

Econ 234C – Corporate Finance
Lecture 8: External Investment (finishing up)
Capital Structure

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Outline

1. Organization: Exams
2. External Investment (IV): Managerial Hubris
3. Capital Structure (I): introduction, basic facts, basic theories
4. HW 1

1 Organization

Midterm: week after next week! (3/20)

Material: nothing surprising

- Material covered in class
- Especially starred papers; but know the basic idea (empirics or model) of other papers we mentioned
- My aim: a useful theoretical exercise (based on toy model from class) and some explanations or criticism of empirical results (e.g. interpretation of a table; critique of an empirical approach)
- You do not need to have done any homeworks

Final exam: 5/8 and 5/10

Alternative is last class: 5/8.

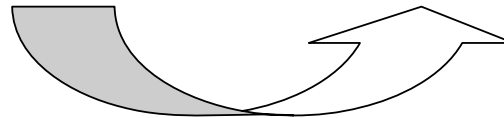
2 External Investment (IV): Hubris

A few final remarks on the empirical attempt to capture hubris

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

Overconfidence

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graph TD; A[Overconfidence] --> B[On private accounts]; A --> C[On corporate accounts];
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On private accounts

- Hold on to options.

Idea: Rational CEO who is

- underdiversified
- risk averse

should

- exercise options early.

On corporate accounts

- Higher probability of acquiring another company, particularly when:
 - Merger has low expected value
 - Manager has lots of cash and untapped debt capacity

Table 6. Are Overconfident CEOs Right to Hold Their Options? (I)

<u>Returns from exercising 1 year sooner and investing in the S&P 500 index</u>	
<u>Percentile</u>	<u>Return</u>
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
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)

<u>Do "Mistaken" Holders Drive the Acquisitiveness Result?</u>			
Longholder = holds options until last year before expiration (at least once)			
Distribution: Logistic. Constant included.			
Dependent Variable: Acquisition (yes or no) ; Normalization: Capital.			
	logit	random effects logit	fixed effects logit
Size	0.8721 (1.93)**	0.8598 (1.99)**	0.6251 (2.46)***
Q _{t-1}	0.7259 (2.86)**	0.7347 (2.54)**	0.8806 (0.74)
Cash Flow	2.0042 (3.49)**	2.1030 (3.22)***	2.8787 (2.64)***
Stock Ownership	1.5555 (0.51)	1.5853 (0.42)	0.7498 (0.15)
Vested Options	2.8574 (1.36)	1.7361 (0.53)	0.4921 (0.51)
Corporate Governance	0.6220 (3.31)***	0.6823 (2.45)**	1.0343 (0.16)
Longholder: Did OK	1.2015 (0.74)	1.2082 (0.80)	1.1555 (0.27)
Longholder: Should Have Exercised	1.8277 (1.95)*	1.9591 (2.32)**	4.4648 (2.32)**
Year Fixed Effects	yes	yes	yes
Observations	3532	3532	2111
Firms		318	172

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 = $\ln(1+\text{returns})$			
Distribution: Logistic. Constant included.			
Dependent Variable: Acquisition (yes or no) ; Normalization: Capital.			
	logit	logit with random effects	logit with fixed effects
Returns _{t-1}	1.4801 (1.61)	1.4467 (1.62)	1.1424 (0.54)
Returns _{t-2}	1.2539 (1.15)	1.2391 (1.01)	1.0474 (0.20)
Returns _{t-3}	1.0635 (0.31)	1.0405 (0.19)	0.9262 (0.35)
Returns _{t-4}	1.3548 (1.40)	1.3452 (1.37)	1.2513 (0.98)
Returns _{t-5}	1.2334 (1.03)	1.2202 (0.95)	1.1539 (0.66)
Longholder	1.5048 (2.33)**	1.6184 (2.83)***	2.4628 (2.56)**
Year Fixed Effects	yes	yes	yes
Observations	3479	3479	2157
Firms		305	173
Regressions include Cash Flow, Q ₋₁ , Size, Ownership, Vested Options, and Governance.			

