Applicant Name: **Weiliang Tan**

Contact Information: wt289@cornell.edu; weiliang.tan@yale.edu

School(s): **Cornell University; Yale University** (see my CV for more details)

Year of Entry into PhD Program: **2018**

Expected Year of Completion: **2025**

Name of Faculty Member(s) Supplying Letter(s) of Recommendation:

- **Jorge Guzman** (incoming postdoc supervisor)
- **Samuel Kortum** (PhD advisor)

Weiliang Tan

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Ithaca, NY 14853

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Email: wt289@cornell.edu; weiliang.tan@yale.edu
Website: www.weiliangtan.com
Citizenship: Singapore, US F1 Visa

Employment

Claremont McKenna College — Claremont, CA, USA
Assistant Professor of Economics — 2026 -

National Bureau of Economic Research — Cambridge, MA, USA
Postdoctoral Research Associate, Startup Cartography Project — 2025 - 2026
Supervisors: Jorge Guzman, Scott Stern, Catherine Fazio

Education

Cornell University — Ithaca, NY, USA
Ph.D. Applied Economics and Management (GPA: 3.90/4) — 2025 (expected)
Dissertation: Essays on the Spatial and Network Aspects of Innovation and Climate Change
Advisor: Prof. Ivan Rudik

Yale University — New Haven, CT, USA
IvyPlus Exchange Scholar, Department of Economics — 2023 - 2025
Advisor: Prof. Samuel Kortum

Yale-NUS College — Singapore
B.A. Environmental Studies, minor in Economics (summa cum laude, GPA: 4.90/5) — 2018

Yale University — New Haven, CT, USA
Visiting International Student Program (GPA: 3.91/4) — Spring 2017

Research Fields

Primary: International and Spatial Economics; Urban Economics; Innovation and Entrepreneurship

Secondary: Macroeconomics; Environmental Economics

Data Access

US Census Special Sworn Status (since Jan 2023)

References

Prof. Samuel Kortum
James Burrows Moffatt Professor of Economics,
Yale University
Director, Cowles Foundation for Research
in Economics
Email: samuel.kortum@yale.edu

Prof. Peter Schott
Juan Trippe Professor of Economics,
Yale University
Executive Director, Yale Branch of the New York
Federal Statistical Research Data Center
Email: peter.schott@yale.edu

Prof. Ivan Rudik
Associate Professor, Cornell University
Email: irudik@cornell.edu

Prof. Nancy Chau
Professor, Cornell University
Email: hyc3@cornell.edu

Working Papers

1. Tan, Weiliang (2024). The Geography of Innovation in the United States. [Link] ***Job Market Paper***.
   - Research question: What drives the rising spatial concentration of innovation in high-skill cities from 1990 and what are the aggregate consequences?
   - Methodological contribution: Introduce endogenous, directed, and microfounded innovation in a dynamic spatial model
2. Rudik, Ivan, Gary Lyn, **Weiliang Tan**, and Ariel Ortiz-Bobea (2022). The Economic Effects of Climate Change in Dynamic Spatial Equilibrium. [Link] ***Revise and Resubmit, Journal of Political Economy: Macroeconomics***
   - Research question: What are the welfare effects of general equilibrium adaptation via trade, migration, and capital accumulation in response to climate change?
   - Methodological contributions: (i) Model-consistent estimating equations to identify climate impacts on productivity and amenities from temperature shocks; (ii) Quantitative decomposition of general equilibrium adaptation channels (trade, migration, industry switching, capital accumulation) to shocks in fundamentals in a dynamic spatial model

Selected Works In Progress

3. The Geography and Spatial Networks of Innovation
   - Research question: What drives the rising intensity and changing geography of cross-region coinventor collaborations, and what are the implications on local and aggregate innovation in the United States?
4. The Geography of Technology Vintages (with Bernardo Ribeiro)
   - Research question: Why are newer technology vintages concentrated in big cities?
   - Methodological contribution: Introduce technology vintages in a dynamic spatial model with endogenous innovation

Non-Academic Publications

1. Addicott, Ethan, Alhasan Badahdah, Luke Elder and **Weiliang Tan** (2019). Internal Carbon Pricing: Policy Framework and Case Studies. Yale Center for Business and the Environment: Research. [Link]

