2.6.1 Valuation

Unit:	Unit 1 – Treasury Strategy
Module:	Module 2 – Risk and return
Date:	1 September 2016
Summary:	An introduction to company valuation on a relative (multiples) basis and on a fundamental (cash flow) basis.
Keywords:	valuation, multiples, relative basis, fundamental basis, enterprise value, equity value, minority interests, synergies, EBITDA, EBIT, price/earnings ratio, earnings per share, book value, price/earnings to growth, dividend, Gordon's Growth Formula, sustainable cash flow, maintenance capex, replacement capex, net operating profit less adjusted taxes, terminal value, adjusted present value, sum of the parts

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Learning outcomes:

After completing this reading and the associated exercises, you should:

1. Be able to explain the difference between relative and fundamental valuation approaches
2. Undertake EV and equity valuations using relative and fundamental methods
3. Have an appreciation of the APV method

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1 Introduction

The value of an entity has been described as the present value of future cashflows, historically regarded to mean dividends. However, such an approach will undervalue entities (to the extent that earnings are reinvested and not paid out as dividends), a fact which cannot be ignored as the investor can sell his shareholding and realise those future cashflows immediately. Valuation is typically the preserve of corporate financiers and investment bankers who use multiples or relative measures comparing the entity to be valued to similar entities. Nowadays the most common measure for enterprise value is usually a multiple of EBITDA, although multiples of cash flows, assets, sales or earnings are all popular. A multiple is simply an expression of market value relative to a key statistic that is assumed to relate to that value, in fact, as the driver of that market value.

Whilst the multiple approach is most likely to be used for valuing a company, the fundamental cash flow methods can be used to test the multiple methods. Treasurers will be familiar with these because they are an extension of investment valuation methods. Cash flow methods are commonly used by Private Equity investors, although they will usually be calculating their exit valuation using multiples!

Throughout this reading you should also be aware that we are making some major and often unrealistic assumptions. For example, in fundamental valuation, although we allow for growth, we essentially assume that the cash flow will be unchanging and lasts forever with constant rates of tax, etc. These assumptions can even be unrealistic in project appraisal where the time horizons are much shorter, so such problems are magnified in valuation, with its long horizons. Small errors of judgement can result in significant changes in the valuation.

2 What are we valuing?

This is a fundamental question. Are we interested in a value for the equity of the firm or for the total firm, the enterprise value (EV)?

Broadly, enterprise value is the value of equity plus net debt (or less net cash) but there are a few other complications such as **minority interests** which we discuss further below. It is simple to adjust from one to the other – by adding or deducting net debt – but you must be aware of what value is being calculated by your chosen valuation method.

In a corporate valuation there are always pieces of value which are not captured by the multiple or included with the discounted cash flow. This is probably clearer in the case of a DCF valuation since such methods will only value the assets needed to generate the expected stream of cash flows. However, the same is generally true of multiples. As a result, we always have to add in the value of redundant assets (if they have a value) and subtract contingent liabilities as separate components of value.

Pension deficits will reduce valuations as will many other non-trading provisions which represent a call on future cash flows.

It should also be noted that valuation techniques do not directly value synergies. Synergies arise from the combination of the acquiring company and the target company. They do not exist in the target alone. Synergies therefore have to be added as a separate item.

We should also not overlook real options. All the methodologies we discuss in this reading value firms in more-or-less their current state. We may allow for a small amount of change in our forecasts of cash flows or valuation metrics, but generally we only assume growth consistent with inflation, in line with maintaining the business in its current state. However, this might not be a correct approach in all cases. Recall the extract from The International Journal of Strategic management which looked at how Xstrata, the mining conglomerate, might be valued to include the real options of its consolidation strategy.

3 Minority interests

Minority interests are a consequence of consolidation accounting. Consolidated accounts generally include the entire results of group companies where they are at least 50% owned.

Example 1: Minority interests
Holdco owns 60% of Subco which has net assets of £240m and earnings (profits after tax) in the year of £20m.

The consolidated group accounts will include 100% of Subco's net assets in the consolidated balance sheet and 100% of Subco's sales & operating profit will appear in the consolidated profit & loss account.

This is clearly misleading as Holdco's shareholders only own 60% of Subco. To reflect this the 40% of Subco's earnings attributable to non-Holco shareholders, ie £8m, is deducted from earnings as attributable to minority interests. In the shareholders' funds part of the balance sheet you will see £96m representing the share of Subco's net assets attributable to non-Holdco shareholders.

If Holdco's market capitalisation is £2,000m, then this represents the market value of its shares. This value is underpinned by the cash flows of the Holdco group which include cash flows attributable to non-Holdco shareholders.

