Zili Yang

PHD STUDENT IN ECONOMICS

To: National Bureau of Economic Research (NBER), Entrepreneurship Research Boot Camp (ERBC)

Dear ERBC organizers,

I am a third-year PhD student at the University of Southern California whose research interest lies in innovation, entrepreneurship, and Economic Growth. I would like to participate in the NBER Entrepreneurship Research Boot Camp 2023 and share and discuss ideas in this fascinating field. I believe my academic background and consistent interest in innovation and entrepreneurship research make me a good fit for the boot camp.

I am an economics major in PhD study. Two-year solid training in economic theory and econometrics makes me fully prepared for following and doing cutting-edge research in innovation and entrepreneurship. My research interests are closely related, and I often think of these topics during my course of study. In my Macro Topic course, I investigated the relationship between declining business dynamism and increasing economic policy uncertainty. Although the result was not striking, it further inspires me to think more carefully about the economic mechanism behind firm dynamism and entrepreneurship. In Trade class, I thought about the relationship between trade and innovation, which later became one of my current projects regarding foreign knowledge spillover entrepreneurship. In the Industrial Organization class, I studied firm integration and innovation novelty in a two-sided market environment, which brought my attention to think about innovation and entrepreneurship from a market incentive. I think understanding innovation and entrepreneurship is essential for our understanding of many macroeconomic phenomena and economic growth, and that's an important reason for me to think the boot camp is well suited for me.

In the early stage of my research, a systematic introduction to the field of entrepreneurship will sharpen my research thinking and I will also contribute my thoughts to help generate more insights into innovation and entrepreneurship. I appreciate your time in viewing this cover letter. If you have any questions, feel free to email me at ziliyang@usc.edu.

Sincerely,

Zili Yang

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RECOMMENDATION LETTER

Caroline M. Betts

Zili Yang

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Education

University of Southern California — Los Angeles, CA
Doctor of Philosophy in Economics — Expected May 2025

University of Wisconsin-Madison — Madison, WI
Master of Science in Economics with an emphasis on Quantitative Economics — May 2020

Huazhong University of Science & Technology — Wuhan, China
Bachelor of Economics — June 2018

Working in Progress

"Import-related foreign knowledge flow and entrepreneurship in China"

- Background: During the last twenty years, China experienced increasing innovation activities including growing patent numbers and high-tech firms. It happened to be that China joined WTO in late 2001 and witnessed a significant increase in imports and exports after that. This coincidence leads me to think about the potential relationship between trade and innovation. An interesting story could be that imports of goods facilitate foreign knowledge flow to China. Inventors and firms could learn advanced technologies through imitation or reverse engineering of foreign exports, and some innovative foreign goods may also spur entrepreneurs to create new businesses. The project investigates the magnitude of the import-related foreign knowledge flow and startup formation.

"The effect of vertical startup acquisitions on innovation and growth"

- Background: Startup acquisitions become more and more popular among tech giants such as Amazon, Microsoft, and Facebook in recent years. Many of the cases involve a giant firm acquiring a prominent startup along its product supply chain such as the Meta-Within case. The effects of these acquisitions on the markets receive the most concern and regulators have viewed big company acquisitions with increasing skepticism. The project seeks to understand the overall effect of vertical startup acquisition in terms of innovation and growth.

Past Research Papers

Graduate Research Paper, "How does monetary policy affect firm R&D? A panel VAR approach with heterogeneous firms"

Undergraduate Thesis, "Monte Carlo simulation on two statistics in the moderate deviations from a unit root"

Research Assistance

Wenhao Li, University of Southern California — January 2023 – February 2023

- Identified the leverage shock using an SVAR model with narrative sign restrictions

Simeon Alder, Center for Research on the Wisconsin Economy (CROWE) — October 2018 – January 2020

- Finished the empirical part of a project on the dynamics of industry agglomeration in the United States

Teaching Assistance

Econ 501-Macroeconomics analysis and policy, University of Southern California — Fall 2021, Spring 2022, Fall 2022
Econ 475-Economic growth, University of Wisconsin-Madison — Spring 2019