Referee Service

Journal of the European Economic Association; Journal of the Association of Environmental and Resource Economists (x2)

Research Experience

Cornell University

Research Assistant to Prof. Ivan Rudik	Fall 2020 – Spring 2021, Spring 2022
Research Assistant to Prof. Todd Gerarden	Summer 2020

Yale University

Herb-Scarf Summer Research Assistant to Prof. Mushfiq Mobarak	Summer 2017

Yale-NUS College

Participant, Summer Research Program	Summer 2017
Research Assistant to Prof. Lei Yu-Hsiang	Winter 2016
Research Assistant to Prof. Guillem Riambau	Winter 2016
Participant, EnviroLab Asia (joint with Claremont Colleges)	Jan 2016, May 2018

Teaching Experience

Yale University

Teaching Assistant, ECON 184 International Economics (undergraduate)	Spring 2023

Cornell University

Teaching Assistant, AEM 6510 Environmental Economics (masters)	Fall 2021
Teaching Assistant, AEM 4500 Resource Economics (upper-level undergraduate)	Spring 2020
Teaching Assistant, AEM 7010 Applied Microeconomics (first-year Ph.D.)	Fall 2019

Yale-NUS College

Peer Tutor, Economics	Spring 2018

Fellowships, Honors, and Awards

Yale-NUS Overseas Graduate Scholarship	2018
Yale-NUS Outstanding Capstone Prize in Environmental Studies	2018
Singapore Ministry of Education-Autonomous University Midterm Scholarship	2017
Singapore National Environment Agency EcoFriend Award	2017
Santander International Experience Scholarship	2016
Yale-NUS Social Impact Fellowship	2015

Volunteering

Co-founder & Chairman, Singapore Sustainable Solutions Network	2015 – 2016
President, I'dECO: Yale-NUS Sustainability Movement	2014 – 2016
Poster Session Presenter, UNFCC COP 21 Global University Climate Forum	2015

Miscellaneous

Programming	R, STATA, Julia, Python, Matlab
Languages	English (native), Standard Chinese (limited), Spanish (basic)
Other	World Chess Federation (FIDE) Candidate Master

Last Updated: February 2025

I study the causes and consequences of the geography of innovation and entrepreneurship by connecting empirical work with quantitative spatial models. In my job market paper titled *The Geography of Innovation in the United States*, I answer the perennial question of what drives the rising spatial concentration of innovation in the United States. Understanding this phenomenon requires a careful examination of when and where it occurred. Leveraging comprehensive data on patents, firms, and inventors from 1976 to 2018, I find that innovation became more concentrated in high-skill cities only after 1990, with the sudden rise of information and communication technologies (ICT) playing two distinct roles in this process. First, there was a compositional shift in innovation toward ICT, which is colocated with the ICT service sector and concentrated in high-skill cities. Second, firms originally concentrated in high-skill cities produced more non-ICT patents, driven by spillovers from ICT innovation and an asymmetric scale effect of the ICT shock, where reductions in communication costs enabled these firms to disproportionately expand production to lower-cost regions, enhancing the profitability of new ideas. To better understand the mechanics of innovation across space and its consequences for macroeconomic growth, I introduce endogenous and directed innovation integrated with technology diffusion to existing dynamic spatial models. My framework provides an analytical characterization of the spatial direction of innovation on the transition path and how its steady-state distribution across space determines long-run aggregate growth.

The methodological tools I develop in my job market paper establish the foundation for a broader research agenda that explores the spatial and network empirics of innovation and entrepreneurship through the lens and discipline of quantitative spatial models. In ongoing projects, I examine what drives the rising intensity of cross-region coinventor collaborations in the United States since 1976 and why patents originating from big cities are more likely to belong to newer technology vintages. On the latter, one hypothesis my coauthor and I are exploring is that big cities benefit from greater venture capital funding and higher quality of entrepreneurship. Other research questions I plan to study using my framework include how the geography of clean energy potential, production and innovation shapes the global rate of the clean energy transition, the impact of university research on aggregate growth and spatial inequality, and the ways in which automation has influenced the dynamics of spatial inequality.