In such circumstances:

EV = Value of equity + Debt + Minority Interests

Ideally, this should be the market value of the minority interests. However, this information is not usually available and it is common to use the book value figure from the balance sheet. It is possible to attempt to value the minority interests using the figure from the profit and loss account using the Geared Valuation method which we will discuss later. The cost of equity for the company is used as a proxy for the cost of equity of the minority shareholders.

4 Multiple or relative valuations

It is important to remember that no matter how much faith you as a treasurer have in cash flow valuations, the market for buying and selling companies is almost exclusively determined by multiples.

This is partly because it is difficult to compare cashflows across different entities, but also because there is often no access to cash flow data. Even if there is a data access period in an acquisition, most investment banks will require bidders to submit initial offers on the basis of very limited information, possibly only that which is publicly available.

Note that we are principally talking about unquoted companies (including subsidiaries or divisions of quoted companies) as clearly there is a market value for quoted companies. That said, an investor can undertake this analysis on a quoted company to determine if it appears to be under-priced or over-priced relative to its competitors.

Typical Enterprise Value multiples include:

1. EV to EBITDA
2. EV to EBIT (largely overtaken by the above EBITDA measure)
3. EV to Sales
4. EV to Unlevered Free Cash Flow

Typical Equity multiples include:

5. P/E multiples
6. Equity to Book value
7. PEG ratios

Multiples can be applied to current values or to forecast values.

Example 2: Multiples valuation
Multiplicity SA had an EBITDA of €100m in 2015 and forecast EBITDA of €300m in 2020. In 2015 the appropriate EV to EBITDA multiple might be 6x, giving an EV of €600m. Applying this to the 2020 forecast, the value in 2020 would be €1,800m. We might also expect valuations to recover by 2020 in which case the EV to EBITDA multiple might rise, giving a higher valuation.

One very important point to note about multiples is the connection between the numerator and denominator. Since enterprise value (EV) equals equity value plus net debt, EV multiples are calculated using denominators relevant to both shareholders and debt holder. Therefore, the relevant denominator must be calculated before interest expense, dividends and minority interests. On the other hand, equity value multiples are calculated using a denominator relevant to equity holders only. Therefore, the relevant denominator must be calculated after interest and minority interests.

We have listed the main multiples above, but we could use virtually any multiple we like to value a business, so long as the multiple is relevant to that business and bearing in mind the relationship between the numerator and the denominator.

Note also that practitioners tend to refer to the multiples by their denominator only as it is obvious what the numerator should be. For example, the EV to EBITDA multiple is commonly called the EBITDA multiple and the equity value to book value multiple is commonly called the book value multiple.

EV multiples are usually preferred to equity multiples because they allow for direct comparison of different firms regardless of capital structure. Equity value multiples, on the other hand, are influenced by leverage. For example, highly levered firms generally have higher PE multiples because their expected returns on equity are higher.

There is a wider range of EV multiples, allowing the practitioner to select the most appropriate measure. In particular, the practitioner can use measures which minimise accounting policy differences such as EBITDA and Operating Free Cash Flow.

One of the main advantages of equity multiples is their familiarity to investors.

When an investment bank is asked to value an entity, it will research recent market activity to ascertain the multiples applicable to the most recent comparable corporate transactions and come up with a range of values. (Note that multiples for corporate transactions are not necessarily the same as multiples for quoted companies, although you would expect some similarities.)

The choice of multiples depends on the nature of the business or the industry in which the business operates. For example, EV/(EBITDA−Capex) multiples are often used to value capital intensive businesses, but would be inappropriate for people businesses. Brokers reports for similar businesses can be a useful source of information about which multiples are most appropriate.

4.1 EBITDA multiples

The EBITDA multiple is probably the most commonly used EV multiple. EBITDA is used as a proxy for cash flow available to the firm. Multiples usually start in the 6x area and prior to the Financial Crisis were getting on for 20x in some industries. But note that some technology companies seem to have valuations on this basis of orders of magnitude higher. Clearly growth is a factor.

4.2 EBIT multiples

Largely overtaken by the EBITDA multiple. Unlike EBITDA, EBIT recognises that depreciation and amortisation, while non-cash charges, reflect real expenses associated with the use of a firm's assets and will eventually need to be replaced. The equivalent range is probably between 10x to 25x.

4.3 Sales multiples

Generally only used where EBITDA is negative, usually in new businesses where costs exceed revenues, e.g. internet companies in the early part of the 21st century. However, it is difficult to apply since firms with similar revenues may have entirely different margins. A deep knowledge of the relevant industry is required. Multiples are typically 1x to 3x. But note that Google bought Nest on arguably a 30x trailing revenue valuation and a 10x forward revenue valuation.
http://blog.nextmarket.co/post/73320622998/breaking-down-the-valuation-for-nests-3-2-billion

This blog is also available as 2.6.1b Google and Nest valuations.

