



and since it did not have any complex transactions, preparing its cash flow statement is relatively straightforward. Capital expenditures is the only number on the cash flow statement that is neither directly from the change column on the balance sheet nor from the income statement or statement of retained earnings. For the cash flow statement, the calculation of capital expenditures is generally the same calculation as the one used for the free cash flow statement. An exception to this occurs when a company has non-cash transactions—for example, purchasing a building by borrowing the money from the seller. We would treat that as a dual transaction on the free cash flow statement—showing both the purchase of the building and the issuance of debt—but nothing would be shown on the cash flow statement according to U.S. GAAP.

**EXHIBIT 3.4** The Bob Adams Company Statement of Cash Flows for Year 0

	Change in Balance Sheet Accounts			Cash Flow Statement	
	Year -1	Year 0	Change	Year 0	
<b>Balance Sheet</b>					
Cash . . . . .	\$ 1,496	\$ 2,152	\$ 656	\$ 2,015	<b>Cash Flow from Operations</b>
Net operating working capital . . . . .	2,992	3,142	150	1,725	Net income
Net property, plant & equipment . . . . .	15,708	16,493	785	-150	Non-cash expenses (depreciation)
Total assets . . . . .	\$20,196	\$21,787	\$1,591	\$ 3,590	Change in <b>non-cash working capital</b>
<b>Investing Activities</b>					
Debt . . . . .	\$12,000	\$11,600	\$ -400	\$-2,510	Capital expenditures
Preferred stock . . . . .	1,000	1,140	140	0	Cash flow from dispositions
Common stock . . . . .	1,000	1,200	200	\$-2,510	Cash flow from investing activities
Retained earnings . . . . .	6,196	7,847	1,651		
Total shareholders' equity . . . . .	\$ 7,196	\$ 9,047	\$1,851		
Total liabilities and equities . . . . .	\$20,196	\$21,787	\$1,591		
<b>Financing Activities</b>					
<b>Statement of Retained Earnings</b>					
	<b>Year 0</b>				
Beginning of year balance . . . . .	\$ 6,196			\$ -110	Preferred stock dividends
Net income . . . . .	2,015			-254	Common equity dividends paid
Preferred stock dividends . . . . .	-110			-400	Change in debt financing
Common equity dividends . . . . .	-254			140	Change in preferred stock financing
End of year balance . . . . .	\$ 7,847			200	Change in common equity financing
<b>Income Statement Information</b>					
Depreciation expense (non-cash expenses) . . . . .	\$ 1,725			\$ -424	Cash flows from financing activities
				\$ 656	Change in cash balance

In Exhibit 3.5, we show the cash flow statements for the Bob Adams Company for all years. The cash flow statement for Year 0 is the same cash flow statement that appears in Exhibit 3.4. We prepared the cash flow statements for the remaining years in the same manner. In fact, to do this, we merely copied the formulas in our spreadsheet from the column representing Year 0 to the columns representing Years 1 to 3. Based on the calculations in Exhibit 3.4, we can see that each number in the cash flow statement results from a calculation based on two balance sheets, the income statement, and/or the statement of retained earnings. Our relatively simple Bob Adams Company example shows how it is possible to create spreadsheet templates in order to calculate a company's cash flow statement and, therefore, its free cash flows from its income statement, balance sheet, and statement of retained earnings. In a financial model, we typically forecast a company's income statements, balance sheets, and supplemental information (for example, more detailed schedules of income taxes and property, plant, and equipment) before using templates (like those in the Bob Adams example) to calculate the company's cash flow statement and free cash flows.

In Exhibit 3.6, we show the free cash flow calculations for the Bob Adams Company using the cash flow from operations method. We add back after-tax interest to cash flow from operations and subtract the

increases in required cash in order to calculate unlevered cash flow from operations, which is the same unlevered cash flow from operations calculated in Exhibit 3.2.

**EXHIBIT 3.5** The Bob Adams Company Statement of Cash Flows Year 0 to Year 3

<b>THE BOB ADAMS COMPANY</b>					
<b>Cash Flow Statement Forecasts</b>					
		Actual Year 0	Forecast Year 1	Forecast Year 2	Forecast Year 3
<b>Cash Flow from Operations</b>					
Net income	+NI	\$ 2,015	\$ 2,077	\$ 2,202	\$ 2,274
Depreciation expense (non-cash expenses)	+NCEXP	1,725	1,976	2,305	2,643
Non-cash revenues	-NCREV	0	0	0	0
Change in net non-cash working capital	-ΔWC	-150	-157	-264	-214
Cash flow from operations	=CFO	<u>\$ 3,590</u>	<u>\$ 3,896</u>	<u>\$ 4,243</u>	<u>\$ 4,703</u>
<b>Investing Activities</b>					
Capital expenditures	-INVEST	-\$2,510	-\$3,295	-\$3,374	-\$3,577
Cash flow from dispositions	+DISP	0	0	0	0
Cash flow from investing activities	=CAPEX	<u>-\$2,510</u>	<u>-\$3,295</u>	<u>-\$3,374</u>	<u>-\$3,577</u>
<b>Financing Activities</b>					
Common equity dividends paid	-CDIV	\$ -254	\$ -336	\$ -417	\$ -328
Preferred stock dividends	-PSDIV	-110	-125	-130	-142
Change in debt financing	+DFIN	-400	-100	-300	-800
Change in preferred stock financing	+PSFIN	140	40	110	250
Change in common equity financing	+CEFIN	200	0	0	0
Cash flows from financing activities	=CFF	<u>\$ -424</u>	<u>\$ -522</u>	<u>\$ -737</u>	<u>\$ -1,019</u>
Change in cash balance	=ΔC	<u>\$ 656</u>	<u>\$ 79</u>	<u>\$ 132</u>	<u>\$ 107</u>

**EXHIBIT 3.6** The Bob Adams Company Free Cash Flow Measured Using the Cash Flow Statement

<b>THE BOB ADAMS COMPANY</b>					
<b>Free Cash Flow Forecasts</b>					
		Actual Year 0	Forecast Year 1	Forecast Year 2	Forecast Year 3
Cash flow from operations	+ CFO	\$3,590	\$3,896	\$4,243	\$4,703
Interest paid in cash	+ CINT	1,200	1,160	1,150	1,120
Interest tax shield	- ITS	-480	-464	-460	-448
Change in required cash	- ΔRC	-75	-79	-132	-107
<b>Unlevered cash flow from operations</b>	<b>= UCFO</b>	<u><b>\$4,235</b></u>	<u><b>\$4,513</b></u>	<u><b>\$4,801</b></u>	<u><b>\$5,268</b></u>
Capital expenditures	- CAPEX	-2,510	-3,295	-3,374	-3,577
<b>Unlevered free cash flow</b>	<b>= FCF</b>	<u><b>\$1,725</b></u>	<u><b>\$1,218</b></u>	<u><b>\$1,427</b></u>	<u><b>\$1,691</b></u>

Now that we have the same unlevered cash flow from operations, the remainder of the free cash flow calculation is the same as in Exhibit 3.2. Likewise, the calculation of equity free cash flows and the reconciliation of the equity free cash flows to the change in the cash balance are the same for the cash flow from operations method as they are for the EBIT method, which we presented in Exhibit 3.2. We do not repeat that part of the schedule in the exhibit. While it is useful to understand the cash flow from operations method for its insights into the EBIT method, most practitioners use the EBIT method when they measure free cash flows.

## REVIEW EXERCISE 3.2

### Frits Seegers, Inc. Cash Flow Statement

Use the information on Frits Seegers in Review Exercise 3.1 to prepare a cash flow statement in order to then calculate the company's unlevered free cash flow using the CFO method. (Note, for more practice, see Problem 1.7 where more years of data for Frits Seegers, Inc. are presented.)

**Solution on pages 119–120.**

**EXHIBIT P3.2** Income Statement and Balance Sheet Forecasts for the Jake and Phil Company

Income Statement	Year 2	Year 3	Balance Sheet	Year 2	Year 3
Net revenues . . . . .	\$ 80,000	\$100,000	Cash and short-term investments . . . . .	\$ 19,500	\$ 22,420
Gain on sale (other revenues) . . . . .	0	700	Accounts receivable . . . . .	8,000	18,000
<b>Total revenues . . . . .</b>	<b>\$ 80,000</b>	<b>\$100,700</b>	Inventories . . . . .	2,000	1,500
Cost of goods sold . . . . .	\$-40,000	\$-50,000	<b>Total current assets . . . . .</b>	<b>\$ 29,500</b>	<b>\$ 41,920</b>
Selling, general & administrative . . . . .	-20,000	-20,000	Property, plant and equipment . . . . .	\$100,000	\$125,000
Depreciation expense—total . . . . .	-10,000	-13,000	Less: accumulated depreciation . . . . .	-10,000	-22,000
<b>Total expenses . . . . .</b>	<b>\$-70,000</b>	<b>\$-83,000</b>	<b>Net property, plant, and equipment . . . . .</b>	<b>\$ 90,000</b>	<b>\$103,000</b>
Income before interest and taxes . . . . .	\$ 10,000	\$ 17,700	Pre-paid expenses (non-current) . . . . .	\$ 0	\$ 3,000
Interest expense . . . . .	-1,000	-3,000	<b>Total assets. . . . .</b>	<b>\$119,500</b>	<b>\$147,920</b>
<b>Income before taxes. . . . .</b>	<b>\$ 9,000</b>	<b>\$ 14,700</b>	Accounts payable—trade . . . . .	\$ 4,200	\$ 8,200
Income tax expense . . . . .	-1,200	-5,880	Accrued liabilities (expenses) . . . . .	6,000	3,500
<b>Net income . . . . .</b>	<b>\$ 7,800</b>	<b>\$ 8,820</b>	Interest payable . . . . .	1,000	1,100
Beginning retained earnings . . . . .		7,800	Income taxes payable . . . . .	500	2,500
Dividends . . . . .	0	-4,000	Dividends payable . . . . .	0	1,000
<b>Ending retained earnings . . . . .</b>	<b>\$ 7,800</b>	<b>\$ 12,620</b>	<b>Total current liabilities. . . . .</b>	<b>\$ 11,700</b>	<b>\$ 16,300</b>
			Long-term debt-A . . . . .	\$ 20,000	\$ 20,000
			Long-term debt-B . . . . .	0	15,000
			<b>Long-term liabilities . . . . .</b>	<b>\$ 20,000</b>	<b>\$ 35,000</b>
			<b>Total liabilities . . . . .</b>	<b>\$ 31,700</b>	<b>\$ 51,300</b>
			Common stock at par . . . . .	\$ 80,000	\$ 85,000
			Additional paid-in capital . . . . .	0	0
			Foreign currency translation adj. . . . .	0	0
			Retained earnings . . . . .	7,800	12,620
			Treasury stock, at cost . . . . .	0	-1,000
			<b>Total shareholders' equity . . . . .</b>	<b>\$ 87,800</b>	<b>\$ 96,620</b>
			<b>Total liabilities and equity . . . . .</b>	<b>\$119,500</b>	<b>\$147,920</b>

**P3.3 The Missing Data Company (Working Backwards—Cash Flow Statement and Free Cash Flow Schedule):** We provide partially completed calculations for the income statements, balance sheets, retained earnings, and free cash flows for the Missing Data Company in Exhibit P3.3. All of the cash flows occur at the end of each year, including capital expenditures and any financing transactions. The company distributes all equity free cash flows to equityholders in the form of dividends; in other words, it does not hold any excess cash. The interest rate it pays on debt is 7%, and its preferred stock dividend rate is 8% (of the company's book value of preferred stock). All cash flows occur at the end of each year. The tax rate is 25% on the first \$4,000 of income and 45% on all income above \$4,000. The company has no income taxes payable at the end of any of the three years. Complete the Missing Data Company's income statements, balance sheets, retained earnings, and free cash flow calculations for Years 0 and 1.

Underline indicates changes.

We measure tax and book accumulated depreciation as of the beginning and end of Year 3. The difference in the tax and book accumulated depreciation is equal to the difference in the tax basis of the asset, which—when multiplied by the income tax rate—measures the deferred tax liability.

Year 3	Tax Basis	Book Value	Difference (Book Value – Tax Basis)	Deferred Income Tax Liability (Asset)
Original amount paid (acquisition cost) . . . . .	\$ 600,000	\$ 600,000	\$ 0	\$ —
Depreciation deducted or expensed as of the beginning of the year . . .	<u>–466,680</u>	<u>–400,000</u>	<u>66,680</u>	<u>26,672</u>
Taxable basis or book value as of the beginning of the year . . . . .	\$ 133,320	\$ 200,000	\$ 66,680	\$ 26,672
Depreciation deducted or expensed during the current year . . . . .	<u>–88,860</u>	<u>–200,000</u>	<u>–111,140</u>	<u>–44,456</u>
Taxable basis or book value as of the end of the year . . . . .	<u>\$ 44,460</u>	<u>\$ 0</u>	<u>\$ –44,460</u>	<u>\$ –17,784</u>

We can now measure income tax for tax and book purposes. For financial reporting (books), the current income tax is equal to 40% of the taxable income for tax purposes; the deferred tax is equal to the change in the balance of the deferred income tax liability. In Year 3, deferred income taxes reduces tax expense relative to the tax owed because the deferred tax liability decreased this year (and actually became a deferred tax asset). The deferred tax liability became a deferred tax asset at the end of Year 3 because the asset was fully depreciated on the books but it was not fully depreciated on the tax records. In Year 4, \$44,460 of depreciation will be deducted on the tax return, but zero depreciation expense will be recorded on the books (income statement).

	Tax (40%)	Book
Net income before depreciation . . . . .	\$ 400,000	\$ 400,000
Depreciation . . . . .	<u>–88,860</u>	<u>–200,000</u>
Taxable income or income before taxes . . . . .	\$ 311,140	\$ 200,000
Provision for income taxes:		
Current . . . . .	\$–124,456	\$–124,456
Deferred . . . . .	<u>44,456</u>	<u>44,456</u>
Provision for income taxes—total . . . . .	\$–124,456	\$ –80,000
Net income . . . . .	<u>\$ 186,684</u>	<u>\$ 120,000</u>
Effective income tax rate . . . . .	40.0%	40.0%

### Solution for Review Exercise 3.4: Net Operating Loss Carryforwards and Interest Tax Shields

In Year 1, the first year of the company's operations, it has a pre-tax loss of \$5,000, which creates an NOL of \$5,000, and the company pays no income tax in Year 1. In Year 2, the company has another pre-tax loss of \$4,000, which increases the NOL balance to \$9,000, and the company also pays no income tax in Year 2. In Year 3, the company has a pre-tax income of \$15,000. It uses its NOL of \$9,000 to reduce its taxable income to \$6,000, on which it pays taxes of \$2,400 ( $\$2,400 = 0.4 \times \$6,000$ ). In Year 4, it pays taxes at the 40% rate. We present these calculations for the levered company on the left-hand-side of the table below. On the right-hand-side of the table, we present the same calculations for the unlevered company. The company would pay taxes of 40% in each year if it were unlevered.

