

Chapter 15



Debt Policy

Topics Covered

- ⇒ Debt and Value in a Tax Free Economy
- ⇒ Capital Structure and Corporate Taxes
- ⇒ Cost of Financial Distress
- ⇒ Explaining Financial Choices

Value and Capital Structure

Assets	Liabilities and Stockholder's Equity
Value of cash flows from firm's real assets and operations	Market value of debt Market value of equity
Value of Firm	Value of Firm

Average Book Debt Ratios

<u>Industry</u>	<u>Debt Ratio</u>
Software and programming	0.06
Semiconductors	0.09
Communications equipment	0.13
Biotech	0.28
Retail	0.34
Hotels and motels	0.37
Chemical manufacturing	0.53
Airlines	0.59
Electric utilities	0.60
Real estate operations	0.62
Beverages (alcohol)	0.63
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Average for US Companies	0.51

M&M (Debt Policy Doesn't Matter)

⇒ Modigliani & Miller

- The value of a firm depends the cash flows it generates, and this value equals to the aggregate value of all the firm's outstanding debt and equity securities. So the value of a firm does not depend on how its cash flows are “sliced”
- When there are no taxes and capital markets function well, it makes no difference whether the firm borrows or individual shareholders borrow. Therefore, the market value of a company does not depend on its capital structure.

M&M (Debt Policy Doesn't Matter)

Assumptions

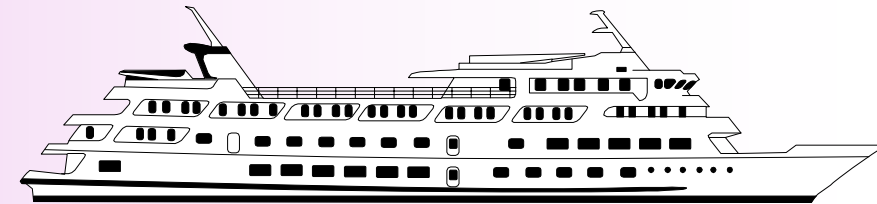
- ⇒ No taxes
- ⇒ Efficient capital markets
- ⇒ No bankruptcy costs
- ⇒ No effect on management incentives

M&M (Debt Policy Doesn't Matter)

Example - River Cruises - All Equity Financed

Data

Number of shares	100,000
Price per share	\$10
Market value of shares	\$1 million



Outcome

State of the Economy

	Slump	Expected	Boom
Operating income	\$75,000	125,000	175,000
Earnings per share	\$.75	1.25	1.75
Return on shares	7.5%	12.5%	17.5%

M&M (Debt Policy Doesn't Matter)

Restructuring - Process of changing the firm's capital structure without changing its asset

M&M (Debt Policy Doesn't Matter)

Example

cont.

50% debt

Data

Number of shares	50,000
Price per share	\$10
Market value of shares	\$ 500,000
Market value of debt	\$ 500,000

Outcome

State of the Economy

	Slump	Expected	Boom
Operating income	\$75,000	125,000	175,000
Interest	\$50,000	50,000	50,000
Equity earnings	\$25,000	75,000	125,000
Earnings per share	\$.50	1.50	2.50
Return on shares	5%	15%	25%

M&M (Debt Policy Doesn't Matter)

Debt replicated by investors (borrow to buy one more share)

Outcome	State of the Economy		
	Slump	Expected	Boom
Earnings on two shares	\$1.50	2.50	3.50
<i>Less</i> Interest @ 10%	\$1.00	1.00	1.00
Net earnings on investment	\$.50	1.50	2.50
Return on \$10 investment	5%	15%	25%

M&M (Debt Policy Doesn't Matter)

Investors undo the effects of debt (by lending half of his capital in River Cruises's Debt)

Outcome	State of the Economy		
	Slump	Expected	Boom
Earnings on one shares	\$0.50	1.50	2.50
<i>Plus</i> Interest @ 10%	\$1.00	1.00	1.00
Net earnings on investment	\$1.50	2.50	3.50
Return on \$20 investment	7.5%	12.5%	17.5%

M&M (Debt Policy Doesn't Matter)

- ➡ Borrowing seems can increase the return on equity. However, investors can borrow or lend on their own to derive any return they want, so they will not pay more for a firm that has borrowed on their behalf
- ➡ MM's proposition I (MM debt irrelevance proposition): The value of a firm is unaffected by its capital structure

M&M (Debt Policy Doesn't Matter)