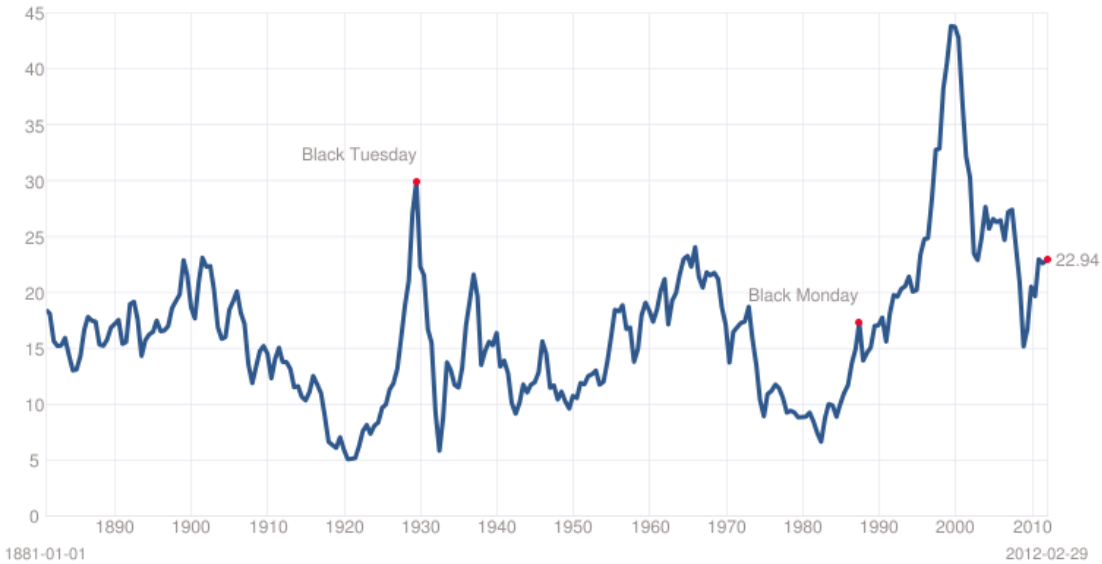
4.4 EV/unlevered FCF

This is essentially a refinement of the EBITDA multiple taking into account maintenance/replacement capex, tax on operating profits and working capital inflation. (We will consider each of these terms in more detail when we look at Sustainable Cash Flows, the mainstay of Fundamental Valuation).

4.5 P/E, price / earnings ratios

The most common equity multiple and a key measure for the equity markets. The numerator is the share price and the denominator is earnings per share (EPS) which is the same as market capitalisation divided by earnings. Some practitioners will adjust the earnings figures adding back amortisation or one-off charges. P/E ratios are typically 10x to 40x.

Exhibit 1: PE ratio history for the S & P 500



Source: http://www.multpl.com/

The P/E used will usually be that for the relevant business sector, i.e. an average of the trailing P/Es[1] for the companies in that sector. Sometimes analysts will exclude outliers (extreme values) from their average. Sometimes it might be the P/E for a particular company if there is a very good match. It is common to discount quoted P/Es when applying them to unquoted entities, possibly because there is a higher concentration of risk in what is often a smaller, single business environment. Note that the P/E ratio is affected by the capital structure, making sector comparison more difficult.

(Note that if you are analysing a quoted company's share price, it is meaningless to use its own P/E ratio as this is a circular argument.)

4.6 Book Value

Rarely used unless all the assets of an entity are held at market value, eg investment trusts and some property companies. Sometimes used in the sale of small private businesses where the book value of equity will sometimes establish a minimum threshold for the seller. Book value ratios can be difficult to interpret as the difference between the book value of equity and market value is primarily unrecognised assets such as goodwill, know-how and intellectual property, factors which differ markedly from one entity to another.

4.7 PEG ratio

This is simply the P/E ratio divided by expected EPS growth (typically over 5 years) and is often in the 0.5x to 3x range. One advantage of PEG is that practitioners can apply different growth expectations depending where the company is in its life cycle.

4.8 Further reading

Read "2.6.1a Valuation Multiples: A Primer" by UBS Warburg (now UBS) dated November 2001. It is well worth reading. Note that UBS take a slightly different approach to the ACT. They assume a period of growth for n years followed by zero growth in perpetuity. Their formulas reflect these assumptions. UBS also use a couple of relationships in these formulae which we don't focus on at MCT, namely:

FCF = NOPLAT × (1 – r) where r is the reinvestment rate, ie FCF is after dividends,

and

g = ROIC × r where ROIC is the post-tax return on invested capital.

