

## MEASURING EARNINGS

To estimate cash flows, we usually begin with a measure of earnings. Free cash flows to the firm, for instance, are based upon after-tax operating earnings. Free cashflow to equity estimates, on the other hand, commence with net income. While we obtain and use 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.

In this chapter, we begin by consider 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 towards 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

When analyzing a firm, what are the questions to which we would like to know the answers? A firm, as we define it, includes both investments already made -- we will call these **assets-in-place** -- and investments yet to be made -- we will call these **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:

Figure 9.1: A Financial Balance Sheet

Assets		Liabilities	
Existing Investments Generate cashflows today Includes long lived (fixed) and short-lived (working capital) assets	Assets in Place	Deb	Fixed Claim on cash flows Little or No role in management <i>Fixed Maturity</i> <i>Tax Deductible</i>
Expected Value that will be created by future investments	Growth Assets	Equity	Residual Claim on cash flows Significant Role in management <i>Perpetual Lives</i>

Note that while this summary does have some similarities with the accounting balance sheet, but 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 of questions relating to each of these items. Figure 9.2 lists the questions.

Figure 9.2: Key Financial Questions

Assets		Liabilities	
What are the assets in place? How valuable are these assets? How risky are these assets?	Assets in Place	Deb	What is the value of the debt? How risky is the debt?
What are the growth assets? How valuable are these assets?	Growth Assets	Equity	What is the value of the equity? How risky is the equity?

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.

### 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.

### **The 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 sometimes six or nine 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 SEC (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 last 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 under valuing them. Even those that are not are changing substantially from quarter to quarter, 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 e-commerce in June 2000. The last 10-K was as of September 1999 and several months old; 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.

*Table 9.1: Ariba: Trailing 12-month versus 10-K (in thousands)*

	<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 Sept 1999 – Six Months March 1999 + Six Months 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 five-fold. Ariba in March 2000 was a very different firm from Ariba in September 1999. Note that these are not the only three 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) and to 235.8 million shares in June 2000.

### **Correcting Earnings Misclassification**

The expenses incurred by a firm can be categorized into three groups:

- 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.

- 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.
- Financial expenses are expenses associated with non-equity 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. We will consider the two most common misclassifications in this section and how to correct for them. The first is the inclusion of capital expenses such as 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 but not net income.

The third factor to consider is the effects of the phenomenon of “managed earnings” at these firms. Technology 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, income is not computed after capital expenses, the reality is that there are a number of capital 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. Under the rationale that the products of research are too uncertain and difficult to quantify, accounting standards have generally required that all

R&D expenses to 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, you 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 commercial life of the products that emerge from the research. 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 to the amortizable life of the research asset. Thus, if the research asset has an amortizable life of 5 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.

$$\text{Value of the Research Asset} = \sum_{t=-(n-1)}^{t=0} \text{R \& D}_t \frac{(n+t)}{n}$$

Thus, in the case of the research asset with a five-year life, you cumulate 1/5 of the R&D expenses from four years ago, 2/5 of the R & D expenses from three years ago, 3/5 of the R&D expenses from two years ago, 4/5 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 re-categorization 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.

Adjusted Operating Income = Operating Income + R & D expenses –  
Amortization of Research Asset

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>

 *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 bio-technology 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 Drugs 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. Table 9.2 provides this information for the firm.

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

This extra tax benefit we get from the entire R&D being tax deductible is as follows:  
(R&D – Amortization) \* tax rate

If we subtract out (R&D – Amortization) (1- tax rate) and add the differential tax benefit which is computed above, (1- tax rate) drops out of the equation.