## Adjusting Growth Rates for Inflation

We can disaggregate the above growth formula further to adjust for inflation. To adjust total revenues for the effects of inflation, we can first divide revenues by one plus the inflation rate for the period in order to measure the effect of inflation on revenues. Assuming inflation was 2.5% in the above example, what is the inflation adjusted (or real) growth rates for revenue and price? We can calculate the real growth rate for revenues by dividing (one plus) the growth rate for revenues by (one plus) the inflation rate.

$$g_{\text{rev, real}} = \frac{1 + g_{\text{rev, total}}}{1 + i} - 1 = \frac{1.476}{1.025} - 1 = 0.44$$

Alternatively, we can calculate the real (inflation adjusted) change in price and use our original formula to measure real growth in revenues.

$$g_{\text{p, real}} = \frac{1 + g_{\text{p}}}{1 + i} - 1 = \frac{1.23}{1.025} - 1 = 0.20$$

$$g_{\text{rev, real}} = g_{\text{p, real}} + (1 + g_{\text{p}}) \times g_{\text{q}} = 0.20 + 1.20 \times 0.20 = 0.20 + 0.24 = 0.44$$

## Potential Forecast Drivers for Revenues and Capital Expenditures

While we think of revenues as being equal to price multiplied by volume, we often use capacity and capacity utilization as measures of volume and use the average price (revenue)—per unit of capacity available or capacity utilized—as a measure of price. For example, we sometimes use price and volume to forecast revenues in industries that produce clearly identifiable products with clearly identifiable prices. As such, in the auto industry, we might use the number of cars and the average price per car in order to measure revenue, or we might disaggregate our revenue forecast by brand or by class of car within a brand if the prices and product mixes vary within our forecast period. Companies in heavy manufacturing industries (for example, steel and paper) have different revenue forecast drivers but they are still measures of capacity and price. The measure used for capacity is the maximum number of tons output (production). In turn, capacity utilization is the actual number of tons of output divided by the maximum number of tons of capacity, and the average revenue per unit of capacity utilized is the average price per ton.

### Valuation in Practice 4.2

**Companies Sometimes Provide Forecasts about Capital Expenditures—Gap, Inc.** Below is a quote from Gap, Inc.'s 10-K filing with the U.S. Securities and Exchange Commission (U.S. SEC). It provides an example of the type of information that we can sometimes glean from a company's financial reports on its value drivers and short-term forecasts.

. . . Our real estate strategy in fiscal 2005 includes plans to open about 175 new stores, weighted more toward Old Navy. We have announced the launch of a new brand targeted at women over the age of 35 and the expansion of Banana Republic into Japan. . . . We also plan to close about 135 stores in 2005, mainly from Gap brand in North America . . . These growth initiatives and moves will negatively impact operating expenses in fiscal 2005, but will position us to take advantage of future opportunities.

In 2005, we expect earnings per share to grow to \$1.41 to \$1.45 per share on a fully diluted basis. . . . We expect operating margin to be about 13% and we also expect to generate at least \$1 billion in free cash flow.

Note that although GAP plans to increase the number of stores it operates by 40, it plans to build 175 new stores and close 135 stores; thus, we would forecast capital expenditures for 175 new stores and not for 40 net new stores.

Source: Gap, Inc. 2004 10-K filing with the U.S. SEC.

but under the auspices of multiple owners. A breakup value should be considered if the independent parts of the company can be utilized more effectively when sold to others than when operating as parts of a single conglomerate company.

We introduced the constant-growth perpetuity model in Chapter 1. In this chapter, we will focus on several key assumptions that we must satisfy in order to use the constant-growth perpetuity model for a continuing value calculation. First, we have to model the firm's year-by-year cash flows sufficiently far into the future so that we are willing to assume that the firm's rate of return on investment will remain constant in perpetuity; that the risks of its operations will be unchanged in the future; and that it is operating with a capital structure that could persist indefinitely given the nature of the business. If all of these hold, we say that the firm has reached steady state. Therefore, a key decision we must make is how far out we need to model the explicit year-by-year cash flows in order for the firm to reach steady state. Second, we have to create a base-year cash flow that we believe can grow at the chosen constant proportionate growth rate. This involves ensuring that all aspects of the free cash flows are growing at the same rate as the assumed growth rate, that the relationship between capital expenditures and depreciation is appropriate, and that the returns embedded in the company's cash flows for both its existing scale of operations and for new investments for real growth are reasonable. In short, we must truly believe that the cash flows in the base year of our continuing value calculation can grow at the chosen constant rate in perpetuity.

As it turns out, satisfying all of these conditions is difficult, and getting a reasonable continuing value requires extensive analysis. Finally, we discuss different techniques for assessing the reasonableness of our continuing value estimates. Since the continuing value component of total firm value is large, it is worth taking the time to do this analysis. Throughout the chapter, we will illustrate many of the concepts we discuss with a detailed analysis of Yahoo! Inc.

## 6.1 YAHOO! INC.

We use a discounted cash flow valuation of Yahoo! Inc. (Yahoo) as of the end of 2006 to illustrate the various issues, analyses, and adjustments that we discuss.<sup>3</sup> We pick this particular time as it helps illustrate the important points we make in this chapter. Yahoo had very little debt in its capital structure and \$2.3 billion in excess assets (marketable securities). In our illustration, we assume that at the end of 2006, Yahoo liquidated all of its excess assets, redeemed all of its debt (\$0.75 billion), and distributed the remaining proceeds (\$1.53 billion). Yahoo had a total market capitalization (firm value) of over \$34 billion around the end of its 2006 fiscal year (December 2006). We developed a set of forecasts that are consistent with this valuation and useful for our illustration. In Exhibit 6.1, we show Yahoo's historical and forecasted income statement and balance sheet forecasts.

Underline indicates changes.

In Exhibit 6.2, we show the free cash flow forecasts generated from operations for Yahoo. Since we assume that as of the date of our valuation, the company redeems all of its debt, liquidates all of its excess assets, and distributes the net proceeds to its equity holders, we do not include the distribution of the excess assets in the unlevered free cash flows in Exhibit 6.2.

We use a 12% unlevered cost of capital (discount rate) and a 2.5% constant free cash flow growth rate for years after 2017 to value Yahoo. We assume that 2.5% is a reasonable forecast for long-term inflation, so, for now, we are assuming no real growth for Yahoo after 2017. In Exhibit 6.3, we show Yahoo's DCF valuation. The valuation of Yahoo's operations is \$32.6 billion. Yahoo's total value is equal to the sum of the value of its operations and the net excess assets of \$2.3 billion which is roughly equal to its \$34.9 billion market capitalization (\$34.9 = \$32.6 + \$2.3) at that time.

We note that as of March 2012, Yahoo's market capitalization is only \$18.5 billion, roughly half of what it was at the end of 2006. Yahoo's revenue in 2011 was \$5 billion, much smaller than the \$25.7 billion we forecasted in order to replicate Yahoo's value in the marketplace in 2006. We also forecasted net income of \$4.0 billion for 2011 whereas its actual net income is \$1.05 billion; no wonder that Yahoo was unable to maintain its 2006 value.

<sup>3</sup> Yahoo (and its consolidated subsidiaries) is a leading global internet website portal. It generates revenue by providing marketing services to businesses across its properties and by establishing paying relationships with users of premium offerings. Yahoo was incorporated in 1995 and is a Delaware corporation headquartered in Sunnyvale, California.

**EXHIBIT 6.1** Yahoo! Inc.—Historical and Forecasted Income Statements and Balance Sheets

YAHOO! INC. Income Statement Forecasts (for the years ended December 31)													
(\$ in millions)	A2005	A2006	F2007	F2008	F2009	F2010	F2011	F2012	F2013	F2014	F2015	F2016	F2017
Revenue	\$ 5,258	\$6,426	\$ 8,032	\$10,442	\$14,096	\$19,735	\$25,655	\$30,786	\$34,647	\$36,406	\$37,316	\$38,249	\$39,205
Cost of goods sold	-2,096	-2,676	-3,213	-4,177	-5,639	-7,894	-10,262	-12,315	-13,859	-14,562	-14,926	-15,300	-15,682
Gross margin	\$ 3,161	\$3,750	\$ 4,819	\$ 6,265	\$ 8,458	\$11,841	\$15,393	\$18,472	\$20,788	\$21,844	\$22,390	\$22,949	\$23,523
Product development	-570	-833	-884	-1,149	-1,551	-2,171	-2,822	-3,387	-3,811	-4,005	-4,105	-4,207	-4,313
Selling, general & administrative	-1,484	-1,976	-2,249	-2,924	-3,947	-5,526	-7,183	-8,620	-9,701	-10,194	-10,449	-10,710	-10,977
Operating income	\$ 1,108	\$ 941	\$ 1,687	\$ 2,193	\$ 2,960	\$ 4,144	\$ 5,388	\$ 6,465	\$ 7,276	\$ 7,645	\$ 7,836	\$ 8,032	\$ 8,233
Interest expense			0	0	0	0	0	0	0	0	0	0	0
Other income and expenses	1,556	268	336	436	589	824	1,072	1,286	1,447	1,521	1,559	1,598	1,638
Income before taxes	\$ 2,664	\$1,209	\$ 2,022	\$ 2,629	\$ 3,549	\$ 4,969	\$ 6,459	\$ 7,751	\$ 8,723	\$ 9,166	\$ 9,395	\$ 9,630	\$ 9,871
Income tax expense	-768	-458	-768	-999	-1,349	-1,888	-2,455	-2,945	-3,315	-3,483	-3,570	-3,659	-3,751
Net income	\$ 1,896	\$ 751	\$ 1,254	\$ 1,630	\$ 2,200	\$ 3,081	\$ 4,005	\$ 4,806	\$ 5,408	\$ 5,683	\$ 5,825	\$ 5,971	\$ 6,120

YAHOO! INC. Balance Sheet Forecasts (for the years ended December 31)													
(\$ in millions)	A2005	Adjusted A2006	F2007	F2008	F2009	F2010	F2011	F2012	F2013	F2014	F2015	F2016	F2017
Cash plus marketable securities	\$ 2,561	\$ 321	\$ 402	\$ 522	\$ 705	\$ 987	\$ 1,283	\$ 1,539	\$ 1,732	\$ 1,820	\$ 1,866	\$ 1,912	\$ 1,960
Accounts receivable	722	931	1,100	1,430	1,931	2,703	3,514	4,217	4,746	4,987	5,112	5,240	5,371
Other current assets	167	218	241	313	423	592	770	924	1,039	1,092	1,119	1,147	1,176
Total current assets	\$ 3,450	\$1,470	\$ 1,743	\$ 2,266	\$ 3,059	\$ 4,282	\$ 5,567	\$ 6,680	\$ 7,518	\$ 7,900	\$ 8,097	\$ 8,300	\$ 8,507
Property, plant & equipment	\$ 1,267	\$1,955	\$ 2,758	\$ 3,802	\$ 5,212	\$ 7,185	\$ 9,751	\$12,829	\$16,294	\$19,118	\$22,047	\$25,099	\$28,228
Accumulated depreciation	-570	-853	-1,220	-1,737	-2,450	-3,428	-4,776	-6,604	-9,011	-11,250	-14,033	-16,885	-19,808
Property, plant & equipment (net)	\$ 698	\$1,101	\$ 1,538	\$ 2,065	\$ 2,761	\$ 3,757	\$ 4,975	\$ 6,225	\$ 7,284	\$ 7,868	\$ 8,014	\$ 8,214	\$ 8,420
Other non-current assets	\$ 6,685	\$6,662	\$ 6,948	\$ 7,622	\$ 8,740	\$10,459	\$11,673	\$12,161	\$12,126	\$11,650	\$11,941	\$12,240	\$12,546
Total assets	\$10,832	\$9,233	\$10,229	\$11,953	\$14,560	\$18,499	\$22,215	\$25,066	\$26,928	\$27,418	\$28,052	\$28,754	\$29,472
<del>* Other assets equal equity investments, goodwill and intangible and other assets</del>													
Accounts payable	\$ 70	\$ 109	\$ 161	\$ 209	\$ 282	\$ 395	\$ 513	\$ 616	\$ 693	\$ 728	\$ 746	\$ 765	\$ 784
Accrued expenses	1,134	1,365	2,008	2,610	3,524	4,934	6,414	7,697	8,662	9,101	9,329	9,562	9,801
Total current liabilities	\$ 1,204	\$1,474	\$ 2,169	\$ 2,819	\$ 3,806	\$ 5,328	\$ 6,927	\$ 8,312	\$ 9,355	\$ 9,830	\$10,075	\$10,327	\$10,585
Long-term debt	750	0	0	0	0	0	0	0	0	0	0	0	0
Non-current liabilities	311	129	161	209	282	395	513	616	693	728	746	765	784
Total liabilities	\$ 2,265	\$ 1,603	\$ 2,329	\$ 3,028	\$ 4,088	\$ 5,723	\$ 7,440	\$ 8,928	\$10,048	\$10,558	\$10,822	\$11,092	\$11,370
Common stock (and other)	\$ 5,600	\$ 5,443	\$ 5,443	\$ 5,443	\$ 5,443	\$ 5,443	\$ 5,443	\$ 5,443	\$ 5,443	\$ 5,443	\$ 5,443	\$ 5,443	\$ 5,443
Retained earnings	2,966	2,187	2,456	3,482	5,029	7,333	9,332	10,695	11,437	11,417	11,787	12,218	12,660
Total shareholders equity	\$ 8,566	\$ 7,630	\$ 7,899	\$ 8,925	\$10,472	\$12,776	\$14,775	\$16,138	\$16,880	\$16,860	\$17,231	\$17,661	\$18,103
Total liabilities and equities	\$10,832	\$9,233	\$10,229	\$11,953	\$14,560	\$18,499	\$22,215	\$25,066	\$26,928	\$27,418	\$28,052	\$28,754	\$29,472

