



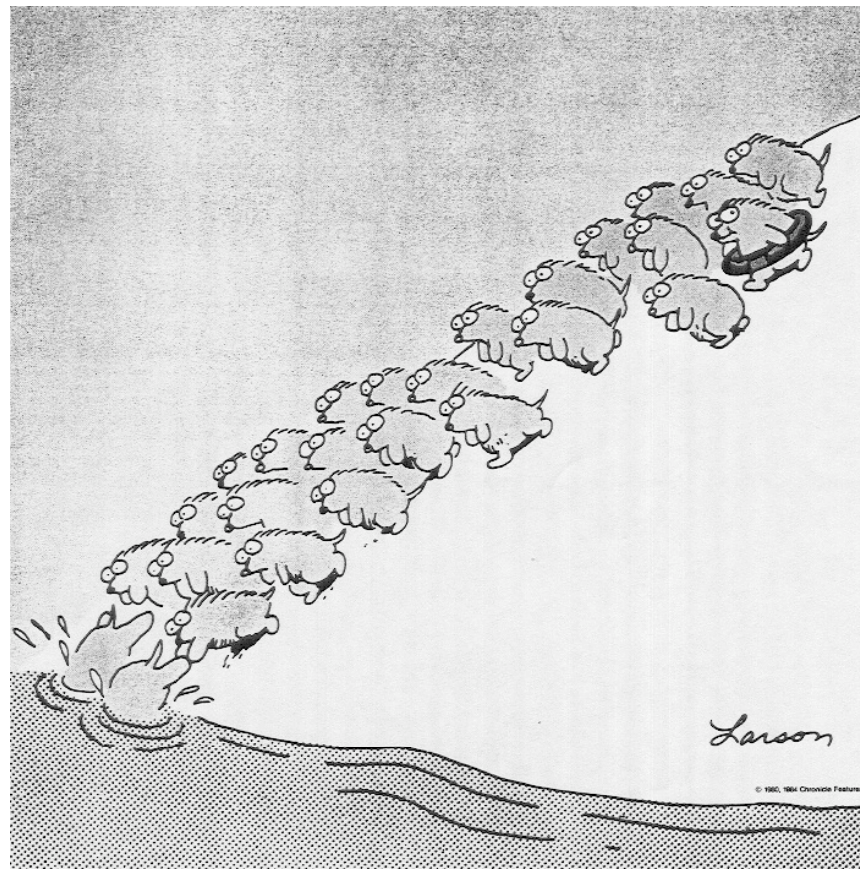
Valuation: First Principles and Loose Ends

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Some Initial Thoughts

" One hundred thousand lemmings cannot be wrong"

Graffiti



Misconceptions about Valuation

- Myth 1: A valuation is an objective search for “true” value
 - Truth 1.1: All valuations are biased. The only questions are how much and in which direction.
 - Truth 1.2: The direction and magnitude of the bias in your valuation is directly proportional to who pays you and how much you are paid.
- Myth 2.: A good valuation provides a precise estimate of value
 - Truth 2.1: There are no precise valuations
 - Truth 2.2: The payoff to valuation is greatest when valuation is least precise.
- Myth 3: . The more quantitative a model, the better the valuation
 - Truth 3.1: One’s understanding of a valuation model is inversely proportional to the number of inputs required for the model.
 - Truth 3.2: Simpler valuation models do much better than complex ones.

Approaches to Valuation

- **Discounted cashflow valuation**, relates the value of an asset to the present value of expected future cashflows on that asset.
- **Relative valuation**, estimates the value of an asset by looking at the pricing of 'comparable' assets relative to a common variable like earnings, cashflows, book value or sales.
- **Contingent claim valuation**, uses option pricing models to measure the value of assets that share option characteristics.

Discounted Cash Flow Valuation

- **What is it:** In discounted cash flow valuation, the value of an asset is the present value of the expected cash flows on the asset.
- **Philosophical Basis:** Every asset has an intrinsic value that can be estimated, based upon its characteristics in terms of cash flows, growth and risk.
- **Information Needed:** To use discounted cash flow valuation, you need
 - to estimate the life of the asset
 - to estimate the cash flows during the life of the asset
 - to estimate the discount rate to apply to these cash flows to get present value
- **Market Inefficiency:** Markets are assumed to make mistakes in pricing assets across time, and are assumed to correct themselves over time, as new information comes out about assets.

