2.3.1 Beta Issues and Gearing

Unit: Unit 1 – Treasury Strategy

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Learning outcomes:

1. To understand the variety of beta by industry sector.
2. To understand the practicalities of finding a beta and weaknesses in its reliability.
3. To understand the difference between geared and un-geared betas (asset beta) and be able to make adjustments to reach one from the other, according to the Hamada formulae.
4. To be able to understand the implication of unstable capital structures in project evaluation and to know when to use geared cash flows.
5. To understand project evaluation in joint ventures such as project finance structures.

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1 Introduction

The academic theory around the creation of a WACC, based on the Capital Asset Pricing Model, has many simplifications, such as one interest rate, one equity premium, an accurate beta and so on. However, the real world is rather more complicated and firms are increasingly global. Different countries have different interest rates and inflation rates, the equity premium will differ, the beta is a concept which doesn't translate too well into practice and firms often comprise divisions which have different business characteristics.

We will try and deal with some of these issues in this reading, but ultimately practitioners have to face up to practicalities and realise that the theory may not provide answers in every case. However, despite limitations, the lack of an exact answer should not deter us from trying to get value from the theories.

Firstly, we can use the theories to get a range for an answer. If the theory tells us that our WACC might lie between 8% and 12% say, that is a very wide range and might cause confusion for management and decision making. However, it does tell us something. It does say that our WACC is not 5% and it is not 15%, which does have value.

Secondly we find that the language of investment and corporate finance includes CAPM, together with beta, WACC and so on. If all the students of corporate finance are taught CAPM, and then go on to use it, then we must understand it as treasurers, despite its limitations.

We will attempt to tackle some of these issues in this reading.

Read pages 116 - 131 (Fundamental Betas) from Applied Corporate Finance, by Aswath Damodaran, 4th edition.

2 Beta

You will recall that beta measures the relationship of a share's return compared to that of the market portfolio, which we generally refer to as the market. Theoretically, since an investor can maximise his return at any given risk level by holding a mix of the market portfolio and the risk free asset, we can equate beta with risk. Ideally, if we are to use beta to adjust for risk, we need to have access to beta data. Otherwise, we will simply be making arbitrary adjustments, although this might be a better approach than none.

Aswath Damodaran maintains a vast array of financial data online at *The Data Page*[1] which is updated annually each January. This is a great source of company data, grouped in a variety of formats. MCT students are expected to have a good feel for current market data and this extends beyond treasury into corporate finance, so you will be expected to have some idea of the likely beta for an industry sector.

[1] http://pages.stern.nyu.edu/~adamodar/New_Home_Page/data.html

2.1 Beta by industry sector

Exhibit 1 shows European industry sector betas at January 2012 and January 2015 for around 100 different sectors, taken from the Damodaran data. They ranged from 0.19 for Educational Services in 2012 through to 1.99 for Shipbuilding & Marine in 2015. The average is around 1 in 2012 but higher in 2015. Don't worry too much about the calculation method, which is bound to throw up complications. It is interesting to see how the beta can change in the period. Some sectors have been reclassified in the period.

Exhibit 1: European industry sector betas, January 2012 and January 2015

	January 2012	January 2015
Advertising	0.76	0.86
Aerospace / Defence	0.94	1.15
Air Transport	0.99	1.48
Apparel	0.88	1.09
Auto & Truck	1.39	1.80
Auto Parts	1.39	1.87
Bank	1.50	1.72
Banks (Regional)	0.66	0.80
Beverage	0.51	0.60
Beverage (Alcoholic)	0.59	0.86
Broadcasting	1.19	1.50
Brokerage & Investment Banking	0.67	1.02
Building Materials	0.88	1.05
Business & Consumer Services	0.85	1.09
Cable TV	0.86	1.18
Chemical (Basic)	0.94	0.89
Chemical (Diversified)	1.47	1.77
Chemical (Specialty)	0.83	1.10
Coal & Related Energy	0.99	1.61
Computer Services	0.90	0.95
Computer Software	0.84	1.11
Computers/Peripherals	1.29	1.45
Construction	1.25	1.49
Diversified	1.15	1.38
Drugs (Biotechnology)	0.93	1.41
Drugs (Pharmaceutical)	0.86	1.27
Educational Services	0.19	1.06
Electrical Equipment	1.06	1.51
Electronics	1.02	1.12
Electronics (Consumer & Office)	1.03	1.44
Engineering	1.23	1.36
Entertainment	0.72	1.17
Environmental & Waste Services	0.90	1.04

