Capital Structure Theories

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Objectives

- Understand the concept of an optimal capital structure
- Explain the theories of capital structure: NI, NOI, MM with and without Tax
- Incorporate the concepts of Financial Distress, the trade off theory and pecking order theory into a discussion on capital structure management

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Capital Structure: The basics

- Capital Structure: Debt (borrowed) capital and equity (ownership) capital

  Capital Structure: Debt + Preferred + Equity

- Financial manager: optimal capital structure at which weighted average cost of capital is minimized and value of the firm is maximized.
- The controversy: two schools of thought on capital structure and the value of the firm

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Capital Structure: The basics

- Balance Sheet

Liabilities and capital	Amount	Assets	Amount
Accounts payable	£. 2,000	Cash at bank	£ 2,000
Accruals	1,000	Account receivables	4,000
Notes payable	2,000	Inventories	2,500
Total current liabilities	**5,000**	**Total current asses**	**8,500**
Long-term debt	5,000	Net fixed assets	11,500
Preferred stock	2,000		
Common stock (20,000 shares)	2,000		
Share premium	1,000		
Retained earnings	5,000		
Total	**£ 20,000**	**Total**	**£ 20,000**

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Capital Structure: The basics

- Balance Sheet: the liability side
- **Financial Structure**
- **Capital Structure**

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Capital Structure: The basics

- **Financial Structure**

Sources of financing		Amount	Percentage
Current liabilities:			
Accounts payable	£ 2,000		
Accruals	1,000		
Notes payable	2,000	£ 5,000	25
Long-term debt		5,000	25
Preferred stock		2,000	10
Common equity:			
Common stock	2,000		
Share premium	1,000		
Retained earnings	5,000	8,000	40
Total		**£ 20,000**	**100**

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Capital Structure: The basics

- **Capital Structure**

Sources of Finance		Amount	Percentage
Long-term debt		£ 5,000	33.33
Preferred stock		2,000	13.33
Common equity:			
Common stock	2,000		
Share premium	1,000		
Retained earnings	5,000	8,000	53.34
Total		**£ 15,000**	**100**

- A part of financial structure of the firm

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Capital Structure: The basics - Setting target/optimal capital structure

- Need to consider two kinds of risk:
  - Business risk
  - Financial risk

Business Risk

- Risk associated with the unique circumstances of the firm

Financial Risk

- The additional risk placed on the common stockholders as debt included in total finance

Example of Business Risk

- Suppose 10 people established a firm and if the firm is financed only with equity equally by all then each investor shares equally (10%) of the business risk

Relationship: Financial and Business Risk

- If the same firm is now financed with 50% debt and 50% equity say five investing in debt and five in equity
- The five who put up the equity will have to bear all the business risk, so the common stock will be twice as risky as it would have been had the firm been all-equity

Business and Financial Risk

- Financial leverage concentrates the firm's business risk on the shareholders because debt-holders, who receive fixed interest payments, bear none of the business risk.

Financial Risk

- Leverage increases shareholder risk
- Leverage also increases the return on equity (to compensate for the higher risk)

Capital Structure: Setting target capital structure

- Advantages in case of a levered firm
  - Interest is tax deductible (lowers the effective cost of debt)
  - Debt-holders are limited to a fixed return – so stockholders do not have to share profits if the business does exceptionally well
  - Debt holders do not have voting rights
- But
  - Use of high debt ratio increases the financial risk
  - Operating income when not sufficient to cover interest expenses

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Capital Structure: Setting target capital structure

- Leverage
- Levered Firm
- Unlevered Firm

Sources of Capital	Alternative Capital Structure				
	I	II	III	IV	V
Debt	0	50	100	150	200
Equity	250	200	150	100	50

