12/04/2019

National Bureau of Economic Research
1050 Massachusetts Ave., Cambridge, MA
02138

NBER Behavioral Macroeconomics Research Boot Camp

Dear NBER Behavioral Macroeconomics Research Boot Camp Review Panel,

I hope this cover letter finds you well. Please find below my application package for the NBER Behavioral Macroeconomics Research Boot Camp. You will find a research statement prepared for the application, as well as an expanded CV with undertaken graduate-level coursework. My recommender will be Prof. Emmanuel Farhi (Harvard University).

Please let me know if there is any further information that would be relevant to the Review Panel.

Best Regards,
Adriano Fernandes
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Adriano Henrique Fernandes

Contact Information

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Brazilian National

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Education

Harvard University August 2018 - Present

Ph.D. Student, Economics
Primary Fields: Finance, Macroeconomics
Secondary Fields: Behavioral Economics
Honors: Claudio Haddad Family Fellow

Columbia University August 2012 - May 2016

Bachelor of Arts, Economics, Mathematics
Honors Thesis: Salience Distortions and Asset Prices in Dynamic Economies
Advisor: Prof. Michael Woodford
Honors: Phi Beta Kappa (Junior Class), Summa Cum Laude, Sanford S. Parker Prize for Outstanding Student in Economics, Departmental Honors, Dean's List

References

Prof. Emmanuel Farhi
Robert C. Waggoner Professor of Economics — efarhi@fas.harvard.edu
Department of Economics, Harvard University — 617-496-1835

Prof. Michael Woodford
John Bates Clark Professor of Political Economy — mw2230@columbia.edu
Department of Economics, Columbia University — 212-854-1094

Research in Progress

Dynamically Salient Returns September 2019
Salience Theory extended to dynamic settings, application to Consumption CAPM. Salience generates non-trivial risk premium in calibration. SMM objective function and estimates in US data suggest weaker effects: SDF (risk aversion) and salient thinking go in opposite directions, former dominates. (Draft available upon request)

Research Experience

Research Assistantships (Harvard University)
Prof. Emmanuel Farhi — June 2019 - October 2019
Prof. Nathan Hendren — April 2018 - June 2018

Pre-Doctoral Fellow (Harvard University)
Education Innovation Laboratory, Prof. Roland Fryer — July 2016 - March 2018

Undergraduate Research (Columbia University)
Honors Thesis: *Salience Distortions and Asset Prices in Dynamic Economies*
Advisor: Prof. Michael Woodford — Spring 2015 - Fall 2016
Junior Seminar: *Preferences over Collective Decision-Making versus Private Contracting: an Experimental Pilot*
Advisor: Prof. Alessandra Casella — Spring 2015
Research Assistant to Prof. David Weinstein — Spring 2015

Graduate Training

Field Courses
Asset Pricing (Prof. Campbell), In Progress
Corporate Finance and Banking (Prof. Hanson, Prof. Sunderam), In Progress
Macro-Finance: Rational and Behavioral (Prof. Gabaix), In Progress
Psychology and Economics (Prof. Laibson, Prof. Shleifer), Completed

First-Year Microeconomics Sequence (Completed)
Price Theory (Prof. Glaeser)
Competitive Game Theory (Prof. Maskin)
General Equilibrium and Contract Theory (Prof. Hart)
Social Choice, Cooperative Games, and Mechanism Design (Prof. Green)

First-Year Macroeconomics Sequence (Completed)
Dynamic Optimization Methods (Prof. Laibson)
Economic Growth (Prof. Barro)
Business Cycle Theory (Prof. Farhi)
International Macroeconomics and Macro-Labor (Prof. Karabarbounis)

First-Year Econometrics Sequence (Completed)
Principles of Econometrics (Prof. Tamer)
Econometric Methods (Prof. Andrews)

Other Graduate-Level Coursework
Microeconomic Theory II, Harvard Kennedy School, PhD (Prof. Avery)
Econometrics I, Columbia, PhD (Prof. Bai)

Awards and Fellowships

Harvard University
Claudio Haddad Family Fellowship

Columbia University

Phi Beta Kappa (Junior Class)	January 2016
Sanford S. Parker Prize, Economics Department	May 2016
Summa Cum Laude	May 2016
Departmental Honors, Economics Department	May 2016
Dean's List	August 2012 – May 2016

Presentations and Talks

Columbia Economics, Honors Thesis Seminar	April 2016
Columbia Economics, Decision and Cognition Lab	April 2016
NYU Economics, Special Projects in Economic Research (M.A.)	December 2015

Summer Schools

Sloan-NOMIS: Cognitive Foundations of Economic Behavior	July 2019

Teaching Experience

Teaching Assistant (at Columbia)