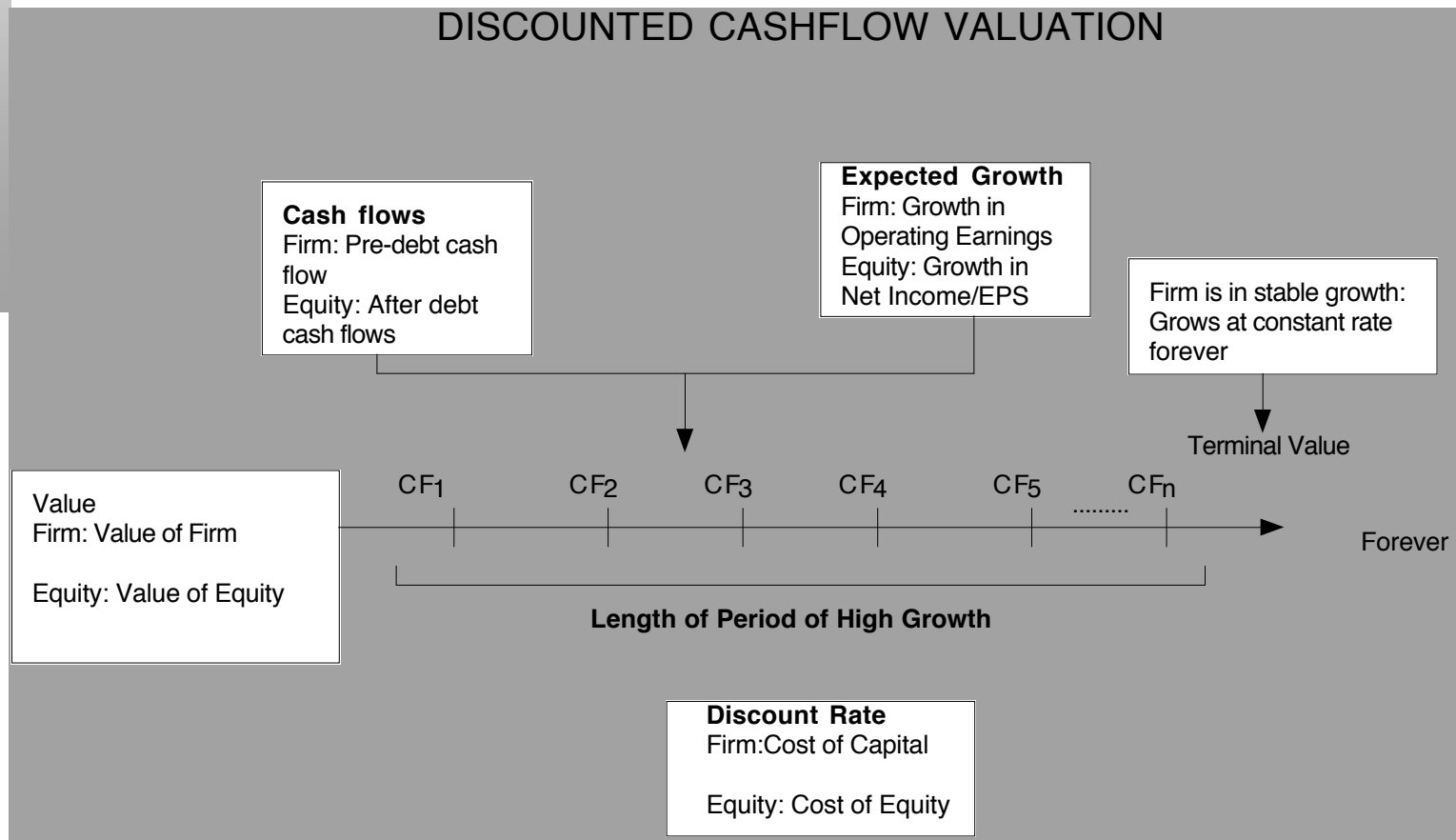
DCF Choices: Equity Valuation versus Firm Valuation

Firm Valuation: Value the entire business by discounting cashflows to all claimholders by a weighted average of their costs.

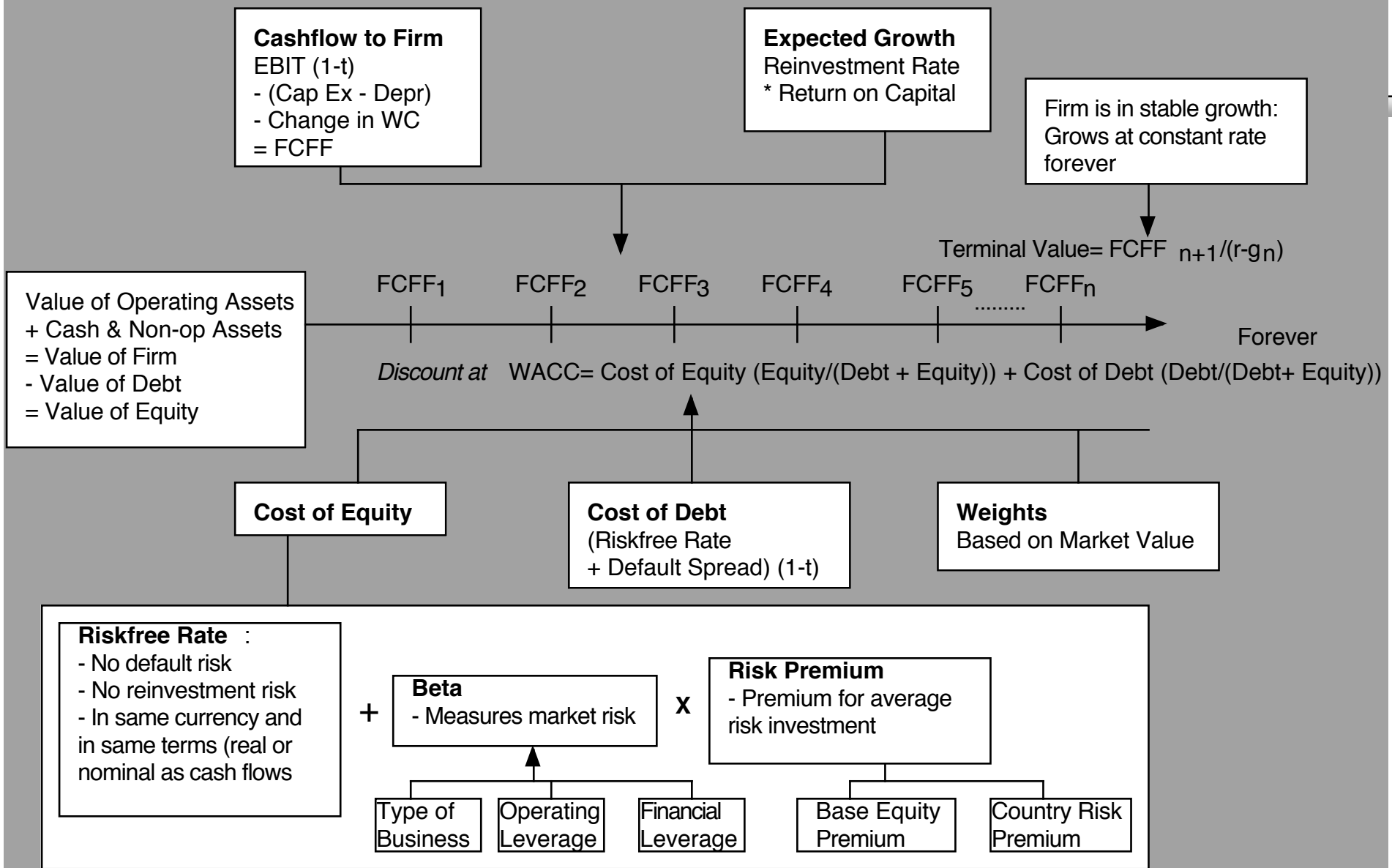
Assets		Liabilities	
Existing Investments Generate cashflows today Includes long lived (fixed) and short-lived (working capital) assets	Assets in Place	Debt	Fixed Claim on cash flows Little or No role in management <i>Fixed Maturity</i> <i>Tax Deductible</i>
Expected Value that will be created by future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

