

Estimating Synthetic Ratings

100

- The rating for a firm can be estimated using the financial characteristics of the firm. In its simplest form, the rating can be estimated from the interest coverage ratio

$$\text{Interest Coverage Ratio} = \text{EBIT} / \text{Interest Expenses}$$

- For Embraer's interest coverage ratio, we used the interest expenses from 2003 and the average EBIT from 2001 to 2003. (The aircraft business was badly affected by 9/11 and its aftermath. In 2002 and 2003, Embraer reported significant drops in operating income)

$$\text{Interest Coverage Ratio} = 462.1 / 129.70 = 3.56$$

Interest Coverage Ratios, Ratings and Default Spreads: 2003 & 2004

101

If Interest Coverage Ratio is		Estimated Bond Rating	Default Spread(2003)	Default Spread(2004)
> 8.50	(>12.50)	AAA	0.75%	0.35%
6.50 - 8.50	(9.5-12.5)	AA	1.00%	0.50%
5.50 - 6.50	(7.5-9.5)	A+	1.50%	0.70%
4.25 - 5.50	(6-7.5)	A	1.80%	0.85%
3.00 - 4.25	(4.5-6)	A-	2.00%	1.00%
2.50 - 3.00	(4-4.5)	BBB	2.25%	1.50%
2.25- 2.50	(3.5-4)	BB+	2.75%	2.00%
2.00 - 2.25	((3-3.5)	BB	3.50%	2.50%
1.75 - 2.00	(2.5-3)	B+	4.75%	3.25%
1.50 - 1.75	(2-2.5)	B	6.50%	4.00%
1.25 - 1.50	(1.5-2)	B-	8.00%	6.00%
0.80 - 1.25	(1.25-1.5)	CCC	10.00%	8.00%
0.65 - 0.80	(0.8-1.25)	CC	11.50%	10.00%
0.20 - 0.65	(0.5-0.8)	C	12.70%	12.00%
< 0.20	(<0.5)	D	15.00%	20.00%

- The first number under interest coverage ratios is for larger market cap companies and the second in brackets is for smaller market cap companies. For Embraer , I used the interest coverage ratio table for smaller/riskier firms (the numbers in brackets) which yields a lower rating for the same interest coverage ratio.

Cost of Debt computations

102

- Companies in countries with low bond ratings and high default risk might bear the burden of country default risk, especially if they are smaller or have all of their revenues within the country.
- Larger companies that derive a significant portion of their revenues in global markets may be less exposed to country default risk. In other words, they may be able to borrow at a rate lower than the government.
- The synthetic rating for Embraer is A-. Using the 2004 default spread of 1.00%, we estimate a cost of debt of 9.29% (using a riskfree rate of 4.29% and adding in two thirds of the country default spread of 6.01%):

Cost of debt

$$\begin{aligned} &= \text{Riskfree rate} + 2/3(\text{Brazil country default spread}) + \text{Company default spread} \\ &= 4.29\% + 4.00\% + 1.00\% = 9.29\% \end{aligned}$$

Synthetic Ratings: Some Caveats

103

- The relationship between interest coverage ratios and ratings, developed using US companies, tends to travel well, as long as we are analyzing large manufacturing firms in markets with interest rates close to the US interest rate
- They are more problematic when looking at smaller companies in markets with higher interest rates than the US. One way to adjust for this difference is modify the interest coverage ratio table to reflect interest rate differences (For instances, if interest rates in an emerging market are twice as high as rates in the US, halve the interest coverage ratio.

