Littauer Center of Public Administration
1805 Cambridge Street
Cambridge, MA 02138

December 8, 2019

To Whom It May Concern:

I am a fourth-year PhD student at Harvard University with research at the intersection of macroeconomics, behavioral economics, and finance. I am writing to apply for the Behavioral Macroeconomics Research Boot Camp. In attending the Boot Camp I am hoping to deepen my knowledge of current research in behavioral macroeconomics in order to continue my own work in the field. The Boot Camp will be a perfect way to accomplish this goal. Lectures will cover the latest research advances, and discussions with Boot Camp participants will help to generate interesting future research ideas.

As detailed in my separate application essay, my dissertation research centers on behavioral macroeconomics. In particular, projects to date study the macro-financial impact of extrapolative expectations and the aggregate effects of present-biased preferences at the household level. Complementing this research, my earlier coursework was heavily focused on macroeconomics, behavioral economics, and finance. The Boot Camp comes at a great time, as I will be able to immediately apply this unique experience to my ongoing research.

In addition to my application, a letter of reference will be sent separately by Professor David Laibson. Should you have any questions, please do not hesitate to contact me at petermaxted@g.harvard.edu. Thank you very much for your consideration.

Sincerely,
Peter Maxted

PETER MAXTED

petermaxted@g.harvard.edu

EDUCATION

Harvard University *2016-Present*
Ph.D. Candidate in Economics

- **Primary Fields:** Macroeconomics, Behavioral Economics, Finance
- **GPA:** 3.97 **Distinctions:** NBER Fellowship in Retirement Research; Harvard Pre-Dissertation Fellowship

Swarthmore College *2010-2014*
B.A. in Economics, with High Honors; Minor in Computer Science & Mathematics

- **Distinctions:** Phi Beta Kappa

RESEARCH PAPERS

"A Macro-Finance Model with Sentiment" (Mimeo) *2019*

- Studies the effect of extrapolative expectations on financial market and macroeconomic dynamics

"Eliminating Equilibrium Pathologies in Models with Present-Biased Discounting" (Mimeo) (with David Laibson) *2019*

- Develops theoretical and numerical methods for solving incomplete-markets consumption models when individuals have present bias

"Estimating Discount Functions with Consumption Choices over the Lifecycle" (Mimeo) (with David Laibson, Andrea Repetto, and Jeremy Tobacman) *2019*

- Combines field data with a lifecycle model to structurally estimate household time preferences

"Self-Control in Consumption Models" (Mimeo) *2018*

- Analyzes subgame perfect equilibria in consumption models with present-biased agents

"Aiyagari-Bewley-Hugget Meet Laibson in an Incomplete Markets Model" *In Progress*

"Consumption Booms from Home Equity Extractions" (with David Laibson and Benjamin Moll) *In Progress*

"The Consumption Response to Income Expectations: Evidence a from Field Experiment" (with Christopher Roth and Johannes Wohlfart) *In Progress*

PROFESSIONAL ACTIVITIES

Presentations: NBER Behavioral Finance Meeting (2019), SITE: Psychology and Economics (2019)

Teaching: Macroeconomic Theory (2019, 1st-Year Ph.D. Course), TF for Professor David Laibson

Workshops: Summer School on the Cognitive Foundations of Economic Behavior (2019), RSF Summer Institute in Behavioral Economics (2018), Princeton Initiative (2018), Macro Financial Modeling Summer Session (2018), briq Summer School in Behavioral Economics (2017)

OTHER EMPLOYMENT

Harvard University & The National Bureau of Economic Research *2014 - 2016*
Research Assistant *Cambridge, MA*

- Professors John Beshears, James Choi, David Laibson, and Brigitte Madrian

YEAR ONE COURSES

- ECON 2010A: Microeconomic Theory
- ECON 2010B: Microeconomic Theory
- ECON 2010C: Macroeconomic Theory
- ECON 2010D: Macroeconomic Theory
- ECON 2030: Psychology and Economics
- ECON 2110: Econometrics I
- ECON 2120: Intro to Applied Econometrics

YEAR TWO COURSES

- ECON 2530A: International Trade
- ECON 2530B: International Finance
- ECON 2532: International Macroeconomics and Finance
- ECON 2723: Asset Pricing
- ECON 2725: Corporate Finance and Banking

INTRODUCTION

In applying to the Behavioral Macroeconomics Research Boot Camp I am hoping to both expand my knowledge of current research in behavioral macroeconomics and meet other economists with shared interests, all towards the goal of continuing my own work in the field. Boot Camp lectures will put me at the forefront of cutting-edge research in behavioral macroeconomics, and discussions with classmates and faculty will afford me the opportunity to develop the ideas that emerge. As a fourth-year student in the Harvard Economics PhD program, both my coursework and dissertation research are centered at the intersection of macroeconomics, behavioral economics, and finance (see attached course list and research details below). I am excited to continue developing my studies in this field through the Boot Camp.

