Econ 234C – Corporate Finance

Lecture 6:

Internal Investment (IV): Overconfidence

External Investment (I): Stylized Facts

Ulrike Malmendier
UC Berkeley

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Outline (next two or three lectures)

1. Exams, Homeworks etc.

2. Internal Investment (IV): Managerial Hubris

3. External Investment (I): Stylized Facts

4. External Investment (II): Corporate Control and Voting

5. External Investment (III): Market Inefficiencies

6. External Investment (IV): Managerial Hubris

1 Exams, Homeworks etc.

- Exams (midterm, final)
  - Homeworks give a basic idea, but exams will be closer to research (*theory*: playing around with a different approach; *empirics*: evaluate an empirical approach, suggest an empirical approach).
  - It is not necessary that you have done the homeworks.
  - Similar to open questions asked in class, e.g. how an objective function would change if under different incentives; how to measure exogenous shocks to cash flow.
  - Midterm: 3/19
  - Final: 5/21

- Field Exam in CF
  - papers & topics discussed in class
  - NOTE: I keep adjusting the syllabus to reflect what we are covering.
  - Textbook for (part of) the theory: Tirole's CF book; Hart's Clarendon Lectures, 2nd part

- Your research
  - 3rd years and higher: please come and see me!
    (Also second-years, of course ...)
  - "Ross Levine research sheet" ready.

“Pseudo-Homework”

Provide a write up of your best research idea, using the Levine research sheet.

“Due” after Spring Break.

Homework 2

Suppose you are interested in the question whether (suboptimal) merger decisions are related to CEO incentives (CEO compensation). You decide to investigate the reationship between (i) firm size and CEO compensation and (ii) merger volume and equity compensation of CEOs using as large as possible a sample that SDC, Compustat and ExecuComp allow you to use.

1. Generate the sample of firms/CEOs for which you have all data necessary to analyze firm size, merger activitivies AND compensation. Provide detailed summary statistics.
   - Please include a detailed description of each step of the data generating process, especially how exactly you download the data from SDC.
   - Be also detailed about the matching process between the data sets: how do you match? (Which identifier?) At what step to you lose how many observations? (Provide a matrix with the details.)

2. Document the stylized features (summary stats full sample, summary stats over time) of of merger activities and CEO compensation for your sample.

3. Relate compensation to size and to mergers.

4. What do you conclude? What are the limits of what you can conclude from that type of exercise (endogeneity, data issues, ..)?

5. Do you have an idea how to overcome these limits?

Note: You need to use STATA. Provide a detailed description of your empirical steps and spell out the exact regression specification (regression model, calculation of standard errors). Please include your full do-file. I may ask for your dta-files.

Due: next week in class (March 12, 2007)

Remarks

- Definition of variables:
  - previous literature;
  - differences in previous literature;
  - comparability with previous literature (!);
  - your own judgement;
  - Examples: Q

- If noone has ever used "your" preferred definition, think twice. (Data missing? Accounting differences?) But also: think whether there might be a paper, e.g. if a large set of companies is investment-cash flow sensitive according to one measure but not another.

- Most recent definitions in major papers: Use the definitions in my paper "Who makes acquisitions? CEO overconfidence and the Market's reaction."

2 Internal Investment: Overconfidence

Why don’t CEOs Invest Optimally?

2 Standard Stories

Asymmetric Information
Myers and Majluf (1984)

Agency Problems
Jensen and Meckling (1976)
• empire building (Jensen 1986)
• tunneling (JLLS 2000)
• quiet life (Bertrand and Mullainathan 1998)

Alternative Story

CEO wants to maximize shareholder value, but gets it wrong

Overconfidence and other personal characteristics

Measure: Investment-Cash Flow Sensitivity

Empirical Finding:

Investment increasing in cash flow, after controlling for investment opportunities.

Standard View: Firm Characteristics

Financing constraints (Fazzarai, Hubbard, Petersen 1988, 2000)

But: Kaplan-Zingales (1997,2000)

Alternative View: Personal Characteristics

1. CEO is overconfident about his investment projects.
2. CEO views external finance as too costly.

Investment Decision

CEO acts in interest of current shareholders. *(No agency problem.)*

- Strongly efficient capital market. *(No asymmetric information.)*

CEO chooses investment and financing:

1. cash flow,
2. debt,
3. equity.

Rational CEO	Overconfident CEO
Invests efficiently.	Overestimates returns.
Investment independent of cash flow.	Perceived under-valuation.
	Investment depends on cash flow.

Model

Assumptions

1. CEO acts in interest of current shareholders.
   (No agency problem.)

2. Efficient capital market.
   (No asymmetric information.)

3. CEO chooses level of investment I and financing out of
   - cash flow,
   - equity.

(Debt later.)

Rational CEO

$\max_I \ (A + R(I) + (C - I)^+) / (s+s')$
s.t. $(A + R(I))(s' / s+s') = I - C \quad \text{if } I > C$

with	A	assets in place
	I	investment
	R(I)	returns
	C	cash flow
	s	shares outstanding
	s'	equity issue

Known by both the CEO and the investors

- Invests efficiently: $R'(I) = 1$
- Investment independent of cash flow: $\frac{dI}{dC} = 0$

Overconfident CEO

$$\max_I \quad \big(A + R(I)(1+\Delta) + [C - I]^+\big) / (s+s')$$

$$\text{s.t.} \quad (A + R(I))(s'/s+s') = I - C \qquad \text{if } I > C$$

Over-estimation of returns

Perceived under-valuation

- Invest inefficiently:

  $R'(I^*) = 1/(1+\Delta)$ *if* $\hat{I} < C$ *(over investment)*

  $1/(1+\Delta) < R'(I^*)$ *if* $\hat{I} > C$ (less investment)

- Investment depends on cash flow: $\dfrac{dI}{dC} > 0$

Empirical Predictions

Rational CEO	Overconfident CEO

1. Effect of overconfidence:
   investment sensitive to cash flow.

2. Effective of overconfidence strongest
   in equity-dependent firms:
   substitute C with $C + D$

Data

Data on private accounts

1. Hall-Liebman (1998)
   Yermack (1995)

Key: Panel data on stock and option holdings of CEOs of Forbes 500 companies 1980-1994

2. Personal information about these CEOs from
   - Dun & Bradstreet
   - Who's who in finance

Data on corporate accounts

CRSP
COMPUSTAT

Information on investment, cash flow, Q ...

Table I
Summary Statistics
A. Firm Data Summary Statistics

Number of Firms = 319; Total Observations = 3569

Variable	Observations	Mean	Median	Standard Deviation	Minimum	Maximum
Assets ($M)	3569	5,287	2,254	11,522	14	191,013
Capital ($M)	3567	2,302	990	4,290	4	110,023
Investment ($M)	3569	360	153	789	0	17,030
Investment normalized by lagged capital	3569	0.232	0.185	0.251	0.000	5.715
Investment normalized by lagged assets	3569	0.092	0.075	0.077	0.000	1.641
Cash flow ($M)	3569	426	189	850	-618	13192
Cash flow normalized by lagged capital	3569	0.336	0.248	0.326	-0.279	2.331
Cash flow normalized by lagged assets	3569	0.112	0.103	0.068	-0.157	0.654
Q (beginning of the fiscal year)	3569	1.419	1.125	0.876	0.512	11.219
Price/Earnings ratio	3514	23.59	14.83	171.93	-2137.50	5262.50
Corporate governance (Outside CEOs)	3569	1.77	1	1.58	0	9
Manufacturing (FF industry dummy)	3555	0.51	1	0.50	0	1
Utilities (FF industry dummy)	3555	0.18	0	0.38	0	1
Shops (FF industry dummy)	3555	0.14	0	0.35	0	1
Money (FF industry dummy)	3555	0.06	0	0.06	0	1
Other (FF industry dummy)	3555	0.12	0	0.32	0	1

All variables are defined in the Appendix. The Fama-French industries (FF industry dummies) are defined on French's website (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html).