Awards and Honors

USC Dornsife College Graduate Merit Award, University of Southern California — 2020 - 2025
Honorable Mention Scholarship, University of Wisconsin-Madison — 2020
Best Undergraduate Thesis, Huazhong University of Science & Technology — 2018

Language and Skills

Languages: English (advanced), Mandarin (native)
Software: Stata, R, MATLAB, Python, LaTeX

A list of all current and completed PhD courses

Core courses:

- Probability and Statistics for Economists
- Macroeconomic Theory I
- Microeconomic Theory I
- Econometric Methods
- Macroeconomic Theory II
- Microeconomic Theory II

Field courses:

- Topics in Macroeconomics
- Economic and Financial Time Series I
- International Trade Theory
- Industrial Organization

Seminar and Other courses:

- Selected Topics in Finance Research
- Causal Inference Research Methods
- Research on Frontier Economics
- Seminar in Dynamic Economics

Essay about Research

Zili Yang

February 12, 2023

I am a third-year PhD student in the University of Southern California Econ department. My research interest includes Economic Growth, Innovation, and Entrepreneurship. As economic growth is essential for the long-term development of human society, and innovation and entrepreneurship are two important sources of economic growth, my research agenda is trying to understand the source of innovation and entrepreneurship from the perspective of economics and their implications for the macroeconomy, especially economic growth.

My study often starts with some empirical work, combining patent and other micro datasets to describe some stylized facts and establish potential causal relations between innovation, entrepreneurship, and potential factors. I may also combine the empirical results with growth models to study their impacts on economic growth. Below are two early-stage projects that I am working on currently.

Import-related foreign knowledge flow and entrepreneurship in China

Does international trade facilitate knowledge diffusion? There is little direct evidence for the phenomenon but many trade models assume it. I am trying to answer part of the question by investigating the existence of the import-related foreign knowledge flow and quantifying the magnitude in the context of China's accession to WTO in late 2001.

First, I collected Chinese firm-level information from China's Annual Survey of Industrial Enterprises (ASIE) and combine them with the Chinese patent and citation data. I plan to construct two measures of knowledge flow, one is the commonly used backward citations, and the other is to exploit texture similarities between domestic and foreign patents. Second, I constructed a measure of tariff exposure and employed the variations in different sectors' tariff reductions after China joining WTO to define the treatment variable. High tariff exposure in 2001 means higher tariff reduction after joining WTO, and thus being treated.

In the next stage, I plan to do the estimation at the firm level with a newly developed method, called synthetic DID. The method applies synthetic weights to units and time periods relaxing the parallel trends assumption in the DID estimator. The rich firm-level information also allows me to partially control potential confounders such as exporting status and ownership structure of firms. If the results are significant, I might further study whether there is foreign knowledge spillover entrepreneurship by looking at the dynamism of patenting startups.

At last, a general equilibrium model might be built to study the effects of import-related foreign knowledge flow on economic growth.

The effect of vertical startup acquisitions on innovation and growth

In addition to knowledge flow, changes in the market environment will also affect the pace of innovation and growth, as it will influence firms' profitability and survival. Startup acquisition is quite popular among dominant high-tech firms these years, and many of the integrations are along the supply chain. Some empirical evidence suggests that vertical integration is beneficial to innovation overall. However, many startup acquisitions are detrimental and often strictly scrutinized by the Federal Trade Commission (FTC). It is interesting to see whether the vertical startup acquisition is a benefit or not overall to innovation and growth.

Starting with data collection, I gathered all the merge and acquisition cases in the U.S. in the last forty years. I then identify vertical relations between target and acquirer firms using input-output tables. The resulting dataset will be merged with the USPTO patent dataset to approximately identify patenting startups. I can use these data to describe some stylized facts such as the popularity of vertical startup acquisition among total startup acquisitions and acquisitions, and target and acquirer firms' innovation before and after the acquisition.

