Introduction to Valuation

Unit 1 Foundations of Value Creation

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Unit Overview

This unit introduces the foundations of value creation. You will learn how a long-run perspective supports value creation for companies and the economy. You will also study how the return on invested capital and growth rate affect a company's cash flow, and how the expectations treadmill affects managers' ability to deliver total returns to shareholders.

Learning outcomes

When you have completed your study of this unit and its readings, you will be able to:

- explain the importance of value to the performance of companies and economies, and differentiate between activities that create value and those that do not
- use the key value driver formula to obtain valuation estimates
- describe the managerial implications of value creation and how it is dependent on the relationship between the cost of capital and the return on invested capital (ROIC)
- explain the potential problems when a manager tries to meet high stock market expectation
- use the traditional and the enhanced approach to break down total returns to shareholders (TRS).

Reading for Unit 1

Tim Koller, Marc Goedhart & David Wessels (2015) *Valuation: Measuring and Managing the Value of Companies,* Chapters 1 'Why value value?', 2 'Fundamental principles of value creation', 3 'Conservation of value and the role of risk' and 4 'The alchemy of stock market performance'.

Richard Dobbs & Werner Rehm (2005) 'The value of share buybacks'. *McKinsey Quarterly*, 3, 54–61.

1.1 Introduction

In this module, we will provide a detailed consideration of the basic elements and determination of corporate 'value'. It is 'value' that should be the key driver in the corporate strategy as well as the market economy. So what is 'value'?

Hypothetically, 'value' can take many forms and meanings. For our purpose, let us focus on corporate strategy, and think of 'value' in terms of a broad and long-term concept – that is, 'value' as the positive factor that influences all the stakeholders concerned, be they shareholders, investors, customers or employees. At a country or macro level, it may be our lack of a thorough understanding and sufficient agreement on the fundamental sources of 'value' creation that leads to financial and economic crises.

For instance, could we confidently differentiate between a true value and, say, a bubble in the equity price of a corporation? By analysing value creation, can managers develop insight into what could be a new and long-term competitive advantage that would help their company to generate growth and maintain returns on investment above their cost of capital? Value creation and valuation techniques are not, of course, simply about accounting terms to beautify the balance sheet. By analysing value, and the sources of value creation, we can gain a greater understanding about how a company uses its resources effectively and efficiently. Hence, our objective is to understand both the logic of value creation and the measurement of value in the most sensible way possible.

Reading 1.1

For a brief introduction to the subject of valuation, please turn to Koller, Goedhart and Wessels (2015), and study their first chapter.

Koller *et al* (2015) Chapter 1 'Why value value?' in *Valuation: Measuring and Managing the Value of Companies*. pp. 23–35.

1.2 Why Study 'Value'?

Why is it important to be able to obtain an accurate and realistic valuation of companies and of sectors? The significant cost of market bubbles and financial crises serve to remind us of the importance of good and proper valuation. This is not only about the financial cost, but also the real cost, including unemployment and lost potential output and production when resources are misallocated. We can consider the internet bubbles of the 1990s that allowed market capitalisation to increase disproportionately in relation to company's actual revenue. One can argue that some of the increasing prices of corporate stocks were justified in some cases, but definitely not all of them – or bubbles would not burst and eventually disappear in such a short period of time.

A popular justification of the internet bubbles is based on the economics of increasing return and network effects. These factors can allow companies involved in technological and commercial innovation to expand quickly and

profitably. However, these concepts cannot be applied to all products and industries (*eg* grocery delivery, pet food, *etc*) to rationalise the marked increase in company valuations that occur periodically.

We also need to be clear about activities that create value, activities that are neutral with respect to value, and activities that destroy value. To get an idea how activities may or may not create value, we can consider the activities in financial institutions leading up to the financial crisis of 2007–08, and the period of stagnation that followed. In brief, mortgage securitisation involved bundling up mortgage repayments (often on sub-prime mortgages), and selling them as relatively risk-free securities to banks and other investors. The mortgage securitisation scheme collapsed because securitisation, financed by availability of cheap short-term debt during the early 2000s, simply repackaged the risk associated with some spurious mortgages. While securitisation is an ingenious financial innovation, it does nothing to increase cash flow – hence, there is no value creation. The subprime crisis is also a vivid example of how an accounting technique that creates no value but mismatches short-term debts with long-term illiquid assets is a bad idea. Ironically, the history of economic crisis tends to repeat itself, in the US (the 2000s), in Asia (the 1990s), and elsewhere. Of course, one cannot blame everything on financial innovation. There are also the issues of how financial regulations have been enforced, or not, as well as our faith in the efficiency of markets. We need to examine how investors value companies, to what extent do financial regulations increase the accuracy of financial reporting, and are stock market valuations based on the fundamental drivers of value creation?

A focus on long-term value creation is essential. Having said that, there are many dimensions to measuring firm performance, *eg* governance and employment conditions, as well as long-term shareholder value. But these dimensions are correlated – *ie* a focus on value creation reinforces employment standards, corporate governance and R&D investment. To create value, companies should pursue investments that boost revenue growth and return on invested capital. Such a strategy rewards companies more than the pursuit of short-term objectives, such as accounting measures that boost earnings per share, or cost reduction via R&D cuts, which could be harmful – or useless at least – in the long run. Understanding value creation requires a solid analysis of the firm's operations at a detailed level, to provide useful information that can help to sustain long-term company performance.

Study Question 1.1

- What do you think about changes in capital structure and changes in accounting practices introduced by a company manager? Do they support value creation?
- What is the empirical relationship between earnings per share (EPS) and the value created by the acquisition of another company?
- Do you agree with the view, expressed in Koller *et al* (2015), that criticism of shareholder capitalism can be interpreted as criticism of short-termism?