While my work has predominantly focused on the geography of innovation thus far, I am excited to explore the interactions between regional innovation and entrepreneurship through collaborative projects with Jorge Guzman, Scott Stern, and Catherine Fazio as part of my upcoming postdoctoral work at the Startup Cartography Project. Some nascent ideas on measurement we discussed include leveraging the quantity and quality of patents produced to improve regional measures of entrepreneurship, while potentially using non-patent measures of the quality of entrepreneurship to predict patent quantity and quality. Beyond measurement, we look forward to in-depth discussions uncovering deeper connections between these two adjacent fields. In this context, I view the Entrepreneurship Research Boot Camp, if selected, as the *perfect* orientation for these collaborative projects. The Boot Camp would provide me with a guided tour of the entrepreneurship literature, a community of like-minded peers to discuss new ideas, and an opportunity to interact with and receive feedback from the broader community of leading entrepreneurship scholars.

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7263183
Brett Maranjian,
National Bureau of Economic Research

Application Credentials

Weiliang Tan
Feb 16, 2025

From
Customer Support & Operations Center
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1	**Recommendation from Prof. Samuel Kortum**	Confidential Letter of Recommendation or Evaluation	3 pages	CONFIDENTIAL

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Yale University

Department of Economics
P.O. Box 208264
New Haven, Connecticut 06520-8264

Samuel Kortum
James Burrows Moffatt
Professor of Economics
Director, Cowles Foundation

December 3, 2023

Dear Colleagues,

I enthusiastically recommend **Weiliang Tan** for positions in international trade, spatial economics, urban economics, or macroeconomics. Weiliang is an incredibly bright, ambitious, and resourceful Ph.D. candidate. He has visited Yale from Cornell for the past two years to finish his job-market paper, **"The Geography of Innovation in the United States."** I have been Weiliang's advisor here at Yale (he will get his PhD from Cornell this coming spring).

Weiliang's skills cover the spectrum from careful empirical analysis with micro data to dynamic general-equilibrium macro modeling. What's particularly special about Weiliang is his tenacity: (i) to stay focused on a fundamental economic phenomenon, (ii) to dig into multiple data sources to uncover the key facts and puzzles, and (iii) to find an explanation (consistent with theory and data) and to formulate it in a quantitative model. These characteristics are all on display in Weiliang's job-market paper.

Weiliang sets out to explain the increasing geographic concentration of innovation within the United States. This trend was identified in an *AER* paper by Moretti (2021), but without an explanation of the driving forces. Using the universe of US patents and their inventors, Weiliang found that the rise in concentration did not start until after 1990 (i.e. later than suggested by prior work), around the time of fundamental breakthroughs and a rapid expansion of patenting in information and communication technology (ICT). He also found that the concentration of innovation largely converged on high-skill cities, defined by their large fraction of college-educated workers as of 1990.

He then explains how a time-series shock (to ICT) led to a spatial shock (to geographic concentration). The simpler piece of the story is that the ICT sector itself was, by 1990, already highly concentrated in high-skill cities. These cities therefore experience an outsized share of the ICT shock, leading to geographic concentration of innovation. But, even non-ICT innovation became increasingly concentrated in high-skill cities. Here the story is trickier, with two parts to it. First, the firms in high-skill cities experienced knowledge spillovers to innovation in other fields. Weiliang sees evidence of this effect in the firm-level patent data (where the firm is the entity to which the patent is assigned, typically the employer of the inventor). Second, these firms appear to take advantage of the IC technology itself, to spread their plants into cities that are not highly skilled. Weiliang hypothesizes that this opportunity to separate innovation from production within the firm was itself a stimulus to innovation.

Weiliang formalizes this story in a quantitative model driven by innovation across a large set of locations within the United States. Production may be spatially separated from innovation due to technology diffusion and consumption may be separated from production due to trade. To combine trade and diffusion, the model builds on recent work of Lind and Ramondo in the *AER* (2023) and *JIE* (forthcoming). He extends this work to introduce imperfect competition, so he can capture the incentive to innovate. The dynamics of the model are driven by delays in technology diffusion and in labor mobility, with labor dynamics modeled as in Caliendo, Dvorkin, and Parro, *Econometrica* (2019). Weiliang has yet to implement a numerical version of the model, but his strategy is clear. He can calibrate the model to spatial data for 1990. He can then simulate the effect of the ICT shock, both to the productivity of innovation and to the ease of technology diffusion, to examine whether it can capture the increasing spatial concentration of innovation in the subsequent two decades.

