

# Managerial Economics (UWEW29)

## Value Maximising Strategies - II

### Recap: Last week

- A firm can be viewed as a collection of assets
- Thus, its value equals discounted value of future earnings
- Appropriate rate of discount is the firm's weighted average cost of capital
- For given interest rate, equity cost of capital depends upon business risk + finance risk
- Equity cost of capital (and hence WACC) will vary with riskiness of business activities

### What we shall learn this week:

- How WACC might be changed by adjusting the firm's capital structure
- Why this strategy may be ineffective (according to Miller and Modigliani).

### INTRODUCTION

#### THE TRADITIONAL VIEW

#### THE MILLER AND MODIGLIANI HYPOTHESIS

#### CONCLUSION

### INTRODUCTION

From last week:

If  $K_e$  = cost of equity and  $K_d$  = cost of debt, then:

$$WACC = K_o = K_e \left( \frac{E}{D+E} \right) + K_d (1-t) \left( \frac{D}{D+E} \right) \quad (3)$$

'WACC' is the weighted average cost of capital

$D$  and  $E$  are the values of debt and equity (at market prices)

$t$  is the rate of corporate tax (interest paid on debt is tax deductible for firms)

Note that  $K_d$  usually less than  $K_e$ .

Note the last line.  $K_d$  usually less than  $K_e$  because debt carries less risk for investors. Also, interest is tax deductible.

(At the moment, for Ford Motor plc corporate bonds pay c7%, while return on equity is c12%.)

On the face of it, therefore, changing the balance of  $E$  and  $D$  should change WACC.

But also recall from last week that we saw that shareholder returns from a geared firm are more variable (riskier) than earnings from an all-equity firm (cet. par.)

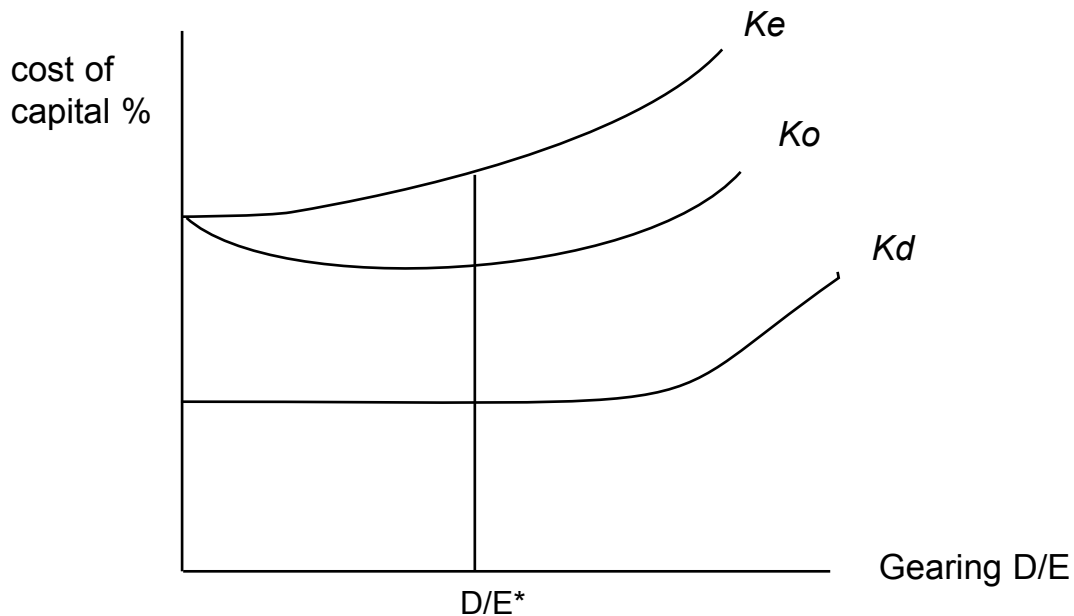
Now we have all we need for next stage of discussion.

## THE TRADITIONAL VIEW

Define gearing as  $D:E$

Increasing the level of gearing initially lowers the WACC until the increased risk to shareholders raises the cost of equity to such an extent that it offsets the cheaper debt.