- ➡ Debt financing does not affect the operating risk or equivalently, the business risk of the firm
- ➡ **Financial Leverage** - Debt financing to amplify the effects of changes in operating income on the returns to stockholders (p.401 figure 15-2)
- ➡ **Financial Risk** - Risk to shareholders resulting from the use of debt

M&M (Debt Policy Doesn't Matter)

➡ From the Gordon model, the share price is equal to the expected dividend divided by the required return

	All Equity	50% Debt
Expected earnings per share	\$1.25	\$1.5
Share price	\$10	\$10
Expected return on share	12.5%	15.0%

➡ Leverage increases the expected earnings to shareholders but it also increases the risk. The two effects cancel, leaving shareholder value unchanged

Cost of Capital

$$\therefore r_{\text{assets}} = (r_{\text{debt}} \times \frac{D}{V}) + (r_{\text{equity}} \times \frac{E}{V})$$

$$\therefore r_{\text{equity}} = r_{\text{assets}} + \frac{D}{E} (r_{\text{assets}} - r_{\text{debt}})$$

★ Restructuring affects the debt-equity ratio, but does not affect the return on assets

★ MM's proposition II: The required rate of return on equity increases as the firm's debt-equity increases

Cost of Capital

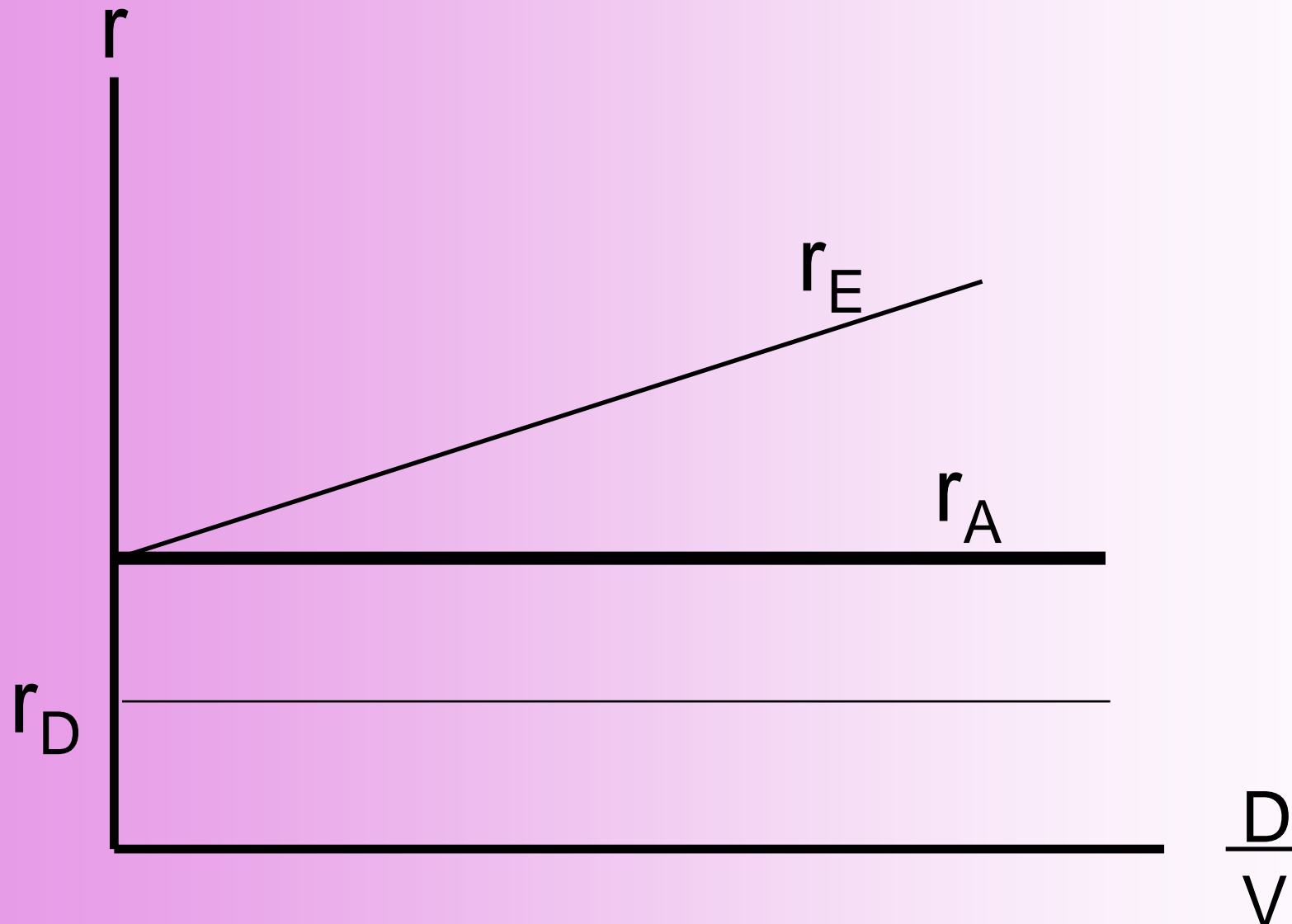
$$WACC (r_A) = r_{\text{debt}} \left(\frac{D}{D + E} \right) + r_{\text{equity}} \left(\frac{E}{D + E} \right)$$