1.3 Growth and Return on Invested Capital (ROIC)

We will now introduce discounted cash flow (DCF) valuation, a method that associates growth, cash flows, return on invested capital, cost of capital and value. This is a powerful method, but it is also important that you are aware of the advantages and disadvantages of using DCF to value companies. As you learn this method, you will see that accounting earnings are not exactly the same as value. You will also discover that the variables used in DCF can vary significantly across firms within the same industry. Therefore it is essential to develop an understanding of the specific circumstances of a company to perform the valuation analysis, while also making comparisons between companies in the same sector. Using DCF you will be able to see how two firms with the same earnings and growth rate can be valued differently if one company has a higher return on invested capital than the other company. Similarly, you will see how two companies can generate similar rates of total shareholder return, but one company has higher growth while the other company has higher return on invested capital.

In the DCF method, the relationship between growth, return on invested capital, and investment rate can be succinctly summarised as:

$$\text{Return on invested capital} = \text{Growth} \ / \ \text{Investment rate}$$

so that in comparing two companies with the same growth, the one with the lower investment rate tends to generate more cash flows, higher return on invested capital, and higher price/earnings (P/E) ratio.

The next reading from Koller *et al* (2015) highlights this relationship between growth, return on invested capital, and cash flow. The reading demonstrates some deceptively simple but fundamental points in the construction of the DCF model.

Suppose there are two companies with identical earnings and the same growth rate of earnings. But also suppose that one company requires less investment to generate their earnings growth. This company will have a higher return on invested capital. And cash flow (defined in this simple example as earnings less new investment) will be higher for this company, leading to a higher valuation.

The essential point being made is that it is insufficient to focus only on earnings growth. Growth in revenues and earnings will only create value if the return on invested capital is greater than the cost of capital.

Reading 1.2

Please turn now to Koller *et al* (2015), and read pages 17–29, up to the section headed 'The math of value creation'.

Koller *et al* (2015) Extract from Chapter 2 'Fundamental principles of value creation' in *Valuation: Measuring and Managing the Value of Companies.* pp. 17–29.

✎ In your notes on the reading, pay particular attention to the example of two companies presented in Exhibits 2.2–2.4, with identical earnings and growth of earnings, but different investment rates, cash flows and valuations. Exhibit 2.5 shows the relation between growth, ROIC and value, based on a different numerical example.

Consider the relation between growth, ROIC and value shown in Exhibit 2.5. Looking across a row of the table, for a given growth rate a higher return on invested capital leads to higher value. Now consider reading down the columns in Exhibit 2.5:

- If ROIC is greater than the cost of capital, then higher rates of growth lead to higher value.
- If ROIC is the same as the cost of capital, then higher growth leaves value unchanged.
- And if ROIC is lower than the cost of capital, higher growth in fact leads to lower value.

To some extent, equity prices observed in the stock market follow this simple valuation analysis. Markets tend to value favourably companies with a high return on invested capital. This valuation principle is not only useful at the company level, but it is also applicable at the sector level, and even country level. But one should not generalise too far.

As a general strategic guideline based on this formulation, for a low or moderate ROIC company, focusing on ROIC improvement creates more value than single-mindedly accelerating only the revenue growth. For an already high ROIC company, increasing growth is a natural objective, because it is harder to create value by trying to improve an already high ROIC. Where a company has achieved a high ROIC, it is also important to understand that not all growth, and its corresponding investment, has the same potential for value creation. For example, think about growth based on new product development vis-à-vis growth based on acquisition. An acquisition strategy tends to demand more investment and capital upfront, and has therefore a lower potential for value creation. Can you think of a growth strategy that will boost ROIC in the long term?

1.4 The Maths of Value Creation

To connect the concept of value creation explained so far with a more practical analysis based on company financial statements, let us start by looking at some simple formulas. These terminologies and variables will be recurring throughout the units, so you will find it useful to try to understand them at this stage. The important variables involved are summarised as follows, with more detailed explanation provided in the next reading.

- NOPLAT: Net Operating Profit Less Adjusted Taxes
- Invested Capital: mainly property, plant, equipment, and working capital.

The two definitions given above relate to the core operations of the company.

- Net Investment is the increase in invested capital from one period to the next:

$$\text{Net investment} = \text{Invested capital}_{t+1} - \text{Invested capital}_{t} \tag{1.1}$$

- Free cash flow is defined as NOPLAT less net investment

$$\text{FCF} = \text{NOPLAT} - \text{Net investment} \tag{1.2}$$

- Return on invested capital is net operating profit from operations expressed in relation to invested capital:

$$\text{ROIC} = \frac{\text{NOPLAT}}{\text{Invested Capital}} \tag{1.3}$$

- Investment rate:

$$\text{IR} = \frac{\text{Net Investment}}{\text{NOPLAT}} \tag{1.4}$$

- WACC: Weighted Average Cost of Capital
  WACC is also the discount rate used to discount future projections of FCF.
- g: A constant rate of growth of NOPLAT (and also FCF)

For cash flows growing at the rate g, and cost of capital WACC, we can use the cash flow perpetuity formula to estimate value

$$\text{Value} = \frac{\text{FCF}_{t=1}}{\text{WACC} - g} \tag{1.5}$$

This perpetuity formula tells us the value of a stream of payments starting one period from now, where the payments are growing at the rate g.

Free cash flow can also be defined in terms of NOPLAT and the investment rate:

$$\begin{aligned} \text{FCF} &= \text{NOPLAT} - \text{Net Investment} \\ &= \text{NOPLAT} - \left(\text{NOPLAT} \times \text{IR}\right) \\ &= \text{NOPLAT}\left(1 - \text{IR}\right) \end{aligned} \tag{1.6}$$

As you have already seen, the investment rate can be expressed in terms of g and ROIC:

$$g = \text{ROIC} \times \text{IR} \qquad \text{so} \;\; \text{IR} = \frac{g}{\text{ROIC}} \tag{1.7}$$

It follows that:

$$\text{FCF} = \text{NOPLAT}\left(1 - \frac{g}{\text{ROIC}}\right) \tag{1.8}$$

Using the expression for FCF in (1.8), and the valuation of a growing perpetuity in (1.5), the key value driver formula is obtained as:

$$\text{Value} = \frac{\text{NOPLAT}_{t=1}\left(1 - \dfrac{g}{\text{ROIC}}\right)}{\text{WACC} - g} \tag{1.9}$$

The value driver formula in (1.9) relates the key variables in the DCF approach of valuation, which you will study in more detail. As you can now

see, based on the DCF analysis, the value creation of a company is about improving growth, returns on invested capital, and the relation of ROIC to the cost of capital. The relationship between value and these variables is non-linear. In practical applications, each of the variables involved will be subject to uncertainty and measurement errors. While DCF analysis is not without problems, it is quite straightforward and more transparent than other approaches, as you will appreciate after studying the materials in this module.