ATTENDANCE RATIONALE

My first reason for applying to attend the Boot Camp is that lectures will provide a great opportunity for me to see new research and learn from prominent economists in the field. Lectures should span a wide range of topics in behavioral macroeconomics and will allow me to gain first-hand exposure to this research. In addition to learning about new research, I am also interested in understanding how this research is being framed within the broader field — what questions are behavioral insights helping to answer, what methodological tools are required, and how are findings most effectively communicated to both macroeconomists and behavioral economists?

Second, I hope that attending the Boot Camp will inspire new research ideas. By bringing together both faculty and graduate students with a shared goal of advancing research in behavioral macroeconomics, the Boot Camp will feature an active discussion on the macroeconomic puzzles that behavioral economics can help to solve. Indeed, the stated goal of this Boot Camp is to "promote research activity in behavioral macroeconomics," and given my research interests this is exactly the sort of discussion that I want to be a part of!

Finally, the Boot Camp will be a terrific way to meet other graduate students whose research interests are so close to my own. These friendships, and potential coauthorships, will be beneficial as I continue developing my research. I am excited to be a member of a community of scholars pursuing a shared research objective in this emerging field, and the Boot Camp will be a great way to build this community.

RESEARCH SUMMARY

I am currently developing six behavioral macroeconomics projects spanning two lines of research, the first studying expectation formation and the impact of non-rational expectations on macroeconomic outcomes, and the second studying the aggregate implications of present bias. My main expectations project to date uses a continuous-time macroeconomic model with financial frictions to study the impact of extrapolative expectations on financial crises and macroeconomic dynamics more broadly. I recently presented this project at the NBER Behavioral Finance Workshop. My second expectations project is a field experiment, joint with Christopher Roth and Johannes Wohlfart, that studies the consumption response to changes in long-run wealth expectations. Nielsen Consumer Panel participants are surveyed about long-run stock market and home price expectations, and then provided with an information intervention to exogenously shift beliefs. Using Nielsen's expenditure data, we will be able to study how changes in these long-run expectations alter household consumption-savings decisions.

My second line of behavioral macroeconomics research investigates the macroeconomic implications of present bias. In joint work with David Laibson, Andrea Repetto, and Jeremy Tobacman we estimate a structural two-asset incomplete-markets model in order to study the joint accumulation of costly liquid consumer debt and low-returning illiquid wealth. One known difficulty of using present-biased time preferences is that they can introduce *consumption pathologies* — consumption policy functions that violate continuity and monotonicity— which inhibit consumption-savings models utilizing present-biased preferences from making stable and reliable predictions. My second project, also with David Laibson, proposes a simple method for eliminating consumption pathologies: use monthly (or shorter) period lengths. When combined with calibrated levels of background noise, we find that this effectively eliminates pathologies. Building on this result, my third project develops methods for solving general equilibrium heterogeneous agent models when individuals have present-biased preferences. These methods are applied in a project with David Laibson and Benjamin Moll that examines the effect of present bias on the refinancing channel of monetary policy.

Gmail by Google

Elisa Pepe <epepe@nber.org>

joint letter for NBER Behavioral Boot Camp

Shleifer, Andrei <shleifer@fas.harvard.edu> Wed, Dec 4, 2019 at 7:00 AM
To: Elisa Pepe <epepe@nber.org>
Cc: Yuriy Gorodnichenko <ygorodni@econ.berkeley.edu>

Dear Elisa and Yuriy,

This is a brief joint letter for 6 Harvard Ph.D. students whom I work closely with applying for the Behavioral Macro bootcamp. They are all part of a group I am advising in this space, and they work together, come to same informal group meetings, and are generally part of a small community. They are also all amazingly good.

I would divide them into the "older" thesis writing category, and the "younger" starting out category, although even people in the younger category are actively doing research.

