

Capital Structure I



Finance Theory II (15.402) – Spring 2003 – Dirk Jenter

The Big Picture: Part I - Financing

A. Identifying Funding Needs

- Feb 6 Case: Wilson Lumber 1
- Feb 11 Case: Wilson Lumber 2

B. Optimal Capital Structure: The Basics

- Feb 13 Lecture: Capital Structure 1
- Feb 20 Lecture: Capital Structure 2
- Feb 25 Case: UST Inc.
- Feb 27 Case: Massey Ferguson

C. Optimal Capital Structure: Information and Agency

- Mar 4 Lecture: Capital Structure 3
- Mar 6 Case: MCI Communications
- Mar 11 Financing Review
- Mar 13 Case: Intel Corporation



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The Key Questions of Corporate Finance

- **Valuation:** How do we distinguish between good investment projects and bad ones?
- **Financing:** How should we finance the investment projects we choose to undertake?



Financing Policy

- Real investment policies imply funding needs.
- We have tools to forecast the funding needs to follow a given real investment policy (from Wilson Lumber)
- But what is the best source of funds?
 - Internal funds (i.e., cash)?
 - Debt (i.e., borrowing)?
 - Equity (i.e., issuing stock)?
- Moreover, different kinds of ...
 - internal funds (e.g., cash reserves vs. cutting dividends)
 - debt (e.g., Banks vs. Bonds)
 - equity (e.g., VC vs. IPO)



Capital Structure

- Capital Structure represents the mix of claims against a firm's assets and free cash flow
- Some characteristics of financial claims
 - Payoff structure (e.g. fixed promised payment)
 - Priority (debt paid before equity)
 - Maturity
 - Restrictive Covenants
 - Voting rights
 - Options (convertible securities, call provisions, etc)
- We focus on leverage (debt vs. equity) and how it can affect firm value

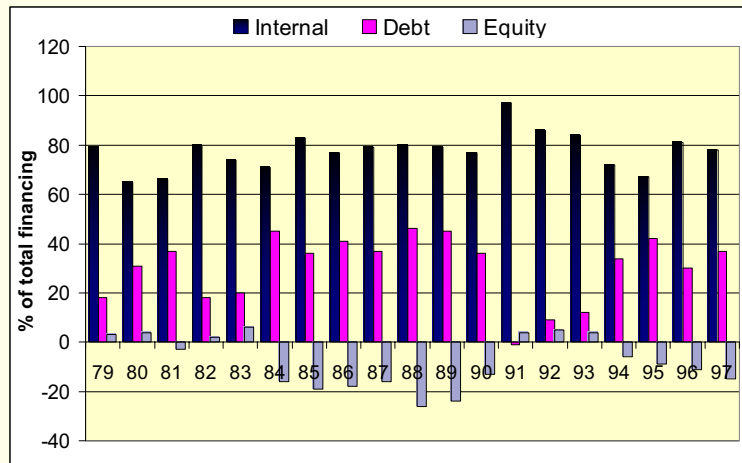


Choosing an Optimal Capital Structure

- Is there an “optimal” capital structure, i.e., an optimal mix between debt and equity?
- More generally, can you add value on the RHS of the balance sheet, i.e., by following a good financial policy?
- If yes, does the optimal financial policy depend on the firm's operations (Real Investment policy), and how?



Sources of Funds: US Corporations 1979-97



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Companies and Industries Vary in Their Capital Structures

Industry	Debt Ratio* (%)
Electric and Gas	43.2
Food Production	22.9
Paper and Plastic	30.4
Equipment	19.1
Retailers	21.7
Chemicals	17.3
Computer Software	3.5
Average over all industries	21.5%

* Debt Ratio = Ratio of book value of debt to the sum of the book value of debt plus the market value of equity.



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Returns

Average rates of return on Treasury bills, government bonds, corporate bonds, and common stocks, 1926-1997 (figures in percent per year)

Portfolio	Average Annual Rate		Average Risk Premium (over T-Bills)
	Nominal	Real	
Treasury bills	3.8	0.7	0.0
Government bonds	5.6	2.6	1.8
Corporate bonds	6.1	3.0	2.3
Common stocks (S&P 500)	13.0	9.7	9.2
Small-firm common stocks	17.7	14.2	13.9

Source: Ibbotson Associates, Inc., 1998 Yearbook (Brealey & Myers p.155)



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Plan of Attack

- 1. Modigliani-Miller Theorem:**
 - Capital Structure is irrelevant
- 2. What's missing from the M-M view?**
 - Taxes
 - Costs of financial distress
 - Other factors
- 3. "Textbook" view of optimal capital structure:**
 - The choice between debt and equity
- 4. Apply/confront this framework to several business cases**
 - Evaluate when its usefulness and its limitations



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M-M's "Irrelevance" Theorem

MM Theorem (without taxes for now).