You could now derive the price to earnings (P/E) ratio by dividing each side of (1.9) by NOPLAT:

$$\frac{\text{Value}}{\text{NOPLAT}_{t=1}} = \frac{\left(1 - \frac{g}{\text{ROIC}}\right)}{\text{WACC} - g} \tag{1.10}$$

The P/E ratio is a popular and much-reported measure. Looking at equation (1.10) you can see how the ratio can be related to the elements driving value in the DCF analysis.

Reading 1.3

Please now turn Koller *et al* (2015), and study pages 29–33 (to the end of the chapter), paying particular attention to the interpretation of the variables.

Koller *et al* (2015) Extract from Chapter 2 'Fundamental principles of value creation' in *Valuation: Measuring and Managing the Value of Companies.* pp. 29–33.

While studying the key value driver formula and the other expressions, you may notice that they are based on some strong assumptions about the future values of the variables. The growth rate, return on invested capital, and cost of capital (and by implication, the capital structure and the balance between debt and equity) are assumed to be constant.

It is possible to estimate value using the key driver formula in equation (1.9). However, in many applications we would want to allow the elements driving value to vary from year to year. As you will see in later units, DCF involves making explicit annual forecasts for FCF in future years, but after this explicit forecast period we stop forecasting FCF for each year, we assume a constant growth rate and we use the continuing value formula represented in equation (1.9). The maths of value creation introduced here encourages you to focus on the fundamental sources of value creation. You may be wondering how this approach can be extended to allow for risk and uncertainty; these issues will be studied in Units 4–6.

Study Question 1.2

- How does the association between growth and value depend on the relationship between ROIC and the cost of capital?
- Do you think the core valuation principle is as equally applicable to countries as it is to companies?

We can now apply the maths of value creation to value the two companies introduced in the reading from Koller *et al* (2015). Recall that both companies have earnings in year 1 of 100, and projected earnings growth of 5% per year; and the cost of capital for both companies is 10%. Volume Inc. has an investment rate of 50% and Value Inc. has an investment rate of 25%.

Review Question 1.1

Estimate value for both companies using the key value driver formula.

Volume Inc. has the higher investment rate, and return on invested capital is equal to 10%:

$$\text{ROIC} = \frac{g}{\text{IR}} = \frac{0.05}{0.50} = 0.10$$

Using the key value driver formula, the estimated value for Volume Inc. is 1,000:

$$\text{Value} = \frac{\text{NOPLAT}_{t=1}\left(1 - \frac{g}{\text{ROIC}}\right)}{\text{WACC} - g} = \frac{100\left(1 - \frac{0.05}{0.10}\right)}{0.10 - 0.05} = 1000$$

Value Inc. has a lower investment rate and correspondingly a higher ROIC equal to 20%:

$$\text{ROIC} = \frac{g}{IR} = \frac{0.05}{0.25} = 0.20$$

The value estimated by the key value driver formula for Value Inc. is 1,500:

$$\text{Value} = \frac{\text{NOPLAT}_{t=1}\left(1 - \frac{g}{\text{ROIC}}\right)}{\text{WACC} - g} = \frac{100\left(1 - \frac{0.05}{0.20}\right)}{0.10 - 0.05} = 1500$$

Equivalently we could have used the growing perpetuity valuation formula, which for Volume Inc. provides value of

$$\text{Value} = \frac{\text{FCF}_{t=1}}{\text{WACC} - g} = \frac{50}{0.10 - 0.05} = 1000$$

and for Value Inc.,

$$\text{Value} = \frac{\text{FCF}_{t=1}}{\text{WACC} - g} = \frac{75}{0.10 - 0.05} = 1500$$

You can see that the key value driver formula is based on the valuation formula for a growing perpetuity. However, the key value driver formula provides more information concerning the sources of value creation in each company.

Finally in this section you should make sure you understand how the key value driver formula introduced in this unit is used in the valuation process.

For the two companies Volume Inc. and Value Inc. we have assumed the growth rate is constant for year 1 onwards. In this case it is possible to use only the key value driver formula to value the companies.

In more realistic situations it is likely that the forecast growth rate for a company will not be the same in every year. In this case we make explicit annual forecasts for a number of years, and then after this explicit forecast period we make an assumption about the growth rate into perpetuity, and we apply the key value driver formula to estimate continuing value. Note that this estimate of continuing value (CV) would need to be discounted back to the time of the valuation.

For example, the values obtained in Exhibit 2.5 in Koller *et al* (2015) are obtained using an explicit forecast period of 15 years (applying the growth rates of 3%, 6% and 9% for the explicit forecast period), and after 15 years the growth rate is assumed to be 4.5%.

In the next review question you will examine an Excel workbook that puts this all together. You will study the more detailed mechanics of valuation in the following units, including discounting, making forecasts, and reorganising financial reports to obtain estimates of NOPLAT. For the moment it will be useful to see how we forecast and discount cash flow using an explicit forecast period and then continuing value, and how the key value driver relates to those forecasts, using a simplified example.

Review Question 1.2

The Excel workbook C364_U1_Q1.xls conducts a valuation with an explicit forecast period of 15 years. After that time the continuing value formula (key value driver formula) is used.

