

## Measuring Earnings

**T**o estimate cash flows, we usually begin with a measure of earnings. Free cash flows to the firm, for instance, are based on after-tax operating earnings. Free cash flow to equity estimates, on the other hand, commence with net income. While we obtain measures of operating and net income from accounting statements, the accounting earnings for many firms bear little or no resemblance to the true earnings of the firm.

This chapter begins by considering the philosophical difference between the accounting and financial views of firms. We then consider how the earnings of a firm, at least as measured by accountants, have to be adjusted to get a measure of earnings that is more appropriate for valuation. In particular, we examine how to treat operating lease expenses, which we argue are really financial expenses, and research and development expenses, which we consider to be capital expenses. The adjustments affect not only our measures of earnings but our estimates of book value of capital. We also look at extraordinary items (both income and expenses) and one-time charges, the use of which has expanded significantly in recent years as firms have shifted toward managing earnings more aggressively. The techniques used to smooth earnings over periods and beat analyst estimates can skew reported earnings, and, if we are not careful, the values that emerge from them.

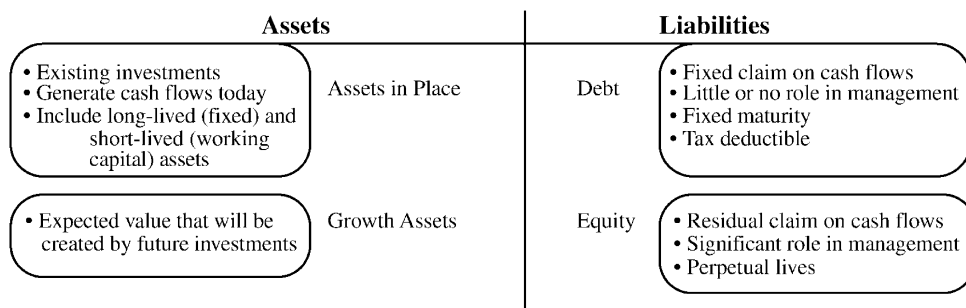
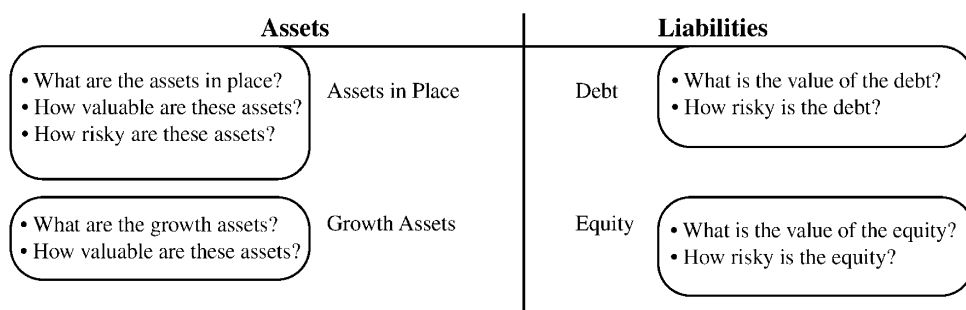
### **ACCOUNTING VERSUS FINANCIAL BALANCE SHEETS**

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When analyzing a firm, what are the questions to which we would like to know the answers? A firm, as defined here, includes both investments already made—assets-in-place—and investments yet to be made—growth assets. In addition, a firm can either borrow the funds it needs to make these investments, in which case it is using debt, or raise it from its owners in the form of equity. Figure 9.1 summarizes this description of a firm in the form of a financial balance sheet.

Note that while this summary does have some similarities with the accounting balance sheet, there are key differences. The most important one is that here we explicitly consider growth assets when we look at what a firm owns.

When doing a financial analysis of a firm, we would like to be able to answer a number of questions relating to each of these items. Figure 9.2 lists the questions. As we will see in this chapter, accounting statements allow us to acquire some information about each of these questions, but they fall short in terms of both the timeliness with which they provide it and the way in which they measure asset value, earnings, and risk.

**FIGURE 9.1** A Financial Balance Sheet**FIGURE 9.2** Key Financial Questions

## ADJUSTING EARNINGS

The income statement for a firm provides measures of both the operating and equity income of the firm in the form of the earnings before interest and taxes (EBIT) and net income. When valuing firms, there are two important considerations in using this measure. One is to obtain as updated an estimate as possible, given how much these firms change over time. The second is that reported earnings at these firms may bear little resemblance to true earnings because of limitations in accounting rules and the firms' own actions.

### Importance of Updating Earnings

Firms reveal their earnings in their financial statements and annual reports to stockholders. Annual reports are released only at the end of a firm's financial year, but you are often required to value firms all through the year. Consequently, the last annual report that is available for a firm being valued can contain information that is several months old. In the case of firms that are changing rapidly over time, it is dangerous to base value estimates on information that is this old. Instead, use more recent information. Since firms in the United States are required to file quarterly reports with the Securities and Exchange Commission (10-Qs) and reveal these reports to the public, a more recent estimate of key items in the financial statements

can be obtained by aggregating the numbers over the most recent four quarters. The estimates of revenues and earnings that emerge from this exercise are called trailing 12-month revenues and earnings and can be very different from the values for the same variables in the most recent annual report.

There is a price paid for the updating. Unfortunately, not all items in the annual report are revealed in the quarterly reports. You have to either use the numbers in the last annual report (which does lead to inconsistent inputs) or estimate their values at the end of the last quarter (which leads to estimation error). For example, firms do not reveal details about options outstanding (issued to managers and employees) in quarterly reports, while they do reveal them in annual reports. Since you need to value these options, you can use the options outstanding as of the last annual report, or assume that the options outstanding today have changed to reflect changes in the other variables. (For instance, if revenues have doubled, the options have doubled as well.)

For younger firms, it is critical that you stay with the most updated numbers you can find, even if these numbers are estimates. These firms are often growing exponentially, and using numbers from the last financial year will lead to misleading estimates of value. Even those that are not growing are changing substantially from quarter to quarter, and updated information might give you a chance to capture these changes.

There are several financial markets where firms still file financial reports only once a year, thus denying us the option of using quarterly updates. When valuing firms in these markets, analysts may have to draw on unofficial sources to update their valuations.

#### ILLUSTRATION 9.1: Updated Earnings for Ariba—June 2000

Assume that you were valuing Ariba, a firm specializing in business-to-business (B2B) e-commerce in June 2000. The last 10-K was as of September 1999 and the firm had released two quarterly reports (10-Qs), one in December 1999 and one in March 2000. To illustrate how much the fundamental inputs to the valuation have changed in the six months, the information in the last 10-K is compared to the trailing 12-month information in the latest 10-Q for revenues, operating income, R&D expenses, and net income (in thousands of dollars).

	<i>Six Months Ending March 2000</i>	<i>Six Months Ending March 1999</i>	<i>Annual September 1999</i>	<i>Trailing 12-Month</i>
Revenues	\$ 63,521	\$16,338	\$45,372	\$ 92,555
EBIT	-\$140,604	-\$ 8,315	-\$31,421	-\$163,710
R&D	\$ 11,567	\$ 3,849	\$11,620	\$ 19,338
Net income	-\$136,274	-\$ 8,128	-\$29,300	-\$157,446

Trailing 12-month = Annual September 1999 + Six-month March 1999 + Six-month March 2000.

The trailing 12-month revenues are twice the revenues reported in the latest 10-K, and the firm's operating loss and net loss have both increased more than fivefold. Ariba in March 2000 was a very different firm from Ariba in September 1999. Note that these are not the only inputs that have changed. The number of shares outstanding in the firm has changed dramatically as well, from 35.03 million shares in September 1999 to 179.24 million shares in the latest 10-Q (March 2000) to 235.8 million shares in June 2000.

## Correcting Earnings Misclassification

1. Operating expenses are expenses that generate benefits for the firm only in the current period. For instance, the fuel used by an airline in the course of its flights is an operating expense, as is the labor cost for an automobile company associated with producing vehicles.
2. Capital expenses are expenses that generate benefits over multiple periods. For example, the expense associated with building and outfitting a new factory for an automobile manufacturer is a capital expense, since it will generate several years of revenues.
3. Financial expenses are expenses associated with nonequity capital raised by a firm. Thus, the interest paid on a bank loan would be a financial expense.

The operating income for a firm, measured correctly, should be equal to its revenues less its operating expenses. Neither financial nor capital expenses should be included in the operating expenses in the year that they occur, though capital expenses may be depreciated or amortized over the period that the firm obtains benefits from the expenses. The net income of a firm should be its revenues less both its operating and financial expenses. No capital expenses should be deducted to arrive at net income.

The accounting measures of earnings can be misleading because operating, capital, and financial expenses are sometimes misclassified. This section will consider the two most common misclassifications and how to correct for them. The first is the inclusion of capital expenses such as research and development (R&D) in the operating expenses, which skews the estimation of both operating and net income. The second adjustment is for financial expenses such as operating leases expenses that are treated as operating expenses. This affects the measurement of operating income and free cash flows to the firm.

The third factor to consider is the effect of the phenomenon of so-called “managed earnings” at these firms. Firms sometimes use accounting techniques to post earnings that beat analyst estimates, resulting in misleading measures of earnings.

**Capital Expenses Treated as Operating Expenses** While in theory capital income is not computed after operating expenses, the reality is that there are a number of expenses that are treated as operating expenses. For instance, a significant shortcoming of accounting statements is the way in which they treat research and development expenses. Using the rationale that the products of research are too uncertain and difficult to quantify, accounting standards have generally required that all R&D expenses be expensed in the period in which they occur. This has several consequences, but one of the most profound is that the value of the assets created by research does not show up on the balance sheet as part of the total assets of the firm. This, in turn, creates ripple effects for the measurement of capital and profitability ratios for the firm. We will consider how to capitalize R&D expenses in the first part of the section and extend the argument to other capital expenses in the second part of the section.

**Capitalizing R&D Expenses** Research expenses, notwithstanding the uncertainty about future benefits, should be capitalized. To capitalize and value research assets, we make an assumption about how long it takes for research and development to

be converted, on average, into commercial products. This is called the amortizable life of these assets. This life will vary across firms and reflect the time involved in converting research into products. To illustrate, research and development expenses at a pharmaceutical company should have fairly long amortizable lives, since the approval process for new drugs is long. In contrast, research and development expenses at a software firm, where products tend to emerge from research much more quickly, should be amortized over a shorter period.

Once the amortizable life of research and development expenses has been estimated, the next step is to collect data on R&D expenses over past years ranging back over the amortizable life of the research asset. Thus, if the research asset has an amortizable life of five years, the R&D expenses in each of the five years prior to the current one have to be obtained. For simplicity, it can be assumed that the amortization is uniform over time, which leads to the following estimate of the residual value of research asset today:

$$\text{Value of the research asset} = \sum_{t=-(n-1)}^{t=0} R\&D_t \frac{(n+t)}{n}$$

Thus, in the case of the research asset with a five-year life, you cumulate one-fifth of the R&D expenses from four years ago, two-fifths of the R&D expenses from three years ago, three-fifths of the R&D expenses from two years ago, four-fifths of the R&D expenses from last year, and this year's entire R&D expense to arrive at the value of the research asset. This augments the value of the assets of the firm and, by extension, the book value of equity.

Adjusted book value of equity = Book value of equity + Value of the research asset

Finally, the operating income is adjusted to reflect the capitalization of R&D expenses. First, the R&D expenses that were subtracted out to arrive at the operating income are added back to the operating income, reflecting their recategorization as capital expenses. Next, the amortization of the research asset is treated the same way that depreciation is and netted out to arrive at the adjusted operating income:

$$\begin{aligned} \text{Adjusted operating income} &= \text{Operating income} + \text{R\&D expenses} \\ &\quad - \text{Amortization of research asset} \end{aligned}$$

The adjusted operating income will generally increase for firms that have R&D expenses that are growing over time. The net income will also be affected by this adjustment:

Adjusted net income = Net income + R&D expenses – Amortization of research asset

While we would normally consider only the after-tax portion of this amount, the fact that R&D is entirely tax deductible eliminates the need for this adjustment.<sup>1</sup>

<sup>1</sup>If only amortization were tax deductible, the tax benefit from R&D expenses would be:

$$\text{Amortization} \times \text{Tax rate}$$

This extra tax benefit we get from the entire R&D being tax deductible is as follows:

$$(\text{R\&D} - \text{Amortization}) \times \text{Tax rate}$$

If we subtract out  $(\text{R\&D} - \text{Amortization})(1 - \text{Tax rate})$  and then add the differential tax benefit that is computed above,  $(1 - \text{Tax rate})$  drops out of the equation.



**R&DConv.xls:** This spreadsheet allows you to convert R&D expenses from operating to capital expenses.

### ILLUSTRATION 9.2: Capitalizing R&D Expenses: Amgen in March 2001

Amgen is a biotechnology firm. Like most pharmaceutical firms, it has a substantial amount of R&D expenses, and we will attempt to capitalize it in this section. The first step in this conversion is determining an amortizable life for R&D expenses. How long will it take, on an expected basis, for research to pay off at Amgen? Given the length of the approval process for new drugs by the Food and Drug Administration, we will assume that this amortizable life is 10 years.

The second step in the analysis is collecting research and development expenses from prior years, with the number of years of historical data being a function of the amortizable life. The following table provides this information for each of the years:

<i>Year</i>	<i>R&amp;D Expenses</i>
Current	\$845.00
-1	\$822.80
-2	\$663.30
-3	\$630.80
-4	\$528.30
-5	\$451.70
-6	\$323.63
-7	\$255.32
-8	\$182.30
-9	\$120.94
-10	Firm not in existence

Dollars in millions.

