333-201 Business Finance

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Lecture 20:
Debt, Dividends and Taxes III

Debt, Dividends and Taxes III

- Examine capital structure theory and the Modigliani-Miller propositions
- Examine the effects of corporate taxes on capital Structure
- Examine the effects of financial distress on capital Structure
- Examine whether an optimal capital structure exists

Required Readings: Lectures 20 - 24

Lecture 20
PBEHP, Ch. 12 (sections 12.4.1, 12.6 – 12.7)

Lecture 21
PBEHP, Ch. 11 (sections 11.1 – 11.2, 11.4 – 11.6)

Lecture 22
PBEHP, Ch. 17 (sections 17.1 – 17.5.4 and 17.6)

Lecture 23
PBEHP, Ch. 18 (sections 18.1 – 18.2.4)

Lecture 24
PBEHP, Ch. 18 (sections 18.2.5 – 18.2.7)

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Modigliani and Miller Proposition 2

- Proposition 2 states that the expected return on equity of a leveraged firm increases in direct proportion to its debt-to equity ratio

  - Note that the overall cost of capital (k_0) of the firm remains unchanged

  - For default risk free debt the cost of debt (k_d) remains unchanged as well

  - The rate of increase in the return on equity (k_e) depends on the spread between the firm's overall cost of capital and its cost of debt (k_d)

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Modigliani and Miller Proposition 2

- The firm's overall cost of capital (k_0) is the rate of return expected by investors on the firm's assets

- Assuming that only debt and equity are used, we have…

$$k_o = \left(\frac{D}{D+E}\right)k_d + \left(\frac{E}{D+E}\right)k_e$$

Where
k_d = Cost of debt (required return on debt)
k_e = Cost of equity (required return on equity)
D = Market value of debt
E = Market value of equity
V = D + E

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Modigliani and Miller Proposition 2

• According to MM proposition 1 the firm's overall cost of capital must be the same no matter how much leverage exists

• Consider the WACC of a leveraged firm…

$$k_o = \left(\frac{D}{D+E}\right)k_d + \left(\frac{E}{D+E}\right)k_e$$

- Multiplying both sides by (D + E)/E, we get…

$$\left(\frac{D+E}{E}\right)k_o = \left(\frac{D}{E}\right)k_d + k_e$$

Modigliani and Miller Proposition 2

Rearranging the terms, we get…

$$k_e = k_o + \frac{D}{E}(k_o - k_d)$$

•Implication?

• The required return on equity is directly proportional to (a linear function of) the firm's debt-to-equity ratio

• The higher the debt-to-equity ratio, the higher the required return on equity

• Does this make sense and why?

• What is the relationship between systematic risk (β) and the debt-to-equity ratio?

Modigliani and Miller Proposition 2

The cost of equity, debt and WACC are related to their systematic risks via the CAPM and security market line relationship

$$k_e = k_o + \frac{D}{E}(k_o - k_d)$$

- Recall that the security market line relationship is…

$$k_j = r_f + \beta_j[E(r_m) - r_f]$$

- Which gives us the following relationship…

$$\beta_e = \beta_o + \frac{D}{E}(\beta_o - \beta_d)$$

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Modigliani and Miller Proposition 2

- Implication?

- The systematic risk of equity is also a linear function of the firm's debt-to-equity ratio

- The higher the debt-to-equity ratio, the higher the systematic risk of equity

- The higher the systematic risk of equity the higher the required rate of return on equity

- There are no free lunches in financial markets!

Modigliani and Miller Proposition 2

Example: Consider the illustration related to ABL Ltd and the case related to the expected outcomes. The cost of debt is 10% and the cost of equity (and assets) of the unleveraged firm is 15%. Assume that the systematic risk of the firm's assets is the same as that of the market portfolio and that the debt is risk-free. How does the cost of equity change as the debt-to equity ratio changes? What would you expect to happen if debt were not risk-free at high levels of the debt-to-equity ratio?