1. Please examine the entries in the workbook, including how the future projections of earnings and free cash flow are obtained in the explicit forecast period; how projections of cash flow are discounted in the explicit forecast period, and how the continuing value formula is used for year 16 and onwards.
2. Vary the investment rate and examine the effect on the calculations (try the values of 0.50 for Volume Inc. and 0.25 for Value Inc.).
3. As a checking mechanism, the workbook also estimates the valuation using only the key value driver formula. In the workbook the valuation using an explicit forecast period of 15 years (and continuing value from year 16 onwards) gives the same value as when we use the CV formula for all projected free cash flow. Why is that?

In this case we have assumed a growth rate of earnings and a given investment rate. From this the ROIC is implied. (Recall equation (1.7) relating the growth rate, IR and ROIC).

In the explicit forecast period we obtain a forecast of earnings each year as earnings in the previous year multiplied by one plus the growth rate. Investment is calculated as earnings multiplied by the investment rate. Free cash flow is earnings less investment.

The forecast cash flow in each year is discounted using the discount factor for that year, which is equal to

$$\text{Discount factor} = \frac{1}{(1+\text{WACC})^t} \tag{1.11}$$

In words, the discount factor for each year is the reciprocal of 1 plus the WACC raised to the power of the number of years ahead of the forecast.

For the continuing value (CV) estimated in year 16 we take the earnings in year 15, we apply the growth rate to get forecast earnings in year 16, and then we use this value of earnings in the key value driver formula. We then discount this estimate of CV using the same discount factor we used for year 15.

The estimate of value is the sum of the discounted cash flows for each of the years in the explicit forecast period, plus the discounted CV obtained for years 16 and beyond:

$$\text{Value} = \frac{\text{FCF}_1}{(1+\text{WACC})^1} + \ldots + \frac{\text{FCF}_{15}}{(1+\text{WACC})^{15}} + \frac{\text{CV}}{(1+\text{WACC})^{15}} \tag{1.12}$$

In this example the value we obtain using an explicit forecast period (years 1 to 15) followed by a period of constant growth (year 16 and beyond) is the same as the value we obtain using the CV formula for all of the years. This is because we have assumed a constant growth rate throughout. We could have an explicit forecast period of 5, 10, 15 or 20 years, followed by the CV formula, and this equality would still hold. If the key value drivers are the same in each year, we can value the company using an explicit forecast period of any length, or we can just use the key value driver formula.

1.5 The Conservation of Value

Please pause for a moment and consider what you have studied so far in this unit. The value of a firm is derived from the discounted cash flow from operations. Value is created if cash flow can be increased. Growth creates value as long as the return on invested capital is greater than the cost of capital. (If ROIC is less than the cost of capital then growth destroys value.)

Therefore strategies that contribute to growth (subject to the ROIC being greater than the WACC), or increase ROIC, or reduce WACC, will increase value.

From this understanding of value it follows that strategies which appear (or can be made to appear) to create value, but which do not increase cash flow by one or more of the above channels, will not actually increase value (and will leave value the same). This is the principle of value conservation. Another way of looking at the principle of value conservation is to say that anything that *appears* to change value, but which does not actually increase or decrease cash flow, will leave value unchanged and is value neutral.

Reporting employee stock options

To demonstrate the conservation of value (or value neutrality) we can use the example of how companies report employee stock options. An employee stock option is 'a call option issued by a company on its own stock and given to an employee as part of his or her compensation' (Hull, 2014: p. 572), and a call option gives the holder the right (but not the obligation) to buy the stock at a certain price by a certain date. If an employee exercises their right to buy the stock, this has the effect of diluting the shareholdings of existing shareholders, and reduces cash flow to existing shareholders. In effect, giving stock options to employees reduces value available to existing shareholders.

Review Question 1.3

Suppose a company previously reported employee stock options in the footnotes to its financial reports. Now suppose the company changes its reporting methods and includes employee stock options as an expense on the income statement. Will this change in reporting affect the value of the company?

If information about employee stock options is already made available, then changing the way the stock options are reported will not affect cash flow and will not change the value of the company. Employee stock options themselves do change value available to existing shareholders (by diluting cash flow to shareholders) but the way the employee stock options are reported does not.

Debt and equity restructuring

Does restructuring the debt and equity of a company create value? Capital restructuring will only affect the value of a company if it changes the cash flows. Otherwise, it will leave the value of the company unchanged. In later units you will see that increasing debt can potentially increase value. Debt finance creates a tax shield (debt interest is deducted before corporation tax is calculated). However, increasing debt and reducing equity changes the riskiness of the company for investors, and alters the weighted cost of capital. In theory, the combined effect of the increased tax shield and the changed WACC should leave the value of the firm (which derives from the discounted cash flow from operations) unchanged.

At this stage we can make two general points about the conservation of value. Firstly, the DCF method makes clear that unless a change alters cash flow, the change will not alter the valuation. Secondly, stock markets also understand the logic of the conservation of value.

In the following sections you will consider a number of additional corporate actions that are perceived to create value, and examine the effect, if any, on company valuation:

- share repurchases
- acquisitions
- financial engineering.

1.5.1 Share repurchases

Companies engage in share repurchases for a number of reasons. Companies may prefer to use this method of returning cash to investors instead of paying dividends. This could be due to different tax treatment for investors between dividends and capital gains. Alternatively, the company may prefer the flexibility of share repurchases: once dividend payments have been established, and an expectation has been created concerning regular dividend payments, if dividends are then stopped it could be interpreted negatively.

Companies also engage in share repurchases because it increases crude measures of earnings per share, and gives the impression of creating value. However, as you saw earlier in this section, changing capital structure cannot create value for the company unless it also increases cash flow.

Reading 1.4

Dobbs & Rehm (2005) 'The value of share buybacks'. *McKinsey Quarterly,* 3, 54–61.