Table 9.2: Historical R& D Expenses (in millions)

Year	R& D Expenses
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	

[Note that the firm has been in existence for only nine years, and that there is no information therefore available for year –10.] 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 us 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 table 9.3:

Table 9.3: Value of Research Asset

Year	R&D Expense	Unamortized portion		Amortization this year
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 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% of the expense from 5 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:

Adjusted Operating Earnings

$$= \text{Operating Earnings} + \text{Current year's R\&D expense} - \text{Amortization of Research Asset}$$

$$= 1,549 + 845 - 398 = \$1,996 \text{ million}$$

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

Adjusted Net Income

$$= \text{Net Income} + \text{Current year's R\&D expense} - \text{Amortization of Research Asset}$$

$$= 1,139 + 845 - 398 = \$1,586 \text{ million}$$

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 upon 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 and obtained a value of \$2,909 million.<sup>2</sup>

Value of Research Asset<sub>1999</sub> = \$2,909 million

Adjusted Book Value of Equity<sub>1999</sub> = Book Value of Equity<sub>1999</sub> + Value of Research Asset  
 = 3,024 million + 2,909 million = \$5,933 million

Adjusted Book Value of Capital<sub>1999</sub> = Book Value of Capital<sub>1999</sub> + Value of Research Asset  
 = 3,347 million + 2,909 million = \$6,256 million

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

	Unadjusted	Adjusted for R&D
Return on Equity	$\frac{1,139}{3,024} = 37.67\%$	$\frac{1,586}{5,933} = 26.73\%$
Pre-tax Return on Capital	$\frac{1,549}{3,347} = 46.28\%$	$\frac{1,996}{6,256} = 31.91\%$

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>3</sup>

#### *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 like KPMG,

<sup>2</sup> Note that you can arrive at this value using the table above and shifting the amortization numbers by one row. Thus, \$ 822.80 million will become the current year's R&D, \$ 663.3 million will become the R&D for year -1 and 90% of it will be unamortized and so on.

<sup>3</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.

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 presumably long term customers. America Online, 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 upon 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>4</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.

Adjusted Operating Income = Operating Income + SG&A expenses for the current period  
– Amortization of SG&A Asset

- A similar adjustment has to be made to net income:

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<sup>4</sup> As an example, Jamie Kiggen, an equity research analyst at Donaldson, Lufkin and Jenrette, valued an Amazon customer at \$2,400 in an equity research report in 1999. This value was based upon the assumption that the customer would continue to buy from Amazon.com and an expected profit margin from such sales.

Adjusted Net Income = Net Income + SG&A expenses for the current period – Amortization of SG&A Asset

- Adjust the book value of equity and capital.

Adjusted BV Equity = BV of Equity + Value SG&A Asset

Adjusted BV Capital = BV of Capital + Value SG&A Asset

*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 a new customer 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 and book value of equity.

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 B&N.com and Borders.com, but also from traditional retailers like Walmart, 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 towards generating revenues in current periods rather than future periods to retain current customers.

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 3 years, on average. This makes a case for treating the expense as a capital expense stronger, with an amortizable life of 3 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, 4 years.

To capitalize the cost of recruiting and training, we obtained these costs from each of the prior four years. Table 9.4 reports on these expenses and amortizes each of these expenses over four years.

*Table 9.4: Human Capital Expenses: CHC*

Year	Training & Recruiting Expenses	Unamortized Portion		Amortization this year
Current	\$ 14.00	100%	\$ 14.00	
-1	\$ 12.00	75%	\$ 9.00	\$ 3.00
-2	\$ 10.40	50%	\$ 5.20	\$ 2.60
-3	\$ 9.10	25%	\$ 2.28	\$ 2.28
-4	\$ 8.30	-	\$ 0.00	\$ 2.08
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 3, the basic approach for converting operating leases into debt was presented. We discount future operating lease commitments back at the firm's pre-tax 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 re-categorized 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.

$$\text{Adjusted Operating Income} = \text{Operating Income} + \text{Operating Lease Expenses} - \text{Depreciation on leased asset}$$

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.

$$\text{Adjusted Operating Income} = \text{Operating Income} + (\text{Present Value of Lease Commitments}) * (\text{Pre-tax Interest rate on debt})$$

#### *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. Table 9.5 presents the operating lease commitments for the firm over the next five years and the lump sum of commitments beyond that point in time.

