Empirical Asset Pricing
Behavioral Finance

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Lecture Outline

- Empirical Facts
  - Empirical facts discussed in the previous classes
  - Investor trading and portfolio choice
- Limits to Arbitrage
- Psychological Biases
  - Models of investor beliefs
    - Overconfidence
    - Extrapolation
    - Experience effect
  - Non-EU preference
    - Prospect Theory
  - Bounded Rationality
- Behavioral Corporate Finance

Overview

- from the 1950s to the 1990s, finance research was dominated by the "traditional" finance paradigm.
  - this framework assumes that:
  - – individuals have *rational beliefs* (update their beliefs according to Bayes' rule when new information arrives)
  - – and make decisions according to *Expected Utility* (with an increasing, concave utility function defined over consumption outcomes)
- starting in the1990s, a new paradigm emerged: behavioral finance
  - this field tries to make sense of the behavior of investors, markets, and firms using models that are *psychologically more realistic* than their predecessors
  - – allow for less than fully rational ***beliefs***
  - – use more realistic ***preferences***
  - – take account of ***cognitive limits***

EAP: Foundations of Market Efficiency

- Rationality:
  - Imagine that all investors are rational. They adjust their estimates of stock price in a rational way when new information is released.
- Independent Deviation from Rationality
  - Suppose that about as many investors were irrationally optimistic as were irrationally pessimistic. Prices would likely rise in a manner consistent with market efficiency.
- Arbitrage
  - Imagine two types of individuals: the irrational amateurs and the rational professionals. If the arbitrage of professionals dominates the speculation of amateurs, market would still be efficient.

Reference: Andrei Shleifer, Inefficient Markets: An Introduction to Behavioral Finance

Investor Behavior: investment decision

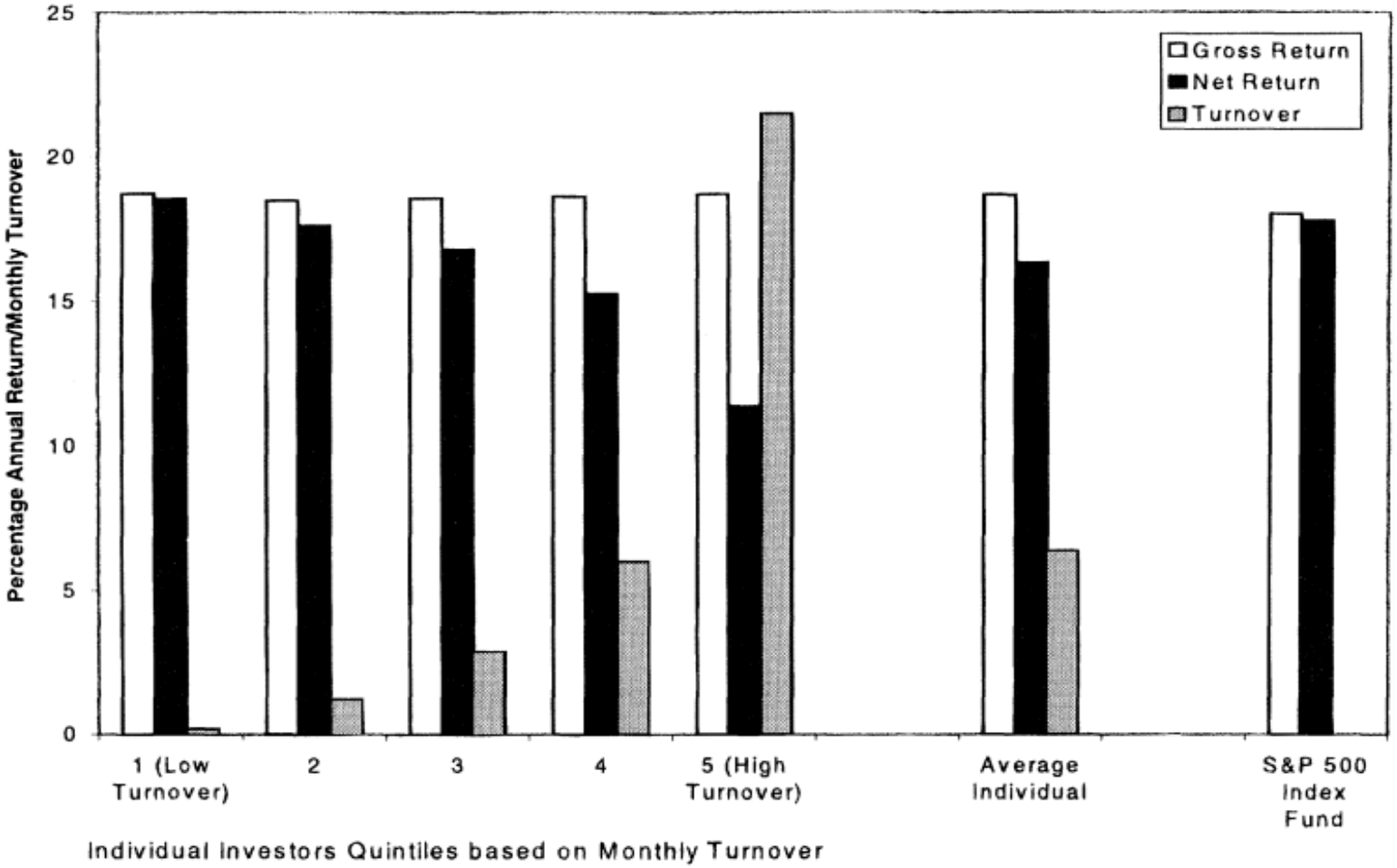
Some well-documented facts in investment decision:

- Non-participation
- Under-diversification:
  - Median number of stocks held by investors in 2001 was four, and 90% of investors held fewer than ten different stocks. [Polkovnichenko RFS2005]
  - Employees invested close to a third of their assets in their employer's own stock.[Benartzi JF2001]
  - Naïve diversification [Benartzi and Thaler AER2001]
- Familiarity Bias: The tendency to favor investments in companies they are familiar with [Huberman RFS2001]

Investor Behavior: trading

Some well-documented facts in trading decision:

- Disposition effect:
  - tendency to hang on to losers and sell winners [Shefrin and Statman JF1985] [Odean JF1998]
- Excessive trading:
  - Tendency to trade too much [Barber and Odean JF2000]



- Barber, Brad, and Terrance Odean (2000), "Trading is Hazardous to Your Wealth: The Common Stock Investment Performance of Individual Investors," Journal of Finance 55, 773-806.

Limits to Arbitrage

- When prices deviate from fundamentals, arbitrage forces are not as strong as one might expect due to the following concerns:
  - Fundamental risk: No perfect substitutes to form a risk-free strategy.
  - Noise trader risk: Mispricing may become even worse in the short-run due to noise traders. (De Long et al., 1990; Shleifer and Vishny, 1997)
  - Implementation costs: commissions, bid-ask spreads, short-sale constraints, etc.

Examples

- We have learnt a lot by studying specific empirical phenomena that are widely viewed as mispricings:
  - twin shares (Lamont Thaler, 2003)
  - equity carve-outs (Lamont Thaler, 2003; Mitchell, Pulvino, Stafford, 2002)
  - index inclusions (Shleifer, 1986)
- these studies demonstrate that there *are* limits to arbitrage
  - and help us understand which limits are more relevant in which settings

- *Survey paper: Gromb, Denis, and Dimitri Vayanos (2010), "Limits of Arbitrage," Annual Review of Financial Economics 2, 251-275.*

Overconfidence

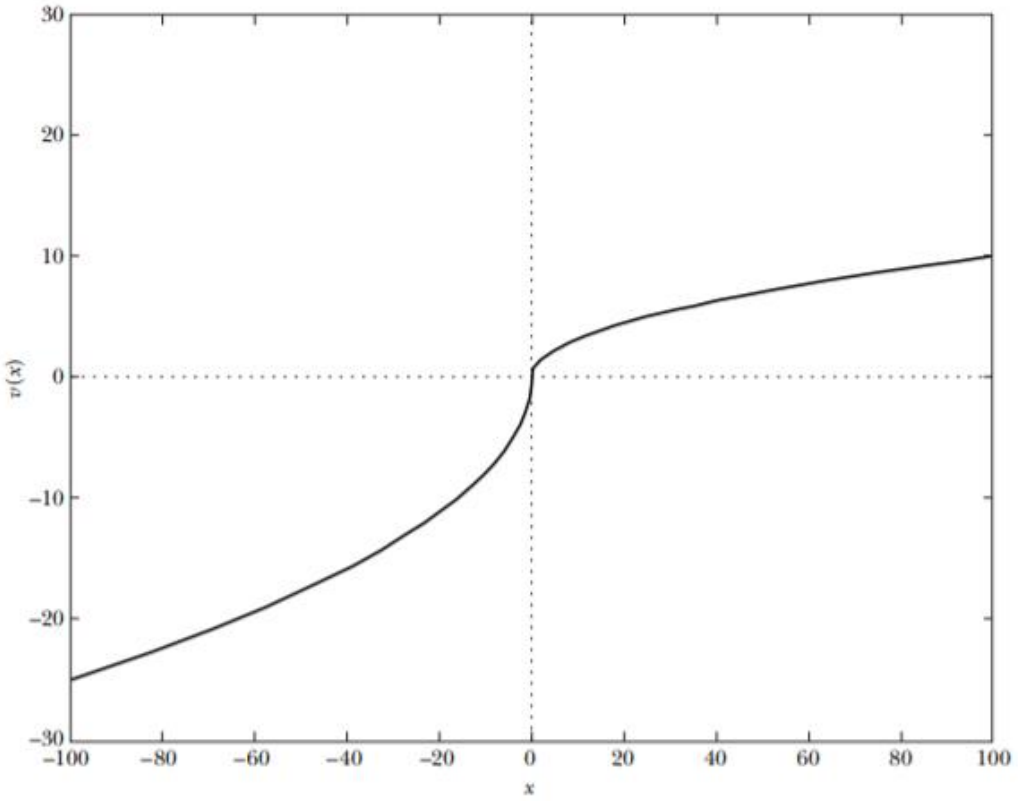
- Overplacement—overestimation of one's rank in a population
- Overprecision—overestimation of the accuracy of one's beliefs.