Farming/Agriculture	0.76	0.79
Financial Services.	0.82	
Financial Services. (Non-bank & Insurance)	1.34	1.06
Food Processing	0.70	0.93
Food Wholesalers	0.63	0.73
Furniture / Home Furnishings	0.89	1.04
Green & Renewable Energy		1.18
Healthcare Services	0.87	1.15
Healthcare Information and Technology	0.84	1.09
Healthcare Products	0.57	1.01
Healthcare Equipment	0.81	
Healthcare Facilities	0.82	0.76
Heavy Construction	1.07	
Homebuilding	1.27	1.01
Hotel/Gaming	0.97	1.11
Household Products	0.66	0.82
Information Services	0.78	1.06
Insurance (General)	1.12	1.34
Insurance (Life)	1.38	1.97
Insurance (Prop / Casualty)	1.18	1.22
Internet software and services	0.76	1.29
Investment Co.	0.68	0.79
Machinery	1.22	1.27
Metals & Mining	1.55	1.61
Office Equipment & Services	0.66	0.87
Oil/Gas (Integrated)	1.29	1.61
Oil/Gas (Production and Exploration)	1.32	1.61
Oil/Gas Distribution	1.04	1.69
Oilfield Services/Equip.	1.29	1.60
Packaging & Container	0.91	1.03
Paper/Forest Products	1.21	1.23
Power	0.80	1.01
Precious Metals	1.01	1.15
Publishing & Newspapers	0.88	1.26
R.E.I.T.	0.59	0.97
Railroad	0.57	0.84
Real Estate	0.83	0.88
Real Estate (Development)	0.84	0.91
Real Estate (Operations & Services)	0.68	0.73
Recreation	0.71	1.12
Reinsurance	1.00	1.09
Restaurant	0.92	1.00
Retail (Automotive)	0.93	1.03

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Retail (Building Supply)	0.92	0.86
Retail (Distributors)	0.87	1.09
Retail (General)	0.87	1.19
Retail (Grocery and Food)	0.64	1.14
Retail (Internet)	0.65	1.25
Retail (Special Lines)	0.91	1.19
Rubber & Tyres	1.93	1.23
Semiconductor	1.53	1.93
Semiconductor Equip	1.80	1.70
Shipbuilding & Marine	1.27	1.99
Shoe	1.01	1.02
Steel	1.41	1.65
Telecom (Wireless)	0.95	1.49
Telecom. Equipment	1.02	1.31
Telecom. Services	0.84	1.21
Thrift	1.25	
Tobacco	0.39	0.82
Transportation	0.95	1.10
Trucking	0.85	0.94
Utility (General)	0.79	1.23
Utility (Water)	0.46	0.71

Intuitively we would expect certain sectors, such as the automotive sector and housing, which react sharply to economic conditions to have high betas. Looking at the data we see:

Exhibit 2: Selected European industry sector betas, January 2012 and January 2015

Retail (Automotive)	0.93	1.03
Auto Parts	1.39	1.87
Auto & Truck	1.39	1.80

The data combines the automotive and truck sectors, but nevertheless a beta of 1.39 / 1.85ish is broadly as expected. The recent higher beta reflects the recent strength in automotive. Note that auto parts includes original equipment manufacturers and aftermarket spares (often these are one and the same), so whilst we might expect some reduction in beta given that expenditure on aftermarket parts is largely unavoidable, a beta in line with manufacturers is not unexpected. The retail beta however is much lower than might be expected, although this could be viewed as simply a reflection that the market tracks the general economy, so that when times are good, people buy more cars.

Looking at construction and homebuilding the data for both these sectors in 2012 is more in line with our intuitive expectations. The construction sector can outperform in a recovering economy although homebuilding might have been expected to follow upwards in 2015.

Exhibit 3: Selected European industry sector betas, January 2012 and January 2015

Construction	1.25	1.49
Homebuilding	1.27	1.01

At the other end of the spectrum we would expect to see very low betas for sectors which do not move with the business cycle, where demand is constant, such as tobacco and food.