Table I

Summary Statistics

B. CEO Data Summary Statistics

Number of CEOs = 665; Total Observations = 3569

Variable	Observations	Mean	Median	Standard Deviation	Minimum	Maximum
Age	3568	57.59	58	6.75	33	84
Years as CEO	3544	8.55	6	7.46	1	45
CEO & President	3569	0.56	1	0.50	0	1
CEO & Chairman	3569	0.82	1	0.39	0	1
CEO & President & Chairman	3569	0.38	0	0.49	0	1
Founder	3039	0.17	0	0.38	0	1
Stock ownership (%)	3569	0.023	0.0012	0.071	0	0.951
Vested options (% of shares outstanding)	3569	0.002	0.0004	0.011	0	0.463
"Depression baby" (born in 1930s)	3568	0.37	0	0.48	0	1
Finance career	1913	0.23	0	0.42	0	1
Technical career	1913	0.18	0	0.39	0	1
Finance education	2110	0.33	0	0.47	0	1
MBA	2110	0.27	0	0.44	0	1
Technical education	2110	0.55	1	0.50	0	1

All variables are defined in the Appendix.

Overconfidence

On private accounts

- Hold on to options.
- Buy additional stock.

Idea: Rational CEO who is

- under diversified
- risk averse

should

- exercise options early
- not buy additional stock.

On corporate accounts

- Invest whenever cash flow available (I/CF sensitivity).
- I/CF sensitivity strongest in equity-dependent firms.

Measure 1: "Holder 67"

Option exercise schedule for risk-averse CEOs (following Hall-Murphy 2001):

Exercise if

- at least 67% (100%) in the money
- after vesting period in 5th year.

Measure of Overconfidence (dummy variable):

CDO is overconfident if he

- "habitually" (at least twice)
- does not exercise a single option
- at/before benchmark.

CEO is coded as overconfident

- from first "late exercise on"
- **or** throughout tenure

Table II

CEO Data Summary Statistics

A. Sample: CEOs with options more than 67% in the money in the fifth year at least 2 times

Number of CEOs = 108; Total Observations = 1019

Variable	Observations	Mean	Median	Standard Deviation	Minimum	Maximum
Manufacturing (FF industry dummy)	1017	0.66	1	0.47	0	1
Utilities (FF industry dummy)	1017	0.05	0	0.23	0	1
Shops (FF industry dummy)	1017	0.14	0	0.34	0	1
Money (FF industry dummy)	1017	0.05	0	0.22	0	1
Other (FF industry dummy)	1017	0.10	0	0.30	0	1
Age	1019	58.10	58	6.16	41	82
Years as CEO	997	10.86	9	7.27	1	39
CEO & President	1019	0.50	1	0.50	0	1
CEO & Chairman	1019	0.86	1	0.35	0	1
CEO & President & Chairman	1019	0.37	0	0.48	0	1
Founder	1019	0.17	0	0.38	0	1
Stock ownership (%)	1019	0.018	0.002	0.050	0	0.385
Vested options (% of shares outstanding)	1019	0.003	0.001	0.007	0	0.106
"Depression baby" (born in 1930s)	1019	0.41	0	0.49	0	1
Finance career	662	0.22	0	0.41	0	1
Technical career	662	0.17	0	0.38	0	1
Finance education	752	0.39	0	0.49	0	1
MBA	752	0.34	0	0.47	0	1
Technical education	752	0.51	1	0.50	0	1

All variables are defined in the Appendix. The Fama-French industries (FF industry dummies) are defined on French's website (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html).

Table II

CEO Data Summary Statistics

B. Subsample: All CEO years after the CEO fails to exercise a five-year-old option that is at least 67% in the money, provided that he subsequently does it again at least once.

Number of CEOs = 56; Total Observations = 293

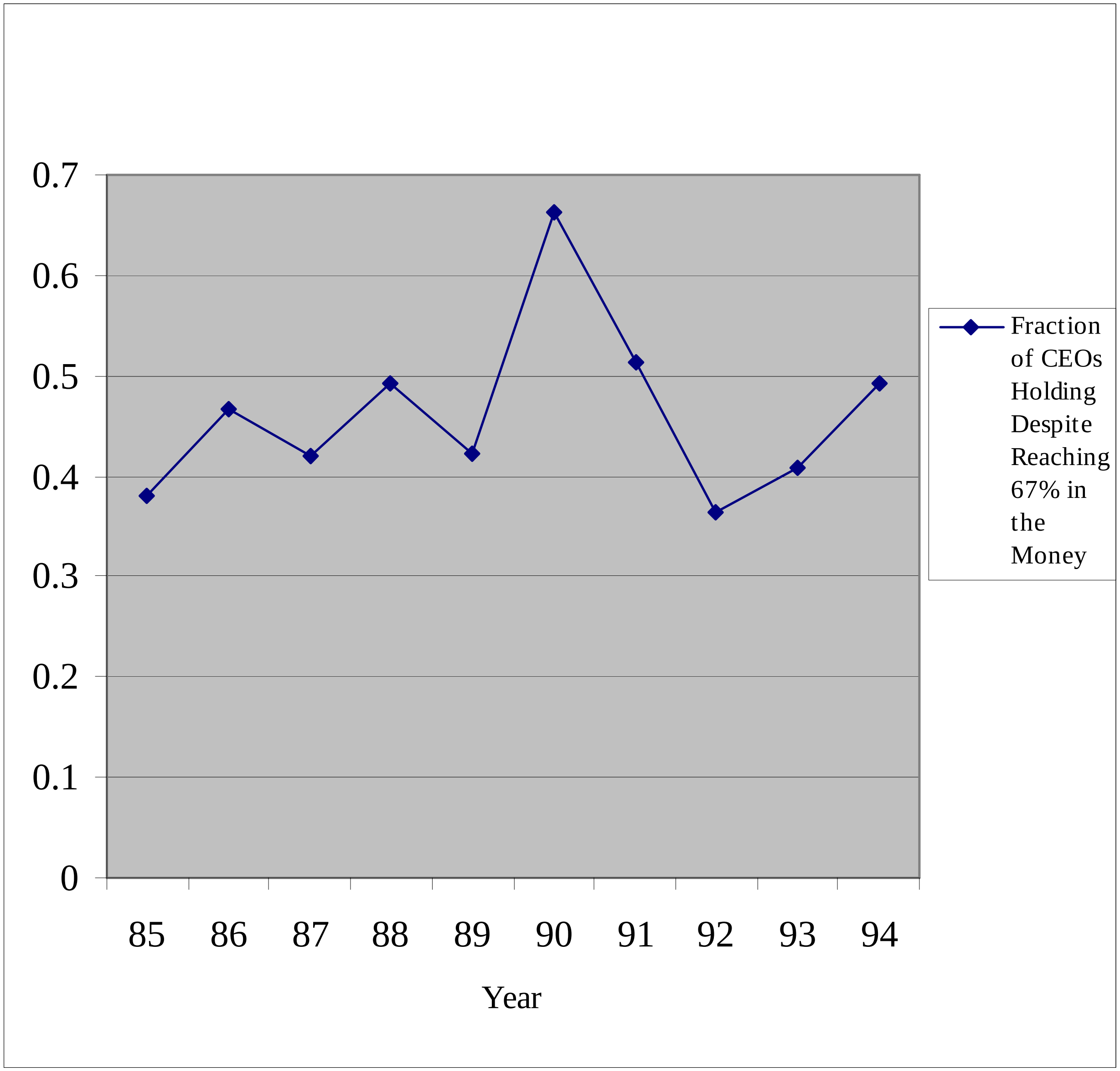
Variable	Observations	Mean	Median	Standard Deviation	Minimum	Maximum
Manufacturing (FF industry dummy)	293	0.71	1	0.45	0	1
Utilities (FF industry dummy)	293	0.00	0	0.00	0	0
Shops (FF industry dummy)	293	0.14	0	0.35	0	1
Money (FF industry dummy)	293	0.05	0	0.21	0	1
Other (FF industry dummy)	293	0.10	0	0.29	0	1
Age	293	60.99	61	5.84	44	82
Years as CEO	285	13.81	13	5.92	6	35
CEO & President	293	0.47	0	0.50	0	1
CEO & Chairman	293	0.92	1	0.26	0	1
CEO & President & Chairman	293	0.40	0	0.49	0	1
Founder	270	0.17	0	0.38	0	1
Stock ownership (%)	293	0.009	0.003	0.021	0	0.225
Vested options (% of shares outstanding)	293	0.005	0.002	0.007	0	0.039
"Depression baby" (born in 1930s)	293	0.37	0	0.48	0	1
Finance career	182	0.15	0	0.36	0	1
Technical career	182	0.16	0	0.37	0	1
Finance education	208	0.44	0	0.50	0	1
MBA	208	0.37	0	0.48	0	1
Technical education	208	0.48	0	0.50	0	1

