Behavioral Finance
AEA Continuing Education 2017, Chicago

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January 4, 2017

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PART 1: INTRODUCTION

Psychology & Economics – The Big Picture

Prototypical economist conception of human behavior (aka the "Classical Model"):

$$\max_{l \in L} U := \sum_{t=1}^{\infty} \delta^t \sum_{s \in S_t} p(s) u(\cdot, s, t)$$

with

- L is set of "life-time strategies"
- S_t is set of state spaces
- $p(s)$ are rational beliefs
- $\delta \in (0, 1)$ is time-consistent discount factor
- $u(\cdot, s, t)$ is true utility at time t in state s

and with ancillary assumptions such as

- self-interest: u depends on own consumption only,
- no habit formation,
- quasi-convexity,...

Improving psychological realism

1. Improving the assumptions about beliefs: $\tilde{p} \neq p$
   - Overconfidence (and overoptimism)
   - Limited attention
   - Persuasion
2. Improving the assumptions about $u(\cdot, s, t)$
   - u depends on the payoff of others (altruism, fairness): $u(\cdot, \mathbf{y})$ where $\mathbf{y}$ represents allocation of others
     - ultimatum game: few people give zero; if zero rejected
     - KKT: price increase of shovels after snow fall
   - u depends on a
     - reference point: $u(\cdot, r)$ with r reference point
     - endowment
   - loss aversion
   - narrow framing: maximization set $\neq L$
3. Improving the assumptions about the maximization
   - time-inconsistency (bounded self-control) β, δ
   - bounded cognition / memory
   - framing; representation

Some assumptions not necessarily "against" the Classical Model.

But: *Non in Variano ergo ad hoc.*

Some examples from different fields

1. Consumer Choice (Industrial Organization I):
   - Time preferences (health clubs, credit cards)
   - Reference Dependence (housing purchases)
   - Persuasion (advertisement)
   - Welfare Enhancement (SMRT plan)
2. Public Finance:
   - Time preferences (addiction, taxes, retirement savings)
   - Social preferences (charitable contributions)
   - Narrow framing (flypaper effect, incidence of taxes)
   - (Social welfare)
3. Environmental Economics:
   - Narrow Framing (WTA/WTP, value of a life)
4. Labor Economics/Development Economics:
   - Time preferences (job search)
   - Social learning (choice of job, choice of crops)
   - Social capital (trust)

Some examples from different fields (continued)

5. Firm behavior (Industrial organization II):
   - Market Reaction
   - Time preferences (teaser rates, mail-in rebates)
   - Attention (complex products)
6. Law and Economics:
   - Self-control (Cooling-off period)
   - Emotions (Litigation)
7. Asset pricing:
   - Overconfidence (over-trading)
   - Loss Aversion: Individual investors sell losers too late.
   - Narrow Framing: Individual investors consider losses and gains at the level of the individual stock, not their overall portfolio (wealth).
   - Attention (footnotes in accounting, demographics)
8. Corporate finance:
   - Overconfidence of CEOs (investment, mergers, options)
   - Attention (media)

Note

Some fields have focused on only one typ of behavioral assumption, maybe even few types of .
Example: Behavioral Corporate Finance

- Basically only beliefs (overconfidence of investors or managers; investor sentiment)
- Few Exception: "earnings" thresholds; credit cards; housing markets; Wall Street game ...

$\longrightarrow$ Research opportunity!

Overview

1. **Introduction** (Ulrike/Nick)
2. **Behavioral Asset Pricing** (Nick)
   - Add on: non-standard belief formation & applications to macro-finance (Ulrike)
   - Emphasis on **Perspective 2**: Behavioral biases do not apply only to small individual investors, but also professionals and institutions.
3. **Behavioral Corporate Finance** (Ulrike)
4. **Conclusion** (Ulrike/Nick)
   - Data: Where is the field going?

Behavioral Corporate Finance: A quick preview

Systematic deviations from our standard model of rational decision-making from **two perspectives:**

Perspective 1: *Investor biases*

- Non-standard investor behavior ("investor sentiment")
- Managerial response = Non-standard corporate finance policies (cf. "Behavioral IO")

Perspective 2: *Managerial biases*

- Non-standard managerial behavior and financial policies
- Market response

Perspective 1: Biased Investors

- **Non-standard investor behavior:** Systematic devations from rational / traditional-model individual investment decisions (investor sentiment), e.g., loss aversion, overconfidence, "experience effects" (on risk attitudes)
- **Managerial response:** Implications for corporate decisions which involve the market (equity issues, equity-financed mergers, equity-financed mergers)

Examples

- Investor sentiment $\rightarrow$ Timing of security issuances (*Baker and Wurgler, 2000; 2002*)
- Timing of mergers (*Shleifer and Vishny, 2003*)
- Employee sentiment $\rightarrow$ Stock-based compensation to lower-level employees (*Oyer, 2004; Bergman and Jenter, 2005*)

Perspective 2: Biased Managers

- **Managerial biases:** Systematic deviations from rational / traditional-model corporate decisions, e.g., overconfidence, experiences, "traits," inducing non-standard corporate policies, i.e., implications for
  - investment decisions, financing decisions, resulting capital structure, mergers & acquisitions;
  - role of the board / corporate governance (e.g. options vs. debt overhang);
  - internal labor market (role of tournaments, design of compensation contracts);
  - "organizational fixes" (*Camerer and Malmendier, 2007*, Behavioral Economics of Organizations)
- **Market response** of investors

Perspective 2: Biased Managers

Examples

- Overconfidence of CEOs $\rightarrow$ "Urge to merge" / to overinvest *Malmendier and Tate, 2005; 2008; 2016* (JEP!)

- Experience bias of CEOs (economic depressions, military service, ...) $\rightarrow$ Conservatism in investment, debt aversion *Malmendier, Tate and Yan, 2011; Schoar, 2012; Benmelech and Frydman, 2012*

This lecture: Mostly structured around the example of merger decisions.

Detailed write-up of both lectures: Our contributions to the Handbook of Behavioral Economics, Elsevier.

PART 2: EXPERIENCE EFFECTS

Behavioral Asset Pricing – Perspective 2

Existing research focuses on "investor beliefs" and "investor preferences"

- often identical with "small investors' beliefs/preferences"
- useful for identification

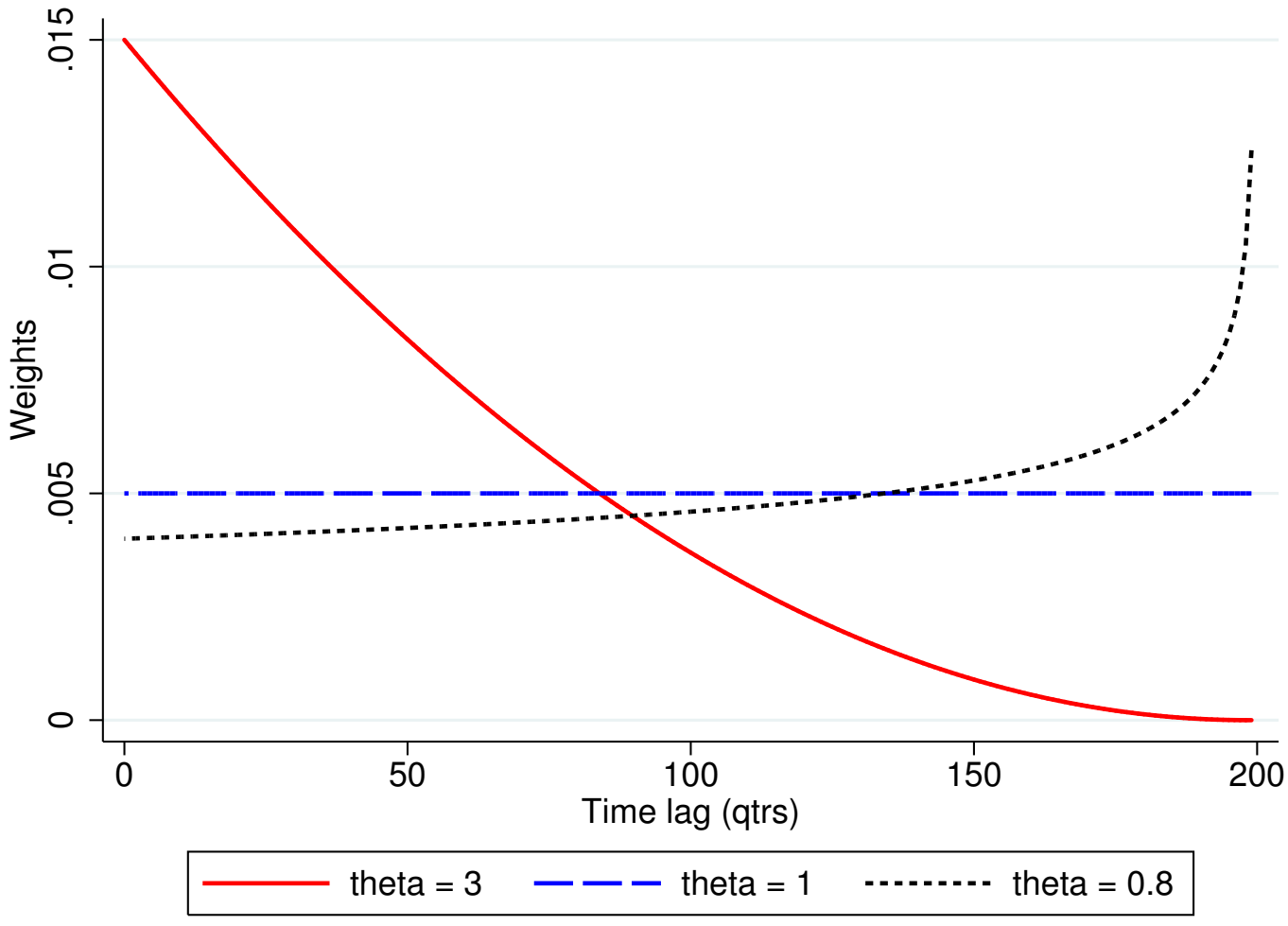
What about institutional investors, policy makers, institutions?

- Common arguments: professional training, sorting, selection
- But ... professional training, sorting, selection
- Key: study the psychology evidence on who exhibits a given bias; study the theoretical predictions.
  - Not necessarily "cognitive limitations" or "underconfidence" in bond traders

Example: Availability Bias

- Def: similarity-based hypothesis generation based on memory of prior cases.
- **Empirical evidence in the field** from physician diagnostics (Weber et al., 1993), i.e., professionals, training, experience.
- **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)
- **Sorting? Selection?**
  - "Depression Babies" effect among high- and low-SES investors
  - "Learning from Inflation experiences" among high- and low-SES consumers
  - ... and even among Federal Reserve Bank governors and presidents

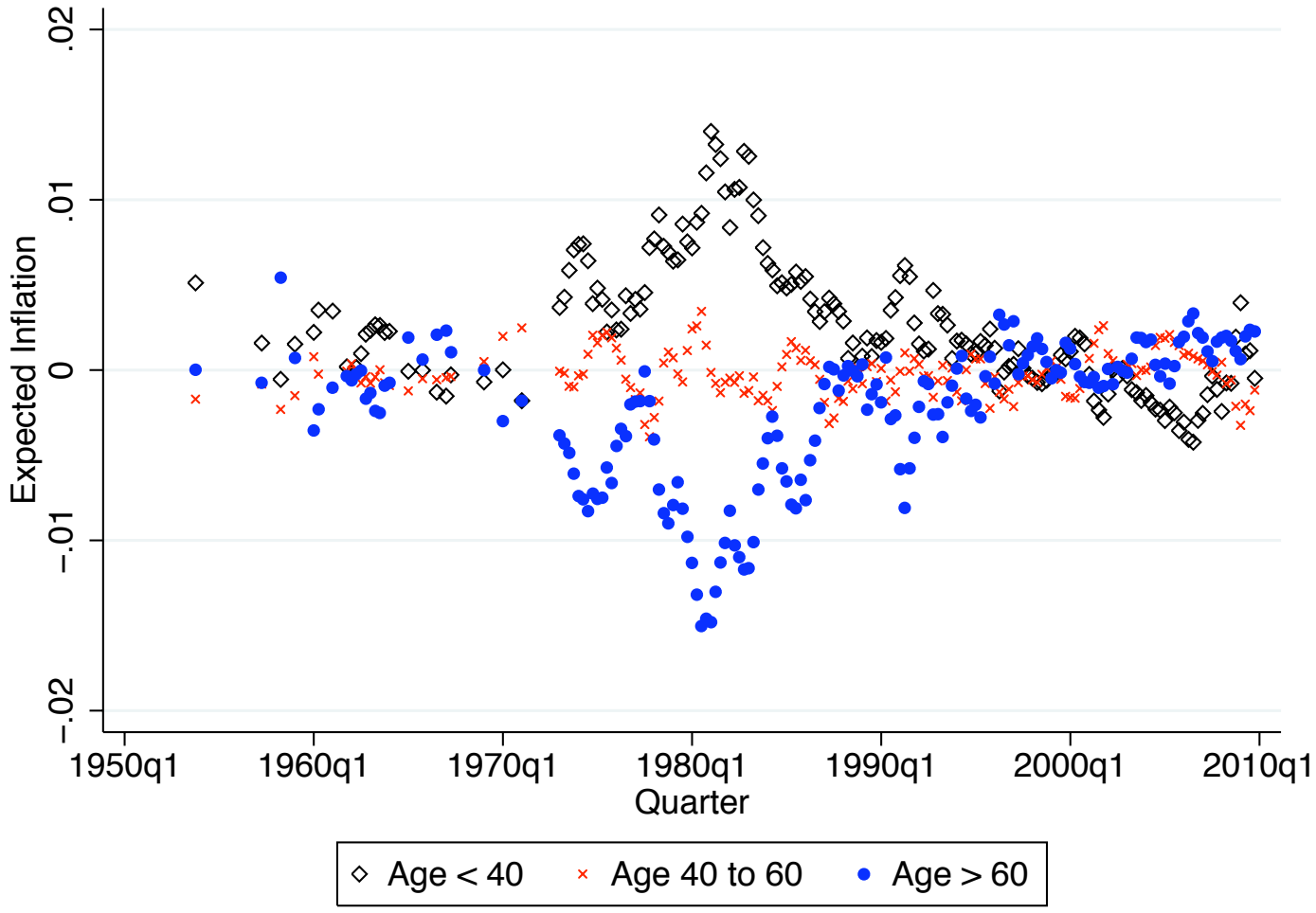
Experience Effects: Weighting of past experiences