Exhibit 4: European tobacco industry sector beta, January 2012 and January 2015

Tobacco	0.39	0.82

In 2012 tobacco had the second lowest beta by industry sector although the 2015 result is more surprising, but not much higher than the minimum, of 0.60 in soft beverages.

All the food industry sectors have fairly low betas, as might be expected, but turmoil in 2015 in the retail sector (e.g. Tesco) has led to the expected result.

Exhibit 5: European food industry sector betas, January 2012 and January 2015

Food Wholesalers	0.63	0.73
Retail (Grocery and Food)	0.64	1.14
Food Processing	0.70	0.93

2.2 Beta in one industry sector

It is interesting to look at the calculations behind the betas for one particular sector. Exhibit 6 gives all the data for companies listed in the European Retail (Automotive) sector which has an average beta of 0.93. This is done for 2012 only but you may wish to research your own sector in a similar way.

Exhibit 6: European Retail (Automotive) sector betas, January 2012[2]

Company	Country	Beta
Aaa Auto Group N.V. (SEP:BAAAAA)	Czech Republic	1.14
Andersen & Martini A/S (CPSE:AM B)	Denmark	0.13
Bilia AB (OM:BILI A)	Sweden	1.71
Caffyns plc (LSE:CFYN)	United Kingdom	0.61
Cambria Automobiles plc (AIM:CAMB)	United Kingdom	0.00
Cloppenburg Automobil AG (DUSE:CLG)	Germany	0.17
Delticom AG (XTRA:DEX)	Germany	1.23
DUMPcar AG (DB:APY)	Germany	0.96
Eurobike AG (DB:EUB)	Germany	2.47
Halfords Group plc (LSE:HFD)	United Kingdom	0.71
HR Owen plc (LSE:HRO)	United Kingdom	0.59
Kindwalls Bil AB (OM:KWAL B)	Sweden	0.69

[2] See accompanying spreadsheet for further detail.

Lastas A/S (CPSE:LAST B)	Denmark	0.84
Lookers plc (LSE:LOOK)	United Kingdom	1.05
Mekonomen AB (OM:MEKO)	Sweden	0.96
Pendragon plc (LSE:PDG)	United Kingdom	2.06
Sfakianakis SA (ATSE:SFA)	Greece	1.64
Statoil Fuel & Retail ASA (OB:SFR)	Norway	0.00
Stern Groep NV (ENXTAM:STRN)	Netherlands	0.93
Vertu Motors Plc (AIM:VTU)	United Kingdom	0.73

Excluding the two companies with zero betas (for reasons which are unclear), the range is from 0.13 to 2.47. Even considering just those companies listed on the London Stock Exchange, the range is 0.59 to 2.06.

Note that the sector beta of 0.93 for the Retail (Automotive) sector is a simple arithmetic average. Making two simple changes will change the beta from this number.

Firstly, excluding the two zero betas increases the average to 1.03. Zero betas probably indicates some false data. Secondly, weighting these betas by Enterprise Value (EV) results in a sector average of 1.19.

It also does not really make sense to average betas across different stock markets. The main London stock market is dominated by oil, mining and finance whereas Germany, for example, has a much higher percentage of engineering businesses. The market portfolio in each will not be the same and this is important as beta compares company returns to the market portfolio. So if HR Owen plc were listed in Germany, it would almost certainly have a different beta.

Note also that sectorisation also introduces problems, especially where a company does not operate in a single sector but has different divisions. The largest quoted automotive retailer in the UK is Inchcape plc, three times the size of Halfords, the biggest UK constituent in the dataset, yet Inchcape does not even figure in the dataset because it is classified as a general retail distributor. This can be even more problematic when we combine data from different markets. Consider Statoil Fuel & Retail. This is part of the largely state owned oil and gas company in Norway. Clearly it has no place in this dataset – it is three times the size of any other constituent company - but it is categorised as such because of its retail fuel business.

Interestingly, if we calculate the average and weighted average betas for those companies listed on the main market of the London Stock Exchange, we get an average beta of 1.00 and a weighted average of 1.22, almost identical to the figures for the entire European sector.

However, if we add in Inchcape which has a beta of 1.92, the average beta increases to 1.06, but the weighted average rises to 1.60 because of its size.

