Valuation Inferno: Dante meets DCF…

"*Abandon every hope, ye who enter here*"
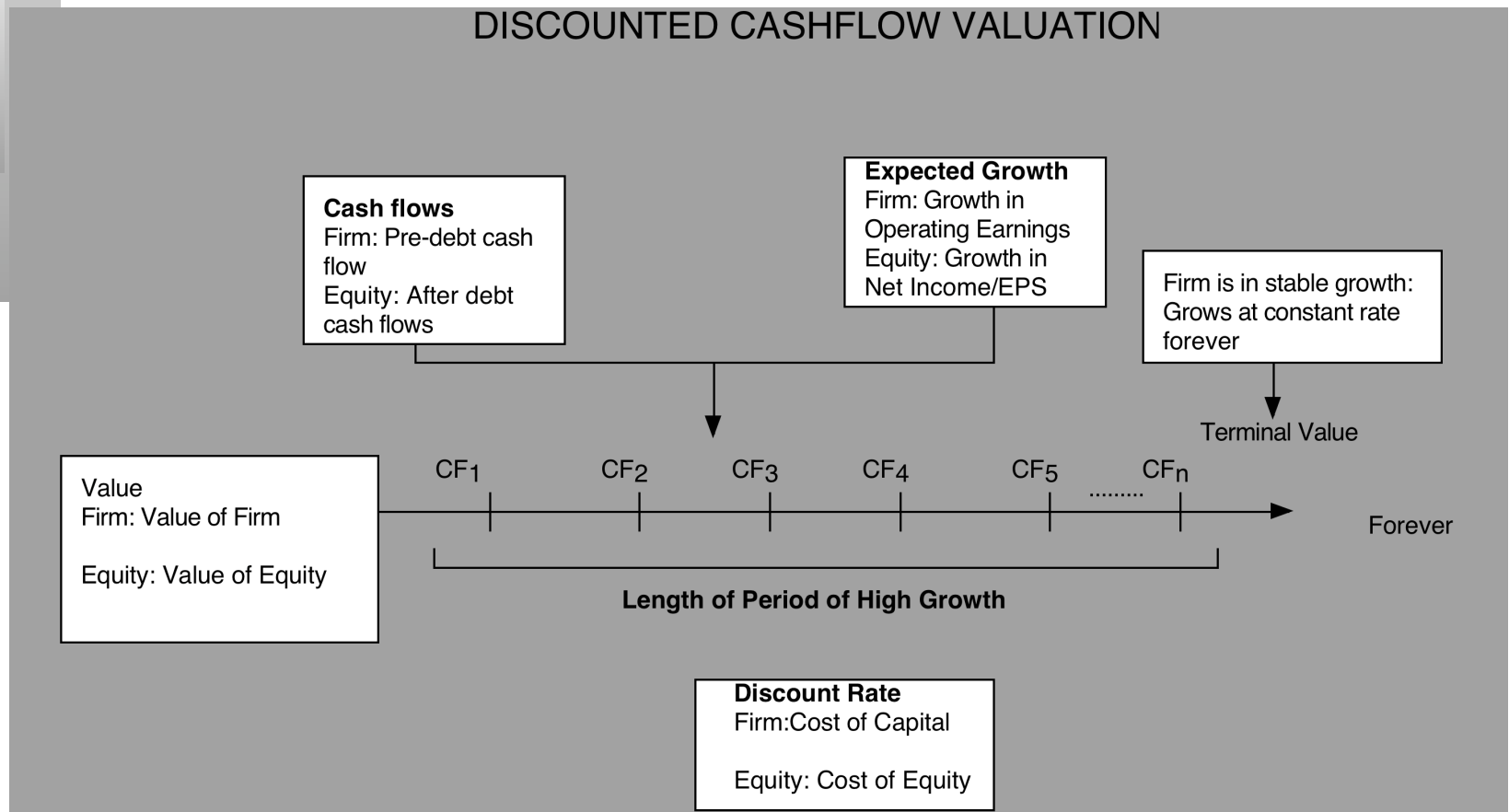
Aswath Damodaran

www.damodaran.com

DCF Choices: Equity versus Firm

Firm Valuation: Value the entire business
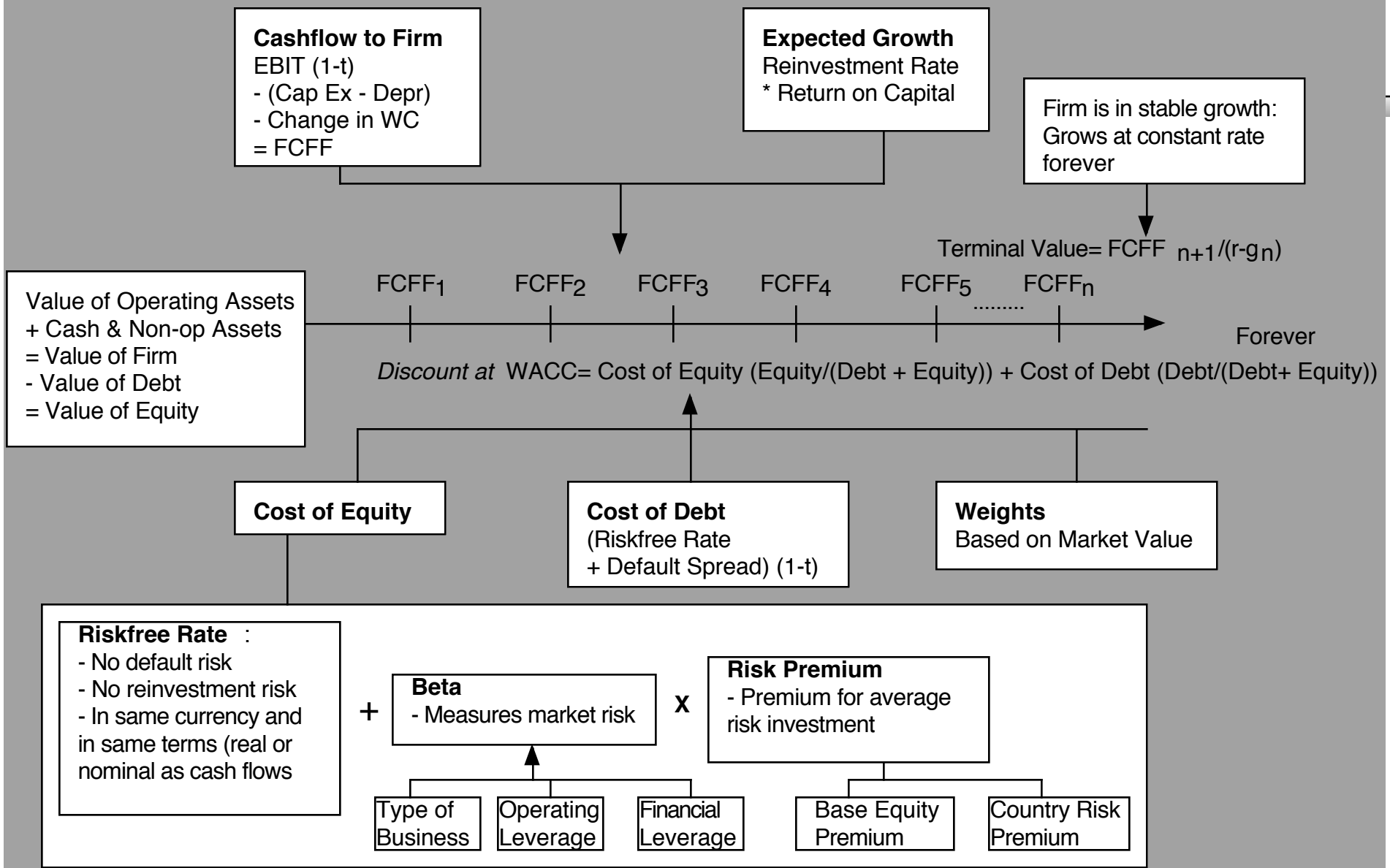 by discounting cash flow to the firm at
 cost of capital

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

Equity valuation: Value just the
 equity claim in the business by
 discounting cash flows to equity at
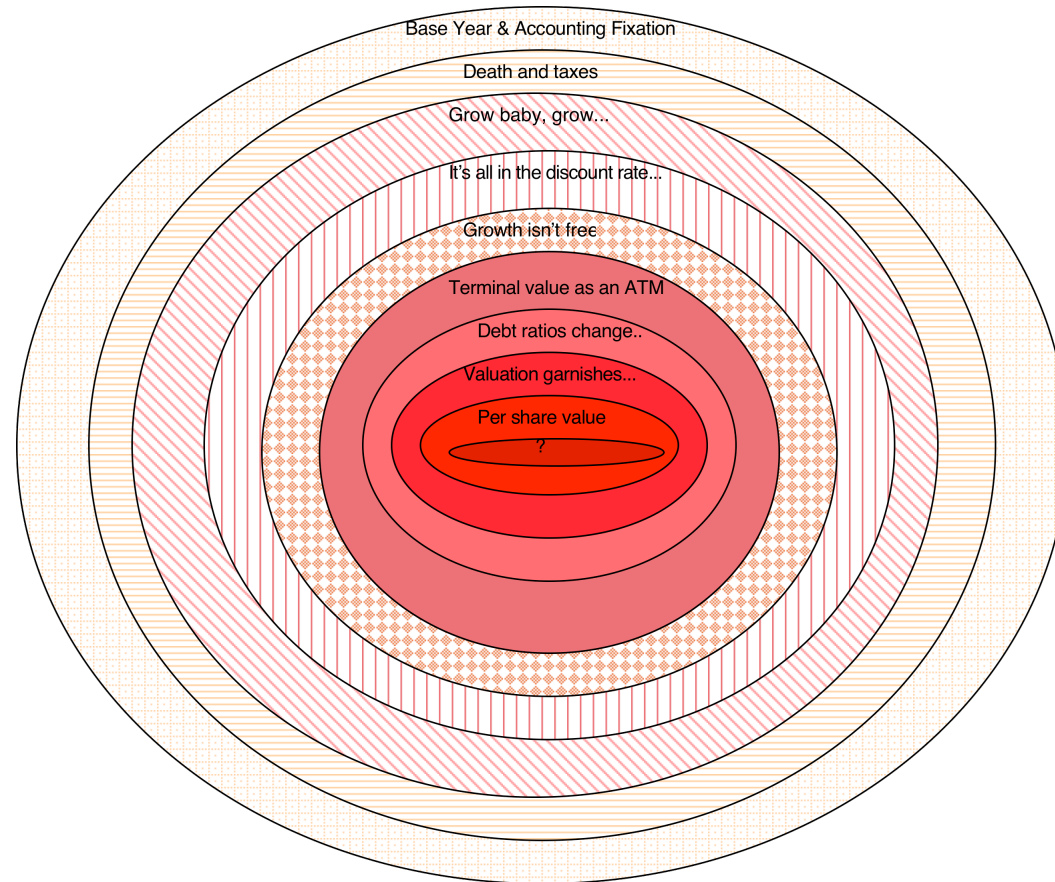 the cost of equity

The Value of a business rests on..

DISCOUNTED CASHFLOW VALUATION

Cash flows
Firm: Pre-debt cash flow
Equity: After debt cash flows

Expected Growth
Firm: Growth in Operating Earnings
Equity: Growth in Net Income/EPS

Firm is in stable growth: Grows at constant rate forever

Terminal Value

Value
Firm: Value of Firm

Equity: Value of Equity

CF_1 CF_2 CF_3 CF_4 CF_5 .... CF_n

Forever

Length of Period of High Growth

Discount Rate
Firm:Cost of Capital

Equity: Cost of Equity

DISCOUNTED CASHFLOW VALUATION

Cashflow to Firm
EBIT (1-t)
- (Cap Ex - Depr)
- Change in WC
= FCFF

Expected Growth
Reinvestment Rate
* Return on Capital

Firm is in stable growth:
Grows at constant rate
forever

Terminal Value= $FCFF_{n+1}/(r-g_n)$

Value of Operating Assets
+ Cash & Non-op Assets
= Value of Firm
- Value of Debt
= Value of Equity

$FCFF_1$ $FCFF_2$ $FCFF_3$ $FCFF_4$ $FCFF_5$ $FCFF_n$ ....

Forever

Discount at WACC= Cost of Equity (Equity/(Debt + Equity)) + Cost of Debt (Debt/(Debt+ Equity))

Cost of Equity

Cost of Debt
(Riskfree Rate
+ Default Spread) (1-t)

Weights
Based on Market Value

Riskfree Rate :
- No default risk
- No reinvestment risk
- In same currency and
in same terms (real or
nominal as cash flows

+

Beta
- Measures market risk

X

Risk Premium
- Premium for average
risk investment

Type of Business	Operating Leverage	Financial Leverage		Base Equity Premium	Country Risk Premium

The nine circles of valuation hell.. With a special bonus circle…

Base Year & Accounting Fixation

Death and taxes

Grow baby, grow...

It's all in the discount rate...

Growth isn't free

Terminal value as an ATM

Debt ratios change..

Valuation garnishes...

Per share value

?

Illustration 1: Base Year fixation….

- You are valuing Exxon Mobil, using the financial statements of the firm from 2007. The following provides the key numbers:

Revenues	$377 billion
EBIT (1-t)	$ 42 billion
Net Cap Ex	$ 3 billion
Chg WC	$ 1 billion

- The cost of capital for the firm is 8% and you use a very conservative stable growth rate of 2% to value the firm. The market cap for the firm is $466 billion and it has $ 9 billion in debt outstanding.

  a. How under or over valued is the equity in the firm?

  b. Would you buy the stock based on this valuation? Why or why not?

Normalization… not easy to do… but…
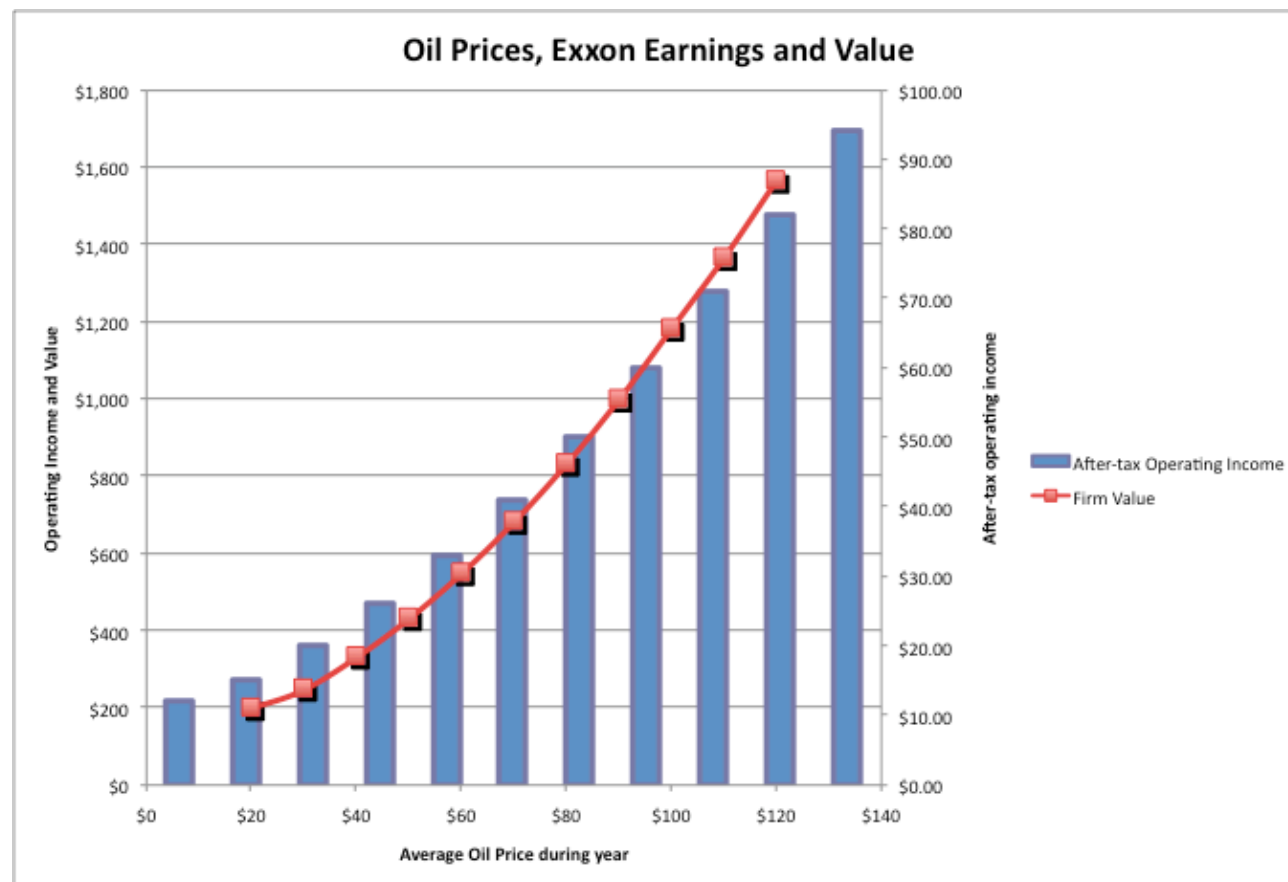
Vale: A Case for Normalization?

Year	2004	2005	2006	2007
Revenues	$27,544	$33,993	$45,291	$64,764
Operating Income	$10,857	$14,854	$20,088	$29,315
Net Income	$6,460	$10,443	$13,431	$20,006
Earnings per share	$1.40	$2.27	$2.78	$4.14
CRB Metals Index	357.69	440.85	693.88	811.85
Deflated Revenues	$27,544.00	$27,580.71	$23,347.18	$28,534.13

1. If you use current earnings as your base, are you likely to find the firm to be under or over valued?
2. Would you normalize earnings?
3. If so, how would you do it?

Embraer: A case for normalization?