UBS also introduce some simple relationships between Sales, EBIT and EBITDA on page 44 which are used to derive the other multiple targets:

[1] The trailing P/E uses the EPS figure for the most recent 12 month period. Sometimes this will be the EPS figure from the latest annual report, other times it will calculated from the most recent quarterly results.

Sales × M = EBIT

EBIT × (1 – T) = NOPLAT

EBITDA × (1 – D) = EBIT

4.9 Current market levels

All multiples vary over time and by sector. Students are expected to have a feel for current market levels, and whether asset prices are increasing or decreasing.

Damodaran cited the following on his blog on January 9, 2010[2]:

> 'As risk premiums have reverted back to pre-crisis levels, we are also seeing multiples also revert back to pre-crisis levels. This can be seen on a number of measures, both in the US and globally:
>
> a. Price Earnings Ratios (PE): The median current PE ratio for US stocks, which plunged from about 19 in January 2008 to about 9 in January 2009, is now back to almost 15. Similar shifts have occurred in the trailing and forward P/E ratios and in most sectors.
>
> b. EV/EBITDA: The median EV/EBITDA multiple for US companies, which had dropped from about 9 in January 2008 to 6 in January 2008, had bounced back to 8 by January 2009.'

5 Cash flow or fundamental valuations

As stated in the introduction, the value of an entity has been described as the present value of future cashflows. In the past this was traditionally regarded to mean dividends.

Dividends were assumed to be paid in perpetuity and were valued using the Gordon Growth Model

$$V_E = \frac{D_1}{Ke - g}$$

where V_E is equity value, D_1 is the prospective dividend, Ke is the cost of equity and g is the expected dividend growth rate. Generally, $D_1 = D_o \times (1+g)$.

[2] Source http://aswathdamodaran.blogspot.com.

Example 3: Gordon growth model

Nodrog Inc has just paid a dividend of 38c (that is, d_0 = USD 0.38), and investors expect a 5% growth rate for all future years.

The estimated dividends one year and two years forward will be:

d_1 = USD 0.38 x 1.05 = USD 0.40

If it is assumed that the required rate of return is 8% and that g is constant to infinity, then:

$$P_0 = \frac{d_1}{k_E - g} = \frac{\$0.40}{0.08 - 0.05} = \$13.33$$

Nowadays many firms no longer pay dividends or only pay nominal dividends to allow certain investing funds to buy their shares, so the Gordon Growth Model is rarely appropriate. Moreover, the dividend valuation approach tends to undervalue entities (to the extent that earnings are reinvested and not paid out as dividends), a fact which cannot be ignored as the investor can sell his shareholding and realise those future cashflows immediately.

In contrast to the investor with a small shareholding in a public company with no influence over company policy, an acquirer valuing that same company would be able, if successful, to change the dividend policy as well as funding, possibly taxation, perhaps overheads and even gross margins. It would, therefore, be inappropriate to base the valuation on the existing dividend policy.

Modern cash flow valuation (sometime referred to as fundamental valuation since the DCF method relies on the basic principle that the value of a business is based on its ability to generate cash flows for the providers of capital) of companies tends to mirror project appraisal. There are two basic approaches:

1. The ungeared approach where the Free Cash Flow to the Firm (FCFF) is valued using WACC, and
2. The geared approach where Free Cash Flow to Equity (FCFE) is valued using the cost of equity.

The ungeared method produces an Enterprise Valuation whereas the geared method produces an equity valuation.

As with project appraisal, the same considerations apply when calculating the cost of equity and WACC, although in company valuation the capital structure and beta must

clearly be those relevant to the entity being valued. However, we use exactly the same techniques when looking for an appropriate proxy for beta.

6 Ungeared valuation – no forecast data

In the scenario where there are no forecasts of cash flows for the company for future periods we assume that the cash flow exists in perpetuity and grows at a constant rate g. If we assume that WACC is constant, the value of the company is then given using the formula for a constantly growing perpetuity[3], i.e.

$$EV = \frac{FCFF_1}{WACC - g}$$

Normally, $FCFF_1 = FCFF_0 \times (1+g)$ where $FCFF_n$ = FCFF at time n.

The key to good valuation is therefore:

1. The calculation of $FCFF_0$
2. Appropriate choice of the growth rate, g
3. Correctly calculating WACC

We already know how to calculate WACC from our work on project appraisal. Ignoring $FCFF_0$ for the moment, what is an appropriate value for g? Remember that we are assuming that the cash flow will grow at this rate for ever. It the company has experienced rapid growth in the last few years, it is unlikely that this will persist for ever, so using historic growth figures is probably inappropriate. It is more likely that cash flows will grow in line with inflation, probably the same rate as is implied in the cost of debt in the WACC calculation. However, as we will see when we look at a worked example later in the reading, valuations are highly dependent on the value of g. It is usually sensible to calculate a range of values using different growth assumptions. Some practitioners use DCF valuation methods to determine the growth assumptions underlying relative (multiple) valuations by equating the valuations and solving for g. This is relatively straightforward in Excel using goal seek.