Default Spreads: The effect of the crisis of 2008.. And the aftermath

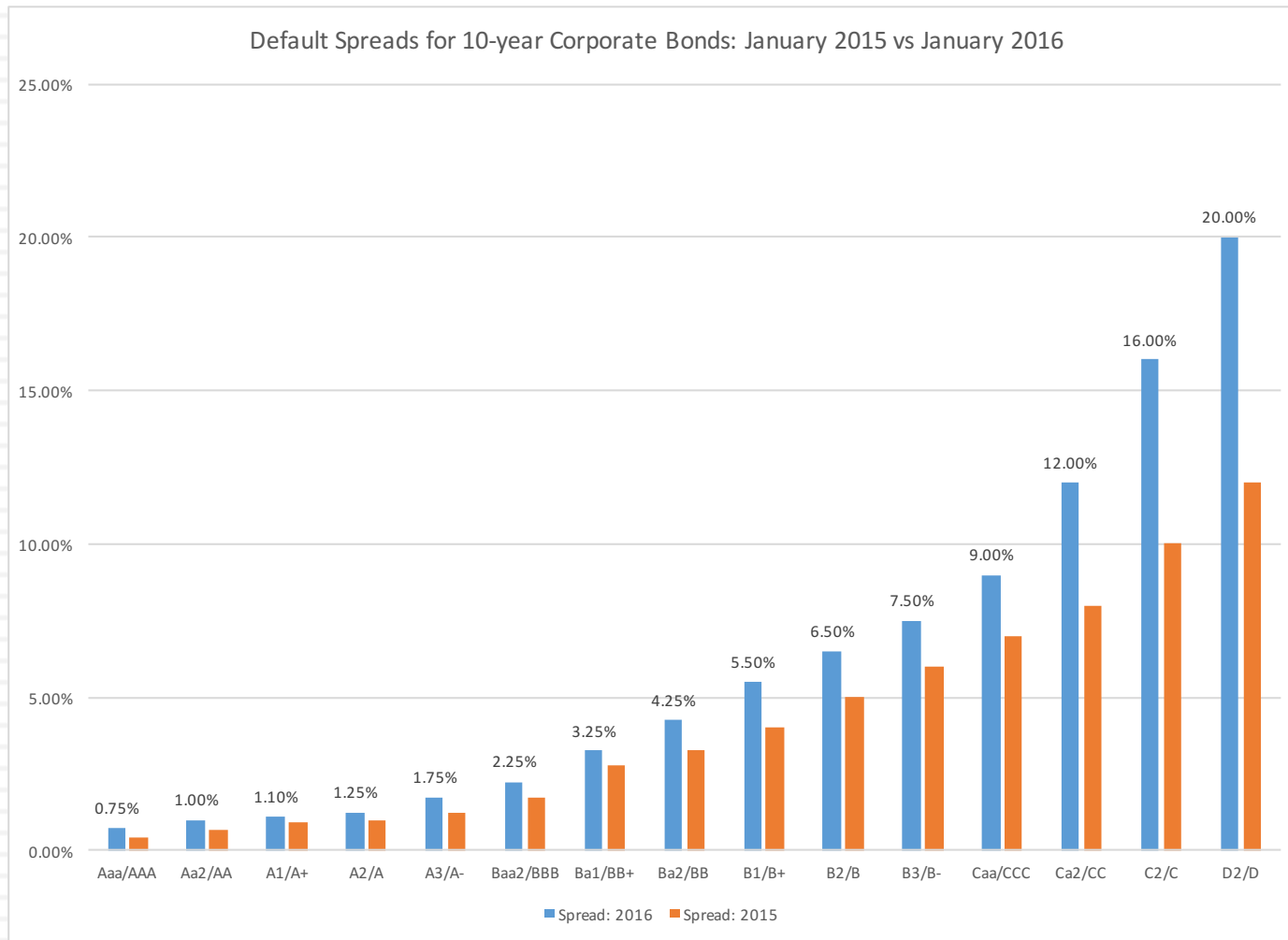
104

Rating	<i>Default spread over treasury</i>					
	1-Jan-08	12-Sep-08	12-Nov-08	1-Jan-09	1-Jan-10	1-Jan-11
Aaa/AAA	0.99%	1.40%	2.15%	2.00%	0.50%	0.55%
Aa1/AA+	1.15%	1.45%	2.30%	2.25%	0.55%	0.60%
Aa2/AA	1.25%	1.50%	2.55%	2.50%	0.65%	0.65%
Aa3/AA-	1.30%	1.65%	2.80%	2.75%	0.70%	0.75%
A1/A+	1.35%	1.85%	3.25%	3.25%	0.85%	0.85%
A2/A	1.42%	1.95%	3.50%	3.50%	0.90%	0.90%
A3/A-	1.48%	2.15%	3.75%	3.75%	1.05%	1.00%
Baa1/BBB+	1.73%	2.65%	4.50%	5.25%	1.65%	1.40%
Baa2/BBB	2.02%	2.90%	5.00%	5.75%	1.80%	1.60%
Baa3/BBB-	2.60%	3.20%	5.75%	7.25%	2.25%	2.05%
Ba1/BB+	3.20%	4.45%	7.00%	9.50%	3.50%	2.90%
Ba2/BB	3.65%	5.15%	8.00%	10.50%	3.85%	3.25%
Ba3/BB-	4.00%	5.30%	9.00%	11.00%	4.00%	3.50%
B1/B+	4.55%	5.85%	9.50%	11.50%	4.25%	3.75%
B2/B	5.65%	6.10%	10.50%	12.50%	5.25%	5.00%
B3/B-	6.45%	9.40%	13.50%	15.50%	5.50%	6.00%
Caa/CCC+	7.15%	9.80%	14.00%	16.50%	7.75%	7.75%
ERP	4.37%	4.52%	6.30%	6.43%	4.36%	5.20%

104

Updated Default Spreads - January 2016

105



Subsidized Debt: What should we do?

106

- Assume that the Brazilian government lends money to Embraer at a subsidized interest rate (say 6% in dollar terms). In computing the cost of capital to value Embraer, should we use the cost of debt based upon default risk or the subsidized cost of debt?
 - a. The subsidized cost of debt (6%). That is what the company is paying.
 - b. The fair cost of debt (9.25%). That is what the company should require its projects to cover.
 - c. A number in the middle.