	2003	2004	2005	2006	2007	Total
Revenues	R$ 6,571	R$ 10,231	R$ 9,133	R$ 8,342	R$ 9,983	R$ 44,260
EBIT	R$ 1,243	R$ 1,740	R$ 794	R$ 546	R$ 527	R$ 4,850
Operating Margin	18.92%	17.01%	8.69%	6.55%	5.28%	10.96%

Three ways to normalize:
1. Average operating income between 2003-2007 = R$ 970 million
2. Average operating margin between 2003-2007 = 10.96% -> Applied to current revenues of R$9,983 million yields R$ 1,094 million
3. Apply industry average margin of 10.68% (US aerospace & defense) to current revenues of R$9,983 million yields R$ 1,066 million.

Illustration 2: Taxes and Value

■ Assume that you have been asked to value a company and have been provided with the most recent year's financial statements:

EBITDA	140
- DA	40
EBIT	100
- Interest exp	20
Taxable income	80
Taxes	32
Net Income	48

Assume also that cash flows will be constant and that there is <u>no growth in perpetuity</u>. What is the free cash flow to the firm?

Lesson 2.1: Don't double count the tax benefit

- <u>Taxes paid</u>: When computing the after-tax operating income, using taxes paid (24) will give you a higher cash flow but will result in double counting the tax benefit - once in the cash flow and again in the cost of capital (when you use the after-tax cost of debt)
- <u>Cap Ex</u>:Though nothing is mentioned about cap ex, the fact that these earnings can be maintained in perpetuity requires us to be consistent in our reinvestment assumptions. If you do not set cap ex = depreciation, the assets of the firm will deplete over time to zero but earnings will continue at current levels.

Ignoring a relevant variable, because you are not given the facts or feel uncertain about it, is just as much an assumption (and often less defensible and more dangerous) than making an explicit assumption.

2.2: Dueling Tax Rates

	Vale	Embraer	Gerdau	Petrobras
Operating income	$29,315.00	$527.00	$4,796.00	$36,432.00
Interest expense	$806.00	$276.00	$0.00	$2,160.00
Taxable Income	$28,646.00	$828.00	$5,295.00	$34,528.00
Taxes paid	$7,086.00	$162.00	$970.00	$11,273.00
Effective tax rate	24.74%	19.57%	18.32%	32.65%
Taxes/ EBIT	24.17%	30.74%	20.23%	30.94%
Marginal tax rate	34%	34%	34%	34%

1. Why is the effective tax rate different from the marginal tax rate?
2. Why is the effective tax rate different from taxes as a % of EBIT?
3. Which tax rate should you use in computing your after-tax operating income?

Illustration 3: High Growth for how long…

Assume that you are valuing a young, high growth firm with great potential, just after its initial public offering. How long would you set your high growth period?

- ❏ < 5 years
- ❏ 5 years
- ❏ 10 years
- ❏ >10 years

Lesson 3.1: Maintaining high growth is difficult…

■ While analysts routinely assume very long high growth periods (with substantial excess returns during the periods), the evidence suggests that they are much too optimistic. A study of revenue growth at firms that make IPOs in the years after the IPO shows the following:

Typically, the revenue growth rate of a newly public company outpaces its industry average for only about five years.

15%

Margin by which revenue growth rate exceeds industry average

12 .... **Post-I.P.O. growth**

9 .... *Median of new issues from 1965 to 2005*

6

3

1   2   3   4   5   6
Number of years after coming to market
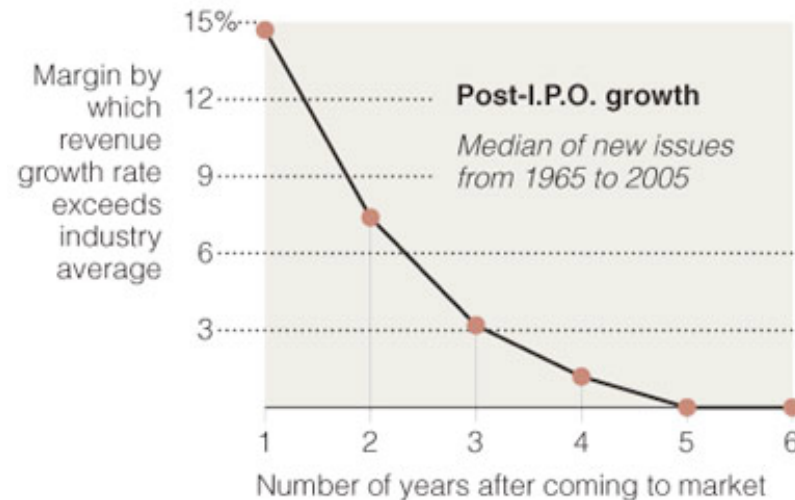
Source: Andrew Metrick   The New York Times

Lesson 3.2: Scaling up growth is hard to do..

Growth and Market Cap
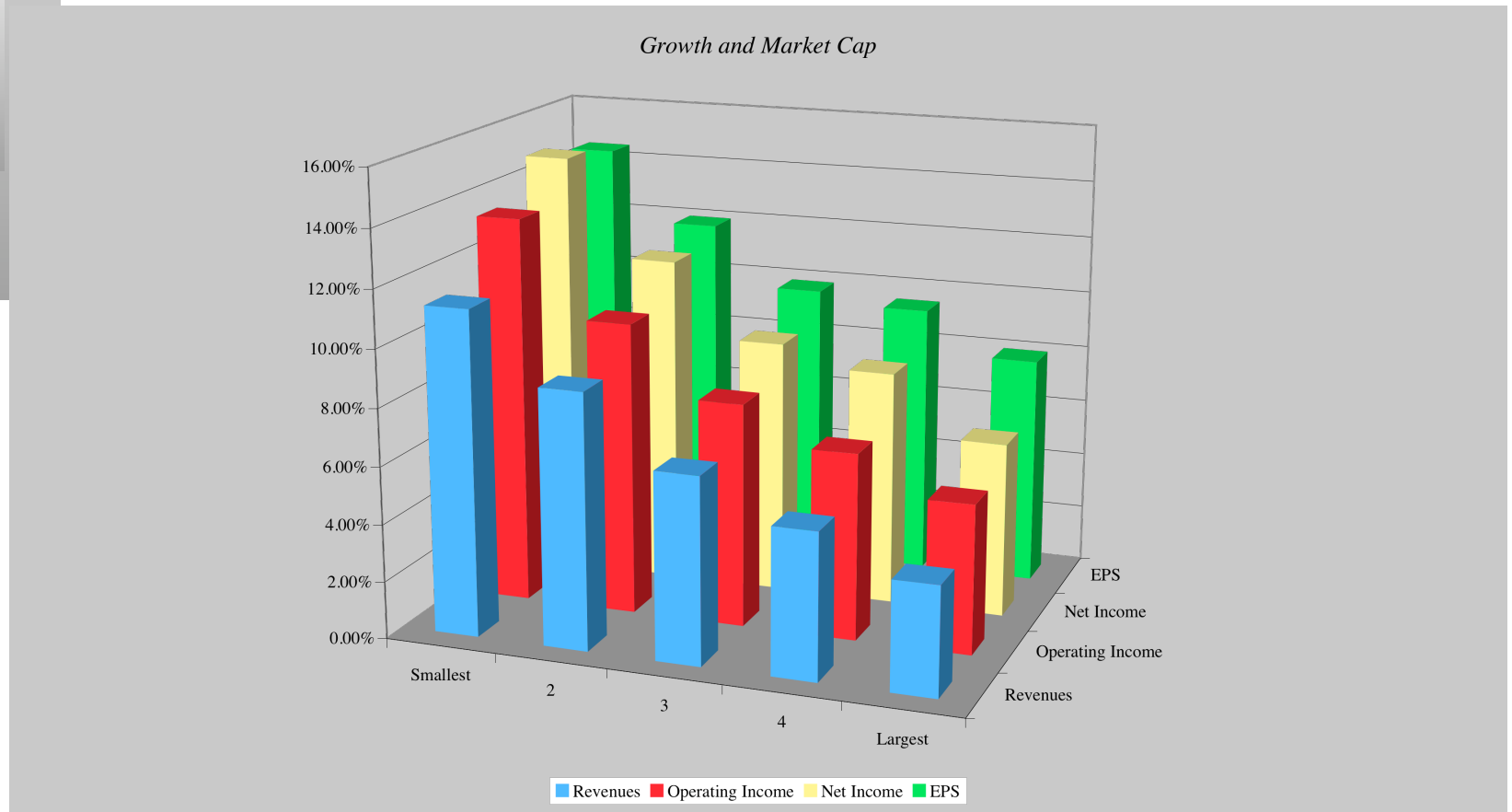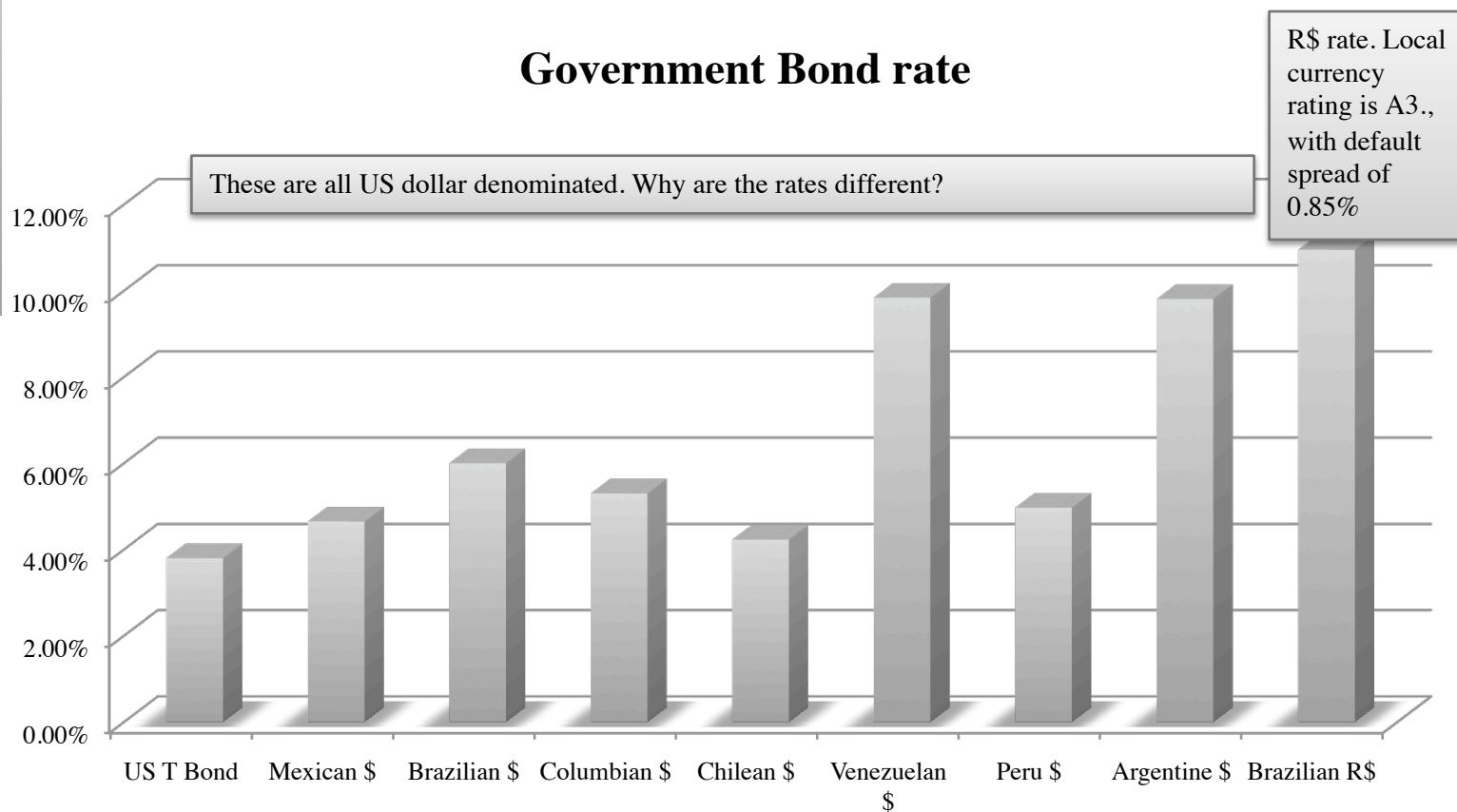
You be the judge: How long a growth period?

■ Given that growth becomes more difficult to maintain as firms get larger and the market stagnates, what type of growth period would you assign the following firms?

☐ Embraer: 0 years, 5 years, 10 years, > 10 years

☐ Vale: 0 years, 5 years, 10 years, > 10 years
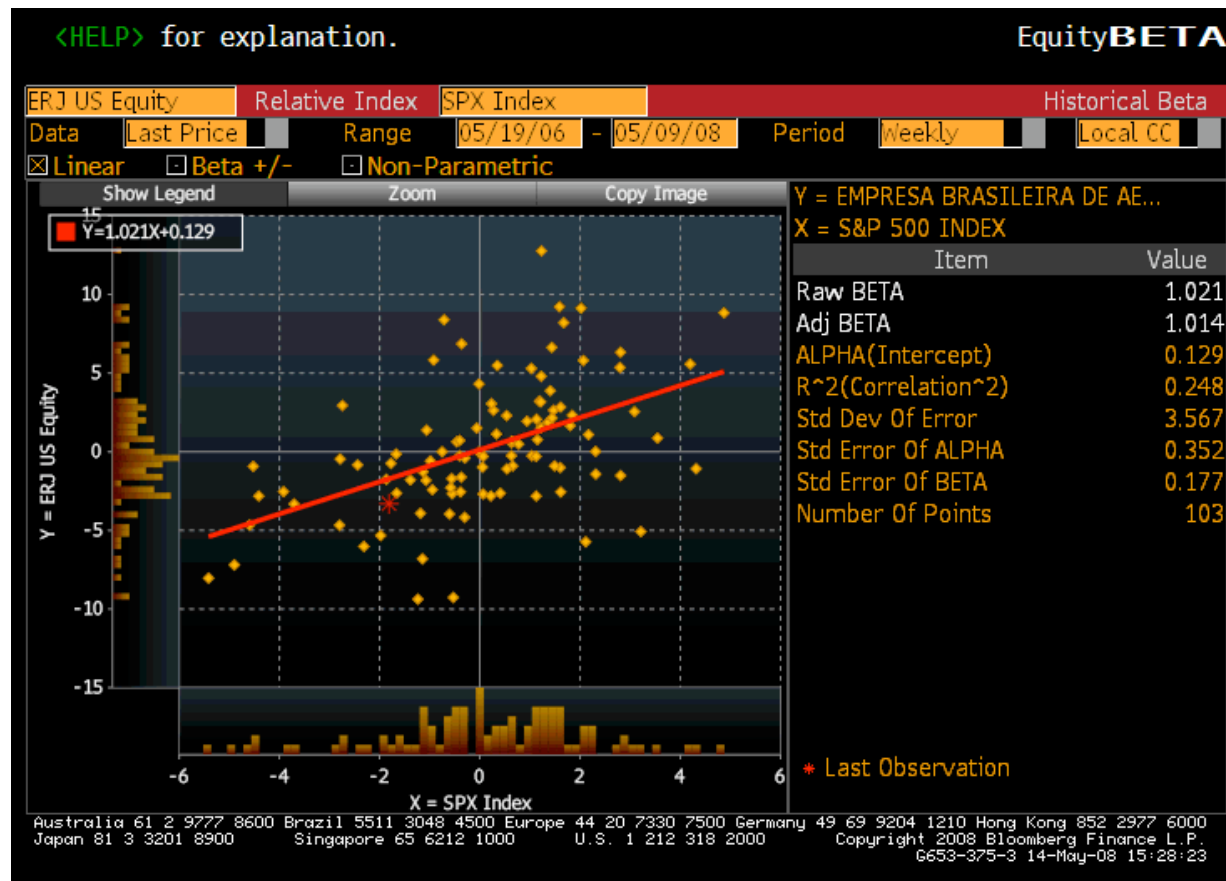
☐ Petrobras: 0 years, 5 years, 10 years, > 10 years

☐ Gerdau Steel: 0 years, 5 years, 10 years, > 10 years

Illustration 4: Regression betas and Debt Cost

■ The US $ cost of capital for Embraer has been computed using the following inputs:

- The cost of equity was estimated from the ten-year dollar denominated Brazilian government bond rate of 6%, a Bloomberg "adjusted" beta for the Embraer ADR of 1.01 and an equity risk premium for Brazil of 6.2% (based on the US historical risk premium of 4% and <u>an additional risk premium of 2.2% for Brazil</u>.

  Cost of equity = Brazilian Government Bond rate + Beta * Risk Premium

  = 6% + 1.01 (6.2%) = 12.26%

- The cost of debt was computed by dividing the interest expenses (276 mil R$) by the book value of debt (3,127 mil R$); the effective tax rate for the firm is 19.5%.