Overconfidence in finance

- Asset pricing theory:
  - Overconfidence and momentum: Daniel, Hirshleifer, and Subrahmanyam (1998)
  - Overconfidence and Speculative Bubbles: Harrison and Kreps (1978), Scheinkman and Xiong (2003)
- Empirical evidence (trading activity):
  - Barber and Odean (2000), "Trading is Hazardous to Your Wealth: The Common Stock Investment Performance of Individual Investors," Journal of Finance 55, 773-806.
  - Barber, Brad, and Terrance Odean (2001), "Boys Will Be Boys: Gender, Overconfidence, and Common Stock Investment," Quarterly Journal of Economics 116, 261-292.
  - Grinblatt, Mark, and Matti Keloharju (2009), "Sensation-seeking, Overconfidence, and Trading Activity," *Journal of Finance* 64, 549-578.
- *Survey paper: Daniel, Kent, and David Hirshleifer. "Overconfident investors, predictable returns, and excessive trading." Journal of Economic Perspectives 29, no. 4 (2015): 61-88.*

Prospect Theory: Value function

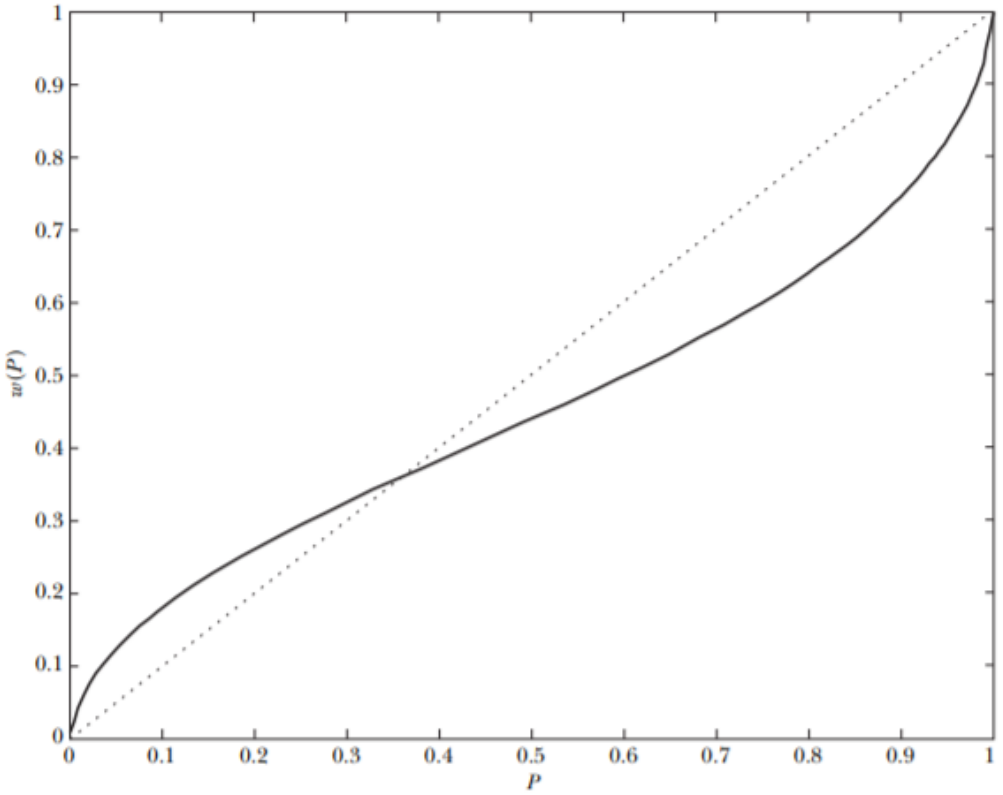
The Prospect Theory Value Function



Notes: The graph plots the value function proposed by Tversky and Kahneman (1992) as part of cumulative prospect theory, namely $v(x) = x^{\alpha}$ for $x \geq 0$ and $v(x) = -\lambda(-x)^{\alpha}$ for $x < 0$, where x is a dollar gain or loss. The authors estimate $\alpha = 0.88$ and $\lambda = 2.25$ from experimental data. The plot uses $\alpha = 0.5$ and $\lambda = 2.5$ so as to make loss aversion and diminishing sensitivity easier to see.