All variables are defined in the Appendix. The Fama-French industries (FF industry dummies) are defined on French's website (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html).

Table VII
Time Series of the Fraction of CEOs Holding 67% in the Money

Year	Fraction of CEOs holding despite reaching 67% in the money (Holders 67)	Observations
85	0.38	63
86	0.47	75
87	0.42	95
88	0.49	75
89	0.42	90
90	0.66	80
91	0.51	74
92	0.36	74
93	0.41	71
94	0.49	69

Table VII
Time Series of the Fraction of CEOs Holding 67% in the Money



Empirical Specification

$$
\begin{aligned}
I_{it} = \; & \beta_1 && + \beta_2 C_{it} && \\
& + \beta_3 Q_{it} && + \beta_4 C_{it} && + X_{it}'\gamma \\
& + \beta_5 Q_{it} C_{it} && + \beta_6 O_{it} C_{it} && + C_{it} X_{it}'\gamma + \varepsilon_{it}
\end{aligned}
$$

with i company — Q Tobin's Q (investment opportunities)

t year — I overconfidence

I investment — X other controls

C cash flow

$\Rightarrow H_0: \beta_6 = 0$ (overconfidence does not matter)

$\Rightarrow H_1: \beta_6 > 0$ (overconfidence does matter)

Table III
Regression of Investment on Cash Flow and Exercise Behavior

	Baseline Regressions			Late Exercise of 67%-in-the-Money Options (in year 5)			
	no fixed effects, no controls	fixed effects, no controls	fixed effects, controls	no controls	with controls	standard errors clustered by firm	industry - CF interactions, clustered errors
Cash flow	0.2390	0.6422	2.0173	0.6674	2.0553	2.0553	2.1908
	(10.42)***	(6.81)***	(11.36)***	(7.09)***	(11.66)***	(3.42)***	(3.96)***
Q	0.0178	0.0655	0.0128	0.0664	0.0093	0.0093	0.0163
	(2.13)**	(6.62)***	(0.64)	(6.74)***	(0.47)	(0.21)	(0.44)
Stock ownership (%)			-0.0800		-0.1951	-0.1951	0.1845
			(0.14)		(0.35)	(0.29)	(0.31)
Vested options			0.0124		-0.0036	-0.0036	-0.0217
			(0.07)		(0.02)	(0.02)	(0.13)
Size			0.0337		0.0429	0.0429	0.0666
			(1.68)*		(2.15)**	(1.23)	(1.83)*
Corporate governance			-0.0036		-0.0079	-0.0079	-0.0066
			(0.45)		(1.00)	(0.79)	(0.67)
(Q)*(Cash flow)			0.0255		0.0374	0.0374	0.0198
			(1.29)		(1.88)*	(0.52)	(0.33)
(Stock ownership)*(Cash flow)			-0.8267		-0.8831	-0.8831	-1.4805
			(1.99)**		(2.14)**	(0.61)	(1.10)
(Vested options)*(Cash flow)			-0.3991		-0.2573	-0.2573	-0.2826
			(3.28)***		(2.07)**	(1.18)	(1.29)
(Size)*(Cash flow)			-0.2214		-0.2260	-0.2260	-0.2324
			(10.27)***		(10.58)***	(2.85)***	(3.22)***
(Corporate governance)*(Cash flow)			0.0382		0.0501	0.0501	0.0345
			(2.20)**		(2.87)***	(1.76)*	(1.35)
Holder 67				-0.0333	-0.0503	-0.0503	-0.0482
				(1.23)	(1.92)*	(1.56)	(1.43)
(Holder 67)*(Cash flow)				0.1562	0.2237	0.2237	0.2215
				(2.94)***	(4.11)***	(2.08)**	(1.93)*
Year fixed effects	no	yes	yes	yes	yes	yes	yes
Firm fixed effects	no	yes	yes	yes	yes	yes	yes
(Year fixed effects)*(Cash flow)	no	yes	yes	yes	yes	yes	yes
(Industry fixed effects)*(Cash flow)	no	no	no	no	no	no	yes
Observations	1019	1019	1019	1019	1019	1019	1017
Adjusted R-squared	0.14	0.55	0.63	0.56	0.63	0.63	0.66

Constant included. Absolute value of t statistics in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%

Alternative Interpretations

1. Less risk aversion / more wealth / more diversification.
   * Variation in benchmark or no benchmark: Measure 2, Measure 3
2. Asymmetric Information (I). Insider Trading.
   * Persistence
   * Losses
   * Losers vs. Winners
3. Asymmetric Information (II). Signaling.
   * Need “imperfect signaling.”
   * Habitual stock purchases
   * Weak signaling power of option exercise (EDGAR, financial services firms)
   * Measure 3: Stock purchases in a period disjoint from the investment decision.

Measure 2: “Long Holder”

CEO did not exercise option until last year before expiration.

CEO displayed this behavior at least once during sample period.

→ independent of CEO wealth, risk aversion, diversification

Measure 3: “Habitual Buyer”

CEO was a net buyer of stock during first 5 years in sample.