Equity valuation: Value just the equity claim in the business by discounting cashflows to equity investors at the cost of equity.

Valuation with Infinite Life



DISCOUNTED CASHFLOW VALUATION



Amgen: Status Quo

Cap Ex = Acc Cap Ex(1218) + Acquisitions (3975) + R&D (2216)

Current Cashflow to Firm
 EBIT(1-t) = :7336(1-.28)= 6058
 - Nt CpX= 6443
 - Chg WC 37
 = FCFF - 423
 Reinvestment Rate = 6480/6058 = 106.98%
 Return on capital = 18.26%

Reinvestment Rate 60%

Expected Growth in EBIT (1-t)
 $.60 * .16 = .096$
 9.6%

Return on Capital 16%

Stable Growth
 g = 4%; Beta = 1.10;
 Debt Ratio= 20%; Tax rate=35%
 Cost of capital = 8.08%
 ROC= 10.00%;
 Reinvestment Rate=4/10=40%

Terminal Value₁₀ = 7300 / (.0808 - .04) = 179,099

Op. Assets 94214
 + Cash: 1283
 - Debt 8272
 =Equity 87226
 -Options 479
 Value/Share \$ 74.33

Year	1	2	3	4	5	6	7	8	9	10	Term Yr
EBIT	\$9,221	\$11,195	\$7,975	\$8,741	\$9,580	\$10,392	\$11,157	\$11,853	\$12,460	\$12,958	16898
EBIT (1-t)	\$6,639	\$7,276	\$7,975	\$8,741	\$9,580	\$10,392	\$11,157	\$11,853	\$12,460	\$12,958	12167
- Reinvestment	\$3,983	\$4,366	\$4,785	\$5,244	\$5,748	\$5,820	\$5,802	\$5,690	\$5,482	\$5,183	4867
= FCFF	\$2,656	\$2,911	\$3,190	\$3,496	\$3,832	\$4,573	\$5,355	\$6,164	\$6,978	\$7,775	7300

Cost of Capital (WACC) = 11.7% (0.90) + 3.66% (0.10) = 10.90%

Debt ratio increases to 20%
 Beta decreases to 1.10

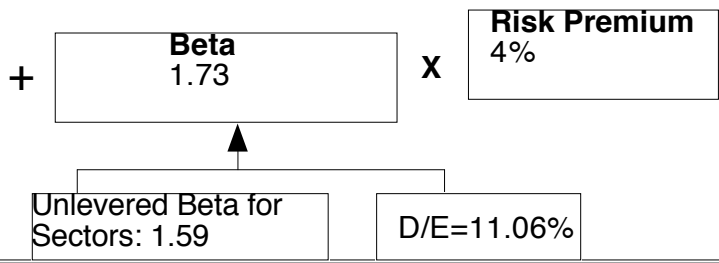
On May 11, 2007, Amgen was trading at \$63.65/share

Cost of Equity 11.70%

Cost of Debt
 $(4.78\% + .85\%)(1-.35) = 3.66\%$

Weights
 E = 90% D = 10%

Riskfree Rate:
 Riskfree rate = 4.78%



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)
 $.60 \times .1681 = .1009$
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 Value₅ = $1168 / (.0782 - .04) = 30,603$

\$ 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) = $9.34\% (.76) + 4.98\% (0.24) = 8.31\%$

Cost of Equity 9.34%

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

Weights
 E = 76% D = 24%

On June 1, 2007
 Gerdau Price = R\$ 36.5

Riskfree Rate:
 \$ Riskfree Rate = 4.8%

$$+ \text{Beta } 0.76 \times \text{Mature market premium } 4\% + \text{Lambda } 0.60 \times \text{Country Equity Risk Premium } 2.50\%$$

