

Agency Problems, Compensation, and Performance Measurement

► **So far we've** concentrated on criteria and procedures for identifying capital investments with positive NPVs. If a firm takes all (and only) positive-NPV projects, it maximizes the firm's value. But do the firm's managers want to maximize value?

Managers have no special gene that automatically aligns their personal interests with outside investors' financial objectives. So how do shareholders ensure that top managers do not feather their own nests or grind their own axes? And how do top managers ensure that middle managers and employees try as hard as they can to find positive-NPV projects?

Here we circle back to the principal-agent problems first raised in Chapter 1. Shareholders are the ultimate principals; top managers are the stockholders' agents. But middle managers and employees are in turn agents of top management. Thus senior managers, including the chief financial officer, are simultaneously agents vis-à-vis shareholders and principals vis-à-vis the rest

of the firm. The problem is to get everyone working together to maximize value.

This chapter summarizes how corporations grapple with that problem. The two main topics we cover are:

- **Incentives:** Making sure that managers and employees are rewarded appropriately when they add value to the firm.
- **Performance measurement:** You can't reward value added unless you can measure it. Since you get what you reward, and reward what you measure, you get what you measure.

We describe alternative performance measures, including economic value added. We uncover the biases lurking in standard accounting income and rates of return. Finally, we confront a disturbing fact: some, maybe most, public corporations seem willing to sacrifice NPV to maintain or increase short-run earnings per share.

12-1 Incentives and Compensation

Top management, including the CFO, must try to ensure that managers and employees have the right incentives to find and invest in positive-NPV projects. We will soon see how difficult it is to get incentives right throughout a large corporation. Why not bypass these difficulties, and let the CFO and his or her immediate staff make the important investment decisions?

The bypass won't work, for at least five reasons. First, top management would have to analyze thousands of projects every year. There's no way to know enough about each one to make intelligent choices. Top management must rely on analysis done at lower levels.

Second, the *design* of a capital investment project involves investment decisions that top managers do not see. Think of a proposal to build a new factory. The managers who developed the plan for the factory had to decide its location. Suppose they chose a more expensive site to get closer to a pool of skilled workers. That's an investment decision: additional

investment to generate extra cash flow from access to these workers' skills. (Outlays for training could be lower, for example.) Does the additional investment generate additional NPV, compared to building the factory at a cheaper but remote site? How is the CFO to know? He or she can't afford the time to investigate every alternative that was considered but rejected by the project's sponsors.

Third, many capital investments don't appear in the capital budget. These include research and development, worker training, and marketing outlays designed to expand a market or lock in satisfied customers.

Fourth, *small decisions add up*. Operating managers make investment decisions every day. They may carry extra inventories of raw materials so they won't have to worry about being caught short. Managers at the confabulator plant in Quayle City, Kansas, may decide they need one more forklift. They may hold on to an idle machine tool or an empty warehouse that could have been sold. These are not big decisions (\$25,000 here, \$50,000 there) but thousands of such decisions add up to real money.

Fifth, the CFO may be subject to the same kinds of temptations that afflict lower layers of management.

We now consider incentives and agency problems in capital investment.

Agency Problems in Capital Budgeting

As you have surely guessed, there is no perfect system of incentives. But it's easy to see what *won't* work. Suppose shareholders decide to pay the financial managers a fixed salary—no bonuses, no stock options, just \$X per month. The manager, as the stockholders' agent, is instructed to find and invest in all positive-NPV projects open to the firm. The manager may sincerely try to do so, but will face various tempting alternatives:

Reduced effort. Finding and implementing investment in truly valuable projects is a high-effort, high-pressure activity. The financial manager will be tempted to slack off.

Perks. Our hypothetical financial manager gets no bonuses. Only \$X per month. But he or she may take a bonus anyway, not in cash, but in tickets to sporting events, lavish office accommodations, planning meetings scheduled at luxury resorts, and so on. Economists refer to these nonpecuniary rewards as *private benefits*. Ordinary people call them *perks* (short for perquisites).¹

Empire building. Other things equal, managers prefer to run large businesses rather than small ones. Getting from small to large may not be a positive-NPV undertaking. Managers are also reluctant to dismantle their empires. That is, they are reluctant to disinvest.

Entrenching investment. Suppose manager Q considers two expansion plans. One plan will require a manager with special skills that manager Q just happens to have. The other plan requires only a general-purpose manager. Guess which plan Q will favor. Projects designed to require or reward the skills of existing managers are called *entrenching investments*.²

Entrenching investments and empire building are typical symptoms of overinvestment, that is, investing beyond the point where NPV falls to zero. The temptation to

¹ But don't assume that all perks are unwarranted and inefficient. That corporate jet can be a good investment if it saves three or four hours a week that the CEO and CFO would otherwise waste in airports. Also, some large companies require the CEO to fly in the corporate jet for security reasons. Rajan and Wulf argue that it is *not* correct to treat all perks as managerial excess. See R. Rajan and J. Wulf, "Are Perks Purely Managerial Excess?" *Journal of Financial Economics* 79 (January 2006), pp. 1-33.

² A. Shleifer and R. W. Vishny, "Management Entrenchment: The Case of Manager-Specific Investments," *Journal of Financial Economics* 25 (November 1989), pp. 123-140.

overinvest is highest when the firm has plenty of cash but limited investment opportunities. Michael Jensen calls this the *free-cash-flow* problem.³

Avoiding risk. If the manager receives only a fixed salary, she cannot share in the upside of risky projects. But, if the risky project turns out to be a loser, her job may be on the line. In this case safe projects are from the manager's viewpoint better than risky ones.⁴ But risky projects can sometimes have large, positive NPVs.

A manager on a fixed salary could hardly avoid all these temptations all of the time. The resulting loss in value is an agency cost.

Monitoring

Agency costs can be reduced by monitoring a manager's efforts and actions and by intervening when the manager veers off course.

Monitoring can prevent the more obvious agency costs, such as blatant perks. It can confirm that the manager is putting sufficient time on the job. But monitoring requires time and money. Some monitoring is almost always worthwhile, but a limit is soon reached at which an extra dollar spent on monitoring would not return an extra dollar of value from reduced agency costs. Like all investments, monitoring encounters diminishing returns.

Some agency costs can't be prevented even with the most thorough monitoring. Suppose a shareholder undertakes to monitor capital investment decisions. How could he or she ever know for sure whether a capital budget approved by top management includes (1) *all* the positive-NPV opportunities open to the firm and (2) *no* projects with negative NPVs due to empire-building or entrenching investments? The managers obviously know more about the firm's prospects than outsiders ever can. If the shareholder could list all projects and their NPVs, then the managers would hardly be needed!

Who actually does the monitoring? Ultimately it is the shareholders' responsibility, but in large, public companies, monitoring is *delegated* to the board of directors, who are elected by shareholders and are supposed to represent their interests. The board meets regularly, both formally and informally, with top management. Attentive directors come to know a great deal about the firm's prospects and performance and the strengths and weaknesses of its top management.

The board also hires independent accountants to audit the firm's financial statements. If the audit uncovers no problems, the auditors issue an opinion that the financial statements fairly represent the company's financial condition and are consistent with Generally Accepted Accounting Principles (GAAP).

If problems are found, the auditors will negotiate changes in assumptions or procedures. Managers almost always agree, because if acceptable changes are not made, the auditors will issue a *qualified opinion*, which is bad news for the company and its shareholders. A qualified opinion suggests that managers are covering something up and undermines investors' confidence.

A qualified audit opinion may be bad news, but when investors learn of accounting irregularities that have escaped detection, there can be hell to pay. In January 2004 Adecco, the giant Swiss employment agency, announced that it had discovered material accounting irregularities in its North American operations. The next day Adecco's share price fell by 40%, wiping \$5 billion off the market value of the company.

³ M. C. Jensen, "Agency Costs of Free Cash Flow, Corporate Finance and Takeovers," *American Economic Review* 76 (May 1986), pp. 323-329.

⁴ Sometimes managers can be tempted to take *too much risk*. Suppose that a regional office suffers unexpected losses. The regional manager's job is on the line, and in response he or she tries a risky strategy that offers a small probability of a big, quick payoff. If the strategy pays off, the manager's job is safe. If it fails, nothing is lost, because the manager would have been fired anyway.

