Lecture

IAQS | INSTITUTE OF ACTUARIAL & QUANTITATIVE STUDIES

Class: MSc

Subject : Business Finance

Subject Code:

Chapter: Unit 4 Chapter 3

Chapter Name: Cost of capital

Today's Agenda

1. Cost of capital
    1. Importance of WACC
    2. WACC
    3. Modigliani – Miller first irrelevance proposition
    4. MM graph
    5. Later theories

2. Cost of equity
    1. Capital asset pricing model and risk
    2. Beta a measure of systematic risk
    3. CAPM(Ke)
    4. Adjusting beta for gearing

3. Cost of debt

1 Cost of capital

Cost of capital is a company's calculation of the minimum return that would be necessary in order to justify undertaking a capital budgeting project, such as building a new factory.

1.1 Importance of weighted average cost of capital

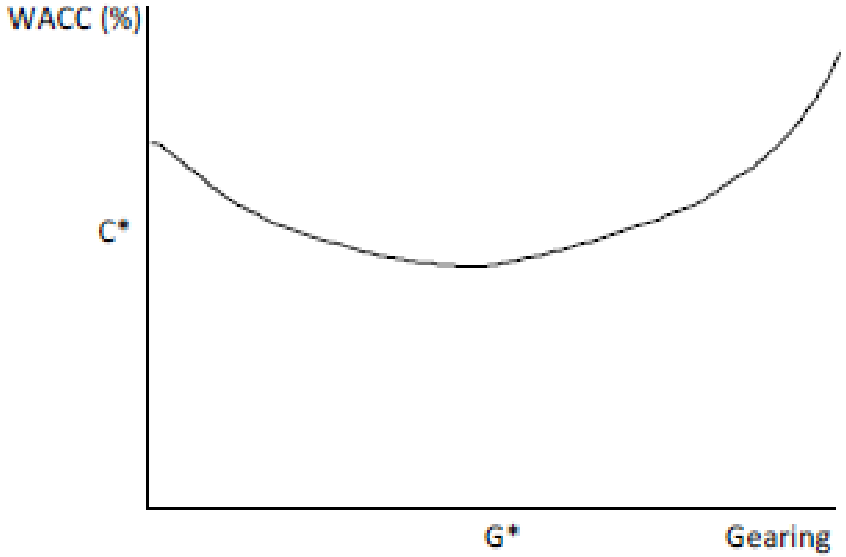
- It is now generally accepted that discounted cashflow techniques for evaluating projects are far superior to the use of simple payback approaches or accounting rates of return. The shareholder value-added approach enhances these techniques further.

- However, to use these techniques requires the calculation of the project cost of capital. In the absence of a suitable discount rate NPV and IRR approaches have no meaning.

- Provided that the project achieves the expected return and that, when adjusted for the risk of that project, the return is more than the company's weighted average cost of capital (WACC), the shareholders are better off than before.

1.2 Weighted average cost of capital

There are many methods of financing a company, they broadly fall into just the two camps of equity or debt.



$$WACC = \frac{Market\ value\ of\ debt}{Market\ value\ of\ debt + equity} \times net\ cost\ of\ debt + \frac{Market\ value\ of\ equity}{Market\ value\ of\ debt + equity} \times cost\ of\ equity$$

1.3 Modigliani-Miller First Irrelevance Proposition

1. The market value of any firm is independent of its capital structure
2. The expected rate of return on the common stock of a leveraged firm increases in proportion to the debt-equity ratio, expressed in market values

Modigliani and Miller argued that, under certain assumptions, gearing has no effect on the value of the company. Their view was that the value of the company lies in its ability to produce profits, not in the way that it is financed・in other words, that the market value of a company is determined primarily by its investment decisions and not by its financing decisions. This proposition allows complete separation of investment and financing decisions.