Even this is not a complete picture because a significant part of the retail automotive business is not operated by quoted companies but is operated by unquoted businesses or by the manufactures themselves. None of this data is captured.

2.3 Implications for financial management

Firstly, as ever, we should be aware of the dangers of blindly using statistics. Questions at every stage of the process are valuable.

Particular care is required where no market data is available. Thus when trying to establish a cost of capital in a division of a diversified group or in unquoted businesses, it is necessary to *construct* a beta from data applicable to other companies, ideally those with similar characteristics. The likelihood is that, at best, we will be able to establish a range for the beta in these circumstances.

3 Geared and un-geared betas

Comparable betas usually have to be adjusted to reflect differences in capital structures. Debt increases the overall riskiness of a firm to its shareholders. Remember that the costs of debt must be met as they fall due whereas there is no similar cost of carry for equity. Thus a debt laden firm should, prima facie, have a higher equity beta. Similarly, while the returns of two firms with the same beta can be expected to vary with market returns in the same way, this does not mean that both firms have the same underlying or business risk. For example, take two firms both having a beta of 0.8, one with no debt and the other with a high level of debt. Clearly in the firm with a high level of debt, part of the beta relates to the capital structure whereas this will not be the case in the firm with no debt. The firm with no debt must have higher underlying business risk.

By definition the beta for the market as a whole is one, and by extension, the beta for the average firm in the market is also one. Since most firms have some level of debt in the capital structure, this means that betas reflect this level of debt. For clarity we sometimes call such betas **equity betas** or **geared betas** although the simple term beta is much more common. **Generally whenever the term beta is used, or you are provided with a beta for a company, you should assume that this relates to an equity beta unless this is obviously not the case from the context.**

The betas provided by data services such as Bloomberg are all equity betas. It is therefore difficult to compare firms without knowledge of their capital structures. We need to get around this.

3.1 The Asset or un-geared beta

Shareholders and debt holders both receive a share of the firm's cash flows and both bear part of the risk. Clearly there is *some* risk, for if the firm goes to the wall, there is no cash for shareholders or debt holders. However, the risk for debt holders is much lower. Consider the case where one person owns all the stock and debt of a firm. That person is then entitled to receive all the residual cash flows and bears all the risks. So we can say that the whole-firm or asset beta is equal to the beta of the firm's equity and its debt, suitably weighted. This implies that we can calculate asset betas from the weightings of debt and equity, but as in the WACC calculation, we also need to consider tax.

For the time being, if we accept that the firm is financed by equity and debt, the value of the firm (the so-called Enterprise Value or EV) comprises the value of its equity plus the value of its debt. So:

EV = EL + D

where EL is the market value of its equity and D is the market value of its debt

However, jumping ahead slightly, Modigliani and Miller's work[3] also allows us to write:

EV = Vu + VTS

Where:

Vu = value of the unlevered company, i.e. the firm with no debt.
VTS = present value of the tax shield

Equating these two equations for EV, we can write:

EL + D = Vu + VTS

and re-arranging, we get an expression for Vu, the value of the unlevered company – in other words a value for the underlying assets of the company.

Vu = EL + D - VTS

Now, what is VTS?

Tax Shield = Interest x Tax Rate, for one year.

= (kd x D) x t

So, if we assume that tax rates are constant and there is always tax capacity to relieve this interest (this means we can discount the cash flows using the cost of debt as the tax shield only depends on the cost of debt under these conditions) we can value these cash flows using the perpetuity formula as:

[3] You will hear arguments, often from finance directors, which suggest that equity is cheaper than debt because it has no cost of carry or the dividend yield is below current interest rates. You will (hopefully more often) hear other arguments which suggest that equity is more expensive than debt, yet Modigliani and Miller (M & M) argue that in a World without tax a firm should be indifferent between the two. Although the cost of equity is generally higher than the cost of debt, M & M argue that the average cost of capital is always the same and equal to the cost of equity. Clearly this is true for the firm funded solely by equity. What about the firm with a high level of debt? Here M & M argue that as the level of debt increases, the cost of equity increases due to the higher risk of bankruptcy. The lower cost due to a higher proportion of debt is exactly offset by an increase in the cost of equity, keeping the overall cost of capital constant. So, in a World with no taxes, holding debt should have no value. However this picture is changed with the introduction of tax. The cost of capital is then lowered as interest is tax deductible (the tax shield) and this increases the value of the firm.

$$V_{TS} = \frac{t \times k_d \times D}{k_d} = D \times t$$

Substituting back in:

Vu = EL + D – Dt

Vu = EL + D(1-t)

This should be thought of as the value of a levered company which is not attributed to the tax shield. Note that this seems to contradict the formula:

EV = EL + D

but as we started with this equation, there is no contradiction. This is merely another way of saying that some debt in a structure will reduce the WACC, thus raising the equity value. The beta has risen, raising the expected return on the equity.

