FIFTH EDITION

THE #1 BESTSELLING GUIDE TO

CORPORATE VALUATION

VALUATION

UNIVERSITY EDITION

Measuring *and* Managing *the* Value *of* Companies

Updated *and* Revised *with* New Insights *into* Business Strategy *and* Investor Behavior

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McKINSEY & COMPANY

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Fundamental Principles of Value Creation

In Chapter 1, we introduced the fundamental principles of corporate finance. Companies create value by investing capital to generate future cash flows at rates of return that exceed their cost of capital. The faster they can grow and deploy more capital at attractive rates of return, the more value they create. The mix of growth and return on invested capital (ROIC)[1] relative to the cost of capital is what drives the creation of value. A corollary of this principle is the conservation of value: any action that doesn't increase cash flows doesn't create value.

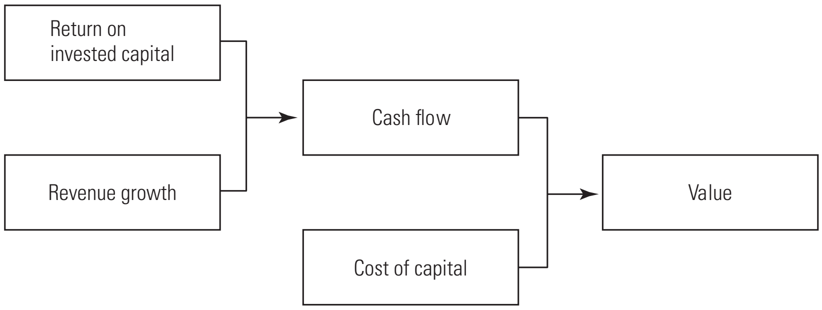
The principles imply that a company's primary task is to generate cash flows at rates of return on invested capital greater than the cost of capital. Following these principles helps managers decide which investments will create the most value for shareholders in the long term. The principles also help investors assess the potential value of alternative investments. Managers and investors alike need to understand in detail what relationships tie together cash flows, ROIC, and value; what consequences arise from the conservation of value; and how to factor any risks attached to future cash flows into their decision making. These are the main subjects of this chapter. The chapter concludes by setting out the relationships between cash flows, ROIC, and value in the key value driver formula—the equation underpinning discounted cash flow (DCF) valuation in both theory and practice.

GROWTH AND ROIC: DRIVERS OF VALUE

Companies create value for their owners by investing cash now to generate more cash in the future. The amount of value they create is the difference

[1] A simple definition of return on invested capital is after-tax operating profit divided by invested capital (working capital plus fixed assets). ROIC's calculation from a company's financial statements is explained in detail in Chapters 6 and 7.

EXHIBIT 2.1 **Growth and ROIC Drive Value**



between cash inflows and the cost of the investments made, adjusted to reflect the fact that tomorrow's cash flows are worth less than today's because of the time value of money and the riskiness of future cash flows. As we will demonstrate later in this chapter, a company's return on invested capital and its revenue growth together determine how revenues are converted to cash flows. That means the amount of value a company creates is governed ultimately by its ROIC, revenue growth, and of course its ability to sustain both over time. Exhibit 2.1 illustrates this core principle of value creation.[2]

One might expect universal agreement on a notion as fundamental as value, but this isn't the case: many executives, boards, and financial media still treat accounting earnings and value as one and the same, and focus almost obsessively on improving earnings. However, while earnings and cash flow are often correlated, earnings don't tell the whole story of value creation, and focusing too much on earnings or earnings growth often leads companies to stray from a value-creating path.

For example, earnings growth alone can't explain why investors in drugstore chain Walgreens, with sales of $54 billion in 2007, and global chewing-gum maker Wm. Wrigley Jr. Company, with sales of $5 billion the same year, earned similar shareholder returns between 1968 and 2007.[3] These two successful companies had very different growth rates. During the period, the net income of Walgreens grew at 14 percent per year, while Wrigley's net income grew at 10 percent per year. Even though Walgreens was one of the fastest-growing companies in the United States during this time, its average annual shareholder returns were 16 percent, compared with 17 percent for the significantly slower-growing Wrigley. The reason Wrigley could create slightly more value than Walgreens despite 40 percent slower growth was that it earned

[2] In its purest form, *value* is the sum of the present values of future expected cash flows—a point-in-time measure. *Value creation* is the change in value due to company performance. Sometimes we refer to value and value creation based on explicit projections of future growth, ROIC, and cash flows. At other times, we use the market price of a company's shares as a proxy for value, and total returns to shareholders (share price appreciation plus dividends) as a proxy for value creation.
[3] Shareholder returns equal dividends plus appreciation in the share price.

a 28 percent ROIC, while the ROIC for Walgreens was 14 percent (a good rate for a retailer).

To be fair, if all companies in an industry earned the same ROIC, then earnings growth *would* be the differentiating metric. For reasons of simplicity, analysts and academics have sometimes made this assumption, but as Chapter 4 will demonstrate, returns on invested capital can vary considerably, even between companies within the same industry.

Relationship of Growth, ROIC, and Cash Flow

Disaggregating cash flow into revenue growth and ROIC helps illuminate the underlying drivers of a company's performance. Say a company's cash flow was $100 last year and will be $150 next year. This doesn't tell us much about its economic performance, since the $50 increase in cash flow could come from many sources, including revenue growth, a reduction in capital spending, or a reduction in marketing expenditures. But if we told you that the company was generating revenue growth of 7 percent per year and would earn a return on invested capital of 15 percent, then you would be able to evaluate its performance. You could, for instance, compare the company's growth rate with the growth rate of its industry or the economy, and you could analyze its ROIC relative to peers, its cost of capital, and its own historical performance.

Growth, ROIC, and cash flow are tightly linked. To see how, consider two companies, Value Inc. and Volume Inc., whose projected earnings and cash flows are displayed in Exhibit 2.2. Both companies earned $100 million in year 1 and increased their revenues and earnings at 5 percent per year, so their projected earnings are identical. If the popular view that value depends only on earnings were true, the two companies' values also would be the same. But this simple example illustrates how wrong that view can be.

Value Inc. generates higher cash flows with the same earnings because it invests only 25 percent of its profits (making its investment rate 25 percent) to achieve the same profit growth as Volume Inc., which invests 50 percent of its profits. Value Inc.'s lower investment rate results in 50 percent higher cash flows than Volume Inc. obtains from the same level of profits.

EXHIBIT 2.2 **Tale of Two Companies: Same Earnings, Different Cash Flows**

$ million

	Value Inc.					Volume Inc.				
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 1	Year 2	Year 3	Year 4	Year 5
Revenue	1,000	1,050	1,102	1,158	1,216	1,000	1,050	1,102	1,158	1,216
Earnings	100	105	110	116	122	100	105	110	116	122
Investment	(25)	(26)	(28)	(29)	(31)	(50)	(53)	(55)	(58)	(61)
Cash flow	75	79	82	87	91	50	52	55	58	61

EXHIBIT 2.3 **Value Inc.: DCF Valuation**

$ millions

	Value Inc.						
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year X**	**Sum**
Earnings	100	105	110	116	122	. . .	–
Investment	(25)	(26)	(28)	(29)	(31)	. . .	–
Cash flow	75	79	82	87	91	. . .	–
Value today	68	65	62	59	56	. . .	1,500

Present value of 75 discounted at 10% for one year

Present value of 87 discounted at 10% for four years

We can value the two companies by discounting their future cash flows at a discount rate that reflects what investors expect to earn from investing in the company—that is, their cost of capital. For both companies, we discounted each year's cash flow to the present at a 10 percent cost of capital and summed the results to derive a total present value of all future cash flows: $1,500 million for Value Inc. (shown in Exhibit 2.3) and $1,000 million for Volume Inc.