The current year's information reflects the R&D in the last financial year (which was calendar year 2000).

The portion of the expenses in prior years that would have been amortized already and the amortization this year from each of these expenses is considered. To make estimation simpler, these expenses are amortized linearly over time; with a 10-year life, 10% is amortized each year. This allows you to estimate the value of the research asset created at each of these firms, and the amortization of R&D expenses in the current year. The procedure is illustrated in the following table:

<i>Year</i>	<i>R&amp;D Expense</i>	<i>Unamortized Portion of Research Asset</i>		<i>Amortization This Year</i>
Current	\$845.00	1.00	\$845.00	
-1	\$822.80	0.90	\$740.52	\$82.28
-2	\$663.30	0.80	\$530.64	\$66.33
-3	\$630.80	0.70	\$441.56	\$63.08
-4	\$528.30	0.60	\$316.98	\$52.83
-5	\$451.70	0.50	\$225.85	\$45.17
-6	\$323.63	0.40	\$129.45	\$32.36
-7	\$255.32	0.30	\$ 76.60	\$25.53
-8	\$182.30	0.20	\$ 36.46	\$18.23
-9	\$120.94	0.10	\$ 12.09	\$12.09
-10	\$ 0.00	0.00	\$ 0.00	\$ —

*Note:* The firm has been in existence only nine years prior to the current year.

Note that none of the current year's expenditure has been amortized because it is assumed to occur at the end of the year but that 50 percent of the expense from five years ago has been amortized. The sum of the dollar values of unamortized R&D from prior years is \$3.355 billion. This can be viewed as the value of Amgen's research asset and would be also added to the book value of equity for computing return on equity and capital measures. The sum of the amortization in the current year for all prior year expenses is \$397.91 million.

The final step in the process is the adjustment of the operating income to reflect the capitalization of research and development expenses. We make the adjustment by adding back R&D expenses to the operating income (to reflect its reclassification as a capital expense) and subtract out the amortization of the research asset, estimated in the last step. For Amgen, which reported operating income of \$1,549 million in its income statement for 2000, the adjusted operating earnings would be:

$$\begin{aligned}\text{Adjusted operating earnings} &= \text{Operating earnings} + \text{Current year's R\&D expense} \\ &\quad - \text{Amortization of research asset} \\ &= 1,549 + 845 - 398 = \$1,996 \text{ million}\end{aligned}$$

The stated net income of \$1,139 million can be adjusted similarly.

$$\begin{aligned}\text{Adjusted net income} &= \text{Net income} + \text{Current year's R\&D expense} - \text{Amortization of research asset} \\ &= 1,139 + 845 - 398 = \$1,586 \text{ million}\end{aligned}$$

You might wonder why there is no tax effect, but we will return to this question in the next chapter.

Both the book value of equity and capital are augmented by the value of the research asset. Since measures of return on capital and equity are based on the prior year's values, we computed the value of the research asset at the end of 1999, using the same approach that we used in 2000.

$$\begin{aligned}\text{Value of research asset}_{1999} &= \$2,909 \text{ million} \\ \text{Adjusted book value of equity}_{1999} &= \text{Book value of equity}_{1999} + \text{Value of research asset} \\ &= 3,024 \text{ million} + 2,909 \text{ million} = \$5,933 \text{ million} \\ \text{Adjusted book value of capital}_{1999} &= \text{Book value of capital}_{1999} + \text{Value of research asset} \\ &= 3,347 \text{ million} + 2,909 \text{ million} = \$6,256 \text{ million}\end{aligned}$$

The returns on equity and capital are reported with both the unadjusted and adjusted numbers:

	<i>Unadjusted</i>	<i>Adjusted for R&amp;D</i>
Return on equity	1,139/3,024 = 37.67%	1,586/5,933 = 26.73%
Pretax return on capital	1,549/3,347 = 46.28%	1,996/6,256 = 31.91%

While the profitability ratios for Amgen remain impressive even after the adjustment, they decline significantly from the unadjusted numbers. This is likely to happen for most firms that earn high returns on equity and capital and have substantial R&D expenses.<sup>2</sup>

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<sup>2</sup>If the return on capital earned by a firm is well below the cost of capital, the adjustment could result in a higher return.

**Capitalizing Other Operating Expenses** While R&D expenses are the most prominent example of capital expenses being treated as operating expenses, there are other operating expenses that arguably should be treated as capital expenses. Consumer product companies such as Gillette and Coca-Cola could argue that a portion of advertising expenses should be treated as capital expenses, since they are designed to augment brand name value. For a consulting firm, the cost of recruiting and training its employees could be considered a capital expense, since the consultants who emerge are likely to be the heart of the firm's assets and provide benefits over many years. For many new technology firms, including e-tailers such as Amazon.com, the biggest operating expense item is selling, general, and administrative expenses (SG&A). These firms could argue that a portion of these expenses should be treated as capital expenses, since they are designed to increase brand name awareness and bring in new customers. America Online (AOL), for instance, used this argument to justify capitalizing the expenses associated with the free trial CDs that it bundled with magazines in the United States.

While this argument has some merit, you should remain wary about using it to justify capitalizing these expenses. For an operating expense to be capitalized, there should be substantial evidence that the benefits from the expense accrue over multiple periods. Does a customer who is enticed to buy from Amazon, based on an advertisement or promotion, continue as a customer for the long term? There are some analysts who claim that this is indeed the case, and attribute significant value added to each new customer.<sup>3</sup> It would be logical, under those circumstances, to capitalize these expenses using a procedure similar to that used to capitalize R&D expenses.

- Determine the period over which the benefits from the operating expense (such as SG&A) will flow.
- Estimate the value of the asset (similar to the research asset) created by these expenses. If the expenses are SG&A expenses, this would be the SG&A asset.
- Adjust the operating income for the expense and the amortization of the created asset.

$$\begin{aligned}\text{Adjusted operating income} &= \text{Operating income} \\ &\quad + \text{SG\&A expenses for the current period} \\ &\quad - \text{Amortization of SG\&A asset}\end{aligned}$$

A similar adjustment has to be made to net income:

$$\begin{aligned}\text{Adjusted net income} &= \text{Net income} + \text{SG\&A expenses for the current period} \\ &\quad - \text{Amortization of SG\&A asset}\end{aligned}$$

As with the research asset, the capitalization of these expenses will create an asset that augments the book value of equity (and capital).

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<sup>3</sup>As an example, Jamie Kiggen, an equity research analyst at Donaldson, Lufkin & Jenrette, valued an Amazon customer at \$2,400 in an equity research report in 1999. This value was based on the assumption that the customer would continue to buy from Amazon.com and on an expected profit margin from such sales.



**ILLUSTRATION 9.3: Should You Capitalize SG&A Expense? Analyzing Amazon.com and America Online**

Let us consider SG&A expenses at Amazon and America Online. To make a judgment on whether you should capitalize this expense, you need to get a sense of what these expenses are and how long the benefits accruing from these expenses last. For instance, assume that an Amazon promotion (the expense of which would be included in SG&A) attracts new customers to the web site, and that customers, once they try Amazon, continue, on average, to be customers for three years. You would then use a three year amortizable life for SG&A expenses, and capitalize them the same way you capitalized R&D: by collecting historical information on SG&A expenses, amortizing them each year, estimating the value of the selling asset and then adjusting operating income.

We do believe, on balance, that selling, general, and administrative expenses should continue to be treated as operating expenses and not capitalized for Amazon for two reasons. First, retail customers are difficult to retain, especially online, and Amazon faces serious competition not only from other online retailers but also from traditional retailers like Wal-Mart, setting up their online operations. Consequently, the customers that Amazon might attract with its advertising or sales promotions are unlikely to stay for an extended period just because of the initial inducements. Second, as the company has become larger, its selling, general, and administrative expenses seem increasingly directed toward generating revenues in current periods rather than future periods.

In contrast, consider the SG&A expenses at America Online. Especially when the firm was smaller, these expenses primarily related to the cost of the CDs that AOL would package with magazines to get readers to try its service. The company's statistics indicated that a customer who tried the service remained a subscriber to it for about three years, on average. This makes a case for treating the expense as a capital expense stronger, with an amortizable life of three years.

**ILLUSTRATION 9.4: Capitalizing Recruitment and Training Expenses: Cyber Health Consulting**

Cyber Health Consulting (CHC) is a firm that specializes in offering management consulting services to health-care firms. CHC reported operating income (EBIT) of \$51.5 million and net income of \$23 million in the most recent year. However, the firm's expenses include the cost of recruiting new consultants (\$5.5 million) and the cost of training (\$8.5 million). A consultant who joins CHC stays with the firm, on average, four years.

To capitalize the cost of recruiting and training, we obtained these costs from each of the prior four years. The following table reports on these human capital expenses, and amortizes each of these expenses over four years.

<i>Year</i>	<i>Training and Recruiting Expenses</i>	<i>Unamortized Portion</i>	<i>Amortization This Year</i>
Current	\$14.00	100%	\$14.00
-1	\$12.00	75%	\$ 9.00
-2	\$10.40	50%	\$ 5.20
-3	\$ 9.10	25%	\$ 2.28
-4	\$ 8.30	—	\$ 0.00
Value of human capital asset =			\$30.48
			\$9.95

The adjustments to operating and net income are as follows:

Adjusted operating income = Operating income + Training and recruiting expenses  
 – Amortization of expense this year  
 = \$51.5 + \$14 – \$9.95 = \$55.55 million

Net income = Net income + Training and recruiting expenses – Amortization of expense this year  
 = \$23 million + \$14 million – \$9.95 million = \$27.05 million

As with R&D expenses, the fact that training and recruiting expenses are fully tax deductible dispenses with the need to consider the tax effect when adjusting net income.

**Adjustments for Financing Expenses** The second adjustment is for financing expenses that accountants treat as operating expenses. The most significant example is operating lease expenses, which are treated as operating expenses, in contrast to capital leases, which are presented as debt.

**Converting Operating Leases into Debt** In Chapter 8, the basic approach for converting operating leases into debt was presented. You discount future operating lease commitments back at the firm's pretax cost of debt. The present value of the operating lease commitments is then added to the conventional debt of the firm to arrive at the total debt outstanding.

$$\text{Adjusted debt} = \text{Debt} + \text{Present value of lease commitments}$$

Once operating leases are recategorized as debt, the operating incomes can be adjusted in two steps. First, the operating lease expense is added back to the operating income, since it is a financial expense. Next, the depreciation on the leased asset is subtracted out to arrive at adjusted operating income:

$$\begin{aligned} \text{Adjusted operating income} &= \text{Operating income} + \text{Operating lease expenses} \\ &\quad - \text{Depreciation on leased asset} \end{aligned}$$

If you assume that the depreciation on the leased asset approximates the principal portion of the debt being repaid, the adjusted operating income can be computed by adding back the imputed interest expense on the debt value of the operating lease expense:

$$\begin{aligned} \text{Adjusted operating income} &= \text{Operating income} \\ &\quad + \text{Debt value of operating lease expense} \\ &\quad \times \text{Interest rate on debt} \end{aligned}$$

#### ILLUSTRATION 9.5: Adjusting Operating Income for Operating Leases: The Gap in 2001

As a specialty retailer, the Gap has hundreds of stores that are leased, with the leases being treated as operating leases. For the most recent financial year, the Gap has operating lease expenses of \$705.8 million. The following table presents the operating lease commitments for the firm over the next five years and the lump sum of commitments beyond that point in time.

<i>Year</i>	<i>Commitment</i>
1	\$774.60
2	\$749.30
3	\$696.50
4	\$635.10
5	\$529.70
6 and beyond	\$5,457.90

The Gap has a pretax cost of debt of 7%. To compute the present value of the commitments, you have to make a judgment on the lump sum commitment in year 6. Based on the average annual lease commitment over the first five years (\$677 million), we arrive at an annuity of eight years:<sup>4</sup>

$$\text{Approximate life of annuity (for year 6 lump sum)} = \$5,458/677 = 8.06$$

<sup>4</sup>The value is rounded to the nearest integer.

The present values of the commitments at the 7% pretax cost of debt are estimated in the following table:

<i>Year</i>	<i>Commitment</i>	<i>Present Value</i>
1	\$774.60	\$ 723.93
2	\$749.30	\$ 654.47
3	\$696.50	\$ 568.55
4	\$635.10	\$ 484.51
5	\$529.70	\$ 377.67
6 and beyond	\$682.24	\$2,904.59
Debt value of leases		\$5,713.72

The present value of operating leases is treated as the equivalent of debt, and is added on to the conventional debt of the firm. The Gap has interest-bearing debt of \$1.56 billion on its balance sheet. The cumulated debt for the firm is:

$$\begin{aligned}\text{Adjusted debt} &= \text{Interest-bearing debt} + \text{Present value of lease commitments} \\ &= \$1,560 \text{ million} + \$5,714 \text{ million} = \$7,274 \text{ million}\end{aligned}$$

To adjust the operating income for the Gap, we first use the full adjustment. To compute depreciation on the leased asset, we assume straight-line depreciation over the lease life<sup>5</sup> (13 years) on the value of the leased asset which is equal to the debt value of the lease commitments:

$$\text{Straight-line depreciation} = \text{Value of leased asset} / \text{Lease life} = \$5,714 / 13 = \$440 \text{ million}$$

The Gap's stated operating income of \$1,365 million is adjusted as follows:

$$\begin{aligned}\text{Adjusted operating income} &= \text{Operating income} + \text{Operating lease expense in current year} \\ &\quad - \text{Depreciation on leased asset} \\ &= \$1,365 \text{ million} + \$706 - \$440 = \$1,631 \text{ million}\end{aligned}$$

The approximate adjustment is also estimated below, where we add the added imputed interest expense using the pretax cost of debt:

$$\begin{aligned}\text{Adjusted operating income} &= \text{Operating income} + \text{Debt value of leases} \times \text{Pretax cost of debt} \\ &= \$1,365 + \$5,714 \times .07 = \$1,765 \text{ million}\end{aligned}$$



***Oplease.xls***: This spreadsheet allows you to convert operating lease expenses into debt.

<sup>5</sup>The lease life is computed by adding the estimated annuity life of eight years for the lump sum to the initial five years.