Given: $k_o = 0.15$, $k_d = 0.10$, $\beta_o = 1$ and $\beta_d = 0$

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Modigliani and Miller Proposition 2

The cost of equity for the leveraged firm is…

$$k_e = k_o + \frac{D}{E}(k_o - k_d)$$

Debt	D/E Ratio	Cost of Equity
$0	0.00	15.0%
$1,000,000	0.11	15.6%
$2,000,000	0.25	16.3%
$3,000,000	0.43	17.1%
$4,000,000	0.67	18.3%
$5,000,000	1.00	20.0%
$6,000,000	1.50	22.5%
$7,000,000	2.33	26.7%
$8,000,000	4.00	35.0%

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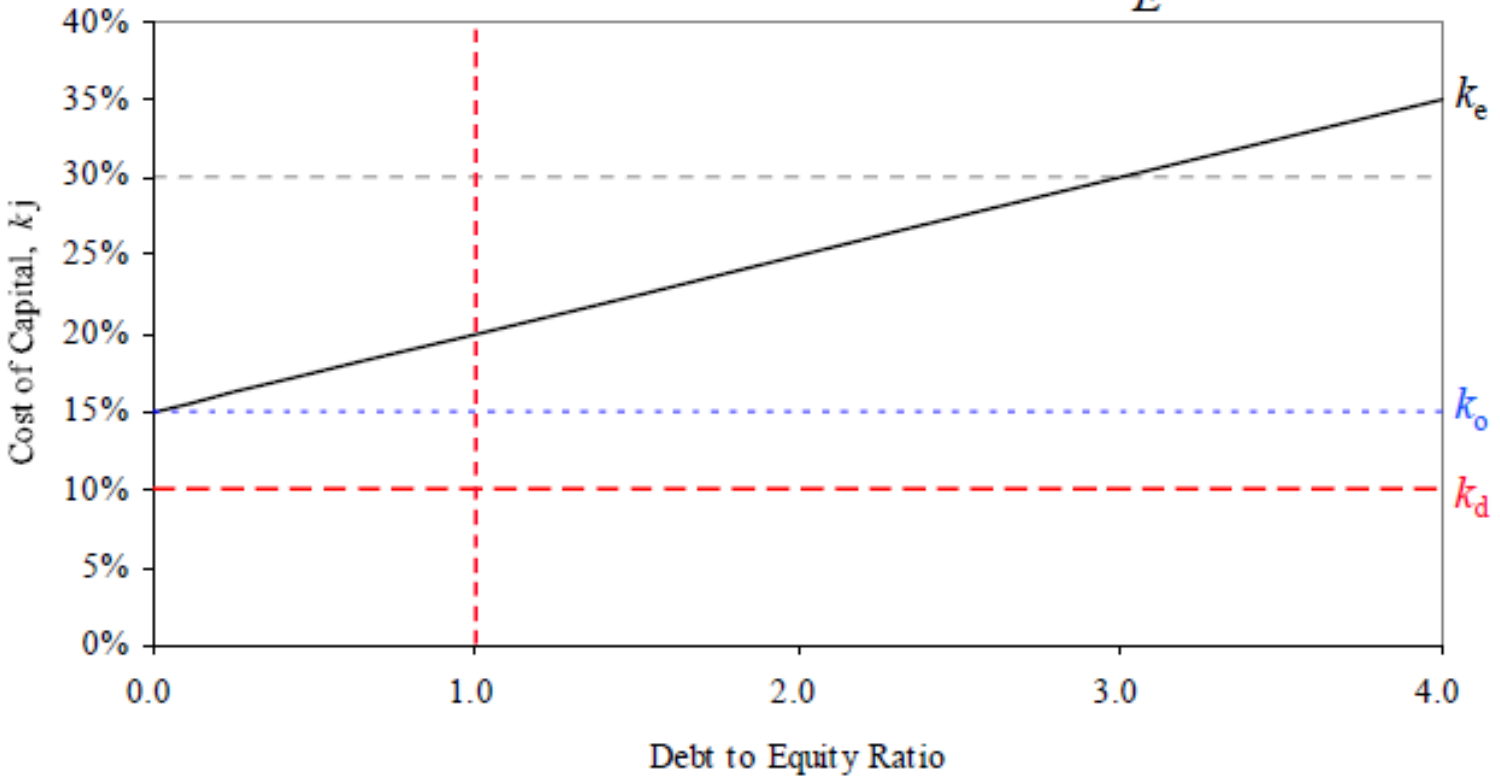
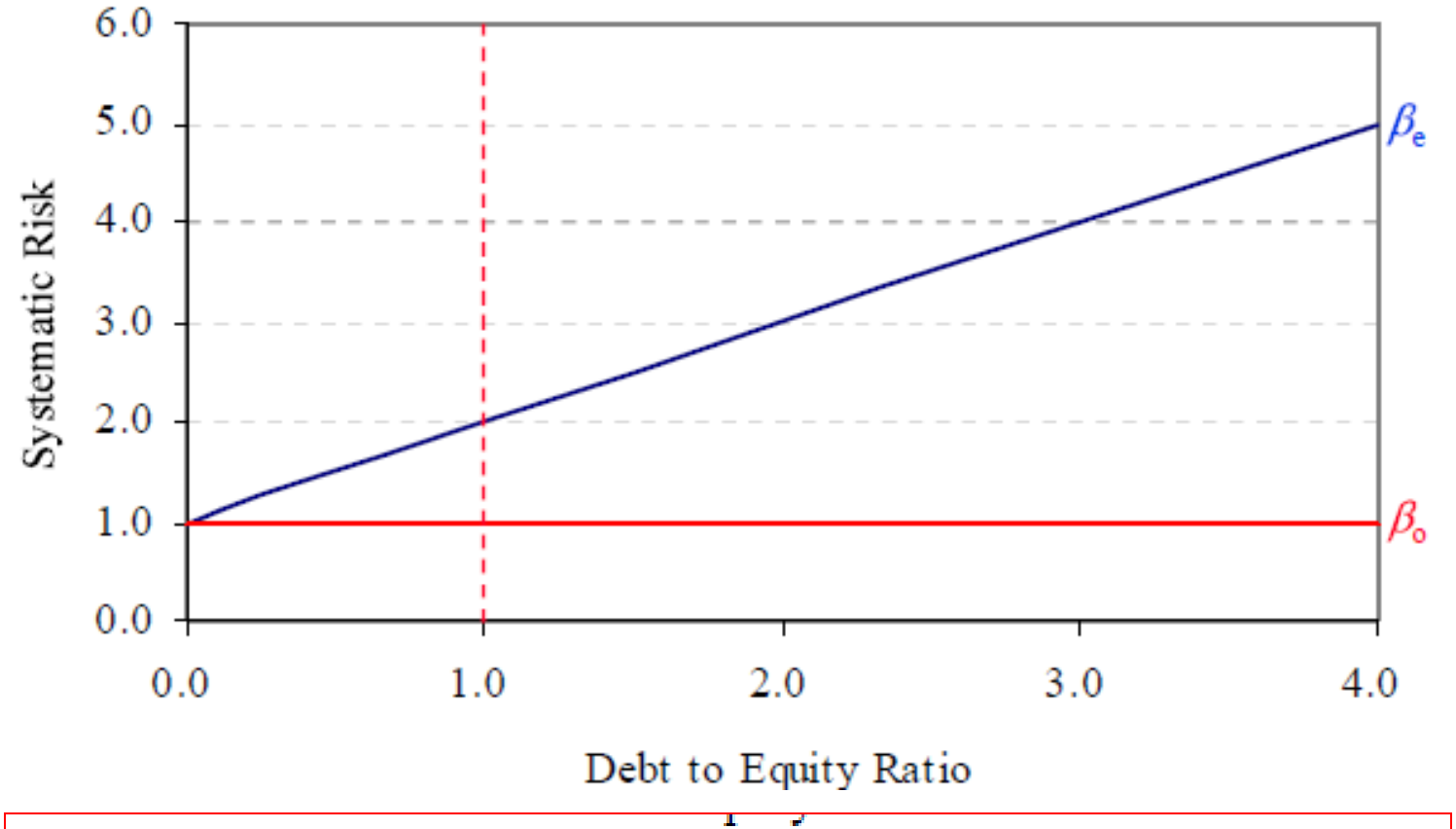
Modigliani and Miller Proposition 2

The cost of equity for the leveraged firm is: $k_e = k_o + \frac{D}{E}(k_o - k_d)$



What happens if debt is not risk-free at high levels of the D/E ratio?