Alternative Explanations

1. Inside Information or Signalling

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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.

	logit	logit with random effects	logit with fixed effects
Volatility _{t-1}	1.2672 (3.22) ^{***}	1.2413 (2.42) ^{**}	1.0403 (0.34)
Longholder	1.4784 (2.26) ^{**}	1.6777 (3.02) ^{***}	2.6370 (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.

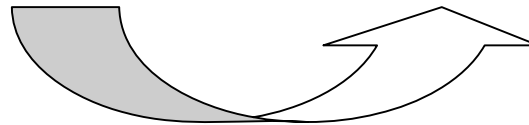
Finance Education

Longholder = holds options until last year before expiration (at least once)			
Distribution: Logistic. Constant included.			
Dependent Variable: Acquisition (yes or no); Normalization: Capital.			
	logit with controls	random effects logit	fixed effects logit
Size	0.7624 (2.27)**	0.7536 (2.49)**	0.1998 (3.96)***
Q _{t-1}	0.8624 (1.24)	0.8514 (1.01)	0.6985 (1.32)
Cash Flow	1.0686 (0.24)	1.0389 (0.14)	0.9442 (0.13)
Ownership	1.0163 (0.01)	0.8967 (0.06)	18.3462 (0.31)
Vested Options	1.2847 (0.28)	1.3302 (0.22)	3.7916 (0.73)
Governance	0.5132 (3.01)***	0.5515 (2.51)**	1.2581 (0.72)
Finance Education	1.5500 (2.00)**	1.6434 (2.17)**	3.2946 (1.46)
Longholder	1.7248 (2.29)**	1.8757 (2.42)**	5.6952 (1.51)
Year Fixed Effects	no	no	yes
Observations	1489	1489	819
Firms	188	188	83

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

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

where $E[r_{it}]$ is daily S&P 500 returns ($\alpha=0$; $\beta=1$)

Table 14. Market Response

Longholder = holds options until last year before expiration (at least once)			
Dependent Variable: Cumulative abnormal returns [-1,+1]			
	OLS (3)	OLS (4)	OLS (5)
Relatedness	0.0048 (1.37)	0.0062 (1.24)	0.0043 (1.24)
Corporate Governance	0.0079 (2.18)**	0.0036 (0.64)	0.0073 (1.98)**
Cash Financing	0.014 (3.91)***	0.0127 (2.60)***	0.0145 (3.99)***
Age			-0.0005 (1.46)
Boss			0.0001 (0.04)
Longholder	-0.0067 (1.81)*	-0.0099 (2.33)**	-0.0079 (2.00)**
Year Fixed Effects	yes	yes	yes
Industry Fixed Effects	no	yes	no
Industry*Year Fixed Effects	no	yes	no
Observations	687	687	687
R-squared	0.10	0.58	0.10
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
2. Articles published 1980-1994
3. Articles which characterize CEO as
 - Confident or optimistic
 - Not confident or not optimistic
 - Reliable, conservative, cautious, practical, steady or frugal

Measuring Press Portrayal

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

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).			
	logit	logit with random effects	logit with fixed effects
TOTALconfident	1.6971 (2.95)***	1.7826 (3.21)***	1.5077 (1.48)
Year Fixed Effects	yes	yes	yes
Observations	3647	3647	1559
Firms		326	128
Dependent Variable: Intra-industry merger (yes or no).			
TOTALconfident	1.0424 (0.20)	1.0368 (0.16)	0.8856 (0.31)
Year Fixed Effects	yes	yes	yes
Observations	3647	3647	1226
Firms		326	100
Regressions include Total Coverage, Cash Flow, Q_{t-1} , 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

3 Capital Structure – Theory

3.1 Modigliani-Miller and the “Trade-Off Theory”

Modigliani-Miller Theorem

- Proposition (1958): Capital structure irrelevance.
 - Intuition:
 - * Value additivity. If operating cashflows are fixed, value of the pie unaffected by split-up of the pie.

– Assumptions:

- * No taxes.
- * No costs of financial distress / no other transaction costs.
- * Fixed, exogenous operating cashflows.
- * Symmetric information.
- * Absence of arbitrage.
- * Rational beliefs, standard preferences!