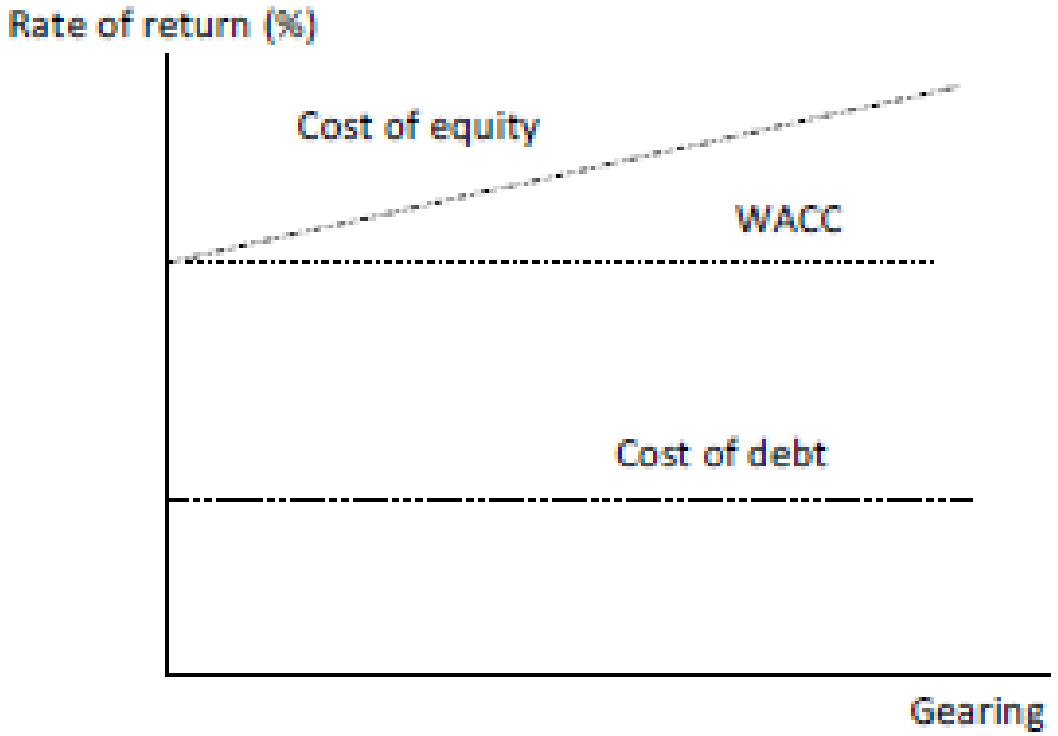
1.3 Modigliani-Miller First Irrelevance Proposition

Assumptions:

- No Taxes
- Unlimited borrowing capacity
- Debt is risk-free
- No Agency Costs
- No Information Asymmetry

1.4 MM Graph

A more highly geared structure offers a higher return on equity, but it also offers a higher risk. These two features cancel out to leave **the price of the shares, the value of the company and the WACC unchanged**.



Question

Which of the following is the most correct summary of the reasons behind Modigliani and Miller's argument that capital markets are indifferent to a company's financial structure?

A. Tax effects undermine the cost of different sources of finance in different ways.
B. Shareholders can adjust gearing at minimal cost.
C. Companies must always follow the optimal gearing strategy in order to attract finance.
D. Institutional investors can "see through" the effects of different financing strategies.

1.5 Later Theories

- The effect of tax
- The effect of different borrowing rates
- The effect of restricted debt capacity

2 Cost of equity

The cost of equity represents the opportunity cost of capital – the rate foregone by shareholders investing in the project rather than investing in alternative securities.

Cost of Equity – Risk Free Rate + Equity Risk Premium

Points to check:

1. Choice of the historical period
2. Real and nominal rates - Real cashflows should be discounted at a real rate of return, while nominal cashflows will need a nominal rate for discounting

Question

Doron is an unquoted company which was founded 12 years ago and which has grown steadily since. Its directors are considering an investment opportunity that will increase the productive capacity of the business by 30%.

Doron was established using the savings of its three founders, who now comprise the company's board of directors. Each of the three founders owns one third of the company's equity. Doron's growth has been funded using retained earnings and the proposed expansion will be funded in the same way. The company has no debt. None of the founders has any other significant personal assets apart from their shares in Doron and their family homes.