Modigliani and Miller Proposition 2



The beta of equity for the leveraged firm is: $\beta_e = \beta_o + \frac{D}{E}(\beta_o - \beta_d)$

MM and Market Imperfections

- Modigliani and Miller's original analysis ignores capital market imperfections including…
  - Corporate and personal taxes
  - Transaction costs
  - Costs associated with financial distress
  - Different cost of borrowing for firms and individuals
  - Changing cost of debt due to changing risk
  - Agency costs

- We focus on the major market imperfections of taxes, financial distress and agency costs

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MM and Corporate Taxes

- Corporate taxes
  - Modigliani and Miller extended their previous analysis and dropped the assumption of zero corporate taxes

- Under the classical tax system…
  - As leverage increases, a firm's value will increase because the interest on debt is a tax deductible expense
  - This results in an increase in the after-tax net cash flows to the firm and investors
    - Recall that we assume that all cash flows are paid out as dividends
  - The pie becomes larger!

MM and Corporate Taxes

Example: Consider two firms, U and L, which are identical in terms of their assets and operations but which have different capital structures. Firm U has no debt in its capital structure while firm L is leveraged and has borrowed $2,000,000 at a cost of debt of 10%. Assume that the debt is permanent, that is, it is “rolled over” when it matures at a cost of 10% forever.

Assume that the earnings generated by the firms are expected to be a constant perpetual stream over time. Also assume that all of the firms’ available earnings are paid out as dividends to shareholders, a corporate tax rate of 30% and a classical tax system. The firms’ cash flows are shown in the table on the next slide

MM and Corporate Taxes

	Firm U	Firm L
EBIT	$1,000,000	$1,000,000
Interest on debt (at 10%)	$0	$200,000
Earnings before taxes	$1,000,000	$800,000
Tax on earnings (at 30%)	$300,000	$240,000
Earnings to shareholders	$700,000	$560,000
Earnings to shareholders and bondholders	$700,000	$760,000

Notes:

EBIT = Earnings before interest and taxes
Interest on debt = 2000000 × 0.10 = $200,000 per year
Earnings to shareholders and debtholders = Interest on debt + Earnings to shareholders
All cash flows are perpetual and the corporate tax rate is 30%

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MM and Corporate Taxes

• The difference in the earnings to shareholders and debtholders is the interest tax shield of $60,000 which is a perpetual cash flow

- •Interest on debt = $D \times k_d$ = 2000000 0.10 = $200,000
- •Interest tax shield = $t_c \times D \times kd$ = 0.30(200000) = $60,000

•The total value added to the leveraged firm's value is the present value of this tax shield. Since the tax shield is a perpetual cash flow, we have…

- • Present value of tax shield = Tax shield/k_d
- • Present value of tax shield = $(t_c \times D \times k_d)/k_d = t_c \times D$
- • Present value of tax shield = 60000/0.10 or 0.30 2000000
- • Present value of tax shield = $600,000

MM and Corporate Taxes

The value of the leveraged firm, V_L now is…

$V_L = V_U + PV\ (Tax\ shield)$

$V_L = V_U + (t_c \times D \times k_D)/k_D$

$VL = V_U + t_c \times D$

- Implication?
  - With the introduction of corporate taxes in the MM analysis the existence of debt matters!
  - The natural conclusion is that firm should maximize the level of debt in their capital structure as this will maximize the value of the firm
- Does this make sense (especially in the current market environment)?
- What's missing from this analysis?

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MM with Corporate and Personal Taxes

- Corporate taxes is only part of the "tax picture"
  - The existence of personal taxes on interest income can reduce the tax advantage associated with debt financing

- Firms save on corporate taxes via the interest tax shield by increasing the debt-to-equity ratio

- However, investors will pay additional personal taxes and will require higher rates of return to compensate them for this and for the higher risk associated with debt

  - Under a classical tax system, the tax advantage of debt at the firm level may be reduced or even eliminated at the shareholder level!

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MM and the Imputation Tax System

- Recall from Lecture 18 that under the imputation tax system…
  - Earnings distributed as franked dividends to resident shareholders is effectively taxed once at the shareholder's (marginal) personal tax rate
  - Interest paid to debtholders is only taxed once at debtholders' personal tax rate

- So, under the imputation tax system there may be tax neutrality between debt and equity

- It is also possible that there is a bias towards those shareholders whose personal tax rates are higher than the corporate tax rate
  - Such shareholders are likely to prefer firms retaining earnings so they can minimize their personal tax burden

- The bottom line?

