

## Financing decisions (3)



Class 17  
Financial Management, 15.414

## Today

### Financing decisions

- Debt, taxes, and the after-tax WACC
- Financial distress

### Reading

- Brealey and Myers, Chapter 18, 19.1 – 19.4

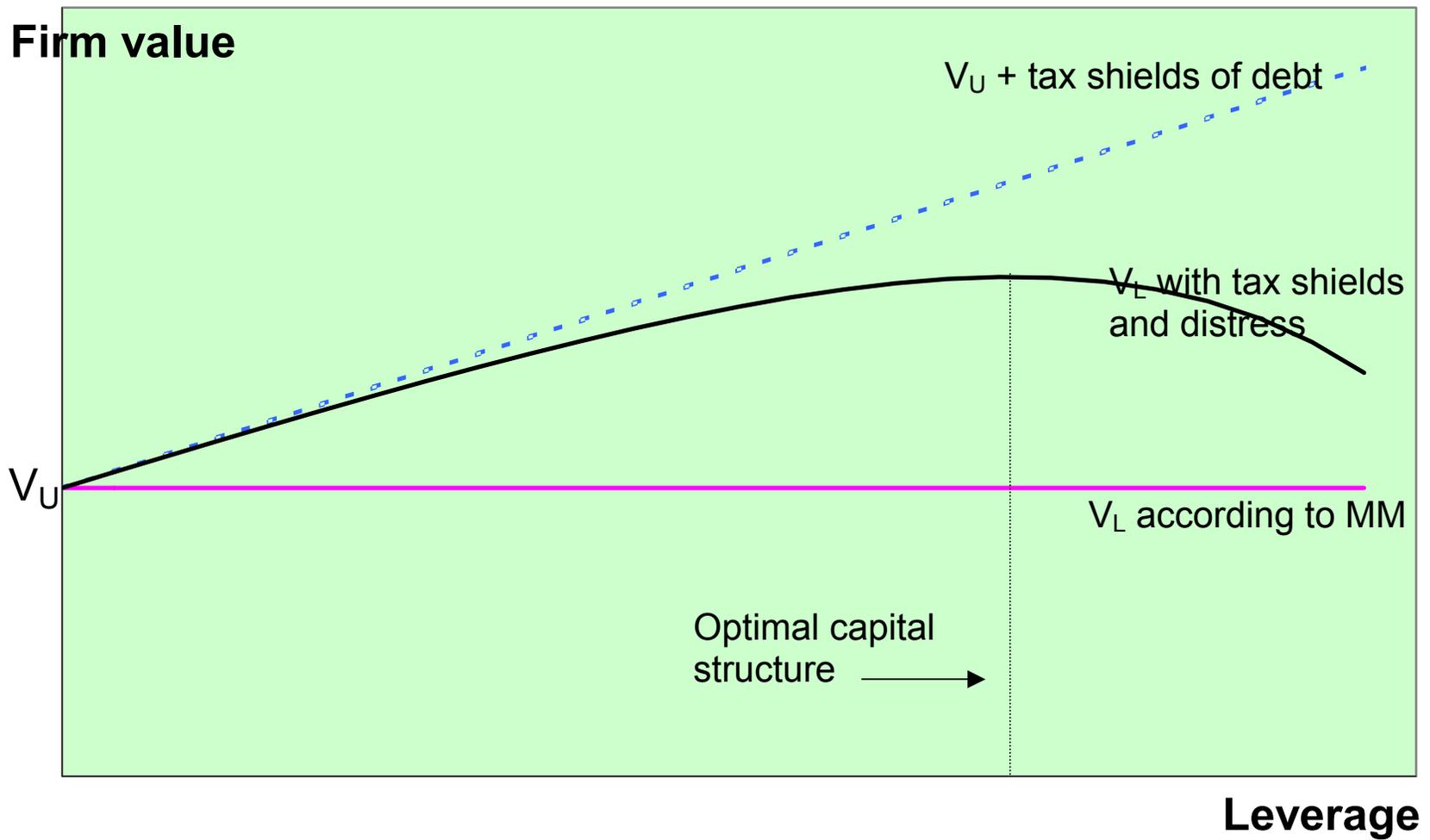
## Financing decisions

### M&M theorem

#### **Financing decisions don't affect firm value if ...**

- (1) the market is efficient and no asymmetric information
- (2) tax considerations are unimportant
- (3) transaction and distress costs are small
- (4) they do not affect the firm's investment policies