Please now read the article by Dobbs and Rehm 'The value of share buybacks'. The article provides a useful application of the methods you have studied so far in this unit. It shows how the value of the company derives from the value of operations, and the circumstances when share buybacks do (and do not) create value. The reading also provides an example of when the spread between ROIC and WACC is negative.

Audio

The reading is also available as a podcast, at
http://www.mckinsey.com/insights/corporate_finance/the_value_of_share_buybacks

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Examining Exhibit 1 in the article, share repurchases do increase earnings per share: interest income on excess cash holdings is lost, but shares outstanding fall proportionately more. However, the value of operations is unchanged. Total value is reduced by the cash used to purchase the shares, but with less shares outstanding, the share price is the same.

Review Question 1.4

With respect to Exhibit 1 in the article by Dobbs and Rehm, confirm that

1. ROIC is 16% before and after the share buyback; and
2. Value from operations is 1,300.

ROIC in this example is calculated as earnings before interest and taxes as a percentage of operating assets, or

$$\text{ROIC} = \frac{94}{580} = 0.162$$

Using the continuing value formula, value from operations is estimated as

$$\text{Value} = \frac{\text{NOPLAT}_{t=1}\left(1 - \frac{g}{\text{ROIC}}\right)}{\text{WACC} - g} = \frac{94\left(1 - \frac{0.05}{0.162}\right)}{0.10 - 0.05} = 1,300$$

Optional Reading 1.1

You may wish to read an empirical examination of share repurchases and the impact on company valuation by:

> Gustavo Grullon and Roni Michaely (2002) 'Dividends, share repurchases, and the substitution hypothesis'. *Journal of Finance*, 57, 1649–84.

However, this is an optional reading.

1.5.2 Acquisitions

Acquisitions can potentially create value for the combined companies. However, this will only be the case if the acquisition increases the cash flows of the combined companies. An acquisition could lead to synergies between the combined companies such that new products can be developed leading to new revenue streams, for the same (combined) invested capital. ROIC increases and value is created. Or costs that were duplicated in the two companies could be reduced, again increasing ROIC.

However, if cash flows are unchanged after the acquisition, the value of the combined companies will be just the same as the value of the two companies separately. The acquisition has not created value. Having said that, it is possible for managers to believe the acquisition has created value if they ignore the conservation of value principle. Taking the example from Koller *et al* (2015), suppose Company A is valued at \$100 and company B is valued at \$50. Company A is expected to earn \$5 so has a P/E ratio of 20. Company B is expected to earn \$3 so has a P/E ratio of 16.7. Suppose the acquisition does not increase cash flows and does not create value. With unchanged value and unchanged earnings the P/E ratio of the combined company will be

$$\frac{100+50}{5+3}=18.75$$

What will be the effect on the P/E of the combined company if the earnings of company B, after the acquisition, are thought to be as highly valued as the earnings of company A. Applying Company A's P/E ratio of 20 to Company B's earnings of 3 gives a value of B of 60. By magic, the value of the combined company is 160 and not 100 plus 50. The perception that the acquisition creates value (even when it does not) arises because managers have assumed the earnings of Company B will be more highly valued because of the acquisition.

The valuation of acquisitions is studied in detail in the module *Advanced Topics in Valuation*. For this unit you need to be aware how the conservation of value principle applies to acquisitions: acquisitions will only create value if the acquisition leads to increased cash flows for the combined company. If cash flows are not changed, then the value of the combined company is just the sum of the value of the two companies considered separately.

1.5.3 Financial engineering

Koller *et al* (2015) define financial engineering as the use of financial instruments or structures other than straight debt and equity to manage a company's capital structure and risk profile. This can include derivatives, structured debt, securitisation, and off-balance sheet financing. Managers and investors should be aware that some examples of financial engineering can create value for the company, and some do not create value.

Financial engineering can create value if it results in tax savings or lower funding costs, or if it allows the company to expand its funding and undertake more investments that generate wealth. Conversely, some elements of financial engineering that appear to create value may be value-neutral or may destroy value.

We can consider how taking assets (and the associated financing) off the balance sheet can enhance value or be value-neutral. The example presented in Koller *et al* (2015) concerns US hotel companies that do not own their hotels. The hotels are actually owned by partnerships or real estate investment trusts. Because these partnerships and trusts are taxed differently to corporations, this example of financial engineering reduces tax payments for the hotel companies and increases value.

Alternatively, consider a company that sells and then leases back its operating assets. It is possible that this off-balance-sheet financing can appear to increase value. Lease expenses reduce NOPLAT, but the company will appear to be less capital intensive, and return on invested capital can appear to be higher. Such an arrangement may or may not increase value. The lease expense will include an element of interest. If the company itself has a lower cost of borrowing than the leasing company, then the sale and lease back could destroy value.

These are relatively simple examples of financial engineering. As the type of instruments used gets more complex, there is further scope for managers to misunderstand the effects on valuation. At best, the instruments may be value neutral, and at worst they could destroy value if they are not understood correctly.

 **Reading 1.5**

Please now turn to Koller *et al* (2015), and read pages 35–42, from the section 'Conservation of value' up to 'Risk and value creation'.

Koller *et al* (2015) Extracts from Chapter 3 'Conservation of value and the role of risk' in *Valuation: Measuring and Managing the Value of Companies.* pp. 35–42.

 Please note the examples of acquisitions that do create value. And also the examples of financial engineering where value is created or left unchanged.

 **Study Question 1.3**

How might the following forms of financial engineering create value?

1. A vehicle manufacturer securitises its accounts receivable by selling them to a fully owned but separate company
2. An airline company transfers the risk of sudden increases in fuel prices to a financial institution specialised in hedging.

In the first case, receivables are a good source of collateral, so that the subsidiary could be able to get a better credit rating than the vehicle manufacturer. In effect, the combined company could expand its debt more than would have been the case without the arrangement, which would increase value if investments exist for which ROIC is greater than WACC. This strategy has been followed by Ford and General Motors.

In the second case, the hedging company would have a comparative advantage in hedging compared to the airline company, and could carry these risks at a lower cost.