  – Cost of debt = Interest expenses/ Book Debt = 276/ 3127 = 8.82%

  – After-tax cost of debt = Cost of debt (1- Effective tax rate) = 8.82% (1-.195) = 7.10%

- The cost of capital was computed using the market value of equity(12729 million R$) and the book value of all liabilities (10260) as weights for debt and equity

  Cost of capital = 13.87% (12729/(12729+10260)) + 7.1% (10260/(12729+10260)) = 9.96%
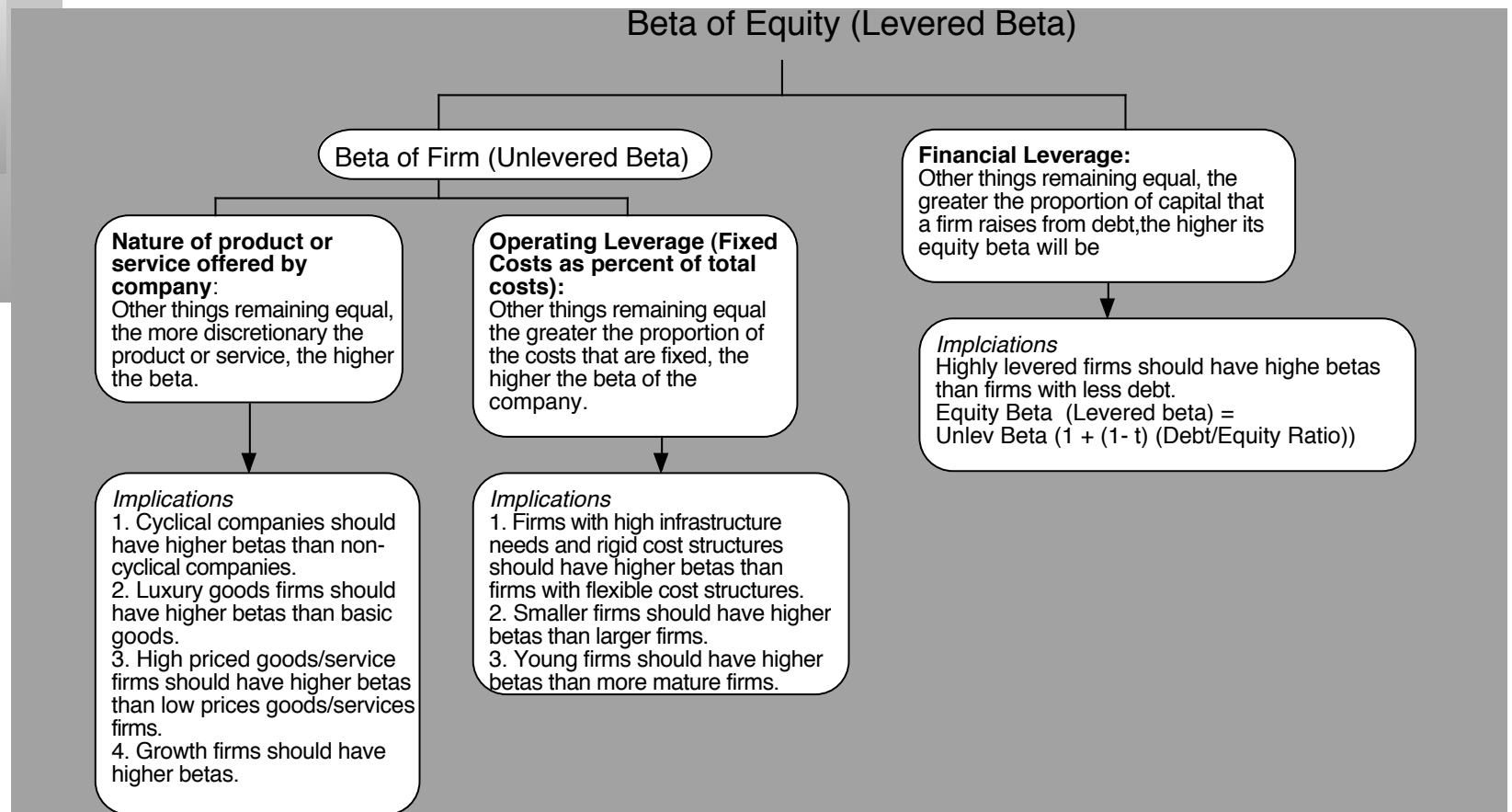
■ Do you agree with the computation?
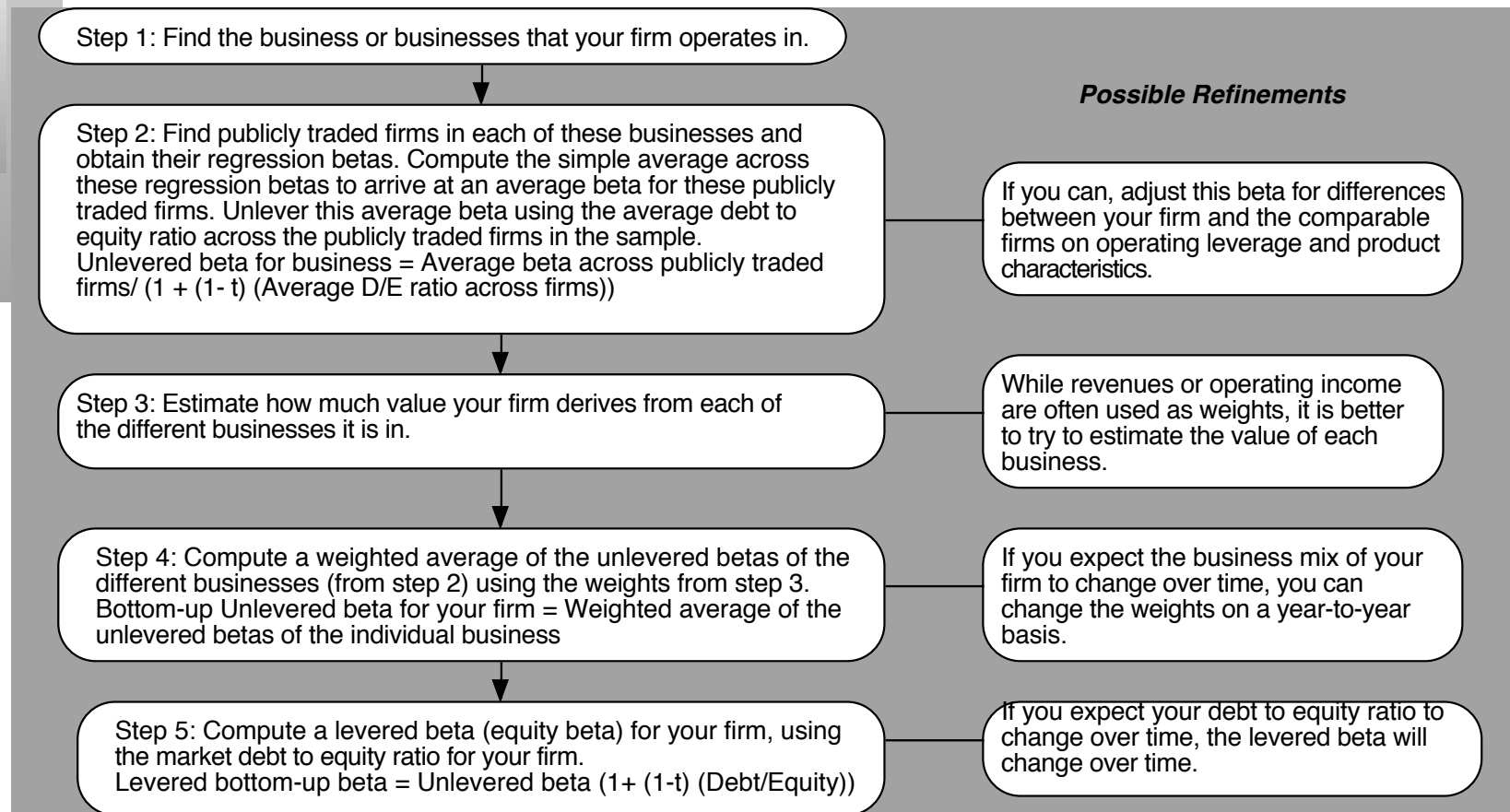
4.1: Government bonds are not always riskless..

Government Bond rate

These are all US dollar denominated. Why are the rates different?

R$ rate. Local currency rating is A3., with default spread of 0.85%

4.2: Betas don't come from regressions..

But from a firm's business mix as well as operating and financing choices…

Beta of Equity (Levered Beta)

Beta of Firm (Unlevered Beta)

Financial Leverage:
Other things remaining equal, the greater the proportion of capital that a firm raises from debt,the higher its equity beta will be

Nature of product or service offered by company:
Other things remaining equal, the more discretionary the product or service, the higher the beta.

Operating Leverage (Fixed Costs as percent of total costs):
Other things remaining equal the greater the proportion of the costs that are fixed, the higher the beta of the company.

Implciations
Highly levered firms should have highe betas than firms with less debt.
Equity Beta (Levered beta) =
Unlev Beta $(1 + (1- t) (Debt/Equity \ Ratio))$

Implications
1. Cyclical companies should have higher betas than non-cyclical companies.
2. Luxury goods firms should have higher betas than basic goods.
3. High priced goods/service firms should have higher betas than low prices goods/services firms.
4. Growth firms should have higher betas.

Implications
1. Firms with high infrastructure needs and rigid cost structures should have higher betas than firms with flexible cost structures.
2. Smaller firms should have higher betas than larger firms.
3. Young firms should have higher betas than more mature firms.

Which yields an alternative to regression betas…

Step 1: Find the business or businesses that your firm operates in.

Possible Refinements

Step 2: Find publicly traded firms in each of these businesses and obtain their regression betas. Compute the simple average across these regression betas to arrive at an average beta for these publicly traded firms. Unlever this average beta using the average debt to equity ratio across the publicly traded firms in the sample.
Unlevered beta for business = Average beta across publicly traded firms/ (1 + (1- t) (Average D/E ratio across firms))

If you can, adjust this beta for differences between your firm and the comparable firms on operating leverage and product characteristics.

Step 3: Estimate how much value your firm derives from each of the different businesses it is in.

While revenues or operating income are often used as weights, it is better to try to estimate the value of each business.

Step 4: Compute a weighted average of the unlevered betas of the different businesses (from step 2) using the weights from step 3.
Bottom-up Unlevered beta for your firm = Weighted average of the unlevered betas of the individual business

If you expect the business mix of your firm to change over time, you can change the weights on a year-to-year basis.

Step 5: Compute a levered beta (equity beta) for your firm, using the market debt to equity ratio for your firm.
Levered bottom-up beta = Unlevered beta (1+ (1-t) (Debt/Equity))

If you expect your debt to equity ratio to change over time, the levered beta will change over time.

Bottom-up Betas…

Company	Business	Unlevered beta	D/E Ratio	Weights	Levered Beta
Embraer	Aerospace	0.75	25.84%	100%	0.88
Ambev	Alcoholic beverages	0.75	19.43%	80%	0.85
	Soft Drinks	0.85	19.43%	20%	0.96
	Company	0.77	19.43%		0.87
Vale	Mining	0.98	25.66%	71%	1.15
	Aluminum	0.72	25.66%	9%	0.84
	Steel	0.63	25.66%	14%	0.74
	Transportation	0.73	25.66%	5%	0.85
	Other	0.74	25.66%	1%	0.87
	Company	0.89	25.66%	100%	1.04
Petrobras	Integrated Oil	0.60	49.58%	100%	0.79

4.3: Equity risk premiums matter.. The US example…

	Arithmetic average		*Geometric Average*		
	Stocks -	Stocks -	Stocks -	Stocks -	
Historical Period	T.Bills	T.Bonds	T.Bills	T.Bonds	
1928-2007	7.78%	6.42%	5.94%	4.79%	←Historical premium
1967-2007	5.94%	4.33%	4.75%	3.50%	
1997-2007	5.26%	2.68%	4.69%	2.34%	

Between 2001 and 2007 dividends and stock buybacks averaged 4.02% of the index each year.

Analysts expect earnings to grow 5% a year for the next 5 years. We will assume that dividends & buybacks will keep pace.. Last year's cashflow (59.03) growing at 5% a year

After year 5, we will assume that earnings on the index will grow at 4.02%, the same rate as the entire economy (= riskfree rate).

| 61.98 | 65.08 | 68.33 | 71.75 | 75.34 |

January 1, 2008
S&P 500 is at 1468.36
4.02% of 1468.36 = 59.03
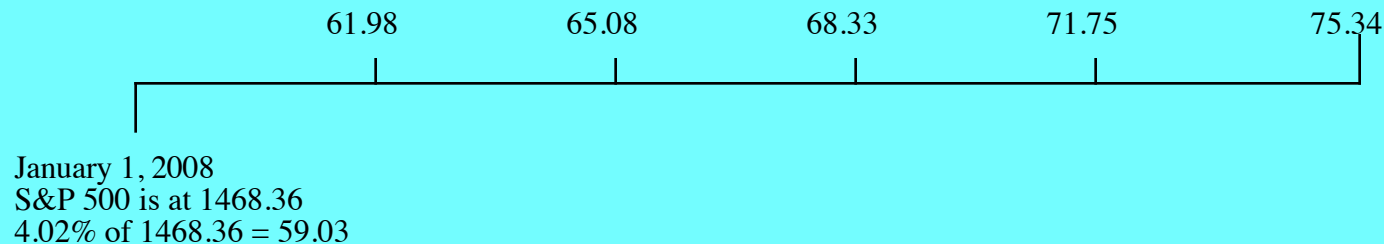
Implied Expected Return on Equity = 8.39%
Riskfree Rate = 4.02%
Implied ERP = 8.39% - 4.02% = 4.37%

For emerging markets, one alternative is to build off US risk premiums..

- Country ratings measure default risk. While default risk premiums and equity risk premiums are highly correlated, one would expect equity spreads to be higher than debt spreads.
- Another is to multiply the bond default spread by the relative volatility of stock and bond prices in that market. Using this approach in 2003:
  - Country risk premium = Default spread on country bond* $\sigma_{\text{Country Equity}}$ / $\sigma_{\text{Country Bond}}$
    - Standard Deviation in Bovespa (Equity) = 29.24%
    - Standard Deviation in Brazil C-Bond = 24.15%
    - Default spread on C-Bond = 6.50%
  - Country Risk Premium for Brazil = 6.50% (29.24%/24.15%) = 7.87%
- Using the same approach in 2008 would yield a much lower country risk premium:
  - Country risk premium = 2.20% (25%/15%) = 3.66%

And the other is to compute an implied equity premium…

- Using the Bovespa as our measure of Brazilian equity, we estimated the following:
  - Level of index = 73512
  - FCFE for stocks in index in 2005 = 3.56% of index level
  - Expected growth rate (in US $) in earnings & FCFE for next 5 years = 9.00%
  - Growth rate beyond year 5 = 3.80%
  - Risk free rate= 3.80%
- Solving for the level of the index, we get
  - Expected return on Brazilian stocks = 8.43%
  - Implied equity risk premium for Brazil = 8.43% - 3.80% = 4.63%

The Evolution of Brazil Country Risk
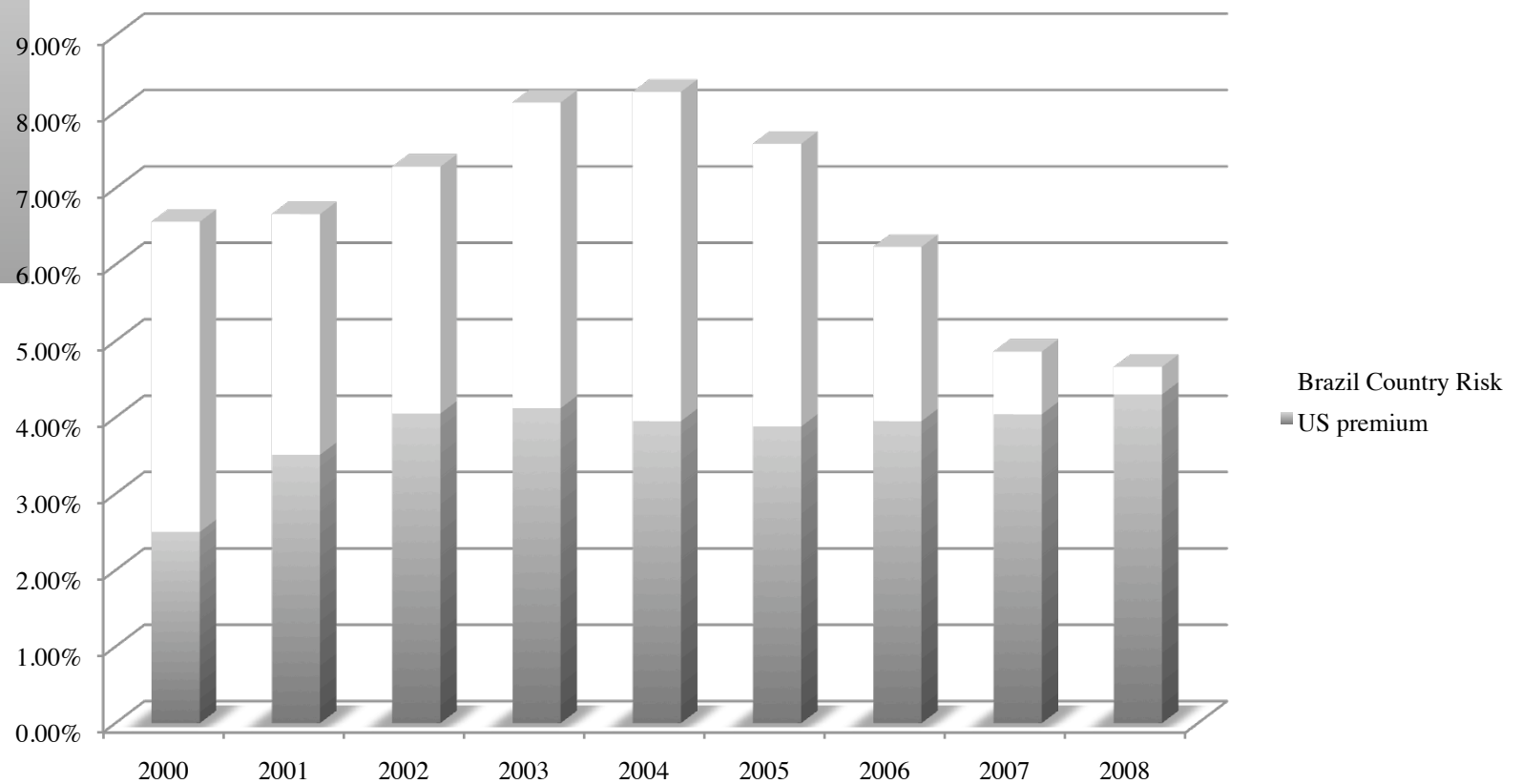
4.4: Not all companies are equally exposed to country risk…

- <u>Source of revenues</u>: Other things remaining equal, a company should be more exposed to risk in a country if it generates more of its revenues from that country. A Brazilian firm that generates the bulk of its revenues in Brazil should be more exposed to country risk than one that generates a smaller percent of its business within Brazil.