- WACC: cost of capital
- Capital Structure influence on WACC

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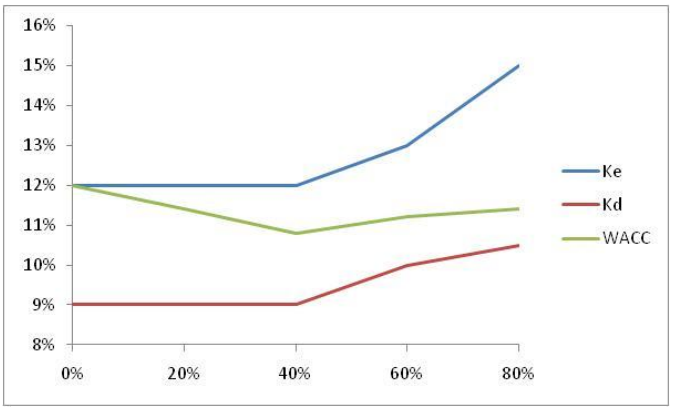
Capital Structure: Setting target capital structure

- Calculate the WACC for the above
- Step 1: find out the Debt to Equity weights
- Step 2: multiply by cost payable to Debt and payable to Equity
  - Note: Cost of Equity is higher than debt and gets higher when the ratio of debt increases. You may like to use Kd (9% for the first 3 years, and then 10% and 11% for fourth and fifth years) and Ks (12% for the first three years and then 13% and 15% for fourth and fifth years)
- Find out the WACC
- What happens to the WACC as we increase the leverage?

Capital Structure: Setting target capital structure

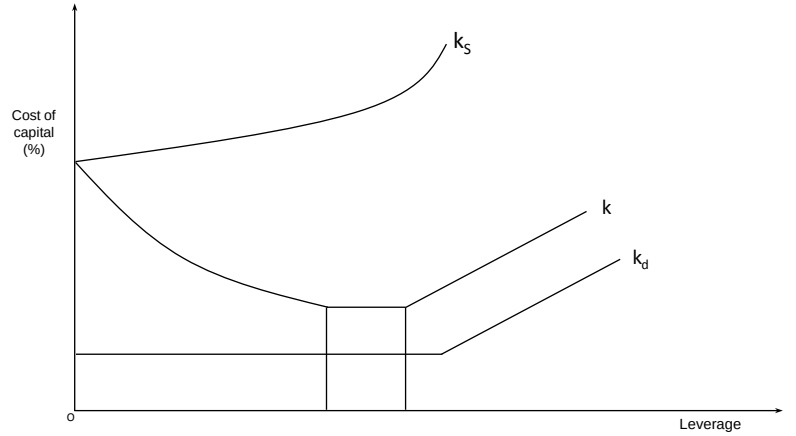


Capital Structure: Setting target capital structure

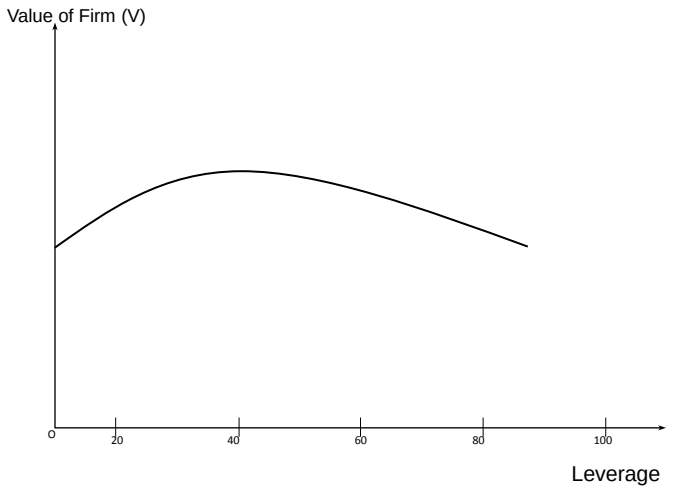
- A particular Debt:Equity ratio represents Optimal Capital Structure
- AKA Target capital structure
- In fact, above illustration on capital structure and explanation on optimal or target capital structure is same to the Traditional Capital Structure Theory

Capital Structure: The Traditional View

- Developed by David Durand in 1952



Capital Structure: The Traditional View



Net Income and Net Operating Income approach

- Developed by David Durand in 1952
- But first be familiar with the assumptions No Tax and
  - Cost of Debt (Kd) = I/B
  - Cost of Equity (Ks) = NI/S = (NOI-I)/S

Net Income approach

- Developed by David Durand in 1952
- No change in Kd and Ke when leverage ratio vary
  - Assumption: Kd<Ks

Net Income approach: Example

- ABC firm has
- NOI= £ 2,400, Kd=8%, Ks=12%
- Debt= £4,500
- What is the value of Stock?