→ LT personality feature

Table VIII
Regression of Investment on Cash Flow and Holding Options "Forever"

	Baseline Regressions			Holding Options Until Last Year Before Expiration			
	no fixed effects, no controls	fixed effects, no controls	fixed effects, controls	no controls	with controls	standard errors clustered by firm	industry - CF interactions, clustered errors
Cash flow	0.2723	0.5051	0.847	0.4367	0.7858	0.7858	0.6743
	(21.24)***	(12.21)***	(9.19)***	(10.32)***	(8.42)***	(2.47)**	(2.05)**
Q	0.053	0.099	0.0812	0.0983	0.0846	0.0846	0.0931
	(11.09)***	(15.06)***	(7.49)***	(15.05)***	(7.79)***	(2.00)**	(1.93)*
Stock ownership (%)			0.2457		0.251	0.251	0.2533
			(2.80)***		(2.86)***	(1.24)	(1.32)
Vested options			-0.0465		-0.0134	-0.0134	-0.0211
			(0.41)		(0.12)	(0.05)	(0.08)
Size			-0.0415		-0.0454	-0.0454	-0.049
			(4.08)***		(4.45)***	(2.02)**	(2.09)**
Corporate governance			0.0021		0.0029	0.0029	0.0041
			(0.51)		(0.72)	(0.52)	(0.78)
(Q)*(Cash flow)			0.0107		0.0063	0.0063	-0.0127
			(1.02)		(0.60)	(0.14)	(0.23)
(Stock ownership)*(Cash flow)			-0.2848		-0.2971	-0.2971	-0.3701
			(1.71)*		(1.79)*	(0.60)	(0.73)
(Vested options)*(Cash flow)			0.3584		0.3225	0.3225	0.3331
			(4.51)***		(4.03)***	(1.30)	(1.38)
(Size)*(Cash flow)			-0.0666		-0.0618	-0.0618	-0.0519
			(5.91)***		(5.47)***	(1.47)	(1.14)
(Corporate governance)*(Cash flow)			-0.0083		-0.0102	-0.0102	-0.0151
			(0.86)		(1.05)	(0.49)	(0.79)
Longholder				-0.0737	-0.0461	-0.0461	-0.0532
				(3.67)***	(2.34)**	(1.07)	(1.29)
(Longholder)*(Cash flow)				0.2317	0.1346	0.1346	0.155
				(6.81)***	(3.95)***	(1.18)	(1.35)
Year fixed effects	no	yes	yes	yes	yes	yes	yes
Firm fixed effects	no	yes	yes	yes	yes	yes	yes
(Year fixed effects)*(Cash flow)	no	yes	yes	yes	yes	yes	yes
(Industry fixed effects)*(Cash flow)	no	no	no	no	no	no	yes
Observations	3569	3569	3569	3569	3569	3569	3555
Adjusted R-squared	0.22	0.51	0.55	0.51	0.55	0.55	0.55

Constant Included. Absolute value of t statistics in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%

Alternative Interpretations

1. Less risk aversion / more wealth / more diversification.

   * Variation in benchmark or no benchmark: Measure 2, Measure 3

2. Asymmetric Information (I). Insider Trading.

   * Persistence

   * Losses

   * Losers vs. Winners

3. Asymmetric Information (II). Signaling.

   * Need "imperfect signaling."

   * Habitual stock purchases

   * Weak signaling power of option exercise (EDGAR, financial services firms)

   * Measure 3: Stock purchases in a period disjoint from the investment decision.

Table IV
Persistence of Exercising Behavior

A. Random Effects Probit Regression

Sample: Observations with 67%-in-the-money options (in year five)

	(1)	(2)	(3)	(4)
Past late exercises	0.2493	0.1896	0.2612	0.1982
	(4.40)***	(2.88)***	(4.70)***	(3.07)***
Q		-0.151		-0.1544
		(1.57)		(1.65)
Price/Earnings ratio			0.0011	0.0014
			(1.19)	(1.26)
Observations	759	528	730	519
Number of CEOs	278	187	272	186

Absolute value of z statistics in parentheses.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table IV
Persistence of Exercising Behavior

B. Percent of "Late Exercisers" Partitioned by Number of Last Late Exercises

Sample: Observations with 67%-in-the-money options (in year five)

Past Late Exercises	% Who Exercise Late	Number of CEOs
0	0.32	487
1	0.64	128
2	0.73	67
3	0.94	32
4	0.79	28
> 4	0.77	15

Table V
Distribution of Returns of "Late Exercisers" (67%, 5th year)

Percentage in the money in year 5		Return (in %) relative to exercising during year 5 and investing in S&P500					
		Exercise at fiscal-year maximum price		Exercises at fiscal-year mean price		Exercises at fiscal-year median price	
Percentile	% in the money	Percentile	Return	Percentile	Return	Percentile	Return
10th	161.89	10th	-16.56	10th	-16.48	10th	-16.45
20th	213.71	20th	-10.32	20th	-10.51	20th	-11.65
30th	280.97	30th	-6.40	30th	-5.89	30th	-7.39
40th	366.88	40th	-2.79	40th	-2.50	40th	-2.56
		46th	-0.66	46th	-0.38	49th	-0.05
50th	435.88	50th	1.02	50th	1.64	50th	0.30
60th	616.83	60th	5.72	60th	6.94	60th	5.59
70th	905.43	70th	10.86	70th	10.96	70th	11.62
80th	1,395.22	80th	19.16	80th	17.32	80th	16.05
90th	2,326.39	90th	28.27	90th	25.27	90th	25.07
Mean	1,275.90		3.60		4.85		3.57
Standard	3,336.66		20.23		20.96		21.15
Observations	182		182		182		182
CEOs	86		86		86		86

Table VI
Regression of Investment on Cash Flow and Exercise Behavior

	Baseline Regressions			Late Exercise of 67%-in-the-Money Options (in year 5) with Losses			
	no fixed effects, no controls	fixed effects, no controls	fixed effects, controls	no controls	with controls	standard errors clustered by firm	industry - CF interactions, clustered errors
Cash flow	0.239	0.6422	2.0173	0.6647	2.0745	2.0745	2.1974
	(10.42)***	(6.81)***	(11.36)***	(7.04)***	(11.64)***	(3.39)***	(3.94)***
Q	0.0178	0.0655	0.0128	0.0665	0.0092	0.0092	0.0159
	(2.13)**	(6.62)***	(0.64)	(6.73)***	(0.46)	(0.20)	(0.43)
(Q)*(Cash flow)			0.0255		0.0371	0.0371	0.02
			(1.29)		(1.87)*	(0.52)	(0.33)
Stock ownership (%)			-0.08		-0.2039	-0.2039	0.1927
			(0.14)		(0.37)	(0.30)	(0.33)
Vested options			0.0124		0.0088	0.0088	-0.0094
			(0.07)		(0.05)	(0.06)	(0.06)
Corporate governance			-0.0036		-0.0084	-0.0084	-0.0075
			(0.45)		(1.05)	(0.82)	(0.76)
Size			0.0337		0.045	0.045	0.0687
			(1.68)*		(2.23)**	(1.24)	(1.84)*
(Stock ownership)*(Cash flow)			-0.8267		-0.887	-0.887	-1.459
			(1.99)**		(2.15)**	(0.61)	(1.10)
(Vested options)*(Cash flow)			-0.3991		-0.2677	-0.2677	-0.2935
			(3.28)***		(2.14)**	(1.21)	(1.33)
(Corporate governance)*(Cash flow)			0.0382		0.0507	0.0507	0.0359
			(2.20)**		(2.91)***	(1.77)*	(1.38)
(Size)*(Cash flow)			0.0255		-0.2281	-0.2281	-0.2333
			(1.29)		(10.57)***	(2.84)***	(3.22)***
Hold and Win 67				-0.0487	-0.0293	-0.0293	-0.0268
				(1.23)	(0.78)	(0.63)	(0.50)
(Hold and Win 67)*(Cash flow)				0.1812	0.2002	0.2002	0.1842
				(2.73)***	(3.04)***	(1.79)*	(1.31)
Hold and Lose 67				-0.0226	-0.0621	-0.0621	-0.0628
				(0.70)	(2.02)**	(1.63)	(1.82)*
(Hold and Lose 67)*(Cash flow)				0.1301	0.2418	0.2418	0.2577
				(1.83)*	(3.46)***	(1.94)*	(2.20)**
Year fixed effects	no	yes	yes	yes	yes	yes	yes
Firm fixed effects	no	yes	yes	yes	yes	yes	yes
(Year fixed effects)*(Cash flow)	no	yes	yes	yes	yes	yes	yes
(Industry fixed effects)*(Cash flow)	no	no	no	no	no	no	yes
Observations	1019	1019	1019	1019	1019	1019	1017
Adjusted R-squared	0.14	0.55	0.63	0.56	0.63	0.63	0.66

