Behavioral Corporate Finance
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RSF Summer Camp, July 5, 2016
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

1. The Firm

Moral Hazard
(empire building, debt overhang)

Asymmetric Information
(dividends, pecking order)

2. The Capital Market
Corporate Finance … zooming in

1a. CEO/Managers
1b. Board of Directors
1c. Employees

corporate governance (monitoring)
moral hazard

2a. Shareholders
2b. Commercial Banks
2c. Outside investors
(target shareholders, potential shareholders)

moral hazard
asymmetric information
Corporate Finance … zooming in (II)

1a. CEO/Managers
1b. Board of Directors
1c. Employees

2a. Shareholders
2b. Commercial Banks
2c. Outside investors (target shareholders, potential shareholders)

3. Investment Banks, Analysts

moral hazard

asymmetric information

moral hazard

corporate governance (monitoring)
“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/organizational economics, 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/](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); Petersen: kellogg.northwestern.edu/faculty/petersen/htm/papers/standarderror.html
  – partly data demands + advantages
  – partly job market requirements (AP, lingo, …) + advantages
Systematic deviations from our standard model of rational decision-making.

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 corporate finance policies
- Market response
Perspective 1: Biased Investors

- **Non-standard investor behavior:** Systematic deviations 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).
  - Cf. “Behavioral IO”

**Examples**

- Investors 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 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 see more careful papers distinguishing between stock with and without institutional ownership
- Unspecified "investor sentiment" … though see more recent research on anchoring effects in (Baker, Pan, 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 an advantage if you get such data
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
  - for investment decisions, financing decisions, resulting capital structure, mergers & acquisitions.
  - for role of the board / corporate governance (e.g. options vs debt overhang)
  - for internal labor market (role of tournaments, design of compensation contracts)
  - “Organizational Fixes” (Camerer and Malmendier (2007), Behavioral Economics of Organizations)
- **Market response**
Perspective 2: Biased Managers

Examples

• Overconfidence of CEOs ➔
  “Urge to merge” / to overinvest
  Malmendier and Tate, 2005, 2008, 2016 (JEP!)

• Experience bias of CEOs (economic depressions, military service, …) ➔
  Conservatism in investment, debt aversion
  Malmendier, Tate, and Yan, 2011; Schoar 2012;
  Benmelech and Frydman 2012
Perspective 2: Biased Managers

Advantages/Promise:

- "Homogeneity" of subgroups of CEOs
  - Forbes 500 companies, certain industries, entrepreneurs
  - Selection → 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 → impact on important, far-reaching decisions (mergers, investment, hiring + down-sizing) … cf. “what’s the alpha” in behavioral AP
Perspective 2: Biased Managers

Disadvantages:

• 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 lifetime experiences) → funding
Some stylized facts:

1. Huge economic significance (whether measured in dollar value of deals, dollar value of firms involved, shareholder value destroyed at announcement, job lost/created/changed, ..).

2. Mergers occur in waves.

3. Within a wave, mergers occur in industry clusters.

4. Merger financing
   * 1970s, 1980s: 45% (at least some) stock financing
   * 1990s: 70% (at least some) stock-financing
   * 2000s+ somewhat of a reversal

5. Negative effect on value for shareholders of acquiring company at announcement (on average or for a large portion), esp. in stock-financed mergers.


Application: M&A

**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
  
  $V_A = S_A K_A$
  
  $V_T = S_T K_T$
  
  $V = S(K_T + K_A)$

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

$\Rightarrow$ Short-run gains (perceived synergies) from mergers:

$V - V_A - V_T$

$\Rightarrow$ For example, zero perceived synergies 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: \( \tilde{V}_A = qK_A \)
- \( \tilde{V}_T = qK_T \)
- \( \tilde{V} = q(K_T + K_A) \)

⇒ Long-run gains from mergers: 0

- Managers act in own (=existing sh.holders’) interest
- Managers exploit market irrationalities.
- Investors draws no inferences about the LR from merger announcements!
Cash-financed acquisition

- A pays cash \( PK_T \geq S_T K_T \)
  - E.g. \( P = S_T \) \( \implies \) No takeover premium.
  - E.g. \( P = S \) \( \implies \) Payment proportional to SR combined value.

