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2021 (Oral): Behavioral Economics (*with distinction)*; Financial Economics (*with distinction)*
2020 (Written): Macroeconomics
2019 (Written): Microeconomics (pre-entry)

**Dissertation Title:** *Essays on Investor Attention, Information, and Beliefs*

**Committee:**
Professor Nicholas Barberis (Co-Chair)
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Professor John Geanakoplos (Co-Chair)
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**Education:**
Ph.D., Economics, Yale University, 2025 (expected)
M.Phil., Economics, Yale University, 2022
M.A., Economics, Yale University, 2009 (Simultaneous BA/MA)
B.A., Economics/Mathematics, *summa cum laude,* Yale University, 2009

**Fellowships, Honors and Awards:**
Carl Arvid Anderson Prize Fellowship in Economics, Yale University, 2023
Raymond Powell Prize (for teaching), Yale University, 2022-2023
NSF Graduate Research Fellowship Program Awardee in Economics, 2019-2024
Louis F. Laun Economics Prize, Yale University, 2009
Distinction in Mathematics, Economics majors, Yale University, 2009
*Phi Beta Kappa,* Yale University, 2008
Stanley Prize in Pure and Applied Mathematics, Yale University, 2008
Benjamin F. Barge Mathematics Prize, Yale University, 2007

**Teaching Experience:**

Fall 2022, Teaching Assistant to Prof. John Geanakoplos, Econ 350a: Mathematical Economics: General Equilibrium Theory (Undergraduate), Yale College

**Work Experience:**

CEO, El Aleph Capital, 2010-2023
Analyst, Tenth Avenue Holdings, 2009-2010

**Publications:**

"The Value of Arbitrage" (2024) [with Eduardo Dávila and Cecilia Parlatore], *Journal of Political Economy*, 132:6, 1947-1993.

**Working Papers:**

"What Lies Beneath Zero: Censoring, Demand Estimation, and Hidden Beliefs," (August 2024), *Job Market Paper*

"Attention and the Retail Alignment Puzzle," (September 2023)

**Work In Progress:**

"Attention versus Sentiment: What Drives Household Investment Performance?" (August 2024).

"Nonexistent Hedge Fund Mergers and Bounded Rationality," (June 2024).

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## Dissertation Abstract

My dissertation studies how financial market participants' attention and belief patterns combine to determine asset prices and exchange volumes. I separately study households and institutional investors, employing novel demand estimation methodologies and empirical approaches to clarify how market prices incorporate, or fail to incorporate, the beliefs of investors.

### What Lies Beneath Zero: Censoring, Demand Estimation, and Hidden Beliefs [Job Market Paper]

Agents' beliefs are a central object of interest to economists, with investors' expected returns a major focus of financial economics. Financial economists have long debated whether investors account for the beliefs and information of other investors, who are potentially informed. SEC-mandated quarterly 13F filings are one source of public information: large institutions must disclose all holdings but not short sales. I show that institutions' private idiosyncratic beliefs about stocks they own, which I call "overt beliefs," can be fully recovered. By contrast, non-owners' beliefs are hidden by either an inability to sell short or 13F filings' non-reporting of short sales. This paper studies whether investors fully account for the hidden beliefs of others by devising a novel demand estimation method and using this new approach to put strong bounds on each institution's hidden beliefs.

Contributing to the literature initiated by Koijen and Yogo (2019), I show how to estimate demand for institutional portfolios by first demonstrating that if expected returns are linear in observable characteristics, observed portfolio weights rescaled by assets' idiosyncratic variances are a censored linear function of observables. Second, I show how to use the Sequential Censored Quantile Regression of Chen (2018) to produce a computationally tractable estimation procedure under a quantile restriction. Finally, I devise a new method to infer investors' "consideration sets," the sets of stocks investors can trade. This paper therefore contributes a computationally tractable microdata approach to demand estimation in the presence of censoring and heterogeneous portfolio constraints.

I apply my demand estimation method to 13F-derived institutional portfolios from 1984-2021. I use the estimates to compute a quarterly Hidden Beliefs Index (HBI) and Overt Beliefs Index (OBI). A stock's HBI aggregates each non-owner's most optimistic idiosyncratic return expectation that would still be consistent with its decision not to own shares given its estimated demand; the OBI aggregates owners' regression residuals: the idiosyncratic beliefs of institutions that own a stock. A stock having a low HBI indicates hidden negative stock-specific information or beliefs, whereas having a high HBI indicates less adverse hidden information or beliefs.

In stark contrast to standard models, hidden beliefs strongly and persistently predict returns in the cross section, with a clear monotonic increasing pattern of abnormal returns as we go from low to high values of the HBI within a given size decile. A simple long/short market cap by HBI sorting strategy that purchases high HBI stocks and sells short low HBI stocks yields an annualized four-factor alpha of 8.50% (9.27) over a 35+ year period. However, the OBI displays at best a weak ability to predict future returns. The findings are consistent with investors making an inference error, failing to fully infer what each institution's lack of ownership implies about their beliefs. I show both theoretically and empirically that results appear to be driven by bounded

rationality and not a disagreement plus short sale constraint mechanism. Results are highly robust to empirical specifications: hidden beliefs strongly predict future returns, whereas overt beliefs do not.

**Attention and the Retail Alignment Puzzle**

This paper establishes a new empirical finance puzzle, the retail alignment puzzle: aggregate retail trader purchases and sales are nearly perfectly correlated across time and in the cross section of equities despite retail traders representing a small fraction of exchange volumes and being commonly represented as displaying lopsided flow patterns. Consistent with this puzzle, retail purchases and sales in the cross section are linearly predicted by the same two attention-associated factors, recent return salience and recent volume, with regressions on purchases and sales possessing almost identical coefficients. Using both directly measured attention through Google Trends search volumes and common indirect measures of attention such as volumes and extreme returns, I show that surges in retail attention consistently generate both large trading volumes and proportionally limited net trading. I then use an equilibrium disagreement model to show analytically and through simulations that while positive shocks to retail attention, sentiment, and disagreement all increase price, only fluctuations in attention can reproduce empirical volume and return patterns. This paper's results suggest that attention is one of the core drivers of retail volume in common stocks.

**Attention versus Sentiment: What Drives Household Investment Performance?**

A large behavioral finance literature documents the mistakes made by individual investors, with only a handful of papers indicating that retail traders might be skilled. This paper investigates retail investment skill by building a random coefficients-based structural model of household direct stock ownership and estimating it using only aggregate data. I account for heterogeneity in household return expectations, varying attention to specific stocks, and shared sentiment among households. Using Generalized Empirical Likelihood via a Mathematical Program with Equilibrium Constraints (GEL-MPEC) as described theoretically by Conlon (2013), I estimate household demand parameters in each quarter from 1984 to 2021 and in the process compute average household sentiment about each stock, the extra return the average household expects to earn when investing in a stock. I find that contrary to popular belief, retail traders are collectively skilled at evaluating stocks, with sentiment-based portfolios positively predicting future returns. However, households' limited attention and macroeconomic beliefs undo the positive gains from investment analysis and result in portfolios that underperform the stock market. Investors may understand product quality, but they are poor macroeconomic traders and are drawn via attention to invest in overpriced stocks.