# Trade-off theory



## Debt and taxes

### Tax effects of financing

- **Corporate taxes**

Interest is treated as an expense for corporate tax purposes, dividends are not

- **Personal taxes**

Interest is taxed at the full income tax rate, while equity income is taxed at a lower rate

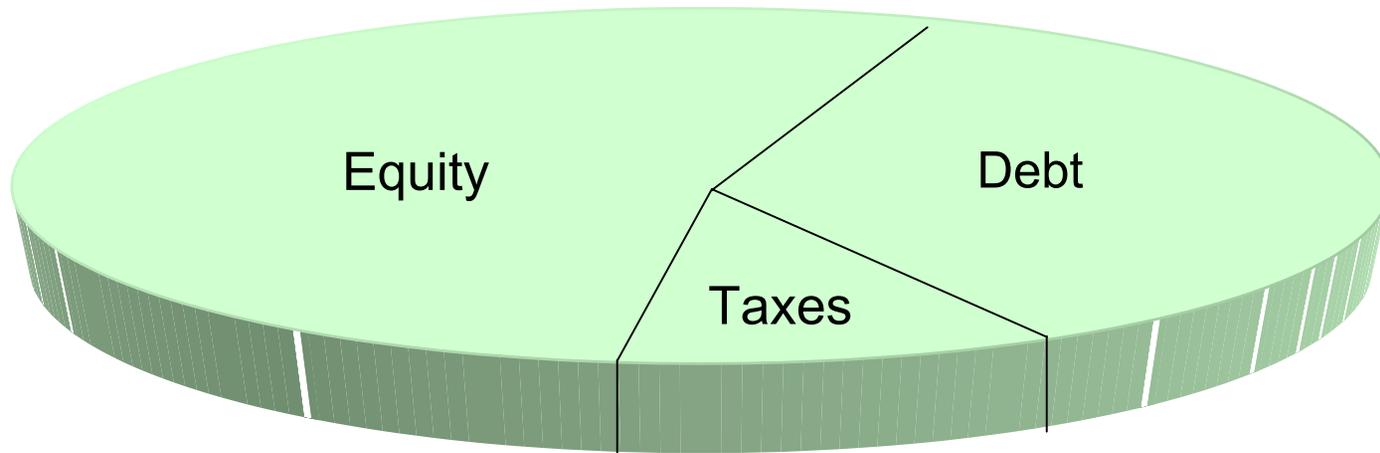
Capital gains and international tax rules