Net Income approach: Example

- Ks = (NOI – I)/ S or S = (NOI – I)/ Ks

S= [2400 – (4500*8%)]/0.12= £17,000

V=B+S = £21,500

WACC = Kd x B/V + Ks x S/V = 11.16%

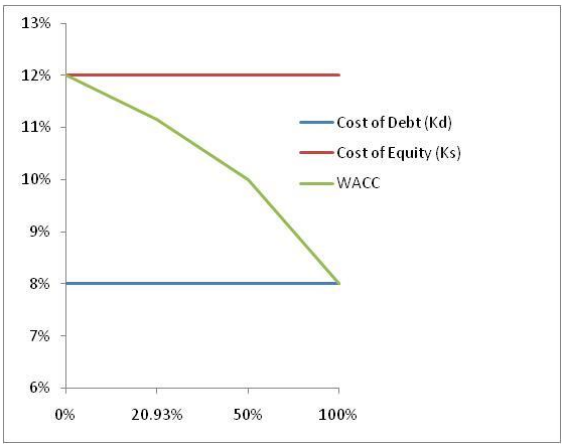
Or

NOI/V = 2400/ 21,500 = 11.16%

Net Income approach: Example

Variables	Financial Leverage (B/V)			
	0%	20.93%	50%	100%
Value of debt (B)	0	£4,500	£12,000	£30,000
Value of equity (S)	£20,000	£17,000	£12,000	£0
Total Value (V)	£20,000	£21,500	£24,000	£30,000
Cost of Debt (Kd)	8%	8%	8%	8%
Cost of Equity (Ks)	12%	12%	12%	12%
Net Operating Income (NOI)	£2,400	£2,400	£2,400	£2,400
WACC	12.0%	11.2%	10.0%	8.0%

Net Income approach: Example



Net Income approach

- Thus, under the NI approach, the firm can lower its cost of capital and raise its total market value through the addition of debt capital.

Net Operating Income (NOI) approach

- Developed by David Durand in 1952
- NOI is capitalised at an overall capitalisation rate to obtain the total market value of the firm
- Assumptions:
  - K is the overall capitalisation rate
  - K depends upon the business risk
  - Debt capitalisation Kd remains constant
  - Use of less costly debt funds increases the risk of shareholders. This increases equity capitalisation rate
  - So advantage of debt is offset by increase in equity capitalisation rate

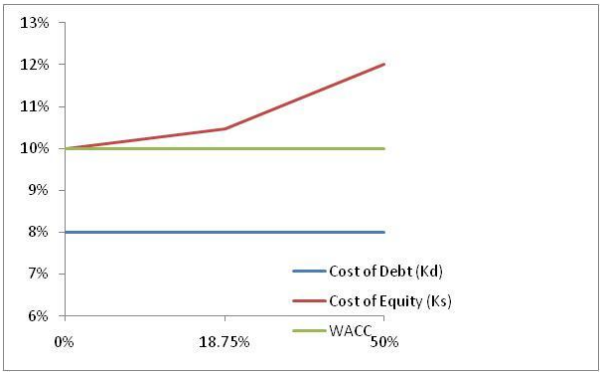
Net Operating Income (NOI) approach

- Consider again the last example of ABC firm
  - Value of the firm (V) = NOI/k
  - Assuming k is 10%, V = £24,000
  - With Debt as £4,500, S = £19,500
  - Implied cost of equity
    - NOI-I/V = (£2,400 - £ 360) / £19,500 = 10.46%
  - Then the k assumed 10% is actually WACC

Net Operating Income (NOI) approach

Variables	Financial Leverage (B/V)			
	0%	18.75%	50%	99%
Value of debt (B)	0	£4,500	£12,000	£23,760
Value of equity (S)	£24,000	£19,500	£12,000	£240
Total Value (V)	24000	24000	24000	24000
Cost of Debt (Kd)	8%	8%	8%	8%
Cost of Equity (Ks)	10%	10.46%	12%	208%
Net Operating Income (NOI)	2400	£2,400	£2,400	£2,400
WACC	10%	10%	10%	10%

Net Operating Income (NOI) approach



Net Operating Income approach

- Thus, the firm's cost of capital and its total market value are not influenced by the use of additional cheap debt funds.