The companies' values can also be expressed as price-to-earnings ratios (P/Es). To do this, divide each company's value by its first-year earnings of $100 million. Value Inc.'s P/E is 15, while Volume Inc.'s is only 10. Despite identical earnings and growth rates, the companies have different earnings multiples because their cash flows are so different.

Value Inc. generates higher cash flows because it doesn't have to invest as much as Volume Inc., thanks to its higher rate of ROIC. In this case, Value Inc. invested $25 million (out of $100 million earned) in year 1 to increase its revenues and profits by $5 million in year 2. Its return on new capital is 20 percent ($5 million of additional profits divided by $25 million of investment).[4] In contrast, Volume Inc.'s return on invested capital is 10 percent ($5 million in additional profits in year 2 divided by an investment of $50 million).

Growth, ROIC, and cash flow (as represented by the investment rate) are tied together mathematically in the following relationship:

$$\text{Investment Rate} = \text{Growth} \div \text{Return on Invested Capital}$$

Applying that formula to Value Inc.,

$$25\% = 5\% \div 20\%$$

[4] We assumed that all of the increase in profits is due to the new investment, with the return on Value Inc.'s existing capital remaining unchanged.

EXHIBIT 2.4 **Translating Growth and ROIC into Value**

Value,[1] dollars

Growth \ ROIC	7%	9%	13%	25%
3%	800	1,100	1,400	1,600
6%	600	1,100	1,600	2,100
9%	400	1,100	1,900	2,700

[1] Present value of future cash flows, assuming year 1 earnings of $100 and a 9% cost of capital. After 15 years all scenarios grow at 3%.

Applying it to Volume Inc.,

$$50\% = 5\% \div 10\%$$

Since the three variables are tied together, you only need two to know the third, so you can describe a company's performance with any two of the variables.

Balancing ROIC and Growth to Create Value

Exhibit 2.4 shows how different combinations of growth and ROIC translate into value. Each cell in the matrix represents the present value of future cash flows under each of the assumptions of growth and ROIC, discounted at the company's cost of capital. In this case, we're assuming a 9 percent cost of capital and a company that earns $100 in the first year.[5]

Using this simple approach, we get real-world results. Take the typical large company, which grows at about 5 to 6 percent per year (nominal), earns about a 13 percent return on equity, and has a 9 percent cost of capital. Finding the intersection of the typical company's return leads you to a value of $1,500 to $1,600. Dividing this value by earnings of $100 results in a price-to-earnings ratio of 15 to 16 times—and 15 times is the median P/E for large U.S. companies outside of a recession.

[5] We made explicit cash flow forecasts for the first 15 years and assumed that growth after that point converges on 4.5 percent in all scenarios. If a company grew faster than the economy forever, it would eventually overtake the entire world economy.

Observe that for any level of growth, value increases with improvements in ROIC. In other words, when all else is equal, a higher ROIC is always good. The same can't be said of growth. When ROIC is high, faster growth increases value, but when ROIC is lower than the company's cost of capital, faster growth necessarily destroys value, making the point where ROIC equals the cost of capital the dividing line between creating and destroying value through growth. On the line, value is neither created nor destroyed, regardless of how fast the company grows.

We sometimes hear the argument that even low-ROIC companies should strive for growth, because if a company grows, its ROIC will naturally increase. However, we find this is true only for young, start-up businesses. Most often in mature companies, a low ROIC indicates a flawed business model or unattractive industry structure.

Real-World Evidence

The logic laid out in this section is reflected in the way companies perform in the stock market. Recall the earlier explanation of why shareholder returns for Walgreens and Wrigley were the same even though earnings for Walgreens grew much faster. General Electric (GE) provides another example of the relative impact of growth and ROIC on value. GE's share price increased from about $5 in 1991 to about $40 in 2001, earning investors $519 billion from the increase in share value and distributions during the final 10 years of Jack Welch's tenure as CEO. A similar amount invested in the S&P 500 index would have returned only $212 billion.

How did GE do it? Its industrial and finance businesses both contributed significantly to its overall creation of value, but in different ways. Over the 10-year period, the industrial businesses increased revenues by only 4 percent a year (less than the growth of the economy), but their ROIC increased from about 13 percent to 31 percent. The finance businesses performed in a more balanced way, demonstrating growth of 18 percent per year and increasing ROIC from 14 percent to 21 percent. In the industrial businesses, ROIC was the key driver of value, while in the financial businesses, improvements in both growth and ROIC contributed significantly to value creation.

Clearly, the core valuation principle applies at the company level. We have found that it applies at the sector level, too. Consider companies as a whole in the consumer packaged-goods sector. Even though well-known names in the sector such as Procter & Gamble and Colgate-Palmolive aren't high-growth companies, the market values them at high earnings multiples because of their high returns on invested capital.

The typical large packaged-goods company increased its revenues only 6 percent a year from 1998 to 2007, slower than the average of about 8 percent for all large U.S. companies. Yet at the end of 2007 (before the market crash), the median P/E of consumer packaged-goods companies was about 20, compared with 17 for the median large company. The high valuation of companies in this sector rested on their high ROICs—typically above 20 percent, compared with ROICs averaging 13 percent for the median large company between 1998 and 2007.

Another example that underlines the point is a comparison of Campbell Soup Company ($8 billion in 2008 revenues) with fast-growing discount retailer Kohl's (revenues of $16 billion in 2008). In the middle years of the decade, revenues for Kohl's grew 15 percent annually, while Campbell achieved only 4 percent in annual organic growth. Yet the two companies had similar P/Es. Campbell's high ROIC of 50 percent made up for its slower growth; Kohl's ROIC averaged only 15 percent.

To test whether the core valuation principle also applies at the level of countries and the aggregate economy, we asked why large U.S.-based companies typically trade at higher multiples than large companies in the more developed Asian countries of Hong Kong, South Korea, Taiwan, and Singapore.[6] Some executives assume the reason is that investors are simply willing to pay higher prices for U.S. companies (an assumption that has prompted some non-U.S. companies to consider moving their share listing to the New York Stock Exchange in an attempt to increase their value). But the real reason U.S. companies trade at higher multiples is that they typically earn higher returns on invested capital. The median large U.S. company earned a 16 percent ROIC in 2007, while the median large Asian company earned 10 percent. Of course, these broad comparisons hide the fact that some Asian sectors and companies—for example, Toyota in automobiles—outperform their U.S. counterparts. But for the most part, Asian companies historically have focused more on growth than profitability or ROIC, which explains the large difference between their average valuation and that of U.S. companies.

More evidence showing that ROIC and growth drive value is presented in Chapters 15 and 16.

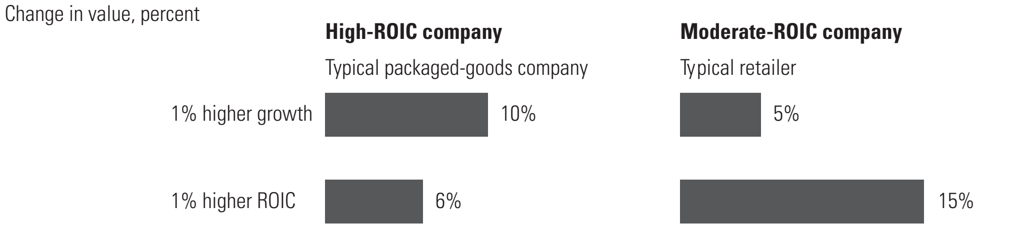
Managerial Implications

We'll dive more deeply into the managerial dimensions of ROIC and growth in Chapters 4 and 5, respectively. For now, we outline several lessons managers should learn for strategic decision making.

