOC) and conducting a literature review on technology commercialization.

Boston University Questrom School of Business **MA, USA**
Research Assistant (Advisor: Prof. Kira Fabrizio) **6/2017 – 8/2017**
- Constructed a firm-level dataset (including patent counts, cumulative abnormal returns, etc.) to understand how the level of biofuels innovation in the oil and gas industry could alleviate the shock from an oil-spill event.

TEACHING EXPERIENCE

Teaching Assistant
- Technology Strategy (Undergraduate/MBA), Prof. Alberto Galasso, 2020, 2021, and 2022
- Strategic Management (Undergraduate), Dr. Hyeun Lee, 2021
- Strategic Management (Undergraduate), Andy (Seungho) Back, 2020 and 2021
- Foundations of Strategic Management (MBA), Prof. Brian Silverman, 2020
- Strategic Management (Undergraduate), Prof. Kevin Bryan, 2019

AWARDS AND GRANTS

1. Project Research Program Grant, *the Institute of Economic Research at Hitotsubashi University*, Principal-Investigator (2021-2022; JPY 570,000)
2. Joseph L. Rotman School of Management Doctoral Fellowship (2018-)
3. Joseph L. Rotman School of Management Director's Fellowship (2018)
4. Tata Fellowship at The MIT Tata Center for Technology + Design (2015-2017)

PROFESSIONAL EXPERIENCE

Bloomberg L.P. **Tokyo, Japan**

Fixed Income Data Analyst **6/2013 - 7/2015**

- Analyzed and identified data needs for Fixed Income products (Government/Corporate Bonds, Credit Ratings, Mortgages and Warrants) in Asia to expand dataset.
- Advised on how to utilize data on the Bloomberg terminal for cash-flow and risk analysis of Fixed Income securities.
- Consolidated workflows from data acquisition to data processing by introducing technologies and managing vendors.

AspenTech Japan Co., Ltd **Tokyo, Japan**

Associate Business/Techincal Consultant **6/2012 - 6/2013**

- Conducted experimental and simulation analysis of clients' existing processes controlled by Distributed Control System (DCS) in refineries and petrochemical plants.
- Performed quantitative estimation of potential energy reduction, throughput increase and quality enhancement by the introduction of Advanced Process Control (APC).
- Proposed APC solutions customized to clients' needs to achieve processes optimization by presenting the quantified analysis results.

PUBLICATIONS

1. Ara Cho, Jieun Shin, Atsushi Takagaki, Ryuji Kikuchi and S.Ted Oyama, "Ligand and Ensemble Effects in Bimetallic NiFe Phosphide Catalysts for the Hydrodeoxygenation of 2-Methyltetrahydrofuran", Top. Catal. 55 (2012) 969-980
2. Noboru Shida, Jieun Shin, "Studying the Use of Adaptive Process Control with an Overseas Refinery Case Study", Instrumentation Control Engineering (Keiso), 56(4), 24-28, 2013-04
3. Noboru Shida, Jieun Shin, "Recent approaches to model construction and maintenance for Advanced Process Control", Instrumentation Control Engineering (Keiso), 56(7), 72-76, 2013-07

PERSONAL SKILLS

Qualifications: Passed CFA (Chartered Financial Analyst) Level 1 (June 2014)
Language Skills: Korean (Native), Japanese (Native), English (Fluent), Spanish (Basic)
Computer Skills: Python, Stata, R, LaTeX, Bloomberg Terminal, Fortran

List of Completed PhD Courses

Department of Economics, University of Toronto

- Mathematics and Statistics for MA Doctoral Stream and PhD Students
- Economic Theory – Micro
- Econometrics (MA)
- Econometrics I (PhD)
- Econometrics II (PhD)
- Industrial Organization and Competition Policy
- Labour Economics I

Rotman School of Management, University of Toronto

- Strategy and Organization
- Innovation and Technology
- Strategy and Economics
- Alliances and Networks
- Strategy and Economic Sociology
- Models and Methods
- Research Methods in Strategic Management
- Research Methods in Business
- Strategic Management Workshop

Department of Sociology, University of Toronto

- Culture Industries

NBER Innovation Research Boot Camp: Essay

Jieun Shin
January 20, 2022

Current and Future Research

My research interests lie in the intersection of innovation, productivity, and environmental sustainability. Governments and international organizations across the world increasingly develop their own "*green growth*" strategies, recognizing the importance of balancing both economic growth and environmental protection. Even business leaders increasingly acknowledge that profit maximization should not be the sole purpose of firms and integrate externalities such as environmental pollution into their decision-making processes. However, these two important outcomes have been studied independently in two distinctive research areas. On the one hand, the productivity literature has extensively addressed the question of why there exist such large and persistent productivity differences across firms/plants (in other words, what makes some producers more efficient than others), solely focusing on economic outcomes. On the other hand, the environmental economics literature has devoted considerable attention to estimating the effects of various environmental regulations and policies that often apply uniformly to all plants within an industry, paying little attention to within-industry heterogeneity in environmental outcomes. I am strongly motivated to address this gap and to deepen our understanding of how firms convert inputs into outputs when factoring both economic and environmental concerns into the equation.