Older category includes Francesca Bastianello, Paul Fontanier, and Peter Maxted. All three are very talented and technically strong, all have completed first rate papers. I think all three are on the market next year, and all were in the very final few for the Sloan pre-doc last year (Francesca got it). (I think they may also all be getting letters from same people who are recommending them for pre-docs.) So I think at this point you are familiar with all of them.

Let me write two sentences about each of the other three -- all of whom I have known for some time because all three were Harvard undergraduates.

Spencer Kwon is a G2, and a very rare person I have seen as a Ph.D. student who has the intellectual ambition and potential to do transformative work. If there is a limit on how talented he is, I have not detected it. I can tell many stories, but this is not the place. Mike and Andrew can provide first hand testimony from the Sloan-Nomis camp.

Johnny Tang is a G2. He is specializing in finance, was at Nick Barberis camp last summer (Nick loved him), has fantastic empirical skills and is doing incredibly well in the program. He is working on a very exciting project with Spencer. He also happens to be just a great person, totally beloved by everyone in his class (it is a Canadian effect, I suppose).

Suproteem Sankar is a G1. He comes with a Computer Science background, went to Sloan Nomis like Spencer before starting grad school, seems to have placed out of most of G1 classes even though he did not major in economics as an undergraduate, and is figuring out what he wants to do. I recently saw his resume (he is applying for the Soros fellowship for first generation americans) and was quite stunned by his accomplishments, which he had not told me about. He is extremely bright and is looking for what he wants to do. I would love to draw him into this field -- his potential is enormous.

I hope this is helpful.

Warm regards,

as

HARVARD UNIVERSITY
DEPARTMENT OF ECONOMICS
CAMBRIDGE, MA 02138

DAVID LAIBSON
ROBERT I. GOLDMAN PROFESSOR OF ECONOMICS
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617-496-3402 (PHONE), 617-495-8570 (FAX)

December 9, 2019

Dear Behavioral Macro Boot Camp Admissions Committee Members,

I am writing to give my *strongest possible* recommendation to **Peter Maxted**, an applicant for your Boot Camp. Peter is a fourth-year doctoral student at Harvard with research interests in finance, macroeconomics, and computational methods. He also has special expertise in continuous time methods (having worked on independent research in this area and also taken a course from Ben Moll who was visiting Harvard at the time).

I'll discuss Peter's work chronologically. His likely job market paper is the one that I will come to last.

From June 2014 to July 2016, Peter worked as a full-time research assistant (and very quickly became a coauthor) at the National Bureau of Economic Research and Harvard University for me and my coauthors John Beshears, James Choi, Brigitte Madrian, Andrea Repetto, and Jeremy Tobacman. In August 2016, Peter stopped working with me and started the doctoral program in Economics at Harvard University. After three and a half years at Harvard, Peter is clearly *the leading student in his doctoral class* of 30 students (this ranking is based on his grades and, more importantly, stunning progress on six papers, some of which I will turn to below).

Reading a recently published paper during his first year of graduate school about poverty traps (published in *Econometrica*),[1] Peter realized that the results would break down as the time-periods went from years (which is the time unit used in the paper) to shorter periods, like quarters, or any period shorter than that. The poverty trap in the original paper completely vanishes when the time periods get (realistically) small. The poverty trap in the original paper depends on people having present bias for a one-year horizon -- e.g., the "present" is one year long -- which runs contrary to the available evidence that the psychological present is only a day or a week long. This insight about the fragility of the theoretical poverty trap was missing in the original *Econometrica* paper. Peter has now finished a response paper that, in my view, powerfully rebuts the original paper and should also be published in *Econometrica*. It is very rare for a student to have their own important, completed paper during their second year of graduate school.

He is also working with me and Ben Moll (Princeton) on a technically challenging paper that models mortgage refinancing decisions, refi cash-outs, and the consumption boom that added fuel to the housing bubble. This paper demonstrates how powerful monetary policy can be in an economy with present-biased agents who are living pay-check to pay-check and have home equity that they cash out when interest rates fall. These cash-out refinancings deplete the net worth of households, create a short-lived "sugar-high" for the aggregate economy, and set the stage for asset bubbles and subsequent recessions.

Peter and I have completed another paper that demonstrates how continuous-time methods and, even *small-time-step discrete-time methods* overcome all of the technical problems (e.g., multiple-equilibria and pathological policy functions) that have plagued standard discrete-time models of lifecycle savings by agents with present-biased preferences. The key insight is that small amounts of high frequency noise (e.g., small liquidity shocks that hit the household each quarter) are enough to smooth out the game theoretic (strategic) considerations that make multiple-self models otherwise problematic to solve. This paper is also very close to completion and will be submitted to *Econometrica* soon. Here too, most of the key insights that paved the way for this paper came from Peter.