Example 1: Value of the tax shield

Serendipity SA is a French based quoted manufacturer of machine tools. It has a market value of EUR 100 million. It has no cash or debt and the tax rate in France, where most of its manufacturing sits, is 35%. Its enterprise value is therefore also EUR 100 million. It has been advised that its capital structure is inefficient and so declares a special dividend of EUR 20 million, financed by a new debt facility. The interest rate for the debt is 5%.

Serendipity now has debt of EUR 20 million, for which the value of the tax shield is:

Tax Shield = Debt x Tax Rate
= 20 x 0.35
= EUR 7.0 million

The equity value will now change to

	EUR 100 million	
Less	EUR 20 million	dividend declared
Add	EUR 7.0 million	tax shield
Total	**EUR 87.0 million**	

The enterprise value is now

Equity	EUR 87 million
Debt	EUR 20 million
Total	**EUR 107 million**

The value of the unlevered firm is now:

Vu = EL + D(1-t)

Equity	EUR 87 million	
Debt	EUR 13 million	Debt x (1 – t)
Total	**EUR 100 million**	

Note the difference between the Enterprise Value and the value of the Unlevered firm.

3.2 The Hamada un-gearing formula

The asset or un-geared beta attempts to isolate that part of the beta which is due to the assets of the firm rather than to its financial risk. Several methods can be used to calculate the asset or un-geared beta and these are referred to as un-gearing formulae. We use the Hamada Formula, which implies that:

$$\beta_u = \beta_g \times \frac{E}{D(1-t)+E} + \beta_d \times \frac{D(1-t)}{D(1-t)+E}$$

i.e. the asset or un-geared beta (βu) is the weighted average of the company's equity or geared beta (βg) and its debt beta (βd)

Now, if we assume that βd = 0 (which is an assumption we make throughout the MCT syllabus, which essentially says that the return on debt is not correlated with the market return), we arrive at the ***Hamada Un-gearing Formula***:

$$\beta_u = \beta_g \times \frac{E}{D(1-t)+E}$$

or, dividing throughout by E

$$\beta_u = \beta_g \times \frac{1}{1+(1-t)\cdot D/E}$$

Example 2: Un-gearing betas

Following the dividend payment by Serendipity SA, seen in Example 1, management have noticed that the shares have become more volatile and their investment bank, Credit de Marseilles, has calculated that the beta for the shares is now 1.2. Calculation of the asset or un-geared beta, is as follows, using the Hamada formula.

$$\beta_u = \beta_g \times \frac{E}{D(1-t)+E}$$

$$\beta_u = 1.2 \times \frac{87}{20(1-0.35)+87}$$

$$= \quad 1.044$$

3.3 The Hamada re-gearing formula

Rearranging, we get the **Hamada Re-gearing Formula**:

$$\beta_g = \beta_u \times \frac{D(1-t)+E}{E}$$

or

$$\beta_g = \beta_u \times \left(1 + (1-t) \cdot D/E\right)$$

Example 3: Re-gearing betas

To prove the formula, we re-gear the beta found in Example 2, using the Hamada formula.

$$\beta_g = \beta_u \times \frac{D(1-t)+E}{E}$$

$$\beta_g = 1.044 \times \frac{20(1-35)+87}{87}$$

$$= 1.2$$

3.3 Issues around the Hamada formula

There are limitations to the use of the Hamada formula, as there are of course limitations with many theories. These limitations apply particularly in highly geared situations. While academics are generally aware of the assumptions underlying their theories and their consequent limitations, practitioners, on the other hand, take the results and apply them – often in ways which are not entirely appropriate.

