Chapter 19

THE COST OF CAPITAL – THE EFFECT OF CHANGES IN GEARING

1. Introduction

In this chapter we will look at the effect of gearing on the cost of capital for a company, and the implications of it for the way in which a company raises finance and the way in which it should appraise investments.

Importantly, in this chapter we will not consider the effect of investing in projects that are more or less risky than the current activities of the company – we will consider this separately in the following chapters. We will therefore assume in all examples that any new projects have the same level of business risk as the current activities of the company.

2. The 'Traditional Theory' of gearing.

2.1. It has long been accepted that:

(a)   equity borrowing is more expensive than debt borrowing (for the reasons stated in the previous chapter)

and,

(b)   that higher levels of gearing increase the risk to shareholders, and therefore result in higher costs of equity.

It would seem sensible therefore that if the level of gearing in a company changes, then so to will the WACC.

Example 1

**Complete the following table by calculating the WACC at each level of gearing.**

Equity / Debt	100%/0%	80%/20%	60%/40%	40%/60%	20%/80%
Cost of Equity	20%	22%	25%	30%	35%
Cost of Debt	10%	10%	10%	12%	16%
WACC					

The figures above are only invented in order to illustrate what seems an obvious proposition – that as the level of gearing changes, the WACC stands also to change.

If it is the case that the WACC changes with gearing, then there must be a level of gearing at which the WACC is a minimum.

2.2. This can be illustrated on a simple graph:
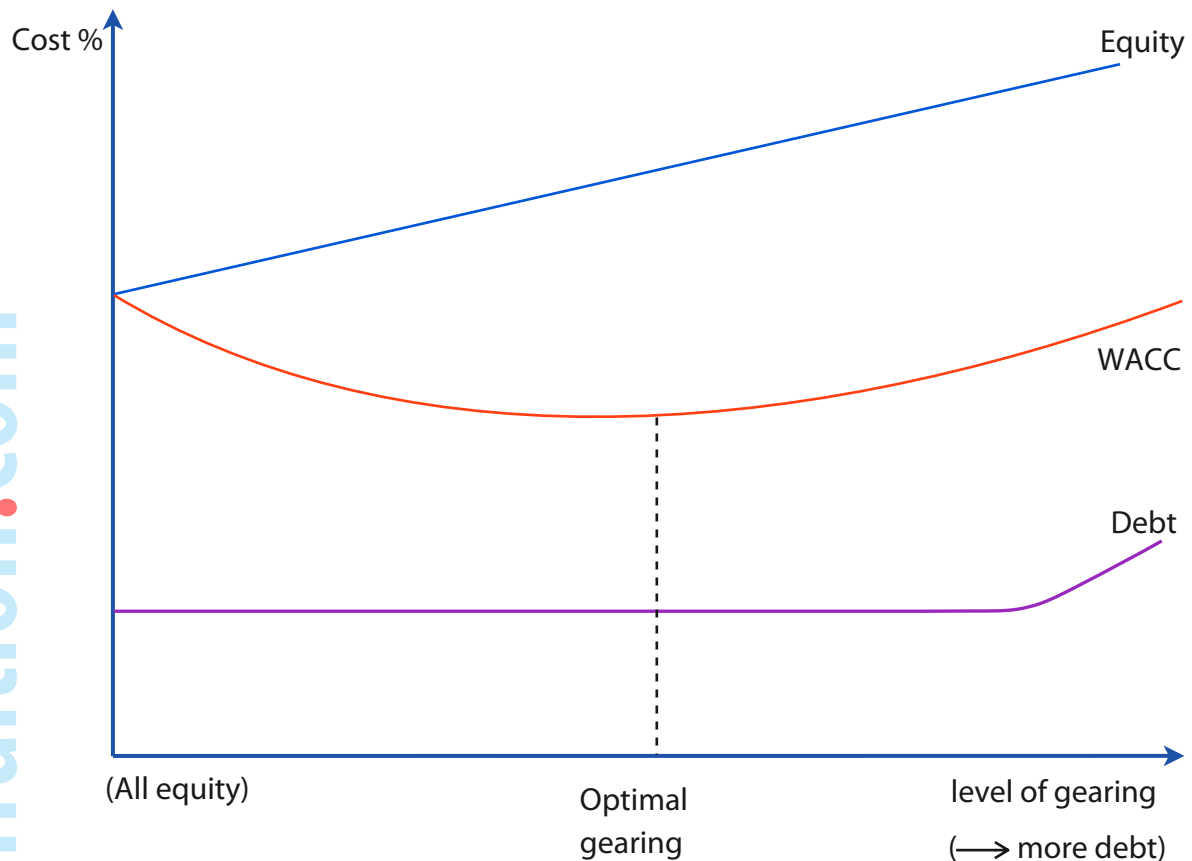
Note that the above graph is only illustrative. The actual way in which the cost of equity reacts to changes in gearing does not matter – all that matters is that as gearing increases, the cost of equity will increase and the weighted changes. As a result it seems sensible that the WACC will change in some way and that therefore there must be a level of gearing at which the WACC is at a minimum – the optimal level of gearing.