In one stream of research within this broad objective, I am interested in exploring what factors drive firms to innovate in clean/green technologies, with a special focus on the internal organization of firms. Innovation has been recognized as the key source of economic growth, and the invention and diffusion of clean/green technologies are even more critical to achieve green growth. However, we may not be able to simply apply our knowledge of innovation to green innovation. Hence, I would like to explore the drivers of green innovation that may be distinct from those of innovation and the reasons and conditions for the convergence and divergence between innovation and green innovation. For instance, one of my dissertation chapters examines the effects of labor unions on firms' innovation activities in environmentally friendly technologies, using a newly constructed dataset that combines National Labor Relations Board (NLRB) union election results with several data sources on green patents and pollution prevention activities.

In another stream of research, I am interested in investigating whether there exist persistent differences in environmental productivity (i.e., how much pollution is emitted or how much energy is consumed for a given amount of production) across firms/plants within narrowly defined industries and, if there are, why there are such differences. This research has received support from the Joint Usage and Research Center, Institute of Economic Research, Hitotsubashi University, and I am planning to provide empirical evidence on heterogeneity in environmental productivity across Japanese firms/plants and contrast the evidence with other measures of productivity, using Japanese government micro data such as the Census of Manufacturers and the Statistical Survey of Energy Consumption.

The Reason for Wanting to Attend the Boot Camp

The NBER Innovation Research Boot Camp would be a great opportunity for me not only to familiarize myself with the frontier of knowledge in the economics of innovation but also, most importantly, to expose myself to the research community in the field. I was fortunate to have had the opportunity to audit Professor Kevin Bryan's course on the economics of innovation at the University of Toronto, which helped me gain a solid foundation of knowledge on the subject. This boot camp would reinforce and enrich my knowledge of the field as well as give me the chance to reflect on my research interests from the angle of innovation. Looking over the list of faculty members who will be presenting the lecturers for the boot camp, I am very excited about the opportunity to hear their insights on the future directions for the field and have direct interaction with them.

Beyond one-directional knowledge transfer, the boot camp would further provide me with an opportunity to interact with top researchers in the field as well as other PhD students with similar research interests. Unfortunately, so far, I have not had many chances to interact with other PhD students who share similar research interests outside of my university. The exchange of ideas with them in the boot camp would expose myself to different perspectives from which to think over my own research and could be the trigger for future collaboration. Armed with the insights learned from the activities with the professors and other Ph.D. students involved, this boot camp would help me make significant progress with my research by enriching and transforming my thoughts.

Rotman

Admission committee
Innovation Research Boot Camp 2022
NBER Cambridge, MA

Toronto, 11 January 2022

Supporting letter for Jieun Shin

Dear Colleagues,

I am writing to strongly recommend Jieun Shin for admission to the Innovation Research Bootcamp in Cambridge, MA in July 2022.

Jieun is a 4th year PhD student in Strategic Management at the Rotman School of Management of the University of Toronto. I serve as her main PhD advisor, and her PhD committee includes Mitchell Hoffman, Nicola Lacetera and Joanne Oxley. Jieun holds a M.S. in Technology Policy from MIT and an undergraduate degree in chemical system engineering from the University of Tokyo.

She has successfully completed her PhD coursework at the University of Toronto taking a combination of courses across the business school and the economics department. She has developed strong microeconomics and econometric skills and, in my view, she would be a great student at your bootcamp.

Jieun's research focuses on the drivers of environmentally friendly innovation. Her long-term research agenda is to understand how green technologies differ from other types of technologies and how policy and

market conditions can direct technological progress toward environmental innovation. Jieun has completed the first chapter of her dissertation and she has recently constructed a new data-set which will be empirically studied in her job-market paper.

In the first chapter of her dissertation, Jieun has explored the role that unions play in shaping firms' environmental technology strategies. The paper uses a newly constructed dataset that combines National Labor Relations Board (NLRB) union election results with several data sources on green patents and pollution prevention activities and exploits a regression discontinuity design (RDD) to compare firms where unions barely won the election with those where unions barely lost the election. Overall, the empirical analysis finds small and statically insignificant effects of unionization on firms' green innovation. It also provides evidence that unionization does not have significant effects on pollution outcomes, using toxic chemical emissions data.

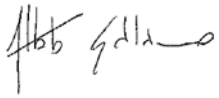
There is a lot to like in the paper. It studies an interesting question at the intersection between innovation, labor and environmental economics with important implications for strategy and economic policy. The null result appears quite convincing, it is robust to a variety of specifications and consistent across different data sets. More importantly, the effect is not only statistically insignificant, but also very small in magnitude especially when compared with the elasticities estimated in the literature for other drivers of environmentally friendly innovation.

During the past year, Jieun embarked in an ambitious data collection aimed at constructing the dataset for her job-market paper. Her goal was to put together a detailed dataset covering information on production, sales, energy consumption, innovation, pollution and management practices in

Japan. To access administrative Japanese data, she interacted with several Japanese institutions and was able to obtain a grant from and an affiliation to the Institute of Economic Research at Hitotsubashi University in Tokyo. Her data collection is now completed, and Jieun is exploring various research directions to leverage these data to examine the interaction between innovation, technological progress and firm environmental activities and pollution. I expect this project to evolve substantially in the next few months and lead to a strong job market paper.

To conclude, I think Jieun would be an excellent student for the NBER Innovation Research Bootcamp. Do not hesitate to contact me if you need further information.

Best wishes,



Alberto Galasso

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