Weights for the Cost of Capital Computation

107

- In computing the cost of capital for a publicly traded firm, the general rule for computing weights for debt and equity is that you use market value weights (and not book value weights). Why?
 - a. Because the market is usually right
 - b. Because market values are easy to obtain
 - c. Because book values of debt and equity are meaningless
 - d. None of the above

Estimating Cost of Capital: Embraer in 2004

108

□ Equity

- ▣ Cost of Equity = $4.29\% + 1.07 (4\%) + 0.27 (7.89\%) = 10.70\%$
- ▣ Market Value of Equity = 11,042 million BR (\$ 3,781 million)

□ Debt

- ▣ Cost of debt = $4.29\% + 4.00\% + 1.00\% = 9.29\%$
- ▣ Market Value of Debt = 2,083 million BR (\$713 million)

□ Cost of Capital

$$\text{Cost of Capital} = 10.70\% (.84) + 9.29\% (1 - .34) (0.16) = 9.97\%$$

- ▣ The book value of equity at Embraer is 3,350 million BR.
- ▣ The book value of debt at Embraer is 1,953 million BR; Interest expense is 222 mil BR; Average maturity of debt = 4 years
- ▣ Estimated market value of debt = $222 \text{ million (PV of annuity, 4 years, 9.29\%)} + \$1,953 \text{ million}/1.0929^4 = 2,083 \text{ million BR}$

If you had to do it....Converting a Dollar Cost of Capital to a Nominal Real Cost of Capital

109

- Approach 1: Use a BR riskfree rate in all of the calculations above. For instance, if the BR riskfree rate was 12%, the cost of capital would be computed as follows:
 - ▣ Cost of Equity = 12% + 1.07(4%) + 0.27 (7.89%) = 18.41%
 - ▣ Cost of Debt = 12% + 1% = 13%
 - ▣ (This assumes the riskfree rate has no country risk premium embedded in it.)
- Approach 2: Use the differential inflation rate to estimate the cost of capital. For instance, if the inflation rate in BR is 8% and the inflation rate in the U.S. is 2%

$$\text{Cost of capital} = (1 + \text{Cost of Capital}_{\$}) \left[\frac{1 + \text{Inflation}_{\text{BR}}}{1 + \text{Inflation}_{\$}} \right]$$

$$= 1.0997 (1.08/1.02) - 1 = 0.1644 \text{ or } 16.44\%$$

Dealing with Hybrids and Preferred Stock

- When dealing with hybrids (convertible bonds, for instance), break the security down into debt and equity and allocate the amounts accordingly. Thus, if a firm has \$ 125 million in convertible debt outstanding, break the \$125 million into straight debt and conversion option components. The conversion option is equity.
- When dealing with preferred stock, it is better to keep it as a separate component. The cost of preferred stock is the preferred dividend yield. (As a rule of thumb, if the preferred stock is less than 5% of the outstanding market value of the firm, lumping it in with debt will make no significant impact on your valuation).

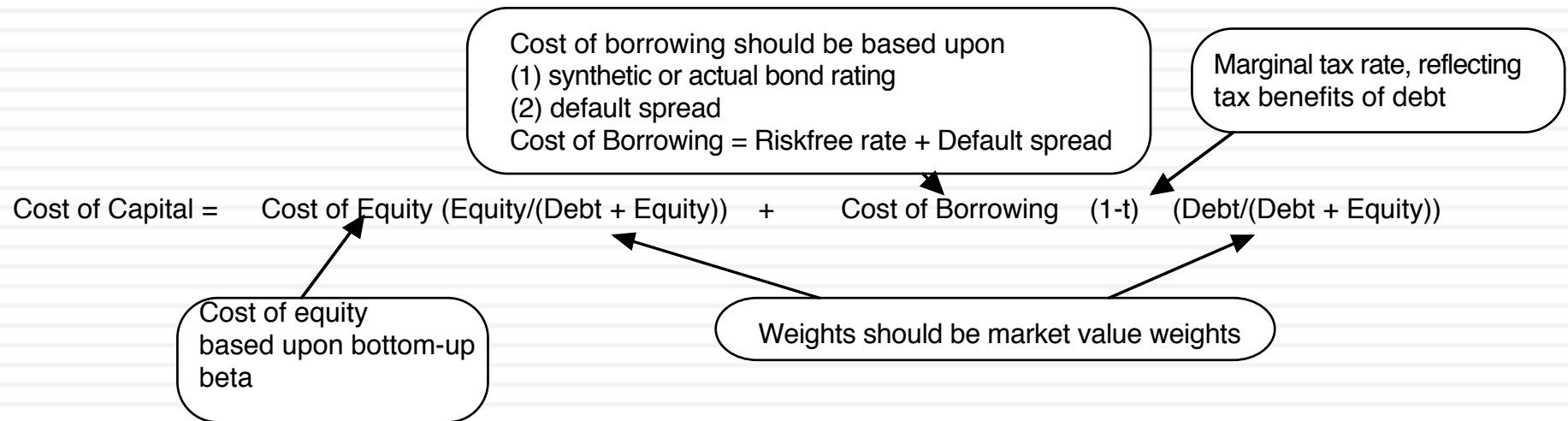
Decomposing a convertible bond...

