February 4, 2025

To the NBER Innovation Boot Camp Selection Committee:

I am writing to apply for the NBER Innovation Research Boot Camp 2025. I am a third-year Ph.D. student in Economics at Harvard University. I work on topics related to innovation, trade, and industrial policy, as well as methods for solving and estimating structural models.

My ongoing work examines how the structure of production in an industry affects firm-level and aggregate innovation outcomes. I have constructed a granular dataset on firm-to-firm linkages, plant and R&D locations, production quantities, and patents in the automotive industry. This dataset lets me measure how the scale of production, supplier-buyer integration, and proximity between innovation and manufacturing activity constrains innovation outcomes. Coupled with a structural model of firm-to-firm linkages and innovation investment, my work addresses counterfactual industrial policy questions. Industrial policy has the potential to improve welfare due to misaligned investment incentives between suppliers and downstream firms. For example, downstream firms like Ford or GM do not fully internalize how their offshoring decisions affect the investment incentives of their suppliers or competitors. Their choices can lead to socially suboptimal production structures. The welfare consequence can be acute when new technology emerges that requires R&D investments across firms. An issue that may be coming to a head with the U.S.'s struggle to make competitive EV technology.

This project contributes to a growing literature that analyzes firms' joint innovation and production decisions. I move beyond studying individual firm's decisions, and unpack how the choices of both upstream and downstream firms collectively matter for firm-level and aggregate innovation outcomes. In follow-up work, I incorporate LinkedIn data into my dataset to study how inventor mobility across firms and countries in a supply chain affects knowledge production within supply chains. Another project connects academic research to patents and battery manufacturing outcomes, exploring the role of basic science in advancing manufacturing technology. Additionally, I have a working paper on solving and estimating models of combinatorial choice, addressing a recurring challenge in analyzing firms' multinational behavior or place-based policies. In the future, I plan to expand my research projects to broader trends in innovation and manufacturing set against the rising global competition in critical industries.

The NBER Innovation Boot Camp will provide me the support and guidance to continue work on policy-relevant innovation questions. It will allow me to engage with a network of students and faculty working on similar issues, refining my work through practical insights on the issue underlying innovation and productivity policies. Finally, the opportunity to meet potential collaborators and peers in a niche field is invaluable.

Thank you for your time and consideration.

Sincerely,

Adrian Kulesza
adriankulesza@g.harvard.edu
201-805-5341
https://adrkul.github.io

Reference: Marc Melitz (mmelitz@harvard.edu)

Adrian Kulesza

adriankulesza@g.harvard.edu — +1 201 805 5341 — adrkul.github.io

Education

Harvard University 2022–Present
Ph.D. in Economics

Yale University 2017–2021
B.A. in Economics (*Distinction*)

Working Papers

Kulesza, Adrian, (2024). *Combinatorial Discrete Choice with Deep Reinforcement Learning.*

Awards

Molly and Domenic Ferrante Economics Research Award 2023 and 2024
National Science Foundation Graduate Research Fellowship 2022-2027
Ronald Meltzer/Cornelia Awdziewicz Economic Award 2021

Research Experience

Harvard University, Research Assistant to Marc Melitz 2023–Present
Harvard University, Research Assistant to Pol Antràs 2022–2023
National Bureau of Economic Research, Research Assistant to Costas Arkolakis 2021–2022
Yale University, Research Assistant to Costas Arkolakis 2019–2021
Yale University, Research Assistant to Andrew Metrik 2018–2019

Other Experience

S&P Global - Platts, Commodities Data Analyst 2019

Academic Service

Harvard International Workshop Organizer 2024-Present
Harvard International Reading Group Organizer 2024-Present

Harvard University

Cambridge, Massachusetts 02138

Harvard Kenneth C. Griffin Graduate School of Arts and Sciences

Kulesza, Adrian Piotr

HUID: **51601661**

Good Academic Standing

Beginning of Harvard Kenneth C. Griffin Graduate School of Arts and Sciences Record

2022 Fall

Program: Doctor of Philosophy
Subject: Economics

Course	Description	Earned	Grade
ECON 2010A	Economic Theory	4.000	A
ECON 2010C	Economic Theory	4.000	A
ECON 2120	Principles of Econometrics	4.000	A-
ECON 3000	TIME	4.000	

2023 Spring

Program: Doctor of Philosophy
Subject: Economics

Course	Description	Earned	Grade
ECON 2010B	Economic Theory	4.000	A-
ECON 2010D	Economic Theory	4.000	A
ECON 2140	Econometric Methods	4.000	A-
ECON 2355	Unleashing Novel Data at Scale	4.000	A

2023 Fall

Program: Doctor of Philosophy
Subject: Economics

Course	Description	Earned	Grade
ECON 2000	Introduction to Quantitative Economics	4.000	A
ECON 2340	Spatial Mobility and Development: Evidence and Quantitative Models	4.000	A
ECON 2530A	International Trade	4.000	A
ECON 2610	Industrial Organization I	4.000	A
ECON 3000	TIME	4.000	

2024 Spring

Program: Doctor of Philosophy
Subject: Economics

Course	Description	Earned	Grade
ECON 2003	Computing for Economists	4.000	A
ECON 2535	Advanced Topics in International Trade	4.000	A
ECON 2611	Industrial Organization II	4.000	A
ECON 2908	Early Stage Research and Discussions on International Economics	4.000	A
ECON 3008	Graduate Student Workshop in International Economics	4.000	SAT