The founders are considering more sophisticated approaches to the evaluation of capital investment projects. They have asked you to determine Doron's cost of equity. They have established the following facts:

- The risk free rate is 4% per annum.
- The equity risk premium is 10% per annum.
- The beta coefficient of a quoted company which is in the same industry as Doron is 1.4.
- The above quoted company has a debt:equity ratio of 0.6:1.
- The corporation tax rate is 20%.

(i) Calculate Doron's cost of equity.

Solution

Geared beta for comparative company = 1.4

Ungeared beta = $B_U = B_g / [1 + ((1 - \text{Tax Rate}) \times \text{Debt/Equity})]$

$1.4/1+(1-0.2)x0.6/1)$

$=1.4/1+ 0.8x\ 0.6)$

$= 1.4/(\ 1+0.48)$

$= 0.946$

Cost of equity = 4 + (0.946 x 10 = 13.46%

2.1 Capital asset pricing model (CAPM) and risk

- The variance (or standard deviation) of the returns experienced by individual stocks are different to (and usually greater than) the market as a whole. This is a consequence of the fact that the individual stock returns are, typically, not perfectly correlated.
- **Specific Risk and Systematic Risk**
    1. Specific Risk can be diversified away
    2. Systematic risk would be the risk of being exposed to the economy in general.

2.1 Capital asset pricing model (CAPM) and risk

Sources of Systematic Risk:

1. Business Cycles
2. Interest Rates
3. Inflation
4. Tax
5. Currency
6. **Global Events**

2.2 Beta a Measure of Systematic Risk

- All companies are exposed to systematic risk because they are all exposed to the market. However, some companies are more exposed to the market than others and therefore are exposed to a greater proportion of the systematic risk in the market.

$$\beta_i = \frac{\sigma_{im}}{\sigma_m^2} \quad \text{OR} \quad \beta_i = \rho_{im}\frac{\sigma_i}{\sigma_m}$$

- A value of beta in excess of 1 indicates a stock that has, historically, amplified the return of the whole market (positive or negative).
- A beta close to zero would indicate a stock that provided a more stable return than the market as a whole.
- A negative beta would signify a stock whose performance was counter cyclical, offsetting the overall market experience.

2.2 Beta – A Measure of Systematic Risk

$$\hat{\sigma}^2_m = \frac{\sum_j (r_{mj} - \tilde{r}_m)^2}{n-1} \quad \text{and} \quad \hat{\sigma}_{i,m} = \frac{\sum_j \left[(r_{ij} - \tilde{r}_i) \times (r_{mj} - \tilde{r}_m) \right]}{n-1}$$

And hence estimate $\hat{\beta}_i = \frac{\hat{\sigma}_{i,m}}{\hat{\sigma}^2_m}$

2.3 CAPM (Ke)

The cost of equity for a particular company as being:

$$: r_i = r_f + \beta_i \left(r_m - r_f \right).$$

The key result of the Capital Asset Pricing Model is that for a single stock:

Cost of equity for stock = Risk-free rate + Equity risk premium × Beta for stock

2.4 Adjusting beta for gearing

Geared beta = ungeared beta ×{1 + debt:equity ratio × (1 −tax rate)}

- The beta of a company's shares, and hence the cost of equity, is affected by the company's existing gearing (leverage / debt position)
- The company's current value of beta incorporates the effect of its current level of gearing. If the gearing changes, the new beta must be found in two stages:
    1. find the ungeared beta first
    2. then find the new beta for the new level of gearing

3 Cost of debt

The cost of debt will vary from company to company depending on its credit worthiness, often expressed as a credit rating. The cost of debt will be related to the credit rating. The lower the credit rating the more the company will have to pay for debt.