### WHAT ABOUT OTHER COMMITMENTS?

The argument made about leases can be made about other long-term commitments where a firm has no escape hatches or cancellations options, or where the payment is not connected to performance/earnings. For instance, consider a professional sports team that signs a star player to a 10-year contract, agreeing to pay \$5 million a year. If the payment is not contingent on performance, this firm has created the equivalent of debt by signing this contract.

The upshot of this argument is that firms that have no debt on their balance sheet may still be highly levered and subject to default risk as a consequence. For instance, Mario Lemieux, a star player for the Pittsburgh Penguins, the professional ice hockey team, was given partial ownership of the team because of its failure to meet contractual commitments it had made to him.

### Accounting Earnings and True Earnings

Firms have become particularly adept at meeting and beating analyst estimates of earnings each quarter. While beating earnings estimates can be viewed as a positive development, some firms adopt accounting techniques that are questionable to accomplish this objective. When valuing these firms, you have to correct operating income for these accounting manipulations to arrive at the correct operating income.

**The Phenomenon of Managed Earnings** In the 1990s, firms like Microsoft and Intel set the pattern for technology firms. In fact, Microsoft beat analyst estimates of earnings in 39 of the 40 quarters during the decade, and Intel posted a record almost as impressive. As the market values of these firms skyrocketed, other technology firms followed in their footsteps in trying to deliver earnings that were higher than analyst estimates by at least a few pennies. The evidence is overwhelming that the phenomenon is spreading. For an unprecedented 18 quarters in a row from 1996 to 2000, more firms beat consensus earnings estimates than missed them.<sup>6</sup> In another indication of the management of earnings, the gap between the earnings reported by firms to the Internal Revenue Service and that reported to equity investors has been growing over the last decade.

Given that these analyst estimates are expectations, what does this tell you? One possibility is that analysts consistently under estimate earnings and never learn from their mistakes. While this is a possibility, it seems extremely unlikely to persist over an entire decade. The other is that technology firms particularly have far more discretion in how they measure and report earnings and are using this discretion to beat estimates. In particular, the treatment of research expenses as operating expenses gives these firms an advantage when it comes to managing earnings.

Does managing earnings really increase a firm's stock price? It might be possible to beat analysts quarter after quarter, but are markets as gullible? They are not, and the advent of so-called whispered earnings estimates is in reaction to the consistent delivery of earnings that are above expectations. What are whispered earnings? Whispered earnings are implicit earnings estimates that firms have to beat to

<sup>6</sup>I/B/E/S estimates.

surprise the market, and these estimates are usually a few cents higher than analyst estimates. For instance, on April 10, 1997, Intel reported earnings per share of \$2.10 per share, higher than analyst estimates of \$2.06 per share, but saw its stock price drop 5 points because the whispered earnings estimate had been \$2.15. In other words, markets had built into expectations the amount by which Intel had beaten earnings estimates historically.

**Why Do Firms Manage Earnings?** Firms generally manage earnings because they believe that they will be rewarded by markets for delivering earnings that are smoother and come in consistently above analyst estimates. As evidence, they point to the success of firms like Microsoft and Intel, and the brutal punishment meted out for firms that do not meet expectations.

Many financial managers also seem to believe that investors take earnings numbers at face value, and work at delivering bottom lines that reflect this belief. This may explain why any efforts by the Financial Accounting Standards Board (FASB) to change the way earnings are measured are fought with vigor, even when the changes make sense. For instance, any attempts by FASB to value the options granted by firms to their managers at a fair value and charge them against earnings or change the way mergers are accounted for have been consistently opposed by technology firms.

It may also be in the best interests of the managers of firms to manage earnings. Managers know that they are more likely to be fired when earnings drop significantly relative to prior periods. Furthermore, there are firms where managerial compensation is still built around profit targets, and meeting these targets can lead to lucrative bonuses.

**Techniques for Managing Earnings** How do firms manage earnings? One aspect of good earnings management is the care and nurturing of analyst expectations, a practice that Microsoft perfected during the 1990s. Executives at the firm monitored analyst estimates of earnings, and stepped in to lower expectations when they believed that the estimates were too high.<sup>7</sup> There are several other techniques that are used, and some of the most common will be considered in this section. Not all the techniques are hurtful to the firm, and some may indeed be considered prudent management.

- *Planning ahead.* Firms can plan investments and asset sales to keep earnings rising smoothly.
- *Revenue recognition.* Firms have some leeway when it comes when revenues have to be recognized. As an example, Microsoft, in 1995, adopted an extremely conservative approach to accounting for revenues from its sale of Windows 95, and chose not to show large chunks of revenues that they were entitled (though not obligated) to show.<sup>8</sup> In fact, the firm had accumulated \$1.1

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<sup>7</sup>Microsoft preserved its credibility with analysts by also letting them know when their estimates were too low. Firms that are consistently pessimistic in their analyst presentations lose their credibility and consequently their effectiveness in managing earnings.

<sup>8</sup>Firms that bought Windows 95 in 1995 also bought the right to upgrades and support in 1996 and 1997. Microsoft could have shown these as revenues in 1995.

billion in unearned revenues by the end of 1996 that it could borrow on to supplement earnings in a weaker quarter.

- *Book revenues early.* In an opposite phenomenon, firms sometimes ship products during the final days of a weak quarter to distributors and retailers and record the revenues. Consider the case of MicroStrategy, a technology firm that went public in 1998. In the last two quarters of 1999, the firm reported revenue growth of 20 percent and 27 percent respectively, but much of that growth was attributable to large deals announced just days after each quarter ended, with some revenues attributed to the just-ended quarter.<sup>9</sup> In a more elaborate variant of this strategy, two technology firms, both of which need to boost revenues, can enter into a transaction swapping revenues.
- *Capitalize operating expenses.* Just as with revenue recognition, firms are given some discretion in whether they classify expenses as operating or capital expenses, especially for items like software R&D. AOL's practice of capitalizing and writing off the cost of the CDs and disks it provided with magazines, for instance, allowed it to report positive earnings through much of the late 1990s.
- *Write-offs.* A major restructuring charge can result in lower income in the current period, but it provides two benefits to the firm taking it. Since operating earnings are reported both before and after the restructuring charge, it allows the firm to separate the expense from operations. It also makes beating earnings easier in future quarters. To see how restructuring can boost earnings, consider the case of IBM. By writing off old plants in the year they are closed, IBM was able to drop depreciation expenses to 5 percent of revenue in 1996 from an average of 7 percent in 1990–1994. The difference, in 1996 revenue, was \$1.64 billion, or 18 percent of the company's \$9.02 billion in pretax profit last year. Technology firms have been particularly adept at writing off a large portion of acquisition costs as “in-process R&D” to register increases in earnings in subsequent quarters. Lev and Deng (1997) studied 389 firms that wrote off in-process R&D between 1990 and 1996<sup>10</sup>; these write-offs amounted, on average, to 72 percent of the purchase price on these acquisitions, and increased the acquiring firm's earnings 22 percent in the fourth quarter after the acquisition.
- *Use reserves.* Firms are allowed to build up reserves for bad debts, product returns, and other potential losses. Some firms are conservative in their estimates in good years, and use the excess reserves that they have built up during these years to smooth out earnings in other years.
- *Income from investments.* Firms with substantial holdings of marketable securities or investments in other firms often have these investments recorded on their books at values well below their market values. Thus, liquidating these investments can result in large capital gains which can boost income in the period.

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<sup>9</sup>*Forbes* magazine carried an article on March 6, 2000, on MicroStrategy, with this excerpt: “On Oct. 4 MicroStrategy and NCR announced what they described as a \$52.5 million licensing and technology agreement. NCR agreed to pay MicroStrategy \$27.5 million to license its software. MicroStrategy bought an NCR unit which had been a competitor for what was then \$14 million in stock, and agreed to pay \$11 million in cash for a data warehousing system. Microstrategy reported \$17.5 million of the licensing money as revenue in the third quarter, which had closed four days earlier.”

<sup>10</sup>Only three firms wrote off in-process R&D during the prior decade (1980–1989).

**Adjustments to Income** To the extent that firms manage earnings, you have to be cautious about using the current year's earnings as a base for projections. This section will consider a series of adjustments that we might need to make to stated earnings before using the number as a basis for projections. We will begin by considering the often subtle differences between one-time, recurring, and unusual items. We will follow up by examining how best to deal with the debris left over by acquisition accounting. Then we will consider how to deal with income from holdings in other companies and investments in marketable securities. Finally, we will look at a series of tests that may help us gauge whether the reported earnings of a firm are reliable indicators of its true earnings.

**Extraordinary, Recurring, and Unusual Items** The rule for estimating both operating and net income is simple. The operating income that is used as a base for projections should reflect continuing operations and should not include any items that are one-time or extraordinary. Putting this statement to practice is often a challenge because there are four types of extraordinary items:

1. *One-time expense or income that is truly one-time.* A large restructuring charge that has occurred only once in the past 10 years would be a good example. These expenses can be backed out of the analysis and the operating and net income calculated without them.
2. *Expenses and income that do not occur every year but seem to recur at regular intervals.* Consider, for instance, a firm that has taken a restructuring charge every 3 years for the past 12 years. While not conclusive, this would suggest that the extraordinary expenses are really ordinary expenses that are being bundled by the firm and taken once every three years. Ignoring such an expense would be dangerous because the expected operating income in future years would be overstated. What would make sense would be to take the expense and spread it out on an annual basis. Thus, if the restructuring expense every three years has amounted to \$1.5 billion, on average, the operating income for the current year should be reduced by \$0.5 billion to reflect the annual charge due to this expense.
3. *Expenses and income that recur every year but with considerable volatility.* The best way to deal with such items is to normalize them by averaging the expenses across time and reducing this year's income by this amount.
4. *Items that recur every year that change signs—positive in some years and negative in others.* Consider, for instance, the effect of foreign currency translations on income. For a firm in the United States, the effect may be negative in years in which the dollar gets stronger and positive in years in which the dollar gets weaker. The most prudent thing to do with these expenses would be to ignore them.

To differentiate between these items requires that you have access to a firm's financial history. For young firms, this may not be available, making it more difficult to draw the line between expenses that should be ignored, expenses that should be normalized and expenses that should be considered in full.

**Adjusting for Acquisitions and Divestitures** Acquisition accounting can wreak havoc on reported earnings for years after an acquisition. The most common by-

product of acquisitions, if purchase accounting is used, is the amortization of goodwill. This amortization can reduce reported net income in subsequent periods, though operating income should be unaffected. Should we consider amortization to be an operating expense? We think not, since it is both a noncash and often a non-tax-deductible charge. The safest route to follow with goodwill amortization is to look at earnings prior to the amortization.

In recent years, technology companies have used an unusual ploy to get the goodwill created when a premium is paid over book value off their books. Using the argument that the bulk of the market value paid for technology companies comes from the value of the research done by the firm over time, they have written off what they called in-process R&D to preserve consistency. After all, they argue, the R&D they do internally is expensed. As with amortization of goodwill, writing off in-process R&D creates a noncash and non-tax-deductible charge and we should look at earnings prior to their write-off.

When firms divest assets, they can generate income in the form of capital gains. Infrequent divestitures can be treated as one-time items and ignored, but some firms divest assets on a regular basis. For such firms, it is best to ignore the income associated with the divestiture, but to consider the cash flows associated with divestiture, net of capital gains taxes, when estimating net capital expenditures. For instance, a firm with \$500 million in capital expenditures, \$300 million in depreciation, and \$120 million in divestitures every year would have a net capital expenditure of \$80 million.

$$\begin{aligned}\text{Net capital expenditures} &= \text{Capital expenditures} - \text{Depreciation} - \text{Divestiture proceeds} \\ &= \$500 - \$300 - \$120 = \$80 \text{ million}\end{aligned}$$

**Income from Investments and Cross Holdings** Investments in marketable securities generate two types of income. The first takes the form of interest or dividends and the second is the capital gains (losses) associated with selling securities at prices that are different from their cost bases. In the 1990s, when the stock market was booming, several technology firms used the latter to augment income and beat analyst estimates. In our view, neither type of income should be considered part of the earnings used in valuation for any firm other than a financial service firm that defines its business as the buying and selling of securities (such as a hedge fund). The interest earned on marketable securities should be ignored when valuing the firm, since it is far easier to add the market value of these securities at the end of the process rather than mingle them with other assets. For instance, assume that you have a firm that generates \$100 million in after-tax cash flows, but also assume that 20 percent of these cash flows come from holdings of marketable securities with a current market value of \$500 million. The remaining 80 percent of the cash flows come operating assets, these cash flows are expected to grow at 5 percent a year in perpetuity, and the cost of capital (based on the risk of these assets) is 10 percent. The value of this firm can be most easily estimated as follows:

Value of operating assets of the firm = $\$80(1.05)/(.10 - .05)$	\$1,680 million
Value of marketable securities	\$ 500 million
Value of firm	\$2,180 million



If we had chosen to discount the entire after-tax cash flow of \$100 million, we would have had to adjust the cost of capital downward (to reflect the lower risk of the marketable securities). The adjustment, done right, should yield the same value as that estimated.<sup>11</sup> The capital gain or loss from the sale of marketable securities should be ignored for a different reason. If you incorporate this gain into your income and use it in your forecasts, you are not only counting on being able to sell your securities for higher prices each period in the future but you risk double counting the value of these securities, if you are adding them to the value of the operating assets to arrive at an estimate of value.