- ★ Since debt also increases financial risk and causes shareholders to demand a higher return, debt is no cheaper than equity
- ★ The return that investors require on their assets (WACC or r_A) is unaffected by the firm's borrowing decision (see the next slide)

Weighted Average Cost of Capital

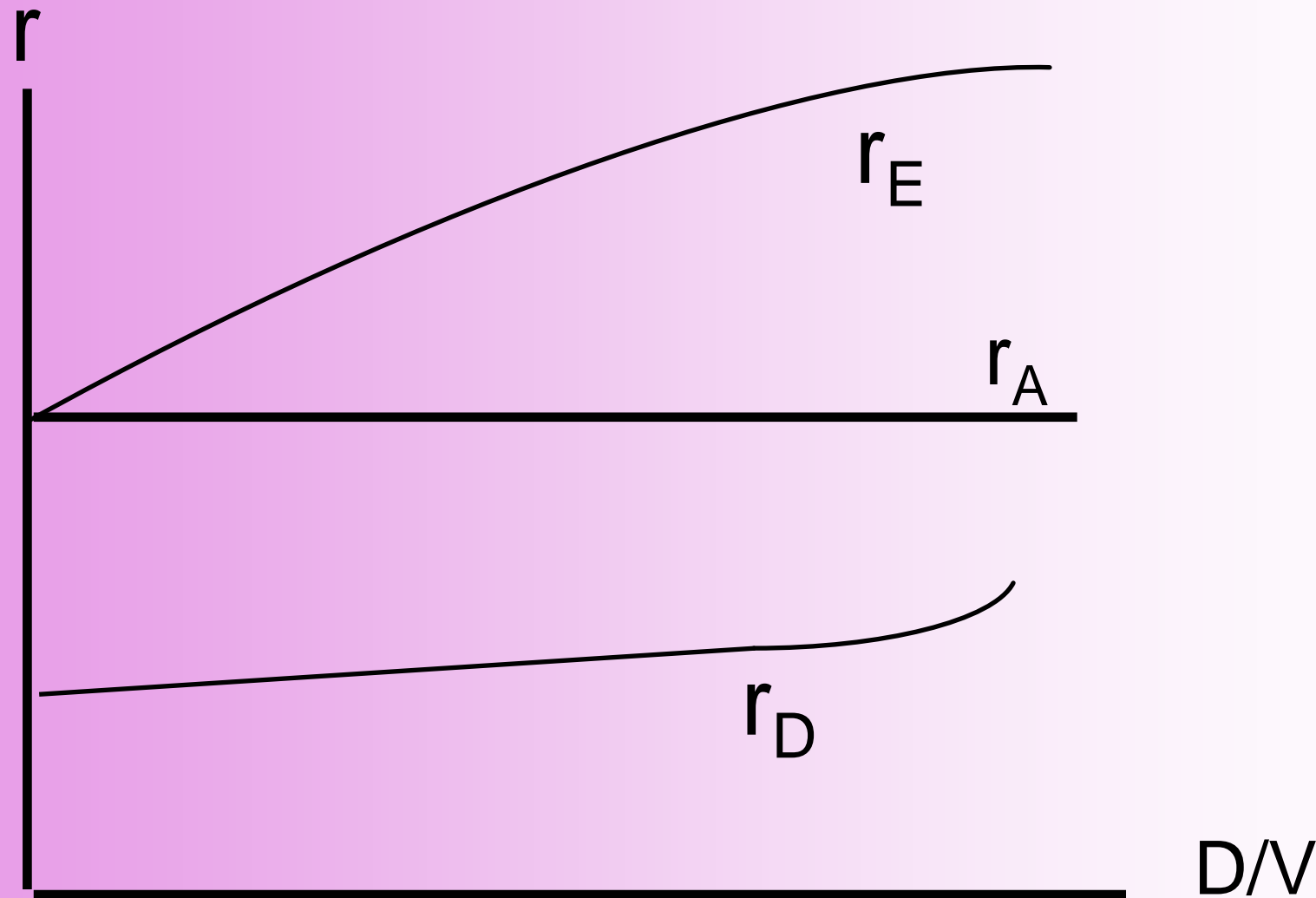
(without taxes)