There is no empirically confirmed level of gearing at which this happens and gearing levels vary widely across industries (and between firms) but they are usually less than 100% (i.e. 1:1)



*Q1: What does the diagram suggest is the optimum strategy for a management trying to maximise value of the firm?*

*Ans: Adjust the level of gearing until the proportion shown by  $D/E^*$  is achieved.*

## THE MILLER AND MODIGLIANI HYPOTHESIS

**For two firms with identical business risk and level of earnings, the cost of capital ( $K_o$ ) is independent of the level of gearing and is equal to the cost of capital for an all-equity firm.**

This amounts to saying that the value of a firm depends solely upon the level of earnings and the risk involved. 'The size of the pie is the same, however it is shared out'.

*Assumptions:*

1. Capital markets are perfect. (Information and transaction costs = 0; rational investors etc..)
2. No taxes

The basic idea is that in perfect capital markets investors can create their own 'home-made gearing'. Thus there is nothing that a firm can do by choosing a capital structure that people cannot do for themselves, so the firm cannot add any value which investors are willing to pay for. Investors are indifferent between all capital structures.

If two firms with same earnings and same business risk do have different capital structures and values, arbitrage will eliminate this.

### Example

Two firms have identical earnings of £10,000 and same business risk. A is an all-equity firm while B has a gearing ratio of 75%. The return on A's equity is 15%. The interest paid by B on its debt is 12%. Because of the gearing, its cost of equity capital is slightly higher than A's at 16%. However, its overall WACC is lower than A's and so B has a higher market value.

	Firm A	Firm B
Earnings	£10,000	£10,000
Interest on debt		£3,600
Earnings available to shareholders	£10,000	£6,400
Equity return ( $K_e$ )	0.15	0.16
Interest on debt ( $K_d$ )	—	0.12
Market value of shares (E)	£66,667	£40,000
Market value of debt (D)		£30,000
Total value of firm	66,667	70,000
Overall cost of capital ( $K_o$ )	15%	14.3%

### Arbitrage steps:

1. assume you are a rational investor owning 1 per cent of the shares in B (=£400)
2. sell these shares for £400
3. borrow £300. Notice that this is equal to 1% of the debt owed by firm B which you also 'owned' before the sale of shares.
4. buy 1% of shares in firm A for £666.67

Note that your income is now 15% on £666.67 = £100. This compares with 16% on £400 = £64. Clearly better? But wait. You have borrowed £300 at 12%. This interest (=£36) must be deducted. £100-36 = £64. But you earn this £64 on a personal investment of £366.67 (=£666.67 - £300). Investing in A is preferable to investing in B.

If investors are rational and well-informed, investors in B will sell and buy shares in A.

Qn: What is the effect of this switch on:

- Market value of B's shares
- Return on B's equity
- Market value of B?

Ans: fall / rise / fall

Where will the process end? Where there are no more arbitrage profits to be had.

Suppose that all the adjustment takes place in the price of B (ie A's share price is unchanged).

*Qn: What will be (i) B's value, (ii) value of B's share, (iii) B's equity return and (iv) WACC?*

*Ans: (i) £66,667 (from Miller-Modigliani)*

*(ii) £36,667 (arbitrage affects the share price only)*

*(iii) 17.45...% (6,400/36,667)*

*(iv)*

$$WACC = K_o = 17.45\% \left( \frac{36667}{66667} \right) + 12\% \left( \frac{30000}{66667} \right) = 15\%$$

From this, M and M deduce three important propositions:

I The market value of any firm is independent of its capital structure and can be found by capitalising its earnings at the capitalisation rate (WACC) of an all-equity firm.

II The expected return on equity increases linearly with the gearing ratio. This is what ensures the result in I (I leave it to you to prove it mathematically).

III Since a firm's investment projects should be appraised by using its WACC, then this too should be done using the cost of capital for an equivalent all-equity firm.

#### CONCLUSION

So why do analysts (and managers) pay so much attention to capital structure?

Recall the restrictive assumptions of M&M.

1. In a perfect capital market everyone can borrow unlimited amounts at the going rate. Thus in our eg. the firm paid 12% and the individual borrowed at 12%. V. unlikely in practice. The individual will pay >12% and this limits the arbitrage gain.

2. In the real world there are taxes. Interest is tax deductible for firms but not for individuals. In our example, the firm paid 12% interest and the shareholder paid 12%. In practice, this further raises the cost of borrowing for the individual relative to the firm.

3. In the real world, there are transaction costs. In our example the shareholder would have to pay commission on selling shares in B and buying shares in A.

And other imperfections.

What all this means is that the potential arbitrage gain has to be quite large because only a fraction of the benefit is going to be accessible. Values (and WACCs) will never move to full equality. But the basic M&M message should always be remembered:

**The fundamental source of firm value is its level of earnings, given the risk.**

