Joel N. Christoph

PhD Candidate in Economics, European University Institute

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NBER Innovation Research Boot Camp 2026 Selection Committee
Professors Kevin Bryan, Ina Ganguli, and Kyle Myers
National Bureau of Economic Research, Cambridge, MA

Dear Members of the Selection Committee,

I am writing to apply for the NBER Innovation Research Boot Camp (July 17–23, 2026). I am a PhD candidate in Economics at the European University Institute, where I have completed all doctoral coursework and am developing my dissertation on the economics of frontier AI, applying tools from mechanism design, industrial organization, and innovation economics.

My research agenda treats artificial intelligence as a general-purpose technology whose production relies on a highly concentrated, quantifiable input: compute. My flagship project, *Risk-Weighted Compute Permit Markets for Frontier AI Oversight*, proposes a cap-and-trade system for the computational resources used to train frontier AI models. A regulator sets an aggregate compute cap, permits trade, and developers surrender permits proportional to metered compute weighted by evaluation-contingent risk multipliers. The paper develops a compliance architecture of stochastic audits and convex penalties, with formal results on implementability and welfare under imperfect monitoring. I submitted a version to the 27th ACM Conference on Economics and Computation (EC'26).

This work is fundamentally about how regulatory institutions shape the direction and pace of innovation. Complementary projects examine how compute export controls affect AI adoption and services upgrading in emerging economies, and how AI capital services can be measured for growth accounting. These questions draw on innovation economics, industrial organization, trade, and public economics: exactly the range of fields the Boot Camp brings together.

The Boot Camp would address a genuine gap in my training. While EUI provided strong foundations in microeconomics, econometrics, and firm dynamics (I completed "Firm Dynamics and Innovation" and "Quantitative Methods: Firm Dynamics," both graded A), the economics of innovation is not offered as a dedicated field course. Systematic exposure to the foundational ideas, empirical evidence, and frontier questions in innovation economics would sharpen both the framing and methodology of my dissertation. Attending the NBER Summer Institute Innovation Policy meeting would connect me to the research community whose work most closely relates to my own.

As requested, a confidential recommendation letter will be sent separately by email.

Sincerely,
Joel N. Christoph

Curriculum Vitae

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Research Fields

Economics of Innovation, Industrial Organization, Mechanism Design, AI Economics, Productivity and Growth.

Education

PhD in Economics, European University Institute (EUI), Florence 2022–Present
All coursework completed. Over two-thirds of grades at A+ or A. Focus: economics of AI, compute governance, innovation policy. Scholarships from France, EUI, and the Japan-IMF Scholarship Program.

M.Res. in Economics, European University Institute 2021–2022

M.Sc. in Economics (PhD Track), Barcelona School of Economics 2020–2021
Tuition waiver on merit. PhD-level coursework.

Master's in Politics and International Relations, Tsinghua University–Johns Hopkins SAIS 2019–2020

B.Sc. in Economics with a Year Abroad, University College London 2015–2019
Year abroad at the University of California (2017–2018).

Selected Research Positions

PhD Researcher, European University Institute 2022–Present
Dissertation on economics of frontier AI governance: market design for compute permits, innovation under regulation, measurement.

Technology and Human Rights Fellow, Harvard Kennedy School 2025–2026
Research on compute governance, AI policy, and human rights implications of frontier AI systems.

Visiting Researcher, Institute for Decentralized AI, University of Oxford 2026
Mechanism design for trust and oversight in decentralized agent networks.

Fellow, ERIA School of Government, Jakarta 2025–2026
Economic incentives for international AI governance in ASEAN; regional digital public goods.

Summer Fellow, Centre for the Governance of AI (GovAI), London 2025
Industrial organization of the semiconductor supply chain; middle-power compute strategies.

Short-term Consultant, World Bank 2022–2023
Modelling financing mechanisms for energy infrastructure investment in East Asia.

Summer Research Fellow, Future of Humanity Institute, University of Oxford 2020
AI hardware R&D trajectories and compute trends.

Selected Working Papers

Risk-Weighted Compute Permit Markets under Imperfect Monitoring (2026). Submitted to the 27th ACM Conference on Economics and Computation (EC'26).

Measuring AI Capital Services Through Compute: A Theoretical Framework for Growth Accounting

(2026). Working Paper.

Mechanism Design for Compute Permits Under Imperfect Monitoring (2026). Provisional draft for the European Summer Symposium in Economic Theory (ESSET) 2026.

Compute Bottlenecks, Vertical Integration, and Competition in Foundation-Model Supply Chains (2025). Poster, Lear Competition Festival, Rome.

Selected Publications

Connecting Crops to Markets: Road Infrastructure for Rural Growth in Sub-Saharan Africa (2026). STEG Ideas for Transformation (I4T 008), CEPR.