The Modigliani –Miller Model

- 1958, 1961, and 1963 on capital structure (Debt, Equity without and with tax) and more afterwards
- Commonly known as MM model
- Various Propositions without and with tax

The Modigliani –Miller Model: Without Tax

- Assumption of Perfect capital market
- Two Propositions:
  - Proposition 1: The proposition that the value of the firm is independent of the firm's capital structure.
  - Proposition 2: The proposition that a firm's cost of equity capital is a positive linear function of the firm's capital structure.

The Modigliani –Miller Model: Without Tax Proposition 1

- The proposition that the value of the firm is independent of the firm's capital structure
- Value of any firm is established by capitalizing its expected net operating income (NOI or EBIT) at a constant rate (i.e. overall cost of capital) which is appropriate for the firm's risk class
  - $V = EBIT/k = EBIT/K_{SU}$
- This is similar to NOI approach

The Modigliani –Miller Model: Without Tax Proposition 2

- MM's proposition defines the cost of equity.
- Ks of a levered firm is equal to 1) the cost of equity to an unlevered firm in the same risk class plus 2) risk premium.
- Size of risk premium depends on both the differential between the costs of equity and debt to an unlevered firm and the amount of leverage used.
- $K_{SL} = K_{SU}$ + Risk Premium

Or, $K_{SL} = K_{SU} + (K_{SU} - Kd) * (B/S)$

The Modigliani –Miller Model: Without Tax Proposition 1 and 2

- Taken together, the first two-MM propositions imply that the inclusion of more debt in the capital structure will not increase the value of the firm because the benefits of cheaper debt will be exactly offset by an increase in the cost of equity.
- So in a world without taxes, both the value of a firm and its cost of capital are completely unaffected by its capital structure.

The Modigliani –Miller Model: With Tax

- Two Propositions
  - Proposition 1: The value of an unlevered firm is the firm's after tax operating income divided by its cost of equity
  - Proposition 2: The cost of equity of a levered firm is equal to 1) the cost of equity of an unlevered firm in the same risk class, plus 2) a risk premium whose size depends on the differential between the costs of equity and debt to an unlevered firm.

The Modigliani –Miller Model: With Tax, Proposition 1

- Proposition 1: The value of an unlevered firm is the firm's after tax operating income divided by its cost of equity

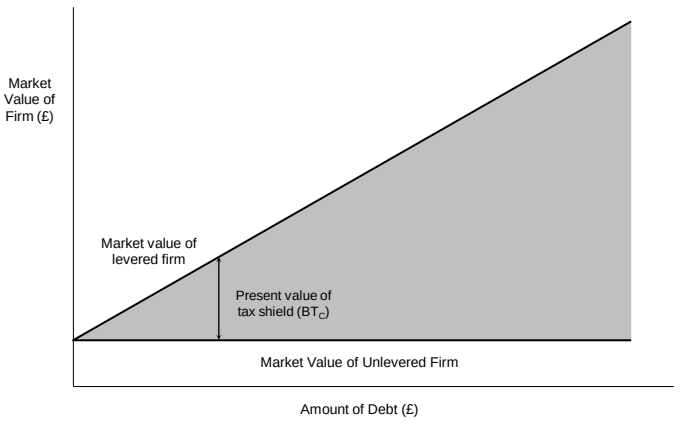
- V_U = [EBIT * (1-T)]/ K_{SU}

The Modigliani –Miller Model: With Tax, Proposition 1

- The value of a levered firm is equal to (1) the value of a unlevered firm in the same risk class plus (2) the gain from leverage, where
- The gain from leverage: is the present value of the tax saving (which equals the corporate tax rate times the amount of debt the firm uses).