What about $FCFF_0$?

6.1 Sustainable cash flow

Here we introduce the idea of sustainable cash flow[4] (SCF, an exam favourite). This is the cash flow in today's terms which, but for growth, would persist for ever. Clearly this is unlikely, but this is often the best forecast we can make.

[3] Some practitioners do not like assuming that cash flows will continue forever, especially in a declining business. However the method can cope with this by assuming a value of g lower than inflation. This implies that the cash flows are in long term real decline. Additionally, some practitioners may only value the cash flows for a limited number of years using spreadsheets rather than perpetuity formulae. For example, a project with constant growth of 2% and a WACC of 7.5% will capture 41% of the full value in 10 years, 73% in 25 years, 93% in 50 years and 99% within 100 years.

[4] Throughout this reading we talk about SCF as the cash flow in current terms, ie SCF at time 0. In the perpetuity formula with constant growth, the first cash flow occurs in one period's time. This is why we

Using historic data, we determine the level of operating profit we expect in the future. We may take this back a level to sales, gross margins and costs, but we still end up with a figure for operating profits. If the trend in operating profits is constant and upwards, this may well be the latest operating figure, but it doesn't have to be.

We then deduct tax on our operating profit forecast based on the effective tax rate we expect to apply in the future, again most probably the latest rate unless this is unrepresentative.

We then add back depreciation, most probably the latest figure unless this is unrepresentative, together with any other non-cash items such as amortisation.

However, we do not adjust for working capital movements as we are not moving from one period to another, but trying to establish a base figure. That said, we do have to adjust working capital for inflation – see below.

Lastly, we need to deduct an amount for capex. Again this is the amount that will be spent in perpetuity. By assuming a growth rate in line with inflation, we are assuming that the business is neither expanding nor contracting. We therefore need to calculate a replacement or maintenance capex figure. Some practitioners simply equate this to the long term deprecation charge, but this ignores asset price inflation. The depreciation charge is based on historic asset costs. Therefore the replacement cost of those fixed assets will usually be higher.

The methodology we use in the MCT programme assumes that the average age of fixed assets is equal to:

$$\text{Average age of fixed assets} = \frac{\text{Accumulated depreciation charge}}{\text{Annual depreciation charge}} = k$$

We then derive a replacement capex figure equal to the annual depreciation charge uprated by the inflation rate for capital assets (we normally just use the same rate of inflation used for g) for the average age of the fixed assets, i.e.

$$\text{Replacement capex} = \text{Annual depreciation charge} \times (1 + \text{inflation})^k$$

Example 4: Depreciation
GTI Ltd has an annual depreciation charge of €40m, net assets in the balance sheet are stated at cost €300m and accumulated depreciation is €150m. Inflation is 4.5%.

use SCF x (1+g) in the numerator. However, some practitioner's calculate SCF at time 1 in which case the numerator is simply SCF. Moreover, rather than making adjustments to reflect SCF, they may make different growth assumptions when calculating SCF at time 1 to those which apply thereafter. The perpetuity formula is still applicable, but the logic is dubious. Why would the growth assumptions applicable to the SCF be different in the first period to the subsequent periods?

$$\text{So, average age of fixed assets} = \frac{\text{Accumulated depreciation charge}}{\text{Annual depreciation charge}} = \frac{150}{40} = 3.75$$

$$\therefore \text{Replacement capex} = \text{Annual depreciation charge} \times (1 + \text{inflation})^{k}$$

$$= €40\text{m} \times (1 + 4.5\%)^{3.75} = €47.2\text{m}$$

So, to summarise:

Exhibit 1: Sustainable Cash Flow

Maintainable operating profit	X
Tax on operating profit	(X)
NOPLAT	X
Add back:	
Depreciation	X
Other non-cash items	X
Less: Inflation in working capital	(X)
Less: Replacement Capex	(X)
SCF	X

6.2 Inflation in working capital

In the ungeared valuation model, SCF increases annually by a factor of 1+g.

This means that every component of SCF, including sales, increases by the same factor of 1+g.

Generally, working capital is related to sales. Usually working capital increases as sales increase.

Example 5: Working capital

GTI Ltd has working capital that is a constant 20% of sales. We shall also assume that sales are €200m pa. Therefore, current working capital is €40m.

In the following year, sales rise by 4.5% to €209m and so working capital will increase to €41.8m, an increase of €1.8m, an effective cash outflow, which we need to reflect in the SCF.

Although the above adjustment is probably accurate enough, the correct SCF adjustment relates to the previous year's level of working capital, i.e.

$$\frac{€40m}{(1+4.5\%)} = €38.28$$

So, the adjustment is €38.28m - €40m = - €1.72m.