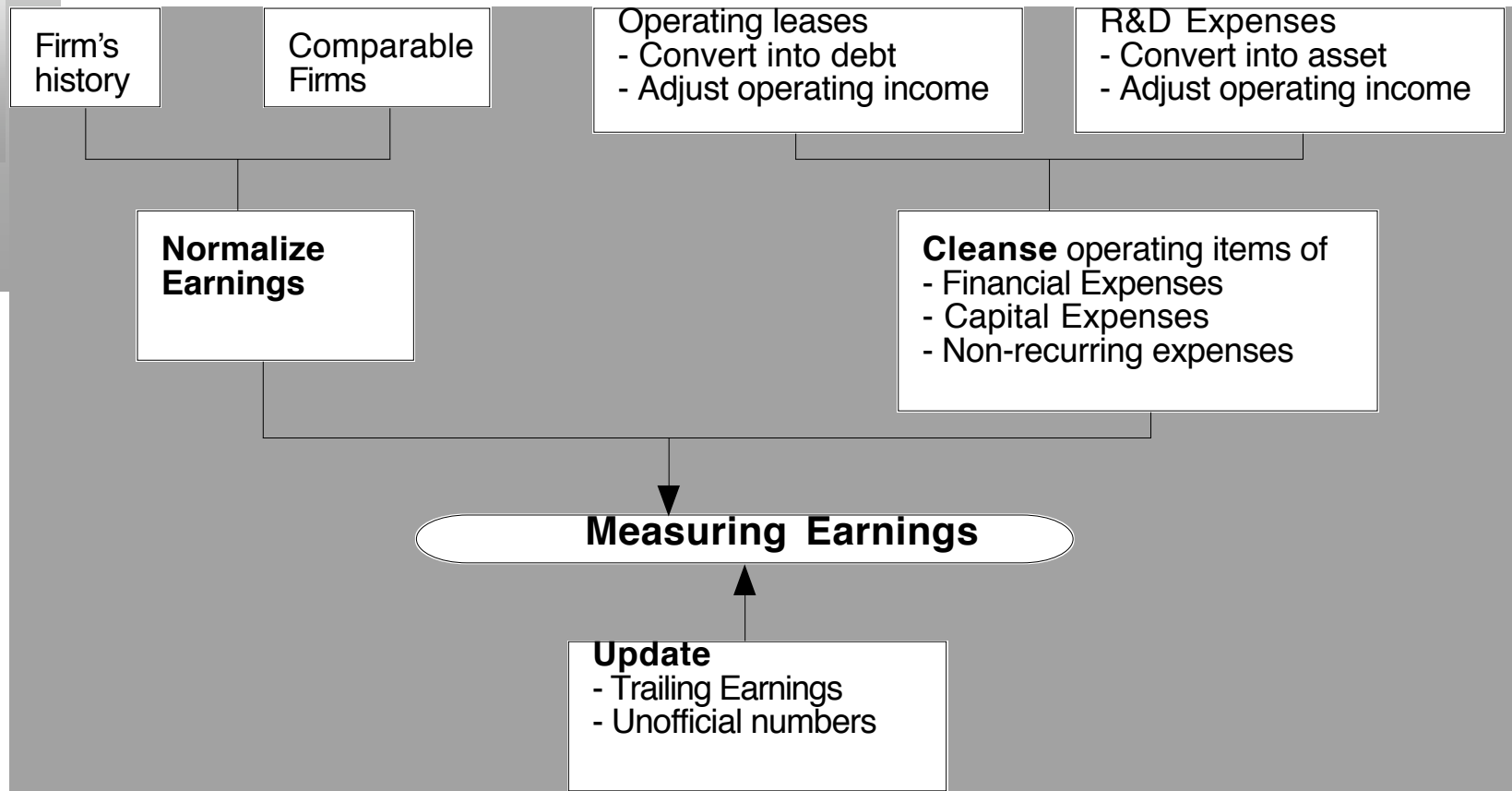
Unlevered Beta for Sectors: 0.64

Firm's D/E Ratio: 31%

Country Default Spread 1.25%

Rel Equity Mkt Vol 2.00

I. Measure earnings right..



Operating Leases at Amgen in 2007

- Amgen has lease commitments and its cost of debt (based on it's A rating) is 5.63%.

Year	Commitment	Present Value
1	\$96.00	\$90.88
2	\$95.00	\$85.14
3	\$102.00	\$86.54
4	\$98.00	\$78.72
5	\$87.00	\$66.16
6-12	\$107.43	\$462.10 (\$752 million prorated)
Debt Value of leases =		\$869.55

- Debt outstanding at Amgen = \$7,402 + \$ 870 = \$8,272 million
- Adjusted Operating Income = Stated OI + Lease exp this year - Depreciation
= 5,071 m + 69 m - 870/12 = \$5,068 million (12 year life for assets)
- Approximate Operating income= \$5,071 m + 870 m (.0563) = \$ 5,120 million

Capitalizing R&D Expenses: Amgen

- R & D was assumed to have a 10-year life.