Integrating Advanced CGE Modeling and AI-Based Scenario Analysis for Climate Policy (2025). 28th Annual Conference on Global Economic Analysis (GTAP), Kigali.

Towards Reliable Misinformation Mitigation: Generalization, Uncertainty, and GPT-4 (2023). EMNLP 2023. With Pelrine, Imouza, Thibault, Reksoprodjo, Gupta, Godbout, Rabbany.

Selected Awards

Imminent Research Grant ($20,000), Language Economics (2026) · Japan-IMF Scholarship for Advanced Studies (2024) · Future of Life Institute Grant ($15,000), PI (2024) · STEG I4T Grant, CEPR/IGC (2025)

Skills

Technical: Python, R, Stata, MATLAB, PyTorch, LaTeX, Git
Languages: French and Japanese (native); English, German, Dutch, Spanish (fluent); Italian and Mandarin (intermediate)

PhD Coursework

Joel N. Christoph, European University Institute

Compulsory Courses (M.Res. and PhD)

Course	Block I	Block II	Block III
Mathematics	A+		
Statistics and Econometrics	A	A−	B+
Microeconomics	B+	A	A+
Macroeconomics	A	A	B

Advanced Courses (PhD)

Course	Grade
Advanced Industrial Organization	B
Economic Measurement	A
The Econometrics of Causality	A−
A Short Course on Production Networks	A
Advanced Macro Introduction (Part I)	A−
Economic History: Policies, Development and Inequality in the Long Run	A
Firm Dynamics and Innovation	A
Fiscal and Monetary (EU) Policy and Institutions (Part II)	A−
Frontiers of Macro-Labor	A+
Quantitative Methods and Applications: Firm Dynamics	A
Topics in Banking and Finance	A+
Topics in Macroeconometrics	A

External Courses

Course	Grade
Firms and Development (BREAD)	Pass

Pre-doctoral coursework (Barcelona School of Economics, M.Sc. in Economics): PhD-level courses in microeconomics, macroeconomics, econometrics, time series, and international trade. Tuition waiver on merit.

Research Statement

Joel N. Christoph
PhD Candidate in Economics, European University Institute

The Industrial Organization of Compute as Innovation Policy

My research is motivated by a central observation: artificial intelligence is a general-purpose technology, but unlike steam or electricity, its production relies on a highly excludable, quantifiable, and concentrated input. While the economics of innovation has traditionally focused on intellectual property or R&D subsidies as the primary policy levers, the physical characteristics of the AI supply chain offer a novel locus for governance. My dissertation investigates how markets and institutions can govern this input, maximizing innovation diffusion while managing safety externalities.

Current Research

My primary working paper, *Risk-Weighted Compute Permit Markets under Imperfect Monitoring*, applies mechanism design to frontier AI governance. A regulator sets a cap on aggregate risk-weighted compute used for training runs; developers surrender permits based on usage multiplied by a risk factor derived from safety evaluations. The core contribution is theoretical: I show how stochastic auditing and convex penalties can induce truthful reporting under imperfect information about model capabilities, extending the logic of environmental permit markets to innovation governance. The paper is submitted to EC'26, with a companion paper on enforcement design in preparation for ESSET 2026.

A second project, *Measuring AI Capital Services Through Compute*, builds a growth accounting framework treating high-performance compute as a distinct capital service flow, adjusting for rapid depreciation and quality improvements to better quantify AI hardware's contribution to total factor productivity.

On the empirical side, I pursue two projects: one using Norwegian matched employer-employee data to estimate causal effects of firm-level AI adoption on employment and skill composition; another examining how compute export controls affect AI adoption and services upgrading in ASEAN economies using quasi-experimental variation in policy exposure. I also study the industrial organization of the AI supply chain; work presented at the 2025 Lear Competition Festival analyzes how compute bottlenecks and vertical integration shape competitive dynamics in foundation-model markets.

Future Research and Why the Boot Camp

Going forward, I plan to deepen the connection between compute governance and innovation incentives: How do permit markets interact with firms' R&D direction? What is the welfare cost of compute regulation relative to output-based liability? How do international asymmetries in compute capacity shape technology diffusion?

The Boot Camp is uniquely well matched to this agenda. While I have strong foundations in mechanism design and firm dynamics, I need systematic exposure to the broader innovation literature: the empirics of R&D, diffusion of technologies, directed technical change, and innovation policy evaluation. Learning from the faculty and attending the Summer Institute Innovation Policy meeting would sharpen my ability to frame my work as a contribution to the fundamental economics of innovation. I am eager to discuss how the compute supply chain's specific features challenge or confirm established models of innovation policy.