Max Planck Institute for Innovation and Competition

NBER Innovation Research Boot Camp 2025
National Bureau of Economic Research
1050 Massachusetts Avenue
Cambridge, MA 02138
USA

Cheng Li, M.Sc.
Doctoral Student and Junior Research Fellow
cheng.li@ip.mpg.de

Referee
Prof. Dietmar Harhoff, Ph.D.
Dipl.-Ing., M.P.A.
Director
dietmar.harhoff@ip.mpg.de

Munich, 3rd Feb. 2025

Dear Admissions Committee,

I am a second-year PhD student at the Max Planck Institute for Innovation and Competition, writing to express my sincere interest in participating in the NBER Innovation Research Boot Camp 2025. My research focuses on artificial intelligence, open-source communities, and innovation strategy—topics that draw upon emerging interests in innovation economics and management.

Along my previous studies, I have worked on interdisciplinary subjects in mechanical engineering, robotics and computer science. Transitioning from engineering background to the economics of innovation research has been challenging yet rewarding for me.

Through my PhD coursework, I developed a strong foundation in quantitative analysis and microeconomic modeling, and also gained hands-on experience by employing quantitative empirical research methods using Python, R, and MATLAB to conduct data-driven research. These skills have enabled me to explore the complex dynamics of emerging technology and disruptive innovation in a rapidly evolving field.

As an early-career researcher in the economics of innovation and innovation policy, I believe this program will offer an unique opportunity for me to learn from leading experts and connect with like-minded peers working at the frontier of innovation research. I would be very grateful if you can consider my application to participate in this Boot Camp. Thank you very much for your time and consideration!

Sincerely,

Cheng Li

Research Agenda

My current research investigates artificial intelligence and firm behavior in the field of innovation.

Patent-Level Representation for Prior Art Search: I examine how natural language processing (NLP) models can improve patent similarity ranking. Patent examiners, inventors, and researchers rely on prior art searches to assess novelty and patentability. Recent advancements in BERT-based NLP models offer new tools for this task by generating vector representations of patent texts. My study explores how leveraging claim-based representations from PaECTER can enhance prior art search through similarity ranking analysis. This work aims to improve patent retrieval models, benefiting both innovation researchers and patent offices.

When Do Firms Prioritize Patent Quality Over Quantity: I analyze firms' strategic patenting behavior within a duopoly model. In this setting, firms decide whether to prioritize the number of patents or their quality, balancing protection from imitation with potential licensing revenues. By deriving Nash equilibrium conditions under symmetric cost structures, I identify conditions under which firms favor quality over quantity. This analysis aims to provide theoretical insights into firm strategic patenting and its implications for competition and innovation policy.

Future Research

I plan to investigate the role of open-source communities in generative AI and the effects of generative AI on economics. While generative AI development is capital-intensive, the rise of small-scale open-source retraining projects—such as those on Hugging Face—has introduced new competitive dynamics. Understanding whether these non-market actors can counterbalance the dominance of large incumbent firms is crucial for competition policy. Given the economic significance of generative AI, this research will provide valuable insights into innovation policy and market structure.

Further, I intend to study the impact of the Unitary Patent System in Europe, which took effect on June 1, 2023, introducing significant changes to the global innovation landscape. The new system reduces the cost of European patenting while facilitating both enforcement and invalidation, making pan-European injunctions and patent revocations more likely. This raises important policy concerns, including the potential influx of low-quality patent applications and the implications of centralized litigation.

Motivation

Attending the NBER Innovation Research Boot Camp will allow me to deepen my understanding of innovation economics and refine my research skills. This is a unique opportunity for me to learn from leading scholars in the field and receive feedback from peers while engaging with the broader innovation research community to establish potential future collaborations.

Cheng Li

cheng.li@ip.mpg.de
linkedin.com/in/chengli2024



Summary

I am a second-year doctoral student at MPI for Innovation and Competition with a multi-disciplinary background in Engineering, Artificial Intelligence, and Innovation Economics. I have a strong passion for solving real-world problems using mathematical modeling, numerical simulations, and AI-driven methods. My research focuses on artificial intelligence, open-source communities, and innovation strategy—topics that draw upon emerging interests in innovation economics and management.

