Application to NBER Innovation Research Boot Camp 2025

Emanuel Schertz

February 6th, 2025

Cover Letter

Dear Members of the Selection Committee,

I am writing to express my interest in participating in the 2025 NBER Innovation Research Boot Camp. I am a fourth year PhD candidate in economics at Harvard University. My research focuses on understanding which conditions that best incentivize innovation to flourish - especially (but not only) in developing countries.

Currently, my objective is to understand how the availability of capital in a sector affect its growth. Initial findings suggest that, in certain sectors such as software development, firms with greater access to capital tend to be (1) more profitable and (2) employ a lower share of untrained individuals. This indicates that the most innovative and profitable firms are less likely to introduce untrained individuals into the workforce, which could have implications for long-term human capital development.

Given that untrained workers often gain skills through on-the-job learning, the relationship between capital investment and sectoral growth is not straightforward. The optimal composition and stock of capital may depend on the current availability of trained workers within different sectors. Understanding this relationship can shed light on how R&D spending allocations influence both short- and long-term growth.

For references, please feel free to contact Professor Xavier Gabaix (xgabaix@fas.harvard.edu).

Thank you for considering my application. I am eager to contribute to and learn from the Innovation Bootcamp community. Please do not hesitate to contact me if further information is needed.

Sincerely,
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Research Statement

Growth in human capital intensive sectors depend critically on the stock of trained individuals, such that an increase in the stock of trained individuals will lead to growth. This project investigates how the allocation of capital—specifically R&D spending—affects the balance between trained and untrained individuals in the workforce, with implications for sectoral growth dynamics.

The core hypothesis is that firms requiring significant capital investments tend to employ a higher share of trained vs untrained workers and are also more profitable and innovative. Conversely, firms with lower capital requirements often provide more on-the-job training opportunities for untrained workers. If R&D spending disproportionately favors capital-intensive firms, this may slow human capital accumulation by reducing the number of firms that introduce untrained workers to the sector. Consequently, the optimal composition of R&D spending depends on the growth stage and workforce composition of different sectors.

Currently, I leverage data from Uruguay's National Research and Innovation Agency (ANII), which provides entrepreneurship and innovation grants ($\sim$ \$80,000).These grants are similar to the U.S. Small Business Innovation Research (SBIR) program. Preliminary findings show that grant recipients are more likely to establish capital-intensive "product" firms that employ a higher share of trained workers. In contrast, rejected applicants often shift toward "consulting" firms that hire more untrained workers and provide on-the-job training opportunities. Notably, individuals who do not receive the grant shift to environments where the ratio of untrained to trained workers is 50% higher on average. If this shift were universal across trained workers, the stock of trained workers would grow 50% faster, underscoring the significance of firm type in shaping human capital accumulation.

These findings reveal that R&D funding allocations directly influence workforce composition and the rate of human capital accumulation. There are trade-offs between immediate productivity gains, driven by high-productivity firms, and the long-term development of a skilled workforce. While my analysis is currently based on Uruguay's software development sector, its implications are relevant to broader contexts.

The next stage of this project will adapt these insights to the U.S. context and explore additional sectors. Correlation-based evidence from U.S. data (i.e Compustat) already suggests that firms with higher R&D spending tend to have a higher ratio of trained to untrained workers, even after accounting for factors such as firm age, size, and industry. In order to establish causation, I aim to identify natural experiments involving quasi-random variations in firms' access to capital (e.g bank lending shocks) and assess whether the patterns observed in Uruguay hold in larger, more complex economies like the U.S.

The ultimate goal of this research is to understand how human capital intensive sectors grow and which types of investments most effectively promote both innovation and workforce development.

I am eager to attend the bootcamp to gain a clearer sense of the frontier in innovation research through lectures and discussions with leading scholars. Beyond that, I am also excited about the opportunity to connect with other participants, exchange ideas, and explore potential collaborations that could extend beyond the program.

EMANUEL SCHERTZ

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EDUCATION

Harvard University, Cambridge, MA 8/2021–Present
PhD in Economics

- Field courses in Macroeconomics, Labor Economics, Industrial Organization

Universidad ORT, Montevideo, Uruguay 3/2015–8/2019
BS in Economics

INDEPENDENT RESEARCH

Relationship between Capital and Growth in Human Capital Intensive Sectors 2/2024–Present

Does Paying with Cards Reduce Crime at Stores? Evidence from a Targeted Cash Ban in Uruguay 7/2018–11/2023
Published at the Journal of Law and Economics – with Nestor Gandelman and Ignacio Munyo

RESEARCH EMPLOYMENT

Harvard University, *Research Assistant,* Cambridge, MA 6/2022–9/2022
Professor Gabriel Chodorow-Reich

Opportunity Insights at Harvard University, *Predoctoral Research Fellow,* Cambridge, MA 7/2019–7/2021
Professors Raj Chetty, John Friedman and Nathan Hendren

Department of Economics - Universidad ORT, *Research Assistant,* Montevideo, Uruguay 10/2017–11/2017; 7/2018–7/2019
Prof. Nestor Gandelman (7/2018–7/2019) and *Prof. Flavia Roldan* (10/2017–11/2017)

TEACHING

Department of Economics – Harvard University *Teaching Fellow,* Cambridge, MA 6/2023–Present
Econ 2010B – Intermediate Macroeconomics (Thomas Baranga, Fall 2023 & 2024; Chris Foote Spring 2024)
Econ 2416 – Advanced Topics in Applied Macroeconomics (Prof. Gabriel Chodorow-Reich Fall 2023 & Spring 2024)
Econ S-1012 – Macroeconomic Theory (Thomas Baranga, Summer 2023)
Econ S-1534 – International Finance and Macroeconomics (Thomas Baranga, Summer 2023)

Department of Economics – Universidad ORT, *Teaching Assistant,* Montevideo, Uruguay 3/2019–8/2019
Mathematics I (Prof. Erik Caceres. Fall 2019)
Monetary Economics (Prof. Julio de Brun, Fall 2019)

HONORS and AWARDS

International Mathematical Olympiad (IMO), *Participant*, Mar del Plata, Argentina; Santa Marta, Colombia 7/2012 & 7/2012

List of Graduate Courses (Harvard unless otherwise stated)

- First year sequences in Microeconomics, Macroeconomics and Econometrics
- Advanced Topics in Empirical Macroeconomics
- Macro-Finance: Rational and Behavioral
- Advanced Macroeconomics II (MIT)
- Industrial Organization I
- Industrial Organization II
- Labor Market Analysis
- History and Human Capital