# Cover Letter

Contact Information

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Ph.D. Program Advisor (Letter writer):

Nicholas C. Barberis

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Yale School of Management

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Dear Committee,

I am a second-year Ph.D. student in Financial Economics at Yale School of Management. My research interests lie in behavioral economics, corporate finance, and financial intermediaries. I am applying to the NBER Behavioral Macroeconomics workshop as I am eager to learn about the cutting-edge research in this emerging field and potentially dive into it in the future.

I have developed my interest in behavioral economics over working on related research projects. I started working with Professor Ulrike Malmendier as her research assistant in 2014 during my undergraduate exchange semester at UC Berkeley, and I later worked as her full-time research assistant from 2016 to 2018. Under her guidance, I investigated how past experiences shape individuals' or institutions' decision-making in various settings, including how banks' past under-capitalization experiences affect their future risk-taking behavior, how households' unemployment experiences have long-term effects on their consumption and wealth accumulation, etc. The compelling evidence we gathered suggests that people are not forming their expectations in a rational or Bayesian manner. Instead, their belief formation is biased by their personal experiences. There are still many open questions following this line of inquiry – How are the expectations of managers with different experiences aggregated in an institution? How can the biases in expectation be incorporated into macroeconomic models? How can we design contracts or policies that can take the non-rational beliefs into consideration?

With these questions in mind and the hope of understanding them deeper, I started my Ph.D. at Yale SOM, another great place to do research in behavioral economics.

During my Ph.D. study at Yale, I have been keenly equipping myself with advanced tools in economic theory and econometrics, and actively conducting independent research at the same time. In terms of academic performance, I have achieved a grade of H (Honors, equivalent to A in other institutions) in 6 out of 7 first-year Ph.D. courses. In terms of research, I have been working on a joint project with Mark Borgschulte (assistant professor at UIUC), Marius Guenzel (Ph.D. student at UC Berkeley), and Ulrike Malmendier. We exploit the introduction of anti-takeover laws in the mid-1980s to show that stricter monitoring regimes have significant implications on a previously undocumented yet important aspect of personal cost -- CEOs' health and life expectancy. On the other hand, we find no evidence that the compensation differential is reflecting this personal cost of health. Furthermore, we use machine learning based method to detect visible signs of aging in the pictures of the CEOs, and find that experiencing distress shock during the 2007-2008 recession increases a CEO's apparent age by roughly one year. The project is still ongoing, but has been invited for presentation in selective conferences like NBER Organization Economics Fall Meeting and AFA Annual Meeting. In another ongoing project with Jingxiong Hu (Ph.D. student at Northwestern) and Jiaheng Yu (Ph.D. student at MIT), we study how the introduction of investment banks as an alternative venue for end-of-day trading affects the close price informativeness. We first provide empirical evidence showing that the price informativeness has increased after the investment banks began doing the end-of-day trading business. Then we offer a theoretical framework illustrating the information amplification mechanism. The paper has been invited for presentation in MFA Annual Meeting 2020. I have also started an early-stage project with Yang You (Ph.D. student at Harvard) where we study how the income or wealth shocks affect households' stock market trading activities using panel surveys from different countries.

In my future work, I hope to further apply the tools I have learned into research in behavioral economics and its interaction with other fields. The NBER Behavioral Macroeconomics workshop would be a great opportunity for me to get exposed to the novel and exciting research that are going on at the interaction of behavioral and macroeconomics. I sincerely hope that I can be a participant in the workshop and get the chance to learn about this new field and interact with the brightest peers interested in similar questions.

# Canyao Liu

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Research Interests: Behavioral Economics, Corporate Finance, Financial Intermediaries

## Education

**Yale University** *New Haven, CT*
Ph.D. in Financial Economics 2018 - Present

**Tsinghua University** *Beijing, China*
B.A. in Economics; B.S. in Mathematics 2012 - 2016
- Graduation with Distinction (GPA: 93/100, 3.95/4.00, Top 2%)
- Exchange student at University of California, Berkeley in Fall 2014

## Working Papers

**"CEO Stress and Life Expectancy: The Role of Corporate Governance and Financial Distress"** (with Mark Borgschulte, Marius Guenzel, and Ulrike Malmendier)

***Abstract***: Optimal pay-for-performance aligns managerial incentives with shareholder interests in the presence of private benefits. We focus on one source of private benefits—CEOs' health and longevity—and show that stricter monitoring regimes have significant adverse consequences for managers' long-term health. Our identification exploits the introduction of anti-takeover laws in the mid-1980s, as well as exposure to industry-wide downturns. Using hand-collected data on the dates of birth and death for more than 1,600 CEOs of large, publicly listed U.S. firms, we estimate that CEOs' lifespan increases by around three years when insulated from market discipline via anti-takeover laws. Our conclusions are not driven by differences in tenure associated with exposure to the laws. We estimate similar effects on longevity from exposure to industry-wide downturns during a CEO's tenure. Finally, we utilize machine-learning based age-estimation software to detect visible signs of aging in pictures of CEOs who experience distress shocks. Using a difference-in-differences design, we estimate that exposure to a distress shock during the Great Recession increases CEOs' apparent age by roughly 1 year over the next decade. The apparent lack of a compensating differential casts doubt on whether all parties rationally account for the health implications of different governance regimes.

