Name: Nicolas Min

Contact (e-mail): nicolas.min@kellogg.northwestern.edu

Contact (phone): 214-770-1815

School: Kellogg School of Management at Northwestern University

Area of interest: Development, Entrepreneurship, and Corporate Finance

Year of entry into the PhD program: 2022

Expected year of completion: 2027 (or 2028)

Name of faculty member supplying letter of recommendation: Sean Higgins (sean.higgins@kellogg.northwestern.edu)

Nicolas Min

nicolas.min@kellogg.northwestern.edu

Education

Northwestern University | Kellogg School of Management Aug 2022 -

· Ph.D. in Finance (Expected Completion: 2027)
· *Relevant Courses*: Asset Pricing, Corporate Finance, Advanced Econometrics

University of California, Berkeley | Department of Statistics Aug 2020 - May 2021

· M.A. in Statistics
· *Relevant Courses*: Machine Learning, Causal Inference, Linear Modeling, Statistical Computing

University of California, Berkeley | Haas School of Business Aug 2013 - Aug 2017

· B.S. in Business Administration

Work in Progress

Impact of Artificial Intelligence on the Public Procurement Market June 2024 -

· Analyze the impact of AI-curated information on procurement competition and firms' bidding performance.
· Collaborate with Cliwant, an OpenAI-partnered startup.
· *RCT piloting under way.*

RA Experience

Northwestern University | Kellogg School of Management June 2023 -

· Investigated the behavioral factors that prevent small firms from adopting profitable opportunities.
· Analyzed the impact of lottery incentives on account openings and deposits.
· Explored heterogeneity in treatment effects using machine learning techniques such as Generic ML.

Stanford University | The Graduate School of Business Jun 2021 - Aug 2022

· Studied the effects of accounting policies on employment using U.S. Census and U.S. Bureau of Economic Analysis data.
· Examined the accounting labor market using LinkedIn and H-1B survey data.

University of California, LA | Anderson School of Management Aug 2017 - Dec 2017

· Developed financial analytics software using XBRL documents.

University of California, Berkeley | Haas School of Business Oct 2015 - May 2017

· Analyzed the monetary and societal effects of public policy proposals, court cases, and regulations.

Professional Experience

Ernst & Young · *Assurance Associate, Financial Services · SF, CA* Aug 2018 - Aug 2020

· Provided assurance services to venture capital, private equity, hedge funds, and fund of funds in the Bay Area.

Teaching Experience

Northwestern University | Kellogg School of Management Aug 2023 -

· FINC 472 - Wall Street, Hedge Funds, and Private Equity (Fall 2023, Fall 2024)
· BUSCOM 715 - Investment Banking and Private Equity (Fall 2023, Fall 2024)
· FINC 445 - Entrepreneurial Finance and Venture Capital (Spring 2024)
· FINCX 430 - Finance I for Executive MBAs (Spring 2024)

University of California, Berkeley | Department of Statistics Jan 2021 - May 2021

· STAT 33A - Introduction to Programming in R (Spring 2021)

Awards

University of California, Berkeley | Department of Statistics Apr 2022

· Outstanding Graduate Student Instructor Award

Skills	*License*: CPA, inactive (California) *Languages*: R, Python, SQL, Bash *Software*: Stata, LaTeX *Human Languages*: Fluent in English and Korean; conversational in Chinese
Other Information	*Miscellaneous*: U.S. Census Bureau Special Sworn Status *Certifications*: Deep Learning by DeepLearning.AI *Volunteering Activities*: Mentor Matching Engine Mentor, Spark Mentor *Citizenship*: U.S.A.

My Research:

How does novel Artificial Intelligence (AI) technology transform the public procurement market? Public procurement plays a crucial role in global economies, accounting for a significant share of GDP worldwide. An efficient procurement market is essential for both public service delivery and private sector growth (Ferraz, Finan, and de Alencar Szerman, 2015). However, inefficiencies, opacity, collusion, and corruption hinder competition (Bosio, Djankov, Glaeser, and Shleifer, 2022). In response, e-procurement reforms have sought to enhance transparency and competition. Yet, can increased transparency alone resolve procurement challenges?

My working paper explores an often-overlooked issue in e-procurement: **information overload**. Unlike previous research, which emphasizes the benefits of transparency or increased information, my paper highlights the unintended friction that arises when firms are overwhelmed with excessive data, impairing effective decision-making. While e-procurement mitigates inefficiencies, it inundates firms with extensive information. For instance, in South Korea, thousands of tenders with detailed Request-for-Proposals (RFPs) are posted daily, making it difficult for firms to process information effectively. Emerging AI technologies offer potential solutions by summarizing RFPs and assisting firms in drafting proposals. **My paper aims to study the magnitude of the benefit of this AI technology. I also examine whether these benefits are diminished in collusive market environments and investigate whether the technology fosters more competitive bidding and/or reduces collusion.** To explore this, **I partnered with Cliwant Inc., a VC-backed AI startup in South Korea, to conduct a randomized controlled trial (RCT).**

Reason for Wanting to Attend the Boot Camp:

Cliwant Inc., the AI startup I have partnered with, stands out in two key ways. First, the CEO is open to running randomized controlled trials (RCTs) and is highly interested in collaborating with a U.S. university to better understand the effect size of his product. Second, the company possesses a complete dataset of South Korean public procurement records from the past five years, to which I have already secured access. Given the company's willingness to conduct an RCT and the availability of extensive data, I anticipate uncovering additional insights beyond the research idea introduced above.