3.3.1 Modigliani & Miller (M&M)

Earlier, we quoted a famous M&M equation: EV = Vu + VTS

Where:

Vu = value of the unlevered company, i.e. with assuming no debt.
VTS = present value of the tax shield

We then used this to derive the Hamada formula.

But, the logical consequence of M&M's equation is that a firm will continue to increase in value as more debt is taken on. This is clearly nonsense as firms cannot finance with 100% debt. The more debt taken on, the greater the risk of default as the interest burden rises and the greater the risk of bankruptcy for shareholders. M&M's theory was adapted to include the costs of financial distress. The formula becomes EV = Vu + VTS – the costs of financial distress.

These costs of financial distress have been ignored in deriving the Hamada formulae. Since the costs of financial distress increase with leverage, Hamada is increasingly unreliable as leverage increases.

3.3.2 The present value of the tax shield

We discounted the tax shield at the cost of debt. This means that we are assuming that tax rates are constant, debt is permanent and that there is always sufficient tax capacity to relieve the interest. The likelihood is that the discount rate should be higher than the cost of debt. This means that the present value of the tax shield should be reduced.

Once again we are faced with the situation where EV is reduced and the reduction is more significant at higher levels of gearing, so again, Hamada is increasingly unreliable as leverage increases.

3.3.3 βd = 0

Earlier, before we made the simplifying assumption that βd = 0, we derived the expression:

$$\beta_u = \beta_g \times \frac{E}{D(1-t)+E} + \beta_d \times \frac{D(1-t)}{D(1-t)+E}$$

Is the beta of debt really 0? In general terms the price of debt (that is interest, the return on debt) does not vary with the return on the market portfolio in anything like the same way as equities. However, there is some correlation as increasing market returns are often (eventually) accompanied by higher inflation and higher interest rates. However, the correlation is small, and for conservatively geared companies, the assumption that βd = 0 is probably acceptable. However, for highly geared companies (or companies in distress) debt can take on some of the characteristics of equity (as the debtholders will usually end of as owners following bankruptcy) and βd > 0.

This means that if we are gearing up a beta (ie we want to calculate βg), we will be over-stating its value as we should be deducting the value associated with βd in the above equation. The adjustment is:

$$\beta_d \times \frac{D(1-t)}{E}$$

which could be significant for highly geared companies as D will be high relative to E and βd > 0.

Clearly we can overcome this weakness by using the Hamada formula without the βd = 0 assumption.

4 Geared analysis: unstable capital structures

In un-geared analysis, it is generally assumed that gearing is stable over time and the same WACC is used for all projects.

Many companies target a stable capital structure. Nevertheless WACC will vary from one period to another. This is inevitable with listed companies as the market value of equity will almost certainly move up and down, even if the market value of debt is relatively stable. Even if all the other components of WACC are static, the WACC will change to reflect the different

weightings of debt and equity. This does not mean that a stable capital structure target has been abandoned, merely that it cannot be micro-managed. The management of the capital structure is inevitably clunky as, for reasons of cost and convenience, debt finance and equity tend to be raised in chunks, further adding to the variation. Equally the repayment of term debt and bonds is lumpy, as is the repayment of equity, be it through dividends or buybacks.

Generally, if the gearing trend is intended to be stable, the ungeared approach assuming a stable WACC is still appropriate for project evaluation.
However, an assumption of a stable capital structure is sometimes not appropriate. Consider for example a leveraged buyout (LBO), or similar private equity type transaction, or a project finance venture. At inception the level of gearing in a private equity venture will be very high, but this will be planned to reduce over time; similarly with project finance where the debt will be repaid over the life of the project. In such circumstances the WACC is clearly dynamic, and it would make sense to vary the WACC used in any project analysis, especially over time but perhaps according to changing risk as well, which also varies with time in these situations.

4.1 Using IRR and NPV

We know that IRR is unique, so it is difficult to use WACC as the hurdle rate if it varies from one period to the next. If it does, the project might appear viable in some periods, but not in others. Therefore, to use IRR effectively, it helps if the WACC is consistent from one period to the next.

For NPV analysis we can easily use different WACCs as the discount factor as we have already noted.

4.2 Geared cashflows

Another approach is to analyse the geared cash flows, that is the cash flows including all the affects of financing – capital, interest & tax shield.