Prospect Theory: Probability weight function

The Probability Weighting Function



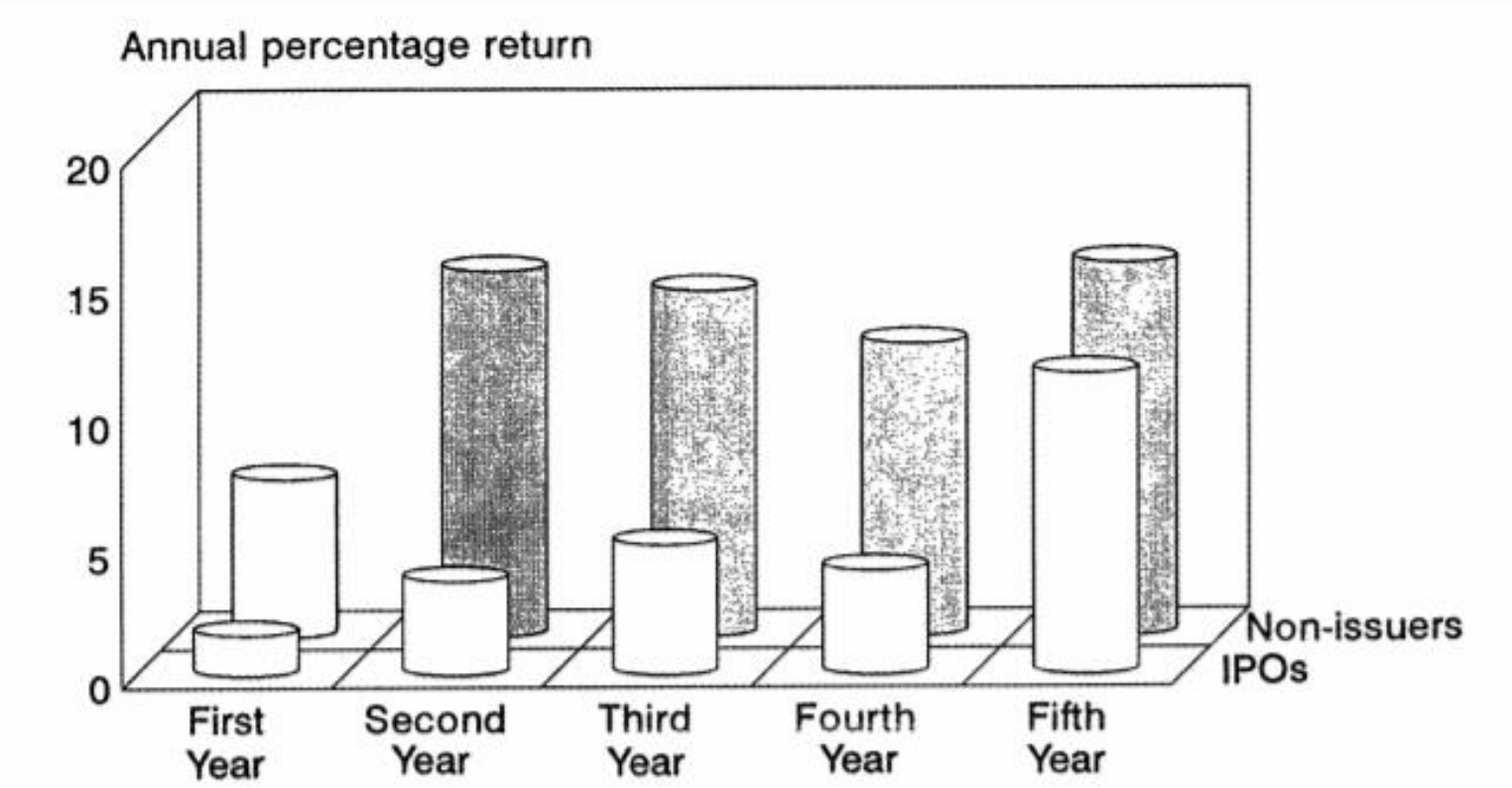
Notes: The graph plots the probability weighting function proposed by Tversky and Kahneman (1992) as part of cumulative prospect theory, namely $w(P) = P^{\delta}/(P^{\delta} + (1-P)^{\delta})^{1/\delta}$, where P is an objective probability, for two values of δ. The solid line corresponds to $\delta = 0.65$, the value estimated by the authors from experimental data. The dotted line corresponds to $\delta = 1$, in other words, to linear probability weighting.