Start by referring back to Exhibit 2.4, because it contains the most important strategic insights for managers concerning the relative impact that changes in ROIC and growth can have on a company's value. In general, companies already earning a high ROIC can generate more additional value by increasing their rate of growth, rather than their ROIC, while low-ROIC companies will generate relatively more value by focusing on increasing their ROIC.

[6] The median large company in the United States had a market-to-book ratio of 2.4 in 2007, while the median large company in these four Asian countries had a median market-to-book ratio of about 1.8.

EXHIBIT 2.5 **Increasing Value: Impact of Higher Growth and ROIC**



Source: McKinsey Corporate Performance Center analysis.

For example, Exhibit 2.5 shows that a typical high-ROIC company, such as a branded consumer packaged-goods company, can increase its value by 10 percent if it increases its growth rate by one percentage point, while a typical moderate-ROIC company, such as the average retailer, will increase its value by only 5 percent for the same increase in growth. In contrast, the moderate-ROIC company gets a 15 percent bump in value from increasing its return on invested capital by one percentage point, while the high-ROIC company gets only a 6 percent bump from the same increase in return on invested capital.

The general lesson is that high-ROIC companies should focus on growth, while low-ROIC companies should focus on improving returns before growing. Of course, this analysis assumes that achieving a one percentage point increase in growth is as easy as achieving a one percentage point increase in ROIC, everything else being constant. In reality, achieving either type of increase poses different degrees of difficulty for different companies in different industries, and the impact of a change in growth and ROIC will also vary between companies. However, every company needs to make the analysis in order to set its strategic priorities.

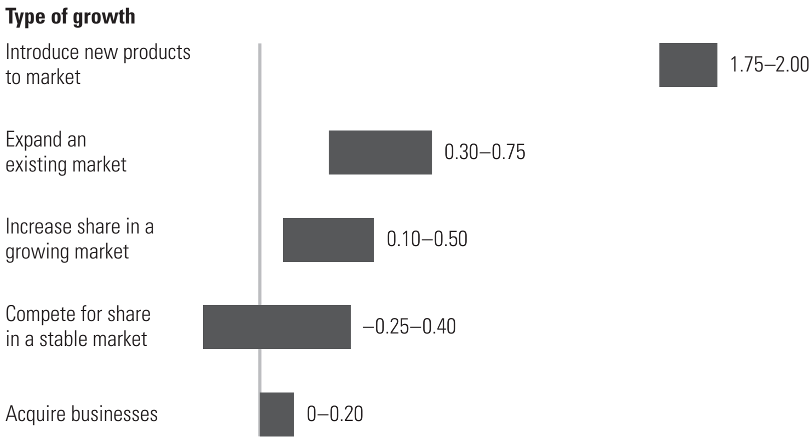
Until now, we have assumed that all growth earns the same ROIC and therefore generates the same value, but this is clearly unrealistic: different types of growth earn different degrees of return so not all growth is equally value-creating. Each company must understand the pecking order of growth-related value creation that applies to its industry and company type.

Exhibit 2.6 shows the value created from different types of growth for a typical consumer products company. These results are based on cases with which we are familiar, not on a comprehensive analysis, but we believe they reflect the broader reality.[7] The results are expressed in terms of value created for $1.00 of incremental revenue. For example, $1.00 of additional revenue from a new product creates $1.75 to $2.00 of value. The most important implication of this chart is the rank order. New products typically create more value for shareholders, while acquisitions typically create the least. The key to

[7] We identified examples for each type of growth and estimated their impact on value creation. For instance, we obtained several examples of the margins and capital requirements for new products.

EXHIBIT 2.6 **Value Creation by Type of Growth**

Shareholder value created for incremental $1.00 of revenue.[1]



[1] Value for a typical consumer packaged-goods company.

Source: McKinsey Corporate Performance Center analysis.

the difference between these extremes is differences in ROICs for the different types of investment.

Growth strategies based on organic new product development frequently have the highest returns because they don't require much new capital; companies can add new products to their existing factory lines and distribution systems. Furthermore, the investments to produce new products are not all required at once. If preliminary results are not promising, future investments can be scaled back or canceled.

Acquisitions, by contrast, require that the entire investment be made up front. The amount of up-front payment reflects the expected cash flows from the target plus a premium to stave off other bidders. So even if the buyer can improve the target enough to generate an attractive ROIC, the rate of return is typically only a small amount higher than its cost of capital.

To be fair, this analysis doesn't reflect the risk of failure. Most product ideas fail before reaching the market, and the cost of failed ideas is not reflected in the numbers. By contrast, acquisitions typically bring existing revenues and cash flows that limit the downside risk to the acquirer. But including the risk of failure would not change the pecking order of investments from a value-creation viewpoint.

The interaction between growth and ROIC is a key factor to consider when assessing the likely impact of a particular investment on a company's overall ROIC. For example, we've found that some very successful, high-ROIC companies in the United States are reluctant to invest in growth if it will reduce their ROICs. One technology company had 30 percent operating margins and a 50+ percent ROIC, so it didn't want to invest in projects that might earn only 25 percent returns, fearing this would dilute its average returns. But as the first principle of value creation would lead you to expect, even a 25 percent return opportunity would still create value as long as the cost of capital was lower, despite the resulting decline in average ROIC.

The evidence backs this up. We examined the performance of 78 high-ROIC companies (greater than 30 percent ROIC) from 1996 to 2005.[8] Not surprisingly, the companies that created the most value (measured by total returns to shareholders over the 10 years) were those that grew fastest and maintained their high ROICs. But the second-highest value creators were those that grew fastest even though they experienced moderate declines in their ROICs. They created more value than companies that increased their ROICs but grew slowly.

We've also seen companies with low returns pursue growth on the assumption that this will also improve their profit margins and returns, reasoning that growth will increase returns by spreading fixed costs across more revenues. As we mentioned earlier in this chapter, however, except for small start-up companies, faster growth rarely fixes a company's ROIC problem. Low returns usually indicate a poor industry structure (e.g., airlines), a flawed business model, or weak execution. If a company has a problem with ROIC, the company shouldn't grow until the problem is fixed.

The evidence backs this up as well. We examined the performance of 64 low-ROIC companies from 1996 to 2005. The companies that had low growth but increased their ROICs outperformed the faster-growing companies that did not improve their ROICs.

CONSERVATION OF VALUE

A corollary of the principle that discounted cash flow drives value is the conservation of value: anything that doesn't increase cash flows doesn't create value. So value is conserved, or unchanged, when a company changes the ownership of claims to its cash flows but doesn't change the total available cash flows—for example, when it substitutes debt for equity or issues debt to repurchase shares. Similarly, changing the appearance of the cash flows without actually changing the cash flows—say, by changing accounting techniques—doesn't change the value of a company.[9] While the validity of this principle is obvious, it is worth emphasizing, because executives, investors, and pundits so often forget it—for example, when they hope that one accounting treatment will lead to a higher value than another, or that some fancy financial structure will turn a mediocre deal into a winner.

[8] Bin Jiang and Timothy Koller, "How to Choose between Growth and ROIC," *McKinsey on Finance* (Autumn 2007): 19–22.

[9] In some cases, a company can increase its value by reducing its cost of capital by using more debt in its capital structure. However, even in this case, the underlying change is to reduce taxes, but the overall pretax cost of capital doesn't change. See Chapter 23 for further discussion.