Hypothetical 50-yr old (200-qtr old) investor/consumer

Inflation experiences and Inflation Expectations

Data: Michigan Survey of Consumers



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

Inflation experiences and Inflation Expectations

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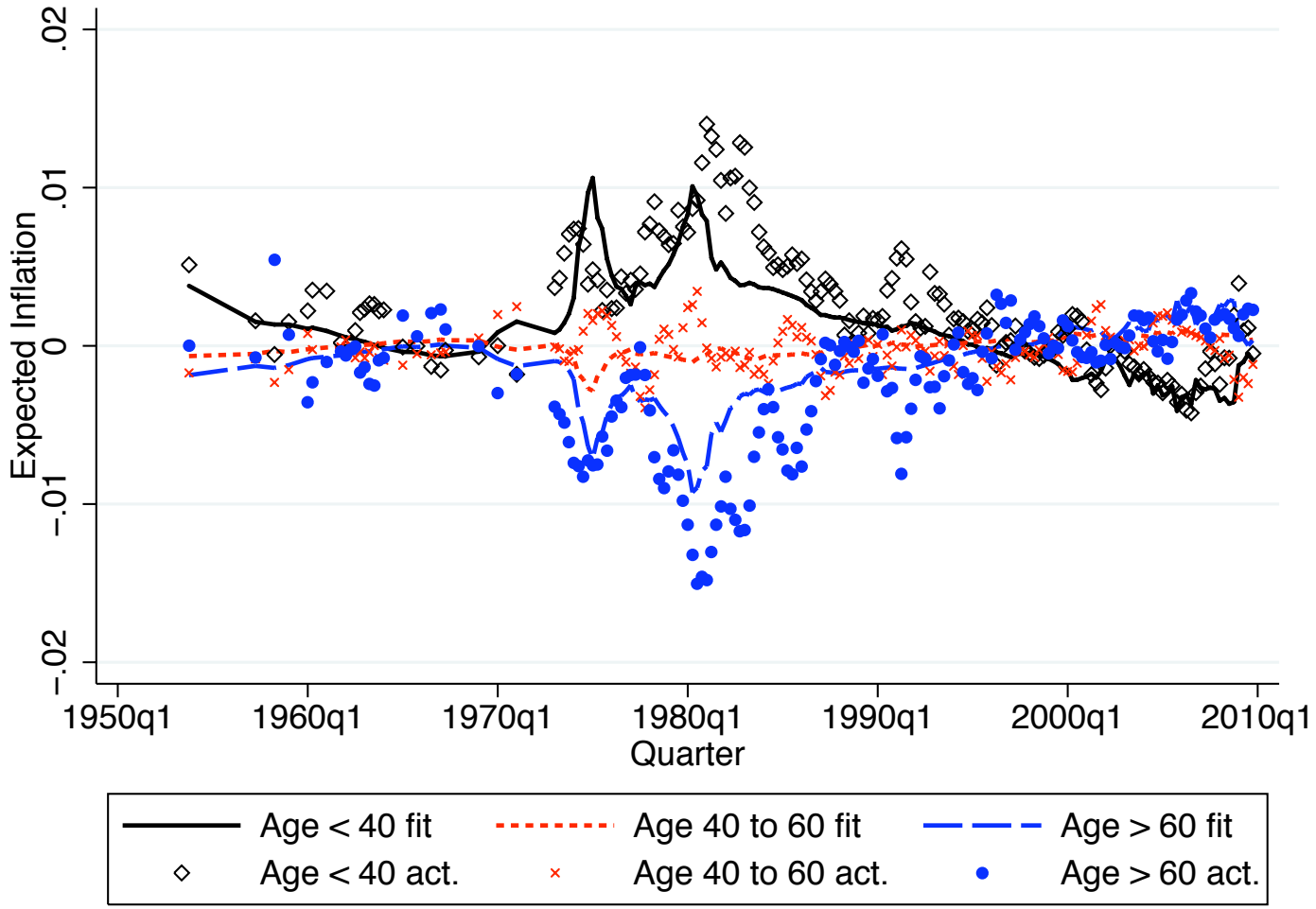


Fitted and actual relative to full-sample c.s. mean (4-quarter MA)

Impact on professional, highly informed FOMC Members?

Example from last year: discussion of the conflicting views among FOMC members on whether rates need to rise soon (Chair Janet Yellen and Vice Chair Stanley Fischer) or not (Federal Reserve Governor Lael Brainard):

> *I think these three players are all products of their experience. Yellen received her Ph.D in 1971. Fischer in 1969. Both experienced the Great Inflation first hand. Brainard earned her Ph.D in 1989. Her professional experience is dominated by the Great Moderation.*
>
> *– Tim Duy's Fed Watch (2015)*

'The Making of Hawks and Doves'

(Malmendier, Nagel, Yan (2016))

- Inflation experiences explain ...
  - ... dovish and hawkish **dissent**,
  - ... dovish and hawkish **tone** in speeches.
  - ... the **Fed Funds Rate target**.
- Inflation experiences affect **beliefs** about future inflation.
  - Semi-annual Monetary Policy Reports to Congress

Language: Example

"Disruptive inflation has plagued our economy for something like 12 years. During that period its virulence has varied, as high as 12.0 per cent in the fourth quarter of 1974 and as low as 1.5 per cent in the second quarter of 1967. But the experience has made clear that we are not "learning to live" with inflation. Increasingly inflation is seen for what it is – a serious addiction that gradually undermines the vitality and even viability of the addict."

(Henry Wallich, "Using the tax system to restrain inflation" (1978, statement before the Joint Economic Committee))

Economic Magnitude of Inflation Effect on Fed Voting

Average partial effect (APE):

- Increase of 0.1% in experience-based forecast ($\approx$ a typical SD of FOMC members' experience-based inflation forecasts in an FOMC meeting) $\longrightarrow$ about one quarter/third increase in probability of hawkish dissent (relative to unconditional mean of 4.0%)
- Increase of 0.1% in experience-based forecast $\longrightarrow$ about one quarter/third decrease in probability of dovish dissent (relative to unconditional mean of 2.4%)

Wallich effect

- "Hyperinflation treatment" $\longrightarrow$ large reduction in probability of dovish dissent, 5 pp, and large increase in probability of hawkish dissent, 8 pp.
- In other words: Hyperinflation "treatment" $\approx$ 1.0 pp increase in experience-based inflation forecast

Economic Magnitude of Stock-Market Experience on Stock-Market Investment

Data: SCF

- Elicited risk tolerance
  - 1 = "not willing to take any financial risk"
  - 2 = "willing to take average financial risks expecting to earn average returns"
  - 3 = "... above av. financial risks .. above av. ret."
  - 4 = "... substantial financial risks ... substantial returns"
- Effect of moving from a bad to a good lifetime experience (10th to 90th percentile): 10 pp!
- Stock-market participation (Stock holdings > \$0): Effect of moving from a bad to a good experience: +14 pp
- Bond-market participation (Bond holdings > \$0): Effect of moving from a bad to a good experience: +15 pp

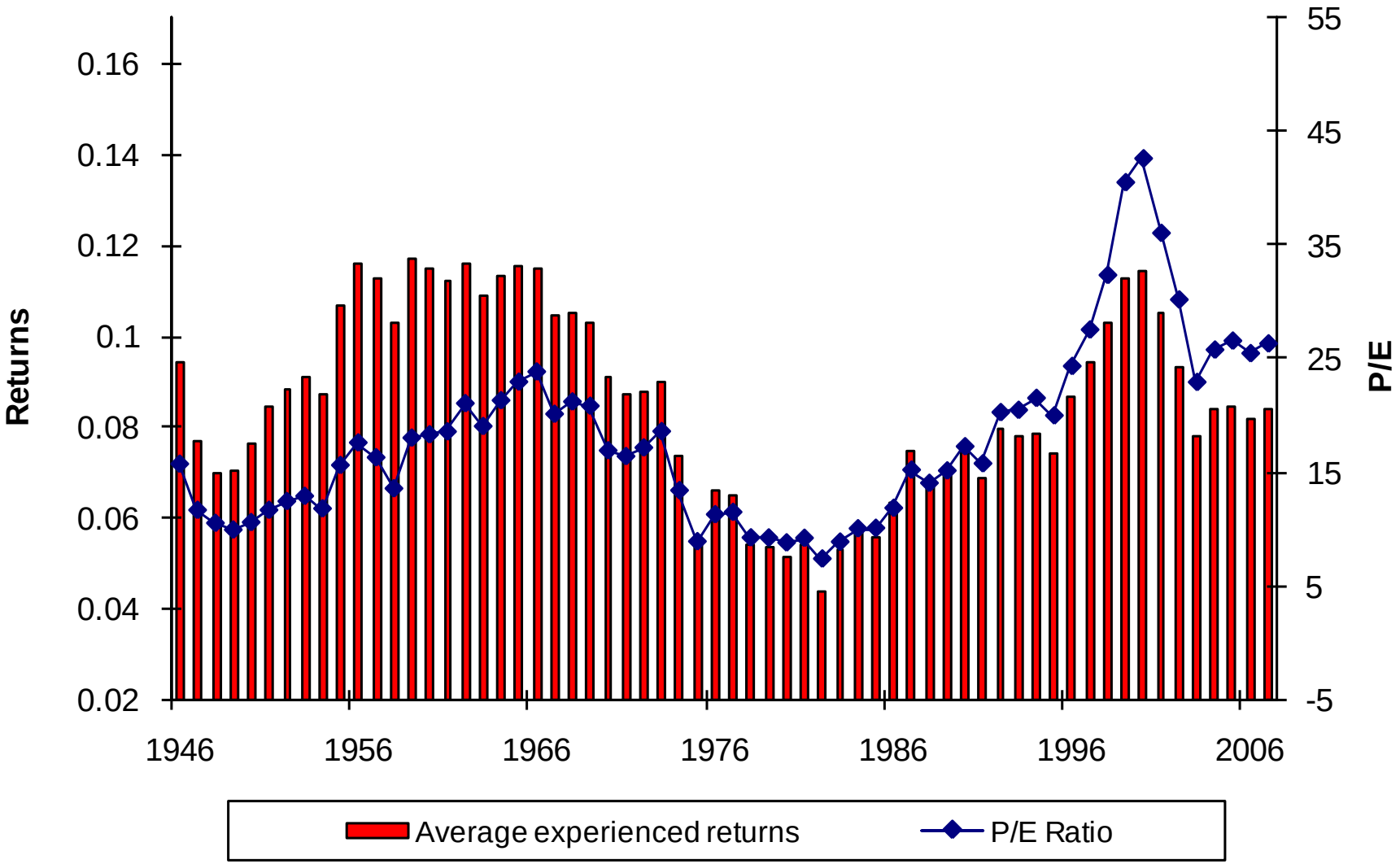
No difference between high-SES and low-SES investors!

Long-lasting effects

Illustration: 2008 Financial Crisis

- Real return of S&P 500 index in 2008: -36%
  - Large negative returns strongly altered investors' (weighted) life-time average returns
  - Effect was strongest for young investors
- Compare to counterfactual of 8.2%
  - For a 30-year old:
    - Experienced returns 4 pp lower
    - Participation rate 10 pp lower
  - For a 60-year old:
    - Experienced returns 2 pp lower
    - Participation rate 5 pp lower
- How long-lasting is the effect?
  - For a 30-year old, , weight on 2008 return in 2009: 8.9%
  - ... in 2019 (then 40-year old): 4.0%
  - ... in 2039 (then 40-year old): 2.0%
  - After 30 years most of the effect faded away.

Aggregate effects



A Note about Expectation Formation in Macro-Finance

- Long history of concerns about "rational beliefs" (Bayesian updating) in micro economics
  - Allais paradox, Ellsberg paradox
  - Savings behavior, loss aversion, ...
- Increasingly also (finally ...) concerns about rational expectations (RE) assumption in macro economics and finance
  - Bubbles in stock prices, housing, and other assets
  - Credit cycles, investment cycles
  - Momentum, mean reversion, Investors chasing past performances

- Acknowledgement that RE models fail to capture most prominent stylized facts in macro and finance, at least without painful addl. assumptions (e.g., Woodford AnnR)
  - Concern: "Adaptive learning" and "constant gain models" etc. are designed to fit the data without, not to get at true underlying expectations formation process
- Candidates: overinference (Barberis, Greenwood, Jin, Shleifer); natural expectations (Fuester, Laibson); experience effects.
- Micro data and experiments needed for
  1. model-based micro-underpinning and
  2. clean identification!

The Big Picture

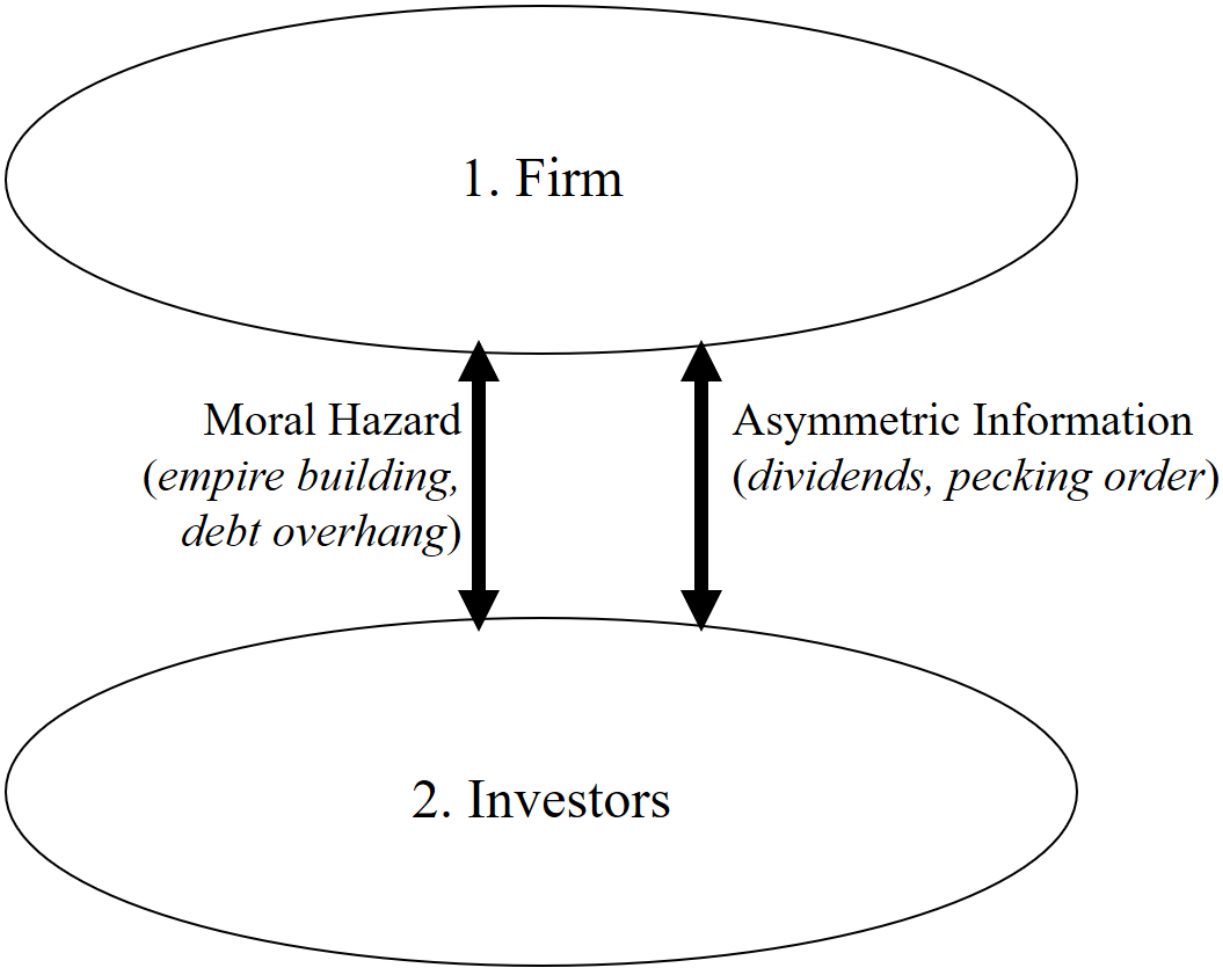
- Importance of psychological concepts of risk and risk perception
  - Here: Availability
  - Overconfidence, Illusion of control, Familiarity, ...
- **Individual-level implications** (investment, mortgage borrowing, corporate decisions)
- **Aggregate implications** (stock market valuation, inflation)