- **Overall, debt typically has tax advantages**

Lower overall taxes

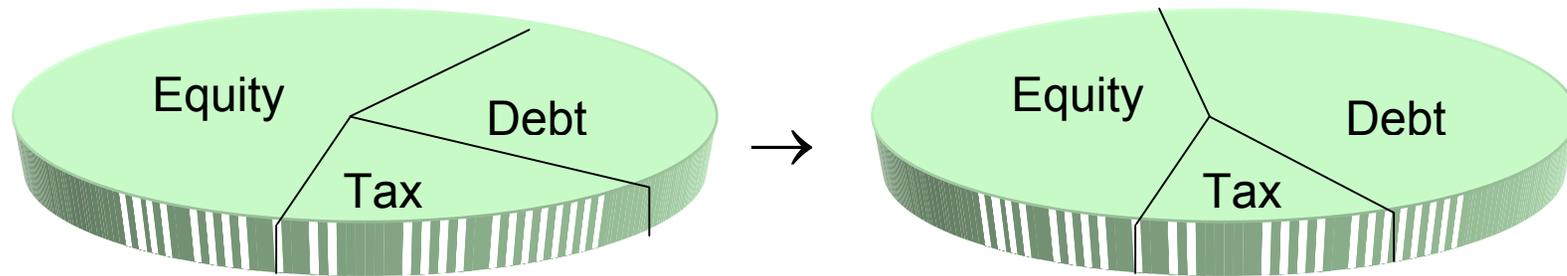
## Debt and taxes

### Pie theory



# Debt and taxes

## Pie theory



## Example

In 2000, Microsoft had sales of \$23 billion, earnings before taxes of \$14.3 billion, and net income of \$9.4 billion. Microsoft paid \$4.9 billion in taxes, had a market value of \$423 billion, and had no long-term debt outstanding.

Bill Gates is thinking about a recapitalization, issuing \$50 billion in long-term debt ( $r_d = 7\%$ ) and repurchasing \$50 billion in stock. How would this transaction affect Microsoft's after-tax cashflows and shareholder wealth?

## Microsoft

### Balance sheet (\$ millions)

Year	1997	1998	1999	2000
Cash	8,966	13,927	17,236	23,798
Current assets	10,373	15,889	20,233	30,308
Current liabs	3,610	5,730	8,718	9,755
LT debt	0	0	0	0
Bk equity	9,797	15,647	27,485	41,368
Mkt equity	155,617	267,700	460,770	422,640
Sales	11,358	14,484	19,747	22,956
EBIT	5,314	7,117	11,891	14,275
Taxes	1,860	2,627	4,106	4,854
Net income	3,454	4,490	7,785	9,421
Oper CF	4,689	6,880	10,003	13,961

## Microsoft

### Income statement, 2000 (\$ millions)

	Current	w/ Leverage
EBIT	\$14,275	\$14,275
Interest ( $r \times 50,000$ )	0	3,500
Earnings before taxes	\$14,275	\$10,775
Taxes (34%)	4,854	3,664
Net income	\$9,421	\$7,111
Cashflow to debtholders	\$0	\$3,500
Cashflow to equityholders*	\$9,421	\$7,111
Total cashflows to D & E	\$9,421	\$10,611

\*before reinvestment

## Debt and taxes

### Tax savings of debt

Marginal tax rate =  $\tau$

Taxes for unlevered firm .....	$\tau$ EBIT
Taxes for levered firm .....	$\tau$ (EBIT – interest)
<hr/>	
<b>Interest tax shield .....</b>	<b><math>\tau</math> interest</b>

Interest =  $r_d D$

**Interest tax shield (each year) =  $\tau r_d D$**



[Only interest, not principal, payments reduce taxes]