The battle over how companies should account for executive stock options illustrates the extent to which executives continue to believe (wrongly) that the stock market is unaware of the conservation of value. Even though there is no cash effect when executive stock options are issued, they reduce the cash flow available to existing shareholders by diluting their ownership when the options are exercised. Under accounting rules dating back to the 1970s, companies could exclude the implicit cost of executive stock options from their income statements. In the early 1990s, as options became more material, the Financial Accounting Standards Board (FASB) proposed a change to the accounting rules, requiring companies to record an expense for the value of options when they are issued. A large group of executives and venture capitalists thought investors would be spooked if options were brought onto the income statement. Some claimed that the entire venture capital industry would be decimated because young start-up companies that provide much of their compensation through options would show low or negative profits.

The FASB issued its new rules in 2004,[10] more than a decade after taking up the issue and only after the bursting of the dot-com bubble. Despite dire predictions, the stock prices of companies didn't change when the new accounting rules were implemented, because the market already reflected the cost of the options in its valuations of companies. One respected analyst said to us, "I don't care whether they are recorded as an expense or simply disclosed in the footnotes. I know what to do with the information."

In this case, the conservation of value principle explains why executives didn't need to worry about any effects that changes in stock option accounting would have on their share price. The same applies to questions such as whether an acquisition creates value simply because reported earnings increase, whether a company should return cash to shareholders through share repurchases instead of dividends, or whether financial engineering creates value. In every circumstance, executives should focus on increasing cash flows rather than finding gimmicks that merely redistribute value among investors or make reported results look better. Executives should also be wary of proposals that claim to create value unless they're clear about how their actions will materially increase the size of the pie. If you can't pinpoint the tangible source of value creation, you're probably looking at an illusion, and you can be sure that's what the market will think, too.

Foundations of the Value Conservation Principle

The value conservation principle is described in Richard Brealey and Stewart Myers's seminal textbook, *Principles of Corporate Finance*.[11] One of the earliest

[10] Financial Accounting Standard 123R, released in December 2004, effective for periods beginning after June 15, 2005.
[11] Richard Brealey, Stewart Myers, and Franklin Allen, *Principles of Corporate Finance*, 9th ed. (New York: McGraw-Hill/Irwin, 2007).

applications of the principle can be found in the pioneering work of Nobel Prize winners Franco Modigliani and Merton Miller, financial economists who in the late 1950s and early 1960s questioned whether managers could use changes in capital structure to increase share prices. In 1958, they showed that the value of a company shouldn't be affected by changing the structure of the debt and equity ownership unless the overall cash flows generated by the company also change.[12]

Imagine a company that has no debt and generates $100 of cash flow each year before paying shareholders. Suppose the company is valued at $1,000. Now suppose the company borrows $200 and pays it out to the shareholders. Our knowledge of the core valuation principle and the value conservation principle tells us that the company would still be worth $1,000, with $200 for the creditors and $800 for the shareholders, because its cash flow available to pay the shareholders and creditors is still $100.

In most countries, however, borrowing money does change cash flows because interest payments are tax deductible. The total taxes paid by the company are lower, thereby increasing the cash flow available to pay both shareholders and creditors. In addition, having debt may induce managers to be more diligent (because they must have cash available to repay the debt on time) and, therefore, increase the company's cash flow. On the downside, having debt could make it more difficult for managers to raise capital for attractive investment opportunities, thereby reducing cash flow. The point is that what matters isn't the substitution of debt for equity in and of itself; it only matters if the substitution changes the company's cash flows through tax reductions or if associated changes in management decisions change cash flows.

In a related vein, finance academics in the 1960s developed the idea of efficient markets. While the meaning and validity of efficient markets are subjects of continuing debate, especially after the bursting of the dot-com and real estate bubbles of the past decade, one implication of efficient market theory remains: the stock market isn't easily fooled when companies undertake actions to increase reported accounting profit without increasing cash flows. One example is the market's reaction to changes in accounting for employee stock options, just described. And when the FASB eliminated goodwill amortization effective in 2002 and the International Accounting Standards Board (IASB) did the same in 2005, many companies reported increased profits, but their underlying values and stock prices didn't change, because the accounting change didn't affect cash flows. The evidence is overwhelming that the market isn't fooled by actions that don't affect cash flow, as we will show in Chapter 16.

[12] F. Modigliani and M. H. Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment," *American Economic Review* 48, no. 3 (1958): 261–297.

Managerial Implications

The conservation of value principle is so useful because it tells what to look for when analyzing whether some action will create value: the cash flow impact and nothing else. This principle applies across a wide range of important business decisions, such as accounting policy (Chapter 16), acquisitions (Chapter 21), corporate portfolio decisions (Chapter 19), dividend payout policy (Chapter 23), and capital structure (also Chapter 23). In this section, we provide three examples of useful applications for the conservation of value principle: share repurchases, acquisitions, and financial engineering.

Share repurchases Share repurchases have become a popular way for companies to return cash to investors (see Chapter 23 for more detail). Until the early 1980s, more than 90 percent of the total distributions by large U.S. companies to shareholders were dividends, and fewer than 10 percent were share repurchases, but since 1998, about 50 to 60 percent of total distributions have been share repurchases.[13]

To determine whether share repurchases create value, you must compare them with some other use of the cash. For example, assume that a company borrows $100 to repurchase 10 percent of its shares. For every $100 of shares repurchased, the company will pay, say, 6 percent interest on its new debt. After tax savings of 35 percent, its total earnings would decline by $3.90. However, the number of shares has declined by 10 percent, so earnings per share (EPS) would increase by about 5 percent.

A 5 percent increase in EPS without working very hard sounds like a great deal. Assuming the company's price-to-earnings (P/E) ratio doesn't change, then its market value per share will also increase by 5 percent. In other words, you can get something for nothing: higher EPS with a constant P/E.

Unfortunately, this doesn't square with the conservation of value, because the total cash flow of the business has not increased. While EPS has increased by 5 percent, the company's debt has increased as well. With higher leverage, the company's equity cash flows will be more volatile, and investors will demand a higher return. This will bring down the company's P/E, offsetting the increase in EPS.

However, even if cash flow isn't increased by a buyback, some have rightly argued that repurchasing shares can reduce the likelihood that management will invest the cash at low returns. If this is true, and it is likely that management would otherwise have invested the money unwisely, then you have a legitimate source of value creation, because the operating cash flows of the company would increase. Said another way, when the likelihood of investing cash at low returns is high, share repurchases make sense as a tactic for avoiding value destruction. But they don't in themselves create value.

[13] Michael J. Mauboussin, "Clear Thinking about Share Repurchases," Legg Mason Capital Management, *Mauboussin on Strategy*, 2006.

Some argue that management should repurchase shares when its shares are undervalued. Suppose management believes that the current share price of the company doesn't reflect its underlying potential, so it buys back shares today. One year later, the market price adjusts to reflect management's expectations. Has value been created? Once again the answer is no, value has not been created; it has only been shifted from one set of shareholders (those that sold) to the shareholders that did not sell. So the holding shareholders may have benefited, but the shareholders as a whole were not affected. Buying shares when they are undervalued may be good for the shareholders who don't sell, but studies of share repurchases have shown that companies aren't very good at timing share repurchases, often buying when their share prices are high, not low.

Executives as a rule need to exercise caution when presented with transactions (like share repurchases) that appear to create value by boosting EPS. Always ask, "Where is the source of the value creation?" Some R&D–intensive companies, for example, have searched for ways to capitalize R&D spending through complex joint ventures, hoping to lower R&D expenses that reduce EPS. But does the joint venture create value by increasing short-term EPS? No, and in fact it may destroy value because the company now transfers upside potential—and risk, of course—to its partners.

Acquisitions Chapter 21 covers acquisitions in more detail, but for now we can say that acquisitions create value only when the combined cash flows of the two companies increase due to cost reductions, accelerated revenue growth, or better use of fixed and working capital.