PART 3: BEHAVIORAL CF

Behavioral Corporate Finance

1. What is Behavioral CF?
   - What is CF?
2. Perspective 1: *Corporate Response* to Investor Biases
3. Perspective 2: Market Response to *Corporate Biases*

Corporate Finance ... in a nutshell



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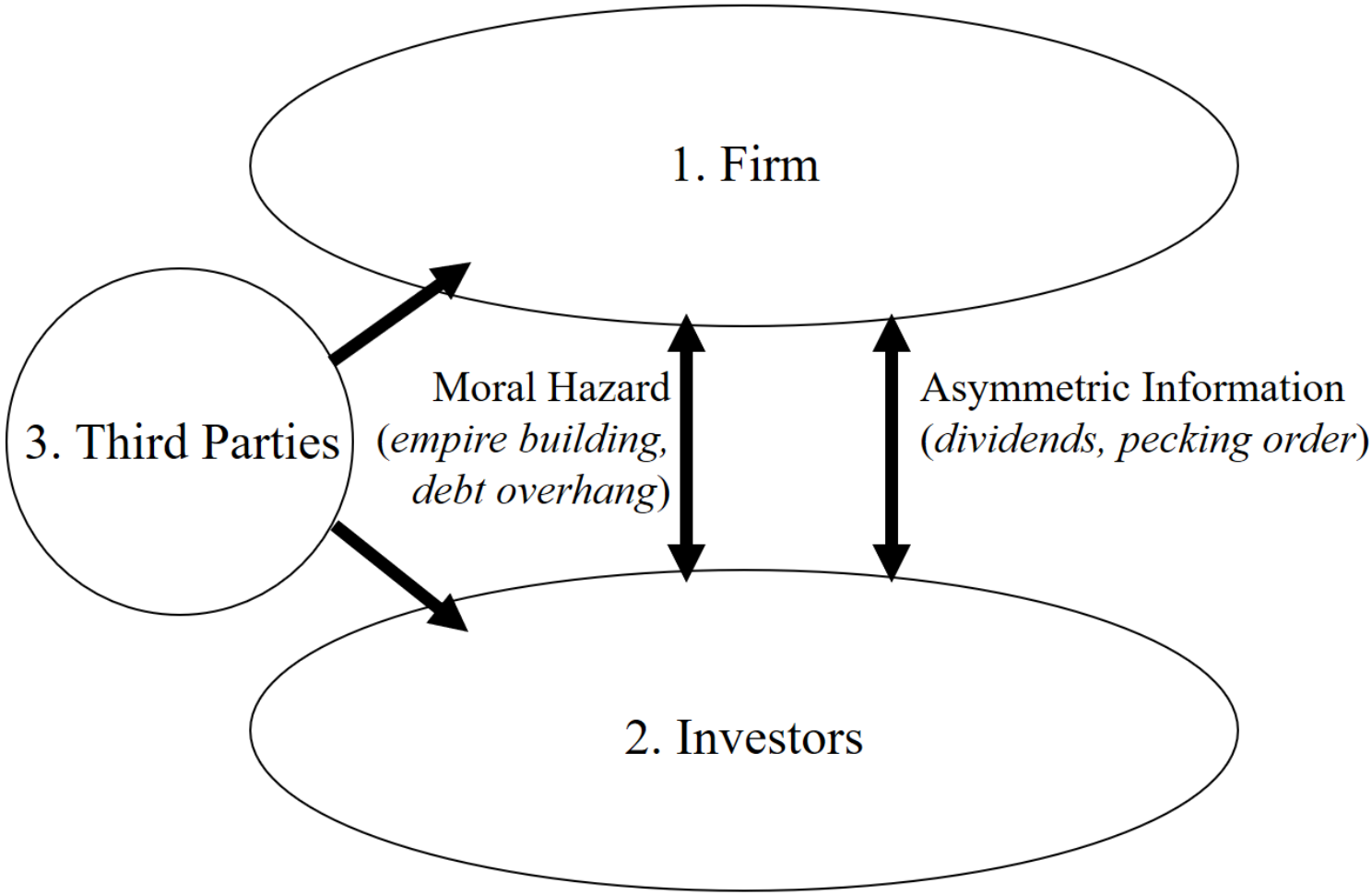
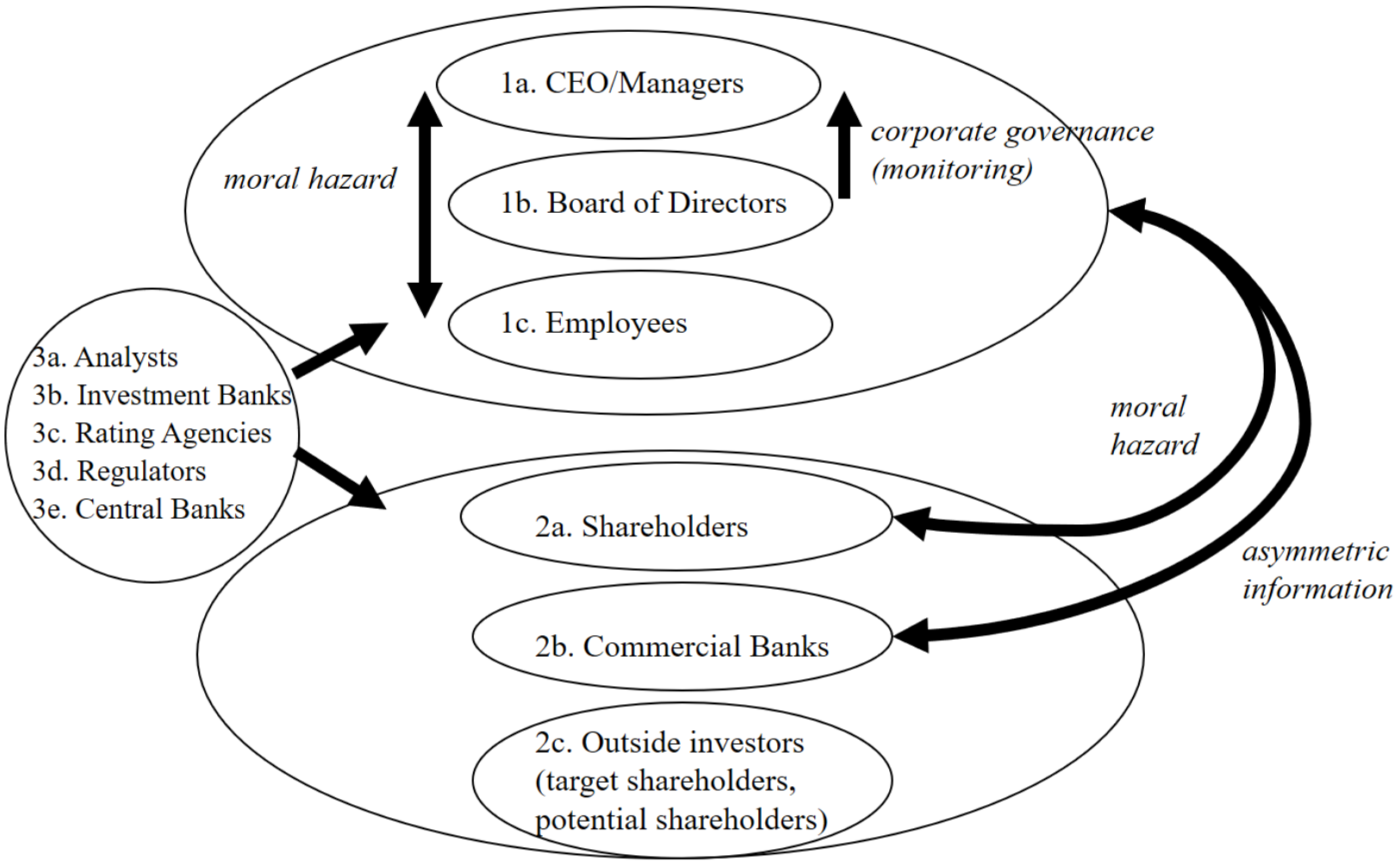


Corporate Finance ... zooming in



"What is CF?" in practice...

- Much broader than "corporate" (small firms, entrepreneurs, analysts, microfinance) and "finance" (any decision-making)
- Strong links to other empirical fields (PF, labor, org econ, devo), theory (contract theory, org econ)
  - Examples devo/political economy: microfinance, stock price reaction to bribes
  - Examples PF: dividends, taxes (agency, asymmetric info)
  - http://conference.nber.org/confer/ → Check out Spring / Fall / SI "CF" (and "BE") programs over the last couple of years
- So what is the separation from Applied Micro:
  - partly methodology (e.g. SE.s: Fama-McBeth vs. clustering); Peterson: kellogg.northwestern.edu/faculty/petersen/htm/papers/standarderror.html
  - partly data demands + advantages
  - partly job market requirements (AP, lingo,...) + advantages
- **Translates into Behavioral CF.**

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Perspective 1: Biased Investors

Advantage (promise in terms of research agenda):

- Plausibility ("smart managers, stupid investors")

Disadvantage (hurdles in research):

- lack of homogeneity among investors ... *though more careful papers distinguish tupes of investors, e.g., between firms with and without institutional stock ownership*
- Unspecified "investor sentiment" ... *though see more recent research on anchoring effects, e.g., Baker, Pan, and Wurgler, 2012*)
- Lack of individual data to proxy for a bias rather than "fitting it to the data"
  - Cf. β-δ-models in "Paying Not to Go to the Gym" (AER 2006)
  - *Becomes and advantage if you get such data ... cf. young males and overconfidence in Odean's work*

Perspective 2: Biased Managers

- **Managerial biases:** Systematic deviations from rational / traditional-model corporate decisions, e.g. overconfidence, experiences, "traits," inducing non-standard corporate policies, i.e., implications for
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Perspective 2: Biased Managers

Advantages / Promise:

- "Homogeneity" of subgroups of CEOs
  - Forbes 500 companies, certain industries, entrepreneurs
  - Selection $\rightarrow$ Plausibility of certain biases and heuristics (that are beneficial to managers in many other situations)
- Data on individuals (ExecuComp, BoardEx, Who's Who, Million-Dollar-Directory)
  - Including information about incentives (compensation etc.)
- Central decision-makers $\rightarrow$ impact on important, far-reaching decisions (mergers, investment, hiring + downsizing) ...
  cf. "*what's the alpha*" in behavioral AP

Perspective 2: Biased Managers

Disadvantages:

- Formerly: plausibility
- Selection (e.g., gender example in managerial traits)
- Low-frequency variation (e.g., within-firm turnover to identify manager specific effects)
- Novel data (?); cf. labor and the NLSY, other BLS data sets = ExecuComp

"Perspective 3": Other Players

E.g., analyst biases

- Systematic deviations from rational evaluation of companies, e.g. representativeness (stereotypes such as "losers" and "winners")
- Implications for corporate decisions such as earnings manipulation, budgeting to exceed thresholds

E.g., rating agencies

E.g., regulators / law makers

E.g., central bankers (making of hawks and doves through their life time experiences) $\rightarrow$ interest rates, funding of firms

Application: M&A

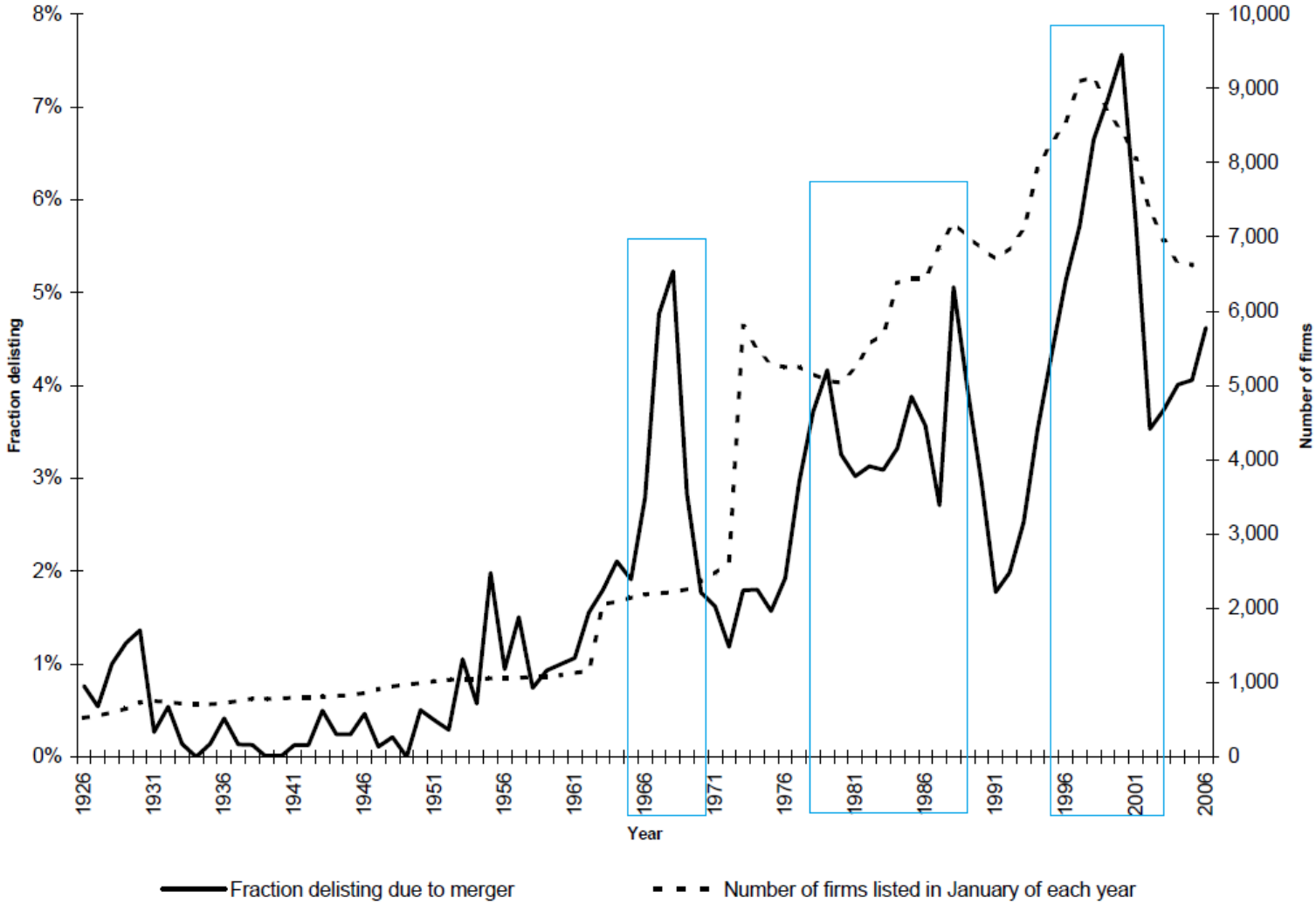
We will discuss Perspectives 1 and 2 using the example of corporate M&A decision-making.