Prospect Theory

- Application
  - The equity premium puzzle:
    - Benartzi and Thaler (1995); Barberis, Huang, and Santos (2001)
  - Assets with Lottery-like features
    - Theory: Barberis and Huang (2008)
    - Empirical: IPO stocks, distress stocks, MAX return, etc.:
      - Loughran and Ritter (1995); Bali, Cakici, Whitelaw(2011); Green and Hwang (2012); Conrad, Kapadia and Xing (2014)

- *Survey paper: Barberis, Nicholas (2013), "Thirty Years of Prospect Theory in Economics: A Review and Assessment," Journal of Economic Perspectives 27, 173-195.*

IPO long-run return



Extrapolation

- Different types of extrapolation:
  - Extrapolate fundamentals
  - Extrapolate returns
  - Extrapolate past experiences
- Early works
  - Representativeness versus Conservatism: People overreact(representativeness)/underreact(conservatism) to patterns in signals. [Edwards1968; Tversky and Kahneman 1974]
  - Barberis, Shleifer and Vishny(1998); Hong and Stein (1999)
- New round of work
  - Greenwood and Shleifer (2014)
  - Barberis, Greenwood, Jin and Shleifer (2015)
  - Barberis, Greenwood, Jin and Shleifer (2016)

Return Extrapolation

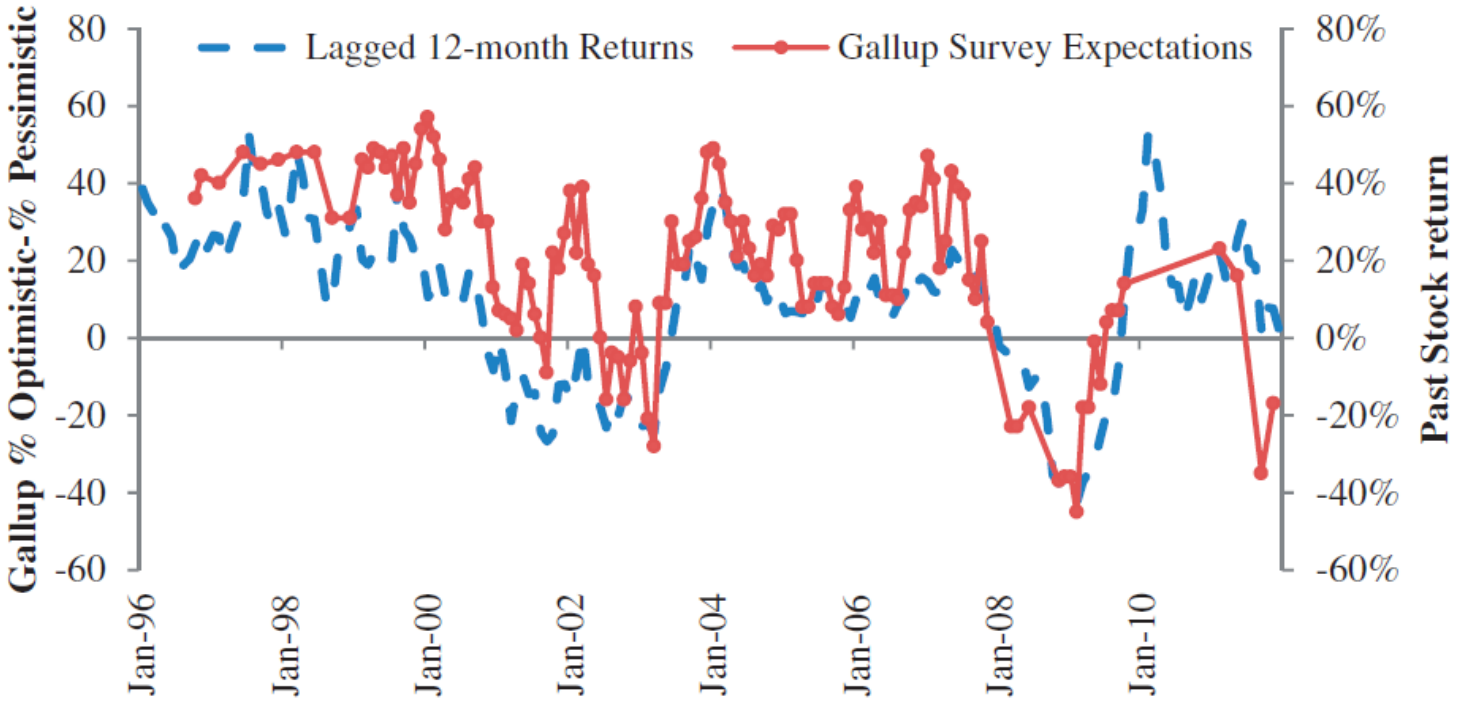


Figure 6
The role of past stock market returns in explaining survey expectations
The dashed line denotes the twelve-month rolling nominal return on the CRSP VW stock index. The solid line marked with circles denotes expectations from the Gallup survey (% optimistic – %pessimistic).