15- 17



Weighted Average Cost of Capital (without taxes)

15- 18



Bankruptcy (or Default) Risk Included

Capital Structure and Corporate Taxes

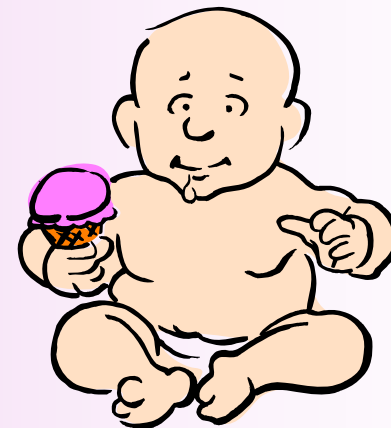
- ➡ If debt policy were completely irrelevant, actual debt ratios would vary randomly from firm to firm and from industry to industry
- ➡ **Interest Tax Shield**- Tax savings resulting from deductibility of interest payments
(All the benefit of tax shield is captured by the shareholder, which means the tax shield is a valuable asset. p.405 table 15-6)



Capital Structure and Corporate Taxes

Example - You own all the equity of Space Babies Diaper Co.. The company has no debt. The company's annual cash flow is \$1,000, before interest and taxes. The corporate tax rate is 40%. You have the option to exchange 1/2 of your equity position for 10% bonds with a face value of \$1,000.

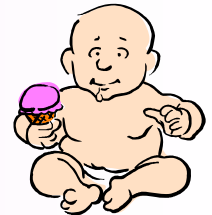
Should you do this and why?



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	<u>All Equity</u>	<u>1/2 Debt</u>
EBIT	1,000	1,000
Interest Pmt	<u>0</u>	<u>100</u>
Pretax Income	1,000	900
Taxes @ 40%	<u>400</u>	<u>360</u>
Net Cash Flow	<u>\$600</u>	<u>\$540</u>

Total Cash Flow

All Equity = 600

***1/2 Debt = 640**

(540 + 100)

Capital Structure

$$\text{PV of Tax Shield} = \frac{D \times r_D \times T_c}{r_D} = D \times T_c$$

(assume perpetuity)

Example:

$$\text{Tax benefit} = 1000 \times (.10) \times (.40) = \$40$$

$$\text{PV of 40 perpetuity} = 40 / .10 = \$400$$

$$\text{PV Tax Shield} = D \times T_c = 1000 \times .4 = \underline{\$400}$$

Capital Structure

Firm Value =

Value of All Equity Firm + PV Tax Shield

Example (suppose the expect return for equity is 20%)