***Presentations***: AFA Annual Meeting 2020 (*scheduled*), Finance, Organizations and Markets (FOM) 2019 Conference (*scheduled*), NBER Organizational Economics 2019 Fall Meeting

**"End-of-day Trading via Banks"** (with Jingxiong Hu and Jiaheng Yu)

***Abstract***: Investment banks like Goldman Sachs have started a "guaranteed close" business where investors looking to buy or sell shares of a certain stock can get a guarantee from the investment bank to honor their orders at the closing price set on the primary exchange. Using the TAQ data from 2012 to 2018, we find that when the fraction of off-exchange at-close-price trades increases, the informativeness of closing price increases. We develop a model featuring three trading venues: regular session, close auction, and bank's close service; and three types of investors: index funds, liquidity traders, and informed traders, who endogenously choose trading venues. A bank conducting "guaranteed close" business competes with the exchange on transaction fees, and gains profit from both transaction fees and trading strategically utilizing the order flow information. Our model shows that the introduction of the bank as an alternative closing venue improves price discovery at the market close by concentrating the price-relevant information into the exchange, absorbing the uninformed noise orders and amplifying the informed orders.

***Presentations***: MFA Annual Meeting 2020 (*scheduled*)

## Professional Experiences

**Full-Time Research Assistant** 2016 - 2018
Sponsoring Researcher: Professor Ulrike Malmendier *Berkeley, CA*

- Built up a novel database on the balance sheets, income statements, and executives of 420 historical U.S. large banks from 1928 to 2015. Investigated the relationship between banks' past experiences and their risk-taking behavior over a long time horizon.
- Used Panel Survey of Income Dynamics database to study the long-term effects of households' past unemployment experiences on their consumption and wealth accumulation.
- Worked on other projects related to the experience effects hypothesis, e.g., the effects of inflation experiences on household mortgage choices, the effects of inflation experiences on FOMC members' policy stance, etc.

## List of Ph.D. Courses

**Yale University** 2018 - Present

General Economic Theory: Microeconomics (Fall 2018) – Grade: H
Econometrics I (Fall 2018) – Grade: H
Financial Economics I (Fall 2018) – Grade: H
General Economic Theory: Microeconomics (Spring 2019) – Grade: H
Econometrics II (Spring 2019) – Grade: H
Empirical Corporate Finance (Spring 2019) – Grade: H
Empirical Asset Pricing (Spring 2019) – Grade: HP
General Economic Theory: Macroeconomics (Fall 2019) – Grade: In progress
Industrial Organization I (Fall 2019) – Grade: In progress
Machine Learning and Data Mining (Fall 2019) – Grade: In progress
Continuous-Time Finance (Fall 2019) – Grade: In progress

**University of California, Berkeley** Fall 2014

Economic Theory (Fall 2014) – Grade: A
Political Economics (Fall 2014) – Grade: A+
Foundations of Psychology and Economics (Fall 2014) – Grade: A-

## Honors & Awards

Yale University Fellowship 2018 - 2023
Academic Excellence Scholarship, Tsinghua University 2013 - 2016
Spark Academic Talent Program (Top 2%), Tsinghua University 2014 - 2016
Outstanding Winner (Top 0.4%), Mathematical Contest in Modeling (MCM/ICM) 2015
Goldman Sachs Scholar, Goldman Sachs - Beijing 2014

## Miscellaneous

Programming: R, Python, Matlab, Stata; Language: English (Fluent), Mandarin (Native)

## Reference

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December 8th, 2019

Dear Behavioral Macro Bootcamp Admissions Committee:

This is a letter for **Canyao Liu**, a second-year Yale PhD student who is very interested in attending the behavioral macroeconomics bootcamp. My letter is short, but hopefully informative.

Canyao is very good and really wants to attend the camp. Obviously, I don't have the full set of applicants in front of me, so it would be a bit forward of me to say that you "must" take him – but I would be quite surprised if you didn't take him, given his preparation and talent.

A few things about Canyao:

First, he has a lot of experience in behavioral economics. Before starting the PhD at Yale, he did a *two-year* full-time research apprenticeship with Ulrike at Berkeley, working largely on behavioral papers. So he has a strong foundation in behavioral work. Now, he wants to learn the cutting-edge stuff in behavioral macro.

Second, he is doing *very* well in the PhD program – rarely has a second-year student looked this good. He has been a star in the coursework, getting the highest grade of H ("Honors") in almost all the courses he has taken. And all the more impressive is that he is working on research at the same time. He is a co-author with Ulrike, on a very interesting paper on CEO stress. And he wrote a pretty sophisticated first-year paper on stock trading. It is clear that he is very serious, smart, and hard-working. (I'll add that he is also a very nice and pleasant fellow, and will interact well with other attendees.)

Third, he really wants to come to the bootcamp. He has all but committed to writing a behavioral economics dissertation, and he specifically wants to work on a macro angle. He contacted me as soon as the announcement came out, and has nudged me about it several times since then.

I suppose the one thing he doesn't have yet is his own (i.e. not with Ulrike) exciting behavioral paper. But there's very few, if any, second-year graduate students who do.

To repeat, then, I hope you can take him. Obviously it depends on your opportunity set, but I'd be surprised if there are many applicants who can match Canyao's preparation, talent, and enthusiasm.

Yours sincerely,



Nick B.