Firms that have a substantial number of cross holdings in other firms will often report increases or decreases to earnings reflecting these holdings. The effect on earnings will vary depending on how the holding is categorized. Chapter 3 differentiated between three classifications:

1. A minority passive holding, where only the dividends received from the holding are recorded in income.
2. A minority active interest, where the portion of the net income (or loss) from the subsidiary is shown in the income statement as an adjustment to net income (but not to operating income).
3. A majority active interest, where the income statements are consolidated and the entire operating income of the subsidiary (or holding) are shown as part of the operating income of the firm. In such cases, the net income is usually adjusted for the portion of the subsidiary owned by others (minority interests).

The safest route to take with the first two types of holdings is to ignore the income shown from the holding when valuing a firm, to value the holding separately and to add it to the value obtained for the other assets. As a simple example, consider a firm (Holding Inc.) that generates \$100 million in after-tax cash flows from its operating assets and assume that these cash flows will grow at 5 percent a year forever. In addition, assume that the firm owns 10 percent of another firm (Subsidiary Inc.) with after-tax cash flows of \$50 million growing at 4 percent a year forever. Finally, assume that the cost of capital for both firms is 10 percent. The firm value for Holding Inc. can be estimated as follows:

Value of operating assets of Holding Inc. = $100(1.05)/(.10 - .05)$	\$2,100 million
Value of operating assets of Subsidiary Inc. = $50(1.04)/(.10 - .04)$	\$ 867 million
Value of Holding Inc. = $\$2,100 + .10(867)$	\$2,187 million

When earnings are consolidated, you can value the combined firm with the consolidated income statement and then subtract out the value of the minority holdings. To do this, though, you have to assume that the two firms are in the same business and are of equivalent risk since the same cost of capital will be applied to both firm's cash flows. Alternatively, you can strip the entire operating income of the subsidiary from the consolidated operating income and follow the process just laid out to value the holding.

<sup>11</sup>This will happen only if the marketable securities are fairly priced and you are earning a fair market return on them. If they are not, you can get different values from the approaches.

**ILLUSTRATION 9.6: Adjusting Earnings for One-Time Charges**

Between 1997 and 1999, Xerox's reported earnings included a significant number of one-time, extraordinary, and unusual items. The summary of the earnings is provided in the following table:

	1999	1998	1997
Sales	\$10,346	\$10,696	\$ 9,881
Service and rentals	\$ 7,856	\$ 7,678	\$ 7,257
Finance income	\$ 1,026	\$ 1,073	\$ 1,006
<i>Total revenues</i>	<i>\$19,228</i>	<i>\$19,447</i>	<i>\$18,144</i>
Costs and expenses			
Cost of sales	\$ 5,744	\$ 5,662	\$ 5,330
Cost of service and rentals	\$ 4,481	\$ 4,205	\$ 3,778
Inventory charges	\$ 0	\$ 113	\$ 0
Equipment financing interest	\$ 547	\$ 570	\$ 520
Research and development expenses	\$ 979	\$ 1,040	\$ 1,065
SG&A expenses	\$ 5,144	\$ 5,321	\$ 5,212
Restructuring charge and asset impairment	\$ 0	\$ 1,531	\$ 0
Other, net	\$ 297	\$ 242	\$ 98
<i>Total expenses</i>	<i>\$17,192</i>	<i>\$18,684</i>	<i>\$16,003</i>
Earnings before taxes, equity income and minority interests	\$ 2,036	\$ 763	\$ 2,141
– Income taxes	\$ 631	\$ 207	\$ 728
+ Equity in net income of unconsolidated affiliates	\$ 68	\$ 74	\$ 127
– Minority interests in earnings of subsidiaries	\$ 49	\$ 45	\$ 88
<i>Net Income from continuing operations</i>	<i>\$ 1,424</i>	<i>\$ 585</i>	<i>\$ 1,452</i>
– Discontinued operations	\$ 0	\$ 190	\$ 0
<i>Net income</i>	<i>\$ 1,424</i>	<i>\$ 395</i>	<i>\$ 1,452</i>

There are a few obvious adjustments to income that represent one-time charges and a host of other issues. Let us consider first the obvious adjustments:

- The inventory charge and restructuring charges seem to represent one-time charges, though there is the possibility that they represent more serious underlying problems that can create charges in future periods. The charge for discontinued operations also affects only one year's income. These expenses should be added back to arrive at adjusted operating income and net income.
- The other (net) expenses line item is a recurring but volatile item. We would average this expense when forecasting future income.
- To arrive at adjusted net income we would also reverse the last two adjustments by subtracting out the equity in net income of subsidiaries (reflecting Xerox's minority holdings in other firms) and adding back the earnings in minority interests (reflecting minority interests in Xerox's majority holdings).

The following table adjusts the net income in each of the years for the changes suggested:

	1999	1998	1997
Net income from continuing operations	\$1,424	\$ 585	\$1,452
– Equity in net income of unconsolidated affiliates	\$ 68	\$ 74	\$ 127
+ Minority interests in earnings of subsidiaries	\$ 49	\$ 45	\$ 88
+ Restructuring charge (1 – Tax rate)	\$ 0	\$1,116	\$ 0
+ Inventory charge (1 – Tax rate)	\$ 0	\$ 82	\$ 0
+ Other, net (1 – Tax rate)	\$ 205	\$ 176	\$ 65
– Normalized other, net (1 – Tax rate)	\$ 147	\$ 155	\$ 140
Adjusted net income	\$1,463	\$1,776	\$1,338

The restructuring and inventory charges were tax deductible and the after-tax portion was added back; the tax rate was computed based on taxes paid and taxable income for that year.

$$\text{Tax rate in 1998} = \text{Taxes paid/Taxable income} = 207/763 = 27.13\%$$

We also add back the after-tax portion of the other expenses (net) and subtract out the average annual expense over the three years:

$$\text{Average annual other expenses} = (297 + 242 + 98)/3 = \$212 \text{ million}$$

Similar adjustments would need to be made to operating income. Xerox nets out interest expenses against interest income on its Capital subsidiary to report finance income. You would need to separate interest expenses from interest income to arrive at an estimate of operating income for the firm.

What are the other issues? The plethora of one-time charges suggests that there may be ongoing operational problems at Xerox that may cause future charges. In fact, it is not surprising that Xerox had to delay its 10-K filing for 2000 because of accounting issues.

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## CONCLUSION

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Financial statements remain the primary source of information for most investors and analysts. There are differences, however, in how accounting and financial analysis approach answering a number of key questions about the firm.

This chapter begins our analysis of earnings by looking at the accounting categorization of expenses into operating, financing and capital expenses. While operating and financing expenses are shown in income statements, capital expenditures are spread over several time periods and take the form of depreciation and amortization. Accounting standards misclassify operating leases and research and development expenses as operating expenses (when the former should be categorized as financing expenses and the latter as capital expenses). We suggest ways in which earnings can be corrected to better measure the impact of these items.

In the second part of the chapter, we consider the effect of one-time, nonrecurring, and unusual items on earnings. While the underlying principle is that earnings should include only normal expenses, this is put to the test by the attempts on the part of companies to move normal operating expenses into the nonrecurring column and nonoperating income into operating earnings.

**WARNING SIGNS IN EARNINGS REPORTS**

The most troubling thing about earnings reports is that we are often blindsided not by the items that get reported (such as extraordinary charges) but by the items that are hidden in other categories. We would suggest the following checklist that should be reviewed about any earnings report to gauge the possibility of such shocks:

- Is earnings growth outstripping revenue growth by a large magnitude year after year? This may well be a sign of increased efficiency, but when the differences are large and continue year after year, you should wonder about the source of these efficiencies.
- Do one-time or nonoperating charges to earnings occur frequently? The charge itself might be categorized differently each year—an inventory charge one year, a restructuring charge the next, and so on. While this may be just bad luck, it may also reflect a conscious effort by a company to move regular operating expenses into these nonoperating items.
- Do any of the operating expenses, as a percent of revenues, swing wildly from year to year? This may suggest that this expense item (say SG&A) includes nonoperating expenses that should really be stripped out and reported separately.
- Does the company manage to beat analyst estimates quarter after quarter by a cent or two? Not every company is a Microsoft. Companies that beat estimates year after year probably are involved in earnings management and are moving earnings across time periods. As growth levels off, this practice can catch up with them.
- Do a substantial proportion of the revenues come from subsidiaries or related holdings? While the sales may be legitimate, the prices set may allow the firm to move earnings from unit to the other and give a misleading view of true earnings at the firm.
- Are accounting rules for valuing inventory or depreciation changed frequently?
- Are acquisitions followed by miraculous increases in earnings? An acquisition strategy is difficult to make successful in the long term. A firm that claims instant success from such a strategy requires scrutiny.
- Is working capital ballooning out as revenues and earnings surge? This can sometimes let us pinpoint those firms that generate revenues by lending to their own customers.

None of these factors, by themselves, suggest that we lower earnings for these firms, but combinations of the factors can be viewed as a warning signal that the earnings statement needs to be held up to higher scrutiny.

## QUESTIONS AND SHORT PROBLEMS

1. Derra Foods is a specialty food retailer. In its balance sheet, the firm reports \$1 billion in book value of equity and no debt, but it has operating leases on all its stores. In the most recent year, the firm made \$85 million in operating lease payments, and its commitments to make lease payments for the next five years and beyond are:

<i>Year</i>	<i>Operating Lease Expense</i>
1	\$90 million
2	\$90 million
3	\$85 million
4	\$80 million
5	\$80 million
6–10	\$75 million annually

If the firm's current cost of borrowing is 7%, estimate the debt value of operating leases. Estimate the book value debt-to-equity ratio.

2. Assume that Derra Foods, in the preceding problem, reported earnings before interest and taxes (with operating leases expensed) of \$200 million. Estimate the adjusted operating income, assuming that operating leases are capitalized.
3. FoodMarkets Inc. is a grocery chain. It reported a book debt-to-capital ratio of 10% and a return on capital of 25% on a book value of capital invested of \$1 billion. Assume that the firm has significant operating leases. If the operating lease expense in the current year is \$100 million and the present value of lease commitments is \$750 million, reestimate FoodMarkets' debt to capital and return on capital. (You can assume a pretax cost of debt of 8%.)
4. Zif Software is a firm with significant research and development expenses. In the most recent year, the firm had \$100 million in R&D expenses. R&D expenses are amortizable over five years, and over the past five years they are:

<i>Year</i>	<i>R&amp;D Expenses</i>
–5	\$ 50 million
–4	\$ 60 million
–3	\$ 70 million
–2	\$ 80 million
–1	\$ 90 million
Current year	\$100 million

Assuming a linear amortization schedule (over five years), estimate:

- a. The value of the research asset.
  - b. The amount of R&D amortization this year.
  - c. The adjustment to operating income.
5. Stellar Computers has a well-earned reputation for earning a high return on capital. The firm had a return on capital of 100% on capital invested of \$1.5 billion, in 1999. Assume that you have estimated the value of the research asset to be \$1 billion. In addition, the R&D expense this year is \$250 million, and the amortization of the research asset is \$150 million. Reestimate Stellar Computers' return on capital.

## From Earnings to Cash Flows

**T**he value of an asset comes from its capacity to generate cash flows. When valuing a firm, these cash flows should be after taxes, prior to debt payments and after reinvestment needs. When valuing equity, the cash flows should also be after debt payments. There are thus three basic steps to estimating these cash flows. The first is to estimate the earnings generated by a firm on its existing assets and investments, a process we examined in the preceding chapter. The second step is to estimate the portion of this income that would go toward taxes. The third is to develop a measure of how much a firm is reinvesting back for future growth.

This chapter will examine the last two steps. It will begin by investigating the difference between effective and marginal taxes, as well as the effects of substantial net operating losses carried forward. To examine how much a firm is reinvesting, we will break it down into reinvestment in tangible and long-lived assets (net capital expenditures) and short-term assets (working capital). We will use a much broader definition of reinvestment to include investments in R&D and acquisitions as part of capital expenditures.

### THE TAX EFFECT

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To compute the after-tax operating income, you multiply the earnings before interest and taxes by an estimated tax rate. This simple procedure can be complicated by three issues that often arise in valuation. The first is the wide differences you observe between effective and marginal tax rates for these firms, and the choice you face between the two in valuation. The second issue arises usually with firms with large losses, leading to net operating losses that are carried forward and can save taxes in future years. The third issue arises from the capitalizing of research and development and other expenses. The fact that these expenditures can be expensed immediately lead to much higher tax benefits for the firm.