**EXHIBIT 6.2** Yahoo! Inc.—Historical and Forecasted Free Cash Flow Schedules

YAHOO! INC. Free Cash Flow Forecasts (for the years ended December 31)													
(\$ in millions)	A2005	Adjusted A2006	F2007	F2008	F2009	F2010	F2011	F2012	F2013	F2014	F2015	F2016	F2017
Earnings before interest and taxes (EBIT)	\$2,664	\$1,209	\$2,022	\$2,629	\$3,549	\$4,969	\$6,459	\$7,751	\$8,723	\$9,166	\$9,395	\$9,630	\$9,871
- Income taxes paid on EBIT	-768	-458	-768	-999	-1,349	-1,888	-2,455	-2,945	-3,315	-3,483	-3,570	-3,659	-3,751
Earnings before interest and after taxes	\$ 1,896	\$ 751	\$ 1,254	\$ 1,630	\$ 2,200	\$ 3,081	\$ 4,005	\$ 4,806	\$ 5,408	\$ 5,683	\$ 5,825	\$ 5,971	\$ 6,120
+ Depreciation	224	302	367	517	713	977	1,348	1,829	2,406	3,056	3,586	3,675	3,767
+ Amortization	173	238	238	238	238	238	238	238	238	238	238	238	238
- Change in accounts receivable	-272	-185	-169	-330	-501	-772	-811	-703	-529	-241	-125	-128	-131
- Change in other current assets	0	0	-23	-72	-110	-169	-178	-154	-116	-53	-27	-28	-29
- Change in other assets	-35	-10	-523	-912	-1,355	-1,957	-1,451	-725	-203	239	-529	-536	-544
+ Change in accounts payable	32	30	52	48	73	113	118	103	77	35	18	19	19
+ Change in accrued expenses	212	175	643	602	914	1,410	1,480	1,283	965	440	228	233	239
+ Change in non-current liabilities	-518	70	32	48	73	113	118	103	77	35	18	19	19
- Change in required cash balance		-41	-80	-120	-183	-282	-296	-257	-193	-88	-46	-47	-48
Unlevered cash flow from operations	\$1,711	\$1,331	\$1,788	\$1,648	\$2,063	\$2,750	\$4,571	\$6,522	\$8,131	\$9,344	\$9,186	\$9,416	\$9,651
- Capital expenditures (net)	-2,146	-816	-803	-1,044	-1,410	-1,973	-2,566	-3,079	-3,465	-3,641	-3,732	-3,876	-3,973
Unlevered free cash flow	\$ -435	\$ 515	\$ 985	\$ 604	\$ 654	\$ 777	\$ 2,006	\$ 3,443	\$ 4,666	\$ 5,703	\$ 5,454	\$ 5,540	\$ 5,678

**EXHIBIT 6.3** Yahoo! Inc.—Discounted Cash Flow Valuation

YAHOO! INC. Discounted Cash Flow Valuation												
Cost of capital .....	12.0%											
Growth rate for free cash flow for continuing value .....	2.5%											
(\$ in millions)	2006	F2007	F2008	F2009	F2010	F2011	F2012	F2013	F2014	F2015	F2016	CV <sub>Firm</sub> F2016
Unlevered free cash flow for continuing value .....												\$ 5,678
Discount factor for continuing value .....												10.526
Unlevered free cash flow and continuing value .....		\$ 985	\$ 604	\$ 654	\$ 777	\$2,006	\$3,443	\$4,666	\$5,703	\$5,454	\$5,540	\$59,773
Discount factor .....		0.893	0.797	0.712	0.636	0.567	0.507	0.452	0.404	0.361	0.322	0.322
Present value .....		\$ 879	\$ 482	\$ 465	\$ 494	\$1,138	\$1,744	\$2,111	\$2,303	\$1,967	\$1,784	\$19,245
Value of the firm (without excess cash) .....	\$32,612											
Net excess assets .....	2,280											
Value of the firm .....	\$34,892											

## 6.2 THE CONSTANT-GROWTH PERPETUITY MODEL

We often use the constant-growth perpetuity model to estimate continuing value. We first discuss the model and its derivation and we then go on to discuss the assumptions we have to make about the company in order use the constant-growth cash flow perpetuity model to estimate a company’s continuing value.

Below, we show the formula to discount an infinite series of cash flows.<sup>4</sup>

$$V_0 = \sum_{t=1}^{\infty} \frac{FCF_t}{(1+r)^t}$$

If we assume free cash flows grow at a constant rate, *g*, after Year 1, we can expand the infinite sum as follows.<sup>5</sup>

$$V_0 = \frac{FCF_1}{(1+r)} \times \left( 1 + \frac{(1+g)}{(1+r)} + \frac{(1+g)^2}{(1+r)^2} + \dots + \frac{(1+g)^{\infty-1}}{(1+r)^{\infty-1}} \right)$$

We cannot directly calculate the result of this formula, for we cannot directly calculate an infinite series; however, we can nicely summarize the above formula if we make an assumption about the relative magnitudes of the discount rate and growth rate. If the discount rate is equal to the growth rate (*r* = *g*), then the last term in the formula is equal to infinity, for an infinite series of 1s is equal to infinity [ $\infty = FCF_1/(1+r) \times (1 + 1 + 1 + \dots)$ ]. We also arrive at the same answer if the discount rate is less than the growth rate (*r* < *g*) because an infinite series of numbers greater than 1 is equal to infinity. If the discount rate is greater than the growth rate (*r* > *g*), the present value of the constant-growth perpetuity is less than infinity and greater than zero.<sup>6</sup> In this case, we can reduce the above formula to a simple and usable form—the constant-growth perpetuity formula.

$$V_0 = \frac{FCF_1}{(r-g)} \tag{6.1}$$

### Using the Free Cash Flow in Year Zero (FCF<sub>0</sub>)

Using the above assumptions, we can also adapt the above perpetuity formula to use the free cash flow in Year 0 ( $FCF_1 = FCF_0 \times (1 + g_1)$ ) as shown below.

$$V_{F,0} = \frac{FCF_0 \times (1 + g_1)}{r - g} \tag{6.2}$$

<sup>4</sup> The discount rate, *r*, is equal to the unlevered cost of capital for an all equity company or the weighted average cost of capital for a company with debt.

<sup>5</sup> In most situations, the free cash flow in period 1 must be greater than zero in order to make the constant-growth assumption.

<sup>6</sup> Recall that we are assuming that the initial cash flow, *FCF*<sub>1</sub>, is positive, that the constant growth rate is a finite number ( $-\infty < g < \infty$ ), and that the discount rate is a finite positive number ( $0 < r < \infty$ ).

**LO1** Calculate continuing value using the constant-growth perpetuity model

holding period for the stock returns used to estimate the market model. Then, we estimate the model and adjust the beta estimate for such effects as mean reversion. When implementing this process, we must be cognizant of the second step in the cost of equity estimation process in Exhibit 8.3, which is evaluating the stability of the companies' operating risk and financial leverage risk, as it informs us about the time period we should use to estimate beta.

#### EXHIBIT 8.4 Steps in Estimating Beta of the Company's Common Stock

1	Decide to use commercially available beta estimate or develop own estimate (if using commercially available estimate, stop sub-process here; however, you should identify underlying assumptions that link to the market risk premium and risk-free rate estimates, as well as understand the period over which beta is estimated)
2	Choose a market index (links to the market risk premium estimation process)
3	Choose an estimation period (length of period and specific dates)
4	Choose the periodicity for the stock return (daily, weekly, or monthly interval)
5	Collect the necessary data and estimate the market model
6	Make adjustments, if any, for mean reversion and other effects

## The Equity Cost of Capital Used in Valuation is Forward Looking but Estimated Using Historical Data

When we estimate a company's cost of capital for purposes of valuing it, we require a **forward-looking** estimate of that cost of capital, that is, a cost of capital relevant for discounting future free cash flows. Unfortunately, the regression approach used to measure beta uses historical information, and therefore represents the historical beta. As we discuss next, the estimate of beta can shift from one estimation period to another for the same company. This effect can be due to just the noise in estimated betas or it can be due to shifts in economic fundamentals, which change the systematic risk of the company or its industry. Below, we discuss ways that we can adjust betas estimated using historical data so they better represent more forward-looking betas, but it is useful to remember that by necessity we start with something that is historical, not forward looking.

## The Market Model

The **market model** represents a direct way to estimate the beta of an asset or security using historical information. It can also further strengthen our intuition for why beta is the measure of risk that is priced in the CAPM. Since we are focused on estimating the cost of equity capital, we focus our discussion on using the market model to estimate equity betas using stock returns; however, it is possible to use the market model for any asset or security if the necessary data are available. We estimate the parameters of the **market model**, one of which is beta, using regression analysis. Such regressions are typically referred to as **market model regressions**. **Regression analysis** is a statistical method that explains the variation in a **dependent variable** with other variables called **independent variables**. A regression model has one dependent variable and can have one or more independent variables.

The standard market model regression has one independent variable; it is a "simple" regression where the stock return of the company for which we are estimating beta is the dependent variable (left-hand-side variable) and the contemporaneous return on a proxy for the market portfolio is the independent variable (right-hand-side variable). We estimate the regression using a time-series (from  $t = 1$  to  $t = T$ ) of the stock returns,  $R_{it}$ , and the contemporaneous returns on the market index,  $R_{mt}$ . The equation for the market model is:

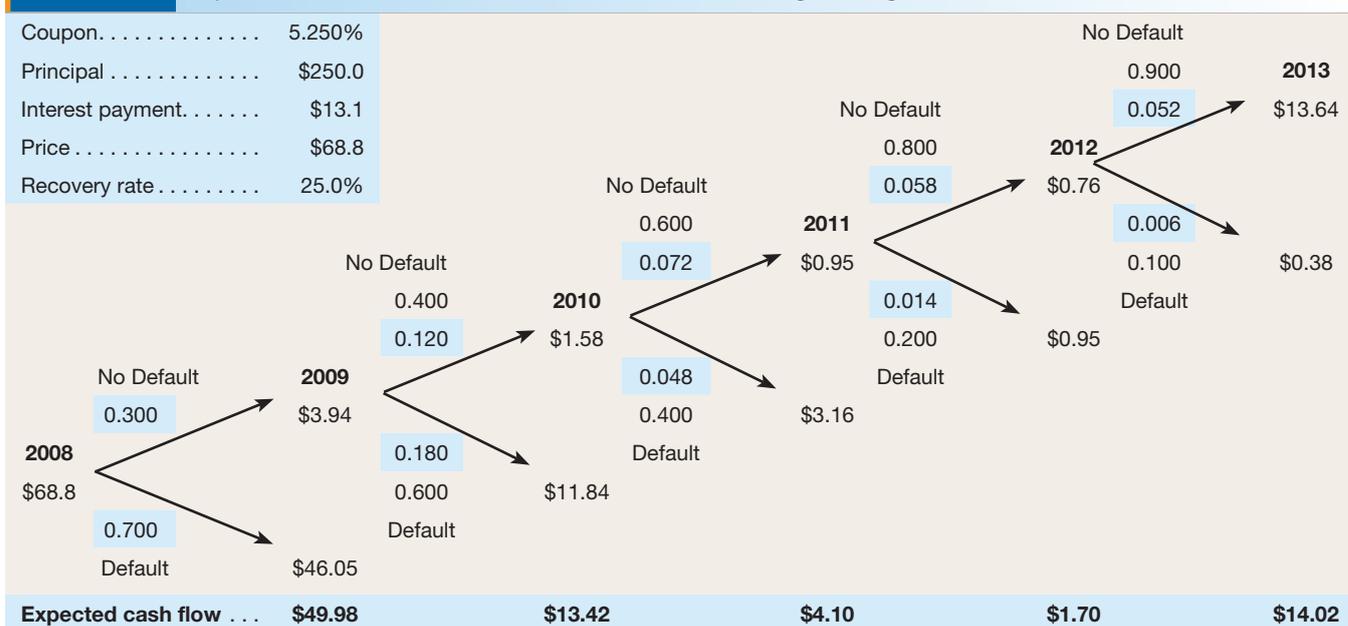
$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \quad t = 1, \dots, T \quad (8.6)$$

The market model specifies that the return of a stock is equal to a constant,  $\alpha_i$ , plus the asset's beta,  $\beta_i$ , multiplied by the return on the market, plus a shock or noise term. The estimate of  $\beta_i$  is the slope of the fitted regression line, and is an estimate of the beta of the CAPM. The estimated  $\alpha_i$  is the intercept of the regression line on the vertical axis. \*

Assuming the data meet the assumptions required for ordinary least squares regression (primarily normality, stationarity, and serial independence of the error terms), the estimate of beta,  $\hat{\beta}_i$ , from a

\* It is also common to estimate beta by regressing a company's return minus the return on the risk-free asset on the market return minus the return on the risk-free asset (called an excess return form of Equation 8.6). Generally, the beta estimates using excess returns are similar to those using Equation 8.6. For example, the beta estimates for the companies in Exhibits 8.5 and 8.6 are different at the third decimal point (a difference in the range of .0001 to .0067).

**EXHIBIT 9.8** Expected Cash Flows for American Axle & Manufacturing Holdings, Inc.



**REVIEW EXERCISE 9.3**

**Debt Cost of Capital for Debt with Maturity Greater than One Year**

Assume the company issues debt with the following characteristics:

Face value of debt . . . . .	\$600
Coupon interest rate (paid annually) . . . . .	8%
Years to maturity . . . . .	5
Issue price . . . . .	\$460
Recovery rate (all years) . . . . .	50%
(Recovery rate is for the principal plus interest for the year of default)	
Probability of default—Year 1 . . . . .	30%
Probability of default—Year 2 . . . . .	20%
Probability of default—Year 3 . . . . .	15%
Probability of default—Year 4 . . . . .	5%
Probability of default—Year 5 . . . . .	5%

Calculate the yield to maturity, the cost of debt, and the expected default loss for this debt issue as of the issue date.

**Solution on page 378.**

**Preferred Stock and the Adjusted Promised Yield Approach**

We use the same conceptual framework to measure the cost of capital for preferred stock as we use to measure the debt cost of capital. The primary differences between debt and preferred stock securities are that debt typically has required interest payments and a defined term to maturity whereas preferred stock often has no mandatory dividend payments and no maturity. Dividend payments must be paid before common shareholders receive distributions if the dividends are cumulative, but not paying preferred dividends only results in an arrearage (dividends in arrears), not a default. For non-cumulative preferred, not paying preferred dividends generally just means that you cannot pay common dividends for some time period (see Valuation in Practice 9.1). Not paying interest results in a default on the debt

from 19.7% to 84.1%, making this rating group the one with the highest probability. Thus, the model classifies General Motors in the correct categories for both periods.