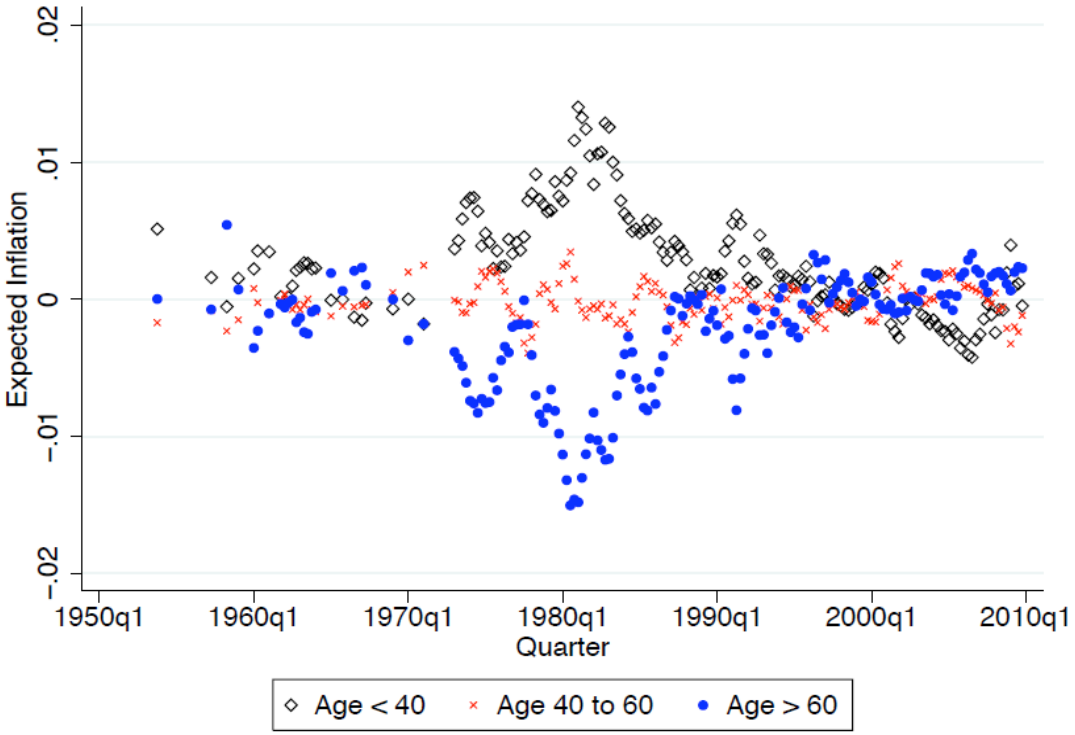
- over-extrapolation: investor expectations are negatively correlated with subsequent realized returns, (Greenwood and Shleifer (2014))

Experience Effects

- Def: similarity-based hypothesis generation based on memory of prior cases.
- Empirical evidence in finance: Experience Effects
  - Lifetime experiences of stock-market returns affect willingness to invest in the stock market (Malmendier and Nagel 2011)
  - Lifetime experience of inflation affects beliefs about future inflation and related financial choices, e.g., mortgage borrowing (Malmendier and Nagel 2016)