1. Interest and asset cover
2. Gearing
3. Beta
4. Tax

Net cost of debt = Cost of debt depending on rating of company ×(1 −tax rate)

Question

Grow Ltd is a manufacturing company. The directors are meeting to discuss some aspects of corporate strategy and also to plan for the publication of the annual report on the current year's trading. The following set of draft financial statements, combining actual results to date and forecast figures for the remainder of the year, has been presented to the directors:

Grow Ltd
Forecast income statement
for the year ended 31 December 2008

	£000
Revenue	5,000
Cost of sales	(2,000)
	3,000
Other operating costs	(500)
	2,500
Finance charges	(720)
Net profit	1,780

Grow Ltd
Forecast balance sheet
as at 31 December 2008

	£000	£000
Non-current assets		17,500
Current assets		
Inventory	167	
Trade receivables	417	
Bank	50	
		634
Total assets		18,134

Question

Equity	
Share capital	5,000
Retained earnings	4,870
	9,870
Non-current liabilities	
Loans	8,000
Current liabilities	264
	18,134

The directors are considering the effects of a proposal to invest in a major new piece of equipment that will expand the company's capacity and will create the potential to generate substantial new cash flows. The equipment will have to be purchased almost immediately or the opportunity to take advantage of the potential sales will be lost.

The equipment will cost £10m. Its acquisition will be funded by a loan paying annual interest at a rate of 9%. The company will depreciate the new equipment at 10% of cost each year, with a full year's depreciation charged during the year ended 31 December 2008. Two months' interest will also be accrued on the loan. There will be very little additional business this year because of the need to install and set up the equipment.

Question

The directors' only reservation about this proposal concerns the impact that it will have on the company's financial statements. They are concerned that they will look unprofitable and more risky.

(i) Recalculate Grow Ltd's figures to show the income statement and balance sheet as if the new equipment had been acquired on the terms stated above.

(ii) (a) Calculate the return on capital employed and gearing ratios both before and after adjusting for the effects of the acquisition of the equipment. (b) Comment on the results in (a).

(iii) Explain whether it is logical for the directors to allow the proposal's impact on the financial statements to affect their decision about proceeding with the investment.

Solution

i.

Extra depreciation

£10m × 10% = £1.0m

Extra interest

£10m × 9% × 2/12 = £150,000

Grow Ltd
Forecast income statement
for the year ended 31 December 2008

	£000
Revenue	5,000
Cost of sales	(3,000)
	2,000
Other operating costs	(500)
	1,500
Finance charges	(870)
Net profit	630

Grow Ltd
Forecast balance sheet
as at 31 December 2008

	£000	£000
Non-current assets		26,500
Current assets		
Inventory	167	
Trade receivables	417	
Bank	50	
		634
Total assets		27,134
Equity		
Share capital		5,000
Retained earnings		3,720
		8,720
Non-current liabilities		
Loans		18,000
Current liabilities		414
		27,134

Solution

(ii) (a)

	Without asset	*With asset*
ROCE	2,500/(9,870 + 8,000) = 14%	1,500/(8,720 + 18,000) = 6%
Gearing	8,000/(9,870 + 8,000) = 45%	18,000/(8,720 + 18,000) = 67%

(b) The investment will make the company appear far less profitable (due to the lower ROCE) and far more risky (because of the much higher gearing ratio). Thus, the investment might undermine shareholder confidence.

Solution

(iii) Shareholder wealth is a function of future cash flows. Future cash flows are not affected by accounting choices or the accounting treatment of transactions. Entering into a transaction that has an adverse impact on the financial statements in the short term should not affect the long term prosperity of the company. The directors should be able to explain the short-term distortions arising from investments and other events. Unfortunately, in the real world shareholders will not always accept explanations of temporary downturns. Companies usually claim that bad results should not be taken too seriously because they do not wish shareholders to panic, so explanations and reassurances often carry very little weight. Shareholders may well pay more attention to a concrete set of reported results that have been audited than to a statement that the company is pursuing long-term goals.

The directors might feel that their personal positions are threatened by the effects of the transaction on the income statement and balance sheet. If the share price is depressed by concerns about the figures then the company could be taken over and the directors replaced.