

Econ 234C – Corporate Finance
Lecture 10:
Finishing up External Investment
Capital Structure

Ulrike Malmendier
UC Berkeley

April 9, 2008

Midterm:

- Maximum points (theoretically): 59.
- Point range: 24-48.

- Rough grading scale:

≥ 20	<i>B-</i>
≥ 25	<i>B</i>
≥ 30	<i>B+</i>
≥ 35	<i>A-</i>
≥ 40	<i>A</i>
≥ 45	<i>A+</i>

- Let's quickly go over it; especially Questions 7 + 8, which suggest some research ideas.

Research Ideas:

- Lots of improvements over first discussions.
- Please come and talk to me about your idea!
 - Special office hours: *does Wed lunch + afternoon work?*
 - Discussion group / advising / student seminars: *are you on the list?*

1 External Investment (IV): Overconfidence

Overconfidence / Hubris can explain

- mergers with negative SR- and LR-returns;
- provides more subtle predictions once we account for 'market interaction':
impact of overconfidence on mergers depends on available financing.

Empirical Predictions

Prediction 1. Overconfident CEOs are more likely to conduct mergers with a high probability of failure and negative expected returns.

Prediction 2. Among CEOs with abundant internal resources (e.g. large cash reserves and low leverage), overconfident CEOs are more likely to conduct acquisitions.

Prediction 3. The expected returns to merger announcements are lower for overconfident than for non-overconfident CEOs.

Further extensions:

External vs. internal investment.

- Overconfidence: about own company + about synergies with target.
- **But:** if overconfidence about own company due to overvaluation of internal investment projects \implies could counteract acquisitiveness if resources are scarce.

Repurchases

- Overconfident CEO may use internal resources to repurchase shares (which the CEO perceives to be undervalued).
- **But:** if maximizing current shareholder value, CEO will not undertake such a transaction since any gain to remaining shareholders is offset by a loss to the former shareholder.

Merger waves.

- Traditional overconfidence does **not** easily capture merger waves.
- Overconfidence with rational market interaction can capture merger waves:
 - Net effect of overconfidence on merger frequency is ambiguous: overestimation of merger synergies versus reluctance to raise external finance.
 - As inflows of cash or capital market conditions mitigate perceived financing constraints, the overestimation of synergies dominates and overconfidence leads to increased merger frequency.

Overconfidence of target CEOs.

- Overconfidence *may* be a feature distinguishing acquirors from targets.
- Additional comparative statics if we allow target managers to also be overconfident:

- Acquisitions of target firms with overconfident management are more likely to be hostile. (The overconfident target management might believe they can create at least as much value as the potential acquirors and, hence, reject shareholder-value increasing bids as too low.)
- Acquirors may have to pay higher premia for targets with overconfident managers, even in friendly deals.
- In both cases, overconfidence on the side of the target management can be beneficial to the target shareholders.

2 Capital Structure – Theory

2.1 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 opportunities.

* Rational beliefs, standard preferences!

– Proof: Arbitrage argument

- Denote with
 - V_D and V_E the values of debt and equity, when the total debt repayment is D ,
 - R the “fundamental” value of the company (the NPV of all income it will generate).
- Let investors be risk neutral.
- Value of the firm is ...?
- **Conclusion:** Company value is $E[R]$, independently of capital structure.

Modigliani-Miller with payout policies

- Keeping the same structure as before, we introduce dividend payments and share issues/repurchases.
- Additional assumptions
 - constant interest rate r
 - denote dividend payment at time t as d_t ,
 - denote price of stock at time t as P_t ,
 - denote return/income (internal cash flow) at time t as R_t ,
 - denote investment (expenditures) at time t as I_t ,
 - denote number of shares outstanding at time t (after possible repurchases or issues) as s_t .
 - *Note:* d_t , P_t , R_t , I_t , and s_t are uncertain as of earlier times $t' < t$.
 - *Note:* Shares are issued [repurchased] if $s_t < s_{t+1}$ [$s_t > s_{t+1}$].

- *Note*: Dividend d_t is paid on shares held ‘since last period’, i.e. on s_{t-1} shares.
- What is the price of stock at t , expressed in terms of future dividends and prices?

- What is the value of the firm?

- **Conclusion:** Firm value is independent of dividend payments and share issues/repurchases.
- **Intuition:** A dividend paid today is a dividend not paid tomorrow. Hence, paying the dividend today drives down the stock price by the amount of the dividend, leaving the value of the firm unchanged.

Background

- Finance up to the early 1970s:
 - Arrow-Debreu general equilibrium model of frictionless markets (perfectly competitive and complete market, no taxes, no transaction costs, no informational asymmetries).
 - * Pricing of financial securities.
 - * Mathematically beautiful ... but useful in practice?
 - Peak: Modigliani and Miller's (1958, 1963) work: In an Arrow-Debreu world, the choice of corporate financing is 'irrelevant'; it does not matter how much debt financing and how much equity financing a firm chooses, what its dividend policy is etc.

Reaction: MM must be wrong ...

- **Reaction 1:** MM are wrong because of frictions such as taxes, bankruptcy costs, other transaction costs.
- **Reaction 2:** MM are wrong because they neglect agency problems. Managers maximize their own compensation and their status, not necessarily their shareholders' wealth.
- **Reaction 3:** MM are wrong because they neglect informational asymmetries. Managers have knowledge about their companies that outside capital-providers (lenders, shareholders) do not have. Result: e.g., the 'lemons problem.'
- **Reaction 4:** MM wrong because both managers and investors are not always the rational optimizers they are assumed to be. Investors overvalue stocks during 'bubbles,' managers are overconfident about how well their investment projects or takeovers will work out.

- Those four reactions characterize what CF research is about today:
 1. More complex markets (incomplete markets, transaction costs) ... immediate reaction to MM papers.
 2. Agency problems ... since the late 1970s.
 3. Informational asymmetries ... since the 1980s.
 4. Behavioral finance ... since the 1990s.

- 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]).

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 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).

$$V_D ?$$

$$V_E ?$$

$$V ?$$

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.
 - * S&L's (or thrifts) = community-based institutions for savings and mortgages.
 - * Tightly regulated until the 1980s.
 - * After deregulation: real-estate boom and high interest rates of the early 1980s induced S&Ls to provide high volumes of risky lending, resulting in S&L insolvencies.
 - * Near-bankruptcy S&L's were not shut down early enough

(—) 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

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

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?

Capital Structure is a topic of key interest in current CF literature.

Examples of recent papers:

- Lemmon Roberts Zender 2007 JF - Back to the Beginning Persistence and the Cross-Section of Corporate Capital Structure
- Strebulaev Forthcoming JF - Do Tests of Capital Structure Theory Mean What They Say
- Leary Roberts 2007 SSRN - The Pecking Order Debt Capacity and Information Asymmetry
- Leary Roberts 2005 JF - Do Firms Rebalance Their Capital Structures