### Effective versus Marginal Tax Rate

You are faced with a choice of several different tax rates. The most widely reported tax rate in financial statements is the effective tax rate, which is computed from the reported income statement as follows:

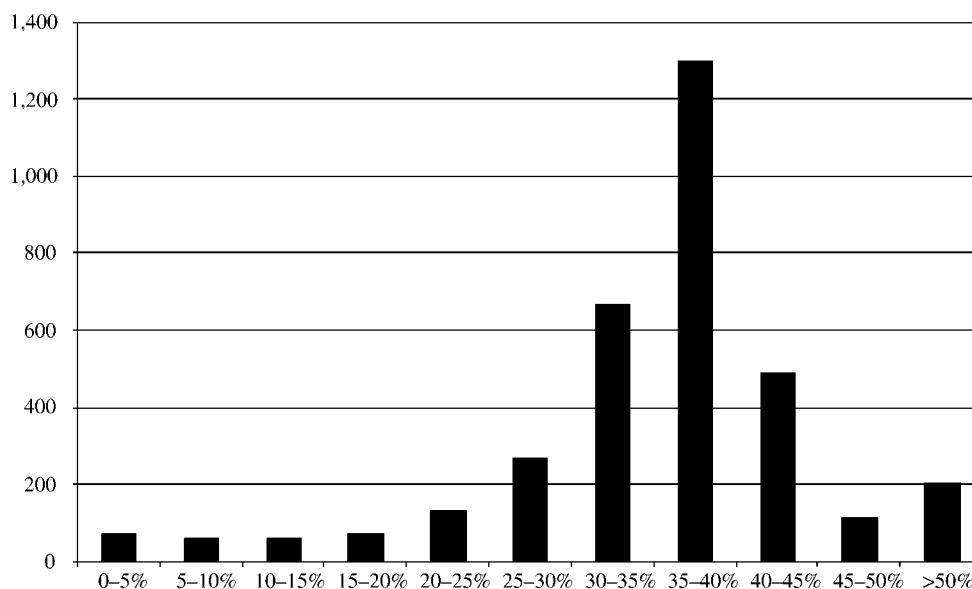
$$\text{Effective tax rate} = \text{Taxes due} / \text{Taxable income}$$

The second choice on tax rates is the marginal tax rate, which is the tax rate the firm faces on its last dollar of income. This rate depends on the tax code and reflects what firms have to pay as taxes on their marginal income. In the United States, for instance, the federal corporate tax rate on marginal income is 35 percent; with the addition of state and local taxes, most firms face a marginal corporate tax rate of 40 percent or higher.

While the marginal tax rates for most firms in the United States should be fairly similar, there are wide differences in effective tax rates across firms. Figure 10.1 provides a distribution of effective tax rates for firms in the United States in January 2001. Note that a number of firms report effective tax rates of less than 10 percent as well as that a number of firms have effective tax rates that exceed 50 percent. In addition, it is worth noting that this figure does not include about 2,000 firms that did not pay taxes during the most recent financial year or that have a negative effective tax rate.<sup>1</sup>

**Reasons for Differences between Marginal and Effective Tax Rates** Given that most of the taxable income of publicly traded firms is at the highest marginal tax bracket, why would a firm's effective tax rate be different from its marginal tax rate? There are at least three reasons:

1. Many firms, at least in the United States, follow different accounting standards for tax and for reporting purposes. For instance, firms often use straight line depreciation for reporting purposes and accelerated depreciation for tax pur-



**FIGURE 10.1** Effective Tax Rates for U.S. Firms: January 2001

Source: Value Line.

<sup>1</sup>A negative effective tax rate usually arises because a firm is reporting an income in its tax books (on which it pays taxes) and a loss in its reporting books.

poses. As a consequence, the reported income is significantly higher than the taxable income, on which taxes are based.<sup>2</sup>

2. Firms sometimes use tax credits to reduce the taxes they pay. These credits, in turn, can reduce the effective tax rate below the marginal tax rate.
3. Finally, firms can sometimes defer taxes on income to future periods. If firms defer taxes, the taxes paid in the current period will be at a rate lower than the marginal tax rate. In a later period, however, when the firm pays the deferred taxes, the effective tax rate will be higher than the marginal tax rate.

**Marginal Tax Rates for Multinationals** When a firm has global operations, its income is taxed at different rates in different locales. When this occurs, what is the marginal tax rate for the firm? There are three ways in which we can deal with different tax rates.

1. The first is to use a weighted average of the marginal tax rates, with the weights based on the income derived by the firm from each of these countries. The problem with this approach is that the weights will change over time, if income is growing at different rates in different countries.
2. The second is to use the marginal tax rate of the country in which the company is incorporated, with the implicit assumption being that the income generated in other countries will eventually have to be repatriated to the country of origin, at which point the firm will have to pay the marginal tax rate.
3. The third and safest approach is to keep the income from each country separate and apply a different marginal tax rate to each income stream.

**Effects of Tax Rate on Value** In valuing a firm, should you use the marginal or the effective tax rates? If the same tax rate has to be applied to earnings every period, the safer choice is the marginal tax rate, because none of the three reasons noted can be sustained in perpetuity. As new capital expenditures taper off, the difference between reported and tax income will narrow; tax credits are seldom perpetual and firms eventually do have to pay their deferred taxes. There is no reason, however, why the tax rates used to compute the after-tax cash flows cannot change over time. Thus, in valuing a firm with an effective tax rate of 24 percent in the current period and a marginal tax rate of 35 percent, you can estimate the first year's cash flows using the marginal tax rate of 24 percent and then increase the tax rate to 35 percent over time. It is critical that the tax rate used in perpetuity to compute the terminal value be the marginal tax rate.

When valuing equity, we often start with net income or earnings per share, which are after-tax earnings. While it looks like we can avoid dealing with the estimating of tax rates when using after-tax earnings, appearances are deceptive. The current after-tax earnings of a firm reflect the taxes paid this year. To the extent that tax planning or deferral caused this payment to be very low (low effective tax rates) or very high (high effective tax rates), we run the risk of assuming that the firm can continue to do this in the future if we do not adjust the net income for changes in the tax rates in future years.

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<sup>2</sup>Since the effective tax rate is based on the taxes paid (which comes from the tax statement) and the reported income, the effective tax rate will be lower than the marginal tax rate for firms that change accounting methods to inflate reported earnings.



**ILLUSTRATION 10.1: Effect of Tax Rate Assumptions on Value**

Convoy Inc. is a telecommunications firm that generated \$150 million in pretax operating income and reinvested \$30 million in the most recent financial year. As a result of tax deferrals, the firm has an effective tax rate of 20%, while its marginal tax rate is 40%. Both the operating income and the reinvestment are expected to grow 10% a year for five years, and 5% thereafter. The firm's cost of capital is 9% and is expected to remain unchanged over time. We will estimate the value of Convoy using three different assumptions about tax rates—the effective tax rate forever, the marginal tax rate forever, and an approach that combines the two rates.

**APPROACH 1: Effective Tax Rate Forever**

We first estimate the value of Convoy assuming that the tax rate remains at 20% forever:

<i>Tax Rate</i>	<i>20% Current Year</i>	<i>20% 1</i>	<i>20% 2</i>	<i>20% 3</i>	<i>20% 4</i>	<i>20% 5</i>	<i>20% Terminal Year</i>
EBIT	\$150.00	\$165.00	\$181.50	\$199.65	\$219.62	\$241.58	\$253.66
EBIT(1 – t)	\$120.00	\$132.00	\$145.20	\$159.72	\$175.69	\$193.26	\$202.92
– Reinvestment	\$ 30.00	\$ 33.00	\$ 36.30	\$ 39.93	\$ 43.92	\$ 48.32	\$ 50.73
Free cash flow to firm (FCFF)	\$ 90.00	\$ 99.00	\$108.90	\$119.79	\$131.77	\$144.95	\$152.19
Terminal value						\$3,804.83	
Present value		\$ 90.83	\$ 91.66	\$ 92.50	\$ 93.35	\$2,567.08	
Firm value	\$2,935.42						

This value is based on the implicit assumption that deferred taxes will never have to be paid by the firm.

**APPROACH 2: Marginal Tax Rate Forever**

We next estimate the value of Convoy assuming that the tax rate is the marginal tax rate of 40% forever:

<i>Tax Rate</i>	<i>20% Current Year</i>	<i>40% 1</i>	<i>40% 2</i>	<i>40% 3</i>	<i>40% 4</i>	<i>40% 5</i>	<i>40% Terminal Year</i>
EBIT	\$150.00	\$165.00	\$181.50	\$199.65	\$219.62	\$241.58	\$253.66
EBIT(1 – t)	\$120.00	\$ 99.00	\$108.90	\$119.79	\$131.77	\$144.95	\$152.19
– Reinvestment	\$ 30.00	\$ 33.00	\$ 36.30	\$ 39.93	\$ 43.92	\$ 48.32	\$ 50.73
FCFF	\$ 90.00	\$ 66.00	\$ 72.60	\$ 79.86	\$ 87.85	\$ 96.63	\$101.46
Terminal value						\$2,536.55	
Present value		\$ 60.55	\$ 61.11	\$ 61.67	\$ 62.23	\$1,711.39	
Firm value	\$1,956.94						

This value is based on the implicit assumption that the firm cannot defer taxes from this point on. In fact, an even more conservative reading would suggest that we should reduce this value by the amount of the cumulated deferred taxes from the past. Thus, if the firm has \$200 million in deferred taxes from prior years, and expects to pay these taxes over the next four years in equal annual installments of \$50 million, we would first compute the present value of these tax payments:

Present value of deferred tax payments = \$50 million(PV of annuity, 9%, 4 years) = \$161.99 million

The value of the firm would then be \$1,794.96 million.

Firm value after deferred taxes = \$1,956.94 – \$161.99 million = \$1,794.96 million

**APPROACH 3: Blended Tax Rates**

In the final approach, we will assume that the effective tax will remain 20% for five years and we will use the marginal tax rate to compute the terminal value:

<i>Tax Rate</i>	<i>20% Current Year</i>	<i>20% 1</i>	<i>20% 2</i>	<i>20% 3</i>	<i>20% 4</i>	<i>20% 5</i>	<i>40% Terminal Year</i>
EBIT	\$150.00	\$165.00	\$181.50	\$199.65	\$219.62	\$241.58	\$253.66
EBIT(1 – t)	\$120.00	\$132.00	\$145.20	\$159.72	\$175.69	\$193.26	\$152.19
– Reinvestment	\$ 30.00	\$ 33.00	\$ 36.30	\$ 39.93	\$ 43.92	\$ 48.32	\$ 50.73
FCFF	\$ 90.00	\$ 99.00	\$108.90	\$119.79	\$131.77	\$144.95	\$101.46
Terminal value						\$2,536.55	
Present value		\$ 90.83	\$ 91.66	\$ 92.50	\$ 93.35	\$1,742.79	
Firm value	\$2,111.12						

Note, however, that the use of the effective tax rate for the first five years will increase the deferred tax liability to the firm. Assuming that the firm ended the current year with a cumulated deferred tax liability of \$200 million, we can compute the deferred tax liability by the end of the fifth year:

$$\begin{aligned}\text{Expected deferred tax liability} &= \$200 + (\$165 + \$181.5 + \$199.65 + \$219.62 + \$241.58) \\ &\quad \times (.40 - .20) = \$401.47 \text{ million}\end{aligned}$$

We will assume that the firm will pay this deferred tax liability after year 5, but spread the payments over 10 years, leading to a present value of \$167.45 million.

$$\begin{aligned}\text{Present value of deferred tax payments} &= (\$401.47/10)(\text{PV of annuity, 9\%, 10 years})/1.09^5 \\ &= \$167.45 \text{ million}\end{aligned}$$

Note that the payments do not start until the sixth year, and hence get discounted back an additional five years. The value of the firm can then be estimated:

$$\text{Value of firm} = \$2,111.12 - \$167.45 = \$1,943.67 \text{ million}$$



**taxrate.xls:** This dataset on the Web summarizes average effective tax rates by industry group in the United States for the most recent quarter.

**Effect of Net Operating Losses**

For firms with large net operating losses carried forward or continuing operating losses, there is the potential for significant tax savings in the first few years that they generate positive earnings. There are two ways of capturing this effect.

One is to change tax rates over time. In the early years, these firms will have a zero tax rate, as losses carried forward offset income. As the net operating losses decrease, the tax rates will climb toward the marginal tax rate. As the tax rates used to estimate the after-tax operating income change, the rates used to compute the after-tax cost of debt in the cost of capital computation also need to change. Thus, for a firm with net operating losses carried forward, the tax rate used for both the computation of after-tax operating income and cost of capital will be zero during the years when the losses shelter income.

The other approach is often used when valuing firms that already have positive earnings but have a large net operating loss carried forward. Analysts will often value the firm, ignoring the tax savings generated by net operating losses, and then add to this amount the expected tax savings from net operating losses. Often, the expected tax savings are estimated by multiplying the tax rate by the net operating loss. The limitation of doing this is that it assumes that the tax savings are both guaranteed and instantaneous. To the extent that firms have to generate earnings to create these tax savings, and there is uncertainty about earnings, it will over estimate the value of the tax savings.

There are two final points that need to be made about operating losses. To the extent that a potential acquirer can claim the tax savings from net operating losses sooner than the firm generating these losses, there can be potential for tax synergy that we will examine in the chapter on acquisitions. The other is that there are countries where there are significant limitations in how far forward operating losses can be taken. If this is the case, the value of these net operating losses may be reduced.