Application: M&A

Some motivating stylized facts:

1. Takeovers are among the largest investments of a firm
   - Largest deal: A: Vodafone, T: Mannesmann, $202B, in 1999
2. Huge economic significance
   - In terms of deal value, value of firms involved, shareholder value created/destroyed, jobs created/lost/changed, ...
3. Mergers occur in waves — merger activity tends to be higher during times of economic expansion (stock-driven acquisitions?)
   - 1960s: The conglomerate merger wave
   - 1980s: The refocusing merger wave
   - 1990s: The global & strategic merger wave
4. Within a wave, mergers occur in industry clusters.
   - Mergers are crucial in industry restructurings (both expansions and consolidations)

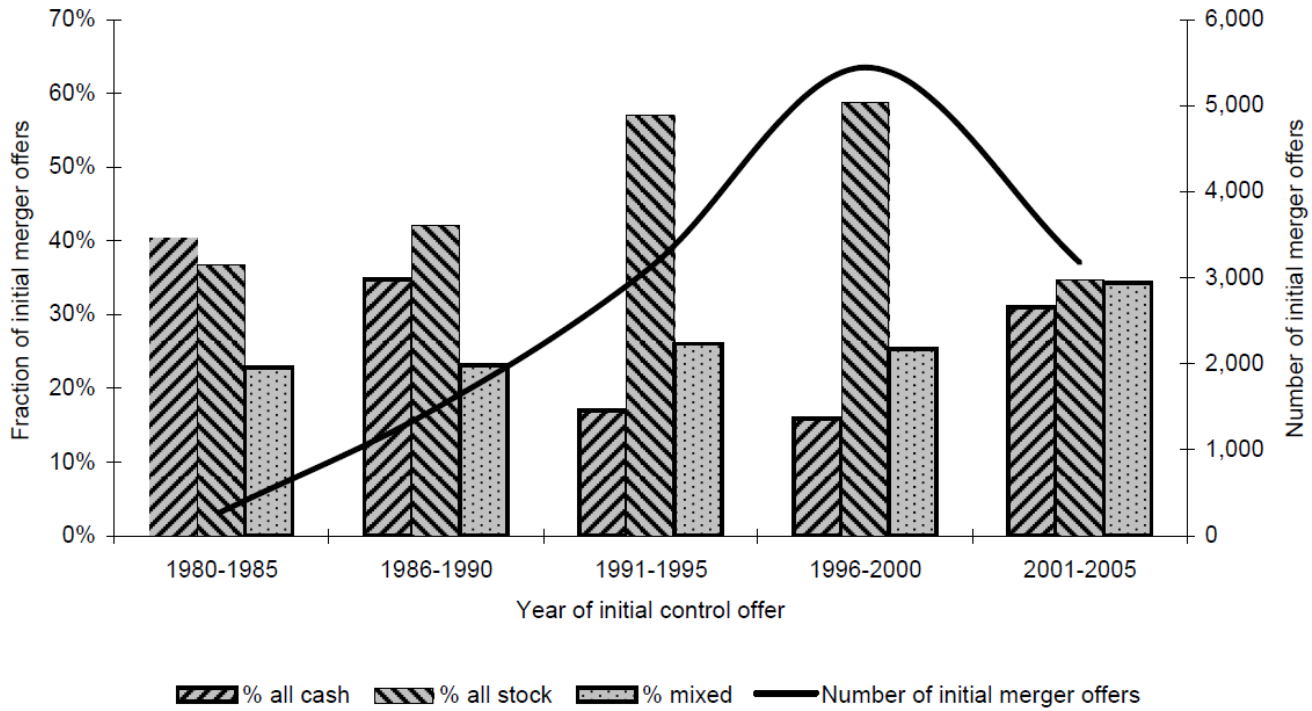
Some stylized facts — Merger waves:



Source: Betton, Eckbo, Thorburn. *Corporate Takeovers*. 2008

Some stylized facts (continued):

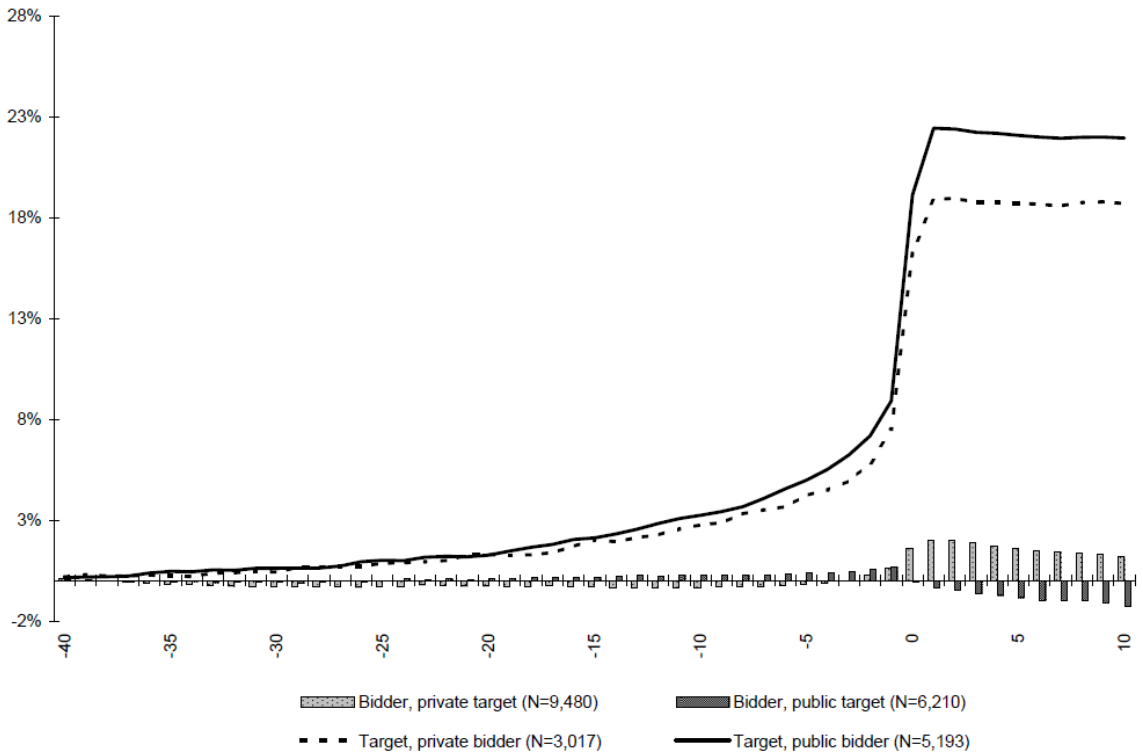
5. Merger financing: Popularity of different payment methods varies over time



Source: Betton, Eckbo, Thorburn. *Corporate Takeovers*. 2008

Some stylized facts (continued):

6. Positive value effect for target shareholders at announcement
7. Negative value effect for bidder shareholders at announcement (on average or for a large portion), esp. when stock-financed



Average CAR to targets and bidders, 1980-2005.
Source: Betton, Eckbo, Thorburn. *Corporate Takeovers*. 2008

Some stylized facts:

6. Positive value effect for target shareholders at announcement
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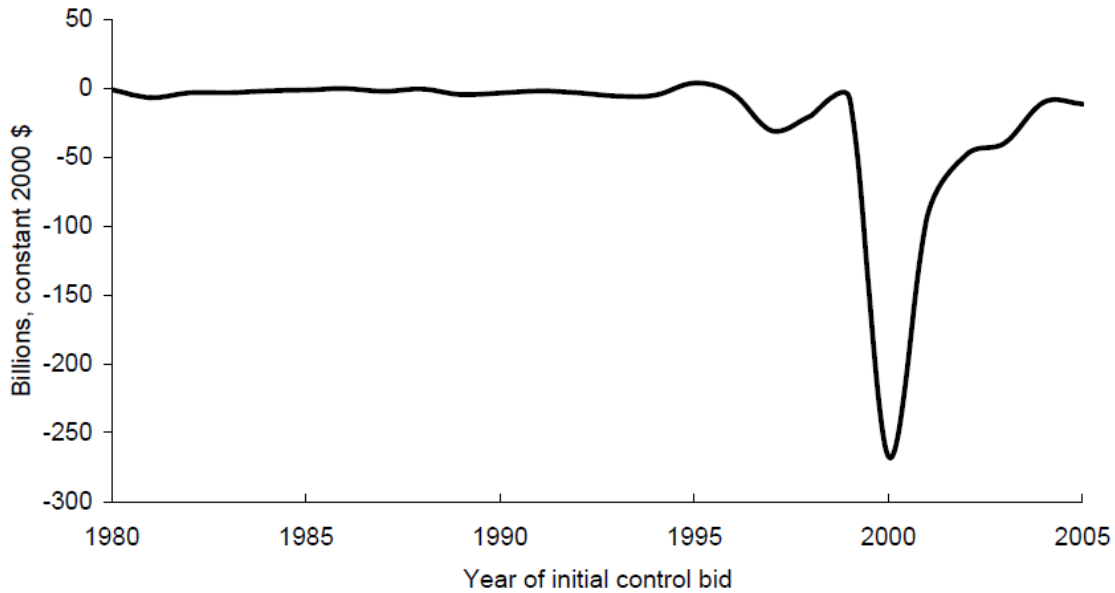


Aggregate dollar abnormal returns to successful **bidders**, in the window **(-2, +1)**.
Source: Betton, Eckbo, Thorburn. *Corporate Takeovers*. 2008

Two Perspectives

Perspective 1: Misvaluation of Investors

- "Investor sentiment"
- Managerial response: timing of mergers, in particular of stock-financed mergers

Perspective 2: Misvaluation of Managers

- "CEO overconfidence"
- Market response: limited willingness to finance overestimated mergers (hence sensitivity to available internal funds); negative stock price reaction to overestimated mergers

M&A — Perspective 1: Misvaluation of Investors

(Baker-Wurgler agenda; Shleifer-Vishny [2003] approach)

Acquirer A and Target T with

- Capital stock (unit) K_A and K_T
- "Short-run" current value

$$\begin{aligned} V_A &= S_A K_A \\ V_T &= S_T K_T \\ V &= S(K_T + K_A) \end{aligned}$$

w.l.o.g. $S_A > S_T$; typical case: $S_A > S > S_T$

$\Rightarrow$ Short-run gains (perceive synergies) from mergers:
$V - V_A - V_T$

$\Rightarrow$ For example, zero perceived gains if S such that
$S(K_A + K_T) - S_A K_A - S_T K_T = 0$

M&A — Perspective 1: Misvaluation of Investors

- Long-run value

$$\begin{aligned} \tilde{V}_A &= qK_A \\ \tilde{V}_T &= qK_T \\ \tilde{V} &= q(K_T + K_A) \end{aligned}$$

  $\Rightarrow$ Long-run gains from mergers: 0

- Managers act in own (=existing shareholders') interest
- Managers exploit market irrationalities
- Investors draw no inferences about the LR from the merger announcements!

Cash-financed acquisition

- A pays cash PK_T ($\geq S_T K_T$)
  - E.g. $P = S_T \Longrightarrow$ No takeover premium
  - E.g. $P = S \Longrightarrow$ Payment proportional to **SR** combined value
- Short-run abnormal returns (**announcement effects**)
  - Acquirer:
$$\begin{aligned} & S(K_A + K_T) - PK_T - S_A K_A \\ = \; & (S - S_A)K_A + (S - P)K_T \end{aligned}$$
  - Target:
$$(P - S_T)K_T$$

$\Longrightarrow$ A-shareholders lose from perceived dilution ($S - S_A < 0$) or gain from "money machine" ($S - S_A > 0$)
$\Longrightarrow$ A-shareholders gain from high SR assessment of synergy relative to price ($S - P > 0$)

- Long-run abnormal returns:
  - Combined: $0 = q(K_A + K_T) - qK_A - qK_T$.
  - For A-Shareholders: $q(K_A + K_T) - PK_T - qK_A = (q - P)K_T$
  - For T-Shareholders: $(P - q)K_T$

$\Longrightarrow$ A-shareholders gain from high LR assessment of synergy relative to price ($q - P > 0$).

$\Longrightarrow$ T-shareholders gain from low LR assessment of synergy relative to price ($q - P < 0$).

(Zero-sum game.)

Stock-financed acquisition

- A pays cash fraction $x = \frac{PK_T}{S(K_A+K_T)}$.
  - Note implicit assumption to get to x.
- Short-run abnormal returns (**announcement effects**): as before
- Long-run abnormal returns
  - Combined Value: 0
  - For A-Shareholders:

$$\begin{aligned} & q(1-x)(K_A+K_T) - qK_A \\ = \; & q(1-\frac{PK_T}{S(K_A+K_T)})(K_A+K_T) - qK_A \\ = \; & q(K_A+K_T-\frac{PK_T}{S}) - qK_A = q(1-\frac{P}{S})K_T \end{aligned}$$

  - For T-Shareholders: $q(\frac{P}{S}-1)K_T$. (Has to be $-A$.)