- <u>Manufacturing facilities</u>: Other things remaining equal, a firm that has all of its production facilities in Brazil should be more exposed to country risk than one which has production facilities spread over multiple countries. The problem will be accented for companies that cannot move their production facilities (mining and petroleum companies, for instance).

- <u>Use of risk management products</u>: Companies can use both options/futures markets and insurance to hedge some or a significant portion of country risk.

A simplistic measure of country risk exposure…

- The easiest and most accessible data is on revenues. Most companies break their revenues down by region. One simplistic solution would be to do the following:

λ = % of revenues domestically$_{firm}$/ % of revenues domestically$_{avg\ firm}$

- Consider, for instance, Embraer and Embratel, both of which are incorporated and traded in Brazil. Embraer gets 3% of its revenues from Brazil whereas Embratel gets almost all of its revenues in Brazil. The average Brazilian company gets about 77% of its revenues in Brazil:
  - Lambda$_{Embraer}$ = 3%/ 77% = .04
  - Lambda$_{Embratel}$ = 100%/77% = 1.30
- There are two implications
  - A company's risk exposure is determined by where it does business and not by where it is located
  - Firms might be able to actively manage their country risk exposures

And a slightly more sophisticated one…

$Return_{Embraer} = 0.0195 + \mathbf{0.2681}\ Return_{C\ Bond}$ $Return_{Embratel} = -0.0308 + \mathbf{2.0030}\ Return_{C\ Bond}$

$Return_{Ambev} = 0.0290 + \mathbf{0.4136}\ Return_{C\ Bond}$ $Return_{Petrobras} = -0.0308 + \mathbf{0.6600}\ Return_{C\ Bond}$

$Return_{Vale} = 0.02169 + \mathbf{0.3760}.Return_{C\ Bond}$

Embraer versus C Bond: 2000-2003 · Embratel versus C Bond: 2000-2003
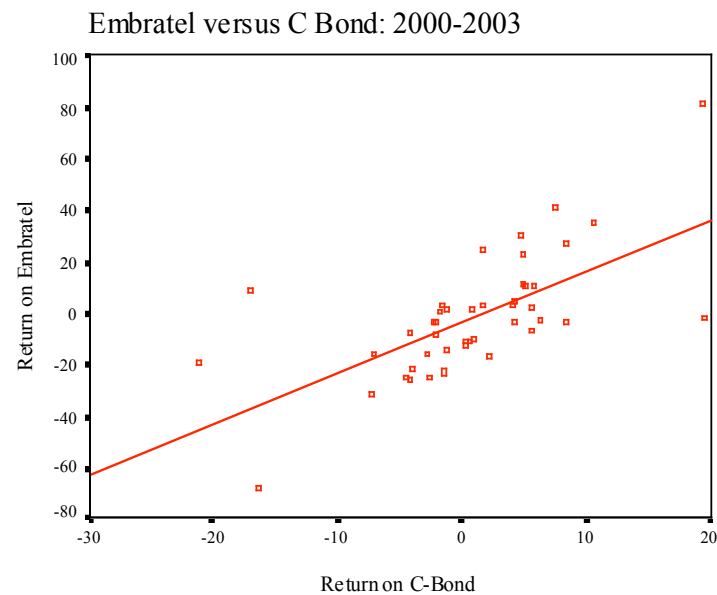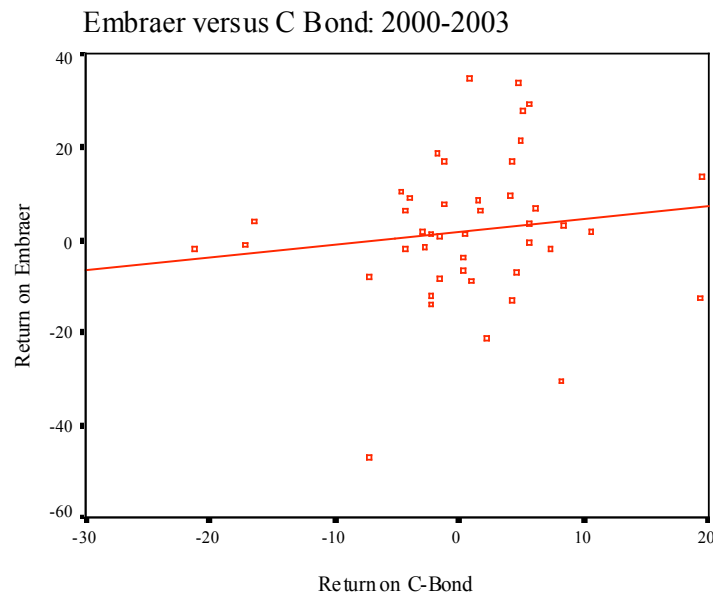
4.5: Not everything is debt…

■ To be treated as debt, there are three conditions that have to be met:

- The liability must give rise to contractual obligations that have me to be met no matter how the firm's operations are doing.

- These obligations are usually tax deductible

- Failing to meet these obligations can lead to loss of control of the business.

■ When defining debt for cost of capital purposes, there are two rules to follow:

- Use market values for debt, rather than book value, even if you have to estimate the market value.

- Define debt narrowly to include only interest bearing debt and lease commitments, rather than everything on the balance sheet

4.6: The Cost of Debt

- The cost of debt is the rate at which a firm can borrow money, long term and today, corrected for the tax benefits of debt.
    - Take all debt, short term as well as long term, and attach one long term cost of debt to it.
    - That long term cost of debt will be based upon the level of riskless rates today and the default risk of the company today (based on either an actual or a synthetic rating).
    - Interest saves you taxes at the margin. Consequently, the marginal tax rate should be used to compute the tax benefit.
- As a general rule, it is dangerous to start breaking debt down into individual pieces (senior, subordinated, unsecured…) and attaching different costs to each one.

A synthetic rating from an interest coverage ratio…

EBIT/ Interest expenses

If Coverage Ratio is		Estimated Rating	Default Spread
> 8.50	(>12.50)	AAA	0.75%
6.50 - 8.50	(9.5-12.5)	AA	1.25%
5.50 - 6.50	(7.5-9.5)	A+	1.40%
4.25 - 5.50	(6-7.5)	A	1.50%
3.00 - 4.25	(4.5-6)	A–	1.70%
2.50 - 3.00	(4-4.5)	BBB	2.50%
2.25- 2.50	(3.5-4)	BB+	3.20%
2.00 - 2.25	((3-3.5)	BB	3.65%
1.75 - 2.00	(2.5-3)	B+	4.50%
1.50 - 1.75	(2-2.5)	B	5.65%
1.25 - 1.50	(1.5-2)	B –	6.50%
0.80 - 1.25	(1.25-1.5)	CCC	7.50%
0.65 - 0.80	(0.8-1.25)	CC	10.00%
0.20 - 0.65	(0.5-0.8)	C	12.00%
< 0.20	(<0.5)	D	20.00%

The first number under interest coverage ratios is for larger market cap companies (> $ 5 billion) and the second in brackets is for smaller market cap companies.

Estimating the cost of debt for Embraer

Step 1: Estimate the interest coverage ratio for Embraer. We used the interest expenses and the average operating income from 2003-2007.

Interest Coverage Ratio = 970/ 271 = 3.58

Step 2: Estimate the synthetic rating for Embraer. Given its market cap, we assigned it to the large market cap group and assigned it a rating of A-, based on the rating.

Step 3: Estimate the default spread, based upon the rating.

Default spread for A- rated bond in May 2008 = 1.7%

Step 4: Determine how much of the country default spread your firm will carry when it borrows money. We assumed that Embraer would carry half the default spread for Brazil (2.2%).

Step 5: Estimate the cost of debt

Riskfree Rate + Default Spread for company + Default spread for country

= 3.8% + 1.7% + 1.1% = 6.6%

A Corrected (US $) Cost of Capital: Embraer

- ■ Equity
  - Cost of Equity = 3.80% + 0.88 (4%) + 0.27 (3.66%) = 8.31%
  - Market Value of Equity = R$ 12,729 million ($ 7.715 billion)
- ■ Debt
  - Cost of debt = 3.8% + 1.7% +1.1%= 6.6%
  - Market Value of Debt = R$ 3,416 million ($2.070 billion)
- ■ Cost of Capital

  Cost of Capital = 8.31 % (.7884) + 6.6% (1- .34) (0.2116)) = 7.47%

- ✓ The book value of equity at Embraer is 5,402 million BR.
- ✓ The book value of debt at Embraer is 3,128 million BR; Interest expense is 276 mil; Average maturity of debt = 5 years
- ✓ Estimated market value of debt = 276 million (PV of annuity, 5 years, 6.6%) + $3,128 million/$1.066^4$ = 3,416 million BR

4.7: Be "currency" and "risk" consistent

■ Assume that you are doing the analysis in Nominal Brazilian Reais. How would your inputs have been different?

❏ Riskfree Rate

❏ Beta

❏ Risk Premium

■ If you value the company in nominal Reais, what effect would you have on the valuation?

❏ The value will go down, because the discount rate will be higher

❏ The value will go up, because the cash flows will be higher

❏ The value should remain unchanged.

A Quick (and consistent) Conversion from one currency to another

- Approach 1: Use a BR riskfree rate in all of the calculations above. For instance, if the BR riskfree rate was 10%, the cost of capital would be computed as follows:
  - Cost of Equity = 10% + 0.88(4%) + 0.27 (3.66%) = 14.51%
  - Cost of Debt = 10% + 1.7% = 11.7%
  - Cost of capital = 14.51% (0.7884) + 11.7% (1-.34) (.2116) = 13.07%
- 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%

Cost of capital=

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

= 1.0747 (1.08/1.02)-1   = 0.1379 or 13.79%

4.8: Don't let your macro views color your valuation

- The country risk premium for Brazil today is about half what it was a few years ago and treasury bond rates in the US today are far lower than they were a few years ago. If you believe that both interest rates and the country risk premium will go up (down), that exchange rates will move adversely (in your favor) and that the economy will weaken (strengthen), should you try to bring them into your company valuation?
  - ❏ Yes
  - ❏ No
- If you do, and you conclude that a stock is overvalued (undervalued), how should I read this conclusion?

Illustration 5: The price of growth..

■ You are looking at the projected cash flows provided by the management of the firm, for use in valuation

Year	Current	1	2	3	4
Growth rate		10%	10%	10%	10%
Revenues	$100.00	$110.00	$121.00	$133.10	$146.41
EBIT (1-t)	$30.00	$33.00	$36.30	$39.93	$43.92
+ Depreciation	$15.00	$16.50	$18.15	$19.97	$21.96
- Cap Ex	$18.00	$19.80	$21.78	$23.96	$26.35
- Chg in WC	$3.00	$3.30	$3.63	$3.99	$4.39
FCFF	$24.00	$26.40	$29.04	$31.94	$35.14

What are the key questions that you would ask the management about its projections?

5.1. Is the growth feasible?

■ If the growth in a firm is coming from revenues increasing over time, the key question to ask is whether this growth is feasible. There a couple of tests that you can use to make this determination.

■ <u>The Max Test</u>: The revenues that you are projecting in the terminal year cannot exceed the overall market for the products and services produced by your company.

- Define the market potential before you start forecasting.
- Keep track of market share

■ <u>The Big Player test</u>: The revenues that you are projecting in your terminal year should be comparable to the revenues of the largest player in the market today, adjusted for inflation.

- Identify the biggest companies in your market and their revenues
- Forecast out their revenues in your terminal year.

5.2: Are you paying for growth?

■ Growth from "new" investments (sustainable growth)
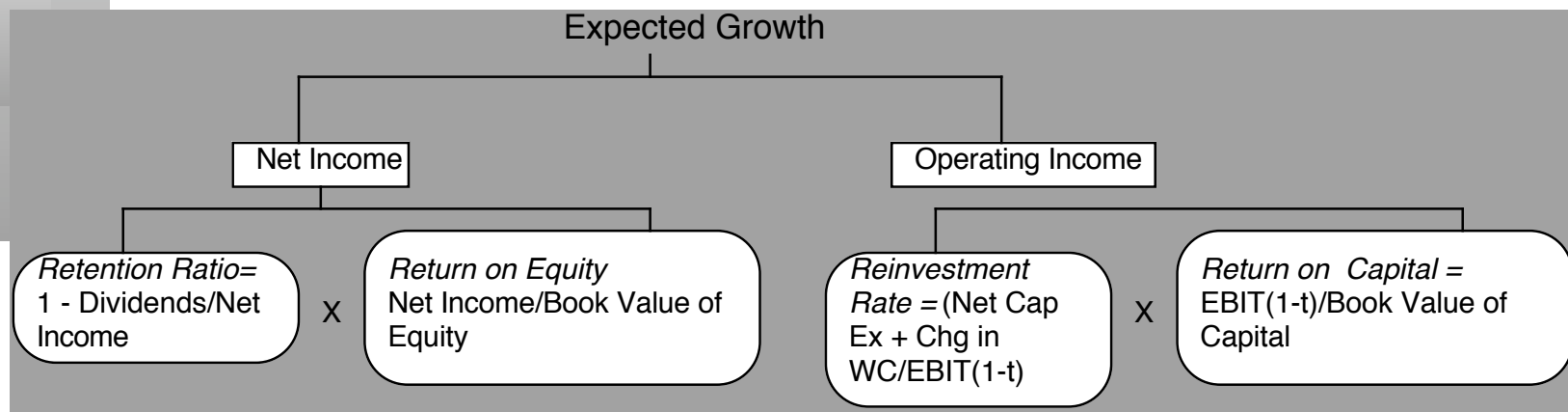
■ Growth from efficiency

- When a company generates higher returns on its existing investments, this can create efficiency growth, measured as follows:
    – With equtiy income: $(ROE_t – ROE_{t-1}) /ROE_{t-1}$
    – With operating income: $(ROC_t – ROC_{t-1}) /ROC_{t-1}$
- This growth can last for the short term but not forever. (Why?)

The Value of Growth

	Firm 1	Firm 2	Firm 3	Firm 4	Firm 5
Reinvestment Rate	20.00%	100.00%	200.00%	20.00%	0.00%
ROIC on new investment	50.00%	10.00%	5.00%	10.00%	10.00%
ROIC on existing investments before	10.00%	10.00%	10.00%	10.00%	10.00%
ROIC on existing investments after	10.00%	10.00%	10.00%	10.80%	11.00%
Expected growth rate	**10.00%**	**10.00%**	**10.00%**	**10.00%**	**10.00%**

Expected growth = Growth from new investments + Efficiency growth

$$= \text{Reinv Rate} * \text{ROC} \qquad + (ROC_t - ROC_{t-1})/ROC_{t-1}$$

Assume that your cost of capital is 10%. As an investor, rank these firms in the order of most value growth to least value growth.

Measuring Return on Capital (Equity)

Adjust EBIT for
a. Extraordinary or one-time expenses or income
b. Operating leases and R&D
c. Cyclicality in earnings (Normalize)
d. Acquisition Debris (Goodwill amortization etc.)

Use a marginal tax rate to be safe. A high ROC created by paying low effective taxes is not sustainable

$$ROC = \frac{EBIT\ (1-\text{tax rate})}{\text{Book Value of Equity} + \text{Book value of debt} - \text{Cash}}$$

Adjust book equity for
1. Capitalized R&D
2. Acquisition Debris (Goodwill)

Adjust book value of debt for
a. Capitalized operating leases

Use end of prior year numbers or average over the year but be consistent in your application

5.4: The Revenue/Margin Trap
Sirius Radio: Revenues and Margins..

Year	Revenue Growth rate	Revenues	Operating Margin	Operating Income
Current		**$187**	**-419.92%**	**-$787**
1	200.00%	$562	-199.96%	-$1,125
2	100.00%	$1,125	-89.98%	-$1,012
3	80.00%	$2,025	-34.99%	-$708
4	60.00%	$3,239	-7.50%	-$243
5	40.00%	$4,535	6.25%	$284
6	25.00%	$5,669	13.13%	$744
7	20.00%	$6,803	16.56%	$1,127
8	15.00%	$7,823	18.28%	$1,430
9	10.00%	$8,605	19.14%	$1,647
10	5.00%	$9,035	19.57%	$1,768

Target margin based upon
Clear Channel

And one way to avoid it..

Year	Revenues	Change in revenue	Sales/Capital Ratio	Reinvestment	Capital Invested	Operating Income (Loss)	Imputed ROC
Current	$187				$ 1,657	-$787	
1	$562	$375	1.50	$250	$ 1,907	-$1,125	-67.87%
2	$1,125	$562	1.50	$375	$ 2,282	-$1,012	-53.08%
3	$2,025	$900	1.50	$600	$ 2,882	-$708	-31.05%
4	$3,239	$1,215	1.50	$810	$ 3,691	-$243	-8.43%
5	$4,535	$1,296	1.50	$864	$ 4,555	$284	7.68%
6	$5,669	$1,134	1.50	$756	$ 5,311	$744	16.33%
7	$6,803	$1,134	1.50	$756	$ 6,067	$1,127	21.21%
8	$7,823	$1,020	1.50	$680	$ 6,747	$1,430	23.57%
9	$8,605	$782	1.50	$522	$ 7,269	$1,647	17.56%
10	$9,035	$430	1.50	$287	$ 7,556	$1,768	15.81%

Check revenues against total market potential and largest firms in sector.

Industry average Sales/Cap Ratio

Capital invested in year t+1=
Capital invested in year t +
Reinvestment in year t+1

Is ending ROC a reasonable number?