**EXHIBIT 9.20** The HZ Credit Rating Model Applied to General Motors Corporation as of September 30 and December 31, 2008\*

Panel A: September 30, 2008, Actual Credit Rating = B							
General Motors Corporation (Credit Rating = B)							
Variable (Logit Model Estimation)	Coefficients	CCC+ & Below	B- to B+	BB- to BB+	BBB- to BBB+	A- to A+	AA- to AAA
Intercept for CCC+ & below . . . . .	-5.632	-5.632					
Intercept for B- to B+ . . . . .	-1.669		-1.669				
Intercept for BB- to BB+ . . . . .	-0.072			-0.072			
Intercept for BBB- to BBB+ . . . . .	1.663				1.663		
Intercept for A- to A+ . . . . .	3.447					3.447	
EBIT to average total debt + shareholders' equity . . . . .	-5.387	0.118	0.118	0.118	0.118	0.118	
Interest to EBITDA . . . . .	2.441	0.233	0.233	0.233	0.233	0.233	
Total debt to CFO – capital expenditures . . . . .	-0.002	234.598	234.598	234.598	234.598	234.598	
Total debt to total debt + shareholders' equity . . . . .	2.092	2.283	2.283	2.283	2.283	2.283	
Capital expenditures to EBITDA . . . . .	-0.182	0.605	0.605	0.605	0.605	0.605	
HZ credit rating score . . . . .		-1.404	2.559	4.156	5.891	7.675	
Cumulative probability . . . . .		0.197	0.928	0.985	0.997	0.9995	1.000
<b>Probability of this credit rating . . . . .</b>		<b>19.72%</b>	<b>73.10%</b>	<b>5.64%</b>	<b>1.27%</b>	<b>0.23%</b>	<b>0.05%</b>
Panel B: December 31, 2008, Actual Credit Rating = CCC+							
General Motors Corporation (Credit Rating = CCC+)							
Variable (Logit Model Estimation)	Coefficients	CCC+ & Below	B- to B+	BB- to BB+	BBB- to BBB+	A- to A+	AA- to AAA
Intercept for CCC+ & below . . . . .	-5.632	-5.632					
Intercept for B- to B+ . . . . .	-1.669		-1.669				
Intercept for BB- to BB+ . . . . .	-0.072			-0.072			
Intercept for BBB- to BBB+ . . . . .	1.663				1.663		
Intercept for A- to A+ . . . . .	3.447					3.447	
EBIT to average total debt + shareholders' equity . . . . .	-5.387	-0.141	-0.141	-0.141	-0.141	-0.141	
Interest to EBITDA . . . . .	2.441	-0.307	-0.307	-0.307	-0.307	-0.307	
Total debt to CFO – capital expenditures . . . . .	-0.002	-2.311	-2.311	-2.311	-2.311	-2.311	
Total debt to total debt + shareholders' equity . . . . .	2.092	3.424	3.424	3.424	3.424	3.424	
Capital expenditures to EBITDA . . . . .	-0.182	-0.668	-0.668	-0.668	-0.668	-0.668	
HZ credit rating score . . . . .		1.665	5.628	7.225	8.960	10.744	
Cumulative probability . . . . .		0.841	0.996	0.999	1.000	1.000	1.000
<b>Probability of this credit rating . . . . .</b>		<b>84.1%</b>	<b>15.6%</b>	<b>0.3%</b>	<b>0.1%</b>	<b>0.0%</b>	<b>0.0%</b>

\* Note: The financial ratios are listed in the table, and the HZ credit rating score is the sum of each ratio multiplied by the applicable coefficient and the appropriate intercept.

Note that given the sample used, senior unsecured debt ratings, one would have to adjust the rating for debt issues that are secured or collateralized or for debt issues that are junior or junior subordinated. It is not unusual for a company with many different kinds of debt instruments outstanding to have different ratings on its debt as a function of security, seniority and maturity.

Note that all such classification or prediction models of this kind make an assumption about the relative cost of misclassifying a company. In our illustration, we assumed that the misclassification cost was constant for each credit rating group, and we chose the credit rating group with the highest probability. If we assume the misclassification costs are not equal, we must adjust the model for the unequal misclassification costs.

In Exhibit 9.21, we show this same analysis for Accenture which had an actual rating of A+. The highest probability rating group for Accenture is the highest rating group—AA- to AAA. Like the individual financial ratio analyses we discussed earlier, the debt rating model classifies Accenture as having a rating higher than its actual rating.

**Review Exercise 9.4: Debt Cost of Capital Estimated Using the CAPM**

Debt cost of capital for AA rated debt . . . . .	6.0%
Market risk premium. . . . .	4.0%
Incremental cost of capital for Ba rating . . . . .	1.1%
Estimated debt cost of capital for Ba rating. . . . .	7.1%

The estimated debt cost of capital is 7.1% ( $0.071 = 0.06 + 0.011$ ).

**Review Exercise 9.5: Using Financial Ratios to Estimate a Credit Rating**

Financial Ratios:	Ratio	Rating
Operating margin (before D&A) (%) . . . . .	64.0%	AAA
Return on capital (%) . . . . .	25.3%	A to AA
EBIT interest coverage (x) . . . . .	14.46	A to AA
EBITDA interest coverage (x) . . . . .	16.34	A to AA
Free cash flow to debt (%) . . . . .	66%	A to AA
Free operating cash flow to debt (%) . . . . .	74%	A to AA
Debt to EBITDA (x) . . . . .	0.78	AA to AAA
Debt to debt + equity (%) . . . . .	38%	BBB to A

The financial ratios for the Snap Company correspond with credit ratings ranging from AAA to BBB which illustrates the fact that using financial ratio distributions to estimate a credit rating can be difficult. Five of the ratios are between the median financial ratios for credit ratings between A and AA and the debt to debt plus equity ratio is very close to the cutoff for an A rating (ratio of 38% versus a cutoff of 36.8%). One of the eight ratios is associated with a credit rating between AA and AAA and another is an AAA rating. Given just the information in the financial ratios, we would anticipate that Snap Company would have an A rating.

**Review Exercise 9.6: Using the HZ Credit Rating Model to Estimate a Credit Rating**

Variable (Logit Model Estimation)	Coefficients	CCC+ & Below	B- to B+	BB- to BB+	BBB- to BBB+	A- to A+	AA- to AAA
Intercept for CCC+ & below . . . . .	-5.632	-5.632					
Intercept for B- to B+ . . . . .	-1.669		-1.669				
Intercept for BB- to BB+ . . . . .	-0.072			-0.072			
Intercept for BBB- to BBB+ . . . . .	1.663				1.663		
Intercept for A- to A+ . . . . .	3.447					3.447	
EBIT to average total debt + shareholders' equity . . . . .	-5.387	0.421	0.421	0.421	0.421	0.421	
Interest to EBITDA . . . . .	2.441	0.061	0.061	0.061	0.061	0.061	
Total debt to CFO - capital expenditures . . . . .	-0.002	1.595	1.595	1.595	1.595	1.595	
Total debt to total debt + shareholders' equity . . . . .	2.092	0.381	0.381	0.381	0.381	0.381	
Capital expenditures to EBITDA . . . . .	-0.182	0.055	0.055	0.055	0.055	0.055	
HZ credit rating score . . . . .		-6.965	-3.002	-1.405	0.330	2.114	
Cumulative probability . . . . .		0.001	0.047	0.197	0.582	0.892	1.000
<b>Probability of credit rating . . . . .</b>		<b>0.1%</b>	<b>4.6%</b>	<b>15.0%</b>	<b>38.5%</b>	<b>31.0%</b>	<b>10.8%</b>

The credit rating with the highest probability is the BBB- to BBB+ group with a probability of 38.5%, but the probability for the A- to A+ group is quite close at 31%. This result indicates that the range of most likely credit ratings is quite wide—from A+ to BBB-.

	Option 1	Option 2	Option 3
Unlevered free cash flow .....	\$1,000	\$1,000	\$1,000
Perpetual growth rate .....	3.0%	3.0%	3.0%
Risk free rate .....	4.0%		
Market risk premium .....	6.0%		

	Option 1	Option 2	Option 3
Debt to firm value .....	10.0%	10.0%	70.0%
Preferred stock to firm value .....	40.0%	10.0%	10.0%
Unlevered cost of capital .....	10.0%	10.0%	10.0%
Debt cost of capital .....	6.0%	6.0%	7.0%
Preferred stock cost of capital .....	9.0%	8.0%	8.0%
Equity cost of capital .....	???	???	???
Income tax rate for all income .....	40.0%	40.0%	40.0%

- a. For each option, calculate the equity cost of capital and weighted average cost of capital under the assumption that interest is tax deductible and that (i) the discount rate for interest tax shields is the unlevered cost of capital, (ii) the discount rate for interest tax shields is the debt cost of capital (zero-growth with fixed amount of perpetual debt), and (iii) the company refinances itself annually to a target capital structure (use the debt cost of capital for the first year and the unlevered cost of capital for subsequent years).
- b. For each option and each alternative assumption about valuing the tax shields:
  - i. Value the firm and the equity using the WACC DCF method.
  - ii. Value the firm using the APV DCF method.
  - iii. Value the equity using the Equity DCF method.
  - iv. Explain any discrepancies between the valuations.

**P10.2 Levering Unlevered Beta** Use the information from P10.1 ~~and assume that the risk free rate is 4% and that the market risk premium is 6%.~~ Answer P10.1 (Part A only) but calculate the equity beta and then use the CAPM to calculate the equity cost of capital.

**P10.3 Levering the Unlevered Cost of Capital** A company is going to finance itself with the capital structure shown below. The company will generate a perpetual series of cash flows that will not grow. Management plans to measure the value of the firm and the value of each of its securities based on the information below and some additional assumptions outlined in each part of the problem. For each part of the problem, measure the value of the firm using the WACC valuation method and measure the value of each of the securities the company uses to finance itself. Then use the APV method to value the firm. Finally, measure the company's equity free cash flow and use the Equity DCF valuation method to value the company's equity.

Debt to firm value .....	40.0%
Preferred stock to firm value .....	20.0%
Unlevered cost of capital .....	12.0%
Debt cost of capital .....	9.0%
Preferred stock cost of capital .....	10.0%
Equity cost of capital .....	???
Income tax rate for interest ( $T_{INT}$ ) .....	40.0%
Unlevered free cash flow .....	\$1,000
Growth rate .....	0.0%

- a. Assume the company is going to issue short-term debt and continually refinance itself such that the discount rate for the company's interest tax shields is equal to the unlevered cost of capital.
- b. Assume that the company is going to issue long-term debt and preferred stock such that the discount rate for the company's interest tax shields is equal to the debt cost of capital.
- c. Assume that the company annually refinances itself to maintain a constant proportionate capital structure.
- d. Compare the equity cost of capital, weighted average cost of capital, value of the firm, value of each of the company's securities, and equity free cash flow for parts (a), (b) and (c) of the problem. Explain how and why they differ.

**P10.4 Unlevering the Equity Cost of Capital** Below, we show the information for two potential comparable companies. Calculate the unlevered cost of capital based on the following assumptions. Neither company expects its free cash flows to grow.

Risk-free cost of capital . . . . .	4.0%		
Market risk premium . . . . .	6.0%		
		<b>Company 1</b>	<b>Company 2</b>
			<b>Company 3</b>
Debt to firm value . . . . .	10.0%	20.0%	60.0%
Preferred stock to firm value . . . . .	40.0%	20.0%	20.0%
Unlevered CAPM beta . . . . .	1.000	1.000	1.000
Debt cost of capital . . . . .	6.0%	6.0%	7.0%
Preferred stock cost of capital . . . . .	7.0%	6.5%	7.5%
Equity cost of capital . . . . .	???	???	???
Income tax rate for interest ( $T_{INT}$ ) . . . . .	40.0%	40.0%	40.0%

- P10.8 Incorrect Valuation Assumptions** A privately held company finances itself with long-term debt and preferred stock using the capital structure shown below. The company's current free cash flow is \$100, and it expects to generate a series of cash flows that will grow at 3% per year in perpetuity. The company plans to maintain its current capital structure strategy of 50% debt and 20% preferred stock in perpetuity, refinancing the company on an ongoing basis.

Initial debt to firm value . . . . .	50.0%
Initial preferred stock to firm value . . . . .	20.0%
Unlevered cost of capital . . . . .	12.0%
Debt cost of capital . . . . .	8.0%
Preferred stock cost of capital . . . . .	9.0%
Equity cost of capital . . . . .	???
<b>Tax rate on all income . . . . .</b>	<b>40%</b>

The company's chief financial officer (CFO) measured the company's equity cost of capital using the following formula.

$$r_E = r_{UA} + (r_{UA} - r_D) \times (1 - T_{INT}) \times \frac{V_D}{V_E} + (r_{UA} - r_{PS}) \times \frac{V_{PS}}{V_E}$$

The CFO valued the company and its equity using the WACC valuation method. The CFO wants to check the WACC valuation by using the APV valuation method but is unsure how to use this valuation method to check the WACC valuation. The CFO calculated a \$15,152 firm value using the WACC valuation method.

- Reproduce the CFO's equity cost of capital, weighted average cost of capital, and WACC valuation and compare it to an APV valuation. Are the valuations consistent?
- Use the WACC valuation method to value the firm and the equity correctly by discounting the tax shields at the unlevered cost of capital. Use the APV valuation method to value the firm, and use the Equity DCF valuation method to value the company's equity. Are the valuations consistent?

