# Nicholas Emery-Xu

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## EDUCATION

**UCLA**, Los Angeles, CA                                                                    2022-2026 (expected)
Ph.D. candidate in economics
**Fields:**   Primary: Industrial organization, economic theory. Secondary: Economics of innovation.

**UCLA**, Los Angeles, CA                                                                    2019-2021
Ph.D. student in political science
M.S. student in statistics

**University of Pennsylvania**, Philadelphia, PA
B.A. in economics, Russian (*summa cum laude* with distinction in Russian)                    2014-2018
Minor: Mathematics

**Herzen University**, St. Petersburg, RU                                                     2017
Certificate in Russian language

## RESEARCH AFFILIATIONS

**MIT FutureTech** Affiliated researcher                                                      2021-Present
**Global Priorities Institute** Global Priorities Fellow                                       2022-2023

## RESEARCH

*Publications*

- Besiroglu, Tamay, Nicholas Emery-Xu, and Neil Thompson. 2022. "Economic Impacts of AI-augmented R&D." *Research Policy.*

  **Abstract:** Since its emergence around 2010, deep learning has rapidly become the most important technique in Artificial Intelligence (AI), producing an array of scientific firsts in areas as diverse as protein folding, drug discovery, integrated chip design, and weather prediction. As scientists and engineers adopt deep learning, it is important to consider what effect widespread deployment would have on scientific progress and, ultimately, economic growth. We assess this impact by estimating the idea production function for AI in two computer vision tasks that are considered key test-beds for deep learning and show that AI idea production is notably more capital-intensive than traditional R&D. Because increasing the capital-intensity of R&D accelerates the investments that make scientists and engineers more productive, our work suggests that AI-augmented R&D has the potential to speed up technological change and economic growth.

- Emery-Xu, Nicholas, Andrew Park, and Robert Trager. 2023. "Uncertainty, information, and risk in international technology races." *Journal of Conflict Resolution.*

  **Abstract:** A formal model reveals how the information environment affects international races to implement a powerful, dangerous new military technology, which may cause a "disaster" affecting all states. States implementing the technology face a tradeoff between the safety of the technology and performance in the race. States face unknown, private, and public information about capabilities. More decisive races, in which small performance leads produce larger probabilities of victory, are usually

more dangerous. In addition, revealing information about rivals' capabilities has two opposing effects on risk: states discover either that they are far apart in capability and compete less or that they are close in capability and drastically reduce safety to win. Therefore, the public information scenario is less risky than the private information scenario except under high decisiveness. Finally, regardless of information, the larger the eventual loser's impact on safety relative to the eventual winner's, the more dangerous is the race.

- Emery-Xu, Nicholas, Richard Jordan, and Robert Trager. 2024. "International governance of advancing artificial intelligence." *AI & Society.*

**Abstract:** New technologies with military applications may demand new modes of governance. In this article, we develop a taxonomy of technology governance forms, outline their strengths, and red-team their weaknesses. In particular, we consider the challenges and opportunities posed by advancing artificial intelligence, which is likely to have substantial dual-use properties. We conclude that subnational governance, though prevalent and mitigating some risks, is insufficient when the individual rewards from societally harmful actions outweigh normative sanctions, as is likely to be the case with AI. Nationally enforced standards are promising ways to govern AI deployment, but they are less viable in the "race-to-the-bottom" environments that are becoming common. When it comes to powerful technologies with military implications, there is only one multilateral option with a strong historical precedent: a non-proliferation plus norms-of-use regime, which we call NPT+. We believe that a non-proliferation regime may, therefore, be the necessary foundation for AI governance. However, AI may exhibit characteristics that would make a non-proliferation regime less effective than it has proven for nuclear weapons. As an alternative, verification-backed restrictions on AI development and use would address more risks, but they face challenges in the case of advanced AI, and we show how these challenges may not have technical solutions. Perhaps more importantly, we show that there is no clear example of major powers restricting the development of a powerful military technology when that technology lacks a ready substitute. We, therefore, turn to a final alternative, International Monopoly, which was the preferred solution of many scholars and policymakers in the early nuclear era. It should be considered again for governing AI: a monopoly would require less-invasive monitoring, though at the possible cost of eroding national sovereignty. Ultimately, we conclude that it is too soon to tell whether a non-proliferation regime, a verification-based regime, or an International Monopoly is most feasible for governing AI. Nonetheless, a variety of policies would yield a high return across all three scenarios, and we conclude by identifying some of these steps that could be taken today.