111

- Assume that the firm that you are analyzing has \$125 million in face value of convertible debt with a stated interest rate of 4%, a 10 year maturity and a market value of \$140 million. If the firm has a bond rating of A and the interest rate on A-rated straight bond is 8%, you can break down the value of the convertible bond into straight debt and equity portions.
 - ▣ Straight debt = (4% of \$125 million) (PV of annuity, 10 years, 8%) + 125 million/1.0810 = \$91.45 million
 - ▣ Equity portion = \$140 million - \$91.45 million = \$48.55 million
- The debt portion (\$91.45 million) gets added to debt and the option portion (\$48.55 million) gets added to the market capitalization to get to the debt and equity weights in the cost of capital.

Recapping the Cost of Capital

112





ESTIMATING CASH FLOWS

Cash is king...

Steps in Cash Flow Estimation

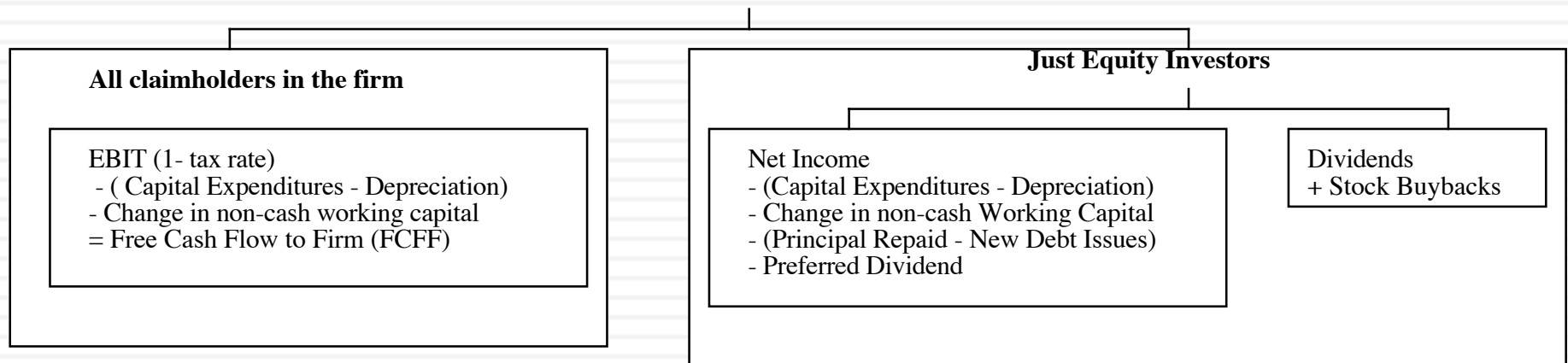
114

- Estimate the current earnings of the firm
 - ▣ If looking at cash flows to equity, look at earnings after interest expenses - i.e. net income
 - ▣ If looking at cash flows to the firm, look at operating earnings after taxes
- Consider how much the firm invested to create future growth
 - ▣ If the investment is not expensed, it will be categorized as capital expenditures. To the extent that depreciation provides a cash flow, it will cover some of these expenditures.
 - ▣ Increasing working capital needs are also investments for future growth
- If looking at cash flows to equity, consider the cash flows from net debt issues (debt issued - debt repaid)

Measuring Cash Flows

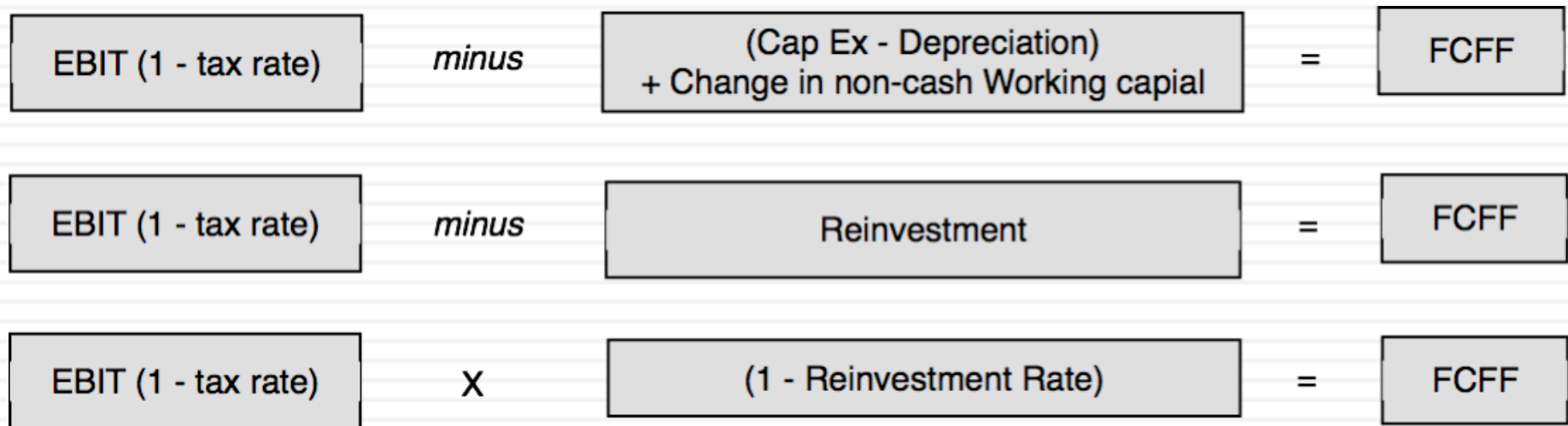
115

Cash flows can be measured to



Measuring Cash Flow to the Firm: Three pathways to the same end game

116



Where are the tax savings from interest expenses?