CHECK: €1.72m x (1+4.5%) = €1.8m

The general formula for the working capital adjustment is:

$$\text{Working Capital adjustment} = \frac{\text{Working Capital}}{(1+\text{inflation})} - \text{Working Capital}$$

7 Ungeared valuation – with forecast data

Sometimes we have detailed forecasts for several years or expect there to be a period of exceptional growth or expect gross margin improvements.

In these circumstances we cannot apply a constant growth rate. However we can adapt the above method by separately identifying the years with forecast cashflows and discounting these individually. We then use the above method to calculate a value for the cash flows in the subsequent years (which are again assumed to grow at a constant rate) which we call the *terminal value*.

The specified cash flows are slightly different to the cash flow used to calculate the SCF. Generally they are:

Exhibit 2: Free cash flow to the firm

NOPLAT for the period	X
Add back:	
Actual Depreciation	X
Other non-cash items	X
(Increase)/decrease in working capital	(X)/X
Less: Actual Capex	(X)
FCFF	X

The terminal value is calculated in exactly the same way as the SCF above. If we have specific forecasts for z years, then the first terminal value cash flow will occur in year z+1. The perpetuity formula will give us a value for the terminal value as at the

beginning of year z+1, which is the same as the end of year z. This value should then be discounted back to time 0 using the discount factor $\frac{1}{(1+\text{WACC})^z}$

7.1 Non-constant WACC

This method can also be used to accommodate non-constant WACC scenarios. For example, in a leveraged structure where the capital structure is expected to change over time as the amount of leverage falls.

Essentially you have to forecast the cash flows for each year until the WACC stabilises. Different WACCs can then be calculated to discount the individually forecast cashflows.

7.2 Unequal cash flow periods

This method can also be adapted for cash flows spanning different periods. This often happens when a valuation is carried out at a specific date which might be part way through the financial year. The first period may therefore not cover a full year.

In this case the first period NPV will be calculated as:

$$\text{PV} = \frac{\text{Period 1 Cash Flow} + \frac{\text{SCF}\times(1+g)}{\text{WACC - g}}}{(1+\text{WACC})^{\text{Days in Period}/365}}$$

8 Worked case study – Brown Ltd

You are attempting to value Brown Ltd using DCF principles. After appropriate thought and consultation you have formed a set of assumptions concerning the cash flows over the next 5 years, the capital structure you intend to impose on the business and other relevant factors.

You have determined the following base case forecast for the performance of Brown Ltd under its new management.

£m Year	**1**	**2**	**3**	**4**	**5**
Sales	100.00	110.00	121.00	133.10	146.41
Gross Profit	25.00	27.50	30.25	33.28	36.60
Overheads:					
Rent, insurance, etc	5.00	5.00	5.00	5.00	5.00
Depreciation	10.00	10.00	10.00	10.00	10.00
Operating profit	10.00	12.50	15.25	18.28	21.60
Interest	3.30	3.30	3.30	3.30	3.30

Profit before tax	6.70	9.20	11.95	14.98	18.30
Taxation	1.68	2.30	2.99	3.74	4.58
Profit after tax	5.03	6.90	8.96	11.23	13.73
Dividends	3.00	3.00	3.00	3.00	3.00
Retained profits	2.03	3.90	5.96	8.23	10.73

Further assumptions have been made as follows:

1. For the first two years capex will be £25m.
2. The marginal effective tax rate is 30%. Tax payments are made one year in arrears. The tax payment in year 1 will be the same as in year 2.
3. Retail Price Index inflation is 2%.
4. The capital structure consists of 35% debt, 65% equity based on market values. The risk free rate is 4%, the equity risk premium is 3% and an appropriate asset beta for the business is 0.75.
5. Brown pays a margin of 2% on its debt, currently £55m.
6. Working capital assumptions. Stock is stable at 15% of sales, debtors will stay at 15% of sales and creditors 10% of sales. No change is expected in year 1.
7. Accumulated depreciation at the start of year 1 is £25m. Assume £5m of fully depreciated assets are scrapped each year.

Calculate a value for Brown Ltd's equity

First calculate WACC.

The asset beta is 0.75, so the geared beta will be increased for the 35% debt in the capital structure.