- Short-run abnormal returns (announcement effects)
  - Acquirer:
    \[
    S(K_A + K_T) - PK_T - S_A K_A \\
    = (S - S_A)K_A + (S - P)K_T
    \]
  - Target:
    \[
    (P - S_T)K_T
    \]

\( \implies \) A-shareholders lose from perceived dilution \((S - S_A < 0)\) or gain from “money machine” \((S - S_A > 0)\)

\( \implies \) 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: \((P - q)K_T\)

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

\[\implies\] 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:
    \[
    q(1 - x)(K_A + K_T) - qK_A = q(1 - \frac{PK_T}{S(K_A + K_T)})(K_A + K_T) - qK_A
    = q(K_A + K_T - \frac{PK_T}{S}) - qK_A = q(1 - \frac{P}{S})K_T
    \]
− For $T$-Shareholders: $q\left(\frac{P}{S} - 1\right)K_T$. (Has to be $-A$.)

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

$\implies$ In the LR, $T$-shareholders gain from high valuation ($P - S > 0$).
**Third important 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 $P < S$.)

$\implies$ 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?
3 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 $A_1, A_2, \ldots, A_n, \ldots, A_N$ evaluate $T$
  
  - Current market values $V_{A_1}, V_{A_2}, \ldots, V_{A_N}, V_T$
  
  - 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,

- 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 manager’s 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:

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

How?

→ Heaton (FM 2002)

→ Malmendier and Tate (2008)
3.1 Single Acquiror with Full Bargaining Power

- Market value of acquiror $A = V_A$; $A$-manager’s valuation of $A = \hat{V}_A$.

- 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 $T = \hat{V}(c)$. 
• Overconfident $A$-manager
  – overvalues own company: $\hat{V}_A > V_A$,
  – overvalues the merger, $\hat{V}(c) - V(c) > \hat{V}_A - V_A$ 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

\[
V(c) = V_A + V_T + e - c.
\]

\( \implies \) Rational CEO makes the first best acquisition decision: acquires iff \( e > 0 \), \textit{independently} of the available \( C \).

\( \implies \) 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?

\textit{Answer:} Overestimates the returns to merging, but also believes that (partial) equity financing entails a loss to current shareholders of

\[
\left( \frac{V_{T-c}}{V(c)} - \frac{V_{T-c}}{V(c)} \right) \hat{V}(c) = \frac{V_{T-c}}{V(c)}(\hat{V}(c) - V(c))
\]
Denoting the “perceived” additional merger synergies as \( \hat{e} \in R_{++} \), we can decompose \( \hat{V}(c) \):

\[
\hat{V}(c) = \hat{V}_A + V_T + e + \hat{e} - c.
\]

\( \implies \) Overconfident CEO acquires iff
\[
e + \hat{e} > \frac{V_T - c}{\hat{V}(c)}(\hat{V}(c) - V(c)).
\]

\( \implies \) That is, he merges whenever actual and perceived merger synergies exceed the perceived loss due to dilution.

\( \implies \) 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.) → Link to corporate decision. Note: successful approach for borrowing, leverage, ..
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).

- under-diversified w.r.t. company-specific risk.
- 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 the future performance of their firms ➔ More willing to hold options, expecting to profit from expected stock price appreciation.

➔ 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


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

\[ \Pr\{Y_{it} = 1 \mid X, O_{it}\} = G(\beta_1 + \beta_2 \cdot O_{it} + X^T \gamma) \]

with
\begin{align*}
  & i \quad \text{company} & O \quad \text{overconfidence} \\
  & t \quad \text{year} & X \quad \text{controls} \\
  & Y \quad \text{acquisition (yes or no)}
\end{align*}

\rightarrow H_0: \beta_2 = 0 \quad \text{(overconfidence does not matter)}
\rightarrow H_1: \beta_2 > 0 \quad \text{(overconfidence does matter)}
Table 4. Do Overconfident CEOs Complete More Mergers?