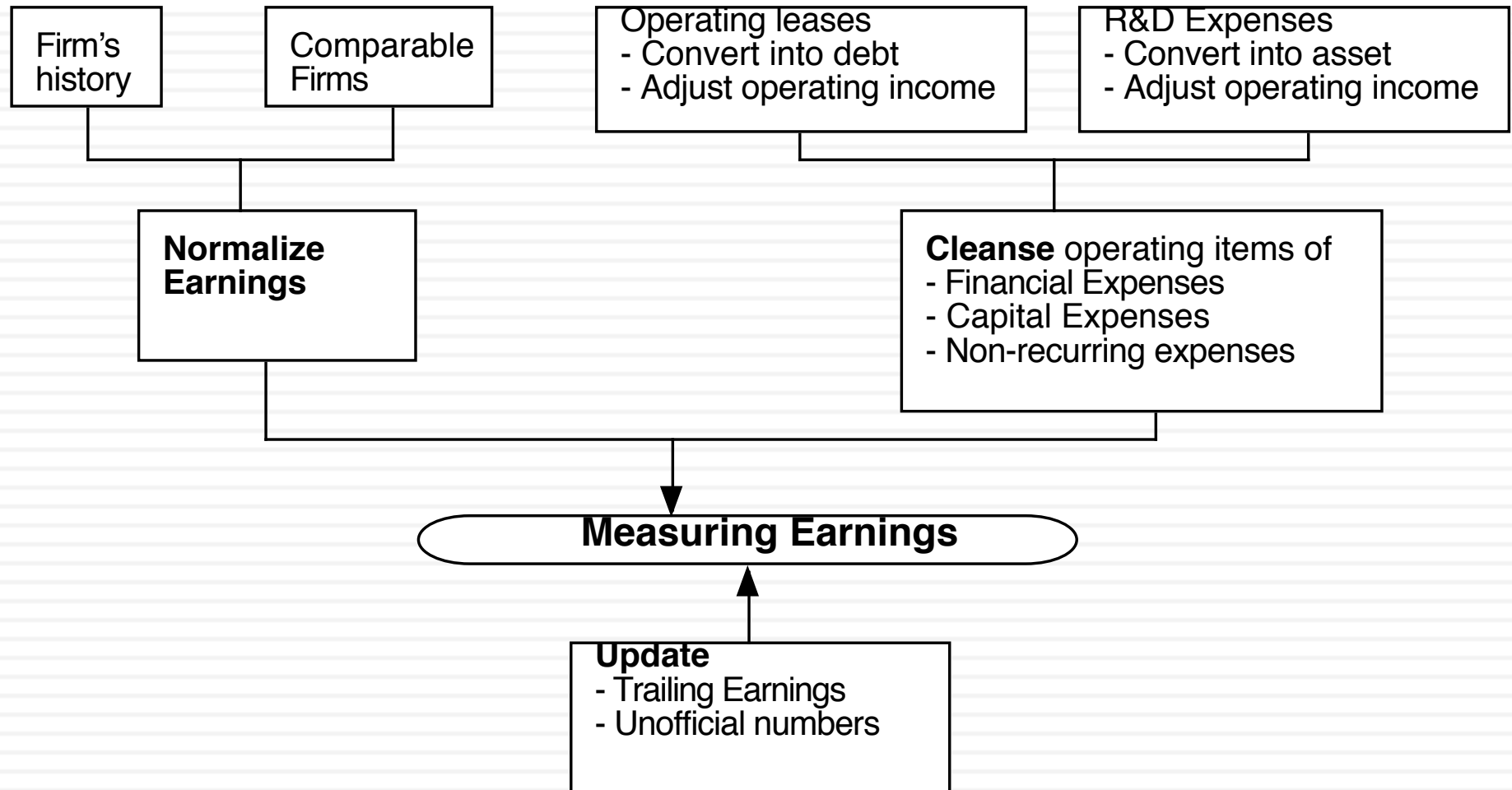
117

Cash Flows I

Accounting Earnings, Flawed but Important

From Reported to Actual Earnings

118



I. Update Earnings

119

- When valuing companies, we often depend upon financial statements for inputs on earnings and assets. Annual reports are often outdated and can be updated by using-
 - ▣ Trailing 12-month data, constructed from quarterly earnings reports.
 - ▣ Informal and unofficial news reports, if quarterly reports are unavailable.
- Updating makes the most difference for smaller and more volatile firms, as well as for firms that have undergone significant restructuring.
- Time saver: To get a trailing 12-month number, all you need is one 10K and one 10Q (example third quarter). Use the Year to date numbers from the 10Q. For example, to get trailing revenues from a third quarter 10Q:
 - ▣ $\text{Trailing 12-month Revenue} = \text{Revenues (in last 10K)} - \text{Revenues from first 3 quarters of last year} + \text{Revenues from first 3 quarters of this year.}$