2.3. The implications of the above are as follows:

(a)   Since a company should always wish to borrow in the cheapest possible way, it should raise debt finance until it achieves the optimal level of gearing

(b)   Once the company has reached its optimal level of gearing, it should maintain that level of gearing by raising future finance part equity/part debt in such a way as to keep the optimal level of gearing unchanged.

(c)   Whilst gearing up, the company should appraise projects at the cost of the extra finance raised (the marginal cost of capital).

(d)   Once optimal gearing has been achieved (and is maintained) then projects should be appraised at the cost of the extra finance raised. However, since the WACC will remain unchanged, the cost of the extra finance will be equal to the WACC.

All of the above is really an expression of common sense rather than any theory.

Certainly, in an examination and in the absence of any additional information, we assume that the company has reached its optimal level of gearing and is maintaining it. We do therefore appraise projects at the WACC.

However, although the above does illustrate the fact that it is important that a company thinks carefully about how to raise additional finance, it would be useful if a company were

able to know in advance as to what their optimal level of gearing were in order that they could go straight to it!

The traditional theory only illustrates the importance of gearing, it does not attempt to quantify the effect of changes in gearing.

In the 1950's, two academics – Modigliani and Miller – decided to try and quantify it on the basis that the risk to shareholders through higher gearing is something that is quantifiable. As a result we should be able to predict the effect of the cost of equity of higher gearing, and therefore predict the WACC.

3. Modigliani and Millers' theory of gearing – ignoring taxes

Modigliani and Miller did not argue with the traditional view that higher gearing created more risk for shareholders, and that therefore the cost of equity would increase. What they did was quantify the effect that higher gearing would have on the cost of equity (making various assumptions regarding a 'perfect world' – these will be listed later).

They produced a formula that would give the cost of equity for any level of gearing (the formula is not in the syllabus for your examination), but when they used this to calculate the WACC, they found (in the absence of taxation) that in fact the WACC would remain constant for all levels of gearing.

If you are wondering how this can be possible, consider the following example.

**Example 2**

Complete the following table by calculating the WACC at each level of gearing.

Equity / Debt	100%/0%	80%/20%	50%/50%	40%/60%
Cost of Equity	20%	22.5%	30%	35%
Cost of Debt	10%	10%	10%	10%
WACC				

They proved that although the cost of equity does indeed increase with higher gearing, it does not increase in a random way but in such a precise way as to keep the WACC constant.