<table>
<thead>
<tr>
<th></th>
<th>logit with controls</th>
<th>random effects</th>
<th>logit with fixed effects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>logit</td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>0.8733 (1.95)*</td>
<td>0.8600 (2.05)**</td>
<td>0.6234 (2.60)*****</td>
</tr>
<tr>
<td>Qt-1</td>
<td>0.7296 (2.97)***</td>
<td>0.7316 (2.70)***</td>
<td>0.8291 (1.11)</td>
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<tr>
<td>Cash Flow</td>
<td>2.0534 (3.93)***</td>
<td>2.1816 (3.68)***</td>
<td>2.6724 (2.70)***</td>
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<tr>
<td>Ownership</td>
<td>1.2905 (0.30)</td>
<td>1.3482 (0.28)</td>
<td>0.8208 (0.11)</td>
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<td>Vested Options</td>
<td>1.5059 (1.96)*</td>
<td>0.9217 (0.19)</td>
<td>0.2802 (2.36)**</td>
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<tr>
<td>Governance</td>
<td>0.6556 (3.08)***</td>
<td>0.7192 (2.17)**</td>
<td>1.0428 (0.21)</td>
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<tr>
<td>Longholder</td>
<td>1.5557 (2.58)***</td>
<td>1.7006 (3.09)***</td>
<td>2.5303 (2.67)***</td>
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<tr>
<td>Firms</td>
<td>327</td>
<td>184</td>
<td></td>
</tr>
</tbody>
</table>

_LONGHOLDER_ = holds options until last year before expiration (at least once)

_Distribution:_ Logistic. Constant included.

_Dependent Variable:_ Acquisition (yes or no); _Normalization:_ Capital.
Identification Strategy

Case 1:
Wayne Huizenga (Cook Data Services/Blockbuster)
- CEO for all 14 years of sample
- Longholder

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)
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
Table 5. Timing of Overconfidence Effect

<table>
<thead>
<tr>
<th>Sample: All firm years</th>
<th>Dependent Variable: Acquisition (yes or no)</th>
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</thead>
<tbody>
<tr>
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<td>logit with random effects</td>
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<tr>
<td>3 Final Years of a Longheld Option</td>
<td>1.5399 (1.86)*</td>
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<td>4 Final Years of a Longheld Option</td>
<td>1.6626 (2.41)**</td>
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<td>5 Final Years of a Longheld Option</td>
<td>1.7072 (2.68)**</td>
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<td>Remaining Longholder CEO Years</td>
<td>1.8045 (3.04)***</td>
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<td>Year Fixed Effects</td>
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<td>Observations</td>
<td>3690</td>
</tr>
<tr>
<td>Number of Firms</td>
<td>327</td>
</tr>
</tbody>
</table>

Regressions include Size, Qₜ₋₁, Cash Flow, Ownership, Vested Options, and Governance.
Table 6. Are Overconfident CEOs Right to Hold Their Options? (I)

<table>
<thead>
<tr>
<th>Percentile</th>
<th>Return</th>
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<tbody>
<tr>
<td>10th</td>
<td>-0.24</td>
</tr>
<tr>
<td>20th</td>
<td>-0.15</td>
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<tr>
<td>30th</td>
<td>-0.10</td>
</tr>
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<td>40th</td>
<td>-0.05</td>
</tr>
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<td>60th</td>
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<tr>
<td>70th</td>
<td>0.10</td>
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<tr>
<td>80th</td>
<td>0.19</td>
</tr>
<tr>
<td>90th</td>
<td>0.39</td>
</tr>
</tbody>
</table>

Mean 0.03

Standard Deviation 0.27

All exercises occur at the maximum stock price during the fiscal year.
Table 6. Are Overconfident CEOs Right to Hold Their Options? (II)