Year	R&D Expense	Unamortized portion	Amortization this year	
Current	3366.00	1.00	3366.00	
-1	2314.00	0.90	2082.60	\$231.40
-2	2028.00	0.80	1622.40	\$202.80
-3	1655.00	0.70	1158.50	\$165.50
-4	1117.00	0.60	670.20	\$111.70
-5	865.00	0.50	432.50	\$86.50
-6	845.00	0.40	338.00	\$84.50
-7	823.00	0.30	246.90	\$82.30
-8	663.00	0.20	132.60	\$66.30
-9	631.00	0.10	63.10	\$63.10
-10	558.00	0.00	0.00	\$55.80

Value of Research Asset = \$10,112.80 \$1,149.90

Adjusted Operating Income = \$5,120 + 3,366 - 1,150 = \$7,336 million

II. Get the big picture (not the accounting one) when it comes to cap ex and working capital

- Capital expenditures should include
 - Research and development expenses, once they have been re-categorized as capital expenses.
 - Acquisitions of other firms, whether paid for with cash or stock.
- Working capital should be defined not as the difference between current assets and current liabilities but as the difference between non-cash current assets and non-debt current liabilities.
- On both items, start with what the company did in the most recent year but do look at the company's history and at industry averages.

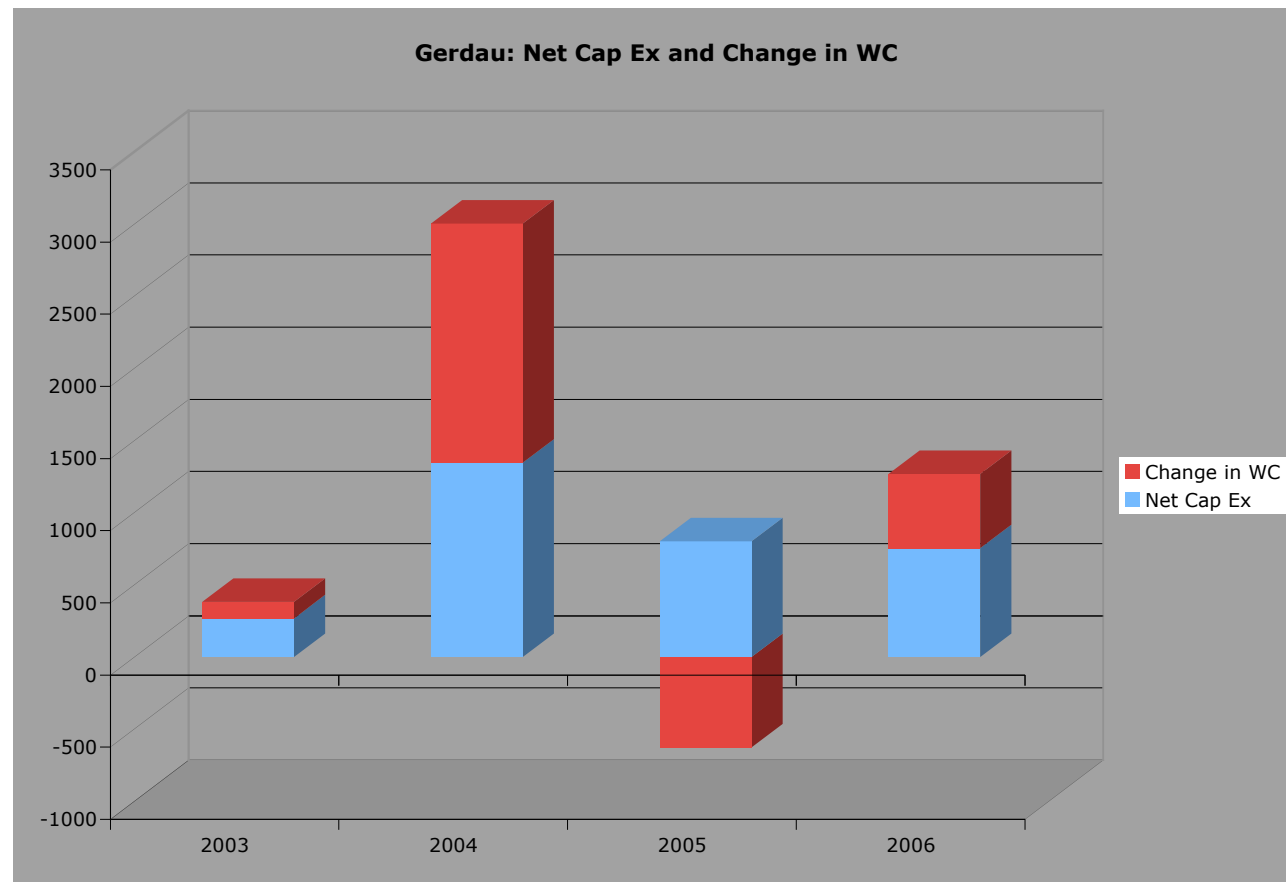
Amgen's Net Capital Expenditures

- If we define capital expenditures broadly to include R&D and acquisitions:

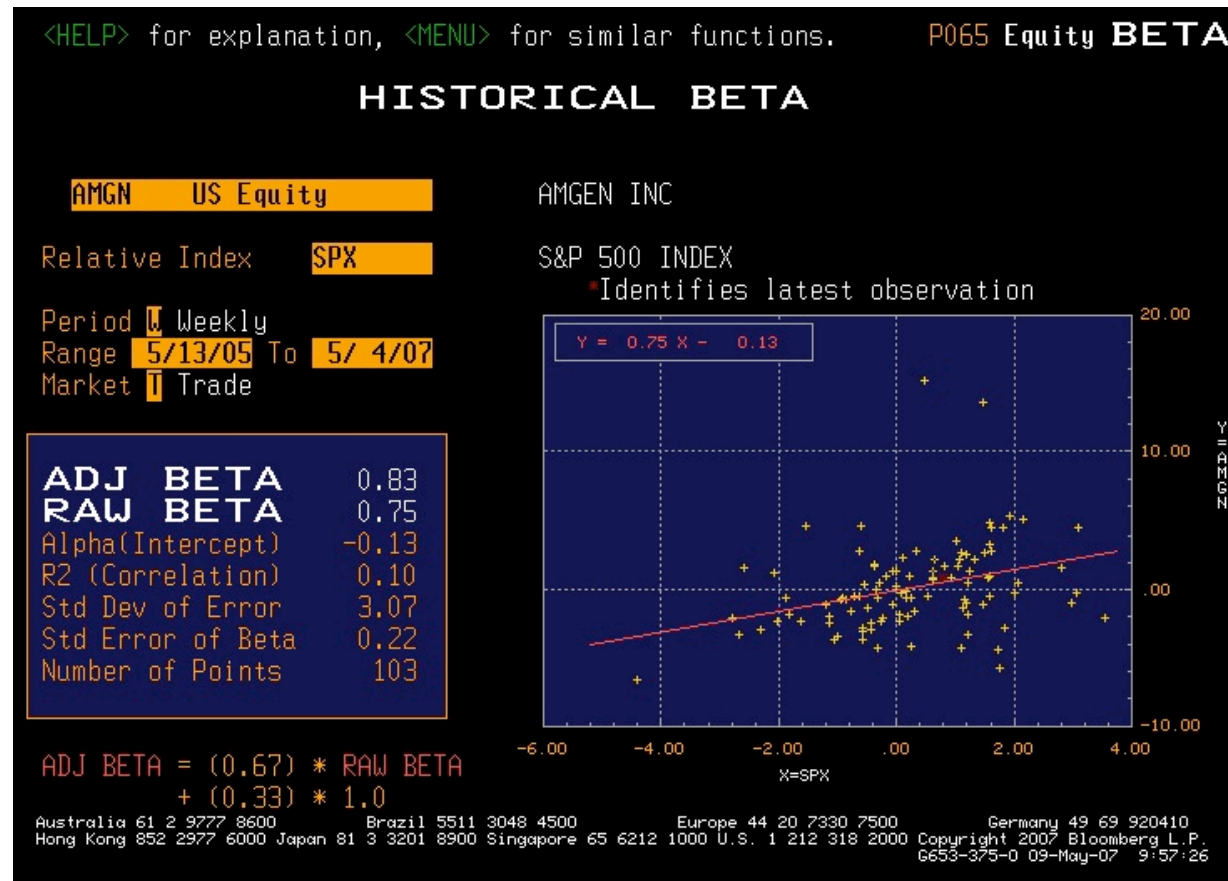
Accounting Capital Expenditures =	\$1,218 million
- Accounting Depreciation =	\$ 963 million
Accounting Net Cap Ex =	\$ 255 million
Net R&D Cap Ex = (3366-1150) =	\$2,216 million
Acquisitions in 2006 =	\$3,975 million
Total Net Capital Expenditures =	\$ 6,443 million

- Acquisitions have been a volatile item. Amgen was quiet on the acquisition front in 2004 and 2005 and had a significant acquisition in 2003.

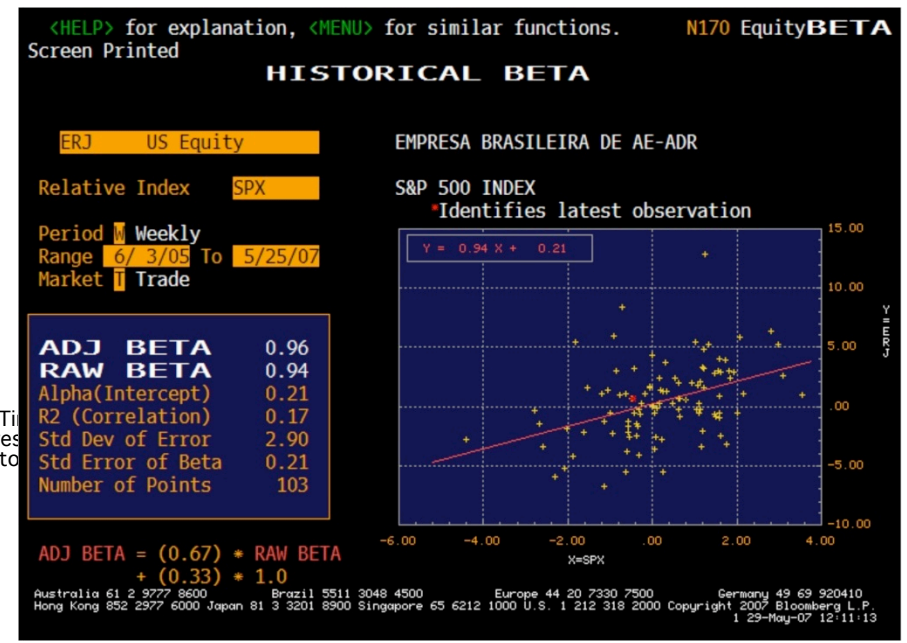
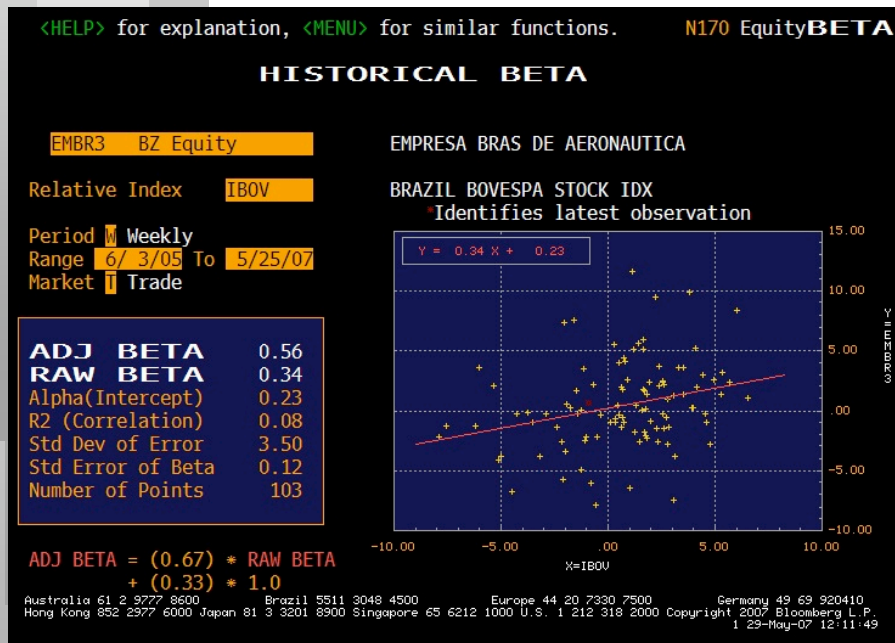
Gerda's Reinvestment over time..