II. Correcting Accounting Earnings

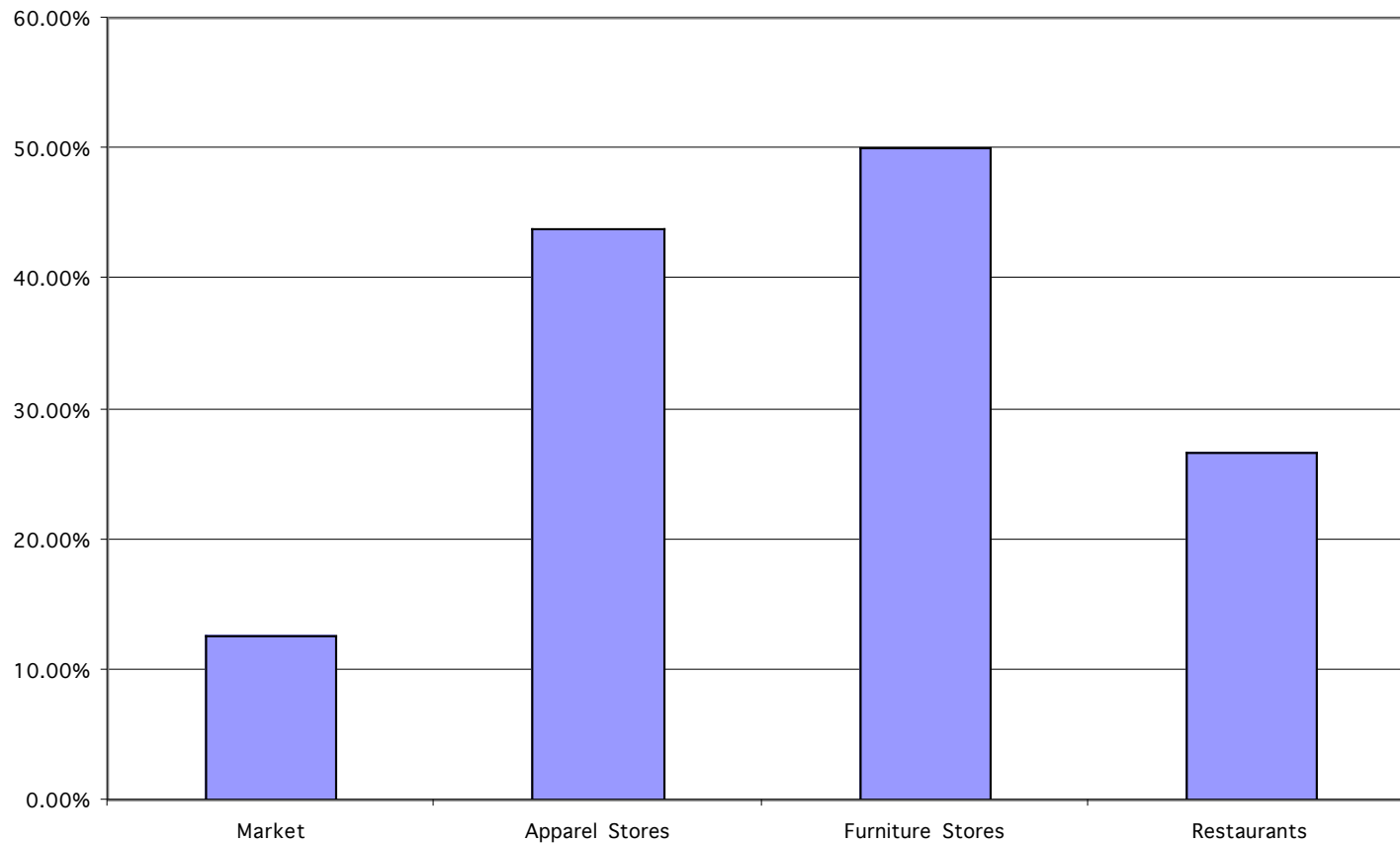
120

- Make sure that there are no financial expenses mixed in with operating expenses
 - ▣ Financial expense: Any commitment that is tax deductible that you have to meet no matter what your operating results: Failure to meet it leads to loss of control of the business.
 - ▣ Example: Operating Leases: While accounting convention treats operating leases as operating expenses, they are really financial expenses and need to be reclassified as such. This has no effect on equity earnings but does change the operating earnings
- Make sure that there are no capital expenses mixed in with the operating expenses
 - ▣ Capital expense: Any expense that is expected to generate benefits over multiple periods.
 - ▣ R & D Adjustment: Since R&D is a capital expenditure (rather than an operating expense), the operating income has to be adjusted to reflect its treatment.

The Magnitude of Operating Leases

121

Operating Lease expenses as % of Operating Income



Dealing with Operating Lease Expenses

122

- Operating Lease Expenses are treated as operating expenses in computing operating income. In reality, operating lease expenses should be treated as financing expenses, with the following adjustments to earnings and capital:
- Debt Value of Operating Leases = Present value of Operating Lease Commitments at the pre-tax cost of debt
- When you convert operating leases into debt, you also create an asset to counter it of exactly the same value.
- Adjusted Operating Earnings
 - Adjusted Operating Earnings = Operating Earnings + Operating Lease Expenses - Depreciation on Leased AssetAs an approximation, this works:
 - Adjusted Operating Earnings = Operating Earnings + Pre-tax cost of Debt * PV of Operating Leases.

