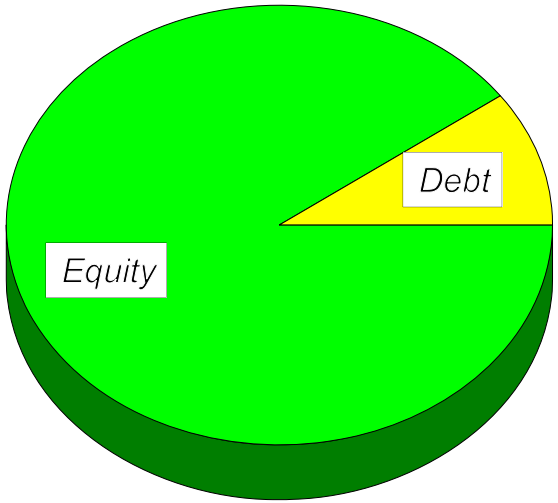
Capital Structure

Issue
Firm's financing mix: What proportion of total capital should be supplied by each type of investor?

"Leveraging up" substitutes less expensive, fixed-cost debt for more expensive, variable cost equity

A non-routine, strategic decision.

Assets	Claims
	Debt %?
	Equity %?
Total	Total

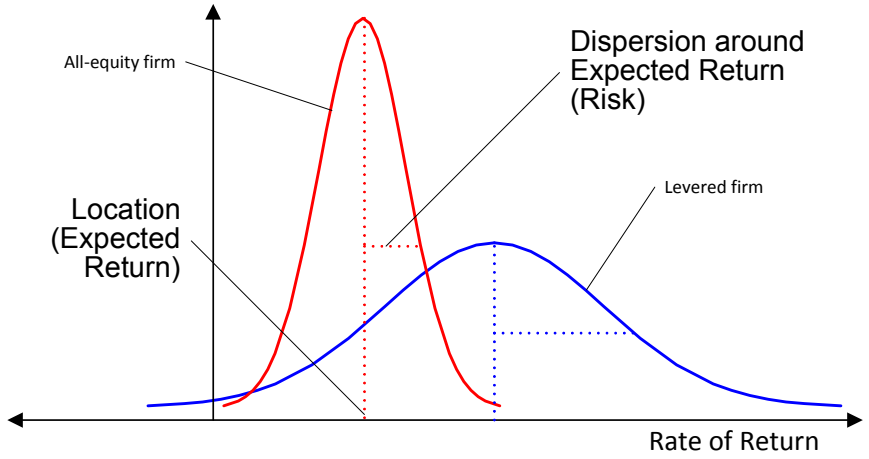


Importance
Affects firm's risk, return, total value, and stock price.
Increased leverage may increase all four (up to a point).

Optimal Capital Structure

Policy
Maximize firm's total market value and share price, and minimize its overall cost of capital (WACC).

As lever up, tradeoff increased risk (reduces stock price) for increased return (increases stock price).



Determinants of Optimum
Business risk (volatility of revenues, fixity of costs)
Nature of firm's assets (tangibility, generality)
Tax position
Desire for financial flexibility (to "keep options open")

Leverage Magnifies Returns: Example

Benefit
Using “other people’s money” magnifies return to shareholders

Return on Equity

$$ROE = \frac{Net\ Income}{Common\ Equity} = \frac{(EBIT - Int)(1 - T_C)}{E}$$

Constants for Example

Total Assets (TA)	$100
Operating Income (EBIT)/Year	$10
Tax Rate (T_C)	0%
Basic Earning Power (BEP = EBIT/TA)	10%
ROIC = EBIT(1-T_C)/(D + E)	10%

Leverage Magnifies Returns: Example (contd)

Financing: All Equity

Given:	Equity	$100
	Debt	$0

$$ROE = \frac{NI}{E} = \frac{(EBIT - Int)(1 - T_C)}{E} = \frac{(10-0)(1-0)}{100} = 10\%$$

Financing: 50% Debt

Given:	Equity	$50
	Debt	$50
	Interest Rate	5%

$$ROE = \frac{NI}{E} = \frac{(EBIT - Int)(1 - T_C)}{E} = \frac{(10-2.5)(1-0)}{50} = 15\%$$

In general

$$ROE = ROIC + \left[ROIC - (1 - T_C)\, i\right]\frac{D}{E}$$

Business and Financial Risk

Market Risk = *Business Risk* + *Financial Risk*

Business Risk

Risk to common shareholders' returns if firm uses *no debt* (measured by β_U)