Lenders also monitor. If a company takes out a large bank loan, the bank will track the company's assets, earnings, and cash flow. By monitoring to protect its loan, the bank protects shareholders' interests also.⁵

Delegated monitoring is especially important when ownership is widely dispersed. If there is a dominant shareholder, he or she will generally keep a close eye on top management. But when the number of stockholders is large, and each stockholding is small, individual investors cannot justify much time and expense for monitoring. Each is tempted to leave the task to others, taking a free ride on others' efforts. But if everybody prefers to let somebody else do it, then it will not get done; that is, monitoring by shareholders will not be strong or effective. Economists call this the *free-rider problem*.⁶

If the free-rider problem is severe, delegated monitoring may be the only solution. But delegation brings its own agency problems. For example, many board members may be long-standing friends of the CEO and may be indebted to the CEO for help or advice. Understandably, they may be reluctant to fire the CEO or enquire too deeply into his or her conduct. Auditing firms may also have conflicts of interest. For example, many believed that Enron's auditors, Arthur Andersen, might have been tougher on the company had it not also earned substantial fees from providing Enron with consulting services. If monitors are likely to have their own agenda, then we have Dr. Seuss's bee-watching problem:

Oh, the jobs people work at!
Out west, near Hawtch-Hawtch,
there's a Hawtch-Hawtcher Bee Watcher.
His job is to watch . . .
is to keep both his eyes on the lazy town bee.
A bee that is watched will work harder you see!

Well . . . he watched and he watched
But, in spite of his watch,
that bee didn't work any harder. Not mawtch.

So then somebody said,
"Our bee-watching man
just isn't bee-watching as hard as he can.
He ought to be watched by another Hawtch-Hawtcher!!
The thing that we need
is a Bee-Watcher-Watcher!"⁷

In response to the Enron debacle, the Sarbanes-Oxley Act set up a bee-watcher-watcher, called the Public Company Oversight Board, to monitor the activities of auditors. It also prohibited an auditing firm from providing both auditing and consulting services to the same company.⁸

⁵ Lenders' and shareholders' interests are not always aligned—see Chapter 18. But a company's ability to satisfy lenders is normally good news for stockholders, particularly when lenders are well placed to monitor. See C. James "Some Evidence on the Uniqueness of Bank Loans," *Journal of Financial Economics* 19 (December 1987), pp. 217–235.

⁶ The free-rider problem might seem to drive out all monitoring by dispersed shareholders. But investors have another reason to investigate: They want to make money on their common stock portfolios by buying undervalued companies and selling overvalued ones. To do this they must investigate companies' performance.

⁷ Dr. Seuss, *Did I Ever Tell You How Lucky You Are?* (New York: Random House, 1973), pp. 26–28.

⁸ The Sarbanes-Oxley Act forbids auditing firms from providing their clients with fairness opinions, actuarial services, investment banking services, management functions, legal services, or any other services proscribed by the Public Company Accounting Oversight Board.

Management Compensation

Because monitoring is necessarily imperfect, compensation plans must be designed to attract competent managers and to give them the right incentives.

Figure 12.1 compares the level of compensation in different countries and Figure 12.2 shows the growth of CEO compensation in the U.S. Three features stand out.

1. The U.S. has unusually high levels of executive pay. CEOs in the States receive over 3 times the pay of German CEOs and almost 10 times the pay of Japanese CEOs.
2. Although CEO compensation in the U.S. fell in 2001 after the end of the dot.com boom and probably again during the 2008–2009 credit crisis, there has for the most part been a strong upward trend.
3. A large and increasing fraction of CEO compensation in the U.S. comes from variable bonuses, stock options, and other long-term incentives.

We look first at the size of the pay package. Then we turn to its contents.

High levels of CEO pay undoubtedly encourage CEOs to work hard and (perhaps more important) offer an attractive carrot to lower-level managers who hope to become CEOs.

FIGURE 12.1

Median CEO compensation in 2008 for large companies. Compensation in the U.S. is relatively high and is heavily dependent on performance. We are grateful to Towers Perrin for providing these data.

Source: Towers Perrin's proprietary data.

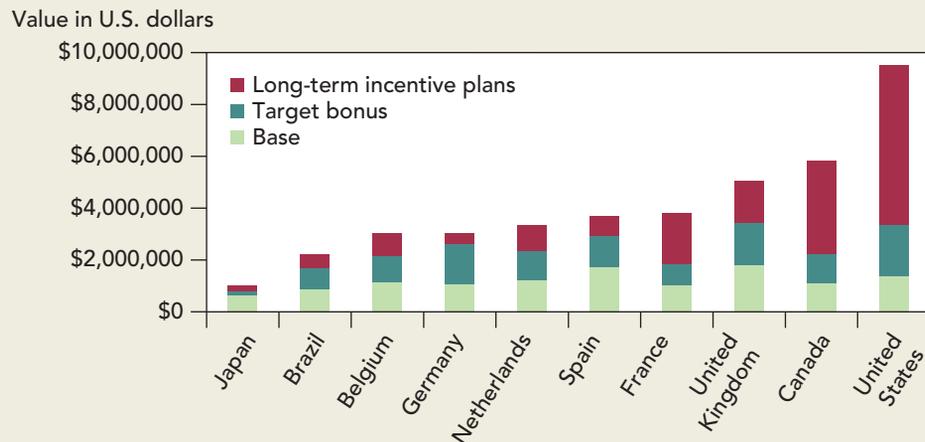


FIGURE 12.2

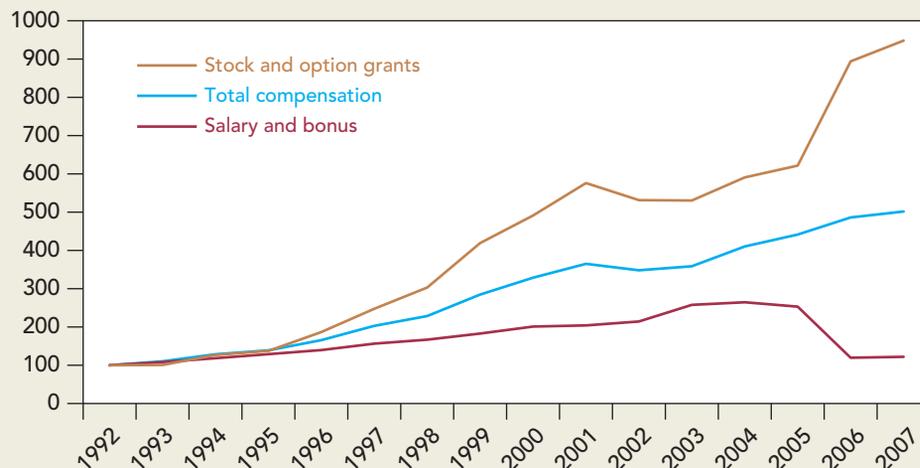
Growth in CEO compensation in the U.S. The growth has come largely from grants of stock and options.

Source: Execucomp.

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Compensation, % of 1992 level



But there has been widespread concern about “excessive” pay, especially pay for mediocre performance. For example, Robert Nardelli received a \$210 million severance package on leaving The Home Depot and Henry McKinnell received almost \$200 million on leaving Pfizer. Both CEOs left behind troubled and underperforming companies. You can imagine the newspaper headlines.

Those headlines got a lot bigger in 2008 when it was revealed that generous bonuses were to be paid to the senior management of banks that had been bailed out by the government. Merrill Lynch hurried through \$3.6 billion in bonuses, including \$121 million to just four executives, only days before Bank of America finalized its deal to buy the collapsing firm with the help of taxpayer money. “Bonuses for Boneheads” was the headline in *Forbes* magazine.

The widespread view that taxpayer money was being used to pay bonuses to bankers whose greed had brought about the credit crisis led to demands that governments curb bankers’ compensation. In France President Sarkozy announced that there would be no bonuses in 2009 at banks that had received state aid. The German government set a €500,000 (\$630,000) limit on executive pay at rescued banks. In the U.S., the Obama administration appointed a “pay czar” to oversee the salaries of top executives at companies receiving “exceptional assistance” from the government. The U.S. Congress also set restrictions on the pay of top executives in banks who accepted bail-out funds. Incentive compensation was limited to one-third of total pay, and was to be paid only in the form of stock that could not be cashed in as long as the company remained in receipt of government aid. The banks were also prohibited from giving big handouts to departing executives.