1.6 Risk and Value Creation

Risk affects valuation via the cost of capital and future cash flows. As you will see in this section, managers need to be more concerned about the risks associated with future cash flows than with how risk affects the cost of capital.

Cost of capital

You will examine the methods used to determine the company's cost of capital in detail in Unit 5. In this section we will introduce what the cost of capital represents, and why risk and the cost of capital is of less concern to managers than the risks concerning future cash flows. For investors, the cost of capital represents the return they require to compensate them for the risks associated with investing in a company. When investors make decisions about their portfolios of securities, they consider diversifiable and non-diversifiable risk.

Some risk can be diversified. Investors choose a portfolio of securities for which the returns are negatively or imperfectly correlated – for two negatively correlated returns, when the returns on one security go down, the returns on the other security go up. So, for example, an investor might buy stocks in a producer of aviation fuel and a user of aviation fuel. Diversification allows investors to reduce the risk of their overall portfolio, for a given expected return on the portfolio. However, some risks cannot be diversified, such as risks due to economic downturns that affect all companies within an economy. It is this non-diversifiable risk that investors are being compensated for by the cost of capital. Since the activities of one company represent a diversifiable risk, the cost of capital is more a reflection of non-diversifiable risk. Put another way, most risks faced by companies are diversifiable and will not affect their cost of capital.

You should be aware, however, that management decisions concerning debt and equity can affect investor perceptions of the riskiness of the company, and this has an influence on the company's cost of capital. You will revisit this relationship at various points in your study of valuation.

Koller *et al* (2015) find that for large companies the cost of equity capital varies in a narrow range of 8 to 10%. We can use the results from the maths of value creation to put that into context.

The key value driver formula is

$$\text{Value} = \frac{\text{NOPLAT}_{t=1}\left(1 - \frac{g}{\text{ROIC}}\right)}{\text{WACC} - g} \tag{1.9}$$

Koller *et al* (2015) observe returns on invested capital in the much wider range of less than 5% to more than 30%, sometimes in the same sector. The conclusion from this observation is that whether WACC is 9% or 10% matters less than the ROIC that is achieved.

You can also use the maths of value creation to examine the influence on price/earnings ratios of the key value drivers, shown in equation (1.10)

$$\frac{\text{Value}}{\text{NOPLAT}_{t=1}} = \frac{\left(1 - \frac{g}{\text{ROIC}}\right)}{\text{WACC} - g} \tag{1.10}$$

The P/E ratios for large companies also fall in a relatively narrow range, between 12 and 20. This range is consistent with the narrow range of the cost of capital between 8 and 10%.

Review Question 1.5

In the context of equation (1.10) representing the price/earnings ratio, what would happen to the P/E range for large companies if the range of the cost of capital was 6 to 15% (and not 8 to 10%).

The P/E ratio varies inversely with the WACC (if everything else is unchanged): higher WACC reduces P/E. If the lower end of the range of the WACC (8%) is associated with the higher end of the P/E range (20%), then a WACC of 6% would be associated with a P/E of more than 25. Conversely, if a WACC at the higher end of the range (10%) is associated with the lower end of the observed P/E range (12), then a WACC of 15% is associated with a P/E ratio of around 8. (Note these are approximate calculations.) The point to take from this is that if the WACC faced by large companies was in a wider range than 8 to 10% then we would observe a wider range of P/E ratios.

We conclude that managers should not be too concerned with how operational risks affect the cost of capital, because most risks they face do not generally affect their cost of capital, and the range of the cost of capital is relatively small compared to the ranges of the other value drivers. Instead, managers should be more concerned with the risks associated with future cash flows.

Cash flow risk

Cash flow risk represents the possibility that actual future cash flows will be less than projected future cash flows. The traditional method for analysing this type of risk is to make at least two types of forecast. For example, a 'normal' or 'optimistic' scenario and a 'pessimistic' scenario, and to attach a

probability of the scenarios occurring. In this way we can weight cash flows in the two scenarios by the two probabilities, and we can calculate expected cash flow each year, and expected discounted cash flow. Subtracting the initial investment produces a figure for expected net present value for a project. The traditional decision rule is that we should pursue projects that have positive expected net present value. You will use this technique to conduct scenario analysis in Unit 6 Reporting Results.

Review Question 1.6

Can you see any problems with this method of forecasting cash flows under different scenarios, assigning probabilities, weighting the cash flows, and calculating expected net present value?

This method produces one figure for expected net present value, which disguises the net present value we would experience if the good outcome occurred, and the net present value we would experience if the bad outcome occurred. Suppose the losses under a pessimistic scenario were so great that they bankrupted the company, but that the potential gains under the good outcome were so high that the expected net present value (calculated using the probabilities of occurrence) was positive. Would you still pursue the project?

To answer this type of question we need to examine the projected cash flows under both scenarios. The risks associated with the cash flows should be incorporated into the cash flow projections (for different scenarios). These detailed projections provide the opportunity to analyse risks that might affect future cash flows, to decide whether to undertake projects, and also to examine the knock-on impacts not only for the valuation but also on other operations and the viability of the company.

You will examine scenario analysis in Unit 6. A more detailed study of the methods available to analyse the impact of flexibility on value, including decision-tree analysis and real options pricing, is provided in the module *Advanced Topics in Valuation*.

The next reading from Koller *et al* (2015) includes a simple example of scenario analysis to demonstrate how we can analyse cash flow risk. It also considers whether and in what circumstances companies should hedge their cash flow risks.

Reading 1.6

Please now turn to Koller *et al* (2015), and read pages 42–47, 'Risk and Value Creation'.

Please make sure you understand the advantages and disadvantages of using hedging to reduce the risk associated with future cash flows.

Koller *et al* (2015) Section 'Risk and value creation' from Chapter 3 'Conservation of value and the role of risk' in *Valuation: Measuring and Managing the Value of Companies.* pp. 42–47.