## SOLUTIONS FOR REVIEW EXERCISES

### Review Exercise 10.1: The Palm Company—Levering the Unlevered Cost of Capital

- If we assume the discount rate for interest tax shields is equal to the company's unlevered cost of capital, then Palm's equity cost of capital (using Equation 10.4) and weighted average cost of capital are, respectively,

$$r_E = 0.12 + (0.12 - 0.07) \times \frac{0.3}{0.5} + (0.12 - 0.08) \times \frac{0.2}{0.5} = 0.1660$$

$$r_{WACC} = 0.1660 \times 0.5 + 0.07 \times (1 - 0.45) \times 0.3 + 0.08 \times 0.2 = 0.1105$$

- Alternatively, if we assume the discount rate for interest tax shields is equal to the company's cost of debt, then Palm's equity cost of capital (using Equation 10.5) and weighted average cost of capital are, respectively,

$$r_E = 0.12 + (0.12 - 0.07) \times (1 - 0.45) \times \frac{0.3}{0.5} + (0.12 - 0.08) \times \frac{0.2}{0.5} = 0.1525$$

$$r_{WACC} = 0.1525 \times 0.5 + 0.07 \times (1 - 0.45) \times 0.3 + 0.08 \times 0.2 = 0.1038$$

**EXHIBIT 11.6** AMR Corporation—2006 Summary Income Statement and Balance Sheet With and Without Capitalizing Its Operating Leases

AMR Corporation Summarized Financial Statements (\$ in millions)	2006 Reported	Beginning of Year Balance	Adjust Rent Expense	Amortization of Capital Lease Asset	Income Taxes	Acquisition of Additional Leases	2006 Adjusted
<b>Income Statement</b>							
Revenues . . . . .	\$22,563.0						\$22,563.0
Rent expense . . . . .	-1,065.0		\$1,065.0				0.0
Depreciation and amortization . . . . .	-1,157.0						-1,157.0
Amortization of operating leases . . . . .				\$-777.2			-777.2
All other operating expenses . . . . .	-19,281.0						-19,281.0
Operating income . . . . .	\$ 1,060.0	\$ 0.0	\$1,065.0	\$-777.2	\$ 0.0	\$ 0.0	\$ 1,347.8
Interest expense, net . . . . .	-722.0						-722.0
Miscellaneous, net . . . . .	-107.0						-107.0
Lease interest . . . . .			-544.0				-544.0
Income before taxes . . . . .	\$ 231.0	\$ 0.0	\$ 521.0	\$-777.2	\$ 0.0	\$ 0.0	\$ -25.3
Income taxes . . . . .	0.0				97.4		97.4
Net income . . . . .	\$ 231.0	\$ 0.0	\$521.0	\$-777.2	\$ 97.4	\$ 0.0	\$ 72.1
<b>Balance Sheet</b>							
Current assets . . . . .	\$ 6,902.0						\$ 6,902.0
Net property, plant, equipment . . . . .	17,941.0						17,941.0
Other assets . . . . .	4,302.0						4,302.0
Deferred tax asset . . . . .					\$ 97.4		97.4
Capitalized operating leases . . . . .		\$7,772.1		\$-777.2		\$286.6	7,281.5
Total assets . . . . .	\$29,145.0	\$7,772.1	\$ 0.0	\$-777.2	\$ 97.4	\$286.6	\$36,523.9
Current operating liabilities . . . . .	\$ 7,156.0						\$ 7,156.0
Other liabilities . . . . .	9,205.0						9,205.0
Deferred tax liability . . . . .					\$ 0.0		0.0
Debt . . . . .	13,390.0						13,390.0
Capitalized operating leases . . . . .		\$7,772.1	\$-521.0			\$286.6	7,537.8
Total liabilities . . . . .	\$29,751.0	\$7,772.1	\$-521.0	\$ 0.0	\$ 0.0	\$286.6	\$37,288.8
Shareholders' equity . . . . .	-606.0		521.0	-777.2	97.4		-764.9
Total liabilities and shareholders' equity . . . . .	\$29,145.0	\$7,772.1	\$ 0.0	\$-777.2	\$ 97.4	\$286.6	\$36,523.9

Underline indicates change.

The income tax adjustment of \$97.4 is the change in net income before tax of  $-256.2$  ( $-256.2 = 521 - 777.2$ ) multiplied by 38%. Note that in the restated financials there is a deferred tax liability of \$2,767.0 ( $\$2,767.0 = \$7,281.5$  ending 2006 capitalized operating lease asset  $\times$  0.38 tax rate) and the deferred tax asset of \$2,864.4 ( $\$2,864.4 = \$7,537.8$  ending 2006 capitalized lease liability  $\times$  0.38 tax rate), which difference between the two is equal to the tax adjustment of \$97.4, so there is no change in cash taxes paid.<sup>13</sup> Finally, we record the additional leases for 2006 (see Exhibit 11.5 for this calculation). Thus, as we showed previously, even though the total amount of capitalized leases at year-end decreased from \$7,772.1 to \$7,537.8, AMR obtained new assets under leases of \$286.6 million.

net deferred tax asset of \$97.4 which

is equal to the net of the

We present a summary free cash flow schedule for AMR in Exhibit 11.7. This exhibit has the same columns as the previous exhibit. The first adjustment we make to the income statement and balance sheet—recording the beginning balance—is not relevant for measuring free cash flows because it does not represent a cash flow in 2006. The other adjustments all flow to the free cash flow statement. Converting from the operating lease method to the capitalized lease method has no effect on equity free cash

<sup>13</sup> Recall that a deferred tax liability exists whenever the book value of an asset for financial reporting purposes exceeds the tax basis of that asset. Since the value of the lease asset on the income tax records is zero, the value of the deferred income tax liability each year is equal to the value of the lease asset each year multiplied by the income tax rate. Similarly, a deferred tax asset exists whenever the book value of a liability for financial reporting purposes exceeds the tax basis of that asset. Here the value of the lease obligation for income tax records is zero, so the value of the deferred tax asset is equal to the value of the capitalized lease obligation multiplied by the income tax rate.

flows; even though this affects net income, because the choice of method does not affect the company's equity free cash flows—however, notice that the unlevered cash flows increase from \$1,296 to \$1,867.6.

**EXHIBIT 11.7** AMR Corporation—2006 Summary Free Cash Flow Schedule

AMR Corporation Summarized Free Cash Flow Schedule (\$ in millions)	2006 Reported	Adjust Rent Expense	Amortization of Capital Lease Asset	Income Taxes	Acquisition of Additional Leases	2006 Adjusted
Earnings before interest and taxes (EBIT) . . . . .	\$ 953.0	\$1,065.0	\$-777.2			\$1,240.8
– Income taxes paid on EBIT . . . . .	0.0			\$-109.4		-109.4
Earnings before interest and after taxes . . . . .	\$ 953.0	\$1,065.0	\$-777.2	\$-109.4	\$ 0.0	\$1,131.4
+ Depreciation and amortization . . . . .	1,157.0					1,157.0
+ Amortization of operating leases . . . . .			777.2			777.2
– Change in net working capital . . . . .	450.0					450.0
+ Change in non-current liabilities and other . . . . .	101.0			-97.4		3.6
– Change in required cash balance . . . . .	0.0					0.0
Unlevered cash flow from operations . . . . .	\$2,661.0	\$1,065.0	\$ 0.0	\$-206.7	\$ 0.0	\$3,519.3
– Capital expenditures (net) . . . . .	-1,365.0					-1,365.0
– Increase in capital lease assets . . . . .					-286.6	-286.6
Unlevered free cash flow . . . . .	\$1,296.0	\$1,065.0	\$ 0.0	\$-206.7	\$-286.6	\$1,867.6
– Interest paid . . . . .	-722.0	-544.0				-1,266.0
+ Interest tax shield . . . . .				206.7		206.7
+ Change in non-common equity . . . . .	-821.0	-521.0				-821.0
+ Change in capital lease obligations . . . . .					286.6	-234.4
Free cash flow to common equity . . . . .	\$-247.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$-247.0
+ Change in common and other . . . . .	230.0					230.0
– Common dividends and repurchases . . . . .						0.0
Change in excess cash . . . . .	\$ -17.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ -17.0
+ Change in required cash balance . . . . .	0.0					0.0
Change in cash balance . . . . .	\$ -17.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ -17.0

These adjustments affect unlevered free cash flows because rent expense is an operating expense and decreases unlevered free cash flow whereas interest and the repayment of the capitalized lease obligation are financing related and do not affect unlevered free cash flows. We also adjust the unlevered free cash flows for the increase in the capitalized lease asset, which we treat as a capital expenditure.

Effectively, what we do is increase the unlevered free cash flows for the lease expense and then decrease it for the increase in capitalized lease assets (essentially the present value of new leases) and then decrease it for the tax shield on the implicit interest expense. In our example, the unlevered free cash flows as adjusted are \$1,867.6 ( $\$1,867.6 = \$1,296.0 + \$1,065 - 0.38 \times \$544 - \$286.6$ ). As such, we need not recast the entire financial statements to make these adjustments. Since rent expense can be larger than or smaller than the present value of new leases when many assets are leased, the effect on unlevered free cash flows can be either positive (which it is for AMR) or negative.<sup>14</sup>



**Valuation Key 11.4**

When we unlever comparable companies to determine the cost of capital for the company of interest, we need to make sure that the treatment of the leases for the company being valued and the comparable companies is the same—if that is not true, we must make appropriate adjustments.

<sup>14</sup> We have seen most of the numbers in the table before, but it is worth discussing a few of the tax numbers. The adjustment to income taxes on EBIT (-109.4) is calculated as 38% multiplied by the net rent expense (1,065.0) minus amortization of the leased asset (777.2). The adjustment to the line “Non-Current Liabilities and Other” (-97.4) is the ~~net~~ change in the deferred tax asset ~~and liability~~ from Exhibit 11.6. The sum of these two tax adjustments (-109.4 and -97.4) is -206.7 which is equal to the absolute value of the interest tax shield on the implicit interest ( $544.0 \times 0.38$ ).

**EXHIBIT A11.1** Hoplomasian Company—Three-Year Lease Example

Annual payment . . . . .	\$4,000.0			
Implicit interest rate . . . . .	10.0%	3.0	Life of lease	
Present value of lease payments . . . . .	\$9,947.4			
	<b>Beginning Lease Obligation</b>	<b>Implicit Interest</b>	<b>Lease Payment</b>	<b>Ending Lease Obligation</b>
Year 1 . . . . .	\$9,947.4	\$994.7	\$4,000.0	\$6,942.1
Year 2 . . . . .	\$6,942.1	\$694.2	\$4,000.0	\$3,636.4
Year 3 . . . . .	\$3,636.4	\$363.6	\$4,000.0	\$0.0

Exhibit may contain small rounding errors

The accounting for capitalized leases works like a house mortgage. For each period, interest expense is equal to the beginning balance of the lease obligation multiplied by the implicit interest rate. The difference between the lease payment and interest is equal to the reduction in the lease obligation. For example, in Year 1, interest is equal to \$994.7 (\$9,947.4 multiplied by 10%). The reduction in the lease obligation is \$3,005.3, which is equal to the difference between the lease payment and interest (\$3005.3 = \$4,000.0 – \$994.7).

In Exhibit A11.2, we present Hoplomasian's income statements and balance sheets for both the operating and capital lease treatments of the three-year life of the lease. At the beginning of the example, the company has no assets aside from \$1,000 in required cash, which remains constant over time. For each period, the company has a policy of distributing all equity free cash flows to its equityholders, and its income tax rate is 40% on all income. We present the operating lease treatment in the first set of columns in the exhibit. The company has revenues of \$10,000.0 in each year and has no expenses other than rent. Thus, each year, its pre-tax income is equal to \$6,000.0, its income tax is equal to \$2,400.0, and its net income is equal to \$3,600.0. Although we do not present the company's cash flows in this exhibit, given that the company has no non-cash assets or operating liabilities—and thus, no accruals—its equity free cash flows are equal to net income (see Exhibit A11.3, which we discuss later).

The capitalized lease treatment is more complex than the operating lease treatment for several reasons. First, over the life of the lease, the lease payments of \$12,000.0 are expensed by amortizing the capitalized lease asset of \$9,947.4 and expensing interest on the outstanding lease obligation, equal to \$2,052.6 over the life of the lease (see Exhibit A11.1). The sum of the lease amortization and interest expense is never equal to \$4,000 in any given year. As shown in Exhibit A11.2, the sum of the lease amortization and interest expense is greater than the lease payment in the early years of the lease and less than the lease payment in the later years of the lease.

Another complication arises because taxing authorities generally require use of the operating lease method for income taxes even if the lease is capitalized in the company's financial statements. As a result, deferred income taxes appear on the balance sheet, and the income tax expense is not equal to income taxes payable. A deferred income tax asset results whenever the book value of a liability for financial reporting purposes exceeds the value of that liability on the tax records (tax basis). The amount of the deferred tax asset is equal to that difference multiplied by the income tax rate. Since the value of the lease obligation on the income tax records is zero, the value of the deferred income tax asset is equal to the value of the capital lease obligation multiplied by the income tax rate; for example, at the end of Year 2, the deferred tax asset is equal to \$1,454.5 (\$1,454.5 = 0.40 × \$3,636.4).

Also recall that a deferred tax liability exists whenever the book value of an asset for financial reporting purposes exceeds the tax basis of that asset. Since the value of the lease asset on the income tax records is zero, the value of the deferred income tax liability is equal to the value of the lease asset multiplied by the income tax rate; for example, the end of Year 2 deferred tax liability is equal to \$1,326.3 (\$1,326.3 = 0.40 × \$3,315.8). Income tax expense for financial reporting purposes is equal to income taxes payable (\$2,400.0 each year), minus the change in the deferred tax asset plus the change in the deferred tax liability; for example, the Year 2 income tax expense is equal to \$2,396.0 [\$2,396.0 = \$2,400 – (\$1,454.5 – \$2,776.9) + (\$1,326.3 – \$2,652.6)].

Since our focus is on valuation, a key issue we must consider is whether capitalizing leases affects a company's free cash flows. We know that using the capitalized lease method affects neither the company's lease payments nor its income tax payments. However, the unlevered free cash flows are not equal between the two methods, for the capitalized lease method assumes the company essentially purchased the capitalized lease asset and financed that purchase with debt. Thus, both the magnitude and timing of the unlevered free cash flows change. We show this effect in Exhibit A11.3.

For financial reporting purposes, in Year 1 the deferred tax asset of \$2,776.9 (\$1,454.5 in Year 2) and the deferred tax liability of \$2,652.6 (\$1,326.3 in Year 2) are offset and reported as a net deferred tax asset of \$124.3 (\$128.2 in Year 2).