These restrictions ensured that banks taking government aid did not pay “excessive” compensation. Putting compensation in a Congressional straightjacket is dangerous, however. How can it make sense to require that two-thirds of executive pay *not* be related to performance? Why should all incentive compensation be in restricted stock?

It is easy to point to cases where poorly performing managers have received unjustifiably large payouts. But is there a more general problem? Perhaps high levels of pay simply reflect a shortage of talent. After all, CEOs are not alone in earning large sums. The earnings of top professional athletes are equally mouthwatering. In 2007 the New York Yankees’ Jason Giambi, Derek Jeter, and Alex Rodriguez were each paid more than \$20 million. The Yankees must have believed that it was worth paying up for stars that would win games and fill up the ballpark.

If star managers are as rare as star baseball players, corporations may need to pay up for CEO talent. Suppose that a superior CEO can add 1% to the value and stock price of a large corporation with a market capitalization of \$10 billion. One percent on a stock-market value of \$10 billion is \$100 million. If the CEO can really deliver, then a pay package of, say, \$20 million per year sounds like a bargain.⁹

There is also a less charitable explanation of managerial pay. This view stresses the close links between the CEO and the other members of the board of directors. If directors are too chummy with the CEO, they may find it difficult to get tough when it comes to setting compensation packages. Sometimes directors approve extra payments that provide shareholders with little or no prospective benefit. Take the example of the German company, Mannesmann, which was acquired in a \$200 billion takeover. After the deal was finalized, Mannesmann’s board of directors voted an *ex gratia* payment of \$74 million to the company’s executives. German Federal prosecutors charged six of the directors with breach of their fiduciary duty and failure to preserve the company’s assets. Although the case was eventually settled out of court, it highlighted the danger that directors may be tempted to

⁹ Gabaix and Landier argue that high CEO pay is a natural consequence of steadily increasing firm values and the competition for management talent. See X. Gabaix and A. Landier, “Why Has CEO Pay Increased So Much?” *Quarterly Journal of Economics* 123 (February 2008), pp. 49–100.

act as lords of the manor, rather than as stewards of the estate, when they set compensation levels.

In most firms executive pay is the responsibility of a compensation committee of the board of directors. This committee does not operate in a vacuum; it usually places significant weight on average compensation in peer companies. The problem is that few boards are prepared to approve a compensation package that is below average. But, if every firm wants its CEO to have above-average compensation, the average will ratchet upward.¹⁰

The danger that CEOs may have undue influence over their compensation has prompted some countries, such as the U.K., Sweden, Australia, and the Netherlands, to give shareholders a vote on executive pay. In most cases the vote is nonbinding,¹¹ but when shareholders of the pharmaceutical giant GlaxoSmithKline voted against a new compensation package for its chief executive, three members of the board's remuneration committee were replaced and the pay package was renegotiated. Shareholders voted against compensation packages at several other U.K. companies, including Royal Dutch Shell and the Royal Bank of Scotland Group.

So we have two views of the level of managerial pay. One is that it results from arms-length contracting in a tight market for managerial talent. The other is that poor governance and weak boards allow excessive pay. There is evidence for and against both views. For example, CEOs are not the only group to have seen their compensation increase rapidly in recent years. Corporate lawyers, sports stars, and celebrity entertainers have all increased their share of national income, even though their compensation is determined by arms-length negotiation.¹² However, the shortage-of-talent argument cannot account for wide disparities in pay. For example, compare the CEO of GM (compensation of \$16 million in 2007, two years before GM's bankruptcy) to the CEO of Toyota (compensation about \$1 million) or to General Petraeus, the former U.S. military commander in Iraq (about \$180,000). It is difficult to argue that GM's CEO delivered the most value or had the most difficult and important job.

Incentive Compensation

The amount of compensation may be less important than how it is structured. The compensation package should encourage managers to maximize shareholder wealth.

Compensation could be based on input (for example, the manager's effort) or on output (income or value added as a result of the manager's decisions). But input is difficult to measure. How can outside investors observe effort? They can check that the manager clocks in on time, but hours worked does not measure true effort. (Is the manager facing up to difficult and stressful choices, or is he or she just burning time with routine meetings, travel, and paperwork?)

Because effort is not observable, compensation must be based on output, that is, on verifiable results. Trouble is, results depend not just on the manager's contribution, but also on events outside the manager's control. Unless you can separate out the manager's contribution, you face a difficult trade-off. You want to give the manager high-powered incentives, so that he or she does very well when the firm does very well and poorly when the firm underperforms. But suppose the firm is a cyclical business that always struggles in

¹⁰ Bizjak, Lemmon, and Naveen found that most firms set pay levels at or above the median of the peer group, and some go much higher. For example, Coca-Cola and IBM consistently aim for pay levels in the upper quartile of their peers. See J. M. Bizjak, M. L. Lemmon, and L. Naveen, "Has the Use of Peer Groups Contributed to Higher Pay and Less Efficient Compensation?" *Journal of Financial Economics* 90 (November 2008), pp. 152–168.

¹¹ The Netherlands gives shareholders a binding vote.

¹² See S. N. Kaplan and J. D. Rauh, "Wall Street and Main Street: What Contributes to the Rise in the Highest Incomes?" *Review of Financial Studies*, forthcoming.

recessions. Then high-powered incentives will force the manager to bear business cycle risk that is not his or her fault.

There are limits to the risks that managers can be asked to bear. So the result is a compromise. Firms do link managers' pay to performance, but fluctuations in firm value are shared by managers and shareholders. Managers bear some of the risks that are beyond their control and shareholders bear some of the agency costs if managers fail to maximize firm value. Thus some agency costs are inevitable.

Most major companies around the world now link part of their executive pay to the stock-price performance.¹³ This compensation is generally in one of three forms: stock options, restricted stock (stock that must be retained for several years), or performance shares (shares awarded only if the company meets an earnings or other target).

Stock options give managers the right (but not the obligation) to buy their company's shares in the future at a fixed exercise price. Usually the exercise price is set equal to the company's stock price on the day when the options are granted. If the company performs well and stock price increases, the manager can buy shares and cash in on the difference between the stock price and the exercise price. If the stock price falls, the manager leaves the options unexercised and hopes for a stock price recovery or compensation through another channel. (If the stock price doesn't recover, the manager may be granted a new batch of options or given a lower exercise price on the original options.)

The popularity of stock options was encouraged by U.S. accounting rules, which allowed companies to grant stock options without recognizing any immediate compensation expense. The rules allowed companies to value options at the excess of the stock price over the exercise price on the grant date. But the exercise price was almost always set equal to the stock price on that date. Thus the excess was zero and the stock options were valued at zero. (We show how to calculate the actual value of options in Chapters 20 and 21.) So companies could grant lots of options at no recorded cost and with no reduction in accounting earnings. Naturally accountants and investors were concerned, because earnings were more and more overstated as the volume of option grants increased. After years of controversy, the accounting rules were changed in 2006. U.S. corporations are now required to value executive stock options more realistically and to deduct these values as a compensation expense.

Options also have a tax advantage in the U.S. Compensation of more than \$1 million has since 1994 been considered unreasonable and is not a tax-deductible expense. However, there is no restriction on compensation in the form of stock options.

You can see the advantages of tying compensation to stock price. When a manager works hard to maximize firm value, she helps both the stockholders and herself. But compensation via options or restricted stock also has at least four imperfections. First, the payoffs depend on the absolute change in stock price, not the change relative to the market or to stock prices of other firms in the same industry. Thus they force the manager to bear market or industry risks, which are outside the manager's control. Compensation based on relative stock-price performance makes logical sense but is rarely seen in practice.

Here is a second difficult issue. Because a company's stock price depends on investors' expectations of future earnings, rates of return depend on how well the company performs relative to expectations. Suppose a company announces the appointment of an outstanding new manager. The stock price leaps up in anticipation of improved performance. If the new manager then delivers exactly the good performance that investors expected, the stock will earn only a normal rate of return. In this case a compensation scheme linked to the stock return after the manager starts would fail to recognize the manager's special contribution.