When Johnson & Johnson purchased Pfizer's consumer health business for $16 billion in late 2006, J&J immediately announced that the combination would reduce costs by $600 million per year. These savings were successfully realized and increased the combined operating profits of J&J/Pfizer's consumer businesses by 30 percent—equal to about $5 billion to $6 billion in present value. Taking these numbers, then, the cost savings of the merger alone would recoup one-third of the purchase price, making it a likely value creator.

A revenue acceleration example also comes from Johnson & Johnson, which acquired Neutrogena (maker of skin care products) in 1994 for $924 million. With new-product development, coupled with an expansion of the brand's presence outside the United States, J&J was able to increase Neutrogena's sales from $281 million to $778 million by 2002. Exhibit 2.7 shows the extent of the new products J&J introduced under the Neutrogena brand.

The common element of both these acquisitions was radical performance improvement, not marginal change. But sometimes we have seen acquisitions justified by what could only be called magic.

Assume, for example, that Company A is worth $100 and Company B is worth $50, based on their respective expected cash flows. Company A buys Company B for $50, issuing its own shares. For simplicity, assume that the

EXHIBIT 2.7 **How Johnson & Johnson Turbocharged Neutrogena's Growth**

Product launches	Launch year 1994–1996	1997–1999	2000–2002
Men			• Complete men's product line
Cosmetics			• "Dermatologist Developed" line with 85+ SKUs
Hair products		• New line under "Clean" sub-brand	
Sun protection	• No-stick sunscreen • SPF hand treatment	• Transparent sunscreen	• Healthy Defense brand
Body care	• Rainbath brand (relaunch) • Norwegian Formula foot cream brand	• Body Clear brand	
Facial care			
Acne	• On-the-Spot brand acne treatment	• Multivitamin acne treatment • Oil-free acne treatment	
Moisturizers	• Healthy Skin Care brand	• Light night moisturizer products	• Visibly Firm brand
Cleansers	• Clear Pore treatment • Deep Clean, Deep Pore brands	• Extra Gentle brand • Pore Refining brand	• SkinClearing brand

Source: McKinsey Corporate Performce Center analysis.

combined cash flows are not expected to increase. What is the new Company AB worth?

Immediately after the acquisition, the two companies are the same as they were before, with the same expected cash flows, and the original shareholders of the two companies still own the shares of the combined company. So Company AB should be worth \$150, and the original A shareholders' shares of AB should be worth \$100, while the original B shareholders' shares of AB should be worth \$50.

As simple as this seems, some executives and financial professionals will still see some extra value in the transaction. Assume that Company A is expected to earn \$5 next year, so its P/E is 20 times. Company B is expected to earn \$3 next year, so its P/E is 16.7 times. What then will be the P/E of Company AB? A straightforward approach suggests that the value of Company AB should remain \$150. Its earnings will be \$8, so its P/E will be about 18.8, between A's and B's P/Es. But here's where the magic happens. Many executives and bankers believe that once A buys B, the stock market will apply A's P/E of 20 to B's earnings. In other words, B's earnings are worth more once they are owned by A. By this thinking, the value of Company AB would be \$160, a \$10 increase in the combined value.

There is even a term for this: "multiple expansion" in the United States or "rerating" in the United Kingdom. The notion is that the multiple of Company B's earnings expands to the level of Company A's because the market doesn't recognize that perhaps the new earnings added to A are not as valuable. This must be so, because B's earnings will now be all mixed up with A's, and the market won't be able to tell the difference.

Another version of the multiple expansion illusion works the other way around, supposing Company B purchases Company A. We've heard the argument that since a lower–P/E company is buying a higher–P/E company, it must be getting into higher-growth businesses. Higher growth is generally good, so another theory postulates that because B is accelerating its growth, its P/E will increase.

If multiple expansion were true, all acquisitions would create value because the P/E on the lower–P/E company's earnings would rise to that of the company with the higher P/E, regardless of which was the buyer or seller. But no data exist that support this fallacy. Multiple expansion may sound great, but it is an entirely unsound way of justifying an acquisition that doesn't have tangible benefits.

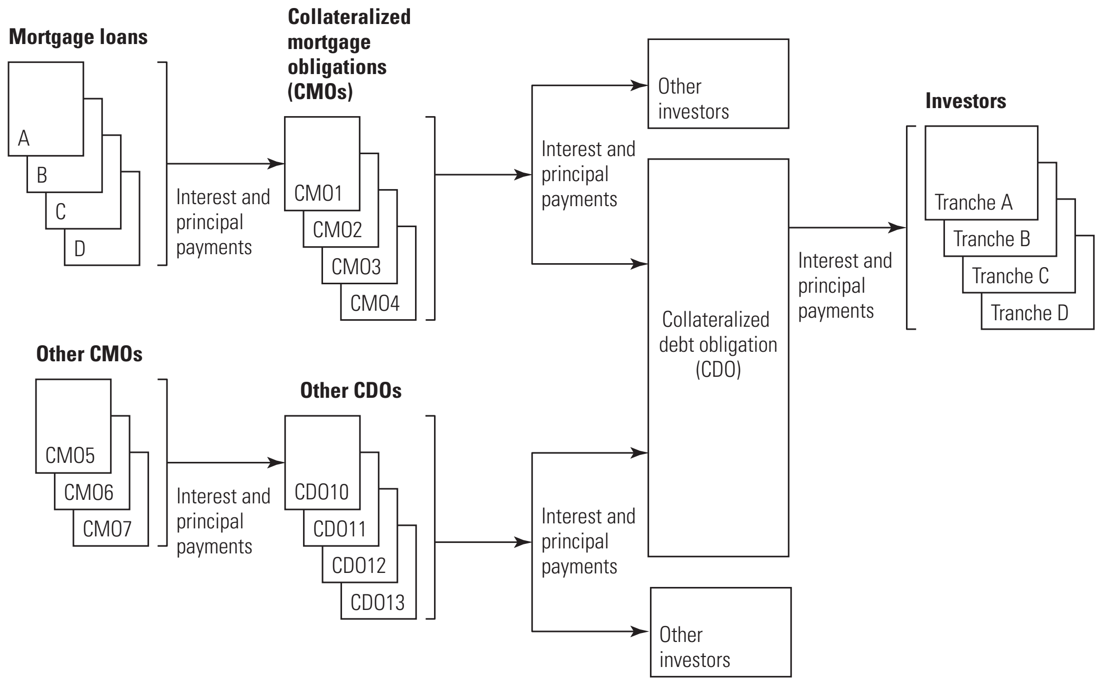
Every corporate leader must know this. So why are we discussing such obvious fallacies? The answer is that companies often do justify acquisitions using this flawed logic. Our alternative approach is simple: if you can't point to specific sources of increased cash flow, the stock market won't be fooled.

Financial engineering Another area where the value conservation principle is important is financial engineering, which unfortunately has no standard definition. Cornell University offers a concentration in financial engineering, which it calls "the design, analysis, and construction of financial contracts to meet the needs of enterprises." For our purposes, we define financial engineering a bit more broadly as the use of financial instruments or structures, other than straight debt and equity, to manage a company's capital structure and risk profile.

Financial engineering can include the use of derivatives, structured debt, securitization, and off–balance-sheet financing. While some of these activities can create real value, most don't. Even so, the motivation to engage in non–value-added financial engineering remains strong because of its short-term, illusory impact.

Consider that many of the largest hotel companies in the United States don't own most of the hotels they operate. Instead, the hotels themselves are owned by other companies, often structured as partnerships or real estate investment trusts (REITs). Unlike corporations, partnerships and REITs don't pay U.S. income taxes; taxes are paid only by their owners. Therefore, an entire layer of taxation is eliminated by placing hotels in partnerships and REITs in the United States. This method of separating ownership and operations lowers total income taxes paid to the government, so investors in the ownership and

EXHIBIT 2.8 **Cash Flows Related to Collateralized Debt Obligations**



operating companies are better off as a group, because their aggregate cash flows are higher. This is an example of financial engineering that adds real value by increasing cash flows.