## Debt and taxes

### Value implication 1

**With corporate taxes (but no other complications), the value of a levered firm equals**

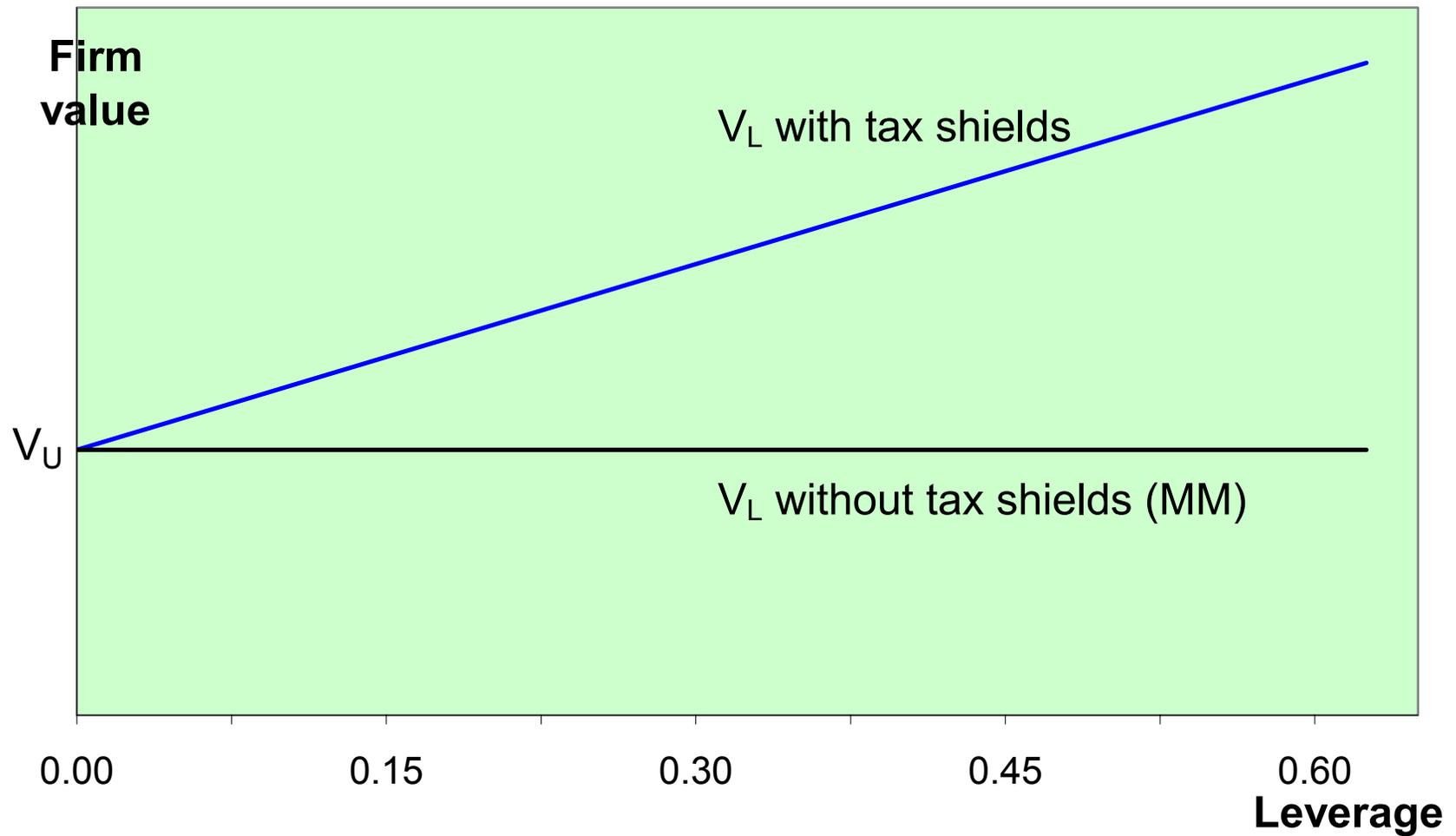
$$V_L = V_U + PV(\text{interest tax shields})$$

**If debt is a perpetuity**

$$PV(\text{tax shields}) = \frac{\text{tax shields per year}}{\text{interest rate}} = \frac{\tau r_d D}{r_d} = \tau D$$

$$V_L = V_U + \tau D$$

# Leverage and firm value



## Microsoft

In 2000, Microsoft had EBIT of \$14.3 billion. Microsoft paid \$4.9 billion in taxes, had a market value of \$423 billion, and had no long-term debt outstanding. Bill Gates is considering a recapitalization, issuing \$50 billion in long-term debt ( $r_d = 7\%$ ) and repurchasing \$50 billion in stock.