*Table 9.5: The Gap's Operating Lease Commitments*

Year	Commitment
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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 pre-tax 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 upon the average annual lease commitment over the first five years (\$677 million), we arrive at an annuity of 8 years:

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

The present value of the commitments are estimated in Table 9.6:

*Table 9.6: Present Value of Operating Lease Commitments: The Gap*

<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 conventional interest-bearing debt of \$1.56 billion on its balance sheet. The cumulated debt for the firm is:

$$\begin{aligned} \text{Adjusted Debt} &= \text{Interest-bearing Debt} + \text{Present Value of Lease Commitments} \\ &= \$1,560 \text{ million} + \$5,714 \text{ million} = \$ 7,274 \text{ million} \end{aligned}$$

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<sup>5</sup> The value is rounded to the nearest integer.

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>6</sup> (13 years) on the value of the leased asset which is equal to the debt value of the lease commitments.

$$\text{Straight line depreciation} = \frac{\text{Value of Leased Asset}}{\text{Lease life}} = \frac{\$5,714}{13} = \$440 \text{ million}$$

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

Adjusted Operating Income = Operating Income + Operating lease expense in current year – Depreciation on leased asset = \$1,365 million + \$706 - \$440 = \$1,631 million

The approximate adjustment is also estimated, where we add the imputed interest expense using the pre-tax cost of debt.

Adjusted Operating Income = Operating Income + Debt value of leases \* Pre-tax cost of debt = \$1,365 + \$5,714 \* 0.07 = \$1,765 million



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

### 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.

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<sup>6</sup> The lease life is computed by adding the estimated annuity life of 8 years for the lump-sum to the initial 5 years.



### **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. 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>7</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 "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 like Intel and Microsoft have to beat to 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, the point to the success of firms like Microsoft and Intel and the brutal punishment meted out, especially at technology firms, for firms that do not deliver 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 attempts 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 these firms to their managers at a fair value and charging them against earnings or change the way to 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

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<sup>7</sup> I/B/E/S Estimates

lower expectations when they believed that the estimates were too high.<sup>8</sup> There are several other techniques that are used and we will consider some of the most common ones in this section. Not all the techniques are harmful to the firm and some may indeed be considered prudent management.

1. *Planning ahead*: Firms can plan investments and asset sales to keep earnings rising smoothly.
2. *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>9</sup> In fact, the firm had accumulated \$1.1 billion in unearned revenues by the end of 1996 that it could borrow on to supplement earnings in weaker quarter.
3. *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% and 27% respectively, but much of that growth was attributable to large deals announced just days before each quarter ended. 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.<sup>10</sup>
4. *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

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<sup>8</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>9</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.

<sup>10</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 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."

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.

5. *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 and equipment in the year they are closed, IBM was able to drop depreciation expenses to 5% of revenue in 1996 from an average of 7% in 1990-94. The difference, in 1996 revenue, was \$1.64 billion, or 18% 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>11</sup>; these write offs amounted, on average, to 72% of the purchase price on these acquisitions and increased the acquiring firm's earnings 22% in the fourth quarter after the acquisition.
6. *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.
7. *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. Technology firms such as Intel have used this route to beat earnings estimates.

### ***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. In this section, we will consider a series

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<sup>11</sup> Only 3 firms wrote off in-process R&D during the prior decade (1980-89).

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:

- *One-time expenses or income that is truly one time:* A large restructuring charge that has occurred only once in the last 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.
- *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 last 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 for every 3 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.
- *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.

- *Items that recur every year which 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 dollars gets weaker. The most prudent thing to do with these expenses would be to ignore them. This is because income gains or losses from exchange rate movements are likely to reverse themselves over time, and making them part of permanent income can yield misleading estimates of value.