- Practical message: “*If* there is an optimal capital structure, it should reflect taxes and/or specific market imperfections.” [Myers 1993]

leads ↓↓ ↓↓
 to
 ↓↓ ↓↓

Trade-off Theory

Optimal capital structure trades off

- tax savings from debt financing (tax-deductibility of interest payments on debt) against
- costs of financial distress from debt financing (agency costs of issuing risky debt; deadweight costs of liquidation or re-organization; costs of debt overhang [Myers 1977]).

(But who on earth came up with this name ...)

Pecking-Order Theory

Firms prefer internal funds \succ safe debt \succ risky debt \succ quasi-equity (e.g. convertibles) \succ equity.

- Traditional PO theory: conflict between managers and shareholders. (“Firms rely too much on internal financing to avoid the discipline of capital markets.”)
- Myers-Majluf (1984): managers acting in the interest of shareholders.
 - Informational asymmetry corporate insiders (managers) and outside investors).

- Managers would “want” to issue equity when overvalued; are reluctant to issue equity when undervalued.
- Investors understand informational asymmetry and market timing \implies equity issues are bad news.

3.2 Homework 1

Myers-Majluf focus on the analysis of internal financing versus external *equity* financing. In Subsection 3.3 they introduce risky debt, without fully modelling it.

- Use the modeling framework from class and introduce safe debt. Make sure you write out the IR constraint for creditors. Show that safe debt functions like cash. (2 points)
- Then introduce risky debt. Make sure you write out the IR constraint for creditors. First assume that the firm pre-announces whether it will use debt or equity. Show that the ex-ante value of the firm is higher under debt- than under equity-financing. How will the firm choose between cash, safe debt, risky debt, equity under which circumstances? (3 points)
- Now assume that the firm announces the issuance of safe debt, risky debt, equity. Consider the case in which safe debt does not suffice to finance the project. How will the firm decide now? (5 points)

Introducing Debt:

Argument in MM:

With equity financing firm issues & invests only if

$$\begin{aligned} A + C &\leq (A + R) \frac{E[A + R | \text{iss}] - (I - C)}{E[A + R | \text{iss}]} \\ &= (A + R) - [A + R] \frac{(I - C)}{E[A + R | \text{iss}]} \\ &= (A + C + R - I) - \frac{I - C}{E[A + R | \dots]} [(A + R) - E[A + R | \dots]] \\ &= (A + C + R - I) - \underbrace{\Delta_E}_{\text{gain to (new) equity holders}} \end{aligned}$$

Note: $E[\text{gain/loss}] = 0$ in equilibrium \rightarrow see formally above.

With debt financing, parallel

$$A + C \leq (A + C + R - I) - \underbrace{\Delta_D}_{\text{gain to debt holders}}$$

Use option-pricing argument: $|\Delta_E| > |\Delta_D|$, i.e. gain or loss for equity holders always larger than for debt-holders.

→ Use of debt or equity announced at $t = 0$: if both negative, the firm invests; if both positive or 0, then debt will be issued in some states of the world where equity will not be issued. Thus less underinvestment under debt. Thus ex-ante value of the firm higher under debt.

→ Use of debt or equity announced at $t = 1$: Issuing equity signals $\Delta_E < 0$ (since $|\Delta_E| > |\Delta_D|$ and firm choose equity if $\Delta_E < \Delta_D$). Thus, issuing equity signals a sure loss. Thus the firm will never issue equity.

4 Capital Structure – Empirics

TO theory

(+) Common sense.

(+) Firms with less tangible assets \implies less debt. (E.g. growth firms, firms with much R&D, firms with much advertisement.)

(?) Evidence on costs of financial distress.

- Direct bankruptcy costs (lawyers fees in bankruptcy) are very low as % of assets.

- Indirect costs (I): inability to invest efficiently when debt is high = debt overhang [Myers 1977]

– Example.

Assets in place: 100 with pr. 0.5; 20 with pr. 0.5.

Debt outstanding: 50

V_D ?

V_E ?

V ?

Potential investment project: $-10 \longrightarrow +15$.