In future research, I may combine some of the stylized facts from the data and build a growth model with startups and incumbents positioning differently along the supply chain, aiming to understand key determinants of overall effects of innovation and growth from the vertical integration and quantify the magnitude based on real data.

Attending the boot camp

Research in innovation and entrepreneurship is full of interesting, as well as challenging. There is no single dataset that can allow me to identify the knowledge spillover entrepreneurship. The interconnection between startup creation, vertical acquisition, and innovation may be far more complicated in the real world. Beyond what I am thinking currently, there are many other fundamental questions regarding the sources and consequences of entrepreneurship and innovation waiting to be answered.

The NBER Entrepreneurship Research Boot Camp provides me with an opportunity to learn from leading researchers in the fields of entrepreneurship and innovation. I will benefit a lot from their knowledge about entrepreneurship and innovation in the real world as well as frontier issues and topics regarding the economics of entrepreneurship and entrepreneurial finance. On the one hand, interactions with the boot camp researchers help me to fix ideas for my current research and refine my thinking about knowledge flow and startup integration. On the other hand, this opportunity also inspires me to explore more interesting research questions in the field. Besides, it's also a good chance to interact with many other PhD students who are interested in entrepreneurship and innovation.

I would like to strengthen my ability to use economics to better understand the innovation and entrepreneurship phenomena and to better help policymaking about innovation incentives. I believe the Entrepreneurship Research Boot Camp will facilitate my ability growth and may generate positive spillovers around my small cycle.

USCDornsife
Dana and David Dornsife
College of Letters, Arts and Sciences

DEPARTMENT OF ECONOMICS

February 15th, 2023

To the NBER Entrepreneurship Research Boot Camp (ERBC) selection committee:

I am writing this letter on behalf of **Zili Yang**, a third-year student in the economics department at the University of Southern California (USC), to strongly recommend him for inclusion in the NBER ERBC during summer 2023.

I have known Zili since he was registered in the first semester PhD class in macroeconomic theory that I teach, in academic year 2020/22. Zili earned an A- grade in that class, which students often find challenging relative to their prior macroeconomic theory education and relative to the other first semester core classes. Notably, Zili's first and second years were impacted heavily by COVID restrictions. I taught first semester Ph.D. macroeconomic theory entirely online, for example, and did not meet Zili in person until Spring 2022.

Zili contacted me in September 2022 for advisement on possible research topics. His ideas at that time were broad and preliminary, concerning topics in entrepreneurship and innovation. Additionally, Zili was eager to integrate formal industrial organization modeling (industrial organization is one of his Ph.D. coursework fields) within a macroeconomic innovation and growth framework (macroeconomics is another of Zili's Ph.D. coursework fields).

Over the last six months, Zili has worked hard to narrow his focus, and zoned in on studying how prominent start-up and supply chain vertical acquisitions by "giants" (Amazon, Microsoft, and Facebook for example) influence industry and aggregate innovation and growth. He has collected some preliminary data to quantify the aggregate importance of such acquisitions. I believe the topic has potential for novel empirical and theoretical results. In addition, Zili has solid analytical and strong statistical modeling skills which I believe place him in a strong position to complete a research paper in this area. Currently, Zili is working

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towards a third-year paper, which can be built upon for his Ph.D. proposal exam, dissertation, and job market paper.

Zili also has second research project involving a quantitative evaluation of China's openness to trade and imports for imitation, innovation, and growth. This project utilizes a dataset integrating Chinese firm level activity with firm level international patenting information. His collaborator is Yu Cao, a former Ph.D. student and current coauthor of mine, now a researcher at the World Bank's research hub in Malaysia. I am consequently confident that the dataset exists and is of high quality, and that the project is feasible and can constitute a chapter of Zili's dissertation.

I believe Zili's research progress and performance will be significantly improved by his participation in this Boot Camp. I know he will work hard on all related assignments, be well-prepared, and a diligent student. He will gain enormously from his participation, and I hope that you can support his application.

Yours faithfully,

Caroline Betts

Caroline Betts

Associate Professor

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