Constant included. Absolute value of t statistics in parentheses.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table IX
Regression of Investment on Cash Flow and Stock Purchases in First Five Years

	Baseline Regressions			Buying Behavior in First Five Years			
	no fixed effects, no controls	fixed effects, no controls	fixed effects, controls	no controls	with controls	standard errors clustered by firm	industry - CF interactions, clustered errors
Cash flow	0.1539	0.2411	1.653	0.0301	1.5614	1.5614	1.094
	(6.27)***	(2.64)***	(6.12)***	(0.31)	(5.84)***	(4.10)***	(2.04)**
Q	0.0305	0.0488	0.0745	0.0343	0.076	0.076	0.074
	(3.58)***	(3.87)***	(3.40)***	(2.71)***	(3.52)***	(3.26)***	(2.69)***
Stock ownership (%)			0.3357		-0.1032	-0.1032	0.3074
			(0.85)		(0.26)	(0.27)	(0.59)
Vested options			0.0761		0.0157	0.0157	0.0196
			(0.31)		(0.06)	(0.06)	(0.08)
Size			-0.1001		-0.0942	-0.0942	-0.1068
			(3.74)***		(3.57)***	(1.76)*	(1.94)*
Corporate governance			0.0043		0.0095	0.0095	0.0071
			(0.43)		(0.96)	(0.55)	(0.42)
(Q)*(Cash flow)			-0.0564		-0.0741	-0.0741	-0.0629
			(2.44)**		(3.21)***	(1.82)*	(1.40)
(Stock ownership)*(Cash flow)			-0.8385		0.3589	0.3589	-0.5852
			(1.22)		(0.49)	(0.30)	(0.47)
(Vested options)*(Cash flow)			-0.0669		0.042	0.042	0.1152
			(0.42)		(0.27)	(0.27)	(0.77)
(Size)*(Cash flow)			-0.1494		-0.1592	-0.1592	-0.1032
			(5.22)***		(5.62)***	(3.39)***	(1.88)*
(Corporate governance)*(Cash flow)			0.0221		-0.0013	-0.0013	0.0111
			(0.91)		(0.05)	(0.02)	(0.18)
Net Buyer				-0.8153	-0.3788	-0.3788	1.506
				(2.33)**	(0.69)	(0.42)	(1.04)
(Net Buyer)*(Cash flow)				0.4913	0.4425	0.4425	0.4267
				(5.44)***	(4.42)***	(1.58)	(1.43)
Year fixed effects	no	yes	yes	yes	yes	yes	yes
Firm fixed effects	no	yes	yes	yes	yes	yes	yes
(Year fixed effects)*(Cash flow)	no	yes	yes	yes	yes	yes	yes
(Industry fixed effects)*(Cash flow)	no	no	no	no	no	no	yes
Observations	818	818	818	818	818	818	818
Adjusted R-squared	0.09	0.47	0.53	0.49	0.54	0.54	0.55

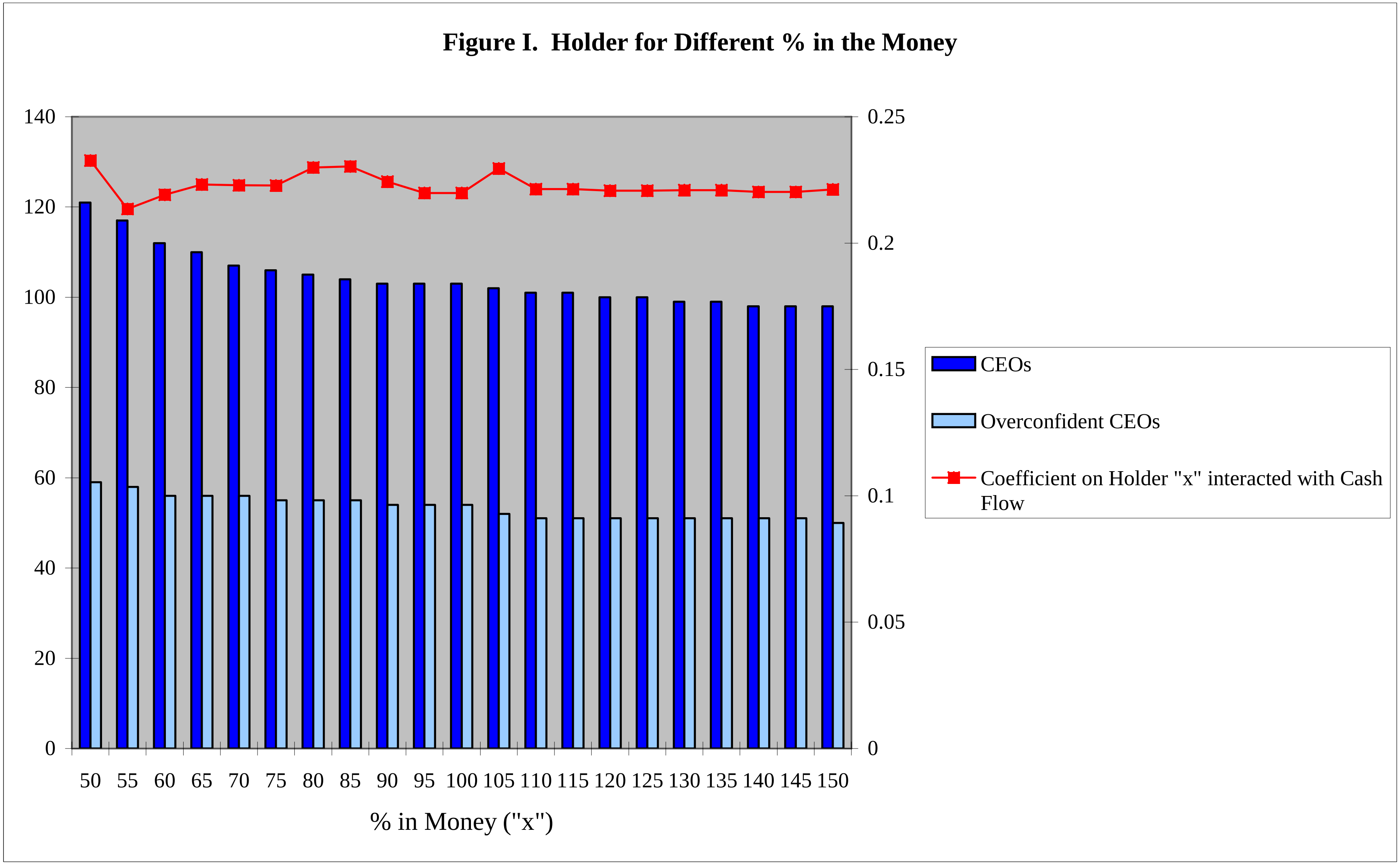
Constant included. Absolute value of t statistics in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%

Robustness Checks

1. Alternative thresholds
2. Normalization by beginning of year assets
3. Control of industry effects
   a. 6 groups by 2 digit SIC codes
   b. 48 groups of Fama and French (1997)
4. Control for firm size
5. Control for financing constraints

Figure I

Regression of Investment on Cash Flow and Exercise Behavior



Economic Significance

1. Regress *I* on Q, C: coefficient on C = 0.2347

   20% decrease in sensitivity coefficient

   Regress I on Q, C, O, O*CF: coefficient on C = 0.1998

2. Regress *I* on Q, C, controls, Q*C, controls*C:
   dI/dC = 0.195 (**or**: 1 sd more C ➡ 0.4009 sd more *I*)

   83% increase in sensitivity

   Regress I on Q, C, O, controls, Q*C, controls*C,O*C:
   dI/dC = 0.357 (**or**: 1 sd more C ➡ 0.7329 sd more *I*)

Test Prediction 2

1. Divide firms into quintiles by degree of equity dependence (Kaplan Zingales index)
   Lamont, Polk and Saa-Requejo (2001); Baker, Stein and Wurgler (2001)

2. Does overconfidence matter more in highest quintile?

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 $\longrightarrow$ Equity dependence
  - Leverage captures debt capacity
  - Deflated cash flow, cash, dividends capture cash on hand
  - Q captures market value of equity (Exclude?)