Growth and Reinvestment at Embraer

	2003	2004	2005	2006	2007	Aggregate
EBIT (1-t)	R$ 1,242	R$ 1,740	R$ 794	R$ 546	R$ 527	R$ 4,849
BV of debt	R$ 1,953	R$ 3,016	R$ 3,554	R$ 3,637	R$ 2,897	R$ 15,057
BV of equity	R$ 3,350	R$ 3,768	R$ 4,480	R$ 4,863	R$ 5,192	R$ 21,653
Cash holdings	R$ 2,321	R$ 3,659	R$ 3,588	R$ 4,479	R$ 3,774	R$ 17,821
Invested Capital	R$ 2,982	R$ 3,125	R$ 4,446	R$ 4,021	R$ 4,315	R$ 18,889
ROIC	41.65%	55.68%	17.86%	13.58%	12.21%	25.67%
Cap ex	R$ 743	R$ 400	R$ 1,544	-R$ 11	R$ 330	R$ 3,006
Depreciation	R$ 161	R$ 222	R$ 284	R$ 330	R$ 361	R$ 1,358
Chg in WC	R$ 37	-R$ 35	R$ 61	-R$ 84	R$ 325	R$ 304
Reinvestment	R$ 619	R$ 143	R$ 1,321	-R$ 425	R$ 294	R$ 1,952
Reinvestment Rate	49.84%	8.22%	166.37%	-77.84%	55.79%	40.26%

In forecasting growth for the next 5 years, we used
 - a return on capital of about 18.10% (based on normalized operating income of R$ 970 million – average over the last 5 years)
-a reinvestment rate of 40% (close to average of the last 5 years)
Expected Growth rate = Return on capital * Reinvestment Rate
$$= 18.1\% * .40 = 7.24\%$$

Illustration 6: The "fixed debt ratio" assumption

■ You have been asked to value a company that currently has the following cost of capital:

Cost of capital = 10% (.9) + 4% (.1) = 9.4%

a. You believe that the target debt ratio for this firm should be 30%. What will the cost of capital be at the target debt ratio?

b. Which debt ratio (and cost of capital) should you use in valuing this company?

6.1: Cost of Capital and Debt Ratios: Embraer in 2008

Debt Ratio	Beta	Cost of Equity	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)	WACC	Firm Value (G)
0%	0.75	7.63%	AAA	5.65%	34.00%	3.73%	7.63%	$12,045
10%	0.80	7.91%	AA	5.90%	34.00%	3.89%	7.51%	$12,457
20%	0.87	8.26%	A-	6.90%	34.00%	4.55%	7.52%	$12,418
30%	0.97	8.76%	CCC	14.90%	30.97%	10.29%	9.22%	$8,332
40%	1.15	9.69%	C	17.60%	19.42%	14.18%	11.48%	$5,695
50%	1.38	10.86%	C	17.60%	15.54%	14.86%	12.86%	$4,735
60%	1.72	12.63%	C	17.60%	12.95%	15.32%	14.24%	$4,028
70%	2.30	15.57%	C	17.60%	11.10%	15.65%	15.62%	$3,486
80%	3.45	21.46%	C	17.60%	9.71%	15.89%	17.00%	$3,058
90%	6.89	39.12%	C	17.60%	8.63%	16.08%	18.38%	$2,711

Aswath Damodaran

6.2: Changing Debt Ratios and Costs of Capital over time - Sirius

Year	Beta	Cost of Equity	Cost of Debt	Tax Rate	After-tax cost of debt	Debt Ratio	Cost of Capital
Current	1.80	11.70%	7.50%	0.00%	7.50%	6.23%	11.44%
1	1.80	11.70%	7.50%	0.00%	7.50%	6.23%	11.44%
2	1.80	11.70%	7.50%	0.00%	7.50%	6.23%	11.44%
3	1.80	11.70%	7.50%	0.00%	7.50%	6.23%	11.44%
4	1.80	11.70%	7.50%	0.00%	7.50%	6.23%	11.44%
5	1.80	11.70%	7.50%	0.00%	7.50%	6.23%	11.44%
6	1.64	11.06%	7.00%	0.00%	7.00%	9.99%	10.65%
7	1.48	10.42%	6.88%	0.00%	6.88%	13.74%	9.93%
8	1.32	9.78%	6.67%	0.00%	6.67%	17.49%	9.24%
9	1.16	9.14%	6.25%	28.05%	4.50%	21.25%	8.15%
10	1.00	8.50%	5.00%	35.00%	3.25%	25.00%	7.19%

Illustration 7: The Terminal Value

■ The best way to compute terminal value is to

❑ Use a stable growth model and assume cash flows grow at a fixed rate forever

❑ Use a multiple of EBITDA or revenues in the terminal year

❑ Use the estimated liquidation value of the assets

You have been asked to value a business. The business expects to $ 120 million in after-tax earnings (and cash flow) next year and to continue generating these earnings in perpetuity. The firm is all equity funded and the cost of equity is 10%; the riskfree rate is 4% and the ERP is 5%. What is the value of the business?

7.1: Limits to stable growth..

■ Assume now that you were told that the firm can grow <u>earnings</u> at 2% a year forever. Estimate the value of the business.

■ Now what if you were told that the firm can grow its earnings at 4% a year forever?

■ What if the growth rate were 6% a year forever?

7.2: And reinvestment to go with growth…

■ To grow, a company has to reinvest. How much it will have to reinvest depends in large part on how fast it wants to grow and what type of return it expects to earn on the reinvestment.

   • Reinvestment rate = Growth Rate/ Return on Capital

■ Assume in the previous example that you were told that the return on capital was 10%. Estimate the reinvestment rate and the value of the business (with a 2% growth rate).

■ What about with a 4% growth rate?

7.3: The terminal value of Embraer…

■ Current Estimate of terminal value

- Expected growth rate in perpetuity = 3.80% (= Riskfree rate)
- EBIT (1 -t) in year 6 = $618.11
- Return on capital = Cost of capital = 7.38%
- Reinvestment Rate = g/ Reinvestment Rate = 3.8%/7.38% = 51.47%
- Terminal Value = 618.11 (1- 0.5147)/ (.0738 - .038) = $8,371.39

Growth Rate	Reinvestment Rate	FCFF	Terminal value
0%	0.00%	$618	$8,371
1%	13.54%	$534	$8,371
2%	27.09%	$451	$8,371
3%	40.63%	$367	$8,371
4%	54.17%	$283	$8,371

8. From firm value to equity value: Not so trivial…

■ For a firm with consolidated financial statements, you have discounted free cashflows to the firm at the cost of capital to arrive at a firm value of $ 100 million. The firm has
- A cash balance of $ 15 million
- Debt outstanding of $ 20 million
- A 5% holding in another company: the book value of this holding is $ 5 million. (Market value of equity in this company is $ 200 million)
- Minority interests of $ 10 million on the balance sheet

■ What is the value of equity in this firm?

■ How would your answer change if you knew that the firm was the target of a lawsuit it is likely to win but where the potential payout could be $ 100 million if it loses?

8.1: The left out assets…

■ When you discount cash flows to the firm at the cost of capital, you are valuing only those assets that contribute to operating income (operating assets). Assets whose earnings are not part of operating income have not been valued yet and need to be explicitly valued and brought into the equation.

■ In general, we can categorize these non-operating assets as follows (from easiest to value to most difficult)

• Cash and marketable securities (current value is usually a given)

• Unused assets that are marketable (vacant land, unutilized buildings)

• Cross holdings in publicly traded companies

• Cross holdings in private businesses

• Other unspecified (and undisclosed) assets

8.2: The double counted assets

■ In the zeal to be comprehensive, analysts often add on value for assets that have already been valued through the cash flows. In the process, these assets get double counted.

■ Examples of double counted assets include

- Goodwill (which represents the excess of market value over book value in an acquired target company)
- Intangibles (Brand name, customer loyalty)
- Physical assets (Real estate in use for operations)

8.3: The missed liabilities

■ When going from the value of the firm to the value of equity, we usually subtract out the debt of the firm. Since equity investors have a residual claim on the firm, after all other claim holders have been paid, this is our last chance to deal with claims on the firm.

■ While almost all analysts bring in long-term interest bearing debt into their analysis, the claims that get missed most often include:

   • Short term interest bearing debt (often shown in current liabilities)

   • Lease and rental commitments

   • Underfunded pension obligations

   • Potential claims from lawsuits

8.4: The double counted liabilities…

■ In getting from firm value to equity, conservative analysts sometimes reach too far to detect claims against the firm that have already been considered elsewhere (often implicitly) in their valuation.

■ Common examples of double counted liabilities include

- Accounts payable, supplier credit and other non-interest bearing debt (which are not only treated as part of working capital but also have no explicit interest expense effect on income)

- Expected debt issues from future years. Note that when we keep the debt ratio of a firm fixed over time, we are implicitly already assuming that dollar debt will increase at the same growth rate as the value of the firm is increasing by.

9. From equity value to equity value per share

■ You have valued the equity in a firm at $ 200 million. Estimate the value of equity per share if there are 10 million shares outstanding..

■ How would your answer change if you were told that there are 2 million employee options outstanding, with a strike price of $ 20 a share and 5 years left to expiration?

Value per share… as a function of stock price volatility and option maturity

Value per Share: The Option Overhang

Legend:
- Value per Share
- Diluted Value per Share
- TS Value per share
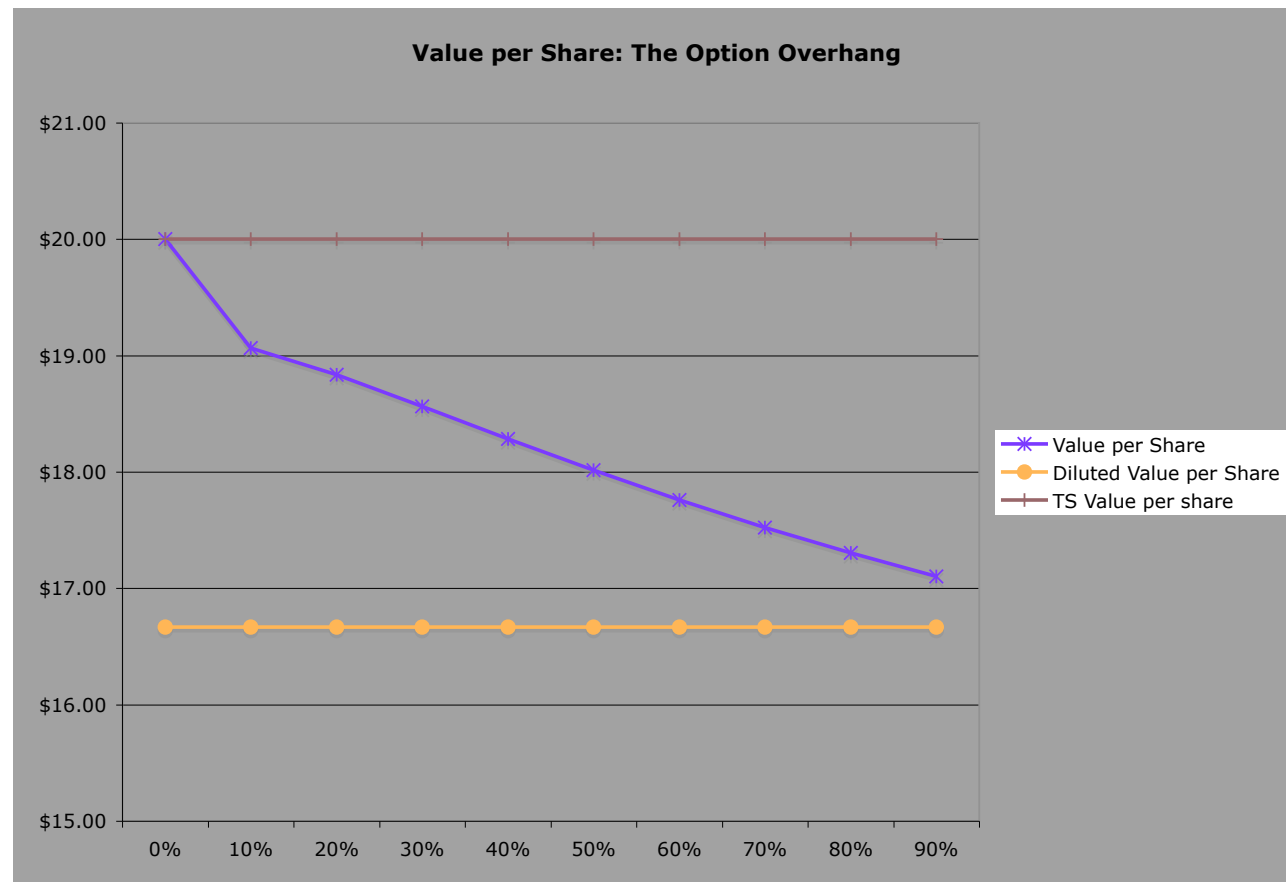
10. The final circle of hell…

Exhibit 8

KENNECOTT COPPER CORPORATION

PROJECTED CARBORUNDUM COMPANY FINANCIAL DATA ADJUSTED TO REFLECT THE ACQUISITION OF CARBORUNDUM BY KENNNECOTT AT A PRICE OF $66 PER SHARE, 1977–1987

($ millions except for per share and ratio data)

	1977 Unadjusted	Adjustments	1977 Adjusted	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Income statement													
Sales	$717.6			$790.1	$885.9	$1,005.2	$1,129.9	$1,265.5	$1,392.1	$1,531.3	$1,684.4	$1,852.8	$2,038.1
Net income (before adjustments)	38.4			43.1	50.7	60.1	70.6	84.7	93.2	102.5	112.7	124.0	136.4
Interest adjustment	0			6.5	7.8	8.5	9.2	9.8	10.7	11.7	12.8	14.0	15.4
Goodwill adjustment	0			2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Plant write-up adjustment	0			2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Net income (after adjustments)	$38.4			$31.8	$38.1	$46.8	$56.6	$70.1	$77.7	$86.0	$95.1	$105.2	$116.2
Balance sheet													
Working capital	$198.8	+ 37.0 / + 100.0 / − 140.0	$195.8	$202.9	$223.0	$248.1	$274.2	$302.8	$329.3	$358.6	$390.7	$426.1	$465.0
Property, plant, and equipment	181.8	+ 124.0	305.8	334.2	367.4	384.6	400.1	411.6	437.5	466.6	499.1	535.6	576.1
Goodwill	0	+ 80.0	80.0	78.0	76.0	74.0	72.0	70.0	68.0	66.0	64.0	62.0	60.0
Total assets	584.3	+ 201.0	785.3	824.0	889.9	948.4	1,007.0	1,065.8	1,135.5	1,213.1	1,299.0	1,394.6	1,500.3
Long-term debt	86.2	+ 100.0	186.2	220.9	238.8	252.9	266.8	280.1	297.7	317.5	339.4	363.9	391.0
Shareholders' equity	309.0	+ 101.0	410.0	410.1	443.5	469.7	495.4	520.2	553.0	589.6	630.3	675.7	726.0
Total capital	395.2	+ 201.0	596.2	631.0	682.3	722.6	762.2	800.3	850.7	907.1	969.7	1,039.6	1,117.0
Capital sources													
Profit retentions				$ 0.1	$33.4	$26.2	$25.7	$24.8	$32.8	$36.6	$40.7	$45.4	$50.3
Capital contributed by Kennecott				—	—	—	—	—	—	—	—	—	—
Debt financing (net)				34.7	17.9	14.1	13.9	13.3	17.6	19.8	21.9	24.5	27.1
Total capital added				$34.8	$51.3	$40.3	$39.6	$38.1	$50.4	$56.4	$62.6	$69.9	$77.4
Key financial ratios													
Growth rate in sales (%)	16.9			10.1	12.1	13.5	12.4	12.0	10.0	10.0	10.0	10.0	10.0
Sales/assets	1.23			0.96	1.00	1.06	1.12	1.19	1.23	1.26	1.30	1.33	1.36
Profit/sales	.054			0.040	0.043	0.047	0.050	0.055	0.056	0.056	0.056	0.057	0.057
Assets/net worth	1.89			2.01	2.01	2.02	2.03	2.05	2.05	2.06	2.06	2.06	2.07
Profit/net worth	.124			0.078	0.086	0.100	0.114	0.135	0.141	0.146	0.151	0.156	0.160

Cash flow to Kennecott													
Acquisition of Carborundum	$(550.0)												
Dividends to Kennecott	140.0		$31.7	$ 4.7	$20.6	$30.9	$45.3	$44.9	$49.4	$54.4	$59.8	$ 65.9	
Utilization of Kennecott tax loss carryforwards	—		20.0	20.0	—	—	—	—	—	—	—	—	
Tax shelter from plant write-up adj.			2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	
Terminal value at 10 times earnings												1,044.9	
Net cash flow	$(410.0)		$54.5	$27.5	$23.4	$33.7	$48.1	$47.7	$52.2	$57.2	$62.6	$1,113.6	

Assumptions:

[1] Kennecott would pay $550 million to acquire Carborundum's equity which had a book value of $309 million. The $241 million in excess of purchase price over book value of assets acquired would be allocated as follows: (a) $37.0 million would be added to inventory to reflect the replacement cost of inventories; (b) $11.0 million would be added to land to reflect the market value of land; (c) $113 million would be added to net plant and equipment to reflect the depreciated replacement cost of plant and equipment; and (d) $80 million would be added to goodwill. Immediately following the acquisition of Carborundum, Carborundum borrows $100 million and then pays a $140 million dividend to Kennecott. This dividend is financed with the $100 million plus $40 million of Carborundum's excess cash.

[2] Interest at the rate of 10% (5% after taxes) is paid on the difference between the amount of Carborundum debt outstanding in Exhibit 8 and the amount of debt assumed to be outstanding in Exhibit 5. In Exhibit 8, it is assumed that Carborundum will have 35% debt in its total capital structure after 1977.

[3] The $80 million of goodwill created as a result of the acquisition is amortized over 40 years. This expense is not tax-deductible.