¹³ The major exceptions are in China, Japan, India, and South Korea, where such incentive schemes are still used by a minority of large firms. See Towers Perrin, *Equity Incentives Around the World*, 2008, www.towersperrin.com.

Third, incentive plans may tempt managers to withhold bad news or manipulate earnings to pump up stock prices. They may also be tempted to defer valuable investment projects if the projects would depress earnings in the short run. We return to this point at the end of the chapter.

Fourth, some compensation schemes encourage excessive risk-taking. Suppose a possible deal comes up that could make or lose \$100 million. You are about to reject it, but then you think of your stock options and realize that you can't lose. If the deal comes off, the stock price will rise and your options will be worth a packet. If it doesn't, there is nothing lost; you just wait for the next deal to surface.

In Chapter 1 we suggested that the subprime crisis was largely an agency problem, where bank CEOs were encouraged by poorly designed incentive schemes to bet the shop. The solution is not to move away from incentive compensation but to ensure that managers bear more of the cost of poor decisions. For example, in 2008 the Swiss bank UBS adopted a new pay system to deal with this problem. Incentive payments are to be retained by the bank for up to five years. If, in the meantime, the manager or trader underperforms, the previously agreed payments will be forfeited.

12-2 Measuring and Rewarding Performance: Residual Income and EVA

Almost all top executives of firms with publicly traded shares have compensation packages that depend in part on their firms' stock price performance. But their compensation also includes a bonus that depends on increases in earnings or on other accounting measures of performance. For lower-level managers, compensation packages usually depend more on accounting measures and less on stock returns.

Accounting measures of performance have two advantages:

1. They are based on absolute performance, rather than on performance relative to investors' expectations.
2. They make it possible to measure the performance of junior managers whose responsibility extends to only a single division or plant.

Tying compensation to accounting profits also creates some obvious problems. First, accounting profits are partly within the control of management. For example, managers whose pay depends on near-term earnings may cut maintenance or staff training. This is not a recipe for adding value, but an ambitious manager hoping for a quick promotion will be tempted to pump up short-term profits, leaving longer-run problems to his or her successors.

Second, accounting earnings and rates of return can be severely biased measures of true profitability. We ignore this problem for now, but return to it in the next section.

Third, growth in earnings does not necessarily mean that shareholders are better off. Any investment with a positive rate of return (1% or 2% will do) will eventually increase earnings. Therefore, if managers are told to maximize growth in earnings, they will dutifully invest in projects offering 1% or 2% rates of return—projects that destroy value. But shareholders do not want growth in earnings for its own sake, and they are not content with 1% or 2% returns. They want positive-NPV investments, and *only* positive-NPV investments. They want the company to invest only if the expected rate of return exceeds the cost of capital.

Look at Table 12.1, which contains a simplified income statement and balance sheet for your company's Quayle City confabulator plant. There are two methods for judging whether the plant's returns are higher than the cost of capital.

Income		Assets	
Sales	\$550	Net working capital [†]	\$80
Cost of goods sold*	275	Property, plant, and equipment investment	1,170
Selling, general, and administrative expenses	<u>75</u>	Less cumulative depreciation	<u>360</u>
	200	Net investment	810
Taxes at 35%	<u>70</u>	Other assets	<u>110</u>
Net income	\$130	Total assets	\$1,000

TABLE 12.1

Simplified statements of income and assets for the Quayle City confabulator plant (figures in millions).

* Includes depreciation expense.

[†] Current assets less current liabilities.

Net Return on Investment Book return on investment (ROI) is just the ratio of after-tax operating income to the net (depreciated) book value of assets.¹⁴ In Chapter 5 we rejected book ROI as a capital investment criterion, and in fact few companies now use it for that purpose. However, managers frequently assess the performance of a division or a plant by comparing its ROI with the cost of capital.

Suppose you need to assess the performance of the Quayle City plant. As you can see from Table 12.1, the corporation has \$1,000 million invested in the plant, which is generating earnings of \$130 million. Therefore the plant is earning an ROI of $130/1,000 = .13$, or 13%.¹⁵ If the cost of capital is (say) 10%, then the plant's activities are adding to shareholder value. The *net* return is $13 - 10 = 3\%$. If the cost of capital is (say) 20%, then shareholders would have been better off investing \$1 billion somewhere else. In this case the net return is negative, at $13 - 20 = -7\%$.

Residual Income or Economic Value Added (EVA®)¹⁶ The second method calculates a net dollar return to shareholders. It asks, What are earnings after deducting a charge for the cost of capital?

When firms calculate income, they start with revenues and then deduct costs, such as wages, raw material costs, overhead, and taxes. But there is one cost that they do not commonly deduct: the cost of capital. True, they allow for depreciation, but investors are not content with a return of their investment; they also demand a return *on* that investment. As we pointed out in Chapter 10, a business that breaks even in terms of accounting profits is really making a loss; it is failing to cover the cost of capital.

To judge the net contribution to value, we need to deduct the cost of capital contributed to the plant by the parent company and its stockholders. Suppose again that the cost of capital is 10%. Then the dollar cost of capital for the Quayle City plant is $.10 \times \$1,000 = \100 million. The net gain is therefore $\$130 - 100 = \30 million. This is the addition to shareholder wealth due to management's hard work (or good luck).

¹⁴ Notice that investment includes the net working capital (current assets minus current liabilities) required to operate the plant. The investment shown is also called net assets or the net capital invested in the plant. We say "ROI," but you will also hear "return on capital" (ROC). "Return on assets" (ROA) sometimes refers to return on assets defined to include net working capital, as in Table 12.1, but sometimes to return on total assets, where current assets are included but current liabilities are not subtracted. It's prudent to check definitions when reviewing reported ROIs, ROCs, or ROAs.

¹⁵ Notice that earnings are calculated after tax but with no deductions for interest paid. The plant is evaluated as if it were all-equity-financed. This is standard practice (see Chapter 6). It helps to separate investment and financing decisions. The tax advantages of debt financing supported by the plant are picked up not in the plant's earnings or cash flows but in the discount rate. The cost of capital is the after-tax weighted-average cost of capital, or WACC. WACC was briefly introduced in Chapter 9 and will be further explained in Chapters 17 and 19.

¹⁶ EVA is the term used by the consulting firm Stern-Stewart, which has done much to popularize and implement this measure of residual income. With Stern-Stewart's permission, we omit the copyright symbol in what follows.

Net income after deducting the dollar return required by investors is called *residual income* or *economic value added (EVA)*. The formula is

$$\begin{aligned} \text{EVA} &= \text{residual income} = \text{income earned} - \text{income required} \\ &= \text{income earned} - \text{cost of capital} \times \text{investment} \end{aligned}$$

For our example, the calculation is

$$\text{EVA} = \text{residual income} = 130 - (.10 \times 1,000) = +\$30 \text{ million}$$

But if the cost of capital were 20%, EVA would be negative by \$70 million.

Net return on investment and EVA are focusing on the same question. When return on investment equals the cost of capital, net return and EVA are both zero. But the net return is a percentage and ignores the scale of the company. EVA recognizes the amount of capital employed and the number of dollars of additional wealth created.

The term *EVA* has been popularized by the consulting firm Stern–Stewart. But the concept of residual income has been around for some time,¹⁷ and many companies that are not Stern–Stewart clients use this concept to measure and reward managers' performance.

Other consulting firms have their own versions of residual income. McKinsey & Company uses *economic profit (EP)*, defined as capital invested multiplied by the spread between return on investment and the cost of capital. This is another way to measure residual income. For the Quayle City plant, with a 10% cost of capital, economic profit is the same as EVA:

$$\begin{aligned} \text{Economic profit (EP)} &= (\text{ROI} - r) \times \text{capital invested} \\ &= (.13 - .10) \times 1,000 = \$30 \text{ million} \end{aligned}$$

In Chapter 28 we take a look at EVAs calculated for some well-known companies. But EVA's most valuable contributions happen inside companies. EVA encourages managers and employees to concentrate on increasing value, not just on increasing earnings.