**EXHIBIT A11.2** Hoplamosian Company—Income Statements and Balances Sheets

Hoplamosian Company (\$ in thousands)	Actual Year 0	Operating Lease			Capitalized Lease			Total Operating Lease	Total Capitalized Lease
		Forecast Year 1	Forecast Year 2	Forecast Year 3	Forecast Year 1	Forecast Year 2	Forecast Year 3		
<b>Income Statement</b>									
Revenue	\$10,000.0	\$10,000.0	\$10,000.0	\$10,000.0	\$10,000.0	\$10,000.0	\$10,000.0	\$30,000.0	\$30,000.0
Rent	-4,000.0	-4,000.0	-4,000.0	-4,000.0	-3,315.8	-3,315.8	-3,315.8	-12,000.0	0.0
Capitalized lease amortization								0.0	-9,947.4
Earnings before interest and taxes	\$ 6,000.0	\$ 6,000.0	\$ 6,000.0	\$ 6,000.0	\$ 6,684.2	\$ 6,684.2	\$ 6,684.2	\$18,000.0	\$20,052.6
Interest expense	0.0	0.0	0.0	0.0	-994.7	-694.2	-363.6	0.0	-2,052.6
Income before taxes	\$ 6,000.0	\$ 6,000.0	\$ 6,000.0	\$ 6,000.0	\$ 5,689.5	\$ 5,990.0	\$ 6,320.6	\$18,000.0	\$18,000.0
Income tax expense	-2,400.0	-2,400.0	-2,400.0	-2,400.0	-2,275.8	-2,396.0	-2,528.2	-7,200.0	-7,200.0
Net income	\$ 3,600.0	\$ 3,600.0	\$ 3,600.0	\$ 3,600.0	\$ 3,413.7	\$ 3,594.0	\$ 3,792.3	\$10,800.0	\$10,800.0
<b>Balance Sheet</b>									
Cash	\$1,000.0	\$ 1,000.0	\$ 1,000.0	\$ 1,000.0	\$ 1,000.0	\$ 1,000.0	\$ 1,000.0	\$ 1,000.0	\$ 1,000.0
Capitalized lease asset					6,631.6	3,315.8	0.0	0.0	0.0
Deferred tax asset					124.3*	128.2*	0.0	0.0	0.0
Total assets	\$1,000.0	\$ 1,000.0	\$ 1,000.0	\$ 1,000.0	\$ 7,755.9	\$ 4,444.0	\$ 1,000.0	\$ 1,000.0	\$ 1,000.0
Deferred tax liability					\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0
Capitalized lease obligation					6,942.1	3,636.4	0.0	0.0	0.0
Equity	\$1,000.0	\$ 1,000.0	\$ 1,000.0	\$ 1,000.0	813.7	807.7	1,000.0	1,000.0	1,000.0
Total liabilities and equities	\$1,000.0	\$ 1,000.0	\$ 1,000.0	\$ 1,000.0	\$ 7,755.9	\$ 4,444.0	\$ 1,000.0	\$ 1,000.0	\$ 1,000.0
Sum of lease amortization and interest expense					\$ 4,310.5	\$ 4,010.0	\$ 3,679.4		\$12,000.0

\*Note: For financial reporting purposes, in Year 1 the deferred tax asset of \$2,776.9 (\$1,454.5 in Year 2) and the deferred tax liability of \$2,652.6 (\$1,326.3 in Year 2) are offset and reported as a net deferred tax asset of \$124.3 (\$128.2 in Year 2).

Exhibit may contain rounding errors

**Review Exercise 11.5: Operating versus Capitalized Leases and Valuation**

Summarized Financial Statements	Year 1 Reported	Beginning of Year Balance	Adjust Rent Expense	Amortization of Capital Lease Asset	Income Taxes	Acquisition of Additional Leases	Year 1 Adjusted
<b>Income Statement</b>							
Revenues	\$22,000.0						\$22,000.0
Rent expense	-2,000.0		\$1,200.0				-800.0
Depreciation and amortization	-3,000.0						-3,000.0
Amortization of operating leases				\$-615.7			-615.7
All other operating expenses	-10,000.0						-10,000.0
Operating income	\$ 7,000.0	\$ 0.0	\$1,200.0	\$-615.7	\$ 0.0	\$ 0.0	\$ 7,584.3
Interest expense	-1,000.0						-1,000.0
Lease interest			-492.5				-492.5
Income before taxes	\$ 6,000.0	\$ 0.0	\$ 707.5	\$-615.7	\$ 0.0	\$ 0.0	\$ 6,091.8
Income taxes	-2,400.0				-36.7		-2,436.7
Net income	\$ 3,600.0	\$ 0.0	\$ 707.5	\$-615.7	\$ -36.7	\$ 0.0	\$ 3,655.1
<b>Balance Sheet</b>							
Current assets	\$ 8,000.0						\$ 8,000.0
Net property, plant, equipment	20,000.0						20,000.0
Other assets	5,000.0						5,000.0
Deferred tax asset					\$ 0.0		0.0
Capitalized operating leases		\$6,156.7		\$-615.7		\$621.7	6,162.7
Total assets	\$33,000.0	\$6,156.7	\$ 0.0	\$-615.7	\$ 0.0	\$621.7	\$ 39,162.7
Current operating liabilities	\$ 7,000.0						\$ 7,000.0
Other liabilities	10,000.0						10,000.0
Deferred tax liability					\$ 36.7		36.7
Debt	13,000.0						13,000.0
Capitalized operating leases		\$6,156.7	\$-707.5			\$621.7	6,070.9
Total liabilities	\$30,000.0	\$6,156.7	\$-707.5	\$ 0.0	\$ 36.7	\$621.7	\$ 36,107.6
Shareholders' equity	3,000.0		707.5	-615.7	-36.7		3,055.1
Total liabilities and shareholders' equity	\$33,000.0	\$6,156.7	\$ 0.0	\$-615.7	\$ 0.0	\$621.7	\$ 39,162.7

Summarized Free Cash Flow Schedule	Year 1 Reported	Adjust Rent Expense	Amortization of Capital Lease Asset	Income Taxes	Acquisition of Additional Leases	Year 1 Adjusted
Earnings before interest and taxes (EBIT)	\$7,000.0	\$1,200.0	\$-615.7			\$7,584.3
- Income taxes paid on EBIT	-2,800.0			\$-233.7		-3,033.7
Earnings before interest and after taxes	\$4,200.0	\$1,200.0	\$-615.7	\$-233.7	\$ 0.0	\$4,550.6
+ Depreciation and amortization	3,000.0					3,000.0
+ Amortization of operating leases			615.7			615.7
- Change in net working capital	500.0					500.0
+ Change in non-current liabilities & other	100.0			36.7		136.7
- Change in required cash balance	-50.0					-50.0
Unlevered cash flow from operations	\$7,750.0	\$1,200.0	\$ 0.0	\$-197.0	\$ 0.0	\$8,753.0
- Capital expenditures (net)	-3,000.0					-3,000.0
- Increase in capital lease assets					-621.7	-621.7
Unlevered free cash flow	\$4,750.0	\$1,200.0	\$ 0.0	\$-197.0	\$-621.7	\$5,131.3
- Interest paid	-1,000.0	-492.5				-1,492.5
+ Interest tax shield	400.0			197.0		597.0
+ Change in non-common equity		0.0				0.0
+ Change in capital lease obligations		-707.5			621.7	-85.8
Free cash flow to common equity	\$4,150.0	\$ 0.0	\$ 0.0	\$ -0.0	\$ 0.0	\$4,150.0

## Review Exercise A11.1: A Simple Lease Example—Part 2

	Operating Lease			Capitalized Lease			Total Operating Lease	Total Capitalized Lease	
	Actual Year 0	Forecast Year 1	Forecast Year 2	Forecast Year 3	Forecast Year 1	Forecast Year 2			Forecast Year 3
<b>Income Statement</b>									
Revenue . . . . .		\$8,000.0	\$8,000.0	\$8,000.0	\$ 8,000.0	\$8,000.0	\$8,000.0	\$24,000.0	\$24,000.0
Rent . . . . .		-5,000.0	-5,000.0	-5,000.0				-15,000.0	0.0
Capitalized lease amortization . . . . .					-4,295.2	-4,295.2	-4,295.2	0.0	-12,885.5
Earnings before interest and taxes . . . . .		\$3,000.0	\$3,000.0	\$3,000.0	\$ 3,704.8	\$3,704.8	\$3,704.8	\$ 9,000.0	\$11,114.5
Interest expense . . . . .					-1,030.8	-713.3	-370.4	0.0	-2,114.5
Income before taxes . . . . .		\$3,000.0	\$3,000.0	\$3,000.0	\$ 2,674.0	\$2,991.5	\$3,334.5	\$ 9,000.0	\$ 9,000.0
Income tax expense . . . . .		-900.0	-900.0	-900.0	-802.2	-897.5	-1,000.3	-2,700.0	-2,700.0
Net income . . . . .		\$2,100.0	\$2,100.0	\$2,100.0	\$ 1,871.8	\$2,094.1	\$2,334.1	\$ 6,300.0	\$ 6,300.0
<b>Balance Sheet</b>									
Cash . . . . .	\$400.0	\$ 400.0	\$ 400.0	\$ 400.0	\$ 400.0	\$ 400.0	\$ 400.0		
Capitalized lease asset . . . . .					8,590.4	4,295.2	0.0		
Deferred tax asset . . . . .					97.8	100.3	0.0		
Total assets . . . . .	\$400.0	\$ 400.0	\$ 400.0	\$ 400.0	\$ 9,088.2	\$ 4,795.5	\$ 400.0		
Deferred tax liability . . . . .					\$ 0.0	\$ 0.0	\$ 0.0		
Capitalized lease obligation . . . . .					8,916.3	4,629.6	0.0		
Equity . . . . .	\$400.0	400.0	400.0	400.0	171.8	165.9	400.0		
Total liabilities and equities . . . . .	\$400.0	\$ 400.0	\$ 400.0	\$ 400.0	\$ 9,088.2	\$ 4,795.5	\$ 400.0		
Sum of lease amortization and interest expense . . . . .					\$ 5,326.0	\$5,008.5	\$4,665.5		\$15,000.0

Exhibit may contain rounding errors

Free Cash Flow Schedule	Operating Lease			Capitalized Lease			Total Operating Lease	Total Capitalized Lease
	Forecast Year 1	Forecast Year 2	Forecast Year 3	Forecast Year 1	Forecast Year 2	Forecast Year 3		
Earnings before interest and taxes . . .	\$3,000.0	\$3,000.0	\$3,000.0	\$3,704.8	\$3,704.8	\$3,704.8	\$9,000.0	\$11,114.5
- Income taxes paid on EBIT . . . . .	-900.0	-900.0	-900.0	-1,111.0	-1,111.0	-1,111.0	-2,700.0	-3,334.0
Earnings before interest and after taxes . . . . .	\$2,100.0	\$2,100.0	\$2,100.0	\$2,593.4	\$2,593.4	\$2,593.4	\$6,300.0	\$ 7,780.2
- Change in required cash . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
+ Lease amortization . . . . .				4,295.2	4,295.2	4,295.2	0.0	12,885.5
+ Deferred tax adjustment . . . . .				-97.8	-2.5	100.3	0.0	-0.0
- Capital lease increases (CAPEX) . . .				-12,885.5	0.0	0.0	0.0	-12,885.5
Unlevered free cash flow . . . . .	\$2,100.0	\$2,100.0	\$2,100.0	\$-6,094.7	\$6,886.0	\$6,988.9	\$6,300.0	\$ 7,780.3
Implicit interest on capitalized leases . . . . .				-1,030.8	-713.3	-370.4	0.0	-2,114.5
Interest tax shield . . . . .				309.3	214.0	111.1	0.0	634.4
Free cash flow minus after-tax interest . . . . .	\$2,100.0	\$2,100.0	\$2,100.0	\$-6,816.3	\$6,386.7	\$6,729.6	\$6,300.0	\$ 6,300.0
Change in capital lease obligation (financing) . . . . .				8,916.3	-4,286.7	-4,629.6	0.0	0.0
Equity free cash flow . . . . .	\$2,100.0	\$2,100.0	\$2,100.0	\$2,100.0	\$2,100.0	\$2,100.0	\$6,300.0	\$ 6,300.0

**EXHIBIT 12.5** Intel Corporation's 2006 Summarized Statement of Cash Flows and Free Cash Flow Schedule\*

Statement of Cash Flows (\$ in millions)		2006	Free Cash Flow Schedule (\$ in millions)		2006	2006 Adjusted
<b>Cash Flows From Operations</b>						
Net earnings		\$ 5,044	Earnings before interest and taxes (EBIT)		\$ 5,652	\$ 5,652
			Income taxes paid on EBIT		-1,619	-1,619
Depreciation and amortization		4,912	Earnings before interest and after taxes		\$ 4,033	\$ 4,033
Deferred income taxes		-325	Depreciation and amortization		4,912	4,912
Other, net		-191	<b>Excess tax benefit from share-based comp</b>		-123	-123
Adjustments for operating working capital, net		-72	<b>Share-based compensation</b>		1,375	0
Excess tax benefit from share-based comp		-123	<b>Deferred income taxes (share-based comp)</b>		-388	0
Share-based compensation		1,375	Deferred income taxes (without share-based comp)		63	63
Cash flow from operations		\$10,620	Other, net		-191	-191
<b>Investing Activities</b>						
Purchase of investments, net		\$ 153	Adjustments for operating working capital, net		-72	-72
Additions to property, plant and equipment		-5,779	Change in required cash balance (assumed)		-400	-400
Proceeds from divestitures, net		752	<b>Unlevered cash flow from operations</b>		\$ 9,209	\$ 8,222
Other, net		-33	Additions to property, plant and equipment		-5,779	-5,779
Net cash used by investing activities		\$-4,907	Proceeds from divestitures, net and other		719	719
<b>Financing Activities</b>						
Change in common stock			<b>Unlevered free cash flow</b>		\$ 4,149	\$ 3,162
Proceeds from sale of stock to employees		\$ 1,046	Interest expense		-30	-30
Excess tax benefit from share-based comp		123	Interest tax shield		9	9
Repurchase and Retirement of Stock		-4,593	CF before non-equity financing changes		\$ 4,128	\$ 3,141
Change in debt, net		-695	Change in debt, net		-695	-695
Common equity dividends paid		-2,320	<b>Equity free cash flow</b>		\$ 3,433	\$ 2,446
Cash flows from financing activities		\$-6,439	Gains, interest and other, after tax		1,032	1,032
<b>Effect of exchange rate changes</b>		\$ 0	Purchase of investments		153	153
Change in cash balance		\$ -726	Effect of exchange rate changes		0	0
Assumed income tax rate	28.6%		Cash flow before cash flows to/from common		\$ 4,618	\$ 3,631
Assumed deductible interest expense	\$ 30		Change in Common Stock			
			Repurchase and retirement of stock		-4,593	-4,593
			Proceeds from sale of stock to employees		1,046	1,046
			<b>Excess tax benefit from share-based comp</b>		123	123
			<b>Share-based compensation</b>		1,375	1,375
			<b>Deferred income taxes (share-based comp)</b>		-388	-388
			Common dividends		-2,320	-2,320
			Change in excess cash		\$-1,126	\$-1,126
			Change in required cash balance		400	400
			<b>Change in cash balance</b>		\$ -726	\$ -726

\* From Intel's 2006 10-K report filed with the U.S. SEC and available from the company's website, [www.intel.com](http://www.intel.com) and authors' estimates.