<table>
<thead>
<tr>
<th></th>
<th>random effects logit</th>
<th>fixed effects logit</th>
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<tr>
<td>Size</td>
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<td></td>
<td>(1.93)**</td>
<td>(2.46)**</td>
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<td>Qt-1</td>
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<tr>
<td></td>
<td>(2.86)**</td>
<td>(0.74)</td>
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<tr>
<td>Cash Flow</td>
<td>2.0042</td>
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<tr>
<td></td>
<td>(3.49)**</td>
<td>(2.64)**</td>
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<td>Stock Ownership</td>
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<td>(0.51)</td>
<td>(0.15)</td>
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<td>Vested Options</td>
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<td>(1.36)</td>
<td>(0.51)</td>
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<td>Corporate Governance</td>
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<td></td>
<td>(3.31)**</td>
<td>(0.16)</td>
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<td>Longholder: Did OK</td>
<td>1.2015</td>
<td>1.1555</td>
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<tr>
<td></td>
<td>(0.74)</td>
<td>(0.27)</td>
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<tr>
<td>Longholder: Should Have Exercised</td>
<td>1.8277</td>
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<td>(2.32)**</td>
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<td>3532</td>
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<tr>
<td>Firms</td>
<td>318</td>
<td>172</td>
</tr>
</tbody>
</table>

Do "Mistaken" Holders Drive the Acquisitiveness Result?

**Longholder** = holds options until last year before expiration (at least once)

**Distribution:** Logistic.  **Constant included.**

**Dependent Variable:** Acquisition (yes or no) ; **Normalization:** Capital.
Alternative Explanations

1. Inside Information or Signalling
   - 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
### Table 7. Control for Returns

**Longholder** = holds options until last year before expiration (at least once)

**Returns** = ln(1+returns)

**Distribution:** Logistic. Constant included.

**Dependent Variable:** Acquisition (yes or no) ; **Normalization:** Capital.

<table>
<thead>
<tr>
<th></th>
<th>logit</th>
<th>logit with random effects</th>
<th>logit with fixed effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Returns_{t-1}</td>
<td>1.4801</td>
<td>1.4467</td>
<td>1.1424</td>
</tr>
<tr>
<td></td>
<td>(1.61)</td>
<td>(1.62)</td>
<td>(0.54)</td>
</tr>
<tr>
<td>Returns_{t-2}</td>
<td>1.2539</td>
<td>1.2391</td>
<td>1.0474</td>
</tr>
<tr>
<td></td>
<td>(1.15)</td>
<td>(1.01)</td>
<td>(0.20)</td>
</tr>
<tr>
<td>Returns_{t-3}</td>
<td>1.0635</td>
<td>1.0405</td>
<td>0.9262</td>
</tr>
<tr>
<td></td>
<td>(0.31)</td>
<td>(0.19)</td>
<td>(0.35)</td>
</tr>
<tr>
<td>Returns_{t-4}</td>
<td>1.3548</td>
<td>1.3452</td>
<td>1.2513</td>
</tr>
<tr>
<td></td>
<td>(1.40)</td>
<td>(1.37)</td>
<td>(0.98)</td>
</tr>
<tr>
<td>Returns_{t-5}</td>
<td>1.2334</td>
<td>1.2202</td>
<td>1.1539</td>
</tr>
<tr>
<td></td>
<td>(1.03)</td>
<td>(0.95)</td>
<td>(0.66)</td>
</tr>
<tr>
<td>Longholder</td>
<td>1.5048</td>
<td>1.6184</td>
<td>2.4628</td>
</tr>
<tr>
<td></td>
<td>(2.33)**</td>
<td>(2.83)***</td>
<td>(2.56)**</td>
</tr>
</tbody>
</table>

**Year Fixed Effects**
- yes

**Observations**
- 3479

**Firms**
- 305

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

1. Inside Information or Signalling
   • 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** = $\ln(1+\text{variance}(\ln(1+\text{returns})))$  
**Distribution:** Logistic. Constant included.  
**Dependent Variable:** Acquisition (yes or no); **Normalization:** Capital.