Pros and Cons of EVA

Let us start with the pros. EVA, economic profit, and other residual income measures are clearly better than earnings or earnings growth for measuring performance. A plant that is generating lots of EVA should generate accolades for its managers as well as value for shareholders. EVA may also highlight parts of the business that are not performing up to scratch. If a division is failing to earn a positive EVA, its management is likely to face some pointed questions about whether the division's assets could be better employed elsewhere.

EVA sends a message to managers: Invest if and only if the increase in earnings is enough to cover the cost of capital. This is an easy message to grasp. Therefore EVA can be used down deep in the organization as an incentive compensation system. It is a substitute for explicit monitoring by top management. Instead of *telling* plant and divisional managers not to waste capital and then trying to figure out whether they are complying, EVA rewards them for careful investment decisions. Of course, if you tie junior managers' compensation to their economic value added, you must also give them power over those decisions that affect EVA. Thus the use of EVA implies delegated decision making.

EVA makes the cost of capital *visible* to operating managers. A plant manager can improve EVA by (a) increasing earnings or (b) *reducing* capital employed. Therefore underutilized assets tend to be flushed out and disposed of.

¹⁷ EVA is conceptually the same as the residual income measure long advocated by some accounting scholars. See, for example, R. Anthony, "Accounting for the Cost of Equity," *Harvard Business Review* 51 (1973), pp. 88–102, and "Equity Interest—Its Time Has Come," *Journal of Accountancy* 154 (1982), pp. 76–93.

Introduction of residual income measures often leads to surprising reductions in assets employed—not from one or two big capital disinvestment decisions, but from many small ones. Ehrbar quotes a sewing machine operator at Herman Miller Corporation:

[EVA] lets you realize that even assets have a cost. . . . we used to have these stacks of fabric sitting here on the tables until we needed them. . . . We were going to use the fabric anyway, so who cares that we're buying it and stacking it up there? Now no one has excess fabric. They only have the stuff we're working on today. And it's changed the way we connect with suppliers, and we're having [them] deliver fabric more often.¹⁸

If you propose to tie a manager's remuneration to her business's profitability, it is clearly better to use EVA than accounting income which takes no account of the cost of the capital employed. But what are the limitations of EVA? Here we return to the same question that bedevils stock-based measures of performance. How can you judge whether a low EVA is a consequence of bad management or of factors outside the manager's control? The deeper you go in the organization, the less independence that managers have and therefore the greater the problem in measuring their contribution.

The second limitation with any accounting measure of performance lies in the data on which it is based. We explore this issue in the next section.

12-3 Biases in Accounting Measures of Performance

Anyone using accounting measures of performance had better hope that the accounting numbers are accurate. Unfortunately, they are often not accurate, but biased. Applying EVA or any other accounting measure of performance therefore requires adjustments to the income statements and balance sheets.

For example, think of the difficulties in measuring the profitability of a pharmaceutical research program, where it typically takes 10 to 12 years to bring a new drug from discovery to final regulatory approval and the drug's first revenues. That means 10 to 12 years of guaranteed losses, even if the managers in charge do everything right. Similar problems occur in start-up ventures, where there may be heavy capital outlays but low or negative earnings in the first years of operation. This does not imply negative NPV, so long as operating earnings and cash flows are sufficiently high later on. But EVA and ROI would be negative in the start-up years, even if the project were on track to a strong positive NPV.

The problem in these cases is not with EVA or ROI, but with the accounting data. The pharmaceutical R&D program may be showing accounting losses, because generally accepted accounting principles require that outlays for R&D be written off as current expenses. But from an economic point of view, those outlays are an investment, not an expense. If a proposal for a new business predicts accounting losses during a start-up period, but the proposal nevertheless shows a positive NPV, then the start-up losses are really an investment—cash outlays made to generate larger cash inflows when the business hits its stride.

Example: Measuring the Profitability of the Nodhead Supermarket

Supermarket chains invest heavily in building and equipping new stores. The regional manager of a chain is about to propose investing \$1 million in a new store in Nodhead. Projected cash flows are

	Year						
	1	2	3	4	5	6	after 6
Cash flow (\$ thousands)	100	200	250	298	298	297	0

¹⁸ A. Ehrbar, *EVA: The Real Key to Creating Wealth* (New York: John Wiley & Sons, Inc., 1998), pp. 130–131.

Of course, real supermarkets last more than six years. But these numbers are realistic in one important sense: It may take two or three years for a new store to build up a substantial, habitual clientele. Thus cash flow is low for the first few years even in the best locations.

We will assume the opportunity cost of capital is 10%. The Nodhead store's NPV at 10% is zero. It is an acceptable project, but not an unusually good one:

$$\text{NPV} = -1,000 + \frac{100}{1.10} + \frac{200}{(1.10)^2} + \frac{250}{(1.10)^3} + \frac{298}{(1.10)^4} + \frac{298}{(1.10)^5} + \frac{297}{(1.10)^6} = 0$$

With NPV = 0, the true (internal) rate of return of this cash-flow stream is also 10%.

Table 12.2 shows the store's forecasted *book* profitability, assuming straight-line depreciation over its six-year life. The book ROI is lower than the true return for the first two years and higher afterward.¹⁹ EVA also starts negative for the first two years, then turns positive and grows steadily to year 6. These are typical outcomes, because accounting income is too low when a project or business is young and too high as it matures.

At this point the regional manager steps up on stage for the following soliloquy:

The Nodhead store's a decent investment. But if we go ahead, I won't look very good at next year's performance review. And what if I also go ahead with the new stores in Russet, Gravenstein, and Sheepnose? Their cash-flow patterns are pretty much the same. I could actually appear to lose money next year. The stores I've got won't earn enough to cover the initial losses on four new ones.

Of course, everyone knows new supermarkets lose money at first. The loss would be in the budget. My boss will understand—I think. But what about her boss? What if the board of directors starts asking pointed questions about profitability in my region? I'm under a lot of pressure to generate better earnings. Pamela Quince, the upstate manager, got a bonus for generating a positive EVA. She didn't spend much on expansion.

The regional manager is getting conflicting signals. On the one hand, he is told to find and propose good investment projects. *Good* is defined by discounted cash flow. On the other hand, he is also urged to seek high book income. But the two goals conflict because book income does not measure true income. The greater the pressure for immediate book profits, the more the regional manager is tempted to forgo good investments or to favor quick-payback projects over longer-lived projects, even if the latter have higher NPVs.

TABLE 12.2

Forecasted book income, ROI, and EVA for the proposed Nodhead store. Book ROI and EVA are underestimated for the first two years and overestimated thereafter.

	Year					
	1	2	3	4	5	6
Cash flow	100	200	250	298	298	297
Book value at start of year	1,000	834	667	500	333	167
Book value at end of year	834	667	500	333	167	0
Book depreciation	167	167	167	167	167	167
Book income	-67	33	83	131	131	130
Book ROI	-0.067	0.040	0.125	0.263	0.394	0.782
EVA	-167	-50	17	81	98	114

Note: There are minor rounding errors in some annual figures.

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¹⁹ The errors in book ROI always catch up with you in the end. If the firm chooses a depreciation schedule that overstates a project's return in some years, it must also understate the return in other years. In fact, you can think of a project's IRR as a kind of average of the book returns. It is not a simple average, however. The weights are the project's book values discounted at the IRR. See J. A. Kay, "Accountants, Too, Could Be Happy in a Golden Age: The Accountant's Rate of Profit and the Internal Rate of Return," *Oxford Economic Papers* 28 (1976), pp. 447-460.

Measuring Economic Profitability

Let us think for a moment about how profitability should be measured in principle. It is easy enough to compute the true, or economic, rate of return for a common stock that is continuously traded. We just record cash receipts (dividends) for the year, add the change in price over the year, and divide by the beginning price:

$$\begin{aligned}\text{Rate of return} &= \frac{\text{cash receipts} + \text{change in price}}{\text{beginning price}} \\ &= \frac{C_1 + (P_1 - P_0)}{P_0}\end{aligned}$$

The numerator of the expression for rate of return (cash flow plus change in value) is called **economic income**:

$$\text{Economic income} = \text{cash flow} + \text{change in present value}$$

Any reduction in present value represents **economic depreciation**; any increase in present value represents *negative* economic depreciation. Therefore

$$\text{Economic income} = \text{cash flow} - \text{economic depreciation}$$

The concept works for any asset. Rate of return equals cash flow plus change in value divided by starting value:

$$\text{Rate of return} = \frac{C_1 + (PV_1 - PV_0)}{PV_0}$$

where PV_0 and PV_1 indicate the present values of the business at the ends of years 0 and 1.