Table X
Regression of Investment on Cash Flow and Overconfidence by Equity Dependence

	OLS with Fixed Effects				
	Most Constrained	--->			Least Constrained
	(1)	(2)	(3)	(4)	(5)
Cash flow	1.1362	0.1443	0.7831	0.7831	0.7052
	(1.93)*	(0.26)	(2.21)**	(1.71)*	(2.29)**
Q	0.1813	0.0549	0.0723	0.0413	-0.0466
	(4.26)***	(1.34)	(2.14)**	(1.74)*	(0.54)
Stock ownership (%)	-0.3888	0.4572	-0.0731	-0.9642	0.5606
	(1.69)*	(1.75)*	(0.41)	(1.62)	(1.41)
Vested options	0.1845	-0.348	0.9945	0.9212	0.3124
	(0.65)	(1.12)	(2.32)**	(1.24)	(0.37)
Size	-0.0461	-0.0154	-0.0002	-0.042	-0.042
	(1.06)	(0.61)	(0.01)	(1.13)	(0.84)
Corporate governance	0.0025	-0.003	0.0036	-0.0137	0.0162
	(0.23)	(0.42)	(0.68)	(1.00)	(0.67)
(Q)*(Cash flow)	-0.1873	0.0557	-0.0531	-0.0066	0.0685
	(2.35)**	(0.47)	(0.70)	(0.21)	(0.81)
(Stock ownership)*(Cash flow)	-0.3197	-0.8051	-0.3971	1.4618	-0.5946
	(0.63)	(1.03)	(0.54)	(1.36)	(0.90)
(Vested options)*(Cash flow)	-0.4351	1.0147	-1.0181	-2.2851	-0.3998
	(1.03)	(1.71)*	(1.06)	(1.59)	(0.86)
(Size)*(Cash flow)	-0.055	-0.013	-0.0408	-0.0035	-0.0391
	(0.72)	(0.19)	(0.92)	(0.07)	(0.89)
(Corporate governance)*(Cash	-0.0463	0.0836	-0.029	0.0447	-0.0327
	(0.84)	(1.85)*	(1.38)	(1.08)	(0.89)
Longholde	-0.083	0.0838	-0.0247	-0.0616	-0.1337
	(1.73)*	(1.61)	(0.89)	(1.30)	(1.30)
(Longholder)*(Cash flow)	0.4927	-0.1414	0.0491	0.117	0.2113
	(3.44)***	(1.06)	(0.61)	(0.84)	(1.44)
Year fixed effects	yes	yes	yes	yes	yes
Firm fixed effects	yes	yes	yes	yes	yes
(Year fixed effects)*(Cash flow)	yes	yes	yes	yes	yes
Observations	700	700	701	700	700
Adjusted R-squared	0.75	0.83	0.92	0.81	0.57

Constant included. Absolute value of t statistics in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%

Overconfidence and other Personal Characteristics

Measure 1-3:

Strong and robust effect overconfidence ⟶ investment

What about personal characteristics other than overconfidence?

– Educational Background (science, business, other)
– Professional Background (technical, finance, other)
– Cohort (depression baby)
– Military Service
– Titles
– Tenure

Table XI
Regression of Investment on Cash Flow and Background

B. Regression of Investment on Cash Flow and Employment Background

	Baseline	Fixed Effects & Controls			Clustered standard errors (by firm)		
		Technical	Finance	Both	Technical	Finance	Both
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Cash flow	1.6089	1.5225	1.6065	1.5237	1.5225	1.6065	1.5237
	(9.73)***	(9.13)***	(9.72)***	(9.13)***	(3.61)***	(3.47)***	(3.62)***
Q	0.1023	0.1122	0.1061	0.1134	0.1122	0.1061	0.1134
	(5.87)***	(6.39)***	(6.01)***	(6.41)***	(1.49)	(1.39)	(1.49)
Technical career		-0.0604		-0.0584	-0.0604		-0.0584
		(1.88)*		(1.77)*	(1.52)		(1.40)
(Technical career)*(CF)		0.2542		0.2473	0.2542		0.2473
		(4.09)***		(3.88)***	(2.42)**		(2.25)**
Finance career			0.0242	0.0054		0.0242	0.0054
			(0.84)	(0.18)		(1.03)	(0.21)
(Finance career)*(CF)			-0.0964	-0.0429		-0.0964	-0.0429
			(1.41)	(0.62)		(1.02)	(0.44)
Observations	1911	1911	1911	1911	1911	1911	1911
Adjusted R-squared	0.63	0.64	0.63	0.64	0.64	0.63	0.64

Constant included. Absolute value of t statistics in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%
Controls for Corporate governance, Stock ownership, Vested options, Size and interactions of these variables and of Q with Cash Flow are included. Fixed effects for Year and Firm and interactions of (Year)*(CF) and (Industry)*(CF) are also included.

Table XI

Regression of Investment on Cash Flow and Background

A. Regression of Investment on Cash Flow and Educational Background

	Baseline	Fixed Effects & Controls			Clustered standard errors (by firm)		
		Technical	Finance	Both	Technical	Finance	Both
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Cash flow	0.974	0.8639	0.9913	0.8839	0.8639	0.9913	0.8839
	(7.43)***	(6.36)***	(7.55)***	(6.49)***	(4.26)***	(4.17)***	(4.36)***
Q	0.011	0.0207	0.0147	0.0236	0.0207	0.0147	0.0236
	(0.68)	(1.27)	(0.91)	(1.44)	(0.24)	(0.17)	(0.27)
Technical education		-0.0627		-0.0591	-0.0627		-0.0591
		(2.75)***		(2.54)**	(2.38)**		(2.24)**
(Technical education)*(CF)		0.1532		0.1455	0.1532		0.1455
		(3.12)***		(2.95)***	(1.79)*		(1.78)*
MBA			0.0383	0.0275		0.0383	0.0275
			(1.60)	(1.13)		(1.64)	(1.14)
(MBA)*(CF)			-0.1247	-0.1102		-0.1247	-0.1102
			(2.31)**	(2.04)**		(1.70)*	(1.46)
Observations	2106	2106	2106	2106	2106	2106	2106
Adjusted R-squared	0.57	0.57	0.57	0.57	0.57	0.57	0.57

	Sign	Significance	Significance in joint regression
Finance/Econ Background	(–)	yes	yes
Technical Background	(+)	yes	(yes/no)
Cohort 1920s	(+)	yes	yes
Army	(+)	yes	(yes/no)
Titles	(+)	yes	yes
Tenure	(–)	yes	yes
Overconfidence	(+)	yes	yes

Conclusion

- Measurable impact of personal characteristics on corporate investment:

  - ❖ CEO Overconfidence ➡ Investment distortions.
  - ❖ Other personal characteristics: cohort, background.
  - ❖ Distinction between overconfidence and other personal characteristics: Equity dependence

- Implication:

  Existing forms of corporate governance and incentives insufficient to induce shareholder-value maximization.