All Equity Value = $600 / .20 = 3,000$

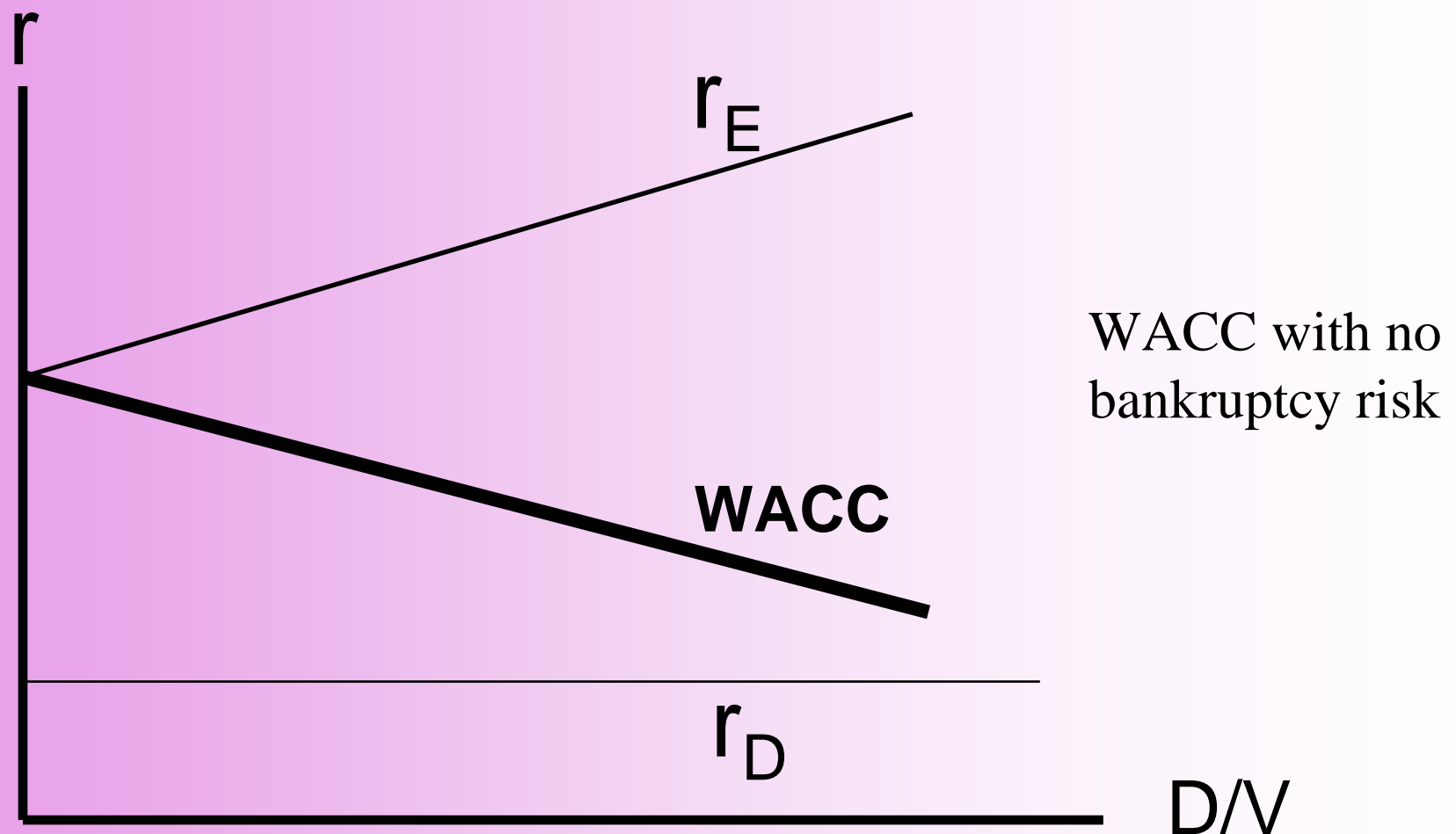
PV Tax Shield = 400

Firm Value with 1/2 Debt = \$3,400

★ Borrowing can reduce the size of the government's slice and leaves more for the investors in the form of the tax savings (p.407 figure 15-5)

Weighted Average Cost of Capital

$$WACC = (1 - T_c) r_{\text{debt}} \left(\frac{D}{D + E} \right) + r_{\text{equity}} \left(\frac{E}{D + E} \right)$$