The only hard part in measuring economic income is calculating present value. You can observe market value if the asset is actively traded, but few plants, divisions, or capital projects have shares traded in the stock market. You can observe the present market value of *all* the firm's assets but not of any one of them taken separately.

Accountants rarely even attempt to measure present value. Instead they give us net book value (BV), which is original cost less depreciation computed according to some arbitrary schedule. If book depreciation and economic depreciation are different (they are rarely the same), then book earnings will not measure true earnings. (In fact, it is not clear that accountants should even *try* to measure true profitability. They could not do so without heavy reliance on subjective estimates of value. Perhaps they should stick to supplying objective information and leave the estimation of value to managers and investors.)

It is not hard to *forecast* economic income and rate of return for the Nodhead store. Table 12.3 shows the calculations. From the cash-flow forecasts we can forecast present

	Year					
	1	2	3	4	5	6
Cash flow	100	200	250	298	298	297
PV at start of year	1,000	1,000	900	740	516	270
PV at end of year	1,000	900	740	516	270	0
Economic depreciation	0	100	160	224	246	270
Economic income	100	100	90	74	52	27
Rate of return	0.10	0.10	0.10	0.10	0.10	0.10
EVA	0.00	0.00	0.00	0.00	0.00	0.00

TABLE 12.3 Forecasted economic income, rate of return, and EVA for the proposed Nodhead store. Economic income equals cash flow minus economic depreciation. Rate of return equals economic income divided by value at start of year. EVA equals income minus cost of capital times value at start of year.

Note: There are minor rounding errors in some annual figures.

value at the start of periods 1 to 6. Cash flow minus economic depreciation equals economic income. Rate of return equals economic income divided by start-of-period value.

Of course, these are forecasts. Actual future cash flows and values will be higher or lower. Table 12.3 shows that investors *expect* to earn 10% in each year of the store's six-year life. In other words, investors expect to earn the opportunity cost of capital each year from holding this asset.

Notice that EVA calculated using present value and economic income is zero in each year of the Nodhead project's life. For year 2, for example,

$$\text{EVA} = 100 - (.10 \times 1,000) = 0$$

EVA *should* be zero, because the project's true rate of return is only equal to the cost of capital. EVA will always give the right signal if book income equals economic income and asset values are measured accurately.

Do the Biases Wash Out in the Long Run?

Even if the forecasts for the Nodhead store turn out to be correct, ROI and EVA will be biased. That might not be a serious problem if the errors wash out in the long run, when the region settles down to a steady state with an even mix of old and new stores.

It turns out that the errors do not wash out in the steady state. Table 12.4 shows steady-state book ROIs and forecasted EVAs for the supermarket chain if it opens one store a year. For simplicity we assume that the company starts from scratch and that each store's cash flows are carbon copies of the Nodhead store. The true rate of return on each store is, therefore, 10% and the true EVA is zero. But as Table 12.4 demonstrates, steady-state book ROI and estimated EVA *overstate* the true profitability.

	Year					
	1	2	3	4	5	6
Book income for store ^a						
1	-67	33	83	131	131	130
2		-67	33	83	131	131
3			-67	33	83	131
4				-67	33	83
5					-67	33
6						-67
Total book income	-67	-33	50	181	312	443
Book value for store						
1	1,000	834	667	500	333	167
2		1,000	834	667	500	333
3			1,000	834	667	500
4				1,000	834	667
5					1,000	834
6						1,000
Total book value	1,000	1,834	2,501	3,001	3,334	3,501
Book ROI for all stores	-0.067	-0.018	0.020	0.060	0.094	0.126 ^b
EVA	-166.73	-216.79	-200.19	-118.91	-20.96	92.66 ^c
						▲
						Steady state

TABLE 12.4 Book ROI for a group of stores like the Nodhead store. The steady-state book ROI overstates the 10% *economic rate* of return. The steady-state EVA is also biased upward.

^a Book income = cash flow - book depreciation.

^b Steady-state book ROI.

^c Steady-state EVA.

Note: There are minor rounding errors in some annual figures.

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Thus we still have a problem even in the long run. The extent of the error depends on how fast the business grows. We have just considered one steady state with a zero growth rate. Think of another firm with a 5% steady-state growth rate. Such a firm would invest \$1,000 the first year, \$1,050 the second, \$1,102.50 the third, and so on. Clearly the faster growth means more new projects relative to old ones. The greater weight given to young projects, which have low book ROIs and negative apparent EVAs, the lower the business's apparent profitability.²⁰

What Can We Do about Biases in Accounting Profitability Measures?

The dangers in judging profitability by accounting measures are clear from these examples. To be forewarned is to be forearmed. But we can say something beyond just “be careful.”

It is natural for firms to set a standard of profitability for plants or divisions. Ideally that standard should be the opportunity cost of capital for investment in the plant or division. That is the whole point of EVA: to compare actual profits with the cost of capital. But if performance is measured by return on investment or EVA, then these measures need to recognize accounting biases. Ideally, the financial manager should identify and eliminate accounting biases before calculating EVA or net ROI. The managers and consultants that implement these measures work hard to adjust book income closer to economic income. For example, they may record R&D as an investment rather than an expense and construct alternative balance sheets showing R&D as an asset.

Accounting biases are notoriously hard to get rid of, however. Thus, many firms end up asking not “Did the widget division earn more than its cost of capital last year?” but “Was the widget division's book ROI typical of a successful firm in the widget industry?” The underlying assumptions are that (1) similar accounting procedures are used by other widget manufacturers and (2) successful widget companies earn their cost of capital.

There are some simple accounting changes that could reduce biases in performance measures. Remember that the biases all stem from *not* using economic depreciation. Therefore why not switch to economic depreciation? The main reason is that each asset's present value would have to be reestimated every year. Imagine the confusion if this were attempted. You can understand why accountants set up a depreciation schedule when an investment is made and then stick to it. But why restrict the choice of depreciation schedules to the old standbys, such as straight-line? Why not specify a depreciation pattern that at least matches *expected* economic depreciation? For example, the Nodhead store could be depreciated according to the expected economic depreciation schedule shown in Table 12.3. This would avoid any systematic biases. It would break no law or accounting standard. This step seems so simple and effective that we are at a loss to explain why firms have not adopted it.²¹

Earnings and Earnings Targets

The biases that we have just described do not come from creative accounting. They are built into GAAP. Of course we should worry about creative accounting also. We have already noted how stock options have tempted managers to fiddle with accounting choices to make reported earnings look good and prop up stock price.

But perhaps there is a deeper problem. CEOs of public companies face constant scrutiny. Much of that scrutiny focuses on earnings. Security analysts forecast earnings per share (EPS) and investors, security analysts, and professional portfolio managers wait to see whether the company can meet or beat the forecasts. *Not* meeting the forecasts can be a big disappointment.

²⁰ We could repeat the steady-state analysis in Table 12.4 for different growth rates. It turns out that book income will overstate economic income if the growth rate is less than the internal rate of return and understate economic income if the growth rate exceeds the internal rate of return. Biases disappear if the growth rate and internal rate of return are exactly equal.

²¹ This procedure has been suggested by several authors, for example by Zvi Bodie in “Compound Interest Depreciation in Capital Investment,” *Harvard Business Review* 60 (May–June 1982), pp. 58–60.

Monitoring by security analysts and portfolio managers can help constrain agency problems. But CEOs complain about the “tyranny of EPS” and the apparent short-sightedness of the stock market. (The British call it *short-termism*.) Of course the stock market is not systematically short-sighted. If it were, growth companies would not sell at the high price-earnings ratios observed in practice.²² Nevertheless, the pressure on CEOs to generate steady, predictable growth in earnings is real.