Inflation experiences and Inflation Expectations

Data: Michigan Survey of Consumers



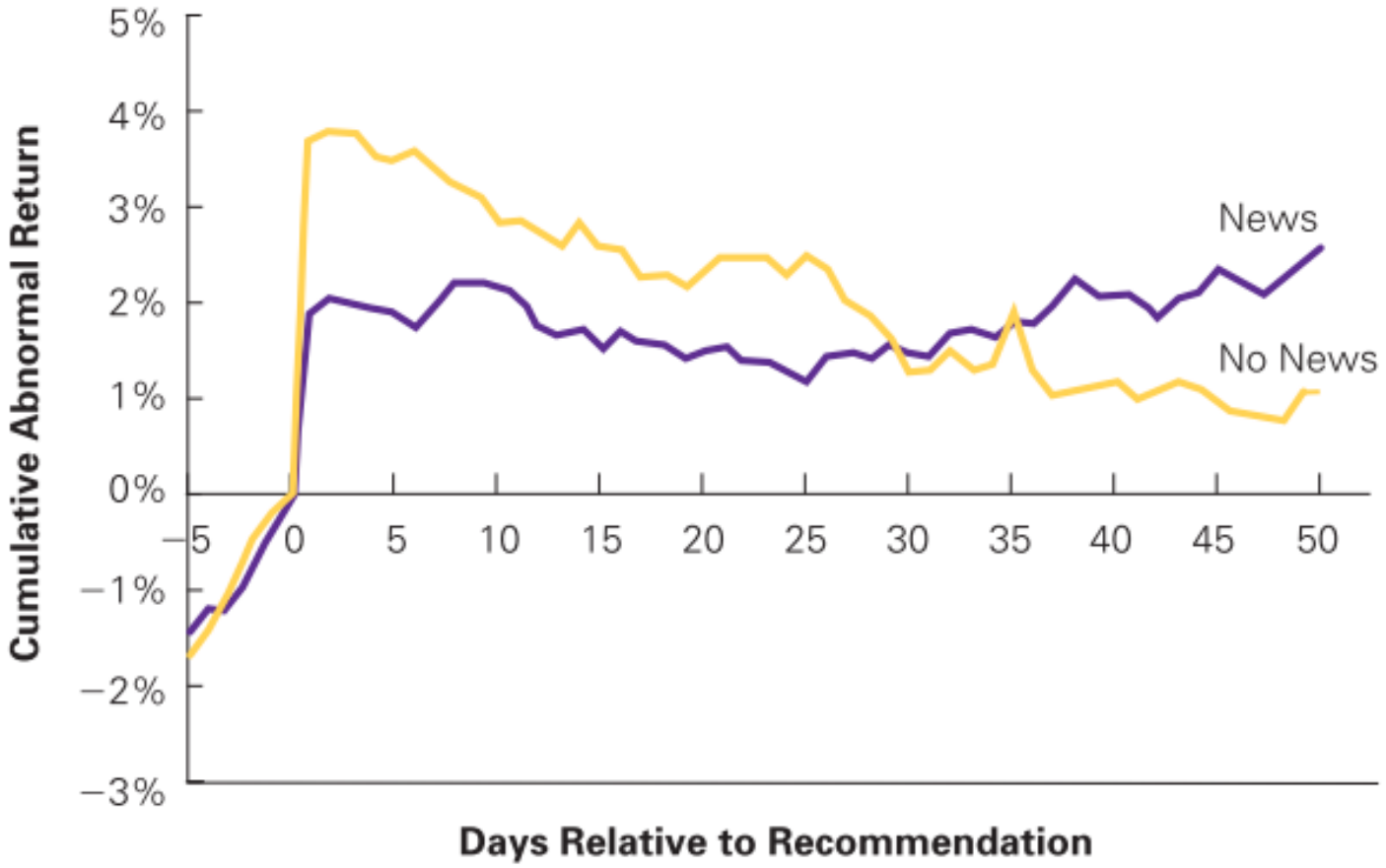
Expectations relative to full-sample mean (4-quarter MA)

- Malmendier, Ulrike, and Stefan Nagel. "Learning from inflation experiences." *The Quarterly Journal of Economics* 131.1 (2015): 53-87.

Bounded Rationality

- Theories:
  - Barberis, Nicholas, and Andrei Shleifer (2003), "Style Investing," Journal of Financial Economics 68, 161-199.
  - Barberis, Nicholas, Andrei Shleifer, and Jeffrey Wurgler (2005), "Comovement," Journal of Financial Economics 75, 283-317
- Limited attention
  - High Return/High volume/News: Barber and Odean (2008)
  - Earning announcements on Fridays: DellaVigna and Pollet (2009)
- Limited information processing ability
  - Customer-supplier relationship and lead-lag return: Cohen and Frazzini (2006)
  - Forecastable demographic changes and industry return: DellaVigna and Pollet (2007)

Investor attention
Stock Price Reactions to Recommendations on Mad Money



Behavioral Corporate Finance

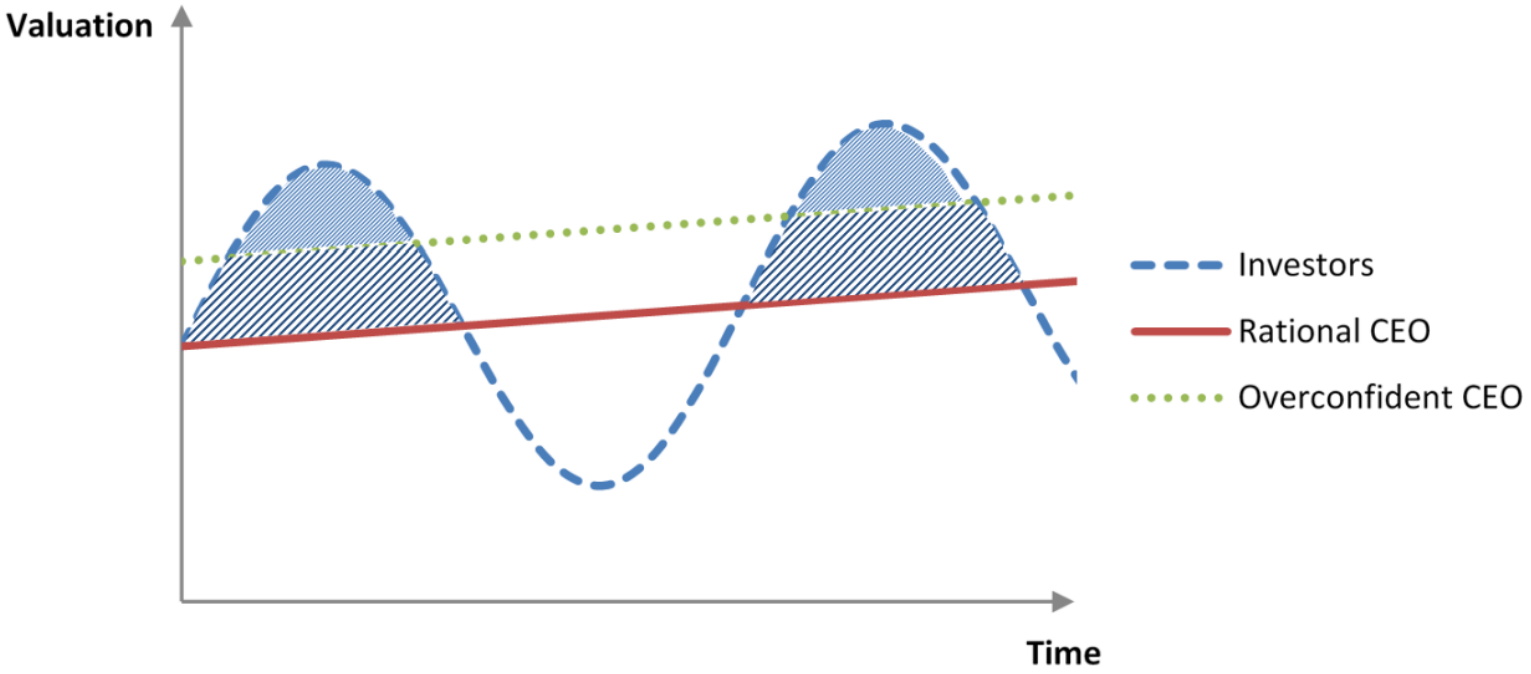
- The previous psychological biases can be applied in the corporate setting and explain corporate behavior