Using Hamada,

βg =0.75 × $\left(1 + (1 - 30\%) \times {}^{35\%}/_{65\%}\right) = 1.0327$

Using CAPM, Ke = 4% + 1.0327 x 3% = 7.0981%

Therefore, WACC = 7.0981% x 65% + (4%+2%) x (1-30%) x 35% = 6.0838%

Now, we have to convert the P&L into Cash Flows:

£m Year	**1**	**2**	**3**	**4**	**5**
Operating profit	10.00	12.50	15.25	18.28	21.60
Add: Depreciation	10.00	10.00	10.00	10.00	10.00
(Inc)/Dec in Working Capital	0.00	-2.00	-2.20	-2.42	-2.66
Capex	-25.00	-25.00	-10.72	-10.82	-10.93
Tax	-2.50	-2.50	-3.13	-3.81	-4.57
FCFF	-7.50	-7.00	9.21	11.22	13.44

The effective tax rate in the P&L is 25% and this is the rate applicable to operating profits.

The Working Capital Adjustments are:

£m Year	**1**	**2**	**3**	**4**	**5**
Working Capital %	20%	20%	20%	20%	20%
Working Capital	20.00	22.00	24.20	26.62	29.28
(Increase)/Decrease		-2.00	-2.20	-2.42	-2.66

And the replacement capex figures (used for year 3 onwards) are:

£m Year	**1**	**2**	**3**	**4**	**5**
Accumulated Depn b/f	25.00	30.00	35.00	40.00	45.00
Charge	10.00	10.00	10.00	10.00	10.00
Write off	-5.00	-5.00	-5.00	-5.00	-5.00
Average life	2.50	3.00	3.50	4.00	4.50
Inflation	2%	2%	2%	2%	2%
Replacement Capex	10.51	10.61	10.72	10.82	10.93

Then, using the WACC of 6.0838%, we discount the cash flows:

£m Year	**1**	**2**	**3**	**4**	**5**
FCFF	-7.50	-7.00	9.21	11.22	13.44
Discount Factor	0.94	0.89	0.84	0.79	0.74
PV	-7.07	-6.22	7.71	8.86	10.00

The NPV is therefore £13.28m

We now need to calculate the sustainable cashflow:

£m	
Operating profit	21.60
Taxation	-4.57
Depreciation	10.00

Replacement capex	-10.93
Working Capital inflation	-0.57
SCF	15.53

The Working Capital inflation is calculated as:

£m	
Prior year	28.71
Current year	29.28
Difference	-0.57

We now calculate the terminal value:

$$\text{Terminal Value} = \frac{\text{SCF} \times (1+g)}{\text{WACC} - g} = \frac{£155.3\text{m} \times (1+2\%)}{6.0838\% - 2\%} = £387.89\text{m}$$

This is stated as at the start of year 6 (= end Year 5)

$$\therefore \text{PV of TV} = \frac{£387.89\text{m}}{(1+6.0838\%)^5} = £288.71\text{m}$$

Therefore the enterprise vale for Brown Ltd = £13.28m + £288.71m = £301.99m, say £302m.

But Brown Limited has debt of £55m[5].

Therefore the value of the equity = £302m - £55m = £247m.

It is interesting to see how sensitive EV is to different values of g.

£m	EV
1.5%	276
2.0%	302
2.5%	335
3.0%	379

[5] This is likely a little simplistic as Brown will probably have a small amount cash by the end of year 5.

Clearly the choice of g is a very important consideration and a key determinant of value.

9 Geared valuation

The methodology is very similar to the ungeared valuation.

Of course, cash flows are now stated in geared or levered terms, ie Free Cash Flows to Equity (FCFE), ie post tax and post minority interests and including loan advances and repayments. However all the other adjustments in calculating SCF are the same as for the ungeared valuation.

As the effects of gearing or leverage are contained within the cash flows, this method is supposed to cope with a changing capital structure. However, we know that Ke varies with beta and beta increases with leverage, so this isn't really possible unless Ke is deemed to be fixed as in private equity for example where there is a target rate.

If Ke is constant, the appropriate annuity formula is:

$$\text{Value of Equity} = \frac{FCFE_1}{Ke - g}$$

Normally $FCFE_1 = FCFE_0 \times (1 + g)$ where $FCFE_n$ = FCFE at time n

Note that we can cope with a varying Ke in the same way as we coped with varying WACC.

10 Adjusted present value valuation (APV)

The APV method of valuation is another DCF valuation method.

It attempts to value the firm as if it had no debt and to separately value the impact of debt on the firm.

It is based on Modigliani and Miller's theory adjusted for the costs of financial distress, i.e.

$EV = V_u + V_{TS}$ – the costs of financial distress

where

V_u = value of the unlevered company, ie assuming no debt.

V_{TS} = present value of the tax shield

It is argued that APV overcomes the problem of a non-stable WACC. This is true, but unfortunately it is very difficult to calculate the third component, the present value of the expected cost of bankruptcy. Some practitioners argue that this component can be ignored for highly rated companies since the likelihood of bankruptcy is small. This may be expedient, but it is fallacious.