Determined on asset (left-hand) side of balance sheet, by

- Industry
  - Volatility of Operating Revenues (sales quantity and price)
    - Cyclicality
    - Competition
- Production Technique
  - Fixity of Operating Costs
    - Input Prices
    - Operating Leverage (break-even quantity)

Financial Risk

Extra risk to common shareholders' returns if use debt (measured by $\beta - \beta_U$)

Determined on claims (right-right) side of balance sheet by

- Fixity of Financing Costs (Financial Leverage)

Example: Operating Leverage Magnifies Business Risk

$$\%\Delta Sales \Rightarrow \%\Delta EBIT$$

	Decrease	Base	Increase	DOL
%ΔSales	-25%	0%	25%	
Fixed Costs: $0				
Sales	$24,000	$32,000	$40,000	
Variable Costs	12,000	16,000	20,000	
Fixed Costs	0	0	0	
EBIT	$12,000	$16,000	$20,000	
%ΔEBIT	-25%	0%	25%	1 00
Fixed Costs: $6,000				
Sales	$24,000	$32,000	$40,000	
Variable Costs	12,000	16,000	20,000	
Fixed Costs	6,000	6,000	6,000	
EBIT	$6,000	$10,000	$14,000	
%ΔEBIT	-40%	0%	40%	1 60
Fixed Costs: $12,000				
Sales	$24,000	$32,000	$40,000	
Variable Costs	12,000	16,000	20,000	
Fixed Costs	12,000	12,000	12,000	
EBIT	$0	$4,000	$8,000	
%ΔEBIT	-100%	0%	100%	4 00

$$DOL = \frac{\%\Delta EBIT}{\%\Delta Sales}$$

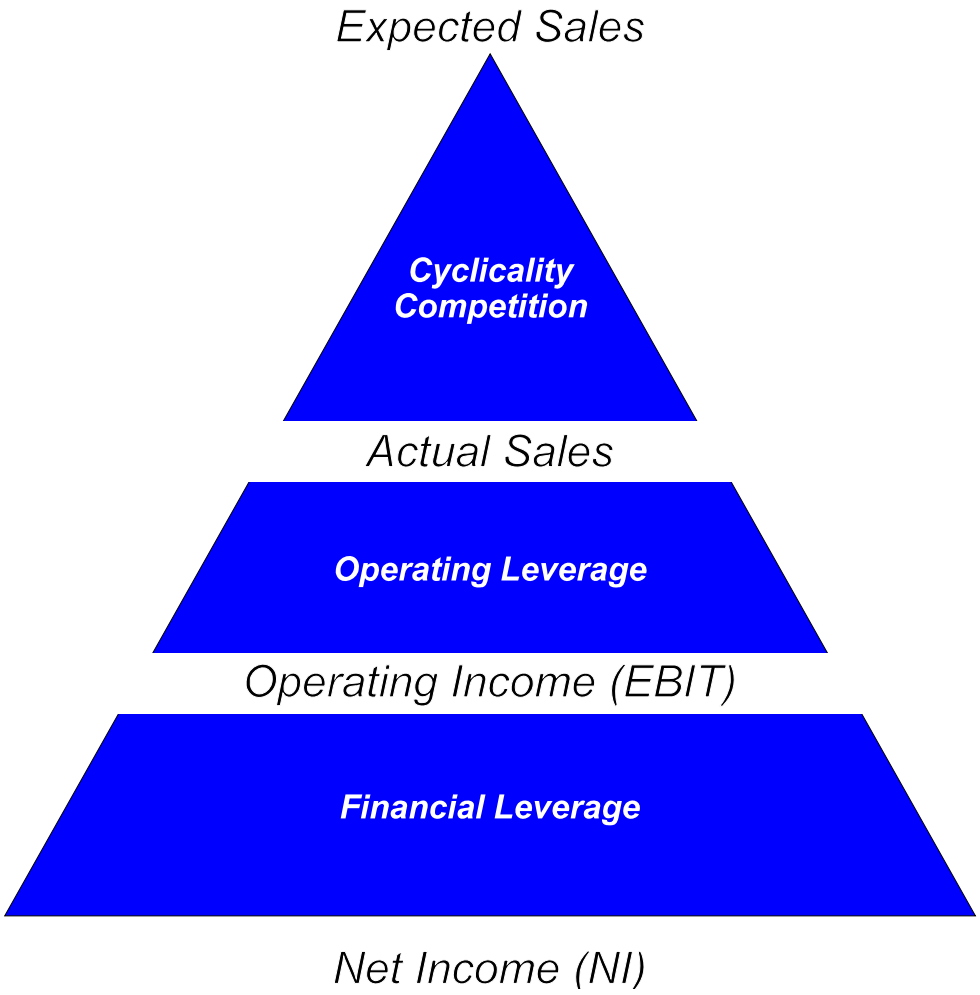
Example: Financial Leverage Magnifies Financial Risk