CEOs complain about this pressure, but do they do anything about it? Unfortunately the answer appears to be yes, according to Graham, Harvey, and Rajgopal, who surveyed about 400 senior managers.²³ Most of the managers said that accounting earnings were the single most important number reported to investors. Most admitted to adjusting their firms’ operations and investments to manage earnings. For example, 80% were willing to decrease discretionary spending in R&D, advertising, or maintenance if necessary to meet earnings targets. Many managers were also prepared to defer or reject investment projects with positive NPVs. There is a good deal of evidence that firms do indeed manage their earnings. For example, DeGeorge, Patel, and Zeckhauser studied a large sample of earnings announcements.²⁴ With remarkable regularity, earnings per share either met or beat security analysts’ forecasts, but only by a few cents. CFOs appeared to report conservatively in good times, building a stockpile of earnings that could be reported later. The rule, it seems, is *Make sure that you report sufficiently good results to keep analysts happy, and, if possible, keep something back for a rainy day.*²⁵

How much value was lost because of such adjustments? For a healthy, profitable company, spending a little more on advertising or deferring a project start for a few months may cause no significant damage. But we cannot endorse any sacrifice of fundamental shareholder value done just to manage earnings.

We may condemn earnings management, but in practice it’s hard for CEOs and CFOs to break away from the crowd. Graham and his coauthors explain it this way:²⁶

The common belief is that a well-run and stable firm should be able to “produce the numbers” . . . even in a year that is somewhat down. Because the market expects firms to be able to hit or slightly exceed earnings targets, and on average firms do just this, problems can arise when a firm does not deliver. . . . The market might assume that not delivering [reveals] potentially serious problems (because the firm is apparently so near the edge that it cannot produce the dollars to hit earnings . . .). As one CFO put it, “if you see one cockroach, you immediately assume that there are hundreds behind the walls.”

Thus we have a cockroach theory explaining why stock prices sometimes fall sharply when a company’s earnings fall short, even if the shortfall is only a penny or two.

Of course private firms do not have to worry about earnings management—which could help explain the increasing number of firms that have been bought out and returned to private ownership. (We discuss “going private” in Chapters 32 and 33.) Firms in some other countries, where quarterly earnings reports are not required and governance is more relaxed, may find it easier to invest for the long run. But such firms will also accumulate more agency problems. We wish there were simple answers to these trade-offs.

²² Recall from Chapter 4 that the price-earnings ratio equals $1/r_E$, where r_E is the cost of equity, *unless* the firm has valuable growth opportunities (PVGGO). The higher the PVGGO, the lower the earnings-price ratio and the higher the price-earnings ratio. Thus the high price-earnings ratios observed for growth companies (much higher than plausible estimates of $1/r_E$) imply that investors forecast large PVGGOs. But PVGGO depends on investments made many years in the future. If investors see significant PVGGOs, they can’t be systematically short-sighted.

²³ J. R. Graham, C. R. Harvey, and S. Rajgopal, “The Economic Implications of Corporate Financial Reporting,” *Journal of Accounting and Economics* 40 (2005), pp. 3–73.

²⁴ F. DeGeorge, J. Patel, and R. Zeckhauser, “Earnings Management to Exceed Thresholds,” *The Journal of Business* 72 (January 1999), pp. 1–33.

²⁵ Sometimes, instead of adjusting their operations, companies meet their target earnings by bending the accounting rules. For example, in August 2009 GE was fined \$50 million for creative accounting in earlier years. The SEC said that GE had met or exceeded analysts’ profit targets in every quarter from 1995 through 2004, but that its top accountants signed off on improper decisions to make its numbers look better and to avoid missing analysts’ earnings expectations.

²⁶ Graham, Harvey, and Rajgopal, *op. cit.*, p. 29.



SUMMARY

Capital investment decisions must be decentralized to a large extent. Consequently, agency problems are inevitable. Plant or divisional managers may be tempted to slack off, to avoid risk, or to propose empire-building or entrenching investments. Of course, top management is also exposed to similar temptations.

Agency problems are mitigated by a combination of monitoring and incentives. For example, shareholders delegate the task of monitoring top management to the board of directors and to the accountants who audit the company's books.

To encourage managers to maximize shareholder value, a large part of their compensation is usually tied to company performance. Typically, this performance-related pay consists of a mixture of stock or stock options and bonuses that depend on accounting measures of profitability. The U.S. is unusual both in the high levels of compensation for top executives and the extent to which pay is performance-related.

If you want to align the interests of the manager and the shareholder, it makes sense to give the manager common stock or stock options. But this is not a complete solution, for at least three reasons. First, stock prices depend on market and industry developments, not just on firm-specific performance. Thus compensation by stock or options exposes managers to risks that are outside their control. Second, today's stock price already reflects managers' expected future performance. Therefore, superior performance if it is expected, will not be rewarded with a superior stock-market return. Third, tying too much of management compensation to stock prices tempts managers to pump up stock prices, for example, by manipulating reported earnings per share.

The further you go down in a company, the more tenuous the link between the stock price and a manager's effort and decisions. Therefore a higher fraction of pay depends on accounting income. Increasing accounting income is not the same thing as increasing value, because accountants do not recognize the cost of capital as an expense. Many companies therefore tie compensation to net return on investment (net ROI) or to Economic Value Added (EVA). Net ROI is the difference between ordinary ROI and the cost of capital. EVA and other residual income measures subtract a charge for capital employed. This charge pushes managers and employees to let go of unneeded assets and to acquire new ones only if the additional earnings exceed the cost of capital.

Of course, any accounting measure of profitability, such as EVA or the book return on investment (ROI), depends on accurate measures of earnings and capital employed. Unless adjustments are made to accounting data, these measures may underestimate the true profitability of new assets and overestimate that of old assets.

In principle, the solution is easy. EVA and ROI should be calculated using true or economic income. Economic income is equal to the cash flow less economic depreciation (that is, the decline in the present value of the asset). Unfortunately, we can't ask accountants to recalculate each asset's present value each time income is calculated. But it does seem fair to ask why they don't at least try to match book depreciation schedules to typical patterns of economic depreciation.

The more pressing problem is that CEOs and CFOs seem to pay too much attention to earnings, at least in the short run, to maintain smooth growth and to meet earnings targets. They manage earnings, not with improper accounting, but by tweaking operating and investment plans. For example, they may defer a positive-NPV project for a few months to move the project's up-front expenses into the next fiscal year. It's not clear how much value is lost by this kind of behavior, but any value loss is unfortunate.

Current practices in management remuneration are discussed in:

K. J. Murphy, "Executive Compensation," in O. Ashenfelter and D. Cards (eds.), *Handbook of Labor Economics* (North-Holland, 1999).

R.K. Aggarwal, "Executive Compensation and Incentives," in B. E. Eckbo (ed.), *Handbook of Empirical Corporate Finance* (Amsterdam: Elsevier/North-Holland, 2007), Chapter 7.

B. J. Hall and K. J. Murphy, "The Trouble with Stock Options," *Journal of Economic Perspectives* 17 (Summer 2003), pp. 49–70.

FURTHER
READING

The following surveys argue that executive compensation has been excessive, owing partly to weaknesses in corporate governance:

L. Bebchuk and J. Fried, *Pay without Performance: The Unfulfilled Promise of Executive Compensation* (Cambridge, MA: Harvard University Press, 2005).

M. C. Jensen, K. J. Murphy, and E. G. Wruck, “Remuneration: Where We’ve Been, How We Got to Here, What Are the Problems, and How to Fix Them,” 2004, at www.ssrn.com, posted July 12, 2004.

The Fall 2005 issue of the Journal of Applied Corporate Finance focuses on executive pay and corporate governance.

The following article is worth reading for survey evidence on earnings and corporate reporting:

J. R. Graham, C. R. Harvey, and S. Rajgopal, “The Economic Implications of Corporate Financial Reporting,” *Journal of Accounting and Economics* 40 (2005), pp. 3–73.

For easy-to-read descriptions of EVA, see:

A. Ehrbar, *EVA: The Real Key to Creating Wealth* (New York: John Wiley & Sons, 1998).

J. M. Stern and J. S. Shiely, *The EVA Challenge—Implementing Value-added Change in an Organization* (New York: John Wiley & Sons, 2001).



Select problems are available in McGraw-Hill Connect. Please see the preface for more information.