3 Mergers and Acquisitions: Introduction

Andrade-Mitchell-Stafford, *JEP* 2001; Holmstroem-Kaplan, *JEP* 2001; Moeller, Schlingemann, Stulz, *JF* 2006

Why do CEOs make acquisitions?

1. Synergies (e.g. economies of scale).
2. Attempt to create market power (e.g. forming monopolies)
3. Incompetent target management $\longrightarrow$ market discipline
4. Self-serving attempts to overexpand (empire-building, hubris).
5. Advantages of diversification (e.g. internal capital market; diversification for undiversified managers)

6. Mergers = reaction to unexpected shocks to industry structure (Explanation for wave/cluster structure in Mitchel and Nulherin, *JFE* 1996, and Andrade, Mitchell, Stafford, *JEP* 2001; could also be the "trigger" in the informational cascades literature.)
   - E.g. technological innovation (creates excess capacity, need for consolidation).
   - E.g. financial innovation.
   - E.g. supply shock (oil prices; foreign competition).
   - E.g. deregulation.
     - 1973: airlines.
     - 1984 and 1996: broadcasting.
     - 1984: entertainment.
     - 1978: natural gas.
     - 1980: trucking.
     - 1994: banks and thrifts.
     - 1992: utilities.
     - 1996: telecommunications.

Importance / Significance of mergers

- Reallocation of resources within and across industries

- 1995: Value of M&A's = 5% GDP and = 48% nonresidential gross investment

- For a firm an "extraordinary event" often doubling its size within months; large organizational uncertainty; movement of human capital

==> Extremely large literature

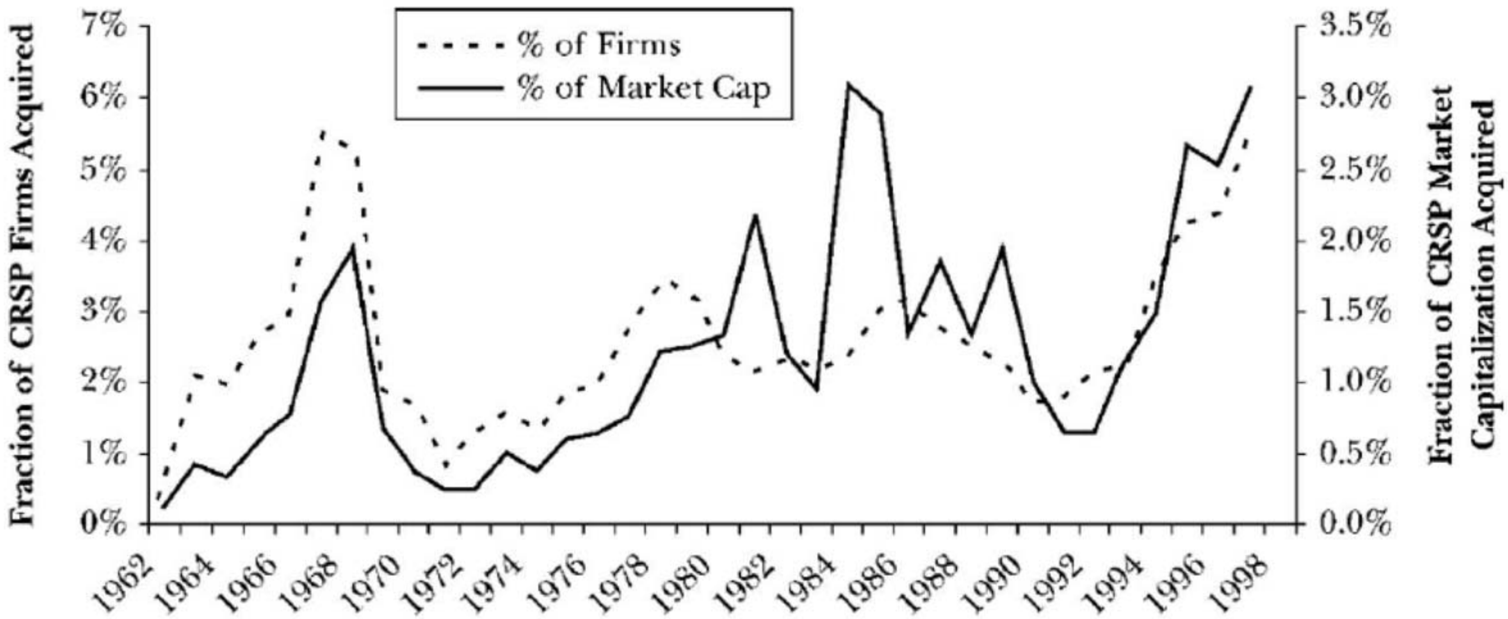
==> In finance, IO, macro; also relevant for labor, public.

Stylized facts

1. Mergers occur in waves.

- 1920s/1930s: Mergers for market power.
- 1960s: Mergers for diversification (def.: 2-digit SIC).
  - Decreasing since 1960s.
    (1970s: 70%, 1980s: 60%, 1990s: 52%)
  - Ultimately failures.
- 1980s: Mergers for market discipline.
  - 1980s: Half of all major US corporatations received a takeover offer.
  - 14% hostile (only?); 4% in 1990s. (*hostile* = target publicly rejects or acquirer describes it as unsolicited and unfriendly)
- late 1980s and 1990s: Mergers of deregulation.
  - three major waves
  - large multi-billion dollar deals

Figure 1
Aggregate Merger Activity



**2. Within a wave,
mergers occur in industry clusters.**

- 1970s: Metal Mining, Real Estate, Oil & Gas, Apparel, Machinery
- 1980s: Oil & Gas, Textile, Misc. Manufacturing, Non-Depository Credit, Food
- 1990s: Metal Mining, Media & Telecommunication, Banking, Real Estate, Hotels

3. Merger financing

- 1970s, 1980s: less stock financing
  - 45% any stock
  - 37% or 32% all stock

- 1990s: stock-financing
  - 70% any stock
  - 58% all stock

Why?

... under/overvaluation?

... overconfidence?

... investment bankers?

4. Announcement Effects

- Methodology: Event Study
  - Average abnormal stock market reaction at announcement as measure of value creation / destruction.
  - Hypothesis: efficient capital market (immediate incorporation of expected value change into stock price).
  - Event windows: (a) short: 3 days (-1 to +1) and (b) long: several days prior to announcement to close of merger. **[Problem with (b)?]**
  - Software: Eventus (WRDS)

- AR 1973-1998
  [both acquirer and target publicly traded!]
  [mixing NYSE, NASDAQ, AMEX]:
  value creation (?),
  entirely accruing to target shareholders (!!)
  - Target:
    positive, **significant** (16%) for -/+1
    positive, **significant** (24%) for -20/close
  - Acquirer:
    negative, **insignificant** (-0.7%) for -/+1
    negative, **insignificant** (-3.8%) for -20/close
  - Combined:
    positive, **significant** (1.8%) for -/+1
    positive, **insignificant** (1.9%) for -20/close

- Magnitude
  - Median target value \$230m $\Longrightarrow$ 16% = \$37m
  - Average annual return publicly traded companies = 12% $\Longrightarrow$ 16% normally over 16 months

- Effect much more striking in \$\$ than in % –> Moeller et al.