In contrast, as an example of questionable financial engineering, consider the collateralized debt obligations (CDOs) that contributed to the 2007–2009 financial crisis. This is the story of how a good idea taken too far almost destroyed the financial markets.

Here's how a CDO works. The sponsor of a CDO (typically a bank) creates a new legal entity called a special-purpose vehicle (SPV) that buys up a lot of loans. These loans can be corporate loans, mortgage loans, or even other CDOs. The new legal entity then issues debt securities that will be paid off by the cash flows from the loans in the SPV's portfolio.

Exhibit 2.8 illustrates the cash flows related to a CDO. Reading from left to right in the top portion of the exhibit, individual homeowners pay interest and principal to their mortgage servicer, which forwards it to an SPV that has issued collateralized mortgage obligations (CMOs). That entity pays interest and principal to its investors, which could include a CDO entity that, in turn, pays principal and interest to the various CDO investors. But the total cash flows received by the investors cannot be more than they would receive if they directly owned the loans and securities; in fact, due to fees and transaction costs, the total cash flow to the CDO holders must be lower than the cash flows from the underlying loans.

One key benefit of a CDO is that it allows banks to remove assets from their balance sheets by selling them to investors (through the CDO), thereby freeing up some of the banks' equity capital to make new loans. Making more loans, with their associated transaction fees, increases the banks' cash flows. CDOs worked well for over 20 years, doing exactly what they were intended to do. The early CDOs were pools of home mortgages that allowed banks to originate loans and then take them off their books so they could originate more loans.

But the CDOs issued in 2005 and 2006 were different and fundamentally flawed. Unlike the early CDOs, the new ones were exceptionally complex and nontransparent. For instance, new CDOs might include slices of CDOs already issued, creating nested products as interwoven as an M. C. Escher drawing (as shown in Exhibit 2.8). Even the most sophisticated investors and banks couldn't assess their risks. Instead, they relied on the rating agencies to grade the securities, because rating agencies have access to more information about credit products than investors do. The problem was that the rating agencies earned large fees from the banks (both sellers and buyers of CDOs) for their ratings, and they didn't want the banks to take their business elsewhere. With no money of their own at stake, the rating agencies pronounced many of these securities AAA or AA, the safest securities. In this elaborate process, pools of risky subprime loans came to be deemed AAA-rated securities. But that violated the conservation of value principle: the actual risks and cash flows attached to subprime loans hadn't changed at all, so the total risk of the CDOs could not have been reduced by the securitization process.

When homeowners with subprime mortgages started to miss payments in 2006 and to default, housing prices fell. Investors then realized that the CDOs and CMOs were riskier than they had thought, so they rushed to sell their stakes. The CDOs and CMOs became impossible to sell. However, investors and banks that owned these securities had often financed them with short-term debt that had to be renewed every month or quarter (or sometimes daily). Their creditors, seeing that the value of their collateral (the CDOs and CMOs) had dropped, would not refinance the short-term debt as it came due. The banks and the investors holding the CDOs had no other options but to sell the assets at fire-sale prices, go out of business, or get a government bailout.

You might ask why the banks were so exposed: wasn't the idea that they were just creating these CDOs, not actually investing in them? But they *were* investing. Indeed, when the market turned, the banks were caught with three types of risky inventory: loans they hadn't yet been able to package into CDOs and securitize; the riskiest tranches of CDOs, which they hadn't been able to sell after creating them; and long-term CDOs they had bought themselves because they believed they could finance these CDOs with cheap short-term debt and make a profit.

Banks sometimes marketed CDOs by proposing that they created additional investment opportunities for investors. However, this argument doesn't hold up to scrutiny. The claim was that investors liked CDOs because they yielded higher returns than other similarly rated securities. In other words, the yield on an AA-rated CDO was higher than an AA-rated corporate bond. But if these CDOs were rated the same as corporate bonds, why did they have higher yields? The answer, which we know from hindsight, is that they were riskier—and the market knew they were riskier, even if the rating agencies didn't. The market saw through the illusion.

RISK AND VALUE CREATION

A company's future cash flows are unknown and therefore risky, so to complete our discussion of value creation, we need to explain how risk affects value. Risk enters into valuation both through the company's cost of capital, which is the price of risk, and in the uncertainty surrounding future cash flows. Managers and investors need to pay particularly close attention to cash flow risks.

Price of Risk

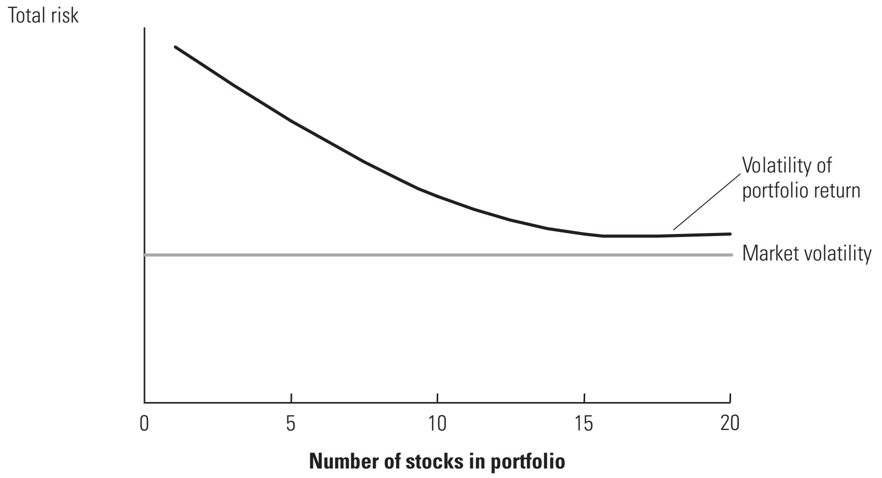
The cost of capital is the price charged by investors for bearing the risk that the company's future cash flows may differ from what they anticipate when they make the investment. The cost of capital to a company equals the minimum return that investors expect to earn from investing in the company. That is why the terms *expected return to investors* and *cost of capital* are essentially the same. The cost of capital is also called the discount rate, because you discount future cash flows at this rate when calculating the present value of an investment, to reflect what you will have to pay investors.

The average cost of equity capital, or the price investors charged for their risk, in late 2009 for a large nonfinancial company was about 9 percent, and most large companies' costs of equity capital fell in the range of 8 to 10 percent. That range can seem narrow, given that it encompasses companies with predictable cash flows like Campbell Soup and highly volatile companies like Google. The range is small because investors purposely avoid putting all their eggs in one basket.

Stock market investors, especially institutional investors, typically have hundreds of different stocks in their portfolios; even the most concentrated investors have at least 50. As a result, their exposure to any single company is limited. Exhibit 2.9 shows what happens to the total risk of a portfolio of stocks as more shares are added to the portfolio. The total risk declines because companies' cash flows are not correlated. Some will increase when others decline.

One of the key insights of academic finance that has stood the test of time concerns the effect of diversification on the cost of capital. If diversification reduces risk to investors and it is not costly to diversify, then investors will not demand a return for any risks they take that they can easily eliminate through diversification. They require compensation only for risks they cannot diversify.

EXHIBIT 2.9 **Volatility of Portfolio Return: Declining with Diversification**



The risks they cannot diversify are those that affect all companies—for example, exposure to economic cycles. However, since most of the risks that companies face are in fact diversifiable, most risks don't affect a company's cost of capital. One way to see this in practice is to note the fairly narrow range of P/Es for large companies. Most large companies have P/Es between 12 and 20. If the cost of capital varied from 6 to 15 percent instead of 8 to 10 percent, many more companies would have P/Es below 8 and above 25.