$\Longrightarrow$ In the LR, A-shareholders gain from high valuation ($S - P > 0$).
$\Longrightarrow$ In the LR, T-shareholders gain from high valuation ($P - S > 0$).

Insight: Difference between LR value creation and LR (mean-reversion) returns.

- LR return of A without acquisition: $(q - S_A)K_A$. (Negative if A initially overpriced.)
- *Incremental* LR return of A from acquisition: $(1 - \frac{P}{S})qK_T$. (Positive if $P < S$.)

$\Longrightarrow$ In the LR, A-shareholders gain from high valuation ($S - P > 0$) even if overall LR return is negative.

("Not as negative as they would have been without the acquisition.")

Empirical issues:

How could you get a good benchmark for over/under valuation?

How could you separate the Tobin's Q effect from the over/under valuation effect?

How could you really get a good measure of the Long Run returns of the acquirers?

M&A — Perspective 2: Misvaluation of Managers (Overconfidence)

(Roll [JB 1986]: The Hubris Hypothesis)

- Let's step back from assuming a given acquirer A and a given target T. Instead: N potential acquirers of a given target T.
- Valuation process
  - Acquirers $A_1, A_2, ..., A_n, ..., A_N$ evaluate T
  - Current market values $V_{A_1}, V_{A_2}, ..., V_{A_N}, V_T$
  - Expected value of merger for A_n: $E_n[V_n] - V_{A_n}$

- How much should company A_n bid (at most)?
  - Vickrey (1961) for private values,
    Milgrom and Weber (1982) for common/affiliated values.
  - If expectation based on signal drawn from a common distribution:
    $b_n < E_n[V_n] - V_{A_n}$
    - E.g. in case of buy-out firm: $E_n[V_n] - V_{A_n} = E_n[V_T]$ and signals about future value of T drawn from common distribution.
    - Then $b_n < E_n[V_T]$.
  - Else: winner's curse.

- Hubris hypothesis (version 1): Bidders do not account for winner's curse and bid (up to) $E_n[V_T]$.
- Hubris hypothesis (version 2): Bidders account for winner's curse,
  shade their bid, but over-estimate the private-value element.
- Plausibility arguments:
  - We observe bids $b_n > V_T$ but not (rarely) $b_n < V_T$;
    thus we observe upwards bias but not downwards error.
  - Little opportunity to learn from past mistakes
    (few acquisitions over a managers lifetime, noisy outcome).
  - Executives appear particularly prone to display overconfidence in experiments.
  - Three main factors:
    - Being in control (incl. illusion of control)
    - High commitment to good outcomes
    - Reference point not concrete

  (Weinstein, 1980; Alicke et al., 1995)

Missing piece:

$\longrightarrow$ Difference in opinion (between rational investors/market and overoptimistic managers) affects bidding behavior via financing constraints.

How?

$\longrightarrow$ **Heaton (FM 2002)**

$\longrightarrow$ **Malmendier and Tate (2008)**

Single Acquiror with Full Bargaining Power

- Market value of acquiror $A = V_A$;
  A-manager's valuation of $A = \widehat{V}_A$.
- Market value of target $T = V_T$.
- A has access to internal resources C (cash and other non-diluting assets); uses $c \leq C$ to pay target shareholders. If no merger takes place, c is 0 (and the full C is part of the firm value V_A).
- Target shareholders are paid with c and/or shares of the merged company.
- Market value of the combination of A and T after paying out $c = V(c)$; A-manager's valuation of the combination of A and $T = \widehat{V}(c)$.

- Overconfident A-manager
  - overvalues own company: $\widehat{V}_A > V_A$,
  - overvalues the merger, $\widehat{V}(c) - V(c) > \widehat{V}_A - V_A$ for some c.
- How much does CEO pay for T? How much in shares after cash payment c? How does it depend on overconfidence?
  Answer: Since the acquiring firm has all the bargaining power, it pays V_T for the target, independent of the CEO's overconfidence.
  For a given amount $c < V_T$ of cash financing, target shareholders demand a share s of the merged company such that $sV(c) = V_T - c$.
- When does a rational CEO conduct the takeover?
  Answer: iff $V(c) - (V_T - c) > V_A$.

- Denoting the merger synergies as $e \in R$, we can decompose $V(c)$ into

$$V(c) = V_A + V_T + e - c.$$

$\Longrightarrow$ Rational CEO makes the first best acquisition decision: acquires iff $e > 0$, *independently* of the available C.
$\Longrightarrow$ Since the capital market is fully efficient, there is no extra cost of raising external capital to finance the merger and the CEO is indifferent among cash, equity, or a combination.

- When does an overconfident CEO conduct the takeover?
Answer: Overestimates the returns to merging, but also believes that (partial) equity financing entails a loss to current shareholders of
$(\frac{V_T - c}{V(c)} - \frac{V_T - c}{\widehat{V}(c)})\widehat{V}(c) = \frac{V_T - c}{V(c)}(\widehat{V}(c) - V(c))$

- Denoting the "perceived" additional merger synergies as $\widehat{e} \in R_{++}$, we can decompose $\widehat{V}(c)$:

$$\widehat{V}(c) = \widehat{V}_A + V_T + e + \widehat{e} - c.$$

$\Longrightarrow$ Overconfident CEO acquires iff
$e + \widehat{e} > \frac{V_T - c}{V(c)}(\widehat{V}(c) - V(c))$.
$\Longrightarrow$ That is, he merges whenever actual and perceived merger synergies exceed the perceived loss due to dilution.
$\Longrightarrow$ The higher c, the lower the perceived loss to dilution.

Empirical Approach

Most common approach to measuring CEO OC in behavioral finance literature (introduced in Malmendier and Tate, 2005; but better see JEP 2015):

Use decisions that the executive makes on his or her **personal portfolio** of company stock options. (Typical 10-year duration, typically vested after 4 yrs.) $\rightarrow$ Link to **corporate decision**.
Note: successful approach for borrowing, leverage, ...

Measure: CEO holds options all the way to expiration (at least 40% in the money) have taken a long-term bet on the future performance of their company's stock, despite their under-diversification.

Empirical Approach

Background: Since the 1980s (particularly in the 1990s), top US executives have received increasingly large stock and option grants as part of their compensation (Hall and Murphy 2003).
$\rightarrow$ under-diversified w.r.t. company-specific risk.
$\rightarrow$ CEOs have a limited ability to address this issue (e.g., restricted stock [time-based vesting or performance-based vesting]; stock options not tradeable and typically also take years to vest; executives are contractually prohibited from taking short positions in the company's stock.

Empirical Approach

Logic:

- Rational, risk-averse executive should seek to exercise stock options (once vested) in order to diversify.
  - Exact timing of optimal option exercise depends on "moneyness" of the options, risk aversion, and extent of under-diversification (Lambert, Larcker, and Verrechia 1991; Hall and Murphy 2002).
- OC executives overestimate future performance of their firms
  $\rightarrow$ More willing to hold options, expecting to profit from expected stock price appreciation.
  $\rightarrow$ Systematic tendency to hold options longer before exercise as a measure of overconfidence.

Measure: CEO holds options all the way to expiration (at least 40% in the money) have taken a long-term bet on the future performance of their company's stock, despite their under-diversification.

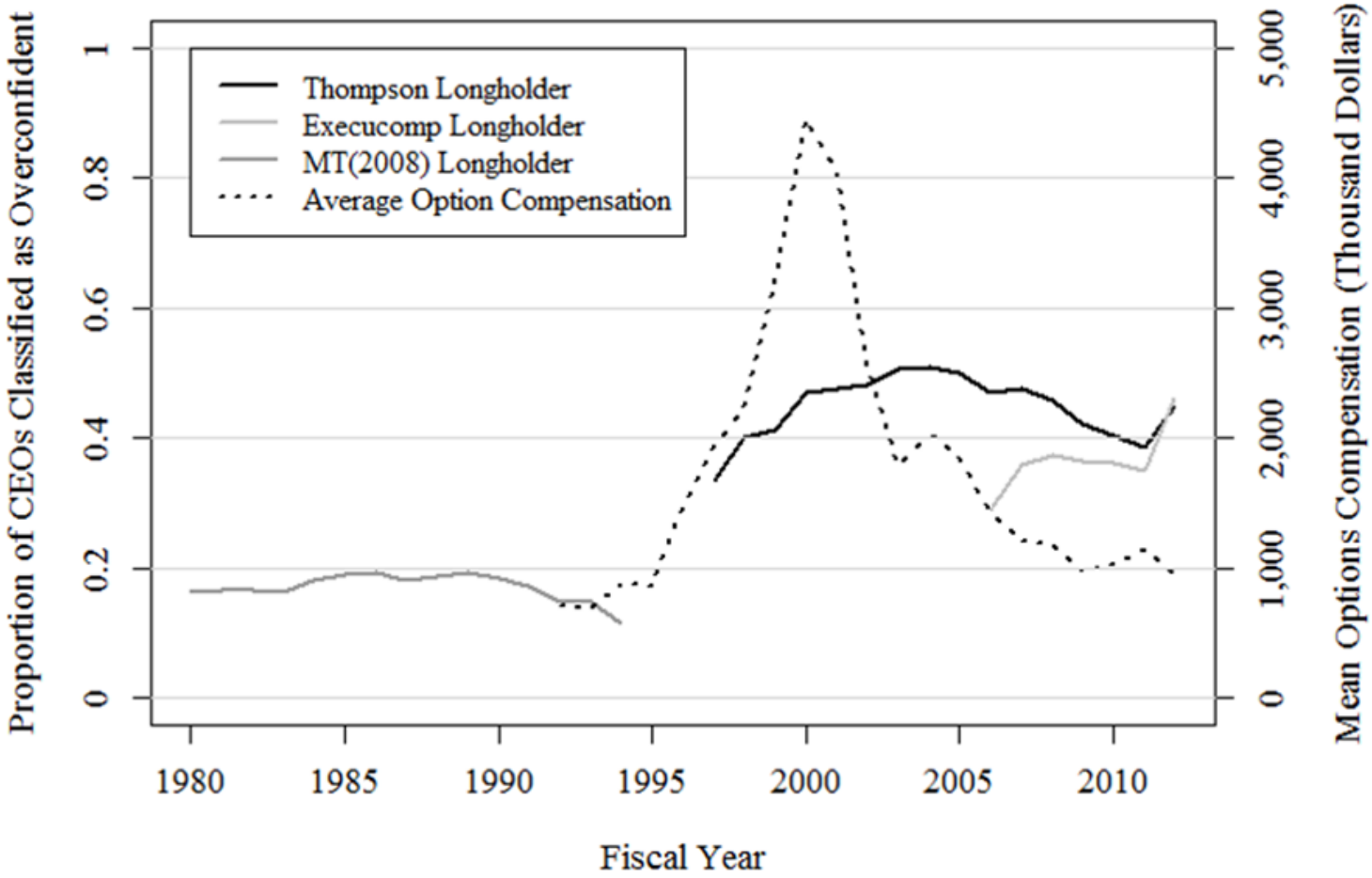
Data

Original "Longholder" measure constructed from Hall and Liebman (1998) data (CEO stock and option holdings in Forbes 500 companies from 1980 to 1994).

Updated Longholder

1. Thomson Reuters' Insider Filings database for the 1996-2012 time period
2. Compustat's ExecuComp database in the format available after 2006

Figure 1: Option-Based Overconfidence Measure



Note: Distribution of option receivers also drastically changed (younger, smaller firms). Or: Experience of long up market.

Empirical Specification

$$\Pr(Y_{it} = 1|X, O_{it}) = G(\beta_1 + \beta_2 O_{it} + X^T \gamma)$$

where i: company, t: year, Y: acquisition dummy (yes or no), O: overconfidence, X: set of controls, G: logistic distribution

$\rightarrow H_0 : \beta_2 = 0$ (overconfidence does not matter)
$\rightarrow H_1 : \beta_2 > 0$ (overconfidence does matter)

Table 3: Do Overconfident CEOs Complete More Mergers?

	Fixed-effects logit			Random-effects logit		
	(1)	(2)	(3)	Baseline (4)	Cash rich (5)	Cash poor (6)
Size	0.6537	0.6600	0.3278	0.9022	0.9480	0.9177
	(2.50)**	(2.42)**	(3.42)***	(1.49)	(0.50)	(1.03)
Q	0.7135	0.7154	0.9062	0.7019	0.7686	0.6839
	(2.20)**	(2.18)**	(0.45)	(2.96)***	(1.25)	(2.70)***
Cash flow	2.0231	2.0377	1.6607	1.5427	0.9948	1.8719
	(1.72)*	(1.72)*	(0.67)	(2.07)**	(0.01)	(2.35)**
Stock ownership	0.3840	0.3813	0.0418	1.4084	21.4335	0.7232
	(0.95)	(0.96)	(0.70)	(0.36)	(1.80)*	(0.29)
Vested options	0.4566	0.4595	0.6384	1.2165	4.2168	1.3186
	(3.97)***	(3.93)***	(0.51)	(0.46)	(0.91)	(0.63)
Efficient board size	1.0817	1.0811	1.8488	0.8012	0.575	0.9184
	(0.40)	(0.40)	(2.10)**	(1.55)	(2.44)**	(0.48)
Longholder	2.1891			1.7447	1.9728	1.5471
	(2.70)***			(3.21)***	(2.53)**	(2.10)**
Post-Longholder		1.8642				
		(1.91)*				
Pre-Longholder		2.3305				
		(2.72)***				
Holder 67			2.5159			
			(2.49)**			
Firm fixed effects	Yes	Yes	Yes	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,568	2,568	853	3,540	1,227	2,313
Number of firms	225	225	124	322	282	314

z-Statistics in parentheses. Constant included.
* Significant at 10%; ** significant at 5%; *** significant at 1%.

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	(0.95)	(0.36)
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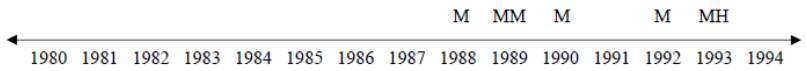
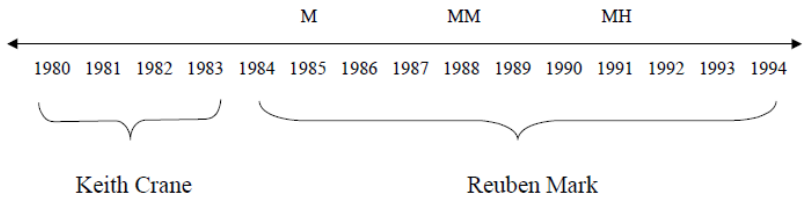
	(0.40)	(1.55)
Longholder	2.1891	1.7447
	(2.70)***	(3.21)***
Firm fixed effects	Yes	No
Year fixed effects	Yes	Yes
Observations	2,568	3,540
Number of firms	225	322

z-Statistics in parentheses. Constant included.
* Significant at 10%; ** significant at 5%; *** significant at 1%.