The lecturers and organizers of the boot camp have extensive experience partnering with startups and running RCTs. I hope to receive guidance from them on the specific research questions I can explore with my existing resources and the best approaches to conducting my study. From my interactions with Dean and Sean here at Northwestern, I have realized that research involving external partnerships often originates from inspirations or motivations that are not explicitly stated in the final paper. During lectures where researchers discuss their own work, I am eager to learn about what sparked their interest and to draw inspiration from their stories and approaches. Additionally, carefully reading a curated list of 50 key papers will help me generate new research ideas. This unique opportunity would be invaluable in refining my research.

Northwestern | Kellogg

Sean Higgins
Associate Professor of Finance
Kellogg School of Management
Northwestern University
sean.higgins@kellogg.northwestern.edu

February 2025

Dear colleague,

It is a pleasure to write this letter of recommendation for Nicolas (Nic) Min. **I very strongly recommend Nic for the NBER Entrepreneurship Research Boot Camp.**

Nic is a third-year PhD student in finance at Kellogg. I have been interacting with him frequently since he joined the program in September 2022: I was his assigned faculty mentor during the first year of his PhD, he has been working for me as a research assistant since the summer after his first year, I was the primary advisor for his second-year paper, and I am a member of his dissertation committee.

Nic's interest in entrepreneurship stems from his second-year paper, in which he closely collaborated with a venture-backed South Korean startup. The startup, Cliwant, uses artificial intelligence (AI) to curate information on public procurement auction requests for proposals (RFPs) in Korea and help firms identify which RFPs to bid on and to prepare their proposals; so far, the startup has raised capital from two venture capital (VC) firms, in addition to funding from OpenAI and Google for the use of their AI services. For his second-year paper, Nic analyzed data shared by Cliwant on the universe of government procurement auction RFPs and bids (including all bids in each procurement auction, i.e., both winning and losing bids, and not just the bids of Cliwant clients). Given the high-quality data on the universe of bids for each RFP (reminiscent of the data used in Kei Kawai's papers on Japanese procurement auctions) and the willingness of Cliwant to collaborate with Nic on a randomized controlled trial (RCT), this project has the potential to become Nic's job market paper. Nic is still brainstorming the exact research question and RCT design for such a paper, which is to be expected given his stage in the PhD.

Nic spent all of last month at Cliwant's offices in South Korea to develop and strengthen his relationships with the startup's CEO, C-suite executives, engineers, accountants, sales representatives, marketers, and designers. This time enabled him to better understand the business, analyze client data including client firms' bids, win rates, and contracts, conduct surveys of client firms, and share insights with Cliwant's CEO, laying the groundwork for the future RCT that he intends to run with Cliwant.

In addition to describing this promising project with a venture-backed startup, I wanted to highlight some of the skills Nic has developed during his PhD: in particular, he has become well-versed in the use of machine learning (ML) methods in economics and finance. Prior to starting the PhD program, Nic already had experience in ML from a course by Joshua Blumenstock at UC Berkeley

(where Nic received a B.S. from the Haas School of Business and an M.A. from the Department of Statistics), as well as from his time as a predoctoral researcher at Stanford where he used random forests and other ML algorithms to estimate the impact of a repatriation tax on the foreign investments of U.S. multinational firms. In the summer after his first year of the PhD, Nic began working for me as a research assistant, and the task I assigned him was to use ML methods to test whether treatment effects in a randomized controlled trial (RCT) we conducted with 34,000 firms were heterogeneous in a particular variable that we had prespecified. Because that variable was correlated with other variables, we sought to measure whether the residual variation in that variable predicted heterogeneous treatment effects (HTEs).

To complete this task, Nic first reviewed the relevant literature on the use of ML for causal inference. He then tested which model specification performed best for this prediction task by comparing out-of-sample root-mean-squared errors (OOS RMSEs) of various model specifications. With the best-performing model based on this OOS RSME test, he then estimated the predicted individual treatment effect (PITE) for every firm in our RCT and identified HTEs both graphically—by graphing PITEs against the variable of interest—and quantitatively. For the quantitative test, he formally tested whether the ML models identified a negative relationship between the PITE and the variable of interest. To account for the fact that PITEs are estimated using a statistical procedure, and that the PITE is a non-linear function of the variable of interest, he implemented a bootstrap of the entire process to estimate the probability that the partial derivative of the treatment effect with respect to the variable of interest is negative, measured at various points throughout the distribution. I have since also had Nic use ML methods (in particular, Chernozhukov et al., 2020) to test for HTEs in a data-driven way for two additional papers of mine.

I have an extremely high opinion of Nic and **very strongly recommend him for the NBER Entrepreneurship Research Boot Camp**. Please do not hesitate to contact me if you have any additional questions.

Sincerely,



Sean Higgins