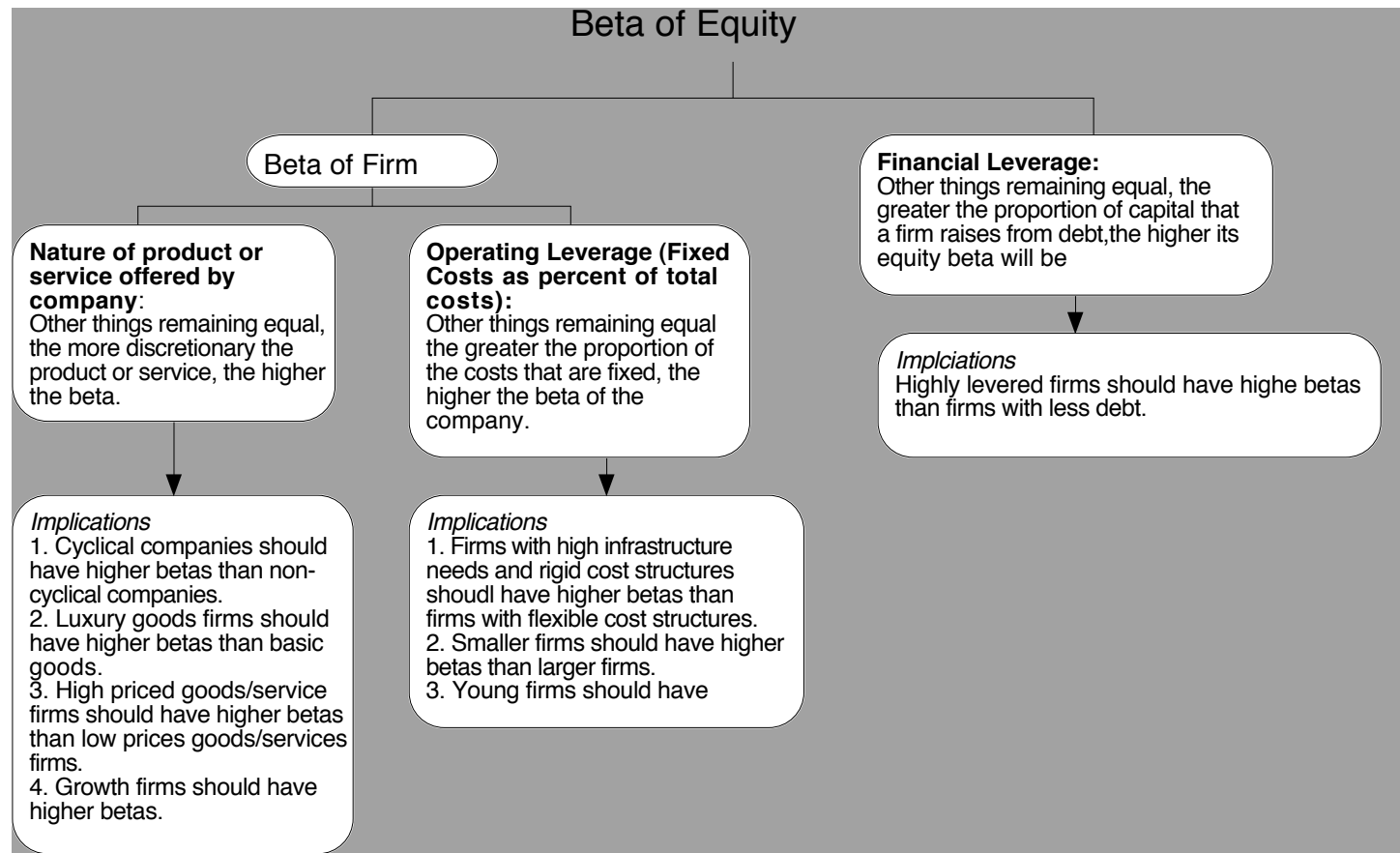
III. Regression betas are unreliable...