MM and Other Market Imperfections

- There are non-tax factors that can cause a firm's value to depend on its capital structure as well
  - Financial distress and bankruptcy costs
  - Agency costs

- Financial distress is the state where a firm is in breach of its debt obligations, which may not necessarily result in bankruptcy

- Note that the term "bankruptcy" means different things in Australia versus other countries (for example, the US)
  - The term "bankruptcy" is used in a generic sense here

- Note also that the following analysis assumes a classical tax system

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MM and Other Market Imperfections

- Direct costs of financial distress
  - Fees associated with advisors, lawyers, accountants, etc.

- Indirect costs of financial distress - Financial distress leads a range of stakeholders to behave in ways that can disrupt a firm's operations and reduce its value
  - Effect of lost sales
  - Reduced operating efficiency
  - Cost of managerial time devoted to averting failure

- Indirect costs are typically much higher than the direct costs
  - The case of Enron…
  - Direct costs estimated as high as $500 million
  - Indirect costs in terms of lost market value exceeded $25 billion!

Agency Costs of Capital Structure

- Agency costs arise from the potential for conflicts of interest between the parties forming the contractual relationships of the firm

- Management may make decisions that transfer wealth from debtholders to shareholders

- The sources of potential conflict are…
  - Dilution of claims
  - Dividend payout
  - Asset substitution
  - Underinvestment

Agency Costs of Capital Structure

- Dilution of claims
  - A firm may issue new debt which ranks higher than existing debt The claim of old debtholders on the firm's assets now less secure
  - New debtholders earn what they're promised so there's a wealth transfer from old debtholders to shareholders

- Dividend payout
  - A firm may significantly increase its dividend payout which decreases the firm's assets and increases the riskiness of its debt
  - Wealth transfer from debtholders to shareholders

Agency Costs of Capital Structure

- Asset substitution
  - A firm's incentive to undertake risky (and even negative NPV) investments increases with the use of debt – there is limited ilability associated with equity
  - If risky investments are successful most of the benefits go to shareholders
    - If risky investments fail most of the costs are borne by debtholders

- Undertaking such (negative NPV) investments will result in total firm value falling, but the relative value of equity will rise and the value of the debt will fall
  - Wealth transfer from debtholders to shareholders

Agency Costs of Capital Structure

- Underinvestment
  - A firm may potentially reject low risk investments even if they are positive NPV investments
  - With risky debt, it may not be in the interest of shareholders to contribute additional capital to finance these new (positive NPV) investments
  - Although the investments are profitable and will increase firm value, shareholders may still lose because the risk of the debt will fall and its value will increase