[4] The $113 million write-up of plant and equipment is depreciated over a 20-year life, providing a reduction in profit after taxes and an increase in cash flow equal to ($113/20) x .5. It is assumed that this added cash flow is paid to Kennecott as dividends.

[5] Dividends to Kennecott equal the difference between Carborundum's net profit (after adjustment) and the profit retention requirements needed to support Carborundum's growth.

[6] The utilization of $40 million of tax loss carry-forwards and investment tax credit carryforwards available to Kennecott are assumed to be utilized as a result of the Carborundum acquisition and that these would expire unutilized without the acquisition.

[7] Carborundum is assumed to be sold at the end of ten years at a price equal to ten times earnings. The proceeds from this sale, $1,162 million, are reduced by $117.1 million as a result of taxes on the capital gain of $1,162−$726. Carborundum's net worth at 12/31/87 is assumed to be $726 million.

Sources: Exhibit 5 and casewriter projections.

	Cost of Equity	Cost of Capital
Kennecott Corp (Acquirer)	13.0%	10.5%
Carborandum (Target)	16.5%	12.5%

Embraer: Status Quo ($)

Avg Reinvestment rate = 40%

Return on Capital 18.1%

Current Cashflow to Firm
EBIT(1-t) : $ 434
- Nt CpX   - 11
- Chg WC   178
= FCFF $ 267
Reinvestment Rate = 167/289= 56%
Effective tax rate = 19.5%

Reinvestment Rate 40%

Expected Growth in EBIT (1-t)
.40*.181=.072
10.09%

Stable Growth
g = 3.8%; Beta = 1.00;
Country Premium= 1.5%
Cost of capital = 7.38%
ROC= 7.38%; Tax rate=34%
Reinvestment Rate=g/ROC
=3.8/7.38 = 51.47%

Terminal Value$_5$= 254(.0738-.038) = 7,091

Op. Assets $ 6,239
+ Cash: 3,068
- Debt   2,070
- Minor. Int.   177
=Equity   7,059
-Options   4
Value/Share $9.53
        R$ 15.72

$ Cashflows

Year	1	2	3	4	5	Term Yr
EBIT (1-t)	$465	$499	$535	$574	$615	524
- Reinvestment	$186	$200	$214	$229	$246	270
FCFF	$279	$299	$321	$344	$369	= 254

Discount at $ Cost of Capital (WACC) = 8.31% (.788) + 4.36% (0.212) = 7.47%

On May 22, 2008
Embraer Price = R$ 17.2

Cost of Equity
8.31%

Cost of Debt
(3.8%+1.7%+1.1%)(1-.34)
= 4.36%

Weights
E = 78.8% D = 21.2%

Riskfree Rate:
US$ Riskfree Rate= 3.8%

+

Beta
0.88

X

Mature market premium
4 %

+

Lambda
0.27

X

Country Equity Risk Premium
3.66%

Unlevered Beta for Sectors: 0.75

Firm's D/E Ratio: 26.84%

Country Default Spread 2.2%

X

Rel Equity Mkt Vol 1.64
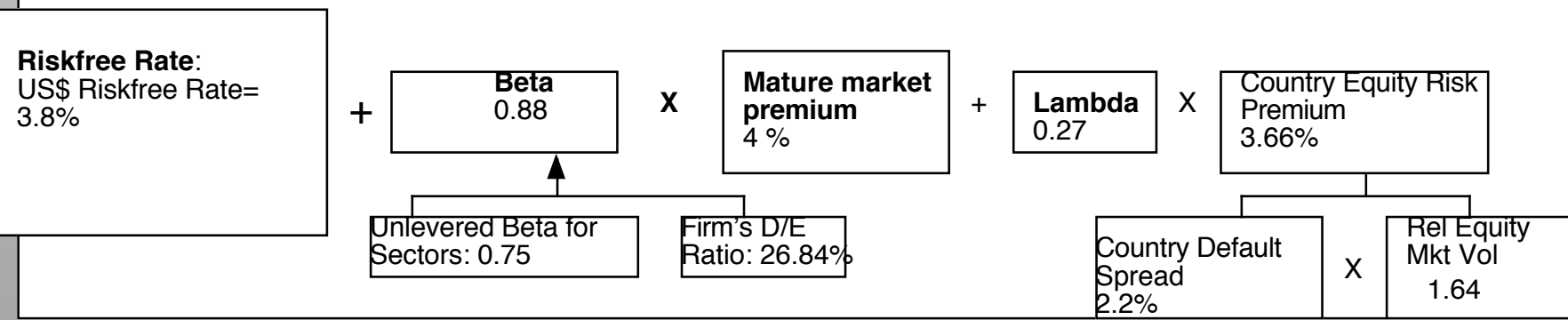
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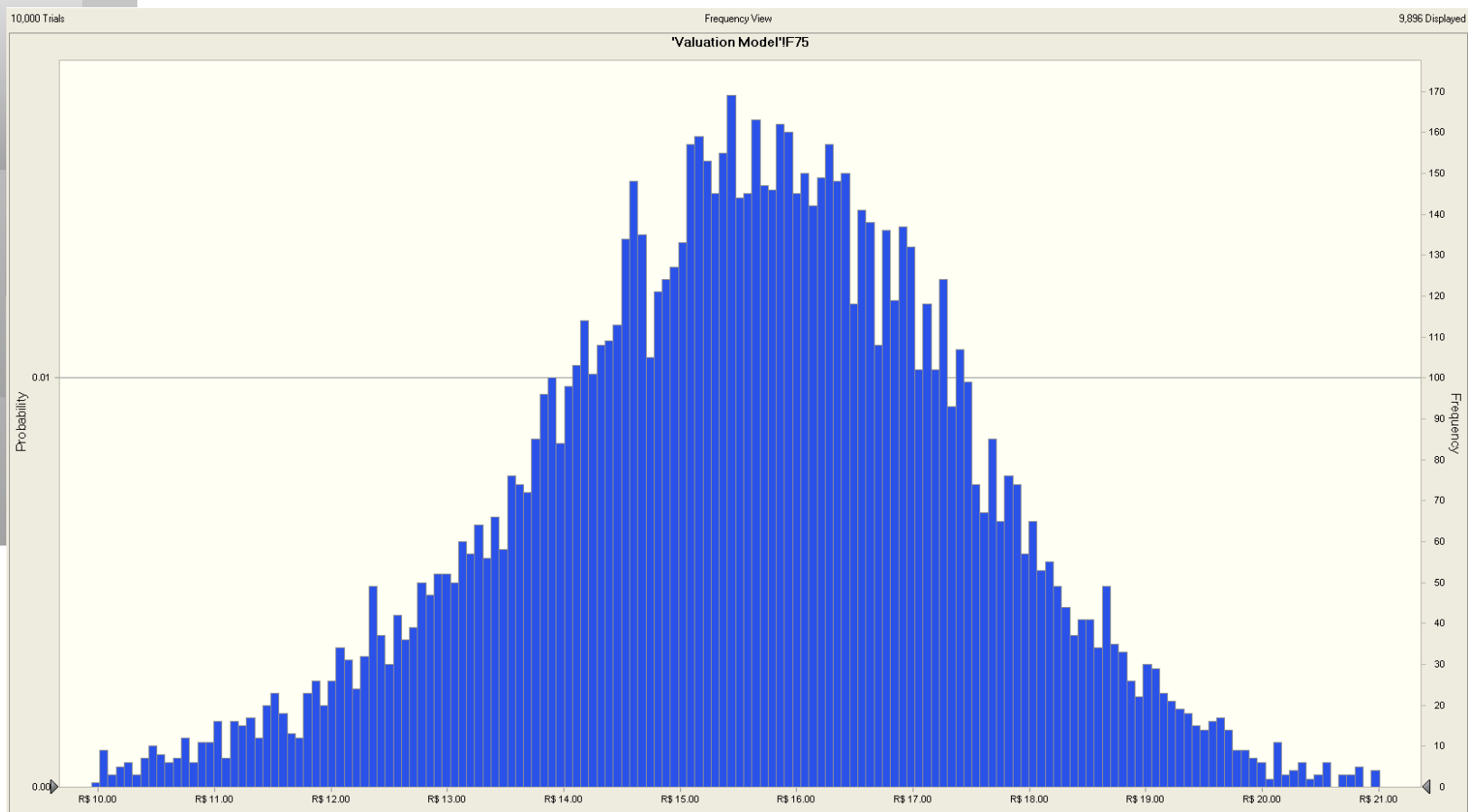
Loose Ends in Valuation: From firm value to value of equity per share

So, you've valued a firm…

Free Cashflow to Firm
EBIT (1- tax rate)
- (Cap Ex - Depreciation)
- Change in non-cash WC
= Free Cashflow to firm

Expected Growth
during high growth

Value of Operating Assets today — Length of high growth period: PV of FCFF during high growth → Stable Growth

Cost of Capital

Cost of Equity   Cost of Debt
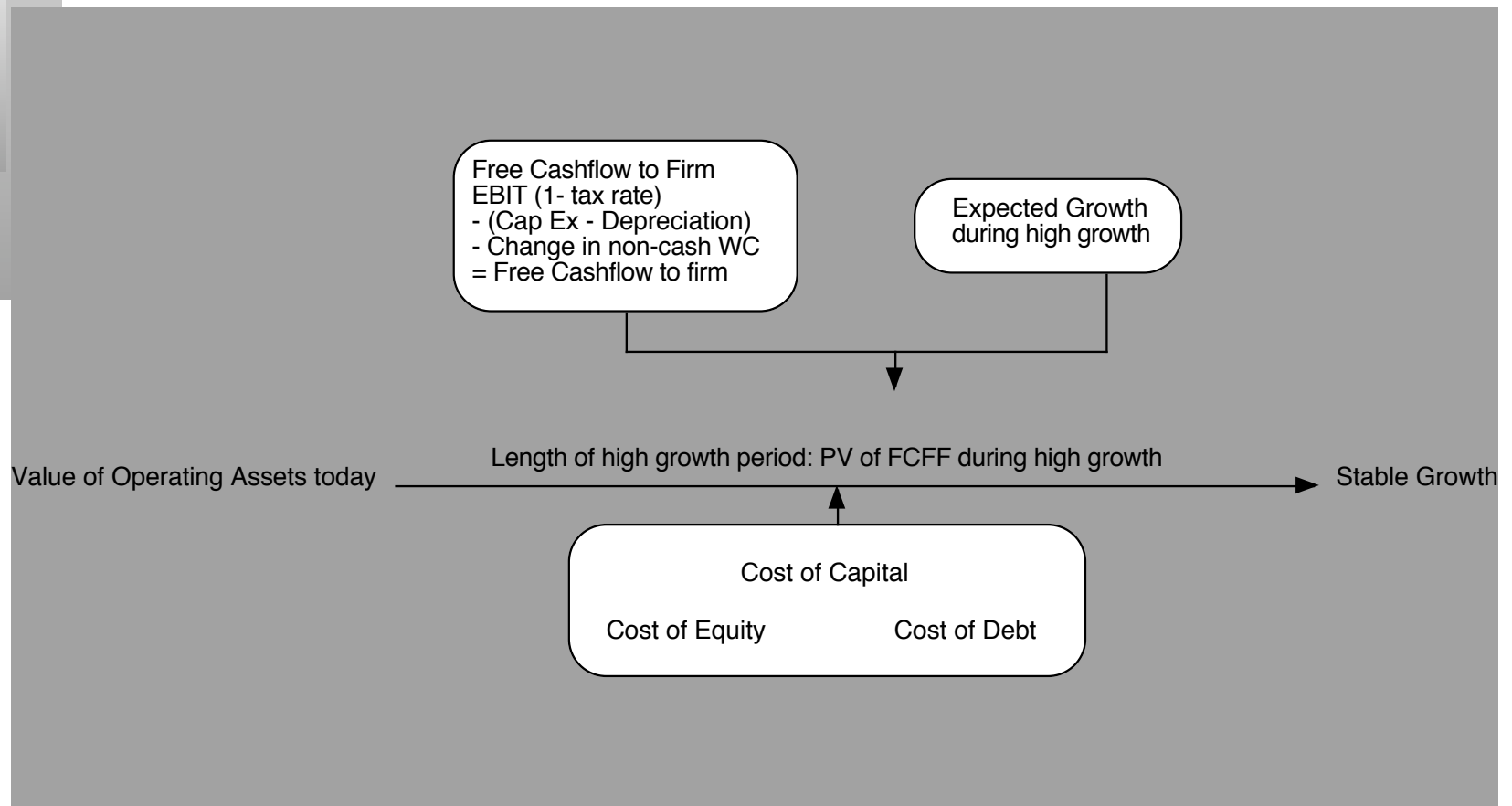
But what comes next?

Value of Operating Assets	Since this is a discounted cashflow valuation, should there be a real option premium?
+ Cash and Marketable Securities	Operating versus Non-opeating cash Should cash be discounted for earning a low return?
+ Value of Cross Holdings	How do you value cross holdings in other companies? What if the cross holdings are in private businesses?
+ Value of Other Assets	What about other valuable assets? How do you consider under utlilized assets?
Value of Firm	Should you discount this value for opacity or complexity? How about a premium for synergy? What about a premium for intangibles (brand name)?
- Value of Debt	What should be counted in debt? Should you subtract book or market value of debt? What about other obligations (pension fund and health care? What about contingent liabilities? What about minority interests?
= Value of Equity	Should there be a premium/discount for control? Should there be a discount for distress
- Value of Equity Options	What equity options should be valued here (vested versus non-vested)? How do you value equity options?
= Value of Common Stock	Should you divide by primary or diluted shares?
/ Number of shares	
= Value per share	Should there be a discount for illiquidity/ marketability? Should there be a discount for minority interests?

I.   The Value of Cash
An Exercise in Cash Valuation

	Company A	Company B	Company C
Enterprise Value	$ 1 billion	$ 1 billion	$ 1 billion
Cash	$ 100 mil	$ 100 mil	$ 100 mil
Return on Capital	10%	5%	22%
Cost of Capital	10%	10%	12%
Trades in	US	US	Argentina

Cash: Discount or Premium?

Market Value of $ 1 in cash:
Estimates obtained by regressing Enterprise Value against Cash Balances
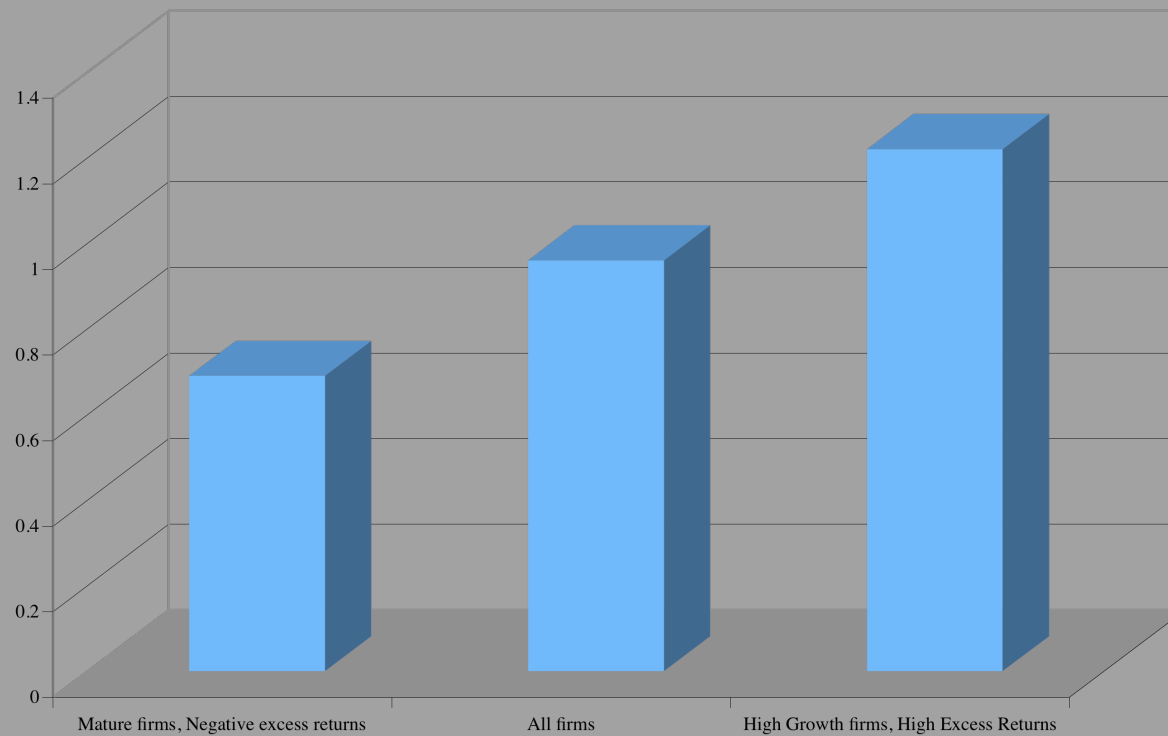
2. Dealing with Holdings in Other firms

- Holdings in other firms can be categorized into
  - <u>Minority passive holdings</u>, in which case only the dividend from the holdings is shown in the balance sheet
  - <u>Minority active holdings</u>, in which case the share of equity income is shown in the income statements
  - <u>Majority active holdings</u>, in which case the financial statements are consolidated.
- We tend to be sloppy in practice in dealing with cross holdings. After valuing the operating assets of a firm, using consolidated statements, it is common to add on the balance sheet value of minority holdings (which are in book value terms) and subtract out the minority interests (again in book value terms), representing the portion of the consolidated company that does not belong to the parent company.

How to value holdings in other firms.. In a perfect world..

■ In a perfect world, we would strip the parent company from its subsidiaries and value each one separately. The value of the combined firm will be
  - Value of parent company + Proportion of value of each subsidiary
■ To do this right, you will need to be provided detailed information on each subsidiary to estimated cash flows and discount rates.