Because of the need to model finance and taxation, geared analysis (or variable WACC ungeared analysis for that matter) is rarely applied to individual projects at divisional level within companies, although in theory there is no reason not to.

By using geared cash flows the effects of varying the capital structure are automatically dealt with as loan advances, repayments and interest payments are included within the cash flows being analysed.

Many students who have trained as accountants baulk at this point as they have always been told to ignore interest when undertaking project analysis. However, this is because traditional analysis considers un-geared cash flows which are discounted using WACC which reflects the cost of debt financing.

In geared analysis, the residual cash flows belong to the investors (including minorities if any). They are often referred to as Free Cash Flows to Equity (“FCFE”). The appropriate discount rate is therefore the cost of equity.

There is one wrinkle in the geared analysis approach. If you recall, the cost of equity depends on beta. Yet we also know that beta varies with financial risk as the capital structure changes

– think back to the Hamada formula. As with the use of WACC in unstable capital structures, we may consider using different costs for equity in each period, but applied to geared cash flows.

Nevertheless, in most cases when a geared approach is appropriate such as with an LBO or in project finance, gearing will be at its maximum level at the outset of the LBO or project. As beta reflects financial risk, the cost of equity will also be at its maximum level. Clearly if a project is viable at this initial cost of equity, there is no need to worry about recalculating the cost of equity in later periods as this will simply increase the NPV.

The geared approach is also valid in situations where the investor is seeking a particular return such as is in the case of a private equity investor. Private Equity houses usually target an equity return which enables them to meet the expectations of investors in their funds.

Private equity returns have been falling in recent years. In the past, expected IRR returns have been as high as 40% and prior to the credit crunch were still in excess of 25%, although this is largely dependent on timing. Read 2.3.1b Private Equity Insights – Duff & Phelps, which suggests that expected private equity returns had fallen to between 12% and 17% in July 2009. This reflects a number of factors, although the level of debt has fallen substantially. Debt to total capital was 70% before the Global Financial Crisis, but only 30% in 2009. This trend has arguably continued and while some recovery was seen in 2014, recent evidence suggests that returns in the 8-10% range are acceptable. Nevertheless, the lessons from the paper make a valuable contribution to understanding this subject.

5 Shareholder economics

So far, we have assumed in both the un-geared and geared approaches, that there is free access to all the cash flows.

However, this is commonly not the case, particularly in project finance situations. These are usually constructed as non recourse single purpose entities or vehicles (“SPE” or “SPV”). This means that if anything goes awry and the SPE is insolvent, the sponsoring shareholders are protected, although there may be some reputational damage. Lenders to SPEs can usually only rely on the SPE itself to repay the debt obligations unless there are guarantees in place, although this tends to negate the purpose of the SPE unless the guarantees are limited in some way. Because of this lenders, particularly where the SPE is highly leveraged as is often the case, tend to restrict cash outflows from the SPE (i.e. dividends and loan interest or repayments (other than to the banks themselves)) until the borrowings are repaid or are reduced to normal levels.

In such circumstances[4] it does not make sense to evaluate a project on the basis of free cash flows.

[4] It is probably worth pointing out that there are often limitations regarding full access to cash flows particularly in the case of non-domestic subsidiaries and joint ventures. Cash can be trapped by exchange control, tax, accounting, legal and lender restrictions. Depreciation of fixed assets reduces the distributable profit, thereby increasing trapped cash balances, especially acute in project companies with a finite life. Bank cover ratios and tax laws which prohibit full distribution have a similar effect.

Instead analysis should concentrate on the cash flows which the shareholder actually receives. Usually the shareholder will receive dividends and these will be the cash flows analysed. It is commonly assumed that all the trapped cash is remitted as the end of a project, perhaps as the result of a sale. How valid an assumption this is depends on the circumstances and should be assessed on a case by case basis.

In the following section we will look at a case study to consider how these projects might be assessed.

Note that cash flows can be remitted by other means. In particular part of the investment may be structured as a subordinated loan on which interest is paid. In such cases the subordinated loan is quasi equity and the interest can be regarded as quasi dividends. In addition, cash may be extracted by way of management charges, for the use of intellectual property or by way of *barter* transactions, e.g. reinvestment in other projects or arrangements with other group companies (conceivably even third parties) who have a need for cash in the relevant jurisdiction.

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