An Optimal Capital Structure

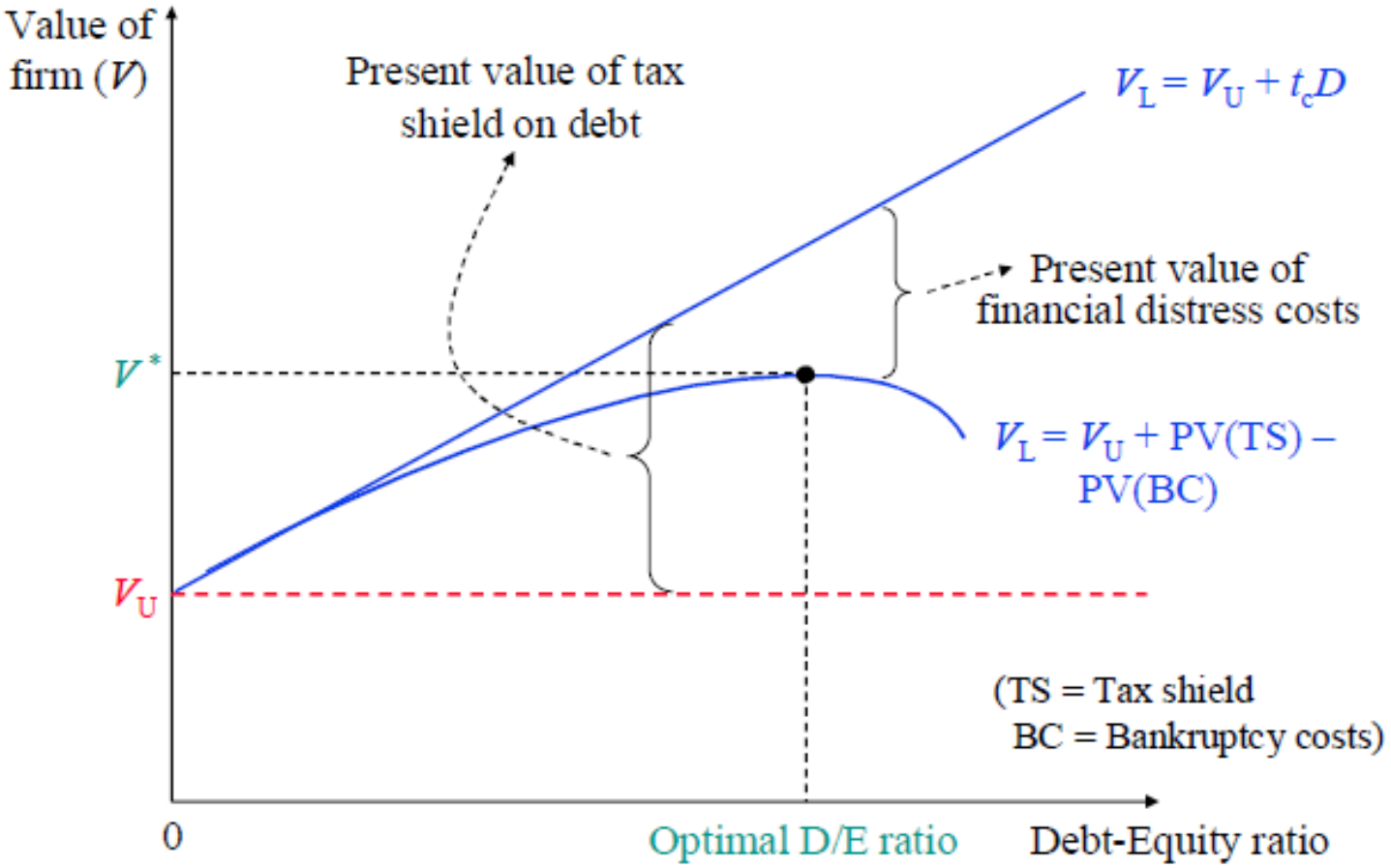
Incorporating the benefits and costs of debt, leads to the following expression of the value of a leveraged firm…

$$V_L = V_U + \text{PV(Tax shield)} - \text{PV(Bankruptcy costs)}$$

- The present value of expected bankruptcy costs depends on the probability of bankruptcy and present value of costs incurred if bankruptcy occurs

- The trade-off theory of capital structure
  - The possibility of a trade-off between the opposing effects of the benefits of debt finance and the costs of financial distress may imply that an optimal capital structure exists
  - Management should aim to maintain a target debt-equity ratio

An Optimal Capital Structure



Key Concepts

• Modigliani and Miller's proposition 2 states that the expected return on equity of a leveraged firm increases in direct proportion to its debt-to-equity ratio

• With corporate taxes, the MM analysis shows that the higher the level of debt the higher the firm's value

• Under the imputation tax system, introducing personal taxes may result in a tax neutrality between debt and equity or even a bias towards those shareholders whose personal tax rates are higher than the corporate tax rate

• Introducing bankruptcy costs and agency costs results in a trade-off between the costs and benefits associated with debt and an optimal capital structure

Key Relationships/Formula Sheet

- The weighted average cost of capital: $k_o = \left(\frac{D}{D+E}\right)k_d + \left(\frac{E}{D+E}\right)k_e$
- The cost of equity: $k_e = k_o + \frac{D}{E}(k_o - k_d)$
- The systematic risk of equity: $\beta_e = \beta_o + \frac{D}{E}(\beta_o - \beta_d)$
- Value of the leveraged firm: $V_L = V_U + t_c \times D$
- Value of the leveraged firm with financial distress: $V_L = V_U +$ PV(Tax shield) – PV(Bankruptcy costs)

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