<table>
<thead>
<tr>
<th></th>
<th>logit</th>
<th>logit with random effects</th>
<th>logit with fixed effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volatility$_{t-1}$</td>
<td>1.2672</td>
<td>1.2413</td>
<td>1.0403</td>
</tr>
<tr>
<td></td>
<td>(3.22)**</td>
<td>(2.42)**</td>
<td>(0.34)</td>
</tr>
<tr>
<td>Longholder</td>
<td>1.4784</td>
<td>1.6777</td>
<td>2.6370</td>
</tr>
<tr>
<td></td>
<td>(2.26)**</td>
<td>(3.02)**</td>
<td>(2.69)**</td>
</tr>
<tr>
<td>Year Fixed Effects</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Observations</td>
<td>3432</td>
<td>3432</td>
<td>2102</td>
</tr>
<tr>
<td>Firms</td>
<td>319</td>
<td>319</td>
<td>180</td>
</tr>
</tbody>
</table>

Regressions include Cash Flow, $Q_{t-1}$, Size, Ownership, Vested Options, and Governance.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Logit with controls</th>
<th>Random effects logit</th>
<th>Fixed effects logit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>0.7624</td>
<td>0.7536</td>
<td>0.1998</td>
</tr>
<tr>
<td></td>
<td>(2.27)**</td>
<td>(2.49)**</td>
<td>(3.96)**</td>
</tr>
<tr>
<td>Qt-1</td>
<td>0.8624</td>
<td>0.8514</td>
<td>0.6985</td>
</tr>
<tr>
<td></td>
<td>(1.24)</td>
<td>(1.01)</td>
<td>(1.32)</td>
</tr>
<tr>
<td>Cash Flow</td>
<td>1.0686</td>
<td>1.0389</td>
<td>0.9442</td>
</tr>
<tr>
<td></td>
<td>(0.24)</td>
<td>(0.14)</td>
<td>(0.13)</td>
</tr>
<tr>
<td>Ownership</td>
<td>1.0163</td>
<td>0.8967</td>
<td>18.3462</td>
</tr>
<tr>
<td></td>
<td>(0.01)</td>
<td>(0.06)</td>
<td>(0.31)</td>
</tr>
<tr>
<td>Vested Options</td>
<td>1.2847</td>
<td>1.3302</td>
<td>3.7916</td>
</tr>
<tr>
<td></td>
<td>(0.28)</td>
<td>(0.22)</td>
<td>(0.73)</td>
</tr>
<tr>
<td>Governance</td>
<td>0.5132</td>
<td>0.5515</td>
<td>1.2581</td>
</tr>
<tr>
<td></td>
<td>(3.01)**</td>
<td>(2.51)**</td>
<td>(0.72)</td>
</tr>
<tr>
<td>Finance Education</td>
<td>1.5500</td>
<td>1.6434</td>
<td>3.2946</td>
</tr>
<tr>
<td></td>
<td>(2.00)**</td>
<td>(2.17)**</td>
<td>(1.46)</td>
</tr>
<tr>
<td>Longholder</td>
<td>1.7248</td>
<td>1.8757</td>
<td>5.6952</td>
</tr>
<tr>
<td></td>
<td>(2.29)**</td>
<td>(2.42)**</td>
<td>(1.51)</td>
</tr>
<tr>
<td>Year Fixed Effects</td>
<td>no</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>Observations</td>
<td>1489</td>
<td>1489</td>
<td>819</td>
</tr>
<tr>
<td>Firms</td>
<td>188</td>
<td>188</td>
<td>83</td>
</tr>
</tbody>
</table>

Longholder = holds options until last year before expiration (at least once)

Distribution: Logistic. Constant included.

Dependent Variable: Acquisition (yes or no); Normalization: Capital.