Cognitive Mechanisms and Economic Behavior (Prof. Woodford)	Spring 2016
Introduction to Econometrics (Prof. Erden, Prof. Rokkanen)	Fall 2015, Fall 2016
Introduction to Econometrics (Prof. Conlon, Prof. Rothe)	Spring 2015

Professional Experience

Morgan Stanley LLC, Ronald B. Fisher Scholar	Summer 2015
McKinsey and Company	Summer 2014
ANIMA Investments	Summer 2013

Languages and Software Skills

- **Programming:** Stata (proficient), Matlab (proficient), LaTeX(proficient), zTree (working knowledge)
- **Languages:** Portuguese (native), English (fluent), Spanish (intermediate), Japanese (basic)

Research Statement
Cognitive Limitations, Asset Prices and Macro Dynamics

Adriano Fernandes*

I am a second-year graduate student in the Department of Economics at Harvard University. My broad research interests lie in the intersection of Finance, Macroeconomics and Behavioral Economics. In particular, I am drawn to the positive and normative implications of deviations from the perfectly rational benchmark in canonical models of asset pricing, consumption dynamics, and business cycles. My view is that there are strong complementarities between these fields. On one hand, behavioral economics can provide alternative assumptions that can explain anomalies in perfectly rational models. On the other hand, theoretical models and datasets from macroeconomics and finance can be seen as rich "fields" to test the plausibility of behavioral models.

This is reflected on my ongoing work, which tractably extends salience theory (Bordalo, Gennaioli and Shleifer 2012) to a dynamic setting and incorporates it in a canonical consumption-based asset pricing model. The extension is valid for any dynamic economy in which the endowment process is Markov. I then study the implications to the equity risk premium puzzle, and illustrate how simulation methods can be used not only to estimate parameters of behavioral models, but also to disentangle the relative forces of standard parameters (e.g. risk aversion) and behavioral forces (e.g. salience). There is much more I would like to explore. On the behavioral side, there are alternative and simpler specifications of salience as in Koster and Dertwinkel (2019), which would allow to simplify the model considerably and allow for more trivial GMM estimation. On the more rational side, extensions to Epstein-Zin preferences would allow me to relate the model to the cross-section of stock returns (Cosemans and Frehen, 2017), and heteroscedastic endowment processes would allow me to investigate how salient thinking affects predictability.

While my current work exemplifies what motivates me to explore the intersection of macroeconomics, finance, and behavioral, it by no means exhausts the range of ideas that attracts me to these fields. This summer, I worked as a research assistant for Prof. Emmanuel Farhi in the intersection of macro-finance, behavioral, and welfare economics. The project posed one central question: how should a planner conduct macroprudential regulation and monetary policy in an over-levered economy with extrapolative agents?

We studied a stylized economy with nominal rigidities, labor wedges, and portfolio restrictions. When households can only save through intermediaries, whose consumption in turn depends on household deposits, aggregate demand externalities arise. In a rational world, monetary policy tackles labor wedges but has no ammunition for fixing excessive leverage, which must be tackled by macroprudential taxation on borrowing. In an extrapolative world, however, belief externalities arise. Even in the absence of macroprudential instruments, monetary policy can influence debt levels by changing asset prices and thus beliefs, in line with the valuation and credit supply channels of monetary policy emphasized in the recent literature on credit cycles.

*Harvard University, Department of Economics. Research Statement prepared for the application to Behavioral Macroeconomics Research Boot Camp for Graduate Students, sponsored by the National Bureau of Economic Research and the Alfred P. Sloan Foundation. E-mail: adrihfernandes@g.harvard.edu

The optimal macroprudential taxes then simultaneously target aggregate demand and belief externalities, with non-trivial effects of the latter even in a neighborhood of the rational equilibrium. When the aggregate demand externalities arising for excessive leverage are strong (weak), the general policy recommendation is to tax more (less) aggressively in an optimistic economy, but to tax less (more) aggressively in a pessimistic economy.

This experience with Emmanuel has rekindled my interest in exploring the intersection of expectation formation models frequently employed in the behavioral finance literature and models of consumption dynamics, business cycles, and credit cycles. There are two opportunities for future work I am currently exploring together with colleagues. First, there has been renewed interest in Aiyagari-Bewley-Huggett models, with large recent literatures either revisiting the New Keynesian paradigm (e.g. Kaplan, Moll, Violante 2018) or better understanding the dynamics of income and wealth distributions (e.g. Achdou et al. 2017). I have grown particularly interested in the implications of cognitive limitations in such models. If agents exhibit extrapolative expectations over their labor productivity or wages, sequences of positive shocks lead agents to extrapolate future income growth and decrease their precautionary savings motives; in turn, periods of prolonged labor income contractions or unemployment may generate the opposite prediction. From a positive perspective, we obtain an amplification mechanism purely from an expectations channel, whose implications for the distribution of marginal propensities to consume and for the wealth distribution may not be trivial. From a normative perspective, we generate belief externalities that impact these very same distributions, and open up the opportunity for macroprudential regulation: a constrained planner incapable of creating markets, but capable of taxing asset holdings and with access to expectations surveys may consider taxing asset holdings in order to bring agents closer to a consumption path consistent with the true model for their labor income or productivity dynamics. And from a methodological perspective, we are particularly excited about the opportunity of using labor market expectations from consumer surveys in order to perform model calibrations.