- **Financing decisions are irrelevant for firm value.**
- **In particular, the choice of capital structure is irrelevant.**

Proof: From Finance Theory I,

- Purely financial transactions do not change the total cash flows and are therefore zero NPV investments.
- With no arbitrage opportunities, they cannot change the total price.
- Thus, they neither increase nor decrease firm value.

Q.E.D.



Example

- Consider two firms with identical assets (in \$M):

Asset (economic, not book) value next year:	Firm A	Firm B
In state 1:	160	160
In state 2:	40	40

- Firm A is all equity financed:
→ Firm A's value is $V(A) = E(A)$
- Firm B is financed with a mix of debt and equity:
→ Debt with one year maturity and face value \$60M
→ Market values of debt $D(B)$ and equity $E(B)$
→ Firm B's value is (by definition) $V(B) = D(B) + E(B)$
- MM says: $V(A) = V(B)$



Proof 1

- Firm A's equity gets all cash flows
- Firm B's cash flows are split between its debt and equity with debt being senior to equity.

Claim's value next year:	Firm A's Equity	Firm B's Debt	Firm B's Equity
In state 1:	160	60	100
In state 2:	40	40	0

- In all (i.e., both) states of the world, the following are equal:
 - The payoff to Firm A's equity
 - The sum of payoffs to Firm B's debt and equity
- By value additivity, $D(B) + E(B) = E(A)$

Q.E.D.

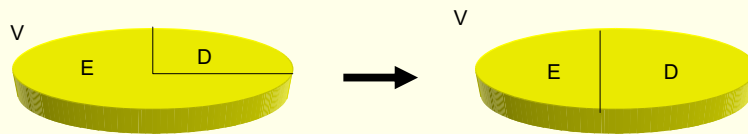


M-M Intuition 1

- If Firm A were to adopt Firm B's capital structure, its total value would not be affected (and vice versa).
- This is because ultimately, its value is that of the cash flows generated by its *operating assets* (e.g., plant and inventories).
- The firm's financial policy divides up this cashflow "pie" among different claimants (e.g., debtholders and equityholders).
- But the size (i.e., value) of the pie is *independent* of how the pie is divided up.



“Pie” Theory I



Proof 2

- In case you forgot where value additivity comes from...
- Assume for instance that market values are:
 - $D(B) = \$50M$
 - $E(B) = \$50M$
- MM says: $V(A) = D(B) + E(B) = \$100M$
- Suppose instead that $E(A) = \$105M$.
- Can you spot an arbitrage opportunity?



Proof 2 (cont.)

- Arbitrage strategy:
 - Buy 1/1M of Firm B's equity for \$50
 - Buy 1/1M of Firm B's debt for \$50
 - Sell 1/1M of Firm A's equity for \$105

	Today	Next year State 1	Next year State 2
Firm B's equity	-\$50	+\$100	\$0
Firm B's debt	-\$50	+\$60	+\$40
Subtotal	-\$100	+\$160	+\$40
Firm A's equity	+\$105	-\$160	-\$40
Total	+\$5	\$0	\$0

Note: Combining Firm B's debt and equity amounts to "undoing Firm B's leverage" (see bolded cells).



M-M: Intuition 2

- Investors will not pay a premium for firms that undertake financial transactions that they can undertake themselves (at the same cost).
- For instance, they will not pay a premium for Firm A over Firm B for having less debt.
- Indeed, by combining Firm B's debt and equity in appropriate proportions, any investor can in effect "unlever" Firm B and reproduce the cashflow of Firm A.



The Curse of M-M

- M-M Theorem was initially meant for capital structure.
- But it applies to all aspects of financial policy:
 - capital structure is irrelevant.
 - long-term vs. short-term debt is irrelevant.
 - dividend policy is irrelevant.
 - risk management is irrelevant.
 - etc.
- Indeed, the proof applies to all financial transactions because they are all zero NPV transactions.



Using M-M Sensibly

- M-M is not a literal statement about the real world. It obviously leaves important things out.
- But it gets you to ask the right question: How is this financing move going to change the size of the pie?
- M-M exposes some popular fallacies such as the “WACC fallacy”.