2024 Fall

Program: Doctor of Philosophy
Subject: Economics

Course	Description	Earned	Grade
ECON 2908	Early Stage Research and Discussions on International Economics	4.000	A
ECON 3000	TIME	8.000	
ECON 3008	Graduate Student Workshop in International Economics	4.000	SAT
ECON 3009	Graduate Student Workshop in Industrial Organization	4.000	SAT

2025 Spring

Program: Doctor of Philosophy
Subject: Economics

Course	Description	Earned	Grade
ECON 3000	TIME		
ECON 3008	Graduate Student Workshop in International Economics		

End of Harvard Kenneth C. Griffin Graduate School of Arts and Sciences Record

UNOFFICIAL TRANSCRIPT

Erika J. McDonald, Registrar
Not official unless signed and sealed

"...domestic innovation capacity is contingent on a robust and diversified industrial base. When manufacturing heads offshore, innovation follows." *White House Report on Building Resilient Supply Chains (2021)*

This quote raises a question of how the structure of production matters for innovation outcomes. In particular, the historical correlation between production activity and innovation has fueled concerns that the declining role of the U.S. in manufacturing could undermine its ability to innovate. Previous research has documented how production and innovation are intertwined within firms – via complementarities, cost sharing, learning-by-doing, and knowledge transfers. However, modern manufacturing is highly fragmented, with innovation driven by the collective R&D efforts of thousands of firms in a supply chain. Understanding how R&D correlates not just with manufacturing activity within firms, but also *across firms* is necessary for forecasting the effect of industrial or place-based policies on innovation.

My project addresses this challenge by constructing a novel dataset of production and innovation in the automotive supply chain. I collect data on buyer-supplier linkages, production quantities, plant and R&D locations, and patents at the firm-country-part-year level. The granularity of the data allows me to exploit variation across the automotive parts that a firm produces within a firm-country-year to measure how aspects of production (e.g. scale and geography) are related to innovation.

The project uses this granular variation to identify several patterns in the innovative behavior of part suppliers. First, innovation is correlated with the scale of production and the dedication of a supplier to a downstream customer. A dedicated supplier allocates a large share of production to only one customer. Second, proximity to one's manufacturing plants correlates with greater innovation. And, in the case of dedicated suppliers, proximity to customer's plants correlates as well. These patterns continue to hold in inventor-level regressions, which exploit variation across parts within the inventor. Moreover, these effects—scale, dedication, and proximity—are stronger for emerging technologies such as batteries and autonomous driving systems.

To interpret these findings, I develop a model of firm-to-firm relationships and innovation to disentangle the causal effect of production on innovation from firms' endogenous R&D investment decisions. The model is being estimated through indirect inference to match the firm-level and inventor-level regression results. I am also expanding the analysis to include downstream firms in this industry to explore how their innovation responds to the structure of upstream production and vice-versa. Here, patent citation data helps discipline knowledge flows. The model will provide insights on policy questions, such as the innovation and productivity impacts of reshoring manufacturing activity in an industry equilibrium.

I have several follow-up projects that complement this work. One incorporates LinkedIn data with the inventors identified in my dataset to study how inventor migration within and across firms and countries shapes knowledge production. Another co-authored project links academic papers to patents, and studies the role of fundamental science in manufacturing innovation. We focus on battery technology, which depends on basic research in materials science and chemistry. Finally, I have ongoing work on methods for estimating structural models of location choice - relevant to placed-based industrial policy questions.

My perspective on innovation and industry policy questions is based on a background in trade, which motivates a structural approach. This is often necessary because the counterfactuals we are interested in often have no analog in the data or don't admit quasi-experimental designs. But the empirical innovation literature has made considerable progress in evaluating various theories of innovation. The NBER Innovation Research Boot Camp will give me the opportunity to familiarize myself with these developments and tool up on empirical designs that I can apply to my own work. Additionally, the opportunity to discuss ideas with other students and faculty in this field as well as find potential collaborators is always rewarding.

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February 6, 2025

Recommendation Letter for Adrian Kulesza
NBER Innovation Boot Camp

Dear Colleague:

I am pleased to give Adrian my very strongest recommendation for the NBER Innovation Research Boot Camp. Adrian is a third-year Ph.D. student in Economics at Harvard, and he has been remarkably productive. He has already completed an excellent research paper that shows how AI optimization algorithms with deep reinforcement learning can be used to solve complex combinatorial discrete choice problems (in the structural trade and spatial literature) that cannot be solved with existing computational techniques. That paper is currently under review at a general interest journal (where his advisors, myself included, recommended that he send the paper).

Adrian has also made significant progress on another promising project, which is poised to be a fantastic job market paper. Adrian described that project in the statement that he submitted for the Boot Camp. That work combines rigorous structural modeling with novel datasets to address pressing policy questions.

The depth and quality of his research set him apart as one of the strongest Ph.D. candidates I have seen. Given his trajectory, I anticipate Adrian will be among the top candidates on the economics job market upon graduation. The NBER Innovation Boot Camp would be an ideal setting for Adrian to further refine his research and engage with leading scholars. I have no doubt he will contribute meaningfully to discussions while benefiting tremendously from the program. I strongly support his application.

Sincerely,