Example: Cross holdings at Gerdau Steel
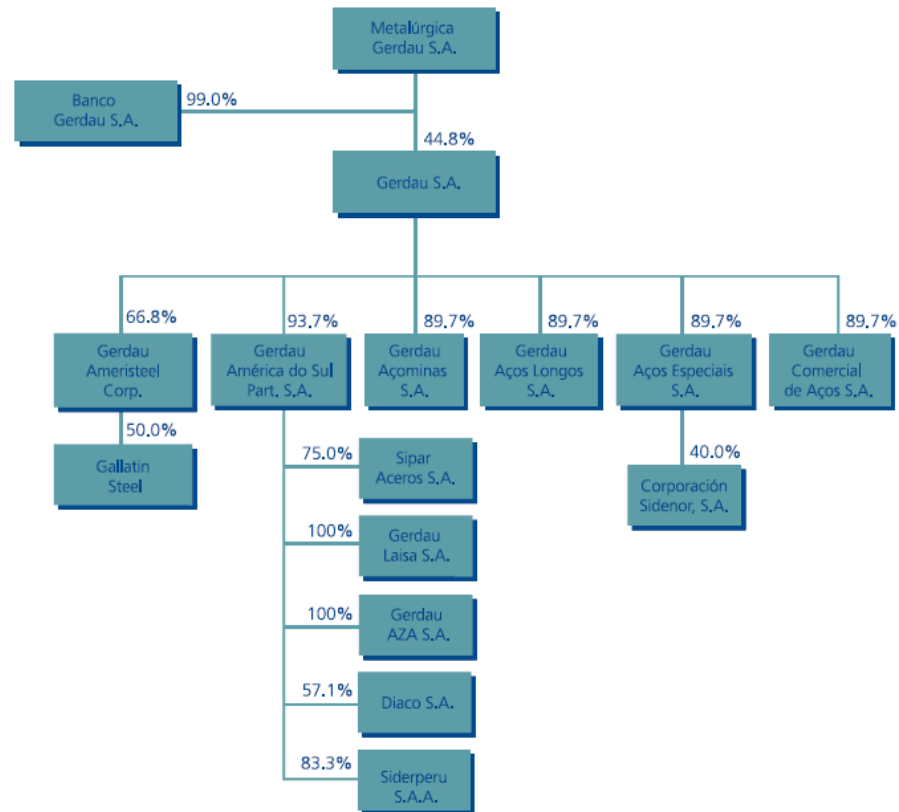
Two compromise solutions…

- The market value solution: When the subsidiaries are publicly traded, you could use their traded market capitalizations to estimate the values of the cross holdings. You do risk carrying into your valuation any mistakes that the market may be making in valuation.

- The relative value solution: When there are too many cross holdings to value separately or when there is insufficient information provided on cross holdings, you can convert the book values of holdings that you have on the balance sheet (for both minority holdings and minority interests in majority holdings) by using the average price to book value ratio of the sector in which the subsidiaries operate.

Valuing Gerdau's Cross Holdings…

■ Minority interests on balance sheet = R$ 8,110 million

■ Holdings are primarily in steel companies. The average price to book ratio for steel companies is 1.80. To estimate the market value of the minority interests, we apply this multiple to the book value of minority interests.

■ Estimated market value of minority interests = 8,110 *1.80 = 14,598 million BR

■ In US$ terms, the minority interests is worth $7,525 million.

3. Other Assets that have not been counted yet..

■ **Unutilized assets**: If you have assets or property that are not being utilized (vacant land, for example), you have not valued it yet. You can assess a market value for these assets and add them on to the value of the firm.

■ **Overfunded pension plans**: If you have a defined benefit plan and your assets exceed your expected liabilities, you could consider the over funding with two caveats:

 • Collective bargaining agreements may prevent you from laying claim to these excess assets.

 • There are tax consequences. Often, withdrawals from pension plans get taxed at much higher rates

4. A Discount for Complexity:
An Experiment

	Company A	*Company B*
Operating Income	$ 1 billion	$ 1 billion
Tax rate	40%	40%
ROIC	10%	10%
Expected Growth	5%	5%
Cost of capital	8%	8%
Business Mix	Single Business	Multiple Businesses
Holdings	Simple	Complex
Accounting	Transparent	Opaque

■ *Which firm would you value more highly?*

Measuring Complexity: Volume of Data in Financial Statements

Company	Number of pages in last 10Q	Number of pages in last 10K
General Electric	65	410
Microsoft	63	218
Wal-mart	38	244
Exxon Mobil	86	332
Pfizer	171	460
Citigroup	252	1026
Intel	69	215
AIG	164	720
Johnson & Johnson	63	218
IBM	85	353

Measuring Complexity: A Complexity Score

Item	Factors	Follow-up Question	Answer	Weighting factor	Gerdau Score	GE Score
Operating Income	1. Multiple Businesses	Number of businesses (with more than 10% of revenues) =	1	2.00	2	30
	2. One-time income and expenses	Percent of operating income =	10%	10.00	1	0.8
	3. Income from unspecified sources	Percent of operating income =	0%	10.00	0	1.2
	4. Items in income statement that are volatile	Percent of operating income =	15%	5.00	0.75	1
Tax Rate	1. Income from multiple locales	Percent of revenues from non-domestic locales =	70%	3.00	2.1	1.8
	2. Different tax and reporting books	Yes or No	No	Yes=3	0	3
	3. Headquarters in tax havens	Yes or No	No	Yes=3	0	0
	4. Volatile effective tax rate	Yes or No	Yes	Yes=2	2	0
Capital Expenditures	1. Volatile capital expenditures	Yes or No	Yes	Yes=2	2	2
	2. Frequent and large acquisitions	Yes or No	Yes	Yes=4	4	4
	3. Stock payment for acquisitions and investments	Yes or No	No	Yes=4	0	4
Working capital	1. Unspecified current assets and current liabilities	Yes or No	No	Yes=3	0	0
	2. Volatile working capital items	Yes or No	Yes	Yes=2	2	2
Expected Growth rate	1. Off-balance sheet assets and liabilities (operating leases and R&D)	Yes or No	No	Yes=3	0	3
	2. Substantial stock buybacks	Yes or No	No	Yes=3	0	3
	3. Changing return on capital over time	Is your return on capital volatile?	Yes	Yes=5	5	5
	4. Unsustainably high return	Is your firm's ROC much higher than industry average?	No	Yes=5	0	0
Cost of capital	1. Multiple businesses	Number of businesses (more than 10% of revenues) =	1	1.00	1	20
	2. Operations in emerging markets	Percent of revenues=	50%	5.00	2.5	2.5
	3. Is the debt market traded?	Yes or No	No	No=2	2	0
	4. Does the company have a rating?	Yes or No	Yes	No=2	0	0
	5. Does the company have off-balance sheet debt?	Yes or No	No	Yes=5	0	5
No-operating assets	Minority holdings as percent of book assets	Minority holdings as percent of book assets	0%	20.00	0	0.8
Firm to Equity value	Consolidation of subsidiaries	Minority interest as percent of book value of equity	63%	20.00	12.6	1.2
Per share value	Shares with different voting rights	Does the firm have shares with different voting rights?	Yes	Yes = 10	10	0
	Equity options outstanding	Options outstanding as percent of shares	0%	10.00	0	0.25
		Complexity Score =			48.95	90.55

Dealing with Complexity

In Discounted Cashflow Valuation

■ The Aggressive Analyst: Trust the firm to tell the truth and value the firm based upon the firm's statements about their value.

■ The Conservative Analyst: Don't value what you cannot see.

■ The Compromise: Adjust the value for complexity

- Adjust cash flows for complexity
- Adjust the discount rate for complexity
- Adjust the expected growth rate/ length of growth period
- Value the firm and then discount value for complexity

In relative valuation

In a relative valuation, you may be able to assess the price that the market is charging for complexity:

With the hundred largest market cap firms, for instance:

PBV = 0.65 + 15.31 ROE – 0.55 Beta + 3.04 Expected growth rate – 0.003 # Pages in 10K

5. The Value of Synergy

■ Synergy can be valued. In fact, if you want to pay for it, it should be valued.

■ To value synergy, you need to answer two questions:

   (a) What **form** is the synergy expected to take? Will it **reduce costs** as a percentage of sales and increase profit margins (as is the case when there are economies of scale)? Will it **increase future growth** (as is the case when there is increased market power)?)

   (b) **When can the synergy be reasonably expected to start** affecting cashflows? (Will the gains from synergy show up instantaneously after the takeover? If it will take time, when can the gains be expected to start showing up?)

■ If you cannot answer these questions, you need to go back to the drawing board…

Sources of Synergy

Synergy is created when two firms are combined and can be either financial or operating

Operating Synergy accrues to the combined firm as

Financial Synergy

Strategic Advantages

Economies of Scale

Tax Benefits

Added Debt Capacity

Diversification?

Higher returns on new investments

More new Investments

More sustainable excess returns

Cost Savings in current operations

Lower taxes on earnings due to
- higher depreciaiton
- operating loss carryforwards

Higher debt raito and lower cost of capital

May reduce cost of equity for private or closely held firm

Higher ROC

Higher Growth Rate

Higher Reinvestment

Higher Growth Rate

Longer Growth Period

Higher Margin

Higher Base-year EBIT

Valuing Synergy

(1) the firms involved in the merger are **valued independently**, by discounting expected cash flows to each firm at the weighted average cost of capital for that firm.

(2) the **value of the combined firm, with no synergy**, is obtained by adding the values obtained for each firm in the first step.

(3) The **effects of synergy are built into expected growth rates and cashflows**, and the combined firm is re-valued with synergy.

Value of Synergy = Value of the combined firm, with synergy - Value of the combined firm, without synergy

J.P. Morgan's estimate of annual operating synergies in Ambev/Labatt Merger

J.P. Morgan's estimate of total synergies in Labatt/Ambev Merger

Labatt DCF valuation

- Labatt is the Canadian subsidiary of Interbrew and is a mature firm with sold brand names. It can be valued using a stable growth firm valuation model.

- Base Year inputs
  - EBIT (1-t) = $411 million
  - Expected Growth Rate = 3%
  - Return on capital = 9%
  - Cost of capital = 7%

- Valuation
  - Reinvestment Rate = g/ ROC = 3/9= 33.33%
  - Value of Labatt = 411 (1-.333)/ (.07-.03) = $6.85 billion

- Ambev is paying for Labatt with 23.3 billion shares (valued at about $5.8 billion) and is assuming $ 1.5 billion in debt, resulting in a value for the firm of about $ 7.3 billion.

Who gets the benefits of synergy?

Total Synergy = $ 2 billion

Premium paid to Labatt Stockholders = $7.3 billion - $6.85 billion = $ 450 million

Voting Shares in Ambev

Non-voting Shares in Ambev

$1.55 billion to be shared?
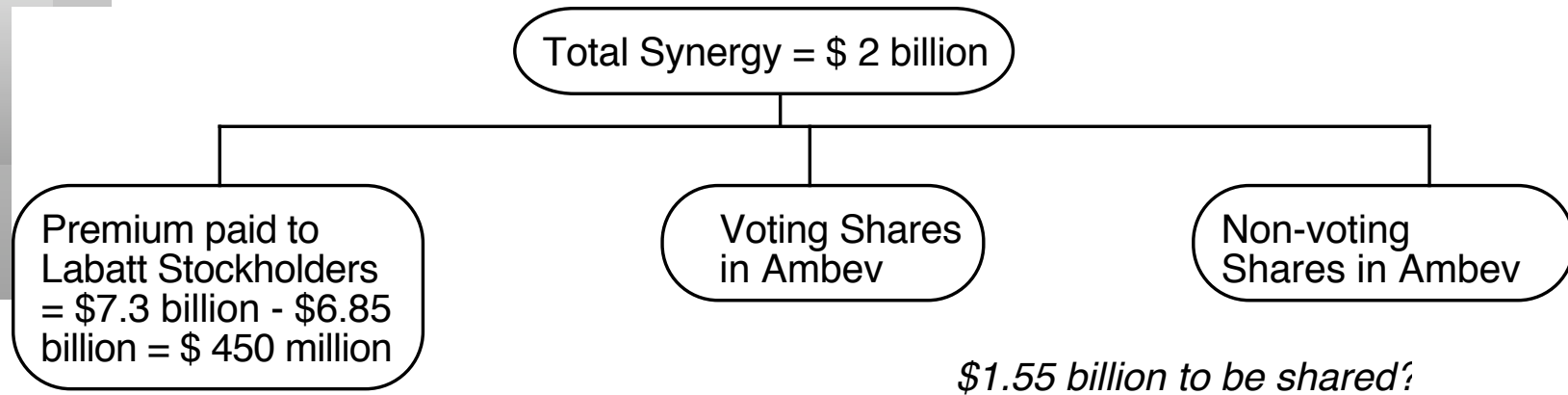
5. Brand name, great management, superb product …Are we short changing the intangibles?

■ There is often a temptation to add on premiums for intangibles. Among them are

- Brand name
- Great management
- Loyal workforce
- Technological prowess

■ There are two potential dangers:

- For some assets, the value may already be in your value and adding a premium will be double counting.
- For other assets, the value may be ignored but incorporating it will not be easy.

Categorizing Intangibles

	Independent and Cash flow generating intangibles	Not independent and cash flow generating to the firm	No cash flows now but potential for cashflows in future
Examples	Copyrights, trademarks, licenses, franchises, professional practices (medical, dental)	Brand names, Quality and Morale of work force, Technological expertise, Corporate reputation	Undeveloped patents, operating or financial flexibility (to expand into new products/markets or abandon existing ones)
Valuation approach	Estimate expected cashflows from the product or service and discount back at appropriate discount rate.	• C ompare DCF value of firm with intangible with firm without (if you can find one) • A ssume that all excess returns of firm are due to intangible. • C ompare multiples at which firm trades to sector averages.	Option valuation • V a lue the undeveloped patent as an option to develop the underlying product. • V a lue expansion options as call options • V a lue abandonment options as put options.
Challenges	• L ife is usually finite and terminal value may be small. • C a s hflows and value may be person dependent (for professional practices)	With multiple intangibles (brand name and reputation for service), it becomes difficult to break down individual components.	• Need exclusivity. • D i f f icult to replicate and arbitrage (making option pricing models dicey)

Valuing Brand Name

	Coca Cola	With Cott Margins
Current Revenues =	$21,962.00	$21,962.00
Length of high-growth period	10	10
Reinvestment Rate =	50%	50%
Operating Margin (after-tax)	15.57%	5.28%
Sales/Capital (Turnover ratio)	1.34	1.34
Return on capital (after-tax)	20.84%	7.06%
Growth rate during period (g) =	10.42%	3.53%
Cost of Capital during period =	7.65%	7.65%
Stable Growth Period		
Growth rate in steady state =	4.00%	4.00%
Return on capital =	7.65%	7.65%
Reinvestment Rate =	52.28%	52.28%
Cost of Capital =	7.65%	7.65%
Value of Firm =	**$79,611.25**	**$15,371.24**

6. Be circumspect about defining debt for cost of capital purposes…

- **General Rule**: Debt generally has the following characteristics:
    - Commitment to make fixed payments in the future
    - The fixed payments are tax deductible
    - Failure to make the payments can lead to either default or loss of control of the firm to the party to whom payments are due.
- Defined as such, debt should include
    - All interest bearing liabilities, short term as well as long term
    - All leases, operating as well as capital
- Debt should not include
    - Accounts payable or supplier credit

But should consider other potential liabilities when getting to equity value…

■ If you have under funded pension fund or health care plans, you should consider the under funding at this stage in getting to the value of equity.

- If you do so, you should not double count by also including a cash flow line item reflecting cash you would need to set aside to meet the unfunded obligation.

- You should not be counting these items as debt in your cost of capital calculations….

■ If you have contingent liabilities - for example, a potential liability from a lawsuit that has not been decided - you should consider the expected value of these contingent liabilities

- Value of contingent liability = Probability that the liability will occur * Expected value of liability

7. The Value of Control

■ The value of the control premium that will be paid to acquire a block of equity will depend upon two factors -

- **Probability that control of firm will change**: This refers to the probability that incumbent management will be replaced. this can be either through acquisition or through existing stockholders exercising their muscle.

- **Value of Gaining Control of the Company:** The value of gaining control of a company arises from two sources - the increase in value that can be wrought by changes in the way the company is managed and run, and the side benefits and perquisites of being in control

    Value of Gaining Control = Present Value (Value of Company with change in control - Value of company without change in control) + Side Benefits of Control

8. The Value of Control

■ The value of the control premium that will be paid to acquire a block of equity will depend upon two factors -

- **Probability that control of firm will change**: This refers to the probability that incumbent management will be replaced. this can be either through acquisition or through existing stockholders exercising their muscle.

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  Value of Gaining Control = Present Value (Value of Company with change in control - Value of company without change in control) + Side Benefits of Control

Assessing the Probability of Control Change at Gerdau

■ On the minus side, the company has voting and non-voting shares and the Gerdau family is firmly in control of the firm (as attested to by their holding of the voting shares and their presence in top management and the board of directors).

■ On the plus side, the non-voting shareholders have been provided with full tag-along rights in a takeover, entitling them to a fair share of the gains.

Bottom line: The probability of control changing in a hostile takeover is close to zero. The probability of control changing in a friendly takeover is much higher.