Identification Strategy

	Logit & Random Effects Logit	Fixed Effects Logit
Case 1:		
Wayne Huizenga (Cook Data Services/Blockbuster) • CEO for all 14 years of sample • Longholder		
	Yes	No
J Willard Marriott (Marriott International) • CEO for all 15 years of sample • Not a Longholder		
		
Case 2:		
Colgate Palmolive • Keith Crane CEO from 1980-1983 (Not a Longholder) • Reuben Mark CEO from 1984-1994 (Longholder)		
	Yes	Yes

Alternative Explanations

1. Inside Information or Signaling
   - Mergers should "cluster" in final years of option term
   - Market should react favorably on merger announcement
   - CEOs should "win" by holding

Timing of Overconfidence Effect

Sample: All firm years **Dependent Variable:** Acquistion (yes or no)			
	logit with random effects	logit with random effects	logit with random effects
3 Final Years of a Longheld Option	**1.5399** (1.86)*		
4 Final Years of a Longheld Option		**1.6626** (2.41)**	
5 Final Years of a Longheld Option			**1.7072** (2.68)***
Remaining Longholder CEO Years	**1.8045** (3.04)***	**1.7371** (2.68)***	**1.6916** (2.39)***
Year Fixed Effects	yes	yes	yes
Observations	3690	3690	3690
Number of Firms	327	327	327
Regressions include Size, Q_{t-1}, Cash Flow, Ownership, Vested Options, and Governance.			

Table 7: Are Overconfident CEOs Right to Hold Their Options?

Panel A. Returns to diversifying	
Percentile	Return
10th	−0.24
20th	−0.15
30th	−0.10
40th	−0.05
50th	−0.03
60th	0.03
70th	0.10
80th	0.19
90th	0.39
Mean	0.03
St. dev.	0.27

Remark: Returns from exercising 1 year sooner and investing in the S&P 500 index

Table 7: Are Overconfident CEOs Right to Hold Their Options?

Panel B. Do "mistaken" holders drive the acquisitiveness result?	
	Fixed-effects logit
Size	0.6757
	(2.20)**
Q	0.7147
	(2.14)**
Cash flow	2.052
	(1.71)*
Stock ownership	0.3502
	(0.97)
Vested options	0.3026
	(1.03)
Efficient board size	1.111
	(0.54)
Longholder: did OK	1.4259
	(0.76)
Longholder: should have exercised	3.4042
	(3.47)***
Year fixed effects	Yes
Observations	2,515
Number of firms	221

z-Statistics in parentheses. Constant included.
* Significant at 10%; ** significant at 5%; *** significant at 1%.

Alternative Explanations

1. Inside Information or Signaling
   - Mergers should "cluster" in final years of option term
   - Market should react favorably on merger announcement
   - CEOs should "win" by holding
2. Stock Price Bubbles
   - Year effects already removed
   - All cross-sectional firm variation already removed
   - Lagged stock returns should explain merger activity

Control for Returns

Longholder = holds options until last year before expiration (at least once)
Returns = ln(1+returns)
Distribution: Logistic. Constant included.
Dependent Variable: Acquistion (yes or no) **; Normalization:** Capital.

	logit	logit with random effects	logit with fixed effects
$Returns_{t-1}$	**1.4801**	**1.4467**	**1.1424**
	(1.61)	(1.62)	(0.54)
$Returns_{t-2}$	**1.2539**	**1.2391**	**1.0474**
	(1.15)	(1.01)	(0.20)
$Returns_{t-3}$	**1.0635**	**1.0405**	**0.9262**
	(0.31)	(0.19)	(0.35)
$Returns_{t-4}$	**1.3548**	**1.3452**	**1.2513**
	(1.40)	(1.37)	(0.98)
$Returns_{t-5}$	**1.2334**	**1.2202**	**1.1539**
	(1.03)	(0.95)	(0.66)
Longholder	**1.5048**	**1.6184**	**2.4628**
	(2.33)**	(2.83)***	(2.56)**
Year Fixed Effects	yes	yes	yes
Observations	3479	3479	2157
Firms		305	173

Regressions include Cash Flow, Q_{t-1}, Size, Ownership, Vested Options, and Governance.

Alternative Explanations

1. Inside Information or Signaling
   - Mergers should "cluster" in final years of option term
   - Market should react favorably on merger announcement
   - CEOs should "win" by holding
2. Stock Price Bubbles
   - Year effects already removed
   - All cross-sectional firm variation already removed
   - Lagged stock returns should explain merger activity
3. Volatile Equity
4. Finance Training

Return Volatility

Longholder = holds options until last year before expiration (at least once)
Volatility = ln(1+variance(ln(1+returns)))
Distribution: Logistic. Constant included.
Dependent Variable: Acquistion (yes or no); **Normalization:** Capital.

	logit	logit with random effects	logit with fixed effects
$Volatility_{t-1}$	**1.2672**	**1.2413**	**1.0403**
	(3.22)***	(2.42)**	(0.34)
Longholder	**1.4784**	**1.6777**	**2.6370**
	(2.26)**	(3.02)***	(2.69)***
Year Fixed Effects	yes	yes	yes
Observations	3432	3432	2102
Firms	319	319	180

Regressions include Cash Flow, Q_{t-1}, Size, Ownership, Vested Options, and Governance.

Finance Education

Longholder = holds options until last year before expiration (at least once)
Distribution: Logistic. Constant included.
Dependent Variable: Acquistion (yes or no); **Normalization:** Capital.

	logit with controls	random effects logit	fixed effects logit
Size	**0.7624**	**0.7536**	**0.1998**
	(2.27)**	(2.49)**	(3.96)***
Q_{t-1}	**0.8624**	**0.8514**	**0.6985**
	(1.24)	(1.01)	(1.32)
Cash Flow	**1.0686**	**1.0389**	**0.9442**
	(0.24)	(0.14)	(0.13)
Ownership	**1.0163**	**0.8967**	**18.3462**
	(0.01)	(0.06)	(0.31)
Vested Options	**1.2847**	**1.3302**	**3.7916**
	(0.28)	(0.22)	(0.73)
Governance	**0.5132**	**0.5515**	**1.2581**
	(3.01)***	(2.51)**	(0.72)
Finance Education	**1.5500**	**1.6434**	**3.2946**
	(2.00)**	(2.17)**	(1.46)
Longholder	**1.7248**	**1.8757**	**5.6952**
	(2.29)**	(2.42)**	(1.51)
Year Fixed Effects	no	no	yes
Observations	1489	1489	819
Firms	188	188	83

Robustness

Do the results hold as we vary the percentage in the money required for a holder to be overconfident?

Yes.

Odds Ratios

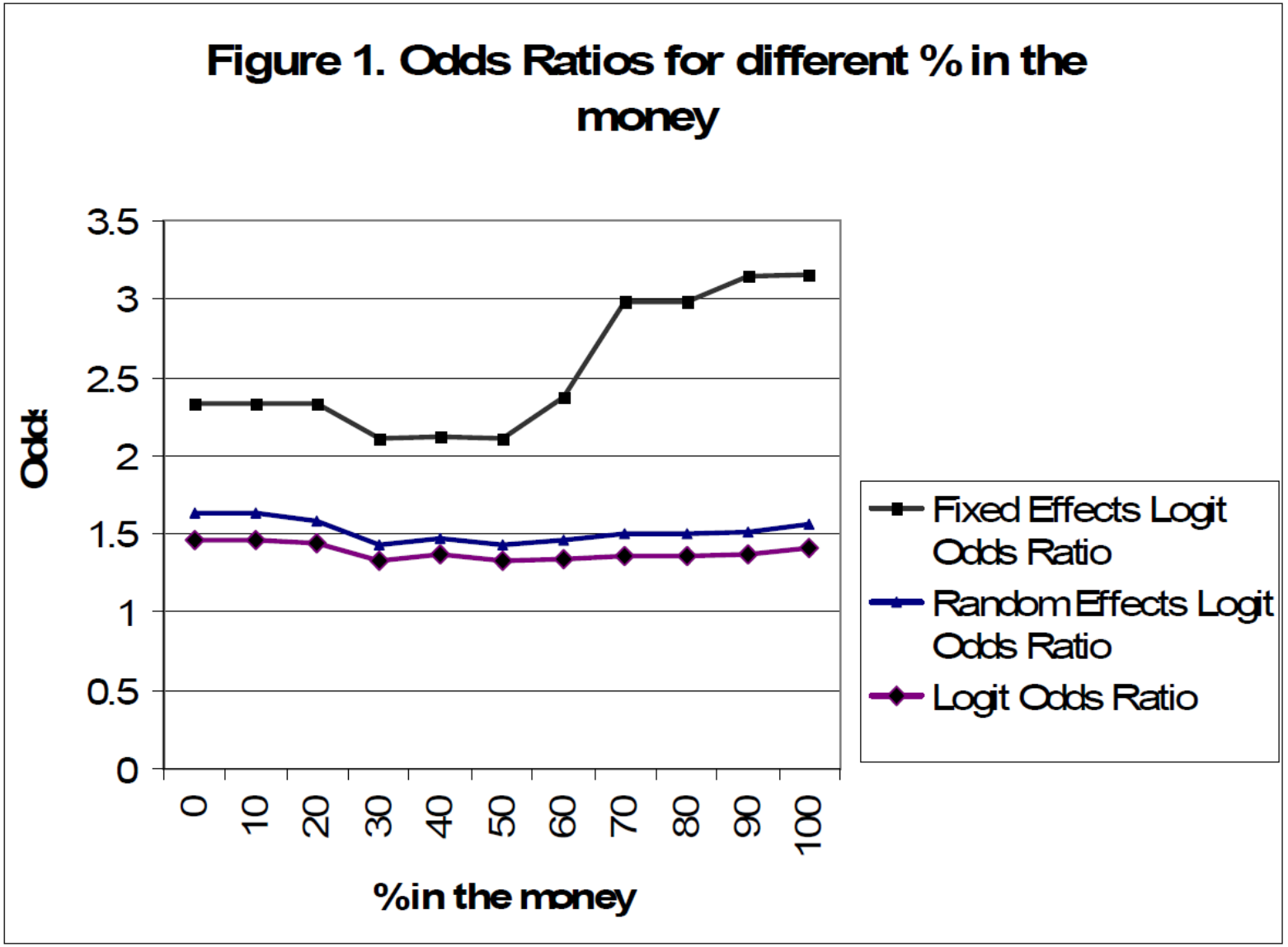


Figure 1. Odds Ratios for different % in the money
Odds
3.5
3
2.5
2
1.5
1
0.5
0
0
10
20
30
40
50
60
70
80
90
100
%in the money
Fixed Effects Logit Odds Ratio
Random Effects Logit Odds Ratio
Logit Odds Ratio

Empirical Predictions

Rational CEO $\longrightarrow$ Overconfident CEO

1. On average?
2. Overconfident CEOs do more mergers that are likely to destroy value
3. Overconfident CEOs do more mergers when they have abundant internal resources
4. The announcement effect after overconfident CEOs make bids is lower than for rational CEOs

Diversifying Mergers

1. Diversification discount
   (*Lamont and Polk, 2002; Servaes, 1996; Berger and Ofek, 1995; Lang and Stulz, 1994*)
2. Market understands ex ante
   (*Morck, Shleifer and Vishny, 1990*)

Table 5: Diversifying Mergers

	Fixed-effects logit	Random-effects logit		
		Baseline	Cash rich	Cash poor
Panel 1. Diversifying mergers				
Longholder	2.5376	2.0108	2.5042	1.781
	(3.31)***	(3.29)***	(2.56)**	(2.27)**
Firm fixed effects	Yes	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes
Observations	1,832	3,540	1,227	2,313
Number of firms	159	322	282	314
Panel 2. Within-industry mergers				
Longholder	1.6646	1.2965	1.3161	1.1471
	(1.03)	(1.01)	(0.82)	(0.43)
Firm fixed effects	Yes	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes
Observations	1,467	3,540	1,227	2,313
Number of firms	127	322	282	314

z-Statistics in parentheses. Constant included.
* Significant at 10%; ** significant at 5%; *** significant at 1%.

Empirical Predictions

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Kaplan-Zingales Index

$$KZ = -1.00 \cdot \frac{CashFlow}{Capital} + 0.28 \cdot Q + 3.14 \cdot Leverage - 39.37 \cdot \frac{Dividends}{Capital} - 1.31 \cdot \frac{Cash}{Capital}$$

- Coefficients from logit regression [Pr(*financially constrained*)]
- High values $\rightarrow$ Cash constrained
  - Leverage captures debt capacity
  - Deflated cash flow, cash, dividends capture cash on hand
  - Q captures market value equity (Exclude?)

Kaplan-Zingales Quintiles

Longholder = holds options until last year before expiration (at least once)
Distribution: Logistic. Constant included.
Dependent Variable: Acquistion (yes or no)**; Normalization:** Capital.
All regressions are logit with random effects.

	Least Equity Dependent		---------->		Most Equity Dependent
			All Mergers		
	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Longholder	**2.2861**	**1.6792**	**1.7756**	**1.9533**	**0.8858**
	(2.46)**	(1.48)	(1.54)	(1.50)	(0.33)
Year Fixed Effects	yes	yes	yes	yes	yes
Observations	718	719	719	719	718
Firms	125	156	168	165	152
			Diversifying Mergers		
	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Longholder	**2.5462**	**1.8852**	**1.7297**	**1.0075**	**1.0865**
	(1.89)*	(1.51)	(1.36)	(0.01)	(0.18)
Year Fixed Effects	yes	yes	yes	yes	yes
Observations	718	719	719	719	718
Firms	125	156	168	165	152

Regressions include Cash Flow, Q_{t-1}, Size, Ownership, Vested Options, and Governance.

Empirical Predictions

Rational CEO $\longrightarrow$ Overconfident CEO

1. On average?
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Empirical Specification

$$CAR_i = \beta_1 + \beta_2 O_i + X^T \gamma + \epsilon_i$$

where i: company, O: overconfidence, X: set of controls

$$CAR_i = \sum_{t=-1}^{1} (r_{it} - \mathbb{E}[r_{it}])$$

where $\mathbb{E}[r_{it}]$ is the daily S&P 500 return ($\alpha = 0, \beta = 1$

Market Response

Panel A			
	Average CAR [−1, +1]		
	All bids	Cash bids	Stock bids
Full sample	−0.0029 (808; 1.73)*	0.0045 (354; 1.82)*	−0.0087 (454; 3.94)***
Longholder = 0	−0.0012 (611; 0.62)	0.0070 (265; 2.21)**	−0.0075 (346; 3.03)***
Longholder = 1	−0.0090 (178; 2.73)***	−0.0032 (78; 0.88)	−0.0135 (100; 2.64)***

Number of observations and *t*-statistics in parentheses.