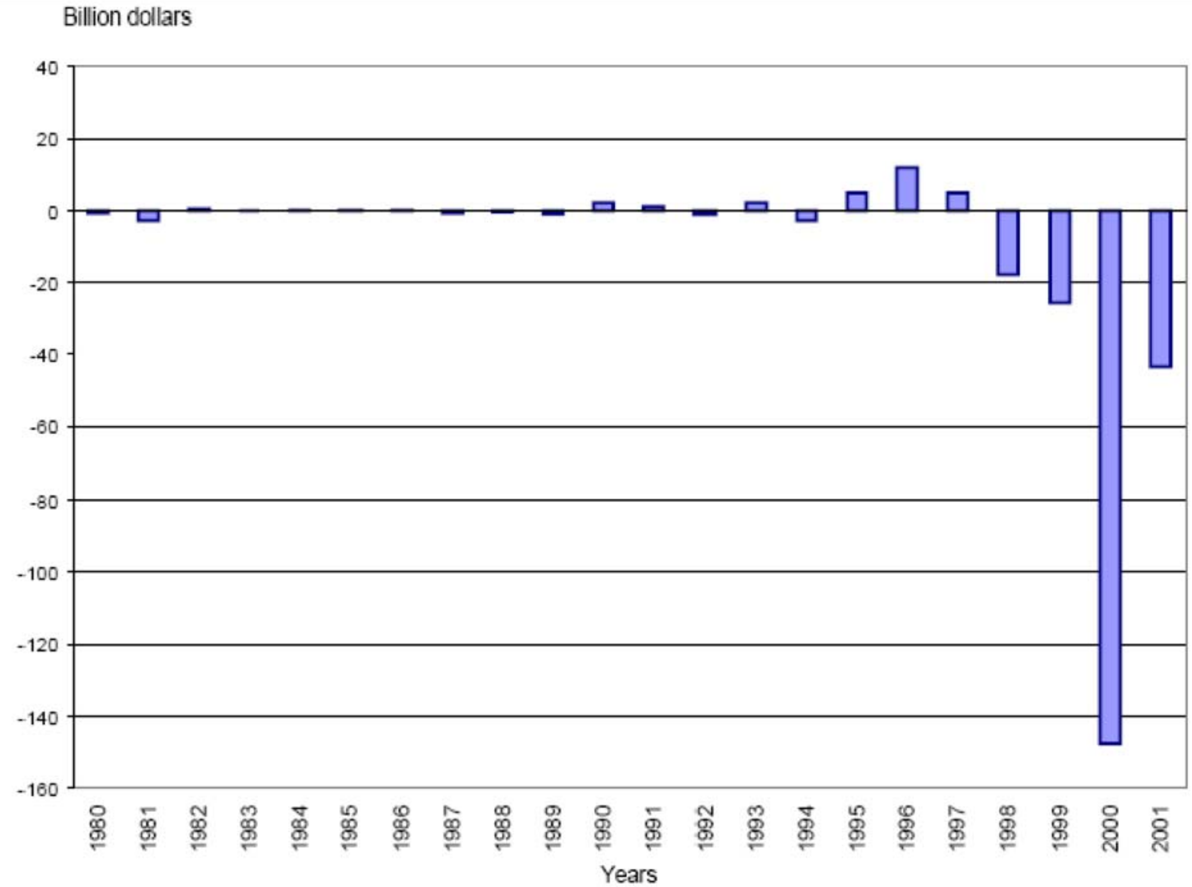


Figure 1. Yearly aggregate dollar return of acquiring-firm shareholders (1980 to 2001). Data are from the SDC Mergers and Acquisitions Database. The graph shows the aggregate dollar return associated with acquisition announcements for each sample year. The aggregate dollar return is defined as the sum of the product of the abnormal return of each announcement multiplied by the equity capitalization of the acquirer.

- Dollar loss of acquiring-firm shareholders = change in the acquiring firm's capitalization over the three days surrounding acquisition announcements (for transactions exceeding 1% of the market value of the assets of the acquirer)

- Sample: yearly aggregate losses to acquiring-firm shareholders for our sample of acquisitions of public firms, private firms, and subsidiaries from 1980 through 2001.

- From 1991 to 2001: acquiring firms' shareholders lost an aggregate $216 billion (more than 50 times the $4 billion lost 1980-1990)

- Most of the acquiring-firm shareholder losses took place from 1998 through 2001
  - -$4 billion in the 1980s,
  - +$24 billion 1991-1997
  - -$240 billion 1998-2001.
- NOTE: even the aggregate combined value of acquiring and acquired firms falls by a total of $134 billion (public firm acquisition announcements 1998-2001).

5. Announcement Effects and Financing

- Equity-financed mergers
  - Acquirer: -1.5%, significant (but insignificant over “-20/close”)
  - Target: 13%, significant
  - Combined: 0.6%, insignificant

- No-equity
  - Acquirer: 0.4%, insignificant
  - Target: 20%, significant
  - Combined: 3.6% significant (but insignificant over “-20/close”)

Link to asymmetric information (Myers-Majluf 1984)?

But: “double-signalling” (value of firm, value of merger)

But: variation over time?

But: combination stock/equity?

6. Long-Term Abnormal Returns

- If markets are not fully efficient ...

- *On average*: negative long-term AR acquirer; overwhelms positive combined stock-price reaction at announcements

- *Financing*: [Loughran and Vijh (1997)] five-year long-term AR 1970-89
  - Stock-Financed: -24.2%
  - Cash-Financed: +18.5%

- *Book-to-Market*: [Rau and Vermaelen (1998)] three-year long-term AR 1980-91
  - Value firms: + 7.6%
  - Growth/Glamour firms: -17.3%
  - Why?

        * Fama and French (1992, 1993): increased risk of v alue firms
        * Lakonishok, Shleifer, Vishny (1994): investors mistakenly estimate future performance by extrapolating from past performance

- But: methodological problems
    - Tests of long-term abnormal performance are joint tests of stock market efficiency and a model of market equilibrium (Fama 1970).
    - Abnormal returns are not independent accross firms. (Clustering by industries.)

Next Question: Why and How?

We will think of M&A as "another type of investment" and go over the motivations (models) considered for internal investment.

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

and

$$V^{old}(c) = \frac{s}{s+s'}\left[V_A + V_T + e - c\right].$$

4 Wrap-Up of Stylized Facts and Link to Theory

Empirical findings:

- Huge economic significance (whether measured in dollar value of deals, dollar value of firms involved, shareholder value destroyed at announcement, job lost/created/changed, ..)
- Merger waves
- Merger waves at different times in different industries
- Negative effect on value for shareholders of acquiring company at announcement
- Large amount of stock financing in the 1990s (70% any stock; 58% all stock) compared to 1970s/1980s (45% any stock; 37% / 32% all stock)

Neoclassical Theory: "mergers are market instruments to prevent inefficient firm management." E.g.: efficiency-improving response to industry shocks (e.g. deregulation).

We will review 3 theoretical / empirical approaches to explain the above facts. All are in (partial) contradiction to the neoclassical view:

1. **Free-riding** (Grossman and Hart, 1980)
   Deviation from neoclassics: Free-riding prevents efficient raiding decisions
2. **Misvaluation** theories (Shleifer and Vishny, 2003)
   Deviation from neoclassics: inefficient markets (investor sentiment / investor biases)
3. **Overconfidence** / Hubris theories (Roll, 1986; Malmendier and Tate, 2007)
   Deviation from neoclassics: managerial biases (at least MT does not need much inefficiency)

Readings for next week or week after:

- Grossman and Hart (1980), “Takeover Bids, The Freerider Problem” and (1988), “One Share One Vote”

- Shleifer and Vishny (2003), “Stock-market driven acquisitions”

- Malmendier and Tate (forthcoming), “Who makes acquistions ...” together with Roll (1986) and Heaton (2002) if you have not done so yet.

- After midterm: Intro into capital structure. (Good overview: Frank and Goyal, Tradeoff and Pecking Order Theories of Debt. To appear in Espen Eckbo (editor): The Handbook of Empirical Corporate Finance, Elsevier Science.).