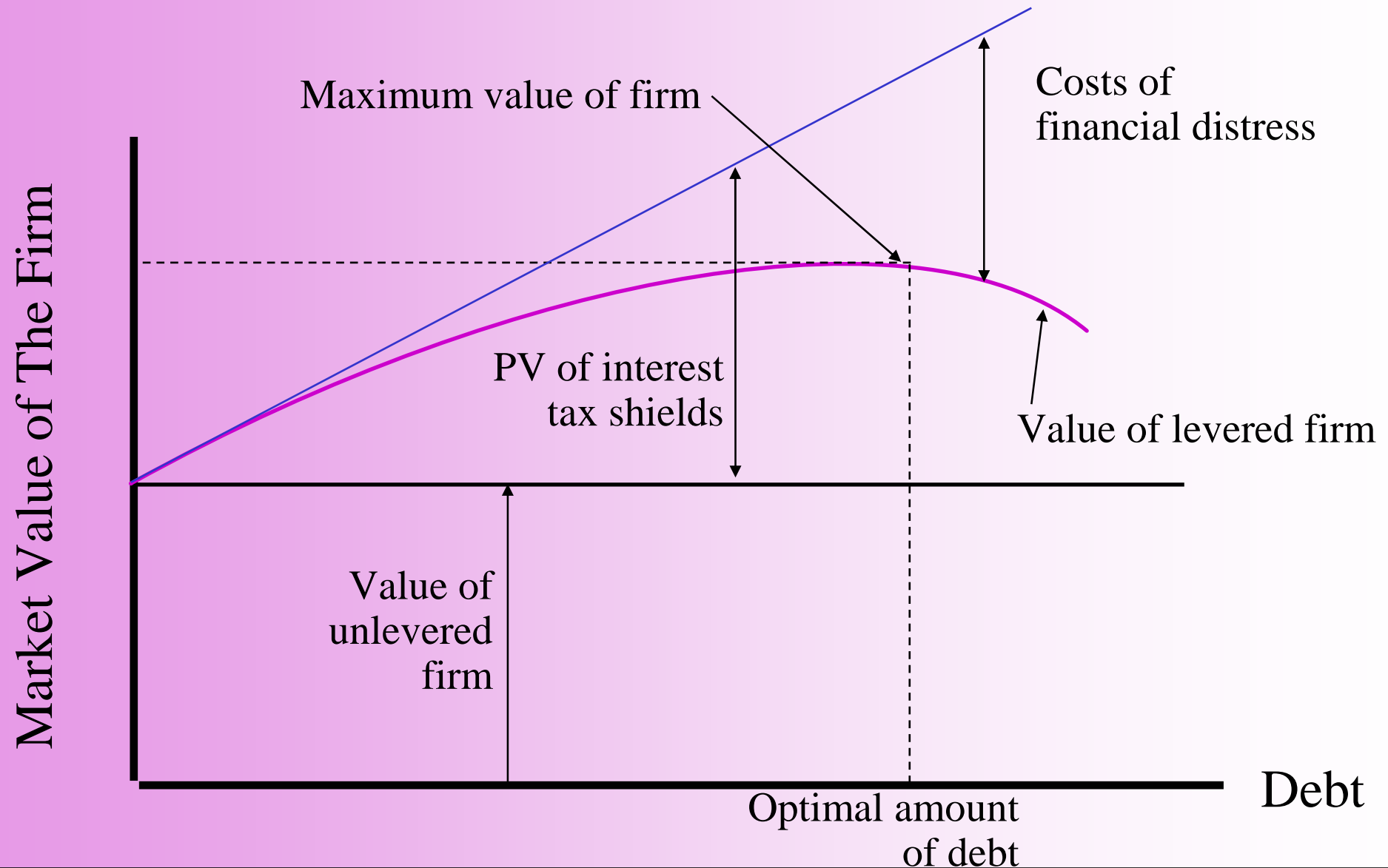


Financial Distress

Costs of Financial Distress - Costs arising from bankruptcy or distorted business decisions before bankruptcy.

$$\begin{aligned} \text{Market Value} = & \text{Value if all Equity Financed} \\ & + \text{PV Tax Shield} \\ & - \text{PV Costs of Financial Distress} \end{aligned}$$

Financial Distress



Financial Choices

- ➡ Near bankruptcy, managers and shareholders will tempted to take excessively risk projects
- ➡ In addition, stockholders may refuse to contribute more equity capital even if the firm has safe, positive-NPV opportunities (因為賺的錢，都會被 bondholders給拿走，此時stockholders會想辦法從公司拿錢出去，而不會投資更多的錢進公司)
- ➡ Costs of distress vary with type of asset. That is why debt ratios are generally low in the high-tech company

Financial Choices

Trade-off Theory - Theory that capital structure is based on a trade-off between tax savings and distress costs of debt.

- ➔ It successfully explains many industry differences in capital structure
- ➔ It cannot explain why some of the most successful companies thrive with little debt

Financial Choices

Pecking Order Theory - Theory stating that firms prefer to issue debt rather than equity if internal finance is insufficient

- ➔ Asymmetric information: managers know more than outside investors about the profitability and prospects of the firms
- ➔ When the stock is overpriced, managers tempt to issue stock, but when the stock is underpriced, managers will decide not to issue, so the announcement of a stock issue is taken as a bad news and mark down the stock price accordingly
- ➔ It explains why the most profitable firms generally borrow less; it is not because they have low target debt ratios but because they don't need outside money
- ➔ It seems to work best for mature firms. Fast-growing high-tech firms often resort to a series of common stock issues

Financial Choices

Financial Slack - It means having cash, marketable securities, readily saleable real assets, and ready access to cash or debt financing

- ➔ Financial slack is most valuable to firms with plenty positive-NPV growth opportunities. That is another reason why growth companies usually aspire to conservative capital structures
- ➔ Too much of financial slack encourage managers to take it easy, expand their perks, or empire-build with cash that should be paid back to stockholders
- ➔ Perhaps the best debt level would leave just enough cash in the company to finance all positive-NPV projects (Skating on thin ice can be useful if it makes the skater concentrate)