#### ILLUSTRATION 10.2: The Effect of Net Operating Loss on Value: Commerce One

This illustration considers the effect of both net operating losses (NOLs) carried forward and expected losses in future periods on the tax rate for Commerce One, a pioneer in the B2B business, in 2001. Commerce One reported an operating loss of \$340 million in 2000 and had an accumulated net operating loss of \$454 million by the end of that year.

While things do look bleak for the firm, we will assume that revenues will grow significantly over the next decade and that the firm's operating margin will converge on the industry average of 16.36% for mature business service firms. The following table summarizes our projections of revenues and operating income for Commerce One for the next 10 years:

Year	Revenues	Operating Income or Loss	NOL at End of Year	Taxable Income	Taxes	Tax Rate
Current	\$ 402	-\$ 340	\$454	\$ 0	\$ 0	0.00%
1	\$ 603	-\$ 206	\$660	\$ 0	\$ 0	0.00%
2	\$ 1,205	-\$ 107	\$767	\$ 0	\$ 0	0.00%
3	\$ 2,170	\$ 81	\$686	\$ 0	\$ 0	0.00%
4	\$ 3,472	\$ 349	\$337	\$ 0	\$ 0	0.00%
5	\$ 4,860	\$ 642	\$ 0	\$ 305	\$107	16.63%
6	\$ 6,561	\$ 970	\$ 0	\$ 970	\$339	35.00%
7	\$ 8,530	\$1,328	\$ 0	\$1,328	\$465	35.00%
8	\$10,236	\$1,634	\$ 0	\$1,634	\$572	35.00%
9	\$11,259	\$1,820	\$ 0	\$1,820	\$637	35.00%
10	\$11,822	\$1,922	\$ 0	\$1,922	\$673	35.00%

Note that Commerce One continues to lose money over the next two years, and adds to its net operating losses. In years 3 and 4, its operating income is positive but it still pays no taxes because of its accumulated net operating losses from prior years. In year 5, it is able to reduce its taxable income by the remaining net operating loss (\$337 million), but it begins paying taxes for the first time. We will assume a 35% tax rate and use this as our marginal tax rate beyond year 5. The benefits of the net operating losses are thus built into the cash flows and the value of the firm.

### The Tax Benefits of R&D Expensing

The preceding chapter argued that R&D expenses should be capitalized. If we decide to do so, there is a tax benefit that we might be missing. Firms are allowed to deduct their entire R&D expense for tax purposes. In contrast, they are allowed to deduct only the depreciation on their capital expenses. To capture the tax benefit, therefore, you would add the tax savings on the difference between the entire R&D expense and the amortized amount of the research asset to the after-tax operating income of the firm:

$$\text{Additional tax benefit}_{\text{R\&D expensing}} = (\text{Current year's R\&D expense} - \text{Amortization of research asset}) \times \text{Tax rate}$$

A similar adjustment would need to be made for any other operating expense that you choose to capitalize. In Chapter 9, we noted that the adjustment to pretax operating income from capitalizing R&D:

$$\text{Adjusted operating earnings} = \text{Operating earnings} + \text{Current year's R\&D expense} - \text{Amortization of research asset}$$

To estimate the after-tax operating income, we would multiply this value by  $(1 - \text{Tax rate})$  and add on the additional tax benefit from above:

$$\begin{aligned} \text{Adjusted after-tax operating earnings} &= (\text{Operating earnings} \\ &\quad + \text{Current year's R\&D expense} \\ &\quad - \text{Amortization of research asset}) \\ &\quad \times (1 - \text{Tax rate}) \\ &\quad + (\text{Current year's R\&D expense} \\ &\quad - \text{Amortization of research asset}) \times \text{Tax rate} \\ &= \text{Operating earnings}(1 - \text{Tax rate}) \\ &\quad + \text{Current year's R\&D expense} \\ &\quad - \text{Amortization of research asset} \end{aligned}$$

In other words, the tax benefit from R&D expensing allows us to add the difference between R&D expense and amortization directly to the after-tax operating income (and to net income).

#### ILLUSTRATION 10.3: Tax Benefit from Expensing: Amgen in 2001

In Chapter 9, we capitalized R&D expenses for Amgen and estimated the value of the research asset to Amgen and adjusted operating income. Reviewing Illustration 9.2, we see the following adjustments:

Current year's R&D expense = \$845 million

Amortization of research asset this year = \$398 million

To estimate the tax benefit from expensing for Amgen, first assume that the tax rate for Amgen is 35% and note that Amgen can deduct the entire \$845 million for tax purposes:

$$\text{Tax deduction from R\&D expense} = \text{R\&D} \times \text{Tax rate} = 845 \times .35 = \$295.75 \text{ million}$$

If only the amortization had been eligible for a tax deduction in 2000, the tax benefit would have been:

$$\text{Tax deduction from R\&D amortization} = \$398 \text{ million} \times .35 = \$139.30 \text{ million}$$

By expensing instead of capitalizing, Amgen was able to derive a much larger tax benefit (\$295.75 million versus \$139.30 million). The differential tax benefit can be written as:

$$\text{Differential tax benefit} = \$295.75 - \$139.30 = \$156.45 \text{ million}$$

Thus, Amgen derives a tax benefit of \$156 million because it can expense R&D expenses rather than capitalize them. Completing the analysis, we computed the adjusted after-tax operating income for Amgen. Note that in Illustration 9.2, we estimated the adjusted pretax operating income to be the following:

$$\begin{aligned}\text{Adjusted pretax operating earnings} &= \text{Operating earnings} + \text{Current year's R\&D expense} \\ &\quad - \text{Amortization of research asset} \\ &= 1,549 + 845 - 398 = \$1,996 \text{ million}\end{aligned}$$

The adjusted after-tax operating income can be written as follows:

$$\begin{aligned}\text{Adjusted after-tax operating earnings} &= \text{After-tax operating earnings} + \text{Current year's R\&D expense} \\ &\quad - \text{Amortization of research asset} \\ &= 1,549(1 - .35) + 845 - 398 = \$1,454 \text{ million}\end{aligned}$$


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**Tax Books and Reporting Books** It is no secret that many firms in the United States maintain two sets of books—one for tax purposes and one for reporting purposes—and that this practice not only is legal but also is widely accepted. While the details vary from company to company, the income reported to stockholders generally is much higher than the income reported for tax purposes. When valuing firms, we generally have access only to the former and not the latter and this can affect our estimates in a number of ways:

- Dividing the taxes paid, which is computed on the tax income, by the reported income, which is generally much higher, will yield a tax rate that is lower than the true tax rate. If we use this tax rate as the forecasted tax rate, we could overvalue the company. This is another reason for shifting to marginal tax rates in future periods.
- If we base the projections on the reported income, we will overstate expected future income. The effect on cash flows is likely to be muted. To see why, consider one very common difference between reporting and tax income: Straight-line depreciation is used to compute the former and accelerated depreciation is used for the latter. Since we add depreciation back to after-tax income to get to cash flows, the drop in depreciation will offset the increase in earnings. The problem, however, is that we understate the tax benefits from depreciation.
- Some companies capitalize expenses for reporting purposes (and depreciating them in subsequent periods) but expense them for tax purposes. Here again, using the income and the capital expenditures from reporting books will result in an understatement of the tax benefits from the expensing.

Thus the problems created by firms having different standards for tax and accounting purposes are much greater if we focus on reported earnings (as is the case when we use earnings multiples) than when we use cash flows. If we did have a choice, however, we would base our valuations on the tax books rather than the reporting books.

### DEALING WITH TAX SUBSIDIES

Firms sometimes obtain tax subsidies from the government for investing in specified areas or types of businesses. These tax subsidies can either take the form of reduced tax rates or tax credits. Either way, these subsidies should increase the value of the firm. The question, of course, is how best to build in the effects into the cash flows. Perhaps the simplest approach is to first value the firm, ignoring the tax subsidies, and to then add on the value increment from the subsidies.

For instance, assume that you are valuing a pharmaceutical firm with operations in Puerto Rico, which entitle the firm to a tax break in the form of a lower tax rate on the income generated from these operations. You could value the firm using its normal marginal tax rate, and then add to that value the present value of the tax savings that will be generated by the Puerto Rican operations. There are three advantages with this approach:

1. It allows you to isolate the tax subsidy and consider it only for the period over which you are entitled to it. When the effects of these tax breaks are consolidated with other cash flows, there is a danger that they can be viewed as perpetuities.
2. The discount rate used to compute the tax breaks can be different from the discount rate used on the other cash flows of the firm. Thus, if the tax break is a guaranteed tax credit by the government, you could use a much lower discount rate to compute the present value of the cash flows.
3. Building on the theme that there are few free lunches, it can be argued that governments provide tax breaks for investments only because firms are exposed to higher costs or more risk in these investments. By isolating the value of the tax breaks, firms can then consider whether the trade off operates in their favor. For example, assume that you are a sugar manufacturer that is offered a tax credit by the government for being in the business. In return, the government imposes sugar price controls. The firm can compare the value created by the tax credit with the value lost because of the price controls and decide whether it should fight to preserve its tax credit.

## REINVESTMENT NEEDS

The cash flow to the firm is computed after reinvestments. Two components go into estimating reinvestment. The first is net capital expenditures, which is the difference between capital expenditures and depreciation. The other is investments in non-cash working capital.

### Net Capital Expenditures

In estimating net capital expenditures, we generally deduct depreciation from capital expenditures. The rationale is that the positive cash flows from depreciation

pay for at least a portion of capital expenditures, and that it is only the excess that represents a drain on the firm's cash flows. While information on capital spending and depreciation are usually easily accessible in most financial statements, forecasting these expenditures can be difficult for three reasons. The first is that firms often incur capital spending in chunks—a large investment in one year can be followed by small investments in subsequent years. The second is that the accounting definition of capital spending does not incorporate those capital expenses that are treated as operating expenses such as R&D expenses. The third is that acquisitions are not classified by accountants as capital expenditures. For firms that grow primarily through acquisition, this will result in an understatement of the net capital expenditures.

**Lumpy Capital Expenditures and the Need for Smoothing** Firms seldom have smooth capital expenditure streams. Firms can go through periods when capital expenditures are very high (as is the case when a new product is introduced or a new plant built), followed by periods of relatively light capital expenditures. Consequently, when estimating the capital expenditures to use for forecasting future cash flows, you should normalize capital expenditures. There are at least two ways in which you can normalize capital expenditures.

The simplest normalization technique is to average capital expenditures over a number of years. For instance, you could estimate the average capital expenditures over the last four or five years for a manufacturing firm and use that number rather than the capital expenditures from the most recent year. By doing so, you could capture the fact that the firm may invest in a new plant every four years. If instead, you had used the capital expenditures from the most recent year, you would either have over estimated capital expenditures (if the firm built a new plant that year) or under estimated it (if the plant had been built in an earlier year).

There are two measurement issues that you will need to confront. One relates to the number of years of history that you should use. The answer will vary across firms and will depend on how infrequently the firm makes large investments. The other is on the question of whether averaging capital expenditures over time requires us to average depreciation as well. Since depreciation is spread out over time, the need for normalization should be much smaller. In addition, the tax benefits received by the firm reflect the actual depreciation in the most recent year, rather than an average depreciation over time. Unless depreciation is as volatile as capital expenditures, it makes more sense to leave depreciation untouched.

For firms with a limited history or firms that have changed their business mix over time, averaging over time is either not an option or will yield numbers that are not indicative of its true capital expenditure needs. For these firms, industry averages for capital expenditures are an alternative. Since the sizes of firms can vary across an industry, the averages are usually computed with capital expenditures as a percent of a base input—revenues and total assets are common choices. We prefer to look at capital expenditures as a percent of depreciation, and average this statistic for the industry. In fact, if there are enough firms in the sample, you could look at the average for a subset of firms that are at the same stage of the life cycle as the firm being analyzed.

**ILLUSTRATION 10.4: Estimating Normalized Net Capital Expenditures: Reliance Industries**

Reliance Industries is one of India's largest firms and is involved in a multitude of businesses ranging from chemicals to textiles. The firm makes substantial investments in these businesses, and the following table summarizes the capital expenditures and depreciation for the period 1997 to 2000:

<i>Year</i>	<i>Capital Expenditures</i>	<i>Depreciation</i>	<i>Net Capital Expenditures</i>
1997	INR 24,077	INR 4,101	INR 19,976
1998	INR 23,247	INR 6,673	INR 16,574
1999	INR 18,223	INR 8,550	INR 9,673
2000	INR 21,118	INR 12,784	INR 8,334
Average	INR 21,666	INR 8,027	INR 13,639

The firm's capital expenditures have been volatile, but its depreciation has been trending upward. There are two ways in which we can normalize the net capital expenditures. One is to take the average net capital expenditure over the four year period, which would result in net capital expenditures of INR 13,639 million. The problem with doing this, however, is that the depreciation implicitly being used in the calculation is INR 8,027 million, which is well below the actual depreciation of INR 12,784. A better way to normalize capital expenditures is to use the average capital expenditure over the four-year period (INR 21,166) and depreciation from the current year (INR 12,784) to arrive at a normalized net capital expenditure value:

$$\text{Normalized net capital expenditures} = 21,166 - 12,784 = \text{INR } 8,382 \text{ million}$$

Note that the normalization did not make much difference in this case because the actual net capital expenditures in 2000 amounted to INR 8,334 million.

**Capital Expenses Treated as Operating Expenses** In Chapter 9, we discussed the capitalization of expenses such as R&D and personnel training, where the benefits last over multiple periods, and examined the effects on earnings. There should also clearly be an impact on our estimates of capital expenditures, depreciation, and, consequently, net capital expenditures.