Operating Leases at The Gap in 2003

123

- The Gap has conventional debt of about \$ 1.97 billion on its balance sheet and its pre-tax cost of debt is about 6%. Its operating lease payments in the 2003 were \$978 million and its commitments for the future are below:

Year	Commitment (millions)	Present Value (at 6%)
1	\$899.00	\$848.11
2	\$846.00	\$752.94
3	\$738.00	\$619.64
4	\$598.00	\$473.67
5	\$477.00	\$356.44
6&7	\$982.50 each year	\$1,346.04

- Debt Value of leases = \$4,396.85 (Also value of leased asset)
- Debt outstanding at The Gap = \$1,970 m + \$4,397 m = \$6,367 m
- Adjusted Operating Income = Stated OI + OL exp this year - Deprec' n
= \$1,012 m + 978 m - 4397 m /7 = \$1,362 million (7 year life for assets)
- Approximate OI = \$1,012 m + \$ 4397 m (.06) = \$1,276 m

The Collateral Effects of Treating Operating Leases as Debt

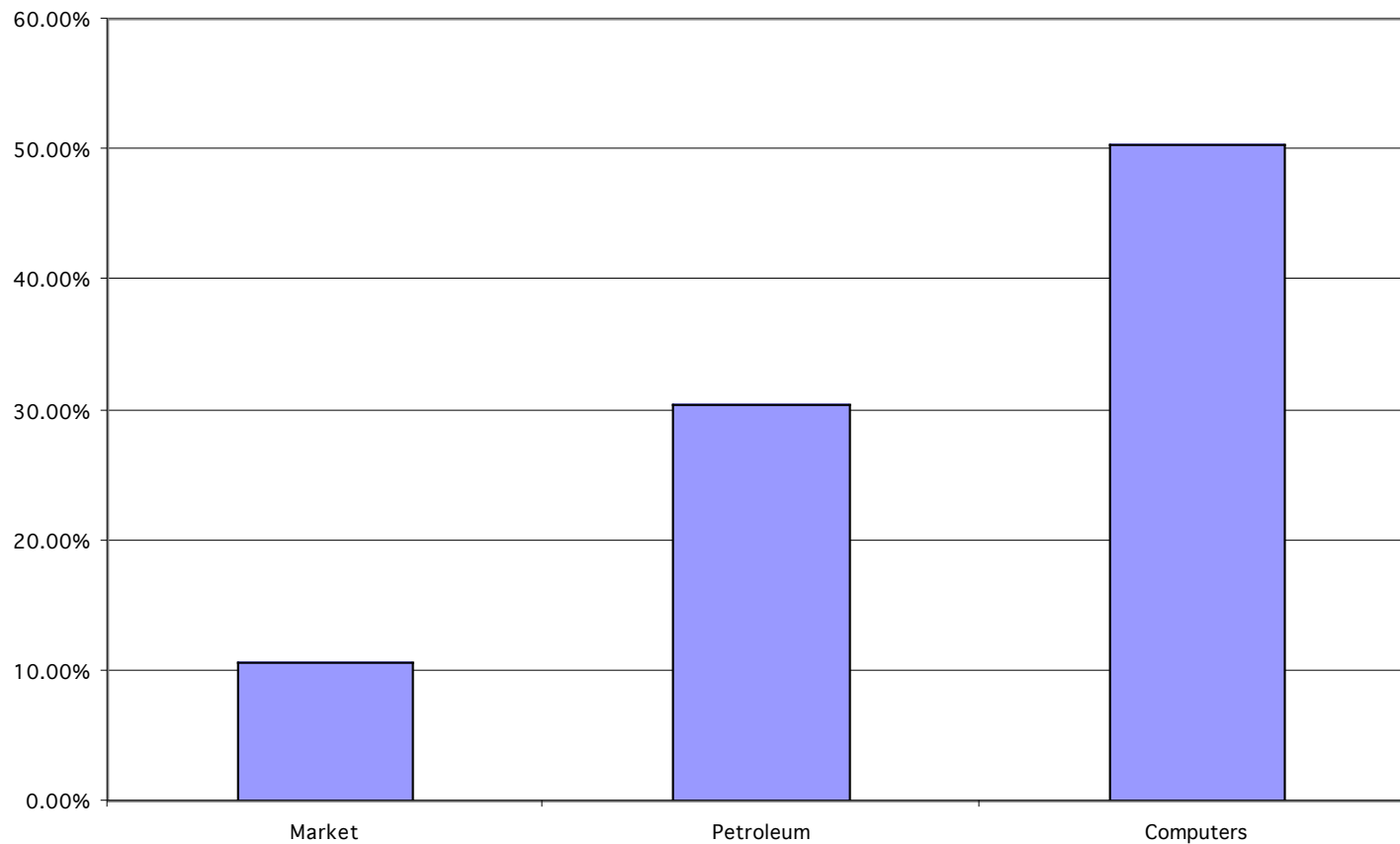
124

<i>Conventional Accounting</i>	<i>Operating Leases Treated as Debt</i>								
<p><i>Income Statement</i></p> <p>EBIT& Leases = 1,990 - Op Leases = 978 EBIT = 1,012</p>	<p><i>Income Statement</i></p> <p>EBIT& Leases = 1,990 - Deprecn: OL= 628 EBIT = 1,362</p> <p>Interest expense will rise to reflect the conversion of operating leases as debt. Net income should not change.</p>								
<p><i>Balance Sheet</i></p> <p>Off balance sheet (Not shown as debt or as an asset). Only the conventional debt of \$1,970 million shows up on balance sheet</p>	<p><i>Balance Sheet</i></p> <table> <tr> <td>Asset</td> <td></td> <td>Liability</td> <td></td> </tr> <tr> <td>OL Asset</td> <td>4397</td> <td>OL Debt</td> <td>4397</td> </tr> </table> <p>Total debt = 4397 + 1970 = \$6,367 million</p>	Asset		Liability		OL Asset	4397	OL Debt	4397
Asset		Liability							
OL Asset	4397	OL Debt	4397						
<p>Cost of capital = $8.20\%(7350/9320) + 4\%(1970/9320) = 7.31\%$</p> <p>Cost of equity for The Gap = 8.20%</p> <p>After-tax cost of debt = 4%</p> <p>Market value of equity = 7350</p>	<p>Cost of capital = $8.20\%(7350/13717) + 4\%(6367/13717) = 6.25\%$</p>								
<p>Return on capital = $1012 (1-.35)/(3130+1970) = 12.90\%$</p>	<p>Return on capital = $1362 (1-.35)/(3130+6367) = 9.30\%$</p>								

The Magnitude of R&D Expenses

125

R&D as % of Operating Income



R&D Expenses: Operating or Capital Expenses

126

- Accounting standards require us to consider R&D as an operating expense even though it is designed to generate future growth. It is more logical to treat it as capital expenditures.