### Recapitalization

- Interest expense =  $\$50 \times 0.07 = \$3.5$  billion
- Tax shield =  $\$3.5 \times 0.34 = \$1.19$  billion annually
- $PV(\text{tax shields}) = 1.19 / 0.07 = 50 \times 0.34 = \$17$  billion\*
- $V_L = V_u + PV(\text{tax shields}) = \$440$  billion

# Microsoft

## Current

Assets	Liab & Eq
<b>Net Assets</b> <b>\$423 billion</b>	<b>Long-Term Debt</b> <b>\$0</b>
	<b>Equity</b> <b>\$423 billion</b>

## After recap

Assets	Liab & Eq
<b>Net Assets</b> <b>\$440 billion</b>	<b>Long-Term Debt</b> <b>\$50 billion</b>
	<b>Equity</b> <b>\$390 billion</b>

## Debt and taxes

### Value implication 2

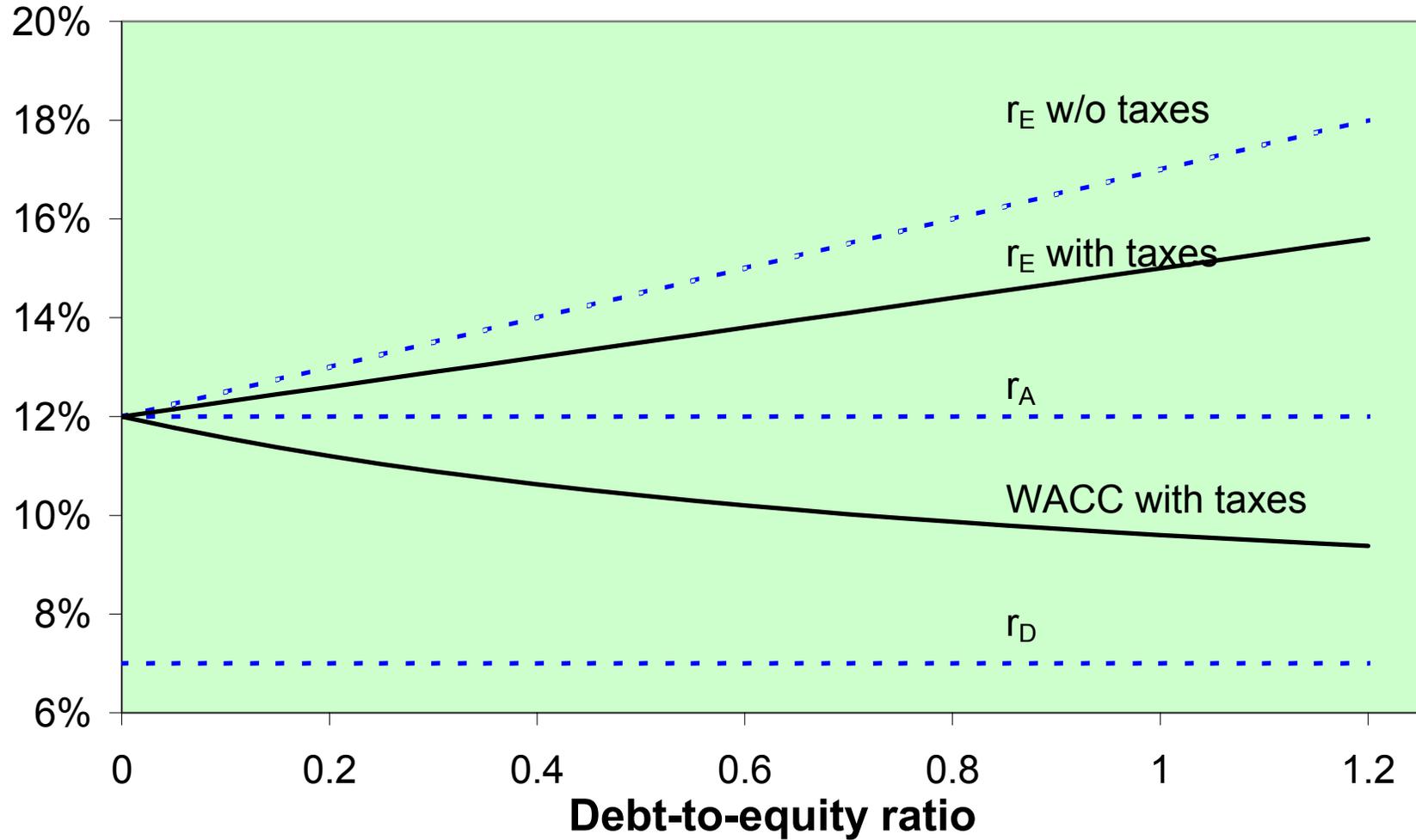
**With corporate taxes (but no other complications), the firm's WACC declines as leverage increases.**