Finance Education
Robustness

- Do the results hold as we vary the percentage in the money required for a holder to be overconfident? Yes.
Figure 1. Odds Ratios for different % in the money

- Fixed Effects Logit Odds Ratio
- Random Effects Logit Odds Ratio
- Logit Odds Ratio
Empirical Predictions

**Rational CEO**

**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 8. Diversifying Mergers

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

<table>
<thead>
<tr>
<th></th>
<th>logit</th>
<th>logit with random effects</th>
<th>logit with fixed effects</th>
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<tr>
<td>Longholder</td>
<td>1.6008</td>
<td>1.7763</td>
<td>3.1494</td>
</tr>
<tr>
<td></td>
<td>(2.40)**</td>
<td>(2.70)***</td>
<td>(2.59)***</td>
</tr>
<tr>
<td>Year Fixed Effects</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Observations</td>
<td>3690</td>
<td>3690</td>
<td>1577</td>
</tr>
<tr>
<td>Firms</td>
<td>327</td>
<td>128</td>
<td></td>
</tr>
</tbody>
</table>

Dependent Variable: Intra-industry merger (yes or no).

<table>
<thead>
<tr>
<th></th>
<th>logit</th>
<th>logit with random effects</th>
<th>logit with fixed effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longholder</td>
<td>1.3762</td>
<td>1.4498</td>
<td>1.5067</td>
</tr>
<tr>
<td></td>
<td>(1.36)</td>
<td>(1.47)</td>
<td>(0.75)</td>
</tr>
<tr>
<td>Year Fixed Effects</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Observations</td>
<td>3690</td>
<td>3690</td>
<td>1227</td>
</tr>
<tr>
<td>Firms</td>
<td>327</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

Regressions include Cash Flow, Q_{t-1}, Size, Ownership, Vested Options, and Governance. Industries are Fama French industry groups.
Empirical Predictions

Rational CEO | 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
Kaplan-Zingales Index

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

- 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 of equity (Exclude?)
### Table 9. Kaplan-Zingales Quintiles

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

<table>
<thead>
<tr>
<th>Quintile 1</th>
<th>Quintile 2</th>
<th>Quintile 3</th>
<th>Quintile 4</th>
<th>Quintile 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Longholder</strong></td>
<td>2.2861 (2.46)**</td>
<td>1.6792 (1.48)</td>
<td>1.7756 (1.54)</td>
<td>1.9533 (1.50)</td>
</tr>
<tr>
<td>Year Fixed Effects</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Observations</td>
<td>718</td>
<td>719</td>
<td>719</td>
<td>719</td>
</tr>
<tr>
<td>Firms</td>
<td>125</td>
<td>156</td>
<td>168</td>
<td>165</td>
</tr>
</tbody>
</table>

**Diversifying Mergers**

<table>
<thead>
<tr>
<th>Quintile 1</th>
<th>Quintile 2</th>
<th>Quintile 3</th>
<th>Quintile 4</th>
<th>Quintile 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Longholder</strong></td>
<td>2.5462 (1.89)*</td>
<td>1.8852 (1.51)</td>
<td>1.7297 (1.36)</td>
<td>1.0075 (0.01)</td>
</tr>
<tr>
<td>Year Fixed Effects</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Observations</td>
<td>718</td>
<td>719</td>
<td>719</td>
<td>719</td>
</tr>
<tr>
<td>Firms</td>
<td>125</td>
<td>156</td>
<td>168</td>
<td>165</td>
</tr>
</tbody>
</table>

Regressions include Cash Flow, Qt-1, Size, Ownership, Vested Options, and Governance.
Empirical Predictions

Rational CEO  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
Empirical Specification

\[
CAR_i = \beta_1 + \beta_2 \cdot O_i + X'\gamma + \varepsilon_i
\]

with \( i \) company \( O \) overconfidence \( X \) controls

\[
CAR_i = \frac{1}{t=1} \sum (r_{it} - E[r_{it}])
\]