## Review Exercise 12.4: Convertible Debt

## Inputs for Straight Debt

Total face value . . . . .	\$2,000,000
Number of bonds . . . . .	2,000
Face value per note . . . . .	\$ 1,000
Price per bond . . . . .	\$ 1,100
Coupon rate . . . . .	8%
Straight debt promised yield . . . . .	10%
Coupon payments per year . . . . .	1
Maturity (years) from date of issue . . . . .	6
Conversion ratio per bond . . . . .	100

Per Bond	Value Using Coupon Rate	Value Using Promised Yield
Coupon (annual) . . . . .	8.000%	10.000%
Year 1 . . . . .	\$ 80.00	\$80.00
Year 2 . . . . .	\$ 80.00	\$80.00
Year 3 . . . . .	\$ 80.00	\$80.00
Year 4 . . . . .	\$ 80.00	\$80.00
Year 5 . . . . .	\$ 80.00	\$80.00
Year 6 . . . . .	\$1,080.00	\$1,080.00
Value of straight debt . . . . .	\$1,000.00	\$ 912.89
Price of debt . . . . .		1,100.00
Value of the conversion provision . . . . .		\$ 187.11
Number of shares . . . . .		100
Value of conversion feature per share . . . . .		\$ 1.871

		Price	Valuation
Income tax rate . . . . .	40.0%		
Risk-free rate of return . . . . .	4.0%		
Equity cost of capital . . . . .	15.0%		
Annual volatility of equity . . . . .	40.0%		
Dividend yield, continuously compounded . . . . .	5.00%		
Expiration of warrants (in years) . . . . .	6.0		
Face value per note . . . . .	\$1,000		
Conversion ratio per \$1,000 agreement . . . . .	100		
Exercise price of conversion feature . . . . .	\$10		
Current stock price . . . . .	\$8.45		
Parity ratio (stock price/conversion price) . . . . .	0.845		
Cost of capital of conversion feature . . . . .	25.7%		
Value of notes (ignoring accrued interest) . . . . .	2,000	\$912.895	\$ 1,825,790
Value of conversion feature . . . . .	200,000	\$ 1.871	374,210
Value of convertible note . . . . .			\$2,200,000.0
Value if converted . . . . .	200,000	\$ 8.450	1,690,000.0
Value of note in excess of converted value . . . . .			\$ 510,000.0
$\sigma_Q$ . . . . .	41.66%		
$d_1$ . . . . .	0.3433		
$d_2$ . . . . .	-0.6771		
$\omega_s$ . . . . .	0.4379		

and we update the risk-free rate to 4.88% which is the rate in effect on June 1. We increase the expected volatility of the stock to 32.1% based on updated information. We show these assumptions and the resulting Daves and Ehrhardt valuation of \$27.4 million for the stock options and stock appreciation rights in Exhibit 14.6. We value the restricted stock units and the restricted stock using the stock price on June 1, which results in a value of \$10.5 million. The total valuation of all of the stock options and other equity-based securities is \$38 million ( $\$37,967 = \$27,428 + \$10,539$ ).

**EXHIBIT 14.5** Universal Corporation—Summary of Stock Options and Other Equity-Based Securities

Options and Stock Appreciation Rights (SARs), Restricted Stock Units (RSUs) and Restricted Stock, as of March 31, 2007	Options and SARs		Restricted Stock Units		Restricted Stock	
	Shares	Weighted Average Exercise Price	Shares	Weighted Average Grant Date Fair Value	Shares	Weighted Average Grant Date Fair Value
Outstanding at beginning of year . . . . .	2,011,782	\$43.34	67,915	\$46.21	28,900	\$38.16
Granted . . . . .	265,500	\$36.03	71,909	\$36.57	10,000	\$35.26
Exercised (options and SARs) – vested (RSUs) . . . . .	-1,232,967	\$43.81	-7,503	\$46.00		
Cancelled/expired . . . . .	-17,000	\$38.94				
Forfeited . . . . .	-69,500	\$38.21	-8,530	\$41.20		
Outstanding at end of year . . . . .	<u>957,815</u>	<u>\$41.16</u>	<u>123,791</u>	<u>\$40.96</u>	<u>38,900</u>	<u>\$37.42</u>

Options and Stock Appreciation Rights (SARs), as of March 31	Exercise Price Range			
	\$20-\$30	\$30-\$40	\$40-\$50	Total
Number outstanding . . . . .	26,217	465,470	466,128	957,815
Weighted average remaining contractual life . . . . .	2.81	6.83	6.82	6.72
Weighted average exercise price, per share . . . . .	\$25.09	\$ 36.49	\$ 46.72	\$ 41.16
Intrinsic value (stock price – exercise price) . . . . .	\$ 951	\$ 11,573	\$ 6,818	\$ 19,342

**EXHIBIT 14.6** Universal Corporation—Valuation of Stock Options and Other Equity-Based Securities

Options and Stock Appreciation Rights (SARs), Restricted Stock Units (RSUs) and Restricted Stock, as of June 1, 2007 (\$ in thousands)	Exercise Price Range			Options and SARs Total	Restricted Stock Units and Stock
	\$20-\$30	\$30-\$40	\$40-\$50		
Number outstanding . . . . .	26,217	465,470	466,128	957,815	162,691
Resulting fair value of SARs and stock options per security . . . . .				\$ 28.64	\$ 64.780
Total value of SARs and stock options . . . . .				<u>\$27,428.0</u>	<u>\$10,539.1</u>
Total Value of Options, SARs, RSUs and Restricted Stock, as of June 1, 2007 . . . . .				\$37,967	

**Enterprise Value and Value of the Common Equity.** In Exhibit 14.7, we combine the above calculations to measure both Universal's enterprise value and the value of the common equity as of June 1, 2007. Recall that we are going to deduct the value of Universal's cash (\$358.2 million) in order to measure both the enterprise value and the value of the common equity. To measure Universal's enterprise value, we take the sum of the value of the debt (\$681.2 million), the value of the preferred (\$330.2 million), the value of all stock-based compensation granted (\$38.0 million), and the value of

## REVIEW EXERCISE 14.1

### Measuring Market Multiple Numerators

Below we present an income statement and balance sheet for the Multiple Company. The company's debt and preferred stock are recorded on the balance sheet at par value. The debt and preferred stock are currently trading at 102% and 98% of their respective par values. The company's debt has a 7% interest rate and the dividend yield for its preferred stock is 8%. The company has 10,000 shares of outstanding stock trading at \$10 per share. The company also has 2,000 employee stock options outstanding, which the company valued at \$2 per option. The company's income tax rate on all income is 40%. Calculate the company's enterprise value and equity value as discussed in the previous sections of this chapter.\* Without making any adjustments to the income statement, also calculate the company's unlevered earnings, EBIT, EBITDA, revenue, and P/E multiples. HINT: Measure the unlevered earnings as net income plus after-tax interest expense and measure EBIT as net income plus interest expense plus income tax expense. EBITDA is just EBIT plus depreciation and amortization.

\*Note: Only make adjustments for factors discussed in previous sections of this chapter.

	Year 2		Year 1	Year 2
Revenue . . . . .	\$30,000	Cash . . . . .	\$12,000	\$12,000
Operating expenses . . . . .	-21,000	Other current assets . . . . .	5,000	5,000
Depreciation expense . . . . .	-8,000	Equity in unconsolidated affiliates . . . . .	11,000	11,000
Operating earnings . . . . .	\$ 1,000	Property, plant & equipment (net) . . . . .	36,000	38,000
Earnings from unconsolidated affiliates . . . . .	2,000	Total assets . . . . .	<u>\$64,000</u>	<u>\$66,000</u>
Investment income (on cash) . . . . .	600	Account payable . . . . .	\$ 3,000	\$ 4,000
Interest expense . . . . .	-840	Debt . . . . .	12,000	12,000
Income before taxes . . . . .	\$ 2,760	Total liabilities . . . . .	<u>\$15,000</u>	<u>\$16,000</u>
Income tax expense . . . . .	-1,104	Minority interest . . . . .	\$ 5,000	\$ 6,000
Minority interest (net of tax) . . . . .	-400	Preferred stock . . . . .	\$ 5,000	\$ 5,000
Net income . . . . .	<u>\$ 1,256</u>	Capital stock . . . . .	3,000	3,000
		Retained earnings . . . . .	36,000	36,000
		Shareholders' equity . . . . .	<u>\$44,000</u>	<u>\$44,000</u>
		Liabilities and shareholders' equity . . . . .	<u>\$64,000</u>	<u>\$66,000</u>

Solution on pages 593–594.

## 14.4 MEASURING MARKET MULTIPLE “DENOMINATORS”

Measuring the denominator is often much more complex than measuring the numerator. Here, we discuss the basic measurement of various denominators, adjustments for the effects of removing cash when measuring enterprise value, adjustments related to other excess assets, and adjustments for non-recurring items.

**LO3** Measure market multiple denominators

### Measuring the Denominators—Basic Calculations

In this section, we discuss how to measure denominators for various market multiples. The specific calculation depends on the specific circumstances of the company, but the basic underlying calculations are the same.

**Unlevered Earnings-Based and Unlevered Cash Flow-Based Denominators.** We use unlevered earnings-based multiples to measure enterprise value. Earnings measures that are used with enterprise value numerators include unlevered earnings, EBIT, and EBITDA. We also sometimes use unlevered free cash flows in conjunction with enterprise value. To measure unlevered earnings, we begin

how it can affect comparability. The key is that we need to treat the leases of the comparable companies and the company being valued in a similar fashion in order to insure comparability.

**EXHIBIT 14.16** AMR Corporation—2006 Summary Income Statement and Balance Sheet With and Without Capitalizing Its Operating Leases

AMR Corporation Summarized Financial Statements (\$ in millions)	2006 Reported	Adjustments to Capitalize	
		Operating Leases	2006 Adjusted
<b>Revenues</b> . . . . .	\$22,563.0		\$22,563.0
Rent expense . . . . .	-1,065.0	\$ 1,065.0	0.0
Depreciation and amortization . . . . .	-1,157.0		-1,157.0
Amortization of operating leases . . . . .		-777.2	-777.2
All other operating expenses . . . . .	-19,281.0		-19,281.0
<b>Operating income</b> . . . . .	<b>\$ 1,060.0</b>	<b>\$ 287.8</b>	<b>\$ 1,347.8</b>
Interest expense, net . . . . .	-722.0		-722.0
Miscellaneous, net . . . . .	-107.0		-107.0
Lease interest . . . . .		-544.0	-544.0
Income before taxes . . . . .	\$ 231.0	\$ -256.3	\$ -25.3
Income taxes . . . . .	0.0	97.4	97.4
<b>Net income</b> . . . . .	<b>\$ 231.0</b>	<b>\$ -158.9</b>	<b>\$ 72.1</b>
Current assets . . . . .	\$ 6,902.0		\$ 6,902.0
Net property, plant, equipment . . . . .	17,941.0		17,941.0
Other assets . . . . .	4,302.0	\$ 97.4	\$ 4,399.4
Capitalized operating lease asset . . . . .		7,281.5	7,281.5
<b>Total assets</b> . . . . .	<b>\$29,145.0</b>	<b>\$ 7,378.9</b>	<b>\$ 36,523.9</b>
Current operating liabilities . . . . .	\$ 7,156.0		\$ 7,156.0
Other liabilities . . . . .	9,205.0	\$ 0.0	\$ 9,205.0
Debt . . . . .	13,390.0		13,390.0
Capitalized operating lease liability . . . . .		7,537.8	7,537.8
Total liabilities . . . . .	\$29,751.0	\$ 7,537.8	\$ 37,288.8
Shareholders' equity . . . . .	-606.0	-158.9	-764.9
<b>Total liabilities and shareholders' equity</b> . . . . .	<b>\$29,145.0</b>	<b>\$ 7,378.9</b>	<b>\$ 36,523.9</b>
<b>Valuation (\$ in millions, except per share amounts)</b>	<b>Equity Value</b>	<b>Enterprise Value</b>	
Shares outstanding . . . . .	239.896	239.896	
Price/share . . . . .	\$ 37.49	\$ 37.49	
Market value of equity . . . . .	\$ 8,993.7	\$ 8,993.7	
Options and other securities . . . . .	1,705.3	1,705.3	
Debt . . . . .		13,390.0	
Cash . . . . .	-121.0	-121.0	
Market value without capitalizing leases . . . . .	\$10,578.0	\$23,968.0	
Capitalized operating leases . . . . .		7,537.8	
Market value with capitalizing leases . . . . .	\$10,578.0	\$31,505.8	

Year 1	Unlevered Earnings	EBIT	EBITDA	Revenue	Net Income to Common
ValueIT Company's value drivers . . . . .	\$ 840.0	\$ 1,200.0	\$ 2,500.0	\$ 5,000.0	\$ 154.0
Market multiple (Review Exercise 14.3) . . . . .	28.91	17.35	6.67	2.89	33.21
	<u>\$24,287.2</u>	<u>\$20,817.6</u>	<u>\$16,680.8</u>	<u>\$14,456.7</u>	<u>\$ 5,113.7</u>
Long-term debt . . . . .					8,000.0
Perpetual preferred stock . . . . .					5,000.0
Enterprise value . . . . .	<u>\$24,287.2</u>	<u>\$20,817.6</u>	<u>\$16,680.8</u>	<u>\$14,456.7</u>	<u>\$18,113.7</u>
Cash and equivalents . . . . .	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0
Excess asset (land) . . . . .	6,000.0	6,000.0	6,000.0	6,000.0	6,000.0
Value of firm with excess assets . . . . .	<u>\$31,287.2</u>	<u>\$27,817.6</u>	<u>\$23,680.8</u>	<u>\$21,456.7</u>	<u>\$25,113.7</u>
Long-term debt . . . . .	-8,000.0	-8,000.0	-8,000.0	-8,000.0	-8,000.0
Perpetual preferred stock . . . . .	-5,000.0	-5,000.0	-5,000.0	-5,000.0	-5,000.0
Common equity value with excess assets . . . . .	<u>\$18,287.2</u>	<u>\$14,817.6</u>	<u>\$10,680.8</u>	<u>\$ 8,456.7</u>	<u>\$12,113.7</u>
<b>% Difference from Unlevered Earnings Valuation</b>					
Value of firm with excess assets . . . . .	0.0%	-11.1%	-24.3%	-31.4%	-19.7%
Equity value with excess assets . . . . .	0.0%	-19.0%	-41.6%	-53.8%	-33.8%