PROBLEM SETS

BASIC

1. True or false?
 - a. U.S. CEOs are paid much more than CEOs in other countries.
 - b. A large fraction of compensation for U.S. CEOs comes from stock-option grants.
 - c. Stock-option grants give the manager a certain number of shares delivered at annual intervals, usually over five years.
 - d. U.S. accounting rules now require recognition of the value of stock-option grants as a compensation expense.
2. Define the following: (a) Agency costs in capital investment, (b) private benefits, (c) empire building, (d) free-rider problem, (e) entrenching investment, (f) delegated monitoring.
3. Monitoring alone can never completely eliminate agency costs in capital investment. Briefly explain why.
4. Here are several questions about economic value added or EVA.
 - a. Is EVA expressed as a percentage or a dollar amount?
 - b. Write down the formula for calculating EVA.
 - c. What is the difference, if any, between EVA and residual income?
 - d. What is the point of EVA? Why do firms use it?
 - e. Does the effectiveness of EVA depend on accurate measures of accounting income and assets?
5. The Modern Language Corporation earned \$1.6 million on net assets of \$20 million. The cost of capital is 11.5%. Calculate the net ROI and EVA.
6. Fill in the blanks:

“A project’s economic income for a given year equals the project’s _____ less its _____ depreciation. New projects may take several years to reach full profitability. In these cases book income is _____ than economic income early in the project’s life and _____ than economic income later in its life.”
7. How in practice do managers of public firms meet short-run earnings targets? By creative accounting?

INTERMEDIATE

8. Compare typical compensation and incentive arrangements for (a) top management, for example, the CEO or CFO, and (b) plant or division managers. What are the chief differences? Can you explain them?
9. Suppose all plant and division managers were paid only a fixed salary—no other incentives or bonuses.
 - a. Describe the agency problems that would appear in capital investment decisions.
 - b. How would tying the managers' compensation to EVA alleviate these problems?
10. Who monitors the top management of public U.S. corporations? (We have mentioned four types of monitoring in this chapter.)
11. We noted that management compensation must in practice rely on results rather than on effort. Why? What problems are introduced by not rewarding effort?
12. Here are a few questions about compensation schemes that tie top management's compensation to the rate of return earned on the company's common stock.
 - a. Today's stock price depends on investors' expectations of future performance. What problems does this create?
 - b. Stock returns depend on factors outside the managers' control, for example, changes in interest rates or prices of raw materials. Could this be a serious problem? If so, can you suggest a partial solution?
 - c. Compensation schemes that depend on stock returns do *not* depend on accounting data. Is that an advantage? Why or why not?
13. You chair the compensation committee of the board of directors of Androscoggin Copper. A consultant suggests two stock-option packages for the CEO:
 - a. A conventional stock-option plan, with the exercise price fixed at today's stock price.
 - b. An alternative plan in which the exercise price depends on the future market value of a portfolio of the stocks of *other* copper-mining companies. This plan pays off for the CEO only if Androscoggin's stock price performs better than its competitors'.

The second plan sets a higher hurdle for the CEO, so the number of shares should be higher than in the conventional plan. Assume that the number of shares granted under each plan has been calibrated so that the present values of the two plans are the same.

Which plan would you vote for? Explain.
14. Table 12.5 shows a condensed income statement and balance sheet for Androscoggin Copper's Rumford smelting plant.
 - a. Calculate the plant's EVA. Assume the cost of capital is 9%.
 - b. As Table 12.5 shows, the plant is carried on Androscoggin's books at \$48.32 million. However, it is a modern design, and could be sold to another copper company for \$95 million. How should this fact change your calculation of EVA?
15. Herbal Resources is a small but profitable producer of dietary supplements for pets. This is not a high-tech business, but Herbal's earnings have averaged around \$1.2 million after tax,

Income Statement for 2011		Assets, December 31, 2011	
Revenue	\$56.66	Net working capital	\$ 7.08
Raw materials cost	18.72	Investment in plant and equipment	69.33
Operating cost	21.09	Less accumulated depreciation	<u>21.01</u>
Depreciation	<u>4.50</u>	Net plant and equipment	<u>48.32</u>
Pretax income	12.35	Total assets	\$55.40
Tax at 35%	<u>4.32</u>		
Net income	\$ 8.03		

TABLE 12.5

Condensed financial statements for the Rumford smelting plant. See Problem 14 (figures in \$ millions).

largely on the strength of its patented enzyme for making cats nonallergenic. The patent has eight years to run, and Herbal has been offered \$4 million for the patent rights.

Herbal's assets include \$2 million of working capital and \$8 million of property, plant, and equipment. The patent is not shown on Herbal's books. Suppose Herbal's cost of capital is 15%. What is its EVA?

16. True or false? Explain briefly.
- Book profitability measures are biased measures of true profitability for individual assets. However, these biases “wash out” when firms hold a balanced mix of old and new assets.
 - Systematic biases in book profitability would be avoided if companies used depreciation schedules that matched expected economic depreciation. However, few, if any, firms have done this.
17. Consider the following project:

	Period			
	0	1	2	3
Net cash flow	-100	0	78.55	78.55

The internal rate of return is 20%. The NPV, assuming a 20% opportunity cost of capital, is exactly zero. Calculate the expected *economic* income and economic depreciation in each year.

18. Calculate the year-by-year book and economic profitability for investment in polyzone production, as described in Chapter 11. Use the cash flows and competitive spreads shown in Table 11.2, and assume straight-line depreciation over 10 years.

What is the steady-state book rate of return (ROI) for a mature company producing polyzone? Assume no growth and competitive spreads.

19. The Web site www.mhhe.com/bma contains an Excel program for calculating the profitability of the Nodhead project. Now suppose that the cash flows from Nodhead's new supermarket are as follows:

	Year						
	0	1	2	3	4	5	6
Cash flows (\$ thousands)	-1,000	+298	+298	+298	+138	+138	+140

- Recalculate economic depreciation. Is it accelerated or decelerated?
 - Rework Tables 12.2 and 12.3 to show the relationship between (i) the “true” rate of return and book ROI and (ii) true EVA and forecasted EVA in each year of the project's life.
20. The Web site www.mhhe.com/bma contains an Excel program for measuring the profitability of the Nodhead project. Reconstruct Table 12.4 assuming a steady-state growth rate of 10% per year. Your answer will illustrate a fascinating theorem, namely, that book rate of return equals the economic rate of return when the economic rate of return and the steady-state growth rate are the same.

CHALLENGE

21. Consider an asset with the following cash flows:

	Year			
	0	1	2	3
Cash flows (\$ millions)	-12	+5.20	+4.80	+4.40

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The firm uses straight-line depreciation. Thus, for this project, it writes off \$4 million per year in years 1, 2, and 3. The discount rate is 10%.

- Show that economic depreciation equals book depreciation.
- Show that the book rate of return is the same in each year.
- Show that the project's book profitability is its true profitability.

You've just illustrated another interesting theorem. If the book rate of return is the same in each year of a project's life, the book rate of return equals the IRR.

22. In our Nodhead example, true depreciation was decelerated. That is not always the case. For instance, Table 12.6 shows how on average the market value of a Boeing 737 has varied with its age²⁷ and the cash flow needed in each year to provide a 10% return. (For example, if you bought a 737 for \$19.69 million at the start of year 1 and sold it a year later, your total profit would be $17.99 + 3.67 - 19.69 = \$1.97$ million, 10% of the purchase cost.)

Many airlines write off their aircraft straight-line over 15 years to a salvage value equal to 20% of the original cost.

- Calculate economic and book depreciation for each year of the plane's life.
- Compare the true and book rates of return in each year.
- Suppose an airline invested in a fixed number of Boeing 737s each year. Would steady-state book return overstate or understate true return?

Start of Year	Market Value	Cash Flow
1	19.69	
2	17.99	\$3.67
3	16.79	3.00
4	15.78	2.69
5	14.89	2.47
6	14.09	2.29
7	13.36	2.14
8	12.68	2.02
9	12.05	1.90
10	11.46	1.80
11	10.91	1.70
12	10.39	1.61
13	9.91	1.52
14	9.44	1.46
15	9.01	1.37
16	8.59	1.32

TABLE 12.6

Estimated market values of a Boeing 737 in January 1987 as a function of age, plus the cash flows needed to provide a 10% true rate of return (figures in \$ millions).

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²⁷ We are grateful to Mike Staunton for providing us with these estimates.