- $V_L = V_U + BT_C$
- Where BTc is the present value of debt tax shield

The Modigliani –Miller Model: With Tax, Proposition 1



The Modigliani –Miller Model: With Tax, Proposition 1

- So the value of the levered firm increases when corporate tax rates are introduced

The Modigliani –Miller Model: With Tax, Proposition 2

- The cost of equity of a levered firm is equal to (1) the cost of equity of an unlevered firm in the same risk class, plus (2) a risk premium whose size depends on the differential between the costs of equity and debt to an unlevered firm.

- $K_{SL} = K_{SU} + (K_{SU} - K_d) * (1-t) * (B/S)$

The Modigliani –Miller Model: With Tax, Proposition 2

- As the firm's use of debt increases, its cost of equity also rises, and in an exactly specified manner.
- However, the cost of equity rises at a slower rate than it did in the absence of taxes.
- It is this characteristic that produces the increase in firm value as leverage increases, as shown in Proposition I.

Financial Distress

- AKA Bankruptcy costs: direct costs e.g. legal fees, and other costs of re-organisation plus indirect costs such as the opportunity cost of funds being tied up during bankruptcy proceedings, lost profits created by decreased sales in anticipation of bankruptcy etc.
- Once bankruptcy costs are considered, optimal or target capital structures appear to exist for firms. In the event of bankruptcy, security holders as a whole receive less than they would otherwise. Thus, the losses associated with bankruptcy cause the value of the firm to be less than the discounted present value of the expected cash flows from operations.

Financial Distress

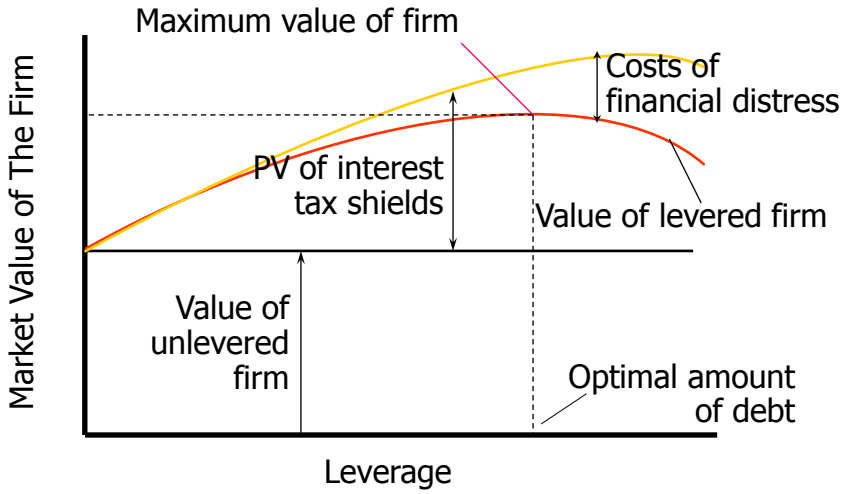
- To the extent that levered firms have a greater probability of bankruptcy, their value will be less than that of unlevered ones.
- If the firm recognizes the cost associated with the risk of bankruptcy, the value of the firm with recognizing both the tax advantage associated with debt and bankruptcy costs is:

- $V_L = V_U + BT_C$ – PV of Bankruptcy cost

Financial Choices

- Trade Off Theory: Theory that capital structure is based on a trade-off between tax savings and distress costs of debt
- Pecking Order Theory: Theory stating that firms prefer to issue debt rather than equity if internal finance is insufficient

Financial Distress and Trade off Theory



A Pecking Order of Financing

- Developed by Stewart C. Myers in 1984.
- Law of least effort
- Internal funds are used first, and when that is depleted, debt is issued, and when it is not sensible to issue any more debt, equity is issued
- Fama and French (2002), and also Myers and Shyam-Sunder (1984) find that some features of the data are better explained by the Pecking Order than by the Trade-Off Theory

- What does the real data says – See data provided by your tutor

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Homework

- Briefly summarise the MM theory of capital structure
- Read the journal articles on various theories discussed in the class (Tutor will provide you the copies of the article)

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Thank You

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