Second, there has been a flurry of remarkable papers on credit cycles and predictability between bond market activity and real aggregate outcomes (e.g. Lopez-Salido et al. 2017). A question that has recently re-emerged in this literature is how should a central banker balance its real activity stabilization motive without creating the conditions for frothy credit markets and thus future downturns. To answer this question, we would first like to revisit Bernanke and Gertler (1989) and Kiyotaki and Moore (1997), in particular considering how the contracting microfoundations can be affected when expectations are extrapolative. Our ultimate goal would be to revisit Bernanke, Gertler and Gilchrist (1999) in an environment where expectations are not rational and capture the dynamics of credit sentiment, and pursue a more quantitative approach, understanding by how much does a planner sacrifice the usual mandates in order to promote financial stability. This is in line with recent work by Bordalo, Gennaioli, Shleifer (2019), and Bordalo, Gennaioli, Shleifer and Terry (2019), who argue diagnostic expectations are powerful modeling tools to capture the joint dynamics of beliefs, credit spreads, and macroeconomic outcomes such as firm investment.

I hope the paragraphs above have conveyed my excitement about the ongoing work on Behavioral Macro-Finance, and my plans to become a contributor to this literature. That being said, I believe the research workshop on Behavioral Macroeconomics sponsored by the NBER and the Sloan Foundation is an incredible opportunity to increase my exposure to the literature, meet new colleagues interested in this agenda, and expand my skill set. In particular, I believe I can particularly profit as a second-year student: my research interests are still malleable, there is time to explore different projects, and certainly many more ideas to discover. I am very much looking forward to the prospect of attending the workshop.

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December 9, 2019

To the Review Panel:

It is my pleasure to recommend Adriano Fernandes to participate in the NBER behavioral macroeconomics workshop this coming Spring. I first met Adriano in my first-year PhD course. He later approached me expressing interest in pursuing research in macro-finance and in working as a research assistant during the summer. Adriano helped me until recently in two different projects. In both cases, he exhibited a remarkable capacity to quickly absorb high-level topics he had not been originally exposed to; built on earlier work with thoughtful insight and care; and engaged in the research process with a high level of commitment and seriousness.

Adriano first helped me with the paper "Global Imbalances and Currency Wars at the ZLB". We were revising the paper and were interested in extending our baseline model to incorporate tariffs. I provided some initial guidance on what I thought would be the best way to carry the extension. Adriano formalized what I had in mind and provided a complete solution to the extended model. He displayed considerable ownership over the project, consistently going beyond what was requested of him. To highlight one important example, he conjectured and proved an extremely insightful result about tariff wars at the ZLB that was perfectly complementary to our results on currency wars at the ZLB. We were incredibly pleased with his contributions.

The second project Adriano was involved is an early-stage project on macroprudential policies on financial intermediaries with extrapolative expectations. I initially provided Adriano with some very raw notes, and asked him to re-derive all the results and write them more formally. Adriano transformed those raw notes into something comparable to the model sections of a working paper. He clarified the model setup and assumptions and even corrected some of the initial results we had. As we began to expand on our earlier

work, Adriano was proving results and contributing first hand to the project. He was undoubtedly the closest person to the derivations and the new results as they were coming in. To highlight a few, he proved interesting results on monetary policy in the absence of macroprudential regulations when agents have extrapolative expectations, and derived optimal macroprudential taxes in one of our settings. Further, Adriano was always communicating, not hesitating to ask clarifying question when he needed, and always eagerly scheduling meetings and calls to discuss his work. His commitment and contributions to the project were once again nothing short of remarkable.

Overall, Adriano excelled in all tasks he performed and exceeded my expectations in all dimensions. His contributions were notable, and our projects have undoubtedly benefitted from his work. He approached the projects with genuine interest and a strong sense of ownership, and often displayed how much of a creative and entrepreneurial student he is. He is a promising student whose interest in macro-finance and behavioral macro will undoubtedly benefit from participation in the workshop, and I am excited to see how his research interests progress in the coming future.

Sincerely,

Emmanuel Farhi

Professor of Economics
Department of Economics
Harvard University