where \( E[r_{it}] \) is daily S&P 500 returns (\( \alpha=0; \beta=1 \))
<table>
<thead>
<tr>
<th>Variable</th>
<th>OLS (3)</th>
<th>OLS (4)</th>
<th>OLS (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relatedness</td>
<td>0.0048</td>
<td>0.0062</td>
<td>0.0043</td>
</tr>
<tr>
<td></td>
<td>(1.37)</td>
<td>(1.24)</td>
<td>(1.24)</td>
</tr>
<tr>
<td>Corporate Governance</td>
<td>0.0079</td>
<td>0.0036</td>
<td>0.0073</td>
</tr>
<tr>
<td></td>
<td>(2.18)**</td>
<td>(0.64)</td>
<td>(1.98)**</td>
</tr>
<tr>
<td>Cash Financing</td>
<td>0.014</td>
<td>0.0127</td>
<td>0.0145</td>
</tr>
<tr>
<td></td>
<td>(3.91)***</td>
<td>(2.60)***</td>
<td>(3.99)***</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td>-0.0005</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(1.46)</td>
</tr>
<tr>
<td>Boss</td>
<td></td>
<td></td>
<td>0.0001</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.04)</td>
</tr>
<tr>
<td>Longholder</td>
<td>-0.0067</td>
<td>-0.0099</td>
<td>-0.0079</td>
</tr>
<tr>
<td></td>
<td>(1.81)*</td>
<td>(2.33)**</td>
<td>(2.00)**</td>
</tr>
<tr>
<td>Year Fixed Effects</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Industry Fixed Effects</td>
<td>no</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Industry*Year Fixed Effects</td>
<td>no</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Observations</td>
<td>687</td>
<td>687</td>
<td>687</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.10</td>
<td>0.58</td>
<td>0.10</td>
</tr>
</tbody>
</table>

Dependent Variable: Cumulative abnormal returns [-1,+1]

Longholder = holds options until last year before expiration (at least once)

Regressions include Ownership and Vested Options.
Do Outsiders Recognize CEO Overconfidence?

Portrayal in Business Press:

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

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

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
  – Especially when they are financially unconstrained

> Overconfidence – identified by CEO or market beliefs – leads to heightened acquisitiveness
### Table 13. Press Coverage and Diversifying Mergers

**Distribution:** Logistic. Constant included; **Normalization:** Capital.

**Dependent Variable:** Diversifying merger (yes or no).

<table>
<thead>
<tr>
<th></th>
<th>Logit</th>
<th>Logit with Random Effects</th>
<th>Logit with Fixed Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTALconfident</td>
<td>1.6971</td>
<td>1.7826</td>
<td>1.5077</td>
</tr>
<tr>
<td></td>
<td>(2.95)***</td>
<td>(3.21)***</td>
<td>(1.48)</td>
</tr>
<tr>
<td>Year Fixed Effects</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Observations</td>
<td>3647</td>
<td>3647</td>
<td>1559</td>
</tr>
<tr>
<td>Firms</td>
<td>326</td>
<td>128</td>
<td></td>
</tr>
</tbody>
</table>

**Dependent Variable:** Intra-industry merger (yes or no).

<table>
<thead>
<tr>
<th></th>
<th>Logit</th>
<th>Logit with Random Effects</th>
<th>Logit with Fixed Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTALconfident</td>
<td>1.0424</td>
<td>1.0368</td>
<td>0.8856</td>
</tr>
<tr>
<td></td>
<td>(0.20)</td>
<td>(0.16)</td>
<td>(0.31)</td>
</tr>
<tr>
<td>Year Fixed Effects</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Observations</td>
<td>3647</td>
<td>3647</td>
<td>1226</td>
</tr>
<tr>
<td>Firms</td>
<td>326</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

Regressions include Total Coverage, Cash Flow, Q1, Size, Ownership, Vested Options, and Governance. Industries are Fama French industry groups.
Conclusions

• Overconfident managers are more acquisitive.

• Much of this 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 21st 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 21st century

- **Identification 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 subprime mortgage → early 2008: 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.
Questions

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. (Graph!)
Figure 2.

Illustration of Differences in Firm Valuation

Valuation

Time

---

- **Investors**
- **Rational CEO**
- **Overconfident CEO**
Where is the field going?
Where is the field going?
Where is the field going?
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 increase 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)
Empirically important biases. 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)