APV also relies on the Hamada formula to calculate the unlevered cost of equity and assumes that the appropriate discount rate for the Tax Shield is the interest rate. It should be remembered that the Hamada formula is an estimate at best and that it is not necessarily correct to discount the tax shield using the cost of debt, as seen elsewhere.

APV valuation comprises three components:

1. The present value of the un-geared cash flows of the firm, which is calculated as follows:

   $$V_U = \frac{FCFF_0(1+g)}{Ke - g}$$

   where un-geared cash flows are inflated for growth and discounted in perpetuity at an **unlevered cost of equity**, adjusted for growth. We end up with a cost of equity as the denominator (even though the numerator consists of ungeared cash flows) because the weighting for debt in the unlevered firm is 0.

2. PLUS: The present value of the tax shield of debt

   $$\text{Tax shield value of perpetual debt} = \frac{D \times i \times t}{i} = Dt$$

   Where D is the amount of debt, i the interest rate and t the tax shelter rate

3. LESS: The present value of the expected cost of bankruptcy

11 Sum of the parts (SOTP)

Sum of the parts can be a useful valuation technique where a company has one or more different businesses. It probably makes sense to value them separately.
SOTP is also sometimes referred to as "break-up" analysis since it can be used to value individual strategic business units and is sometimes used as a defence to defend against hostile takeover bids.

SOTP provides a range of values for a company's equity by summing the value of its individual business segments to arrive at the total enterprise value (EV). Equity value is then calculated by deducting net debt and other non-operating adjustments.

For a company with different business segments, each segment is valued using multiples appropriate for that particular segment or by using DCF analysis. The same valuation technique does not have to be used for each segment.

12 Summary of valuation methods

The exhibit below attempts to relate the choice of valuation method to a number of factors which can be used to characterise any particular valuation situation:

i) whether an enterprise or an equity valuation is sought
ii) whether detailed cash flow information is available
iii) whether the cash flow/profit situation is stable or volatile
iv) whether gearing is stable
v) whether a fundamental (DCF) or relative (multiple) method is preferred

The equity cash flows so derived should be discounted using the required return on equity based on the appropriately-geared beta. In leveraged buyouts private equity investors will simply know what compound rate of return they require eg 25%, 35%, 50%, depending on the perceived operating and financial risks. In other situations you will need to calculate a cost of equity. Because gearing is changing it may be appropriate to use different values in each period to reflect the change in the geared beta. Once the equity value has been calculated the EV can be derived by simply adding back net debt.

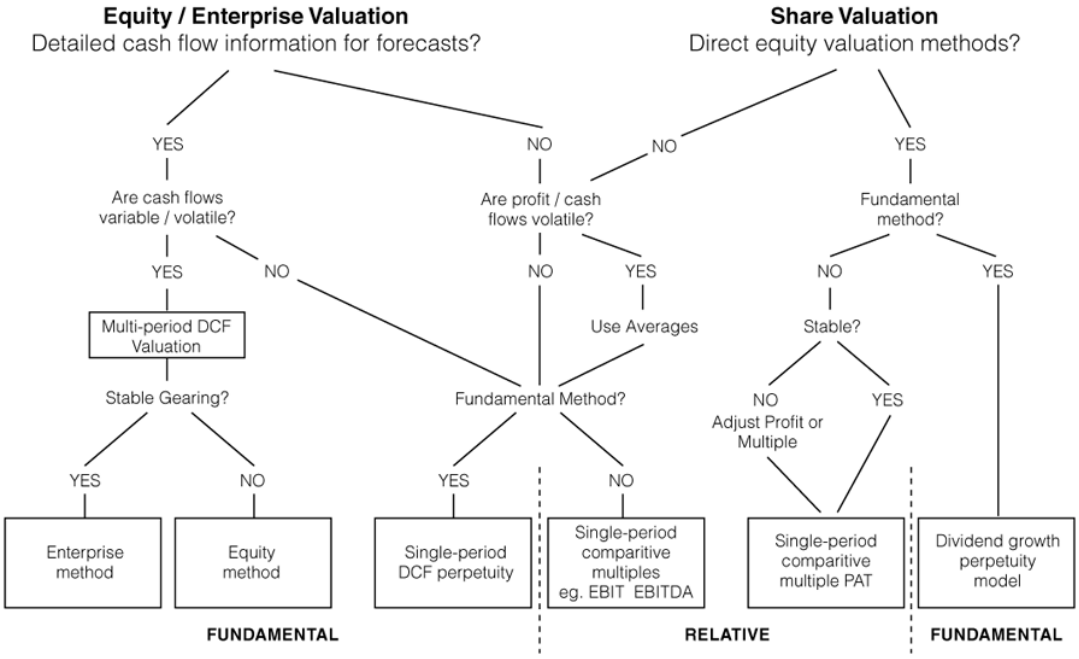



Exhibit 1: Choice of valuation method