Review Question 1.7

A company is considering undertaking a project. The outcome of this project has two possibilities:

1. 70% probability that it is worth 100 million USD
2. 30% probability that it is worth nothing and bankrupts the company

Should the company undertake this project? Suppose first that, as a CEO of this company, you are risk-neutral (*ie* your decision is based on the expected payoff).

Next, suppose instead that you are a risk-averse CEO.

Note briefly your views on these possibilities.

In general, hedging should reduce the volatility of the company's cash flows. However, a decision to hedge (or not) is not just an accounting consideration. For instance, if mining companies were to hedge their revenue, this would add complexity to the portfolio management of the investors who, after all, are investing in the first place because they want exposure to volatile commodity prices.

Yet, there are some risks that a company may want to hedge in any case. Currency risk is especially important to exporting companies. Because revenues and costs are not in the same currency, changes in exchange rates between the home and foreign markets influences operating margins.

A company in emerging markets may be more exposed to currency risk, because the home market currency tends to be more volatile than the currency of developed markets. Hedging choices also depend on the availability of hedging instruments that a company can access *ie* forward contracts, options, futures and swaps. More in-depth treatment of hedging cash flows can be found in the module *Risk Management: Principles and Applications*.

1.7 Expectations and Why Shareholder Expectations Become a Treadmill

Over the long run (*ie* more than 10 years), the performance of management and that of a company could be aligned and captured by the gains in share price plus dividend, known as the Total Return to Shareholders (TRS). However, improving the expected overall performance, or an 'expectation treadmill' measured by TRS, may be more difficult for an already successful business. For a mature or high performance company, it may seem that there is not much room for further growth to keep up with the past performance. In addition, if one looks at a snapshot of TRS, it is likely to be too rudimentary to provide further insight into long-term performance; there are many other factors affecting the share price – such as market sentiments, bubbles and irrationalities, among others. So at times, there might be a mismatch between a rather short-term measure such as the traditional TRS and long-

term value creation. What we need to consider is a decomposition of TRS into the key drivers of value creation – growth and ROIC.

The starting point for understanding the expectations treadmill, or the working of TRS, is to recall that, at any given level of earnings, the existing shareholders and prospective shareholders would have different rates of return in mind, depending on the prices paid for their shares. To maintain a good performance, and to push for even higher share prices, the expectations treadmill would have to run ever faster – it becomes more difficult to meet market expectations, and even more so for companies with high performance expectations. To maintain a high TRS above its peers in the industry, the manager may be tempted to boost the short-run TRS by carrying out projects or investments that could be unproductive in the long run. Focusing too narrowly on the expectation of the markets, the company may become short-sighted in terms of its investment choices.

Reading 1.7

Please now turn to Koller *et al* (2015), and read the beginning of Chapter 4, pages 49–54.

In your notes on the reading, focus particularly on the real-world effects of the expectations treadmill on Reckitt Benckiser in Exhibit 4.1.

Koller *et al* (2015) Extract from Chapter 4 'The alchemy of stock market performance' in *Valuation: Measuring and Managing the Value of Companies.* pp. 49–54.

1.8 Decomposing Total Returns to Shareholders

To avoid the expectations trap, we should try to understand further the company performance by decomposing TRS into the key value drivers. The decomposition should help us to discover the sources of change in TRS. Such a decomposition should also inform expectations concerning performance so they are more consistent with the concept of value-creation discussed so far.

We start with the traditional approach to TRS decomposition. TRS equals the dividend yield plus the percentage change in share price. The percentage change in share price can be decomposed into the percentage change in earnings plus the percentage change in the P/E:

$$\begin{aligned} \text{TRS} &= \text{Dividend Yield} + \%\Delta(\text{Share Price}) \\ &= \text{Dividend Yield} + \%\Delta(\text{Earnings}) + \%\Delta(P/E) \end{aligned} \tag{1.13}$$

This traditional approach is quite problematic. First, recall that not all earnings growth has the same potential for value creation (*eg* new product vis-à-vis acquisition). Second, we can see in this formulation that increasing dividends, while increasing TRS, may negatively affect the available cash flow for future investment. Third, this traditional TRS decomposition does not take into account risk associated with leverage, *ie* debt/equity ratios.

Instead, we should decompose TRS into five components, as follows:

1. The value created by revenue growth, net of invested capital
2. The impact of profit margin improvements
3. What TRS would have been without the growth measured in part 1 and the improvement to profit margins in part 2
4. The change in P/E that reflects changes in shareholders' expectations
5. The effect of the debt/equity ratio on TRS.

The first and second components are really the TRS from performance improvements; whereas the third and the fourth components can be considered as a temporary boost to the TRS; a high level of the fifth component is associated with greater risk.

Reading 1.8

Please now turn to Koller *et al* (2015), and study pages 54–63, the remainder of Chapter 4.

Check that you understand and can explain the TRS decomposition in the theoretical example in Exhibits 4.4 and 4.6, and the example of Reckitt Benckiser and Henkel in Exhibit 4.7.

Koller *et al* (2015) Extract from Chapter 4 'The alchemy of stock market performance' in *Valuation: Measuring and Managing the Value of Companies.* pp. 54–63.

Consider the example in Exhibit 4.4. TRS is the percentage change in the share price plus the dividend yield. The percentage change in the share price is

$$\left(\frac{137.5}{125}-1\right)\times 100 = 10\%$$

The dividend yield is the dividend distributed in a period divided by the equity value at the start of the period, so

$$\frac{5.5}{125}\times 100 = 4.4\%$$

And TRS is 14.4%.

Now consider the traditional decomposition of TRS. The percentage change in earnings is

$$\left(\frac{107}{100}-1\right)\times 100 = 7.0\%$$

The change in P/E is

$$\left(\frac{10.3}{10}-1\right)\times 100 = 3.0\%$$

The dividend yield is the same, 4.4%. And TRS is 14.4% (matching the figure obtained above).