**Firm value goes up because WACC drops.**

$$\text{No taxes: } WACC = \frac{D}{A} r_D + \frac{E}{A} r_E \quad [WACC = r_A]$$

$$\text{With taxes: } WACC = \frac{D}{V} (1 - \tau) r_D + \frac{E}{V} r_E \quad [WACC < r_A]$$

## Leverage and the cost of capital



## **Financing decisions**

### **Advantages of debt**

Taxes

Signaling

Corporate control

Lower issue costs

**Should firms be 100% debt financed?**

**What are the costs?**

## Financial distress

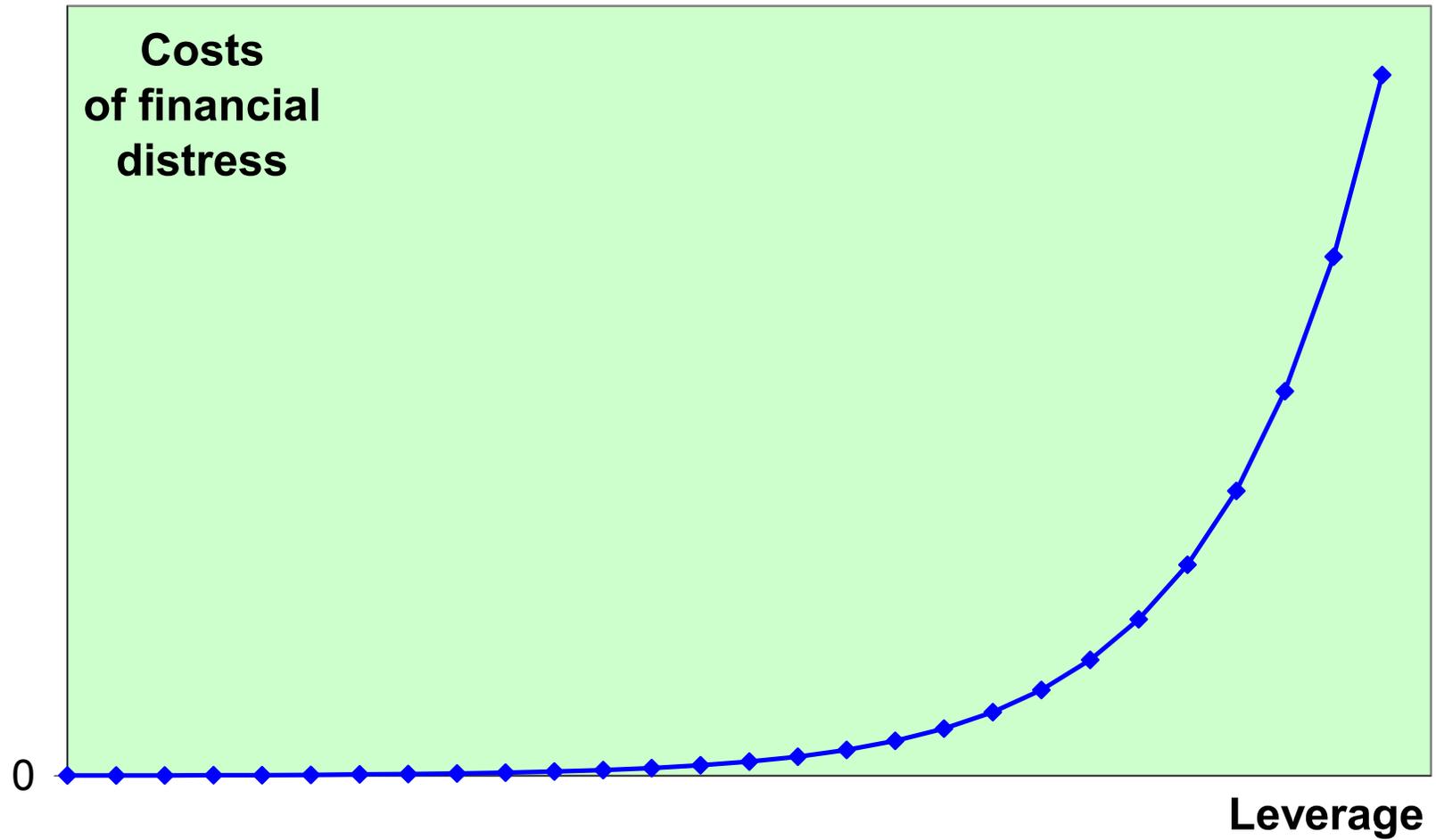
### Direct costs

- Managers' time and effort
- Legal costs

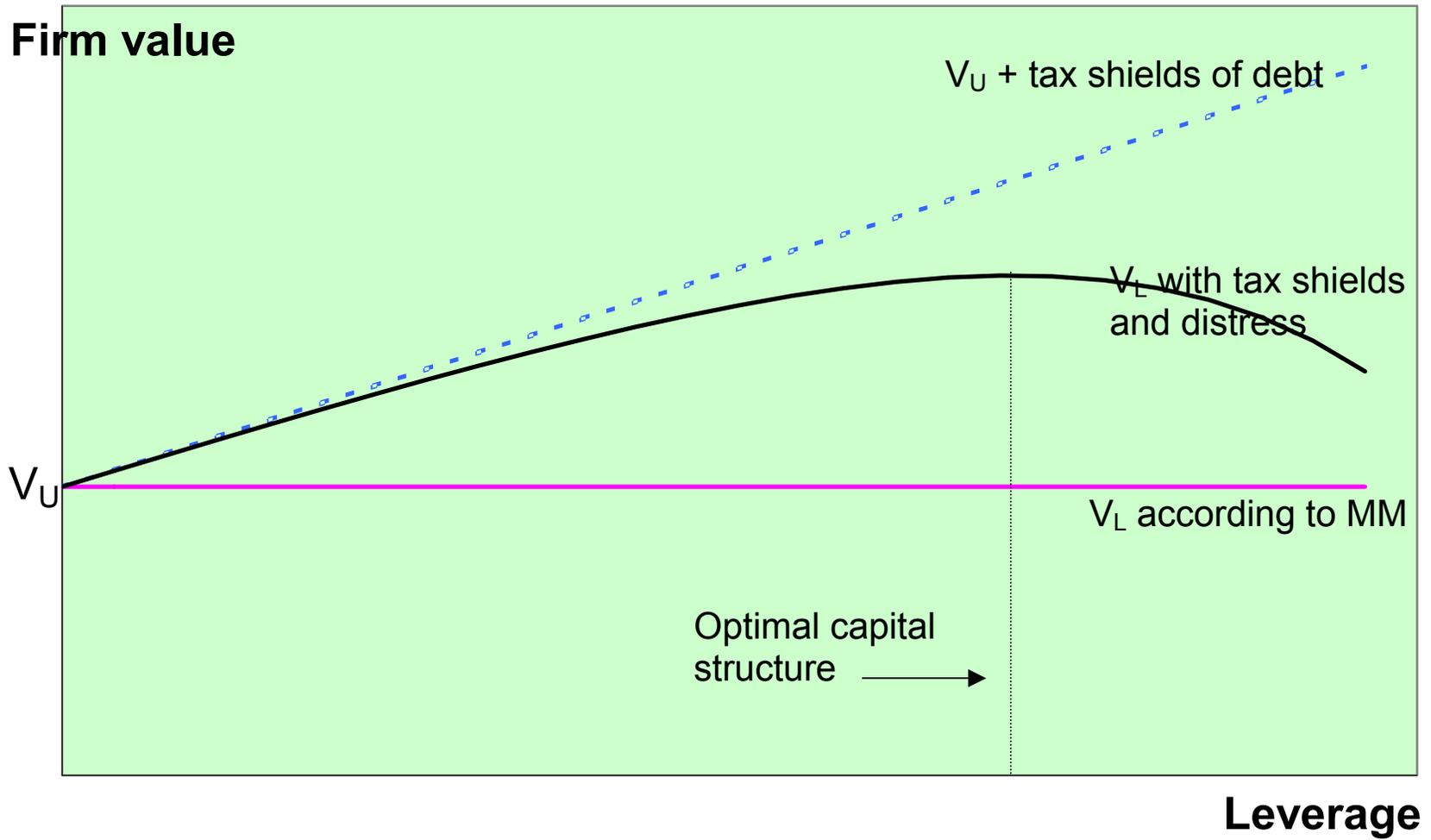
### Indirect costs

- Foregone positive NPV projects
- Loss of competitive position
- Lost customers
- Lost suppliers
- Asset fire sales and liquidation
- Loss of interest tax shields

# Summary



# Trade-off theory



## Summary

### Financing checklist

➤ **Taxes**

Does the firm benefit from interest tax shields?