The results that Weiliang reports are from the patent data, where firms are the entities to which the patents are assigned. Weiliang has also gone much deeper by analyzing the confidential establishment-level data provided by the Secure Census Data Center at Yale. Unfortunately, these results will not be disclosed until around January, 2025. I mention it because Weiliang's investment in working with these data is an indicator of what a serious researcher he is. It also explains why the current draft of his paper has come together later than would have been desired by his advisors!

In addition to the job market paper, Weiliang has a paper on climate change, joint with his advisor at Cornell and others, that is a revise and resubmit at JPE Macro.
He has also made substantial progress on a paper about spatially separated co-inventors in the United States.

I met Weiliang in the spring of 2022 while I was on sabbatical at UC Berkeley and he was visiting Berkeley from Cornell. Even then, Weiliang had already developed hypotheses about innovation across US cities and was quite articulate in sharing it. Thus, I was delighted to host him when he proposed visiting Yale in 2023. He did a terrific job as a TA for my undergraduate trade class that spring. As a visiting student at Yale Weiliang has been an excellent citizen, interacting with many of the faculty and students here. Weiliang

is an incredibly friendly person who can engage with nearly anyone. He will make a wonderful colleague. Please contact me by email (samuel.kortum@yale.edu) if you have any questions about Weiliang Tan.

Sincerely,



Samuel Kortum

Columbia Business School
AT THE VERY CENTER OF BUSINESS™ | Management Division

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Dear Colleague,

I write to strongly recommend Weiliang Tan for the NBER entrepreneurship boot camp.

At first impression, Weiliang might seem to you a different profile from the students I typically recommend. Rather than being a Columbia management Ph.D. who is studying the ways entrepreneurs can improve their firms, he is a macroeconomist. His Ph.D. is from Yale, and his main advisor is Sam Kortum, not me. He is also further along than the usual boot camper, having just finished his job market and with a job offer at Claremont McKenna college.

But, I have come to know Weiliang quite well, and have made a personal commitment to his potential: in fact, I just hired him. Together with Scott Stern and Cathy Fazio, Weiliang will spend next year as a full-time postdoc at the NBER, executing an NSF grant to develop a new version of the Startup Cartography Project that can be used to provide regional measurement of entrepreneurship at any industry level and assess the performance of regional innovation ecosystem investments. His work will include building out the new SCP data, and thinking clearly through all the details of the measurement of entrepreneurship. This will rely on his skills to build and process datasets, which he has exhibited by working with the Census Longitudinal Business Database. It will also require his ingenuity in thinking through novel research questions, of which Weiliang appears particularly interested in thinking about how to use patent data to understand the relationship between startups and the technological trajectories of their regions.

Weiliang's current work is in the tradition of Sam Kortum's students and their interest in place-based policies for innovation and entrepreneurship—such as the great paper presented by Nghiem Q. Huynh during the NBER entrepreneurship winter meeting. Weiliang's job market paper, titled 'The Geography of Innovation in the United States,' studies why there has been an increasing concentration of U.S. innovation in a few regions—one of the core problems of interest to our group. He finds an important role of IT in seeding this difference, which was then amplified by subsequent agglomeration.

But, importantly, while his work is highly relevant to the work we do, he has not been able to learn in detail the broader empirical evidence in entrepreneurship or be part of the academic community of knowledge. This is a miss, for both the group and his agenda. And why I believe the boot camp can be so valuable. Weiliang stands as someone who can truly bridge from macroeconomic models to empirical work, creating future clarity on how innovation and entrepreneurship lead to economic growth.

I hope my enthusiasm for Weiliang has come through in this letter, as does my own commitment to developing him when he works as a postdoc, together with Scott Stern and Cathy Fazio. If it makes any difference through funding, he will also be local (already living in Cambridge) at the time.

Otherwise, please do not hesitate to contact me if you have any questions.

Jorge Guzman
Jorge Guzman

February, 2025.