Do Outsiders Recognize CEO Overconfidence?

Portrayal in Business Press:

1. Articles in
   - New York Times
   - Business Week
   - Financial Times
   - The Economist
   - Wall Street Journal
2. Articles published in 1980-1994
3. Articles which characterize CEO as
   - Confident or optimistic
   - Not confident or not optimistic
   - Reliable, conservative, cautious, practical, steady or frugal

$$TOTALconfident =$$

$$\begin{cases} 1 \text{ , if [“confident” + “optimistic”]} > \text{[“not confident” +} \\ \qquad \text{“not optimistic” + “reliable, conservative, cautious} \\ \qquad \text{practical, steady, frugal”]} \\ 0 \text{ , otherwise} \end{cases}$$

Independent of the effects of coverage frequency

Market Perception versus CEO beliefs

- *TOTALconfident* positively and statistically significantly correlated with Longholder
  - Farrell and Mark are *TOTALconfident*
  - Marriott and Crane are *not TOTALconfident*
- *TOTALconfident* CEOs (like *Longholders*) are more acquisitive on average
  - Especially through diversifying mergers
  - Especcially when they are financially unconstrained

$\Rightarrow$ Overconfidence — identified by CEO *or* market beliefs — leads to heightened acquisitiveness

Press Coverage and Diversifying Mergers

	All	Diversifying	Intra-industry
	(2)	(4)	(6)
TOTALconfident	2.5442	3.2492	1.6670
	(2.36)**	(2.35)**	(0.86)
"No past merger" state dummies	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	716	716	548

z-Statistics in parentheses. Constant excluded.
* Significant at 10%; ** significant at 5%; *** significant at 1%.

Conclusions

- Overconfident managers are more acquisitive
- Much of the acquisitiveness is in the form of diversifying mergers
- Overconfidence has largest impact if CEO has abundant internal resources
- The market reacts more negatively to the mergers of overconfident CEOs

Implications for Contract Design

Overconfidence vs. "empire-building" preferences:

- Immune to incentives
- Responds to capital structure (motivates "debt overhang")
- Requires board independence and vigilance

Empirical Approach in the 21^{st} century

- **Identification of biases**, not just average behavior
- Big unresolved question: Selection!
  - Cf. gender
- Big danger: *p*-hunting for "traits and biases"

Empirical Approach in the 21^{st} century

- **Identification of corporate decision**, e.g. I/CF sensitivity (*Malmendier and Tate, 2005*): I on OC, CF, $OC * CF$, FE among *financially constraint* firms
  - Exploit a natural-experiment design: plausibly exogenous exposure to external financing costs (*Almeida, Campello, Laranjeira and Weisbenner, 2012*)
    - Prior to Aug 2007: stable / decreasing spreads on both investment-grade and high-yield bonds
    - Aug 2007: decline in housing prices in 2006 + wave of suprime mortgage $\rightarrow$ early 2007: spreads on investment-grade corporate bonds risen from 1 pp to 3 pp; spreads on high-yield corporate bonds risen from 3 pp to 7-8 pp

    (Only changes before Great Recession, before the Lehman bankruptcy, before other economic catastrophes in September 2008)
  - Identify the effect of a shock to financing constraints on corporate investment exploiting differences across firms in the portion of long-term debt that matured just after the shock hit

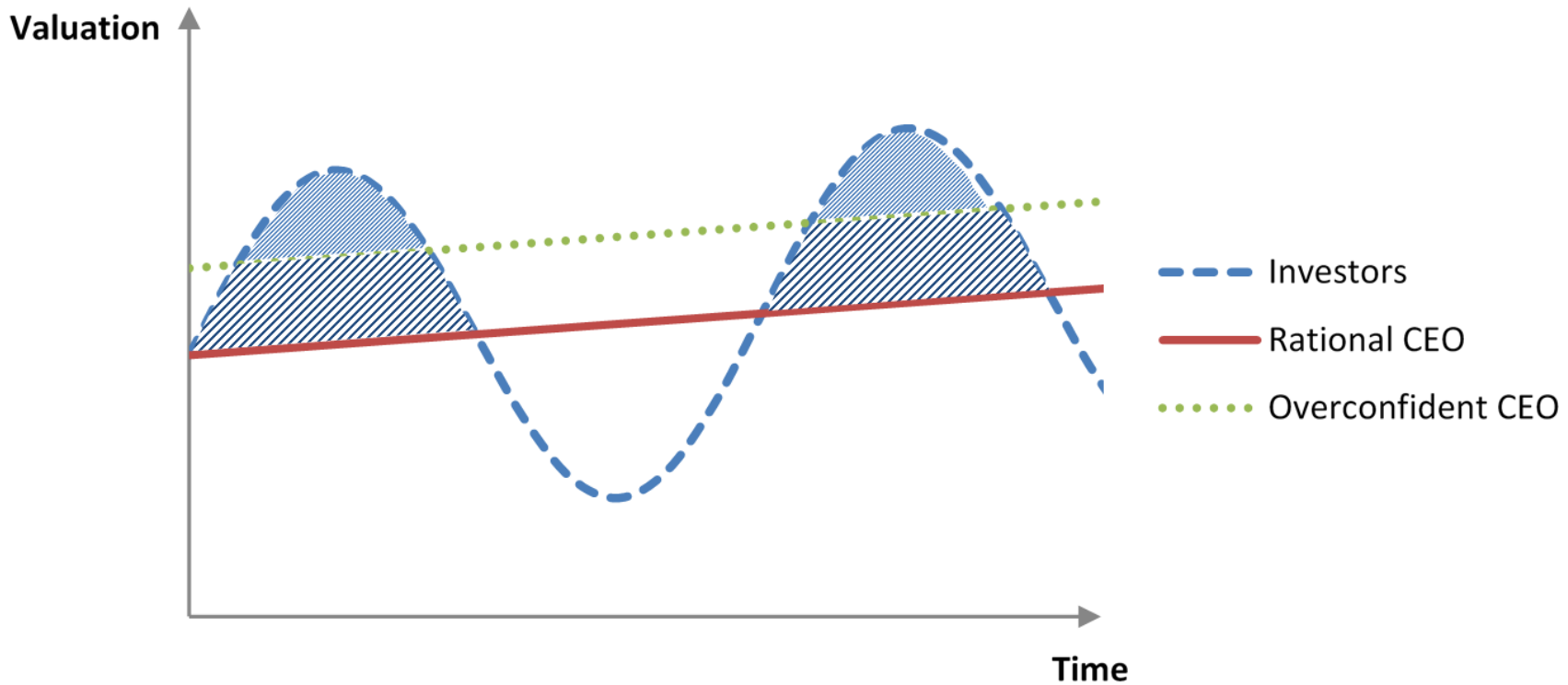
Biased Managers or Biased Investors?

- Who is biased? Which approach is right?

Not the right question

- Consider gym example — self-control problems of members and overconfidence of entrepreneurs
- Merger example: easily consistent

Illustration of Differences in Firm Valuation



Questions

Question: What about interactions of these biases? What if biases of managers and of investors are correlated?

- Generates exacerbated booms and busts in many settings
- Can we get more distinctive predictions?

Example

- CEO overconfidence appears to be pro-cyclical
  - Measure: under-diversified CEOs invest even more in their company (do not exercise options that are highly in the money, buy additional stock)
  - Number of CEOs who are "identifiable" as overconfident increases in good times
  - But also: Percentage of overconfident CEOs increases in good times
- Investor sentiment appears to be pro-cyclical (investors more optimistic in good times, pessimistic in bad times)

Where is the field going?

Where is the field going?

Approach:

- Download abstracts of all papers published in the JF, JFE, and RFS since the year 2000
- Identify papers which might be classifiable as a "behavioral corporate finance" paper
- For these papers, read through main sections of the paper and search for key words (bias, psychological, cater, exploit, etc.).
- Classify these papers into one of 7 categories pertaining to behavioral finance and behavioral corporate finance

Categorization of Behavioral Finance

1. **Managerial biases (CF):** covers managerial biases, such as overconfidence and those resulting from past experiences
2. **Managerial traits and characteristics (CF):** covers general managerial traits and their effect on corporate outcomes
3. **Social ties and networks among managers (CF):** covers personal connections of CEOs and their impact on firm policies
4. **Biases of other agents (CF):** similar to first category, but focuses on biases of other agents (e.g. directors, analysts, and bankers)
5. **Traits and characteristics of other agents (CF):** similar to second category, but again focuses on other agents
6. **Investor biases with managerial response (CF):** covers the exploitation of investor biases by rational managers (catering, market timing)
7. **Behavioral finance (non-CF):** covers behavioral finance papers not pertaining to corporate finance

Categorization of Behavioral Finance

1. **Managerial biases (CF):** CEO overconfidence and early life experience papers by Malmendier and Tate (2005) and Malmendier, Tate, and Yan (2011)
2. **Managerial traits and characteristics (CF):** CEO personal and corporate leverage paper by Cronqvist, Makhija, and Yonker (2012)
3. **Social ties and networks among managers (CF):** MBA peer group paper by Shue (2013)
4. **Biases of other agents (CF):** Malmendier and Shanthikumar (2014), who study "genuine overoptimism" of analysts
5. **Traits and characteristics of other agents (CF):** Gompers, Mukharlyamov, and Xuan (2016), who explore how personal characteristics affect collaboration in the VC industry
6. **Investor biases with managerial response (CF):** Market timing and catering papers by Baker and Wurgler (2000), Baker and Wurgler (2004)
7. **Behavioral finance (non-CF):** X-CAPM (extrapolative agents) paper by Barberis, Greenwood, Jin, and Shleifer (2015)

Issues and caveats

- To be included, topic from the area of behavioral corporate finance must be at the core of the analysis — papers can be relevant even if they find evidence that is inconsistent with a behavioral explanation
  - Example: Pseudo market timing paper by Schultz (2003)
- Several research strands appear to have a "behavioral corporate flavor" at first glance, but are arguably not rooted in investor or managerial psychology

Seemingly relevant research areas

- *Managerial risk-taking incentives*: Managerial actions are viewed and modeled as a rational response to particular components of executive compensation
- *Managerial ability*: Papers that introduce heterogeneity in CEO ability are excluded unless a specific paper links managerial ability to personal experiences, social networks, etc.
- *Managerial entrenchment, tunneling, and free-riding*: Such behaviors are attributable to agency problems, not behavioral biases or personal preferences
- *Managerial myopia*: Myopia is usually viewed as resulting from short-term incentives (e.g. reputation and career concerns or pay structure)

Seemingly relevant research areas

- *Managerial risk-taking incentives*: Coles, Daniel, and Naveen (2006), who investigate the effect of managerial risk-taking incentives on various corporate policies (e.g. investment and debt policy)
- *Managerial ability*: Taylor (2010), who studies forced CEO turnover and models firm profitability as a mean-reverting process around the CEO's ability level α_{CEO}.
- *Managerial entrenchment, tunneling, and free-riding*: Cronqvist, Heyman, Nilsson, Svaleryd, and Vlachos (2009), who find evidence that entrenched CEOs increase their employees' pay.
- *Managerial myopia*: Edmans (2009), who studies the interplay of managerial myopia and blockholder trading.

Seemingly relevant research areas

- *Peer effects and herding*:
  - Included if response to peer firm behavior is attributed to managerial irrationality (e.g. over-reaction)
  - Excluded if peer effects are exclusively viewed as a social learning construct
- *Political connections*:
  - Included if paper explores the *personal* ties that managers have with politicians (through, e.g., same alma mater)
  - Excluded if paper focuses on general connections between firms and the political community (e.g., lobbying or donations)
- *Catering to "rational heterogeneity"*: Catering papers are excluded if investor needs or preferences are explained by rational motives

Seemingly relevant research areas

- *Peer effects and herding*:
  - Included: Kaustia and Randala (2015), since they interpret a firms' tendency to follow peer firms in splitting their stock as managers "mistaking noise for a signal"
  - Excluded: Foucault and Fresard (2014), where rational managers gauge investment opportunities from peer firms' valuations
- *Political connections*:
  - Included: Faccio, Masulis, and McConnell (2006), since they friendships between executives and politicians in their definition of connectedness
  - Excluded: Cooper, Gulen, and Ovtchinnikov (2010), since they study firm-level contributions to political campaigns in the U.S.
- *Catering to "rational heterogeneity"*: Guibaud, Nosbusch, and Vayanos (2013), who analyze optimal government debt maturity structure in the presence of overlapping generations representing different investor clienteles

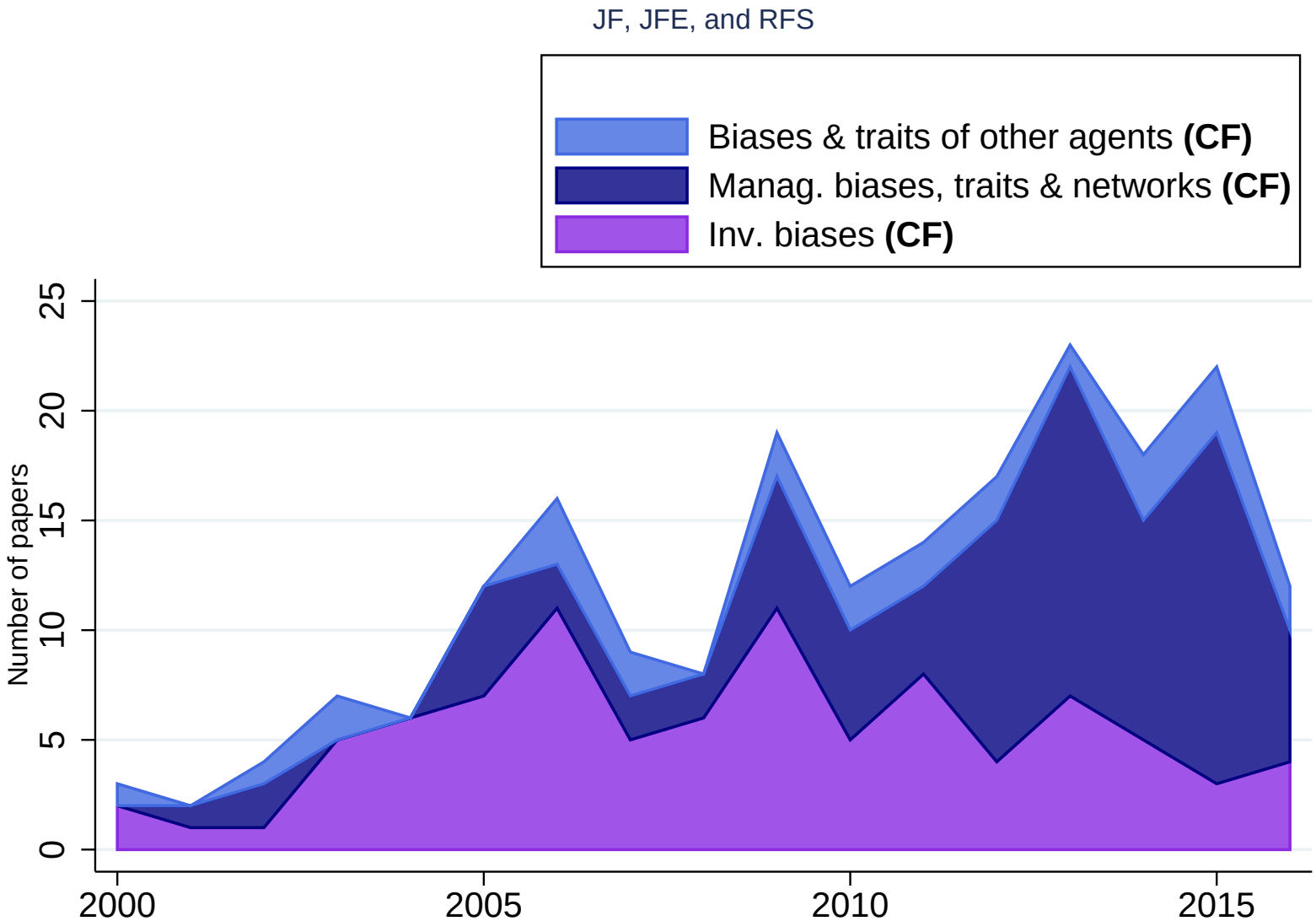
Seemingly relevant research areas

- *Earnings management*: Papers that unveil the ways in which firms manage earnings around corporate actions are excluded unless a specific paper is framed in the context of investor inattention, overreaction to news, etc.
- *"Attention management"*:
  - Included if news manipulation is motivated by the idea that firms exploit investor (in)attention or other biases
  - Excluded if theoretical framework is agency considerations or information asymmetries
- *Analyst optimism*:
  - Included if over-optimism is attributed to psychological factors
  - Excluded if optimistic forecasts are explained with career or reputational concerns