3.1. A simple graphical illustration of their results is as follows:
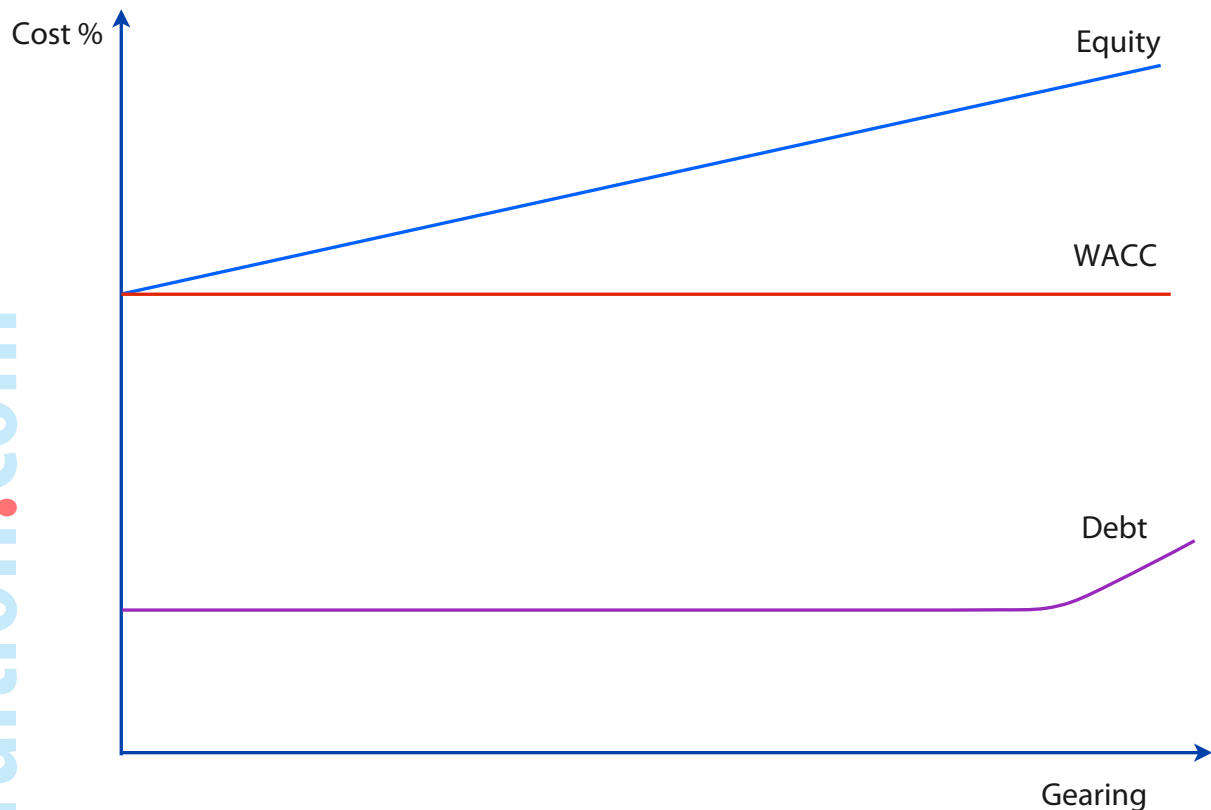
3.2. The implications of their results are as follows:

(a) it is irrelevant how a company raises finance – the overall cost of borrowing will be unaffected

(b) all investments should be appraised at the WACC, however they are actually financed.

A further implication is that the total market value of the company (equity plus debt) will be unaffected by changes in gearing. This is to an extent logical, because whichever way in which the company is financed, the total available for distribution will be unchanged – if more goes to debt then there is less to equity, and vice versa, but the total must be the same. Therefore, why should the total value of the company be any different?

Modigliani and Millers' proof is outside your syllabus and is therefore not reproduced in these notes. If you are interested in seeing it then you can find it in the Study Text, although you do not need to learn the proof.

Although the above caused a lot of interest at the time, it had limited practical relevance because it ignored all taxes.

They therefore went further and developed their model for a world with tax. They introduced Corporation Tax into their model (but initially ignored Personal Taxes) and it is this model (and the associated formulae) that you need to learn for the examinations.

4. Modigliani and Millers' theory of gearing – with corporation tax

As we saw in the previous chapters, the effect of corporation tax is to reduce the cost of debt to the company (because of tax relief on interest payments). However, corporation tax has no effect on the cost of equity because dividends are not tax allowable.

Let us repeat Example 2, but introduce corporation tax at 30%. This will reduce the cost of debt to only 70% of the previous figures.

Example 3

Complete the following table by calculating the WACC at each level of gearing.

Equity / Debt	100%/0%	80%/20%	50%/50%	40%/60%
Cost of Equity	20%	22.5%	30%	35%
Cost of Debt	7%	7%	7%	7%
WACC				

They proved that with corporation tax, higher levels of gearing resulted in a lower WACC (because of the benefit of the tax relief on debt interest).