  Innovation: Who is irrational?

  - Irrational investor, rational manager
    - Capital budgeting: Stein (1996)
    - Issuance/capital structure/payout: Baker and Wurgler (2000,2002, 2003,2004); Baker, Stein, and Wurgler (2002)
    - Timing of mergers: Shleifer and Vishny (2003)
  - Irrational corporate manager
    - Malmendier, Ulrike, and Geoffrey Tate (2005), "CEO Overconfidence and Corporate Investment," *Journal of Finance* 60, 2661-2700.
    - Malmendier, Ulrike, and Geoffrey Tate (2008), "Who Makes Acquisitions? CEO Overconfidence and the Market's Reaction," *Journal of Financial Economics* 89, 20-43.
    - Ben-David, Izthak, John Graham, and Campbell Harvey (2013), "Managerial Miscalibration," *Quarterly Journal of Economics* 128, 1547-1584.
  - Irrationality of other market participants

  Survey paper: Malmendier (2018) Behavioral Corporate Finance

Illustration of Differences in Firm Valuation



Irrationality of other market participants

- What about institutional investors, policy makers, institutions?
- Common arguments: professional training, sorting, selection
- Key: study the psychology evidence on who exhibits a given bias; study the theoretical predictions.

Cheat sheet: How to find a research idea

- **What:**
  - All the psychological biases
  - All the frictions in the market
- **Who:**
  - Investors
    - Retail/Households
    - Sophisticated Investors: Mutual funds, Hedge funds, Professional traders
  - Analysts, bankers, financial advisors, etc..
  - Corporate Managers
  - Policy Makers
- **When:**
  - Short-term vs long term..
  - Special period: Friday/holidays/seasonality/ sports game, etc.
- **Why:**
  - Genetics, cultural, personal traits, personal experience, etc..

- **Where:**
  - Financial market
    - Price/Returns/bubbles
    - Trading volume/volatility/liquidity
    - Earnings/other fundamentals
    - Different markets: Stocks, bond, commodity, currency, options, real estate, etc.

    …
  - Corporate
    - Capital structure
    - Merger & acquisitions
    - Investment decision
    - Securities issuance
    - Payout policy
    - Innovation

    …
  - Other financial settings

Where is this field going?

- New features of psychological biases
- Application to emerging areas
  - Behavioral macroeconomics
  - Household finance
- Application to markets outside the U.S. stock market
- New data and new technologies
  - Machine learning and fintech
- Real consequences

General suggestions:

- PhD training consists of two parts:
  - Skill: Ask a research question, and solve it.
  - **Taste: Cultivate a taste for research topics.**

- Criteria for good research topic:
  - New, important, interesting

Readings and Online Resources

- Barberis, Nicholas, and Richard Thaler (2003), "A Survey of Behavioral Finance," in George Constantinides, Milton Harris, Rene Stulz (eds.), Handbook of the Economics of Finance, Volume 1, Elsevier.
- Kahneman, Daniel (2011), Thinking, Fast and Slow, Farrah, Straus, and Giroux.
- Shiller, Robert (2005), Irrational Exuberance, Crown Publishing Group.
- Shleifer, Andrei (2000), Inefficient Markets: An Introduction to Behavioral Finance, Oxford University Press.
- AEA continuing education 2017 https://www.aeaweb.org/conference/cont-ed/2017-webcasts