Experience

Doctoral Student and Junior Research Fellow
Max Planck Institute for Innovation and Competition
Jun 2023 - Present
Supervisor: Prof. Dietmar Harhoff

Patent Engineer
Wuesthoff & Wuesthoff
Jan 2022 - Jun 2023
Patent prosecution for AI and computer-implemented invention

Project Intern
Autowise.ai
Mar 2021 - May 2021
Autonomous road sweeper project with Marcel Boschung AG

Student Assistant
ETH Zürich
Jul 2020 - Feb 2021
AI algorithms acceleration and optimization

Research Intern
Huawei Enterprise Switzerland
Sep 2019 - Feb 2020
Software development for quantum computing open-source framework

Teaching Assistant for Engineering Math
Technische Universität Dresden
Sep 2016 - Jan 2018
Leading tutorials in engineering mathematics

Education

Ludwig-Maximilians-Universität München
Postgraduate Degree, Business Administration and Management
2023 - 2026

FernUni Schweiz
Bachelor of Mathematics, Online
Aug 2022 - Aug 2023
Completed Courses:
Algorithmics, Statistics and Discrete Structures, Analysis, Linear Algebra

ETH Zürich
Master's degree, Robotics system and control
2018 - 2021
Thesis: Data-driven analysis of the “Ranking quality” network formation model
Advisor: Dr. Nicolo Pagan, Prof. Dr. Wenjun Mei and Prof. Dr. Florian Dörfler

Technische Universität Dresden
Bachelor's degree, Mechanical Engineering
2015 - 2018
Thesis: Software Application for the analysis of live machine data
Supervisor: Prof. Ralph H. Stelzer

Licenses & Certifications

English C1 - IELTS Official

Test Deutsch - German C1 - German Language Center

The European patent system from filing to grant - European Patent Office

Skills

Mandarin • English • German • Python • Matlab and R

Honors & Awards

DAAD Stibet Graduation scholarship
Apr 2018

Completed PhD Courses

Core Courses:	**Grade: 1.0 (highest) to 6.0 (lowest)**
Basic Readings in Management	1.3
Quantitative Methods	1.0
Publishing with Mixed Methods	1.3
Scientific Publications	1.0
Microeconomic Methods	1.0
Experimental Methods	1.0
Elective Courses:	
Advanced AI in Businesses and Organizations	PASS
Competitive Strategy	PASS
Prep-course on Data Science with DataCamp	PASS
LMU-MPG Open Science Summer School 2024	PASS

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MAX-PLANCK-GESELLSCHAFT

NBER Innovation Research Boot Camp
National Bureau of Economic Research

Attn.: Brett Maranjian
maranjian@nber.org

Prof. Dietmar Harhoff, Ph.D.
Dipl.-Ing., M.P.A.
Managing Director
Tel.:+49 89 24246-550
Fax:+49 89 24246-599
dietmar.harhoff@ip.mpg.de

Munich, February 6 2025

Letter of Recommendation for Cheng Li

Dear members of the selection committee,

Cheng Li is applying for admission to the NBER Innovation Research Boot Camp. I confirm that Cheng Li is a 3rd year PhD student at the Max Planck Institute for Innovation and Competition and a member of our research team. He is enrolled in the collaborating PhD program at Ludwig-Maximilians-Universität in Munich.

Cheng is an outstanding student and has been extremely successful in his course work. He has embarked on two very ambitious research projects, one related to examination processes at the European Patent Office, the other on the application of transformer-based semantic analysis of publications using Open Alex data.

Cheng is unusually talented and brings great technical understanding from his robotics training at ETH Zürich and from his work at a patent law firm to bear. He has build a thorough understanding of innovation economics at an impressive speed. Intellectually and socially, he will make a great contribution to the NBER Boot Camp, should you decide to select him. I recommend him with great enthusiasm.

Sincerely yours,



Prof. Dietmar Harhoff, Ph.D.