- To capitalize R&D,
 - Specify an amortizable life for R&D (2 - 10 years)
 - Collect past R&D expenses for as long as the amortizable life
 - Sum up the unamortized R&D over the period. (Thus, if the amortizable life is 5 years, the research asset can be obtained by adding up 1/5th of the R&D expense from five years ago, 2/5th of the R&D expense from four years ago....)

Capitalizing R&D Expenses: SAP

127

- R & D was assumed to have a 5-year life.

Year	R&D Expense	Unamortized	Amortization this year	
Current	1020.02	1.00	1020.02	
-1	993.99	0.80	795.19	€ 198.80
-2	909.39	0.60	545.63	€ 181.88
-3	898.25	0.40	359.30	€ 179.65
-4	969.38	0.20	193.88	€ 193.88
-5	744.67	0.00	0.00	€ 148.93
Value of research asset =			€ 2,914 million	
Amortization of research asset in 2004 =			€ 903 million	
Increase in Operating Income = 1020 - 903 =			€ 117 million	

The Effect of Capitalizing R&D at SAP

128

<i>Conventional Accounting</i>	<i>R&D treated as capital expenditure</i>						
<p><i>Income Statement</i></p> <p>EBIT& R&D = 3045 - R&D = 1020 EBIT = 2025 EBIT (1-t) = 1285 m</p>	<p><i>Income Statement</i></p> <p>EBIT& R&D = 3045 - Amort: R&D = 903 EBIT = 2142 (Increase of 117 m) EBIT (1-t) = 1359 m Ignored tax benefit = (1020-903)(.3654) = 43 Adjusted EBIT (1-t) = 1359+43 = 1402 m (Increase of 117 million) Net Income will also increase by 117 million</p>						
<p><i>Balance Sheet</i></p> <p>Off balance sheet asset. Book value of equity at 3,768 million Euros is understated because biggest asset is off the books.</p>	<p><i>Balance Sheet</i></p> <table> <tr> <td>Asset</td> <td>Liability</td> </tr> <tr> <td>R&D Asset 2914</td> <td>Book Equity +2914</td> </tr> <tr> <td colspan="2">Total Book Equity = 3768+2914= 6782 mil</td> </tr> </table>	Asset	Liability	R&D Asset 2914	Book Equity +2914	Total Book Equity = 3768+2914= 6782 mil	
Asset	Liability						
R&D Asset 2914	Book Equity +2914						
Total Book Equity = 3768+2914= 6782 mil							
<p><i>Capital Expenditures</i></p> <p>Conventional net cap ex of 2 million Euros</p>	<p><i>Capital Expenditures</i></p> <p>Net Cap ex = 2+ 1020 - 903 = 119 mil</p>						
<p><i>Cash Flows</i></p> <p>EBIT (1-t) = 1285 - Net Cap Ex = 2 FCFF = 1283</p>	<p><i>Cash Flows</i></p> <p>EBIT (1-t) = 1402 - Net Cap Ex = 119 FCFF = 1283 m</p>						
<p>Return on capital = 1285/(3768+530)</p>	<p>Return on capital = 1402/(6782+530)</p>						