➤ **Signaling and mispricing**

Is our equity fairly valued? How will investor react?

➤ **Expected distress costs**

What are our cash needs going forward (FCFs)?

Cashflow volatility?

How costly is it to cut back on expenditures?

Customer and supplier concerns?

Is renegotiation possible?

Asset sales?

Financially strong competitors?

## Summary

### Who should have low debt?

- **Firms with high costs of financial distress**  
Assets cannot be sold easily, high intangibles, high growth options, time-sensitive investment
- **Firms with risky earnings and cashflows**  
High probability of distress
- **Firms with financially strong competitors**  
Predatory pricing, exploiting downturns
- **Firms with low earnings and cumulative losses**  
Tax shields small

## Capital structure, 1997

Industry	Debt / (Debt + Equity)
<b>High leverage</b>	
Building construction	60.2%
Hotels and lodging	55.4
Air transport	38.8
Primary metals	29.1
Paper	28.2
<b>Low leverage</b>	
Drugs and chemicals	4.8
Electronics	9.1
Management services	12.3
Computers	9.6
Health services	15.2

## Summary

### Target: Single A rated debt

- **Tax shields**
- **Prob of default and credit spreads: AAA vs. A vs. BBB**
- **Access to credit markets**
  - Regulation
  - International capital markets
- **Competitors**
- **Bond covenants**

## Bond ratings

### Default probabilities for S&P ratings

Original rating	Percentage defaulting within		
	1 year	5 years	10 years
AAA	0.00	0.06	0.06
AA	0.00	0.67	0.74
A	0.00	0.22	0.64
BBB	0.03	1.64	2.80
BB	0.37	8.32	16.37
B	1.47	21.95	33.01
CCC	2.28	35.42	47.46

## Bond ratings

### Credit spreads\*

Rating	Time to maturity		
	1 year	5 years	10 years
AAA	.53	.94	1.11
AA	.66	1.10	1.39
A	.83	1.37	1.93
BBB	1.20	1.84	2.46
BB	2.25	3.00	4.50
B	4.00	5.25	8.00
CCC	5.25	6.50	9.75

\*Yield relative to Tbonds