- If we decide to recategorize some operating expenses as capital expenses, we should treat the current period's value for this item as a capital expenditure. For instance, if we decide to capitalize R&D expenses, the amount spent on R&D in the current period has to be added to capital expenditures.

$$\begin{aligned} \text{Adjusted capital expenditures} &= \text{Capital expenditures} \\ &\quad + \text{R\&D expenses in current period} \end{aligned}$$

- Since capitalizing an operating expense creates an asset, the amortization of this asset should be added to depreciation for the current period. Thus, capitalizing R&D creates a research asset, which generates an amortization in the current period.

$$\begin{aligned} \text{Adjusted depreciation and amortization} &= \text{Depreciation and amortization} \\ &\quad + \text{Amortization of the research asset} \end{aligned}$$



- If we are adding the current period's expense to the capital expenditures and the amortization of the asset to the depreciation, the net capital expenditures of the firm will increase by the difference between the two:

$$\begin{aligned}\text{Adjusted net capital expenditure} &= \text{Net capital expenditures} \\ &\quad + \text{R\&D expenses in current period} \\ &\quad - \text{Amortization of the research asset}\end{aligned}$$

Note that the adjustment that we make to net capital expenditure mirrors the adjustment we make to operating income. Since net capital expenditures are subtracted from after-tax operating income, we are, in a sense, nullifying the impact on cash flows of capitalizing R&D.

#### ILLUSTRATION 10.5: Effect of Capitalizing R&D: Amgen

In Illustration 9.2 we capitalized Amgen's R&D expense and created a research asset. In Illustration 10.2 we considered the additional tax benefit generated by the fact that a company can expense the entire amount. In this illustration, we complete the analysis by looking at the impact of capitalization on net capital expenditures.

Reviewing the numbers again, Amgen had an R&D expense of \$845 million in 2000. Capitalizing the R&D expenses, using an amortizable life of 10 years, yields a value for the research asset of \$3,355 million and an amortization for the current year (2000) of \$398 million. In addition, note that Amgen reported capital expenditures of \$438 million in 2000 and depreciation and amortization amounting to \$212 million. The adjustments to capital expenditures, depreciation, and amortization and net capital expenditures are:

$$\begin{aligned}\text{Adjusted capital expenditures} &= \text{Capital expenditures} + \text{R\&D expenses in current period} \\ &= \$438 \text{ million} + \$845 \text{ million} = \$1,283 \text{ million}\end{aligned}$$

$$\begin{aligned}\text{Adjusted depreciation and amortization} &= \text{Depreciation and amortization} \\ &\quad + \text{Amortization of the research asset} \\ &= \$212 \text{ million} + \$398 \text{ million} = \$610 \text{ million}\end{aligned}$$

$$\begin{aligned}\text{Adjusted net capital expenditure} &= \text{Net capital expenditures} + \text{R\&D expenses in current period} \\ &\quad - \text{Amortization of the research asset} \\ &= (\$438 \text{ million} - \$212 \text{ million}) + \$845 \text{ million} - \$398 \text{ million} \\ &= \$673 \text{ million}\end{aligned}$$

Viewed in conjunction with the adjustment to after-tax operating income in Illustration 10.2, the change in net capital expenditure is exactly equal to the change in after-tax operating income. Capitalizing R&D thus has no effect on the free cash flow to the firm. Though the bottom-line cash flow does not change, the capitalization of R&D significantly changes the estimates of earnings and reinvestment. Thus it helps us better understand how profitable a firm is and how much it is reinvesting for future growth.

**Acquisitions** In estimating capital expenditures, we should not distinguish between internal investments (which are usually categorized as capital expenditures in cash flow statements) and external investments (which are acquisitions). The capital expenditures of a firm, therefore, need to include acquisitions. Since firms seldom make acquisitions every year, and each acquisition has a different price tag, the point about normalizing capital expenditures applies even more strongly to this item. The capital expenditure projections for a firm that makes an acquisition of \$100 million approximately every five years should therefore include about \$20 million, adjusted for inflation, every year.

Should you distinguish between acquisitions funded with cash versus those funded with stock? We do not believe so. While there may be no cash spent by a

firm in the latter case, the firm is increasing the number of shares outstanding. In fact, one way to think about stock-funded acquisitions is that the firm has skipped a step in the funding process. It could have issued the stock to the public, and used the cash to make the acquisitions. Another way of thinking about this issue is that a firm that uses stock to fund acquisitions year after year and is expected to continue to do so in the future will increase the number of shares outstanding. This, in turn, will dilute the value per share to existing stockholders.

#### ILLUSTRATION 10.6: Estimating Net Capital Expenditures: Cisco Systems in 1999

Cisco Systems increased its market value a hundredfold during the 1990s, largely based on its capacity to grow revenues and earnings at an annual rate of 60% to 70%. Much of this growth was created by acquisitions of small companies with promising technologies and Cisco's success at converting them into commercial successes. To estimate net capital expenditures for Cisco, we begin with the estimates of capital expenditure (\$584 million) and depreciation (\$486 million) in the 10-K. Based on these numbers, we would have concluded that Cisco's net capital expenditures in 1999 were \$98 million.

The first adjustment we make to this number is to incorporate the effect of research and development expenses. We used a five-year amortizable life and estimated the value of the research asset and the amortization in 1999 in the following table:

<i>Year</i>	<i>R&amp;D Expense</i>	<i>Unamortized at Year-End</i>	<i>Amortization This Year</i>
Current	\$1,594.00	100.00%	\$1,594.00
-1	\$1,026.00	80.00%	\$ 820.80
-2	\$ 698.00	60.00%	\$ 418.80
-3	\$ 399.00	40.00%	\$ 159.60
-4	\$ 211.00	20.00%	\$ 42.20
-5	\$ 89.00	0.00%	\$ —
Value of the research asset		\$3,035.40	
	Amortization this year		\$484.60

The net capital expenditures for Cisco were adjusted by adding back the R&D expenses in the most recent financial year (\$1,594 million) and subtracting the amortization of the research asset (\$485 million).

The second adjustment is to bring in the effect of acquisitions that Cisco made during the last financial year. The following table summarizes the acquisitions made during the year and the price paid on these acquisitions:

<i>Acquired</i>	<i>Method of Acquisition</i>	<i>Price Paid</i>
GeoTel	Pooling	\$1,344
Fibex	Pooling	318
Sentient	Pooling	103
American Internet Corporation	Purchase	58
Summa Four	Purchase	129
Clarity Wireless	Purchase	153
Selsius Systems	Purchase	134
PipeLinks	Purchase	118
Amteva Technologies	Purchase	159
Total		\$2,516
Dollars in millions.		

Note that both purchase and pooling transactions are included, and that the sum total of these acquisitions is added to net capital expenditures in 1999. We are assuming, given Cisco's track record, that

its acquisitions in 1999 are not unusual and reflect Cisco's reinvestment policy. The amortization associated with these acquisitions is already included as part of depreciation by the firm.<sup>3</sup> The following table summarizes the final net capital expenditures for Cisco in 1999.

Capital expenditures	\$584.00
– Depreciation	\$486.00
Net cap ex (from financials)	\$98.00
+ R&D expenditures	\$1,594.00
– Amortization of R&D	\$484.60
+ Acquisitions	\$2,516.00
Adjusted net cap ex	\$3,723.40

### IGNORING ACQUISITIONS IN VALUATION: A POSSIBILITY?

Incorporating acquisitions into net capital expenditures and value can be difficult, and especially so for firms that do large acquisitions infrequently. Predicting whether there will be acquisitions, how much they will cost, and what they will deliver in terms of higher growth can be close to impossible. There is one way in which you can ignore acquisitions, but it does come with a cost. If you assume that firms pay a fair price on acquisitions (i.e., a price that reflects the fair value of the target company) and you assume that the target company stockholders claim any or all synergy or control value, acquisitions have no effect on value no matter how large they might be and how much they might seem to deliver in terms of higher growth. The reason is simple: A fair-value acquisition is an investment that earns its required return—a zero net present value investment.

If you choose not to consider acquisitions when valuing a firm, you have to remain internally consistent. The portion of growth that is due to acquisitions should not be considered in the valuation. A common mistake that is made in valuing companies that have posted impressive historic growth numbers from an acquisition-based strategy is to extrapolate from this growth and ignore acquisitions at the same time. This will result in an overvaluation of your firm, since you have counted the benefits of the acquisitions but have not paid for them.

What is the cost of ignoring acquisitions? Not all acquisitions are fairly priced, and not all synergy and control value ends up with the target company stockholders. Ignoring the costs and benefits of acquisitions will result in an undervaluation of a firm like Cisco that has established a reputation for generating value from acquisitions. However, ignoring acquisitions can overvalue firms that routinely overpay on acquisitions.



**capex.xls:** This dataset on the Web summarizes capital expenditures, as a percent of revenues and firm value, by industry group in the United States for the most recent quarter.

<sup>3</sup>It is only the tax-deductible amortization that really matters. To the extent that amortization is not tax deductible, you would look at the EBIT before the amortization and not consider it while estimating net capital expenditures.

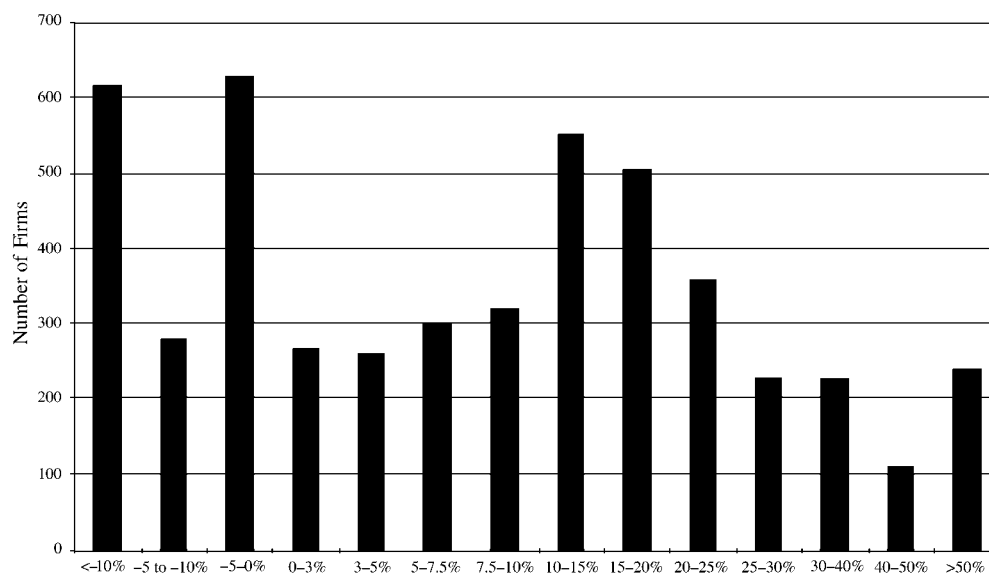
## Investment in Working Capital

The second component of reinvestment is the cash that needs to be set aside for working capital needs. Increases in working capital tie up more cash and hence generate negative cash flows. Conversely, decreases in working capital release cash and positive cash flows.

**Defining Working Capital** Working capital is usually defined to be the difference between current assets and current liabilities. However, we will modify that definition when we measure working capital for valuation purposes.

- We will back out cash and investments in marketable securities from current assets. This is because cash, especially in large amounts, is invested by firms in Treasury bills, short-term government securities, or commercial paper. While the return on these investments may be lower than what the firm may make on its real investments, they represent a fair return for riskless investments. Unlike inventory, accounts receivable and other current assets, cash then earns a fair return and should not be included in measures of working capital. Are there exceptions to this rule? When valuing a firm that has to maintain a large cash balance for day-to-day operations or a firm that operates in a market in a poorly developed banking system, you could consider the cash needed for operations as a part of working capital.
- We will also back out all interest-bearing debt—short-term debt and the portion of long-term debt that is due in the current period—from the current liabilities. This debt will be considered when computing cost of capital and it would be inappropriate to count it twice.

The noncash working capital varies widely across firms in different sectors and often across firms in the same sector. Figure 10.2 shows the distribution of noncash working capital as a percent of revenues for U.S. firms in January 2001.



**FIGURE 10.2** Noncash Working Capital as Percent of Revenues

Source: Value Line.

**ILLUSTRATION 10.7: Working Capital versus Noncash Working Capital: Marks and Spencer**

Marks and Spencer operates retail stores in the United Kingdom and has substantial holdings in retail firms in other parts of the world. The following table breaks down the components of working capital for the firm for 1999 and 2000 and reports both the total working capital and noncash working capital in each year:

	1999	2000
Cash and near cash	282	301
Marketable securities	204	386
Trade debtors (accounts receivable)	1,980	2,186
Stocks (Inventory)	515	475
Other current assets	271	281
Total current assets	3,252	3,629
Noncash current assets	2,766	2,942
Trade creditors (accounts payable)	215	219
Short-term debt	913	1,169
Other short-term liabilities	903	774
Total current liabilities	2,031	2,162
Nondebt current liabilities	1,118	993
Working capital	1,221	1,467
Noncash working capital	1,648	1,949

The noncash working capital is substantially higher than the working capital in both years. We would suggest that the former is a much better measure of cash tied up in working capital.