Whether a company's cost of capital is 8 percent or 10 percent or somewhere in between is a question of great dispute (the cost of capital is discussed in more detail in Chapter 11). For decades, the standard model for measuring differences in costs of capital has been the capital asset pricing model (CAPM). The CAPM has been challenged by academics and practitioners, but so far, no practical competing model has emerged. Anyway, when returns on capital across companies vary from less than 5 percent to more than 30 percent, a one or two percentage point difference in the cost of capital seems hardly worth arguing about.

General risk affecting all companies may be priced into the cost of capital, but that does not mean executives do not need to worry about risk. The unique risks that any particular company faces of, say, running into business trouble or, even worse, bankruptcy (which clearly destroys shareholder value) are not priced into the cost of capital. Companies certainly do need to worry about the effects of such unique risk on the total cash flows from any potential investment.

Cash Flow Risk

The risk that companies must identify and manage is their cash flow risk, meaning uncertainty about their future cash flows. Finance theory is, for the most part, silent about how much cash flow risk a company should take on.

In practice, however, managers need to be aware that calculating expected cash flows can obscure material risks capable of jeopardizing their business when they are deciding how much cash flow risk to accept. They also need to manage any risks affecting cash flows that investors are unable to mitigate for themselves.

Deciding how much cash flow risk to take on What should companies look out for? Consider an example. Project A requires an up-front investment of $2,000. If everything goes well with the project, the company earns $1,000 per year forever. If not, the company gets zero. (Such all-or-nothing projects are not unusual.) To value project A, finance theory directs you to discount the expected cash flow at the cost of capital. But what is the expected cash flow in this case? If there is a 60 percent chance of everything going well, the expected cash flows would be $600 per year. At a 10 percent cost of capital, the project would be worth $6,000 once completed. Subtracting the $2,000 investment, the net value of the project before the investment is made is $4,000.

But the project will never generate $600 per year. It will generate annual cash flows of either $1,000 or zero. That means the present value of the discounted cash flows will be either $10,000 or nothing, making the project net of the initial investment worth either $8,000 or –$2,000. The probability of it being worth the expected value of $4,000 ($6,000 less the investment) is zero. Rather than knowing the expected value, managers would be better off knowing that the project carries a 60 percent chance of being worth $8,000 and a 40 percent risk of losing $2,000. Managers can then examine the scenarios under which each outcome prevails and decide whether the upside compensates for the downside, whether the company can comfortably absorb the potential loss, and whether they can take actions to reduce the magnitude or risk of loss. The theoretical approach of focusing on expected values, while mathematically correct, hides some important information about the range and exclusivity of particular outcomes.

Moreover, some companies don't apply the expected-value approach correctly. Few companies discuss multiple scenarios, preferring a single-point forecast on which to base a yes-or-no decision. So most companies would simply represent the expected cash flows from this project as being $1,000 per year, the amount if everything goes well, and allow for uncertainty in the cash flow by arbitrarily increasing the discount rate. While you can get to the "right" answer with this approach, it has two flaws. First, there is no easy way to determine the cost of capital that gives the correct value. In this case, using a 16.7 percent cost of capital instead of 10 percent results in a project value of $6,000 before the investment and $4,000 after the investment, but the only way to know that this was the correct value would be to conduct a thorough scenario analysis. Companies sometimes arbitrarily add a risk premium to the cost of capital, but there is no way for them to know whether the amount they add is even reasonably accurate. Second, the decision makers faced with a project with cash flows of $1,000 per year and a 16.7 percent cost of capital are still not thinking through the 40 percent risk that it generates no cash at all.

How should a company think through whether to undertake the project with an upside of $8,000, a downside of –$2,000 and an expected value of $4,000? Theory says take on all projects with a positive expected value, regardless of the upside-versus-downside risk. But following the theory could be problematic.

What if the downside possibility would bankrupt the company? Consider an electric power company with the opportunity to build a nuclear power facility for $15 billion (not unrealistic in 2009 for a facility with two reactors). Suppose the company has $25 billion in existing debt and $25 billion in equity market capitalization. If the plant is successfully constructed and brought on line, it will be worth $28 billion. But there is a 20 percent chance it will fail to receive regulatory approval and be worth zero. As a single project, the expected value is $22 billion, or $7 billion net of investment. Another way to put this is that there is an 80 percent chance the project will be worth $13 billion ($28 billion less $15 billion investment) and a 20 percent chance it will be worth –$15 billion. Furthermore, failure will bankrupt the company, because the cash flow from the company's existing plants will be insufficient to cover its existing debt plus the debt on the failed plant. In this case, the economics of the nuclear plant spill over onto the value of the rest of the company. Failure will wipe out all the equity of the company, not just the $15 billion invested in the plant.

We can extend the theory to say that a company should not take on a risk that will put the rest of the company in danger. In other words, don't do anything that has large negative spillover effects on the rest of the company. This caveat would be enough to guide managers in the earlier example of deciding whether to go ahead with project A. If a $2,000 loss would endanger the company as a whole, they should forgo the project, despite its 60 percent likelihood of success. But by the same token, companies should not try to reduce risks that don't threaten the company's ability to operate normally. For example, profitable companies with modest amounts of debt should not worry about interest rate risk, because it won't be large enough to threaten to disrupt the business.

Deciding which types of risk to hedge There are also risks that investors positively want companies to take. For example, investors in gold-mining companies and oil production companies buy those stocks to gain exposure to often-volatile gold or oil prices. If gold and oil companies attempt to hedge their revenues, that effort merely complicates life for their investors, who then have to guess how much price risk is being hedged and how and whether management will change its policy in the future. Moreover, hedging may lock in today's prices for two years, the time horizon within which it is possible to hedge those commodities, but a company's present value includes the cash flows from subsequent years at fluctuating market prices. So while hedging may reduce the short-term cash flow volatility, it will have little effect on the company's valuation based on long-term cash flows.

Some risks, like the commodity price risk in the earlier example of gold and oil companies, can be managed by shareholders themselves. Other, similar-looking risks—for example, some forms of currency risk—are harder for shareholders to generalize. The general rule is to avoid hedging the first type of risk, but hedge the second if you can.

Consider the effect of currency risk on Heineken, the global brewer. Heineken produces its flagship brand, Heineken, in the Netherlands, and ships it around the world, especially to the United States. Most other large brewers, in contrast, produce most of their beer in the same national markets in which they sell it. So for most brewers, an exchange rate change affects only the translation of their profits into their reporting currency. For example, a 1 percent change in the value of the currency of one of their non-home markets translates into a 1 percent change in revenues from those markets and a 1 percent change in profits as well. Note that the effect on revenues and profits is the same, because all the revenues and costs are in the same currency. There is no change in operating margin.

Heineken's picture is different. Consider Heineken's sales in the United States. When the exchange rate changes, Heineken's revenues in euros are affected, but not its costs. If the dollar declines by 1 percent, Heineken's euro revenues also decline by 1 percent. But since its costs are in euros, they don't change. Assuming a 10 percent margin to begin with, a 1 percent decline in the dollar will reduce Heineken's margin to 9 percent, and its profits reported in euros will decline by a whopping 10 percent.

Because Heineken's production facilities are in a different country and it is unable to pass on cost increases because it is competing with locally produced products, its foreign exchange risk is much larger than that of other global brewers. Hedging might be critical to Heineken's survival, while the other global brewers probably would not benefit from hedging, because the impact of exchange rate changes on their business is not material.