$$\%\Delta EBIT \Rightarrow \%\Delta NI$$

	Decrease	Base	Increase	DFL
%ΔEBIT	-40%	0%	40%	
No Debt				
EBIT	$6,000	$10,000	$14,000	
Interest	0	0	0	
EBT	$6,000	$10,000	$14,000	
Taxes	$2,400	$4,000	$5,600	
NI	$3,600	$6,000	$8,400	
%ΔNI	-40%	0%	40%	1 00
$12,000 Debt at 10%				
EBIT	$6,000	$10,000	$14,000	
Interest	1,200	1,200	1,200	
EBT	4,800	8,800	12,800	
Taxes	1,920	3,520	5,120	
NI	2,880	5,280	7,680	
%ΔNI	-45%	0%	45%	1 14
$25,000 Debt at 12%				
EBIT	$6,000	$10,000	$14,000	
Interest	3,000	3,000	3,000	
EBT	3,000	7,000	11,000	
Taxes	1,200	2,800	4,400	
NI	1,800	4,200	6,600	
%ΔNI	-57%	0%	57%	1 43

$$DFL = \frac{\%\Delta NI}{\%\Delta EBIT}$$

Fixed Costs Magnify Risk



$$\%\Delta Sales < \%\Delta EBIT < \%\Delta NI$$

Financial Leverage and Earnings

Effects of Increased Debt

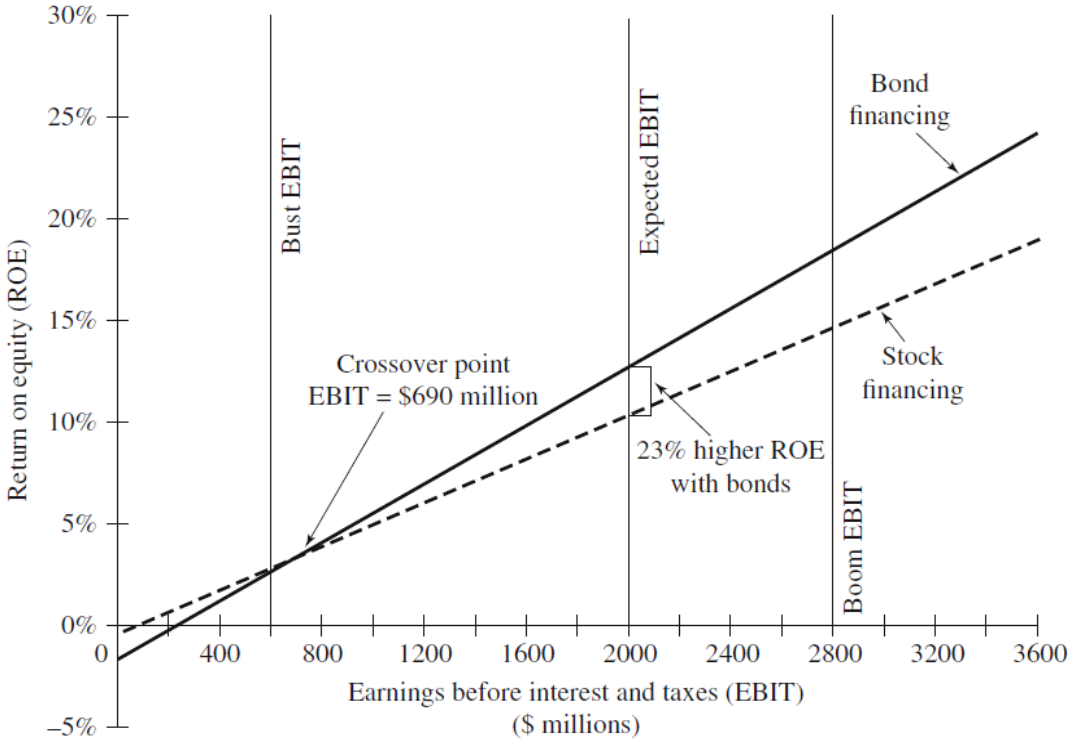
Reduces taxes

Reduces NI

Reduces number of shares outstanding

EPS and ROE may rise or fall mor, depending upon EBIT

Range of Earnings Chart



Optimal Capital Structure, Revisited

Irrelevance

Unless leverage changes the size of the expected operating cash flows, it will not affect the firms value, which lies in the assets.