Increase Cash Flows

Reduce the cost of capital

More efficient operations and cost cuttting: Higher Margins

Divest assets that have negative EBIT

Reduce tax rate
- moving income to lower tax locales
- transfer pricing
- risk management

Revenues

* Operating Margin

= EBIT

- Tax Rate * EBIT

EBIT (1-t)

+ Depreciation
- Capital Expenditures
- Chg in Working Capital
= FCFF

Live off past over-investment

Better inventory management and tighter credit policies

Make your product/service less discretionary

Reduce Operating leverage

Reduce beta

Cost of Equity * (Equity/Capital) + Pre-tax Cost of Debt (1- tax rate) * (Debt/Capital)

Match your financing to your assets: Reduce your default risk and cost of debt

Shift interest expenses to higher tax locales

Change financing mix to reduce cost of capital

Firm Value

Increase Expected Growth
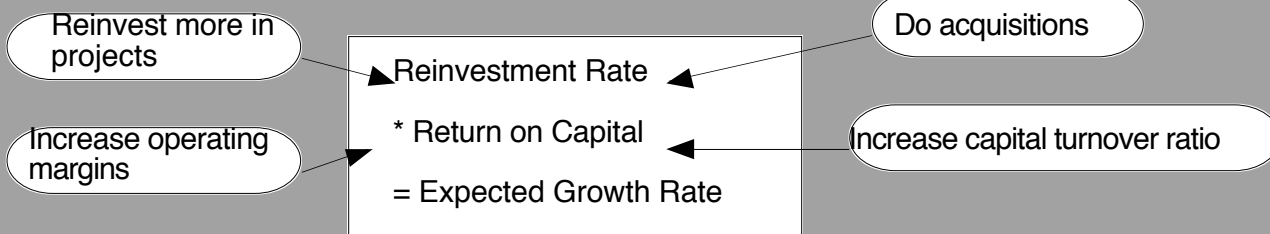
Increase length of growth period

Reinvest more in projects

Increase operating margins

Do acquisitions

Increase capital turnover ratio

Reinvestment Rate

* Return on Capital

= Expected Growth Rate

Build on existing competitive advantages

Create new competitive advantages
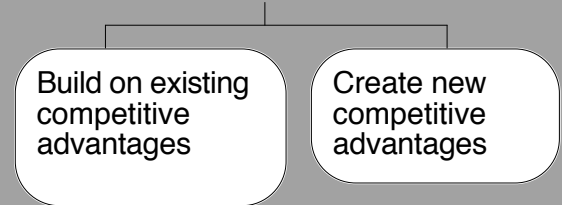
Gerdau: Status Quo ($)

Avg Reinvestment rate =60%	

Return on Capital 16.81%

Current Cashflow to Firm
EBIT(1-t) : $1423
- Nt CpX   465
- Chg WC   240
= FCFF $ 717
Reinvestment Rate = 705/1423
= 49.6%

Reinvestment Rate 60%

Expected Growth in EBIT (1-t)
.60*.1681=.1009
10.09%

Stable Growth
g = 4%; Beta = 0.80;
Country Premium= 1.5%
Cost of capital = 7.82%
ROC= 7.82%; Tax rate=34%
Reinvestment Rate=g/ROC
=4/ 7.82= 51.18%

Terminal Value$_5$= 1168/(.0782-.04) = 30,603

$ Cashflows

Op. Assets $23,522
+ Cash: 550
- Debt   4,369
- Minor. Int.   7,525
=Equity   12,178
-Options   0
Value/Share $16.24
         R$ 31.50

Year	1	2	3	4	5
EBIT (1-t)	$1,566	$1,724	$1,898	$2,089	$2,300
- Reinvestment	$940	$1,034	$1,139	$1,254	$1,380
FCFF	$626	$690	$759	$836	$920

Term Yr
2392
-1224
= 1168

Discount at $ Cost of Capital (WACC) = 9.34% (.76) + 4.98% (0.24) = 8.31%

On June 1, 2007
Gerdau Price = R$ 36.5

Cost of Equity
9.34%

Cost of Debt
(4.8%+1.25%+1.5%)(1-.34)
= 4.98%

Weights
E = 76% D = 24%

Riskfree Rate:
$ Riskfree Rate= 4.8%

+

Beta
0.76

X

Mature market premium
4 %

+

Lambda
0.60

X

Country Equity Risk Premium
2.50%

Unlevered Beta for Sectors: 0.64

Firm's D/E Ratio: 31%

Country Default Spread
1.25%

X

Rel Equity Mkt Vol
2.00

The Optimal Financing Mix for Gerdau…

Debt Ratio	Beta	Cost of Equity	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)	WACC	Firm Value (G)
0%	0.63	9.82%	AAA	6.80%	34.00%	4.49%	9.82%	$25,205
10%	0.68	10.01%	AAA	6.80%	34.00%	4.49%	9.46%	$26,280
20%	0.73	10.24%	AA	7.05%	34.00%	4.65%	9.12%	$27,341
30%	0.81	10.54%	A	7.85%	34.00%	5.18%	8.93%	$27,990
40%	0.91	10.93%	A-	8.05%	34.00%	5.31%	8.69%	$28,864
50%	1.05	11.49%	BBB	8.30%	34.00%	5.48%	8.48%	$29,626
60%	1.26	12.32%	B-	14.05%	34.00%	9.27%	10.49%	$23,453
70%	1.60	13.71%	CC	17.55%	34.00%	11.58%	12.22%	$19,875
80%	2.31	16.54%	CC	17.55%	33.45%	11.68%	12.65%	$19,144
90%	4.62	25.78%	CC	17.55%	29.73%	12.33%	13.68%	$17,603

Gerdau: Restructured ($)

Return on Capital 15.00%

Current Cashflow to Firm
EBIT(1-t) : $1423
- Nt CpX   465
- Chg WC   240
= FCFF $ 717
Reinvestment Rate = 705/1423
= 49.6%

Reinvestment Rate 70%

Expected Growth in EBIT (1-t)
.70*.15=.105
10.50%

Stable Growth
g = 4%; Beta = 0.80;
Country Premium= 1.5%
Cost of capital = 7.85%
ROC= 7.85%; Tax rate=34%
Reinvestment Rate=g/ROC
          =4/ 7.85= 50.96%

$ Cashflows

Terminal Value$_5$= 1279/(.0785-.04) = 33,219

Op. Assets $24,606
+ Cash: 550
- Debt   4,369
- Minor. Int.   7,525
=Equity   12,178
-Options   0
Value/Share $17.91
         R$ 34.75

Year	1	2	3	4	5	Term Yr
						2607
EBIT (1-t)	$1,593	$1,784	$1,999	$2,238	$2,507	-1328
- Reinvestment	$1,195	$1,338	$1,499	$1,679	$1,880	= 1279
FCFF	$398	$446	$500	$560	$627	

Discount at $ Cost of Capital (WACC) = 10.5% (.0.50) + 5.48% (0.50) = 7.99%

On June 1, 2007
Gerdau Price = R$ 36.5

Cost of Equity
10.50%

Cost of Debt
(4.8%+1.25%+2.25%)(1-.34)
= 5.48%

Weights
E = 50% D = 50%

Riskfree Rate:
$ Riskfree Rate= 4.8%

+

Beta
1.05

X

Mature market premium
4 %

+

Lambda
0.60

X

Country Equity Risk Premium
2.50%

Unlevered Beta for Sectors: 0.64

Firm's D/E Ratio: 31%

Country Default Spread
1.25%

X

Rel Equity Mkt Vol
2.00
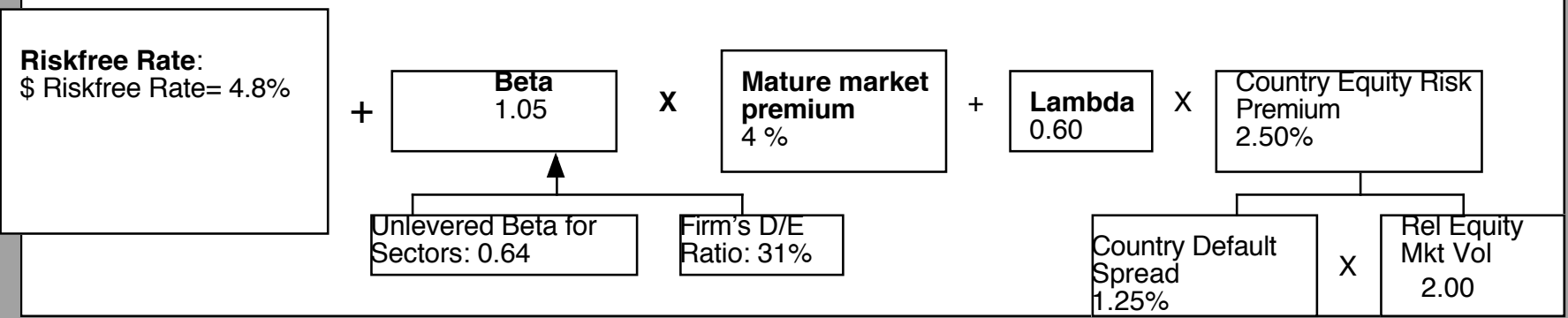
Minority Discounts and Voting Shares

- Assume that a firm has a value of $ 100 million run by incumbent managers and $ 150 million run optimally.
- Proposition 1: The market price will reflect the expected value of control
  - The firm has 10 million voting shares outstanding.
  - Since the potential for changing management is created by this offering, the value per share will fall between $10 and $15, depending upon the probability that is attached to the management change. Thus, if the probability of the management change is 60%, the value per share will be $13.00.

    $$\text{Value/Share} = (150*.6+100*.4)/10 = \$13$$

- Proposition 2: If you have shares with different voting rights, the voting shares will get a disproportionate share of the value of control…

- Proposition 3: The value of a minority interest (49%) of a private business will be significantly lower then the value of a majority stake in the same business if control has value.

Empirical Studies on Voting versus Non-Voting Shares

■ Studies that compare the prices of traded voting shares against the prices of traded non-voting shares, to examine the value of the voting rightsconclude that while the **voting shares generally trade at a premium over the non-voting shares**, the **premium is small**.

- Lease, McConnell and Mikkelson (1983) find an average premium of only 5.44% for the voting shares. (There are similar findings in DeAngelo and DeAngelo (1985) and Megginson (1990))
- These studies have been critiqued for underestimating the value of control, because the probability of gaining control by acquiring these voting shares is considered low for two reasons - first, a substantial block of the voting shares is often still held by one or two individuals in many of these cases, and second, the prices used in these studies are based upon small block trades, which are unlikely to give the buyer majority control.

8. Distress and the Going Concern Assumption

■ Traditional valuation techniques are built on the assumption of a going concern, i.e., a firm that has continuing operations and there is no significant threat to these operations.

- In discounted cashflow valuation, this going concern assumption finds its place most prominently in the terminal value calculation, which usually is based upon an infinite life and ever-growing cashflows.

- In relative valuation, this going concern assumption often shows up implicitly because a firm is valued based upon how other firms - most of which are healthy - are priced by the market today.

■ When there is a significant likelihood that a firm will not survive the immediate future (next few years), traditional valuation models may yield an over-optimistic estimate of value.
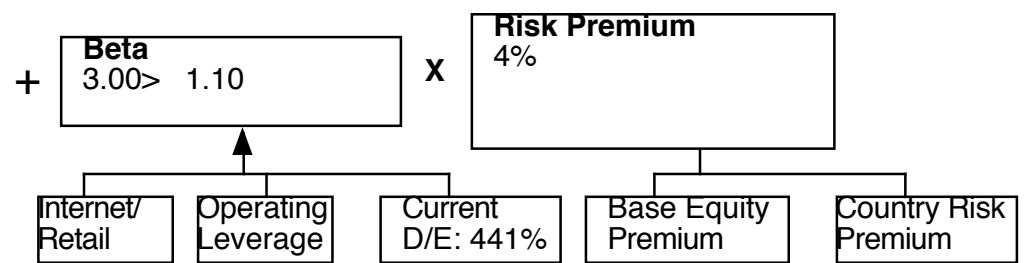
Current Revenue $ 3,804

Current Margin: -49.82%

EBIT -1895m

NOL: 2,076m

Cap ex growth slows and net cap ex decreases

Revenue Growth: 13.33%

EBITDA/Sales -> 30%

Stable Growth

Stable Revenue Growth: 5%

Stable EBITDA/Sales 30%

Stable ROC=7.36% Reinvest 67.93%

Terminal Value= 677(.0736-.05) =$ 28,683

	1	2	3	4	5	6	7	8	9	10	Term. Year
Revenues	$3,804	$5,326	$6,923	$8,308	$9,139	$10,053	$11,058	$11,942	$12,659	$13,292	$13,902
EBITDA	($95)	$ 0	$346	$831	$1,371	$1,809	$2,322	$2,508	$3,038	$3,589	$ 4,187
EBIT	($1,675)	($1,738)	($1,565)	($1,272)	$320	$1,074	$1,550	$1,697	$2,186	$2,694	$ 3,248
EBIT (1-t)	($1,675)	($1,738)	($1,565)	($1,272)	$320	$1,074	$1,550	$1,697	$2,186	$2,276	$ 2,111
+ Depreciation	$1,580	$1,738	$1,911	$2,102	$1,051	$736	$773	$811	$852	$894	$ 939
- Cap Ex	$3,431	$1,716	$1,201	$1,261	$1,324	$1,390	$1,460	$1,533	$1,609	$1,690	$ 2,353
- Chg WC	$ 0	$46	$48	$42	$25	$27	$30	$27	$21	$19	$ 20
FCFF	($3,526)	($1,761)	($903)	($472)	$22	$392	$832	$949	$1,407	$1,461	$ 677

Value of Op Assets	$ 5,530
+ Cash & Non-op	$ 2,260
= Value of Firm	$ 7,790
- Value of Debt	$ 4,923
= Value of Equity	$ 2867
- Equity Options	$ 14
Value per share	$ 3.22

	1	2	3	4	5	6	7	8	9	10
Beta	3.00	3.00	3.00	3.00	3.00	2.60	2.20	1.80	1.40	1.00
Cost of Equity	16.80%	16.80%	16.80%	16.80%	16.80%	15.20%	13.60%	12.00%	10.40%	8.80%
Cost of Debt	12.80%	12.80%	12.80%	12.80%	12.80%	11.84%	10.88%	9.92%	8.96%	6.76%
Debt Ratio	74.91%	74.91%	74.91%	74.91%	74.91%	67.93%	60.95%	53.96%	46.98%	40.00%
Cost of Capital	13.80%	13.80%	13.80%	13.80%	13.80%	12.92%	11.94%	10.88%	9.72%	7.98%

Forever

Cost of Equity 16.80%

Cost of Debt 4.8%+8.0%=12.8% Tax rate = 0% -> 35%

Weights Debt= 74.91% -> 40%

Riskfree Rate: T. Bond rate = 4.8%

+

Beta 3.00> 1.10

X

Risk Premium 4%

Global Crossing November 2001 Stock price = $1.86

Internet/ Retail

Operating Leverage

Current D/E: 441%

Base Equity Premium

Country Risk Premium

Valuing Global Crossing with Distress

- ■ Probability of distress
  - • P $653 = \sum_{t=1}^{t=8} \frac{120(1 - \pi_{Distress})^t}{(1.05)^t} + \frac{1000(1 - \pi_{Distress})^8}{(1.05)^8}$ Crossing = $ 653
  - • Probability of distress = 13.53% a year (Riskfree rate = 5%)
  - • Cumulative probability of survival over 10 years = $(1 - .1353)^{10} = 23.37\%$
- ■ Distress sale value of equity
  - • Book value of capital = $14,531 million
  - • Distress sale value = 15% of book value = .15*14531 = $2,180 million
  - • Book value of debt = $7,647 million
  - • Distress sale value of equity = $ 0
- ■ Distress adjusted value of equity
  - • Value of Global Crossing = $3.22 (.2337) + $0.00 (.7663) = $0.75

9. Equity to Employees: Effect on Value

■ In recent years, firms have turned to giving employees (and especially top managers) equity option packages as part of compensation. These options are usually

  - Long term

  - At-the-money when issued

  - On volatile stocks

■ Are they worth money? And if yes, who is paying for them?

■ Two key issues with employee options:

  - How do options granted in the past affect equity value per share today?

  - How do expected future option grants affect equity value today?

Equity Options and Value

- ■ Options outstanding
  - Step 1: List all options outstanding, with maturity, exercise price and vesting status.
  - Step 2: Value the options, taking into accoutning dilution, vesting and early exercise considerations
  - Step 3: Subtract from the value of equity and divide by the actual number of shares outstanding (not diluted or partially diluted).
- ■ Expected future option and restricted stock issues
  - Step 1: Forecast value of options that will be granted each year as percent of revenues that year. (As firm gets larger, this should decrease)
  - Step 2: Treat as operating expense and reduce operating income and cash flows
  - Step 3: Take present value of cashflows to value operations or equity.

10. Analyzing the Effect of Illiquidity on Value

■ Investments which are less liquid should trade for less than otherwise similar investments which are more liquid.

■ The size of the illiquidity discount should vary across firms and also across time. The conventional practice of relying upon studies of restricted stocks or IPOs will fail sooner rather than later.

- Restricted stock studies are based upon small samples of troubled firms

- The discounts observed in IPO studies are too large for these to be arms length transactions. They just do not make sense.

Illiquidity Discounts from Bid-Ask Spreads

- Using data from the end of 2000, for instance, we regressed the bid-ask spread against annual revenues, a dummy variable for positive earnings (DERN: 0 if negative and 1 if positive), cash as a percent of firm value and trading volume.

  Spread = 0.145 – 0.0022 ln (Annual Revenues) -0.015 (DERN) – 0.016 (Cash/ Firm Value) – 0.11 ($ Monthly trading volume/ Firm Value)

- We could substitute in the revenues of Kristin Kandy ($5 million), the fact that it has positive earnings and the cash as a percent of revenues held by the firm (8%):

  Spread = 0.145 – 0.0022 ln (Annual Revenues) -0.015 (DERN) – 0.016 (Cash/ Firm Value) – 0.11 ($ Monthly trading volume/ Firm Value)

  = 0.145 – 0.0022 ln (5) -0.015 (1) – 0.016 (.08) – 0.11 (0) = .12.52%

- Based on this approach, we would estimate an illiquidity discount of 12.52% for Kristin Kandy.

Some closing thoughts on valuation…

- View "paradigm shifts" with skepticism.
- Focus on the big picture; don't let the details trip you up.
- Keep your perspective; it is only a valuation.
- If you have to choose between valuation skills and luck….