Now consider the enhanced decomposition of TRS. The percentage growth in earnings is the same, 7%. The required investment (in terms of return to shareholders) is the increase in capital expressed as a percentage of the equity value in the base year, so

$$\frac{107-100}{125}\times 100 = 5.6\%$$

The TRS from performance is then the earnings growth less the required investment, so 1.4%.

The next element in the enhanced decomposition is the zero growth return. Koller *et al* note on pages 56–57 of Koller *et al* (2015) that this can be calculated as the inverse of the P/E, which in this case equals

$$\frac{1}{10}\times 100 = 10\%$$

The change in P/E is the same at 3%. As a check, adding together the elements of the enhanced decomposition gives TRS equal to 14%, as shown in Exhibit 4.4

$$1.4\% + 10\% + 3\% = 14\%$$

Now that you have read this section on the TRS decomposition, you can see it is difficult to raise the TRS further if it is already at a high level. This is likely to be the case for any well-run company, and a subsequent decline in the share price relative to the overall market would be expected over the long run. The current share price is therefore an informative source of expectations performance that has already been built in.

The traditional TRS decomposition is not an appropriate analysis in and of itself, if one takes the expectations treadmill into account. Further, the expectations treadmill disconnects executive compensation from the true drivers of value creation, namely revenue growth, ROIC, and the performance TRS (the first two parts of TRS decomposition). For instance, instead of using stock options as management compensation, you can see that compensation should be awarded in relation to the performance elements in the decomposition of TRS (*ie* relative to the industry). Essentially, the short-run movement of share prices is of little value when it comes to performance evaluation.

Study Question 1.4

Based on the following financial information:

Table 1.1

$ Million	Base year	One year later
Invested capital	200	208
Earnings	20	22
P/E	12	12.6
Equity value	240	277.2
Dividends	10	12

the traditional breakdown of TRS is

$$\begin{aligned} TRS &= \frac{D_1}{P_0} + \left(\frac{E_1}{E_0} - 1\right) + \left(\frac{P_1/E_1}{P_0/E_0} - 1\right) \\ &= \frac{12}{240} + \left(\frac{22}{20} - 1\right) + \left(\frac{12.6}{12} - 1\right) \\ &= 0.05 + 0.10 + 0.05 \\ &= 0.20 \\ &= 20\% \end{aligned}$$

Obtain the enhanced breakdown of TRS:

- What is the TRS from performance?
- What is the zero-growth return?
- What is the change in the price/earnings ratio?

Try to work out the answers on your own, before reading on.

The percentage change in earnings is

$$\left(\frac{E_1}{E_0} - 1\right) = \left(\frac{22}{20} - 1\right) = 0.10 = 10\%$$

The required investment (in terms of return to shareholders) is the increase in capital expressed as a percentage of the equity value in the base year:

$$\frac{208 - 200}{240} = 0.033 = 3.3\%$$

The TRS from performance is the earnings growth less the required investment, so 10 – 3.3 = 6.7%.

The zero-growth return is the inverse of P/E, so

$$\frac{1}{12} = 0.083 = 8.3\%$$

The change in the price/earnings ratio is

$$\frac{P_1/E_1}{P_0/E_0} - 1 = \frac{12.6}{12} - 1 = 0.05 = 5\%$$

And to check, $\text{TRS} = 6.7 + 8.3 + 5.0 = 20\%$

Please note that the TRS without breakdown, equal to the change in share price plus the dividend yield, is slightly different at 20.5%, and should be ignored for this question[1]:

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[1] This is also discussed in Koller *et al* (2015) p. 54.

$$\begin{aligned}\text{TRS} &= \frac{D_1}{P_0} + \left(\frac{P_1}{P_0} - 1\right) \\ &= \frac{12}{240} + \left(\frac{277.2}{240} - 1\right) \\ &= 0.05 + 0.155 \\ &= 0.205 \\ &= 20.5\%\end{aligned}$$

1.9 Conclusion

This unit has provided an introduction to the fundamental principles of valuation using the method of discounted cash flow. You have seen why it is important to obtain reliable and accurate estimates of company value. You have also studied the key drivers of value creation, and the principle of value conservation. Anything that increases cash flow adds value to the company – anything that does not affect cash flow will not affect company value.

In your analysis of the maths of value creation you have examined the key value driver formula, in which net operating profit from operations less adjusted taxes (NOPLAT), growth, the return on invested capital, and the cost of capital drive value creation. This formula is useful for understanding the fundamental principles of valuation. The key value driver formula can be used to value companies, but only if it is realistic to assume the growth rate, ROIC and WACC are constant. In practical applications we are more likely to forecast annual cash flow over an explicit forecast period, and to use the key value driver formula to value cash flow beyond this explicit forecast period, either because it is safe to assume the company has reached a steady state by then, or because it is not informative to make forecasts for individual years so far into the future.

Your study of the conservation of value, risk and value, and the enhanced decomposition of TRS have reinforced the idea that we should focus on the factors affecting the company's true long-term performance, and you should be aware of the dangers of being distracted from this by, for example, short-term movements in share prices, or changes in accounting or reporting that do not affect value.

The fundamental concepts you have studied in this unit are very powerful, but they have been presented in stylised and simplified examples. To perform valuation analysis, and to assess the accuracy of value estimates, we need to examine in more detail the elements of the valuation process. You will do this in Units 2 to 6.

Unit 2 discusses the return on invested capital and revenue growth, and the difficulties involved in sustaining ROIC and growth. Unit 3 introduces the detail of the discounted cash flow model, and compares it to alternative

methods. It also presents the reorganisation of accounting statements to derive measures of cash flow. Unit 4 is concerned with the analysis of performance, and how to forecast future cash flows. Unit 5 discusses the methods available to estimate the cost of capital, and the adjustments needed to move from the value of operations to value per share. Unit 6 is concerned with reporting results, including sensitivity analysis, valuation in alternative scenarios, and comparison with peer companies operating in the same market or sector.

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