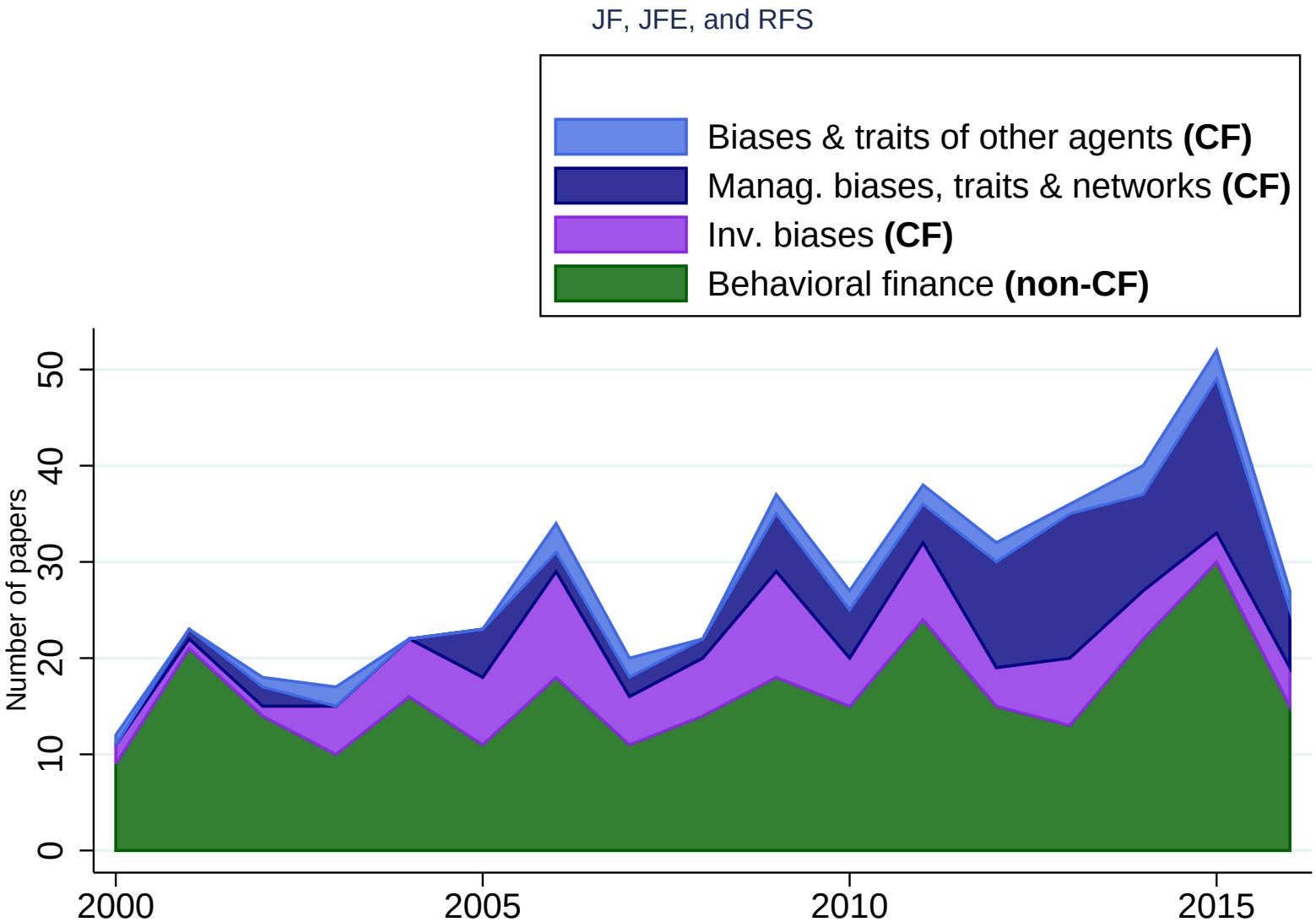
Seemingly relevant research areas

- *Earnings management*: DuCharme, Malatesta, and Sefcik (2004), since they focus on managers' incentives to inflate earnings to maximize proceeds from new issues, not on the vulnerability of investors resulting from biases and bounded rationality
- *"Attention management"*:
  - Included: DellaVigna and Pollet (2009), who find that investors underreact to earnings announcements on Friday
  - Excluded: Almazan, Banerji, and Motta (2008), whose cheap talk paper is framed in the context of agency conflicts
- *Analyst optimism*:
  - Included: Malmendier and Shanthikumar (2014), who study "genuine overoptimism" of analysts
  - Excluded: Hong and Kubik (2003), who explain the issuance of optimistic forecasts with career concerns

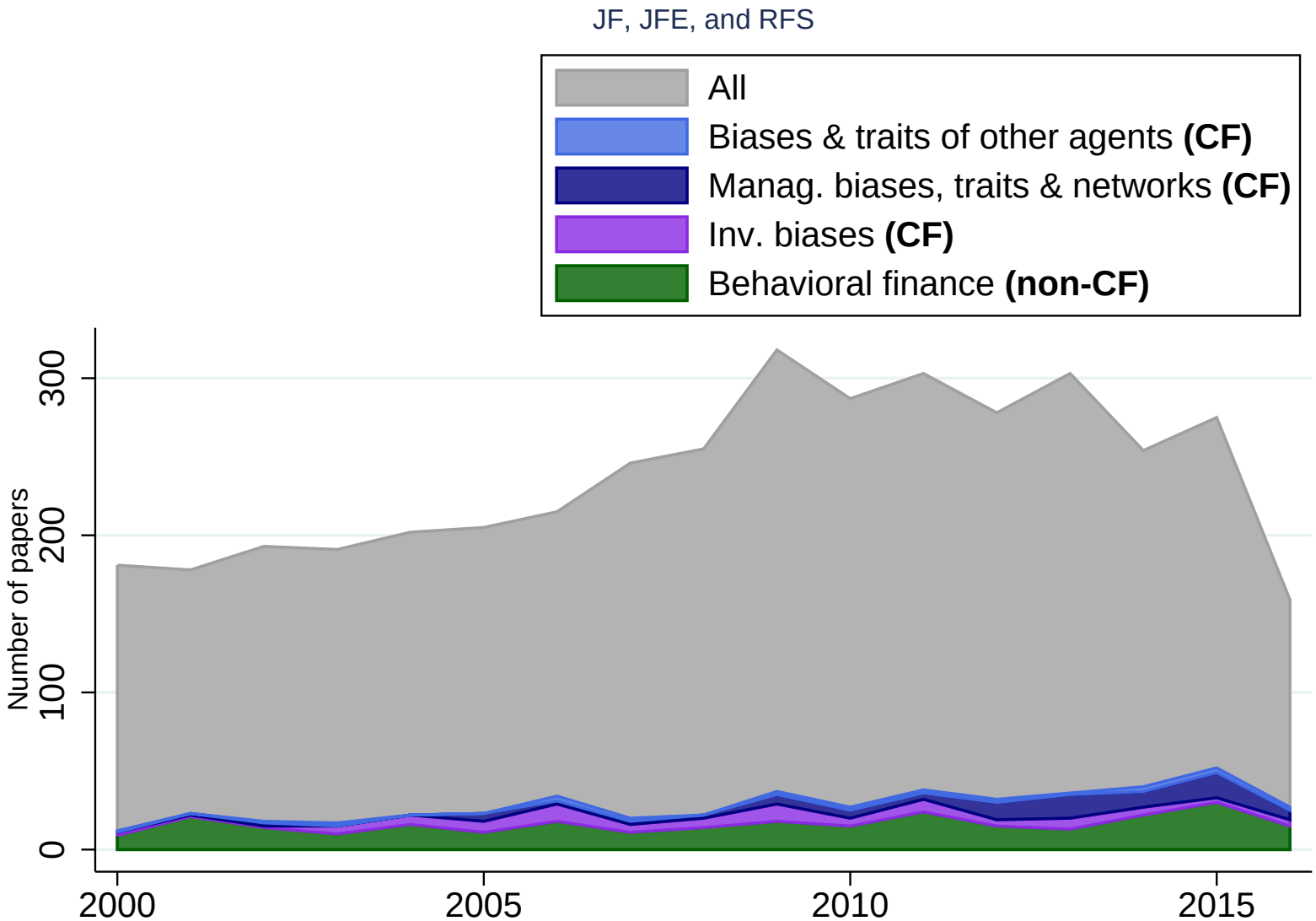
All Top 3 Finance Journals



All Top 3 Finance Journals



All Top 3 Finance Journals



Behavioral corporate finance - A closer look

1. Descriptive statistics on number of papers published in each category, year of publication, and number of citations
   - For all papers, Google Scholar citations have been manually retrieved on July 31st, 2016
2. Identify relative importance of topics in the literature
   - Define 15 key topics (e.g. Investment, M&A, Dividends and repurchases)
   - Count number of papers that address each topic
   - Note: I allow for multiple topics to be assigned to one paper

Descriptive statistics

Panel A: All papers

Category	No. of articles	Median year of publ.	First publ.	Last publ.	Total cit.	Mean cit.	Median cit.
Managerial biases	35	2012	2001	2016	15,700	449	80
Man. characteristics	33	2014	2005	2016	4,404	133	67
Social ties & networks	19	2013	2006	2015	4,719	248	113
Biases of other agents	11	2006	2000	2016	2,764	251	219
Characteristics of other agents	14	2011.5	2007	2016	3,518	251	135.5
Investor biases with managerial response	91	2009	2000	2016	30,604	336	172
Total number:	203						

Descriptive statistics

- "Investor biases with managerial response" is largest category (91 out of 203 papers)
- Median paper in this category published earlier than that in categories focusing on "behavioral managers"
- Discrepancy between publication years is also reflected in the number of citations per paper, which is substantially higher for papers that focus on investor biases
- **Idea**: Focus on papers published in later years to alleviate limitations associated with comparing citations of papers published in different years
- Trade-off for choosing cutoff year:
  - Comparability across categories is better in recent years
  - Informativeness of citations increases with time since publication

Descriptive statistics

Panel B: Papers published since 2005

Category	No. of articles	Median year of publ.	First publ.	Last publ.	Total cit.	Mean cit.	Median cit.
Managerial biases	32	2012	2005	2016	7,528	235	77
Man. characteristics	33	2014	2005	2016	4,404	133	67
Social ties & networks	19	2013	2006	2015	4,719	248	113
Biases of other agents	7	2007	2006	2016	1,062	152	177
Characteristics of other agents	14	2011.5	2007	2016	3,518	251	135.5
Investor biases with managerial response	76	2009	2005	2016	18,675	246	129
Total number:	181						

- Number of citations slightly more evenly distributed across categories
- 2005 as cutoff year probably still too early when comparability shall be top priority (more than half of the "behavioral managers" papers published in 2012 or later)

Descriptive statistics

Panel C: Papers published since 2010

Category	No. of articles	Median year of publ.	First publ.	Last publ.	Total cit.	Mean cit.	Median cit.
Managerial biases	24	2013	2010	2016	2,660	111	57
Man. characteristics	28	2014	2010	2016	2,498	89	54
Social ties & networks	15	2013	2010	2015	1,543	103	92
Biases of other agents	3	2014	2013	2016	248	83	62
Characteristics of other agents	11	2014	2010	2016	1,145	104	45
Investor biases with managerial response	36	2013	2010	2016	3,035	84	54.5
Total number:	117						

- Both streams of the literature (manag. biases and charac. vs. investor biases) have similar median no. of citations
- A notable trend is the growing importance of papers exploring social ties and networks among managers (fewer papers, but substantially higher median no. of citations)

Key Topics

	Category		
Topic	Manag. biases, traits, and networks	Biases and traits of other agents	Investor biases w/ manag. response
Investment & Divestment	18	3	9
M&A	17	4	15
Innovation	2	1	1
Venture capital	1	2	-
Internal capital markets	5	-	-
IPO	5	-	12
Financial decisions, debt-equity mix, capital structure	12	1	37
Dividends and repurchases	3	-	18
Financial intermediation	2	2	3
Entrepreneurship	6	-	-
Compensation	12	2	1
Governance	9	3	-
CEO selection and turnover	6	1	-
Firm performance, firm value, cost of capital	21	1	6
Other	16	16	8

* "Other" includes topics such as earnings management and ethical behavior, (corporate) culture, and fraud, as well as topics related to analysts, government, and society and workforce.

Open Questions

Empirically important biases

- Managerial Biases: Dominance of overconfidence research
- Prior: sunk-cost fallacy (escalation of commitment), lifetime experiences, hindsight bias

Microdata of decision-making processes and people involved in the firm (corporation as well as start-up)

- Stories, status-quo, persuasion, confirmation, ...
- Prior experiences (engineers versus MBAs)

THANK YOU!

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