The risk- and return-magnifying effects cancel out, particularly since investors can substitute “homemade” leverage for corporate leverage.

Relevance

Trade off

- Tax benefits
  - tax shield produces dollar-for-dollar gain; but is firm profitable enough to use it?
- Distress costs
  - Bankruptcy costs
    - probability rises with debt
    - cost depends of “resale value” of assets (tangible, general, “in place”)
  - Indirect costs: missed opportunities, sales, reluctant suppliers, difficult financing
  - Conflicts of interest: e.g., double-down, go-for-broke
- Desire for “financial flexibility”
  - “going concern,” may need additional capital in future
  - reserve borrowing capacity avoids equity market, missed opportunities

Signaling

Observed

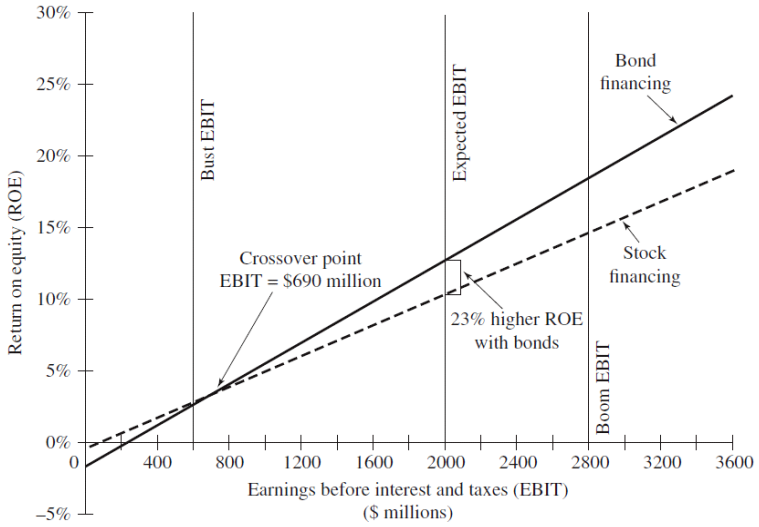
Equity issues usually followed by stock price decline (a lot), but not so for debt issues

Repurchases usually followed by stock price increases

Causes

- Dilution? Not if cash put to good use
- Information asymmetry: managers know more than investors about firms prospects
  - If they are optimistic, they will issue debt
  - If they are pessimistic, they will issue equity

  Investors infer attitudes from sale
- Managers might issue equity when they think it overpriced, and debt when they think it underpriced. Investors know this ("lemons")



Pecking Order

Result of information asymmetry (lemons problem)

- Internal financing: retained earnings, depreciation, excess cash
- External financing: new debt
- External financing: new equity

Observed capital structures of such firms are cumulative results over time of firm's profitability relative to its investment needs

		Profitability	
		High	**Low**
Growth	**High**		need more debt
	Low	need little debt	

Management Incentives

An agency problem

Managers may act on own preferences to:

- retain earnings rather than pay them out
- indulge in growth for its own sake
- settle for mediocre performance
- etc.

Discipline

A high debt burden will force such mangers to run a tighter, more efficient ship–especially if they own much equity

Financing and Growth

High Growth Companies

Value created by investment, let financing be passive
Volatility of income causes probability of distress to rise rapidly with debt
Intangible growth opportunities (poor resale value) raise cost of distress
Recommendations:

- carry conservative debt ratio, maintain reserve borrowing capacity
- keep modest dividend payout ratio
- use cash & marketables to cover when investment exceeds internal resources
- if necessary, issue debt only until flexibility affected
- as last resort, sell equity, rather than limit growth

Low Growth Companies

Few investment opportunities, but lots of excess cash
Recommendations:

- Borrow as much as possible (given OCFs) and
- Repurchase shares

Benefits:

- Tax shield
- Positive market signal
- Managerial discipline

Empirically supported

Choosing Maturity of Liabilities

Same of similar
If liabilities have similar maturity to assets, they are “self-liquidating,” i.e., OCFs should cover debt service over time. Least-risk strategy