V_D ?

V_E ?

V ?

Will management undertake project if it can be financed with internal funds (cash)?

Can management raise new equity for investment (from shareholders)?

- Insight: If debt senior (and underwater in some states), debt captures part of the surplus from new investment. This discourages equity from contributing capital.

- Indirect costs (II): asset substitution problem [Jensen-Meckling 1976]

- Example.

Assets in place: 100 with pr. 0.5; 20 with pr. 0.5. Cash: 10.

Debt outstanding: 50

$$V_D = 35$$

$$V_E = 25$$

$$V = 60$$

Potential investment project: $-10 \rightarrow 15$ with pr. 0.5 (in the high-asset-value state); 0 with pr. 0.5 (in the low-asset-value state). (Perf. corr.)

$$V_D ?$$

$$V_E ?$$

$$V ?$$

Will management undertake project?

- Insight: Equity = call with strike of “nominal debt.” Debt = Firm value *minus* call. Increased variance increases value of call.
- Classic example: Near-bankrupt S&L’s in 1980s gambling for salvation.

(−) Evidence on debt and taxes.

- Studies correlating *level* of $D/(D + E)$ to tax-status largely failed.
- Studies correlating *marginal financing decisions* on tax more or less successful. [Mackie-Mason 1990]
- Graham (2000) estimates corporate tax benefits of debt as 10%. Money (tax benefits) left on the table.

(−) Announcement effects.

$(-/+)$ Neg. correlation profit and debt old economy / new economy.

$(-)$ Wide variation in leverage among firms with similar operating risks.

PO theory

(+) Investment mostly financed by retained earnings (60%), debt (24%), increases in accounts payable (12%). Very little financing with new equity (4%).

(-) Firms issue equity when they could have issued investment-grade debt.

(+) Announcement effects.

(+) Neg. correlation profit and debt.

Empirical Tests

1. Shyam-Sunder and Myers (1999)

Research Question: Does pecking order theory hold?

Empirical Approach: Analyze what type of financing is used to fill the “financing deficit.”

- Financing deficit = asset growth *minus* liabilities growth minus growth in retained earnings.
- Financing deficit must be filled with (net) sales of new securities.

- Specification

$$\Delta D_{it} = \alpha + \beta DEF_{it} + \varepsilon_{it}$$

Prediction PO theory?

Finding

- $\beta = 0.75$

Problems

- Need comparison debt / equity issues sensitivity, not “looking at debt only.”
- Limited debt capacity. (But: large, mature firms.)
- Limited sample, limited time horizon.

2. Frank and Goyal (2002)

Research Question: Does pecking order theory or does trade-off theory hold?
Or: How can we prove Shyam-Sunder and Myers wrong?

Empirical approach:

1. Replicate Shyam-Sunder and Myers on large sample and with longer horizon.
 - $\implies \beta$ significantly weaker post 1990.
 - $\implies \beta$ significantly smaller for small, high-growth firms.

2. Incorporate TO theory determinants of capital

$$\begin{aligned}\Delta D_{it} = & \alpha + \beta_{DEF} DEF_{it} + \beta_T \Delta T_{it} \\ & + \beta_Q Q_{it} + \beta_{size} S_{it} + \beta_{\Pi} \Pi_{it} + \varepsilon_{it}\end{aligned}$$

with

T = asset tangibility,

Q = book-to-market

Size = log sales (alt.: log assets)

Π = profit

\implies DEF has little explanatory power.

3. Lemmon and Zender (2002)

Guess what?

Growing discontent.

What to do?

1. **Under stand regime switches.** (Why pre-1990 different from post-1990?)
2. **Understand managers.** Personal fixed-effects of CEOs and CFOs
3. **Behavioral Approaches.**

(a) Could managers exploit overvaluation of their company?

Myers (1993): “When the market overvalues the firm, the manager would like to issue the most overvalued security: equity. (Warrants would be even better.) If the market undervalues the firm, the manager would like to issue debt in order to minimize the bargain handed to the investors. *But no intelligent investor would let the manager play this game.*”

(b) Might managers make biased capital structure decisions?