### Solution for Review Exercise 14.5: Market Multiple and Operating Leases

	Reported	Adjustments	Adjusted
Revenues . . . . .	\$ 7,000.0		\$ 7,000.0
Rent expense . . . . .	-500.0	\$ 500	0.0
Depreciation and amortization . . . . .	-2,000.0		-2,000.0
Amortization of operating leases . . . . .		-399.3	-399.3
All other operating expenses . . . . .	-3,000.0		-3,000.0
Operating income . . . . .	\$ 1,500.0	\$ 100.7	\$ 1,600.7
Interest expense, net . . . . .	-400.0		-400.0
Lease interest . . . . .		-159.7	-159.7
Income before taxes . . . . .	\$ 1,100.0	\$ -59.0	\$ 1,041.0
Income taxes . . . . .	-440.0	23.6	-416.4
Net income . . . . .	\$ 660.0	\$ -35.4	\$ 624.6
Cash . . . . .	\$ 400.0		\$ 400.0
Other current assets . . . . .	2000.0	\$ 23.6	\$ 2,023.6
Net property, plant, equipment . . . . .	8,000.0		8,000.0
Other assets . . . . .	2,000.0		2,000.0
Capitalized operating leased asset . . . . .		2,041.0	2,041.0
Total assets . . . . .	\$12,400.0	\$ 2,064.6	\$ 14,464.6
Current operating liabilities . . . . .	\$ 1,000.0		\$ 1,000.0
Other liabilities . . . . .	1,500.0	\$ 0.0	\$ 1,500.0
Debt . . . . .	4,500.0		4,500.0
Capitalized operating lease obligations . . . . .		2,100.0	2,100.0
Total liabilities . . . . .	\$ 7,000.0	\$ 2,100.0	\$ 9,100.0
Shareholders' equity . . . . .	5,400.0	-35.4	5,364.6
Total liabilities and shareholders' equity . . . . .	\$12,400.0	\$ 2,064.6	\$ 14,464.6

**EXHIBIT 15.16** Debt Schedule Forecasts

(\$ in millions)	Total	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
<b>Balance at Year End</b>													
Revolver (total commitment in 1st column) . . . . .	\$ 300.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0
Debt assumed . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Senior secured note (bank debt) . . . . .	3,620.0	3,594.4	3,219.2	2,813.4	2,335.1	1,669.9	931.9	133.8	0.0	0.0	0.0	0.0	0.0
Subordinated note (unsecured debt) . . . . .	1,810.0	1,810.0	1,810.0	1,810.0	1,810.0	1,810.0	1,810.0	1,089.0	150.6	0.0	0.0	0.0	0.0
Mezzanine debt . . . . .	3,020.0	3,020.0	3,020.0	3,020.0	3,020.0	3,020.0	3,020.0	3,020.0	3,020.0	2,141.9	1,007.0		
All debt issued at par . . . . .	\$8,550.0	\$8,424.4	\$8,049.2	\$7,643.4	\$7,165.1	\$6,499.9	\$5,761.9	\$4,963.8	\$4,109.0	\$3,170.6	\$ 2,141.9	\$ 1,007.0	
<b>Repayment at Year End</b>													
Total cash available for repayment. . . . .	\$ -7,543.0	\$ 125.6	\$ 375.2	\$ 405.8	\$ 478.3	\$ 665.1	\$ 738.1	\$ 798.0	\$ 854.9	\$ 938.4	\$ 1,028.7	\$ 1,134.9	
Revolver . . . . .	\$ 100.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0
Debt assumed . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Senior secured note (bank debt) . . . . .	3,620.0	-25.6	-375.2	-405.8	-478.3	-665.1	-738.1	-798.0	-854.9	-938.4	-1,028.7	-1,134.9	
Subordinated note (unsecured debt) . . . . .	1,810.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mezzanine debt . . . . .	2,013.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total debt repaid. . . . .	\$ 7,543.0	\$ -125.6	\$ -375.2	\$ -405.8	\$ -478.3	\$ -665.1	\$ -738.1	\$ -798.0	\$ -854.9	\$ -938.4	\$ -1,028.7	\$ -1,134.9	
<b>Interest Expense</b>													
Revolver . . . . .	Coupon = 4.500%	Year 1 \$ 6.0	Year 2 \$ 1.5	Year 3 \$ 1.5	Year 4 \$ 1.5	Year 5 \$ 1.5	Year 6 \$ 0.0	Year 7 \$ 0.0	Year 8 \$ 0.0	Year 9 \$ 0.0	Year 10 \$ 0.0	Year 11 \$ 0.0	
Debt assumed . . . . .	0.000%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Senior secured note (bank debt) . . . . .	6.000%	217.2	215.7	193.2	168.8	140.1	100.2	55.9	8.0	0.0	0.0	0.0	0.0
Subordinated note (unsecured debt) . . . . .	10.000%	181.0	181.0	181.0	181.0	181.0	181.0	181.0	181.0	108.9	15.1	0.0	0.0
Mezzanine debt . . . . .	12.000%	362.4	362.4	362.4	362.4	362.4	362.4	362.4	362.4	362.4	362.4	257.0	0.0
Amortization of fees . . . . .		30.6	30.6	30.6	30.6	30.6	30.6	30.6	30.6	15.1	9.1	0.0	0.0
Amortization of discount/premium on debt . . . . .		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Assume interest expense = interest deductible</b>		<b>\$797.2</b>	<b>\$791.2</b>	<b>\$768.7</b>	<b>\$744.3</b>	<b>\$715.6</b>	<b>\$674.2</b>	<b>\$629.9</b>	<b>\$566.5</b>	<b>\$486.4</b>	<b>\$386.5</b>	<b>\$257.0</b>	
Weighted average interest rate. . . . .		8.97%	9.03%	9.17%	9.34%	9.56%	9.90%	10.40%	11.11%	11.47%	11.91%	12.00%	
<b>Amortization of Fees</b>													
Debt assumed	<b>Fee %</b>	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	
Senior secured note (bank debt) . . . . .	3.000%	\$15.5	\$15.5	\$15.5	\$15.5	\$15.5	\$15.5	\$15.5	\$6.0	\$ 6.0			
Subordinated note (unsecured debt) . . . . .	3.000%	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	9.1	9.1	\$9.1	
Mezzanine debt . . . . .	3.000%	90.6	90.6	90.6	90.6	90.6	90.6	90.6	90.6	9.1	9.1	\$9.1	
Amortization of fees . . . . .		\$30.6	\$30.6	\$30.6	\$30.6	\$30.6	\$30.6	\$30.6	\$15.1	\$15.1	\$9.1	\$0.0	
Total	<b>Total Fees</b>	\$108.6	\$108.6	\$108.6	\$108.6	\$108.6	\$108.6	\$108.6	\$108.6	\$108.6	\$108.6	\$108.6	

**EXHIBIT 15.24** Year-by-Year Adjusted Present Value Valuations

Beginning of Year Value (\$ in millions)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	CV Year 10	
<b>Value of the Unlevered Firm</b>												
Unlevered free cash flow for continuing value												\$ 1,289.1
Discount factor for continuing value												12.500
Unlevered free cash flow	\$ 573.4	\$ 819.3	\$ 836.4	\$ 894.3	\$ 1,063.9	\$ 1,112.0	\$ 1,145.4	\$ 1,179.7	\$ 1,215.1	\$ 1,251.6		
Unlevered firm value at end of year	11,927.9	12,420.7	12,950.7	13,480.9	13,899.9	14,316.9	14,746.4	15,188.8	15,644.5	16,113.8		
Unlevered firm value + unlevered free cash flow	\$12,501.3	\$13,240.0	\$13,787.0	\$14,375.2	\$14,963.8	\$15,428.9	\$15,891.8	\$16,368.5	\$16,859.6	\$17,365.4		
Discount factor for one year	0.901	0.901	0.901	0.901	0.901	0.901	0.901	0.901	0.901	0.901		
Value of the firm at beginning of year	\$11,262.4	\$11,927.9	\$12,420.7	\$12,950.7	\$13,480.9	\$13,899.9	\$14,316.9	\$14,746.4	\$15,188.8	\$15,644.5		\$16,113.8
<b>Value of the Interest Tax Shields Discounted at the Debt Cost of Capital</b>												
Interest tax shield	\$ 269.6	\$ 267.2	\$ 258.2	\$ 248.4	\$ 215.7	\$ 199.2	\$ 181.4	\$ 142.6	\$ 119.4	\$ 91.1		
Value of the interest tax shields (ITSs) at end of year	1,292.6	1,123.2	950.8	775.8	615.1	460.2	312.5	191.5	85.3	0.0		
Value of the ITSs at end of year plus ITS	\$ 1,562.2	\$ 1,390.4	\$ 1,209.0	\$ 1,024.2	\$ 830.9	\$ 659.4	\$ 494.0	\$ 334.0	\$ 204.7	\$ 91.1		
Discount factor for one year	0.930	0.930	0.929	0.928	0.934	0.933	0.932	0.936	0.935	0.935		
Value of the ITSs at beginning of year	\$ 1,452.8	\$ 1,292.6	\$ 1,123.2	\$ 950.8	\$ 775.8	\$ 615.1	\$ 460.2	\$ 312.5	\$ 191.5	\$ 85.3		\$ 0.0
<b>Value of the Interest Tax Shields Discounted at the Unlevered Cost of Capital</b>												
Interest tax shield for continuing value												\$ 115.9
Discount factor for continuing value												12.500
Value of the ITSs at end of year plus ITS	\$ 566.4	\$ 628.7	\$ 697.9	\$ 774.7	\$ 859.9	\$ 954.5	\$ 1,059.4	\$ 1,176.0	\$ 1,305.3	\$ 1,448.9		
Discount factor for one year	0.901	0.901	0.901	0.901	0.901	0.901	0.901	0.901	0.901	0.901		
Value of the ITSs at beginning of year	\$ 510.3	\$ 566.4	\$ 628.7	\$ 697.9	\$ 774.7	\$ 859.9	\$ 954.5	\$ 1,059.4	\$ 1,176.0	\$ 1,305.3		\$ 1,448.9
Value of interest tax shields at beginning of year	\$ 1,963.1	\$ 1,859.0	\$ 1,751.9	\$ 1,648.7	\$ 1,550.4	\$ 1,475.0	\$ 1,414.7	\$ 1,372.0	\$ 1,367.5	\$ 1,390.6		\$ 1,448.9
Value of the firm at beginning of year	\$13,225.6	\$13,786.9	\$14,172.6	\$14,599.3	\$15,031.3	\$15,374.9	\$15,731.6	\$16,118.4	\$16,556.3	\$17,035.1		\$17,562.7

**Solution for Review Exercise 15.5: Post-LBO Equity and Weighted Average Costs of Capital**

Beginning of Year Value (\$ in millions)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	CV Year 10	
<b>Value of the Unlevered Firm</b>												
Unlevered free cash flow for continuing value												\$ 176.4
Discount factor for continuing value												16.667
Unlevered free cash flow	\$ 259.1	\$ 280.7	\$ 325.7	\$ 313.1	\$ 246.7	\$ 263.8	\$ 186.5	\$ 62.7	\$ 203.4	\$ 170.1		
Unlevered firm value at end of year	2,799.1	2,770.3	2,693.9	2,623.3	2,612.7	2,584.0	2,630.0	2,804.1	2,853.0	2,939.6		
Unlevered firm value + unlevered free cash flow	\$3,058.2	\$3,051.0	\$3,019.6	\$2,936.4	\$2,859.4	\$2,847.8	\$2,816.6	\$2,866.7	\$3,056.4	\$3,109.7		
Discount factor for one year	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917		
Value of the firm at beginning of year	\$2,805.7	\$2,799.1	\$2,770.3	\$2,693.9	\$2,623.3	\$2,612.7	\$2,584.0	\$2,630.0	\$2,804.1	\$2,853.0	\$2,939.6	
<b>Value of the Interest Tax Shields Discounted at the Debt Cost of Capital</b>												
Interest tax shield	\$ 56.1	\$ 53.0	\$ 49.2	\$ 39.6	\$ 31.8	\$ 27.5	\$ 22.7	\$ 18.0	\$ 17.6	\$ 13.3		
Value of the interest tax shields (ITSs) at end of year	217.0	178.4	141.3	110.7	85.4	62.9	43.9	28.5	12.5	0.0		
Value of the ITSs at end of year plus ITS	\$ 273.2	\$ 231.4	\$ 190.5	\$ 150.2	\$ 117.2	\$ 90.4	\$ 66.6	\$ 46.5	\$ 30.2	\$ 13.3		
Discount factor for one year	0.939	0.938	0.936	0.941	0.944	0.944	0.944	0.944	0.944	0.944		
Value of the ITSs at beginning of year	\$ 256.6	\$ 217.0	\$ 178.4	\$ 141.3	\$ 110.7	\$ 85.4	\$ 62.9	\$ 43.9	\$ 28.5	\$ 12.5	\$ 0.0	
<b>Value of the Interest Tax Shields Discounted at the Unlevered Cost of Capital</b>												
Interest tax shield for continuing value												\$ 19.2
Discount factor for continuing value												16.667
Value of the ITSs at end of year plus ITS	\$ 147.6	\$ 160.9	\$ 175.4	\$ 191.2	\$ 208.4	\$ 227.1	\$ 247.6	\$ 269.8	\$ 294.1	\$ 320.6		
Discount factor for one year	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917		
Value of the ITSs at beginning of year	\$ 135.4	\$ 147.6	\$ 160.9	\$ 175.4	\$ 191.2	\$ 208.4	\$ 227.1	\$ 247.6	\$ 269.8	\$ 294.1	\$ 320.6	
Value of interest tax shields at beginning of year	\$ 392.0	\$ 364.6	\$ 339.3	\$ 316.7	\$ 301.8	\$ 293.8	\$ 290.0	\$ 291.5	\$ 298.3	\$ 306.7	\$ 320.6	
Value of the firm at beginning of year	\$3,197.7	\$3,163.7	\$3,109.6	\$3,010.6	\$2,925.1	\$2,906.5	\$2,874.0	\$2,921.5	\$3,102.4	\$3,159.6	\$3,260.2	

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