**Estimating Expected Changes in Noncash Working Capital** While we can estimate the noncash working capital change fairly simply for any year using financial statements, this estimate has to be used with caution. Changes in noncash working capital are unstable, with big increases in some years followed by big decreases in the following years. To ensure that the projections are not the result of an unusual base year, you should tie the changes in working capital to expected changes in revenues or costs of goods sold at the firm over time. The noncash working capital as a percent of revenues can be used, in conjunction with expected revenue changes each period, to estimate projected changes in noncash working capital over time. You can obtain the noncash working capital as a percent of revenues by looking at the firm's history or at industry standards.

Should you break working capital down into more detail? In other words, is there a payoff to estimating individual items, such as accounts receivable, inventory, and accounts payable separately? The answer will depend on both the firm being analyzed and how far into the future working capital is being projected. For firms where inventory and accounts receivable behave in very different ways as revenues grow, it clearly makes sense to break down into detail. The cost, of course, is that it increases the number of inputs needed to value a firm. In addition, the payoff to breaking working capital down into individual items will become smaller as we go further into the future. For most firms, estimating a composite number for noncash working capital is easier to do and often more accurate than breaking it down into more detail.

**ILLUSTRATION 10.8: Estimating Noncash Working Capital Needs: The Gap**

As a specialty retailer, the Gap has substantial inventory and working capital needs. At the end of the 2000 financial year (which concluded in January 2001), the Gap reported \$1,904 million in inventory and \$335 million in other noncash current assets. At the same time, the accounts payable amounted to \$1,067 million and other non-interest-bearing current liabilities of \$702 million. The noncash working capital for the Gap in January 2001 can be estimated as follows:

$$\text{Noncash working capital} = \$1,904 + \$335 - \$1,067 - \$702 = \$470 \text{ million}$$

The following table reports on the noncash working capital at the end of the previous year and the total revenues in each year:

	1999	2000	Change
Inventory	\$ 1,462	\$ 1,904	\$ 442
Other noncash current assets	\$ 285	\$ 335	\$ 50
Accounts payable	\$ 806	\$ 1,067	\$ 261
Other noninterest-bearing current liabilities	\$ 778	\$ 702	-\$ 76
Noncash working capital	\$ 163	\$ 470	\$ 307
Revenues	\$11,635	\$13,673	\$2,038
Working capital as % of revenues	1.40%	3.44%	15.06%

The noncash working capital increased by \$307 million from last year to this one. When forecasting the noncash working capital needs for the Gap, there are five choices:

1. One is to use the change in noncash working capital from the year (\$307 million) and to grow that change at the same rate as earnings are expected to grow in the future. This is probably the least desirable option because changes in noncash working capital from year to year are extremely volatile, and last year's change may in fact be an outlier.
2. The second is to base our changes on noncash working capital as a percent of revenues in the most recent year and expected revenue growth in future years. In the case of the Gap, that would indicate that noncash working capital changes in future years will be 3.44% of revenue changes in that year. This is a much better option than the first one, but the noncash working capital as a percent of revenues can also change from one year to the next.
3. The third is to base our changes on the marginal noncash working capital as a percent of revenues in the most recent year, computed by dividing the change in noncash working capital in the most recent year and the change in revenues in the most recent year, and expected revenue growth in future years. In the case of the Gap, this would lead to noncash working capital changes being 15.06% of revenues in future periods. This approach is best used for firms whose business is changing and where growth is occurring in areas different from the past. For instance, a brick-and-mortar retailer that is growing mostly online may have a very different marginal working capital requirement than the total.
4. The fourth is to base our changes on the noncash working capital as a percent of revenues over a historical period. For instance, noncash working capital as a percent of revenues between 1997 and 2000 averaged out to 4.5% of revenues. The advantage of this approach is that it smooths out year-to-year shifts, but it may not be appropriate if there is a trend (upward or downward) in working capital.
5. The final approach is to ignore the working capital history of the firm and to base the projections on the industry average for noncash working capital as a percent of revenues. This approach is most appropriate when a firm's history reveals a working capital that is volatile and unpredictable. It is also the best way of estimating noncash working capital for very small firms that

may see economies of scale as they grow. While these conditions do not apply for the Gap, we can still estimate noncash working capital requirements using the average noncash working capital as a percent of revenues for specialty retailers is 7.54%.

To illustrate how much of a change each of these assumptions can have on working capital requirements, the following table forecasts expected changes in noncash working capital (WC) using each of them. In making these estimates, we have assumed a 10% growth rate in revenues and earnings for the Gap for the next five years.

	<i>Current</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
Revenues	\$13,673.00	\$15,040.30	\$16,544.33	\$18,198.76	\$20,018.64	\$22,020.50
Change in revenues		\$ 1,367.30	\$ 1,504.03	\$ 1,654.43	\$ 1,819.88	\$ 2,001.86
1. Change in noncash WC	\$ 307.00	\$ 337.70	\$ 371.47	\$ 408.62	\$ 449.48	\$ 494.43
2. Current: WC/revenues	3.44%	\$ 47.00	\$ 51.70	\$ 56.87	\$ 62.56	\$ 68.81
3. Marginal: WC/revenues	15.06%	\$ 205.97	\$ 226.56	\$ 249.22	\$ 274.14	\$ 301.56
4. Historical average	4.50%	\$ 61.53	\$ 67.68	\$ 74.45	\$ 81.89	\$ 90.08
5. Industry average	7.54%	\$ 103.09	\$ 113.40	\$ 124.74	\$ 137.22	\$ 150.94

The noncash working capital investment varies widely across the five approaches that have been described here.

**Negative Working Capital (or Changes)** Can the change in noncash working capital be negative? The answer is clearly yes. Consider, though, the implications of such a change. When noncash working capital decreases, it releases tied-up cash and increases the cash flow of the firm. If a firm has bloated inventory or gives out credit too easily, managing one or both components more efficiently can reduce working capital and be a source of positive cash flows into the immediate future—three, four, or even five years. The question, however, becomes whether it can be a source of cash flows for longer than that. At some point in time, there will be no more inefficiencies left in the system, and any further decreases in working capital can have negative consequences for revenue growth and profits. Therefore, it appears that for firms with positive working capital, decreases in working capital are feasible only for short periods. In fact, once working capital is being managed efficiently, the working capital changes from year to year should be estimated using working capital as a percent of revenues. For example, consider a firm that has noncash working capital that represents 10 percent of revenues and that you believe that better management of working capital could reduce this to 6 percent of revenues. You could allow working capital to decline each year for the next four years from 10 percent to 6 percent, and, once this adjustment is made, begin estimating the working capital requirement each year as 6 percent of additional revenues. The following table provides estimates of the change in noncash working capital on this firm, assuming that current revenues are \$1 billion and that revenues are expected to grow 10 percent a year for the next 15 years.

Year	Current	1	2	3	4	5
Revenues	\$1,000.00	\$1,100.00	\$1,210.00	\$1,331.00	\$1,464.10	\$1,610.51
Noncash WC as % of revenues	10%	9%	8%	7%	6%	6%
Noncash working capital	\$ 100.00	\$ 99.00	\$ 96.80	\$ 93.17	\$ 87.85	\$ 96.63
Change in noncash WC		-\$ 1.00	-\$ 2.20	-\$ .63	-\$ 5.32	\$ 8.78

Can working capital itself be negative? Again, the answer is yes. Firms whose current liabilities exceed noncash current assets have negative noncash working capital. This is a thornier issue than negative changes in working capital. A firm that has a negative working capital is, in a sense, using supplier credit as a source of capital, especially if the negative working capital becomes larger as the firm becomes larger. A number of firms, with Wal-Mart being the most prominent example, have used this strategy to grow. While this may seem like a cost-efficient strategy, there are potential downsides. The first is that supplier credit is generally not really free. To the extent that delaying paying supplier bills may lead to the loss of cash discounts and other price breaks, firms are paying for the privilege. Thus a firm that decides to adopt this strategy will have to compare the costs of this capital to more traditional forms of borrowing.

The second downside is that a negative noncash working capital has generally been viewed both by accountants and ratings agencies as a source of default risk. To the extent that a firm's rating drops and interest rates paid by the firm increase, there may be costs created for other capital by using supplier credit as a source. As a practical question, you still have an estimation problem on your hands when forecasting working capital requirements for a firm that has negative noncash working capital. As in the previous scenario, with negative changes in noncash working capital, there is no reason why firms cannot continue to use supplier credit as a source of capital in the short term. In the long term, however, we should not assume that noncash working capital will become more and more negative over time. At some point in the future we have to assume either that the change in non-cash working capital is zero or that pressure will build for increases in working capital.



**wcdata.xls:** This dataset on the Web summarizes noncash working capital needs by industry group in the United States for the most recent quarter.

## CONCLUSION

When valuing a firm, the cash flows that are discounted should be after taxes and reinvestment needs but before debt payments. This chapter considered some of the challenges in coming up with this number for firms.

The chapter began with the corrected and updated version of income described in Chapter 9. To state this income in after-tax terms, you need a tax rate.



Firms generally state their effective tax rates in their financial statements, but these effective tax rates can be different from marginal tax rates. While the effective tax rate can be used to arrive at the after-tax operating income in the early years, the tax rate used should converge on the marginal tax rate in future periods. For firms that are losing money and not paying taxes, the net operating losses that they are accumulating will protect some of their future income from taxation.

The reinvestment that firms make in their own operations is then considered in two parts. The first part is the net capital expenditure of the firm which is the difference between capital expenditures (a cash outflow) and depreciation (effectively a cash inflow). In this net capital expenditure, we include the capitalized operating expenses (such as R&D) and acquisitions. The second part relates to investments in noncash working capital, mainly inventory and accounts receivable. Increases in noncash working capital represent cash outflows to the firm, while decreases represent cash inflows. Noncash working capital at most firms tends to be volatile and may need to be smoothed out when forecasting future cash flows.

## QUESTIONS AND SHORT PROBLEMS

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1. You are valuing GenFlex, a small manufacturing firm, which reported paying taxes of \$12.5 million on taxable income of \$50 million and reinvesting \$15 million in the most recent year. The firm has no debt outstanding, the cost of capital is 11%, and the marginal tax rate for the firm is 35%. Assuming that the firm's earnings and reinvestment are expected to grow 10% a year for three years and 5% a year forever after that, estimate the value of this firm:
  - a. Using the effective tax rate to estimate after-tax operating income.
  - b. Using the marginal tax rate to estimate after-tax operating income.
  - c. Using the effective tax rate for the next three years and the marginal tax rate in year 4.
2. You are trying to estimate the free cash flow to the firm for RevTech, a technology firm. The firm reported \$80 million in earnings before interest and taxes, capital expenditures of \$30 million, and depreciation of \$20 million in the most recent year. There are two additional complications:
  - The firm had R&D expenses of \$50 million in the most recent year. You believe that a three-year amortizable life is appropriate for this firm and the R&D expenses for the past three years have amounted to \$20 million, \$30 million, and \$40 million respectively.
  - The firm also made two acquisitions during the year—a cash-based acquisition for \$45 million and a stock-based acquisition for \$35 million.If the firm has no working capital requirements and a tax rate of 40%, estimate the free cash flow to the firm in the most recent year.
3. Lewis Clark, a firm in the travel business, reported earnings before interest and taxes of \$60 million last year, but you have uncovered the following additional items of interest:

- The firm had operating lease expenses of \$50 million last year and has a commitment to make equivalent payments for the next eight years.
- The firm reported capital expenditures of \$30 million and depreciation of \$50 million last year. However, the firm also made two acquisitions, one funded with cash for \$50 million and another funded with a stock swap for \$30 million. The amortization of these acquisitions is already included in the current year's depreciation.
- The total working capital increased from \$180 million at the start of the year to \$200 million at the end of the year. However, the firm's cash balance was a significant portion of this working capital and increased from \$80 million at the start of the year to \$120 million at the end. (The cash is invested in T-bills.)
- The tax rate is 40%, and the firm's pretax cost of debt is 6%.

Estimate the free cash flows to the firm last year.

4. The following is the balance sheet for Ford Motor Company as of December 31, 1994 (in millions).

<i>Assets</i>		<i>Liabilities</i>	
Cash	\$ 19,927	Accounts payable	\$ 11,635
Receivables	\$132,904	Debt due within 1 year	\$ 36,240
Inventory	\$ 10,128	Other current liabilities	\$ 2,721
<i>Current assets</i>	<i>\$ 91,524</i>	<i>Current liabilities</i>	<i>\$ 50,596</i>
Fixed assets	\$ 45,586	Short-term debt	\$ 36,200
		Long-term debt	\$ 37,490
		Equity	\$ 12,824
Total assets	\$137,110	Total liabilities	\$137,110

The firm had revenues of \$154,951 million in 1994 and cost of goods sold of \$103,817 million.

- a. Estimate the net working capital.
  - b. Estimate the noncash working capital.
  - c. Estimate noncash working capital as a percent of revenues.
5. Continuing problem 4, assume that you expect Ford's revenues to grow 10% a year for the next five years.
- a. Estimate the expected changes in noncash working capital each year, assuming that noncash working capital as a percent of revenues remains at 1994 levels.
  - b. Estimate the expected changes in noncash working capital each year, assuming that noncash working capital as a percent of revenues will converge on the industry average of 4.3% of revenues.
6. Newell Stores is a retail firm that reported \$1 billion in revenues, \$80 million in after-tax operating income, and noncash working capital of -\$50 million last year.
- a. Assuming that working capital as a percent of revenues remains unchanged next year and that there are no net capital expenditures, estimate the free cash flow to the firm if revenues are expected to grow 10%.
  - b. If you are projecting free cash flows to the firm for the next 10 years, would you make the same assumptions about working capital? Why or why not?