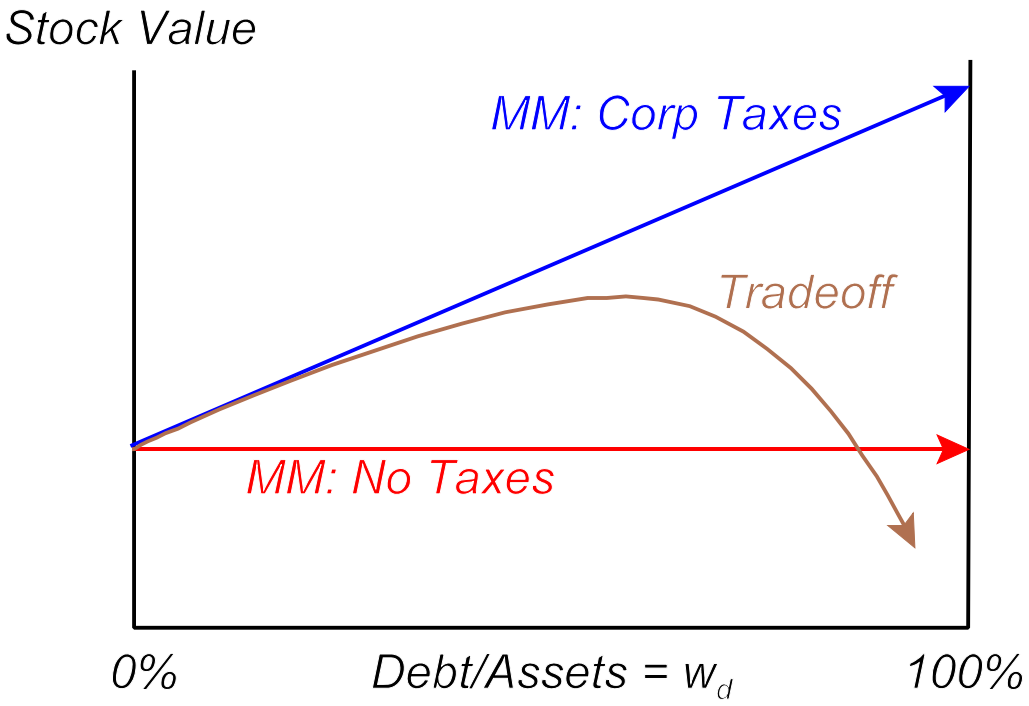
Liabilities shorter
Refinancing risk
Rollover risk
Flotation costs
Short-term debt cheaper
May believe interests rates will fall (can also issue callable debt)

Liabilities longer
Excess cash

Capital Structure Theories: Overview

Each Model Builds on Previous One

Model	Emphasis	Optimum
MM/Miller	Taxes	None/Extreme
Trade-Off	Bankruptcy Costs	Interior
Signaling	Information Asymmetry	Interior (lower)



Capital Structure Theories: Details

MM/Miller Models

Emphasis:	interest tax shield
Assumptions:	firms have same business risk investors have homogeneous expectations perfect capital markets all debt riskless
Argument:	Firm may increase total cash flow and value by borrowing (arbitrage proof)
Policy:	Optimal capital structure depends on tax regime: either irrelevant or 100% debt

Proposition I

with no taxes: $V_L = V_U$

with corporate taxes only: $V_L = V_U + PV\left(\text{Tax Shields}\right)$

with corporate and personal taxes: $V_L = V_U + \left[1 - \frac{(1-T_C)(1-T_S)}{1-T_D}\right] D$

Capital Structure Theories: Details

Tradeoff Models

Emphasis:	financial distress, agency costs
Assumptions:	debt risky
Argument:	As borrow more, both benefits and costs of leverage increase. Lever up until they just balance.
Policy:	Firm should borrow more, the • lower its business risk • more tangible its assets • higher its tax rate

Proposition I

$$V_L = V_U + PV\left(\text{Tax Shields}\right)$$
$$-PV\left(\text{Expected Cost of Financial Distress}\right)$$
$$-PV\left(\text{Agency Costs}\right)$$

Capital Structure Theories: Details

Signaling Models

Emphasis:	sticky dividends, pecking order
Assumptions:	information asymmetric or expectations heterogeneous
Argument:	Managers have better information about a firm's prospects, but “talk is cheap.” Rational investors interpret stock issues as bad news (overvaluation) and debt issues as good news (undervaluation).
Policy:	Firm should: ● issue stock if project urgent/can't borrow or shares overvalued ● maintain reserve borrowing capacity ● pay low dividends (high retention) A firm can signal its prospects with capital structure