*Working Papers*

- Emery-Xu, Nicholas, Jayson Lynch, and Neil Thompson. 2025. "The impact of Moore's law on the productivity slowdown and decline of the labor share." *[Major rewrite in progress.]*

**Abstract:** Using data a large scale technology survey, we study the impact of Moore's law on productivity growth and changes in the labor share. Motivated by the fact that the ratio of computation to labor in production is rising, while both the labor and computational shares are declining, we develop a novel production function with both labor- and computation-augmenting productivity terms. Using this setup, we estimate a production function for all U.S. public firms in our survey in order to quantify the effects of computation and other IT inputs on productivity growth and the fall in the labor share.

*Works in Progress*

- Emery-Xu, Nicholas and Jackson Mejia. 2025. "Dynamic frictions and firm productivity: Evidence from cloud computing."

*Policy reports*

- National Network for Critical Technology Assessment. 2023. "Securing America's Future: A Framework for Critical Technology Assessment." *https://nncta.org/opportunities/report.html.*

- Jensen, Mckay, Nicholas Emery-Xu, and Robert Trager. 2023. "Industrial policy for advanced AI: Compute pricing and the safety tax." https://arxiv.org/pdf/2302.11436.

*Data Sets*

- Emery-Xu, Nicholas, Kristen Ghodsee and Mitchell A. Orenstein. 2021. "Taking Stock of Shock Database." University of Pennsylvania. *https://www.socialimpactsoftransition.com/.*

## TEACHING

- Teaching assistant for Empricial Industrial Organization (Econ 452)       S2025
- Teaching assistant for Data Science for Economists (Econ 104)       F2023, F2024, W2025

## GRANTS AND FELLOWSHIPS

*External*

- **Institute for Humane Studies** Junior Fellowship (2025): \$3,000
- **Institute for Humane Studies** Expense support (2024): \$4,000
- **Open Philanthropy Project** Early Career Funding for Improving the Long-Term Future (2024): \$51,000
- **Oxford University** Global Priorities Fellowship (2023): £5,000
- **Open Philanthropy Project** Early Career Funding for Improving the Long-Term Future (2023): \$51,000
- **APSA** Travel Grant (2022): \$150
- **Centre for Effective Altruism** Effective Altruism Funds: to hold panels on effective altruism and political science (with Mahendra Prasad and Caroline Jeanmaire) (2022): \$16,487
- **Global Priorities Institute** Global Priorities Fellowship (2022): £5,000
- **Open Philanthropy Project** Early Career Funding for Improving the Long-Term Future (2022): \$51,000
- **APSA** Travel Grant (2021): \$300
- **NSF** Graduate Research Fellowship Program (2021): Honorable Mention
- **Open Philanthropy Project** Early Career Funding for Improving the Long-Term Future (2021): \$48,000
- **Future of Humanity Institute** grant for cloud storage (with Jacob Carlson) (2020): \$250
- **Future of Humanity Institute** Summer Research Fellowship (2020): £750

*Internal*

- UCLA Lewis L. Clarke Data Purchase & Data Collection Award (2024): \$1,000
- UCLA Graduate Summer Research Mentorship (2021): \$6,000
- UCLA Graduate Research Mentorship (2020): \$20,000 + tuition and fees
- UCLA Graduate Summer Research Mentorship (2020): \$6,000
- UCLA first year fellowship (2019): \$27,500 + tuition and fees

## CONFERENCE PRESENTATIONS

*2024*
Artificial intelligence & the Future of Work

*2023*
Southern California Graduate Conference in Applied Economics

*2022*
APSA, Politics of Emerging Technology Mini-Conference, Lawrence Livermore National Laboratory,

*2021*
APSA, Stanford Existential Risks Initiative, SPSA

*2020*
WPSA

## INVITED PRESENTATIONS

- "Information Hazards in Races for Advanced Artificial Intelligence." Presentation at the Works in Progress series at the Centre for the Governance of AI, Oxford, UK, September 2021.

- "Estimating a Production Function for Artificial Intelligence." Presentation at the Future of Humanity Institute, Oxford, UK, August 2020.

- "Examining Public Opinion on Transition." Presentation at the University of Pennsylvania, Philadelphia, PA, November 2019.

- "Media as the Fourth Estate: The Influence of Press Freedom on Corruption Perception in Russia under Putin." Paper presented at the University of Pennsylvania Slavic Bazaar, Philadelphia, PA, April 2018.

## PROFESSIONAL SERVICE

Reviewer for *Southern California Graduate Conference in Applied Economics, Security Studies, International Studies Quarterly, Research Policy.*

## LANGUAGES

*Natural:* English (native), Russian (professional working proficiency)
*Programming:* R (`dplyr, tidyverse, ggplot2`, regex), MATLAB, LaTeX