To differentiate among 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 non-cash 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, the R&D they do internally is expensed. As with amortization of goodwill, writing off in-process R&D creates a non-cash 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 recent years, 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% of these cash flows come from holdings of riskless marketable securities with a current market value of \$500 million. The remaining 80% of the cash flows come from operating assets and these cash flows are expected to grow at 5% a year in perpetuity and the cost of capital (based upon the risk of these assets) is 10%. The value of this firm can be most easily estimated as follows:

$$\begin{aligned}\text{Value of operating assets of the firm} &= \$ 80 (1.05)/(.10-.05) = \$1,680 \text{ million} \\ \text{Value of marketable securities} &= &= \$ 500 \text{ million} \\ \text{Value of firm} &= &= \$2,180 \text{ million}\end{aligned}$$

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 (to reflect the appropriate risk of the marketable securities). The adjustment, done right, should yield the same value as that estimated

above.<sup>12</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 on 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 upon how the holding is categorized. In chapter 3, we differentiated among three classifications.

- A minority, passive holding, where only the dividends received from the holding are recorded in income.
- 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).
- 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 subsidiary when valuing a firm, to value the subsidiary separately and to add it on to the value obtained for the parent. 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% a year forever. In addition, assume that the firm owns 10% of another firm (Subsidiary Inc.) with after-tax cash flows of \$50 million growing at 4% a year forever. Finally, assume that the cost of capital for both firms is 10%. The firm value for Holding Inc. can be estimated as follows.

$$\text{Value of operating assets of Holding Inc} = 100 \frac{1.05}{0.10 - 0.05} = \$2,100 \text{ million}$$

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<sup>12</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.



$$\text{Value of operating assets of Subsidiary Inc} = 50 \frac{1.04}{0.10 - 0.04} = \$867 \text{ million}$$

Value of Holding company's share of Subsidiary Inc = \$2,100 + 0.10 (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 laid out above to value the holding. We will return to examine this issue in more detail in chapter 16.

*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 Table 9.7.

*Table 9.7: Earnings for Xerox: 1997-1999*

	1999	1998	1997
Sales	\$10,346	\$10,696	\$9,881
Service & 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		\$113	
Equipment Financing Interest	\$547	\$570	\$520
Research and Development Expenses	\$979	\$1,040	\$1,065
S, G & A Expenses	\$5,144	\$5,321	\$5,212
Restructuring Charge & Asset Impairment		\$1,531	
Other, net	\$297	\$242	\$98
<i>Total Expenses</i>	<i>\$17,192</i>	<i>\$18,684</i>	<i>\$16,003</i>
<i>Earnings before taxes, Equity Income and Minority Interests</i>	<i>\$2,036</i>	<i>\$763</i>	<i>\$2,141</i>
- 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 in 1998 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 in 1998 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 concerning subsidiaries by subtracting out the "Equity in Net Income of unconsolidated affiliates" (reflecting Xerox's minority holdings in other firms) and adding back the "Minority Interests in earnings of subsidiaries" (reflecting minority interests in Xerox's majority holdings).

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

*Table 9.8: Adjusted Net Income For Xerox*

	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 upon taxes paid and taxable income for that year.

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

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

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

$$\text{Normalized Other, net (1-tax rate) for 1998} = (212)(1 - 0.2713) = \$155 \text{ million}$$

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 10K filing in 2000 because of accounting issues.

### **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 non-operating 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 non-operating items.

- Do any of the operating expenses, as a percent of revenues, swing wildly from year to year? This may suggest that the expense item (say SG&A) includes non-operating 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 are involved in earnings management and are moving earnings across time periods. As growth levels off, this practice can catch up with them.
- Does 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 as strategy requires scrutiny.
- Is working capital ballooning out as revenues and earning 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.

## Summary

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.

In this chapter we begin 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 (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, non-recurring and unusual items on earnings. While the underlying principle that earnings should include only normal expenses is put to the test by attempts on the part of companies to move normal operating expenses into the non-recurring column and non-operating income into operating earnings.

### 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 5 years and beyond are summarized.

Year	Operating Lease Expense
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.

12. Assume that Derra Foods, in problem 1, 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 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, estimate the FoodMarket's debt to capital and return on capital.

4. Zif Software is a firm with significant research and development expenses. In the most recent year, the firm had \$100 million in research and development expenses. R&D expenses are amortizable over 5 years and the R& D expenses over the last 5 years are as follows:

Year	R&D expenses
-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 5 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 that the amortization of the research asset is \$150 million. Re-estimate Stellar Computer's return on capital.