[1] Bernheim, B. D., Ray, D., & Yeltekin, Ş. (2015). Poverty and self-control. *Econometrica*, *83*(5), 1877-1911.

Finally, Peter has two other solely authored projects. I'll summarize the one that he just completed (which may be his job market paper). In this paper, Peter uses continuous-time methods to model extrapolative expectations in a GE macro and asset pricing setting with frictions. This framework allows him to powerfully generalize a much more limited class of extrapolative models. He has titled this project "A Macro-Finance Model with Sentiment." This work explores and extends the view that financial distress is sometimes engendered by unwinding of earlier over-optimism. And it also emphasizes GE feedback loops, which I will explain below.

Specifically, Peter's extrapolation paper develops a tractable and portable method for extending rational models by incorporating a continuous-time variant of diagnostic expectations (Bordalo, Gennaioli, Shleifer 2018). Diagnostic expectations are a forward-looking theory of extrapolative expectations in which agents overweight future states that are representative of the types of new information that are likely to be realized by the true data generating process. Diagnostic expectations imply that when recent shocks have tended to be positive, sentiment will be elevated and agents will be overoptimistic about future economic growth (and vice versa when shocks have recently been negative). Peter generalizes earlier work by applying diagnostic expectations to endogenous settings (i.e., GE) where feedback from expectations to the real economy is likely to arise. Accordingly, economic fundamentals affect expectations, and expectations feed back to alter the evolution of the aggregate economy, thereby further influencing the evolution of expectations.

To illustrate these feedback dynamics, Peter generalizes He and Krishnamurthy (2019), which is an RBC model with a financial intermediary and frictions. The intermediary faces an occasionally inability to raise equity funding; these financial frictions become more likely to bind as the intermediary finds itself in a more precarious position.

Three results arise from the model. First, the model quantifies how elevated sentiment contributes to future financial crises by lowering the realized returns earned by the financial sector. This channel implies that sentiment plays a critical role in amplifying financial market vulnerability.

The model's second prediction is that financial crises are *less* likely to occur when expectations are diagnostic than when they are rational. This unexpected finding contradicts the more common narrative that extrapolative expectations create financial instability. This counter-intuitive *stability* from diagnostic beliefs arises because sentiment tracks recent economic shocks, and therefore sentiment is typically depressed as the economy nears a financial crisis. Excessive pessimism leads the financial sector to earn higher returns than expected, thus allowing the financial sector to more quickly rebuild its balance sheet than it would in the alternative world with rational beliefs.

Third, the model demonstrates how diagnostic expectations interact with nonlinear financial frictions to generate boom-bust cycles in the real economy (e.g., investment). When sentiment is elevated, investment will rise because capital prices are relatively high. This generates a boom in investment. However, elevated sentiment leads to deterioration in the financial sector's balance sheets, which increases financial frictions and impairs investment. The sentiment effect occurs sooner than the balance sheet effect, so the economy goes through a sentiment-driven boom in the short run followed by a financial-frictions bust.

This is likely to be an important paper because it is ties non-rational belief models to a GE framework where distorted beliefs feed back into the model and affect the economic fundamentals on which beliefs are based. The paper also yields many surprising results that challenge our preconceived beliefs about how extrapolative beliefs change the economy's vulnerability to financial crises.

In addition to being an extraordinary researcher – years ahead of the other students in his cohort at Harvard – Peter is also a remarkable member of our community: extremely mature, sophisticated, wise, humble, and always interested in the perspectives of others. He has an open mind. He is a great communicator and a kind person. He loves meeting new people and sharing ideas. He is deeply concerned about the well-being of others. He is compassionate and easy-going. He has a great sense of humor, ironclad modesty, and is a wonderful member of our academic community. I predict he is going to do highly influential work and that he is going to prized as a colleague.

Putting it all together, I predict that Peter will be a leading scholar in his generation of economists. I give Peter my ***strongest possible recommendation*** for your Boot Camp. I see a student with Peter's promise only once every five years in Harvard's doctoral program. Please let me know if I can be of any further assistance in evaluating this extraordinary young scholar and outstanding young person.

Sincerely,



David Laibson, Robert I. Goldman Professor of Economics, and Director, Foundations of Human Behavior Initiative