THE MATH OF VALUE CREATION

The chapters in Part Two provide a step-by-step guide for analyzing and valuing a company in practice, including how to measure and interpret the drivers of value, ROIC, and revenue growth. As a bridge between the theoretical explanation of those drivers provided earlier in this chapter and the practical guidance to come in Part Two, we introduce here the key value driver formula, a simple equation that captures the essence of valuation in practice. We first introduce some terminology that we will use throughout the book (the terms are defined in detail in Part Two):

- *Net operating profit less adjusted taxes (NOPLAT)* represents the profits generated from the company's core operations after subtracting the income taxes related to the core operations.
- *Invested capital* represents the cumulative amount the business has invested in its core operations—primarily property, plant, and equipment and working capital.
- *Net investment* is the increase in invested capital from one year to the next:

$$\text{Net Investment} = \text{Invested Capital}_{t+1} - \text{Invested Capital}_t$$

- *Free cash flow (FCF)* is the cash flow generated by the core operations of the business after deducting investments in new capital:

$$\text{FCF} = \text{NOPLAT} - \text{Net Investment}$$

- *Return on invested capital (ROIC)* is the return the company earns on each dollar invested in the business:

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

  (ROIC can be defined in two ways, as the return on all capital or as the return on new or incremental capital. For now, we assume that both returns are the same.)
- *Investment rate (IR)* is the portion of NOPLAT invested back into the business:

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

- *Weighted average cost of capital (WACC)* is the rate of return that investors expect to earn from investing in the company and therefore the appropriate discount rate for the free cash flow. WACC is defined in detail in Chapter 11.
- *Growth* (g) is the rate at which the company's NOPLAT and cash flow grow each year.

Assume that the company's revenues and NOPLAT grow at a constant rate and the company invests the same proportion of its NOPLAT in its business each year. Investing the same proportion of NOPLAT each year also means that the company's free cash flow will grow at a constant rate.

Since the company's cash flows are growing at a constant rate, we can begin by valuing a company using the well-known cash flow perpetuity formula:

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

This formula is well established in the finance and mathematics literature.[14]

Next, define free cash flow in terms of NOPLAT and the investment rate:

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

Earlier, we developed the relationship between the investment rate (IR), the company's projected growth in NOPLAT (g), and the return on investment (ROIC):[15]

$$g = \text{ROIC} \times \text{IR}$$

Solving for IR, rather than g, leads to

$$\text{IR} = \frac{g}{\text{ROIC}}$$

Now build this into the definition of free cash flow:

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

Substituting for free cash flow gives the key value driver formula:

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

This formula underpins the DCF approach to valuation, and a variant of the equation lies behind the economic-profit approach. These two mathematically equivalent valuation techniques are described in detail in Chapter 6.

[14] For the derivation, see T. E. Copeland and J. Fred Weston, *Financial Theory and Corporate Policy*, 3rd ed. (Reading, MA: Addison Wesley, 1988), Appendix A.

[15] Technically, we should use the return on new, or incremental, capital, but for simplicity here, we assume that the ROIC and incremental ROIC are equal.

Substituting the forecast assumptions for Value Inc. and Volume Inc. in Exhibit 2.2 into the key value driver formula results in the same values we came up with when we discounted their cash flows:

Company	$\text{NOPLAT}_{t=1}$	Growth (percent)	ROIC (percent)	WACC (percent)	Value
Volume Inc.	100	5	10	10	1,000
Value Inc.	100	5	20	10	1,500

We call the key value driver formula the "Tao of corporate finance" because it relates a company's value to the fundamental drivers of economic value: growth, ROIC, and the cost of capital. You might go so far as to say that this formula represents all there is to valuation. Everything else is mere detail.

However, in most cases, we do not use this formula in practice. The reason is that in most situations, the model is overly restrictive, as it assumes a constant ROIC and growth rate going forward. For companies whose key value drivers are expected to change, we need a model that is more flexible in its forecasts. Nevertheless, while we do not use this formula in practice, it is extremely useful as a way to keep the mind focused on what drives value.

Until now, we have concentrated on how ROIC and growth drive the discounted cash flow (DCF) valuation. We can also use the key value driver formula to show that ROIC and growth determine multiples commonly used to analyze company valuation, such as price-to-earnings and market-to-book ratios. To see this, divide both sides of the key value driver formula by NOPLAT:

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

As the formula shows, a company's earnings multiple is driven by both its expected growth and its return on invested capital.

You can also turn the formula into a value-to-invested-capital formula. Start with the identity:

$$\text{NOPLAT} = \text{Invested Capital} \times \text{ROIC}$$

Substitute this definition of NOPLAT into the key value driver formula:

$$\text{Value} = \frac{\text{Invested Capital} \times \text{ROIC} \times \left(1 - \frac{g}{\text{ROIC}}\right)}{\text{WACC} - g}$$

Divide both sides by invested capital:[16]

$$\frac{\text{Value}}{\text{Invested Capital}} = \text{ROIC}\left(\frac{1 - \dfrac{g}{\text{ROIC}}}{\text{WACC} - g}\right)$$

Now that we have explained the logic behind the DCF approach to valuation, you may wonder why analysts' reports and investment banking pitches so often use earnings multiples, rather than valuations based on DCF analysis. The answer is partly that earnings multiples are a useful shorthand for communicating values to a wider public. A leading sell-side analyst recently told us that he uses discounted cash flow to analyze and value companies but typically communicates his findings in terms of implied multiples. For example, an analyst might say Company X deserves a higher multiple than Company Y because it is expected to grow faster, earn higher margins, or generate more cash flow. Earnings multiples are also a useful sanity check for your valuation. In practice, we always compare a company's implied multiple based on our valuation with those of its peers to see if we can explain why its multiple is higher or lower in terms of its ROIC or growth rates. See Chapter 14 for a discussion of how to analyze earnings multiples.

SUMMARY

This chapter showed that value is driven by expected cash flows discounted at a cost of capital. Cash flow, in turn, is driven by expected returns on invested capital and revenue growth. The corollary is that any management action that does not increase cash flow does not create value. These are the principal lessons of valuation and corporate finance. Although finance theory has little to say on how to approach cash flow risk, in practice managers' and investors' valuations also need to take account of any risks attached to cash flows that shareholders cannot manage for themselves. The concepts governing the theory of valuation based on discounted cash flows are expressed mathematically in the key value driver formula.

[16] If total ROIC and incremental ROIC are not the same, then this equation becomes

$$\frac{\text{Value}}{\text{Invested Capital}} = \text{ROIC}\left(\frac{1 - \dfrac{g}{\text{RONIC}}}{\text{WACC} - g}\right)$$

where ROIC equals the return on the company's current capital and RONIC equals the return on incremental capital.

REVIEW QUESTIONS

1. How does return on invested capital (ROIC) affect a company's cash flow? Explain the relationship between ROIC, growth, and cash flow.
2. If value is based on discounted cash flows, why should a company or investor analyze growth and ROIC?
3. Under what circumstances does growth destroy value?
4. Which type of business, a software company or an electric utility, would benefit more from improving ROIC than from increasing growth? Why?
5. Why does organic growth often create more value than growth from acquisitions? Describe how different types of organic growth might create different amounts of value.
6. What is the conservation of value principle? Provide some examples of where it might apply.
7. Under what circumstances would changing a company's capital structure affect its value?
8. What is financial engineering? When does it create value?
9. Apply the conservation of value principle to acquisitions.
10. How do diversifiable and nondiversifiable risks affect a company's cost of capital?
11. How should a company decide which risks to hold and which to hedge?
12. How much cash flow risk should a company take on? How should it manage risks with extreme outcomes that could potentially bankrupt the company but are very unlikely to occur?