4.1. A simple graphical illustration of their results is as follows.
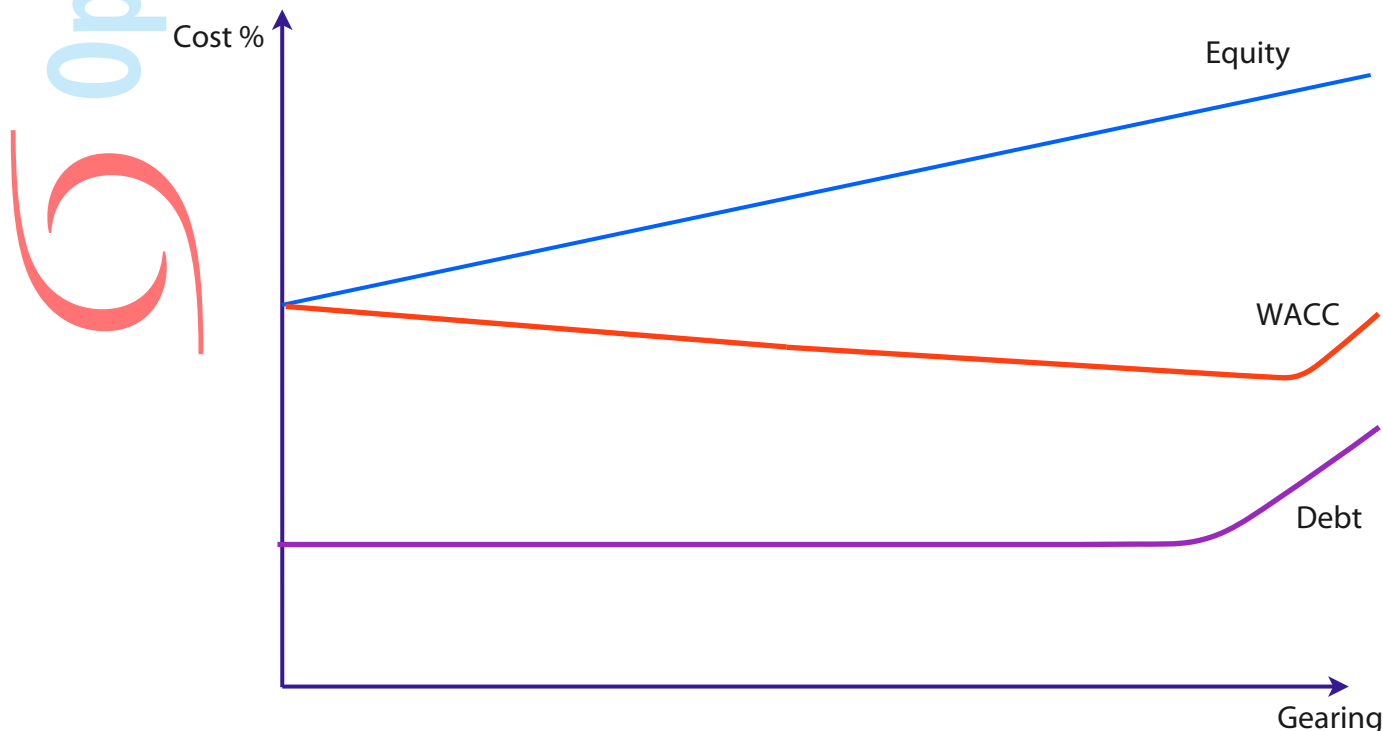
4.2. The implications of the above are as follows:

(a) the WACC will fall with higher levels of gearing

(b) a company should raise as much debt as possible (in order to get as much tax relief as possible)

A further implication of the above is that as the level of gearing increases, the total market value of the company (equity plus debt) will also increase. This is in fact logical because as the company has more debt borrowing and therefore pays more interest, they will pay less tax on the same (before interest) profits and therefore be able to distribute more in total (to equity and debt together). If they are able to distribute more then certainly the total value of the company should be higher.

Again, Modigliani and Miller produced formulae expressing how the WACC and the total market value of the company are affected by the level of gearing.

Although the introduction of corporation tax did make the model more practical, it did still ignore personal tax. They did do further work on the effect of personal taxation, but this is not in your syllabus and is not therefore in these notes. If you do wish to read about it you can find it in the Study Text.

5. Modigliani and Millers' assumptions

Although you are not expected to know the proof of Modigliani and Millers' theory, you are expected (for written parts to questions) to be aware of the main assumptions that they made in producing their theory.

5.1. Their main assumptions are as follows:

- shareholders have perfect knowledge
- shareholders act rationally with regard to risk
- a perfect market exists
- debt interest is tax allowable (and the company is able to get the benefit of it)
- investors are indifferent between corporate gearing and personal gearing
- the debt borrowing is irredeemable

6. Pecking order theory

Pecking order theory has been developed as an alternative to traditional theory. It states that firms will prefer retained earnings to any other source of finance, and then will choose debt, and last of all equity

6.1. The order of preference will be:

- Retained earnings
- Straight debt
- Convertible debt
- Preference shares
- Equity shares

Now read the following technical article available on the ACCA website:
"Optimal capital structure"