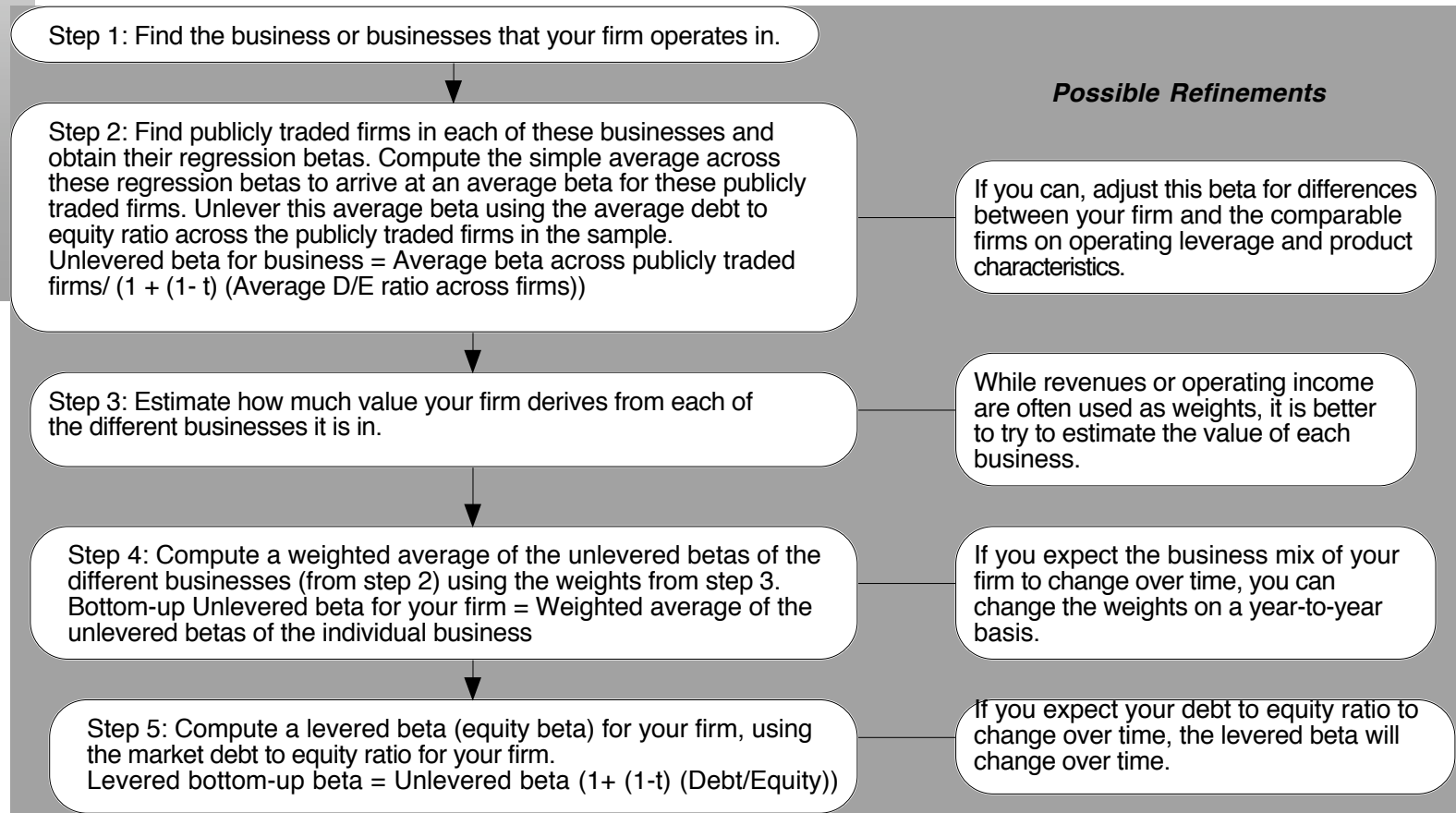
And playing with the regression won't help...



Determinants of Betas



Bottom-up Betas



Estimating bottom up betas

■ Amgen

- The unlevered beta for pharmaceutical firms is 1.59. Using Amgen's debt to equity ratio of 11%, the bottom up beta for Amgen is
- Bottom-up Beta = $1.59 (1 + (1 - .35)(.11)) = 1.73$

■ Gerdau

- The unlevered beta for integrated steel companies is 0.64. Applying Gerdau's debt to equity ratio of 29.02% and tax rate of 34%, we get a levered beta of 0.76.
- Bottom-up Beta = $0.64 (1 + (1 - .34) (.2902)) = 0.76$

IV. And the past is not always a good indicator of the future

- It is standard practice to use historical premiums as forward looking premiums. :

Historical Period	<i>Arithmetic average</i>		<i>Geometric Average</i>	
	Stocks - T.Bills	Stocks - T.Bonds	Stocks - T.Bills	Stocks - T.Bonds
1928-2006	7.87%	6.57%	6.01%	4.91%
1966-2006	5.57%	4.13%	4.34%	3.25%
1996-2006	6.91%	5.14%	5.42%	3.90%

- An alternative is to back out the premium from market prices:

Between 2001 and 2006, dividends and stock buybacks averaged 3.75% of the index each year.

Analysts expect earnings (53.16) to grow 6% a year for the next 5 years .

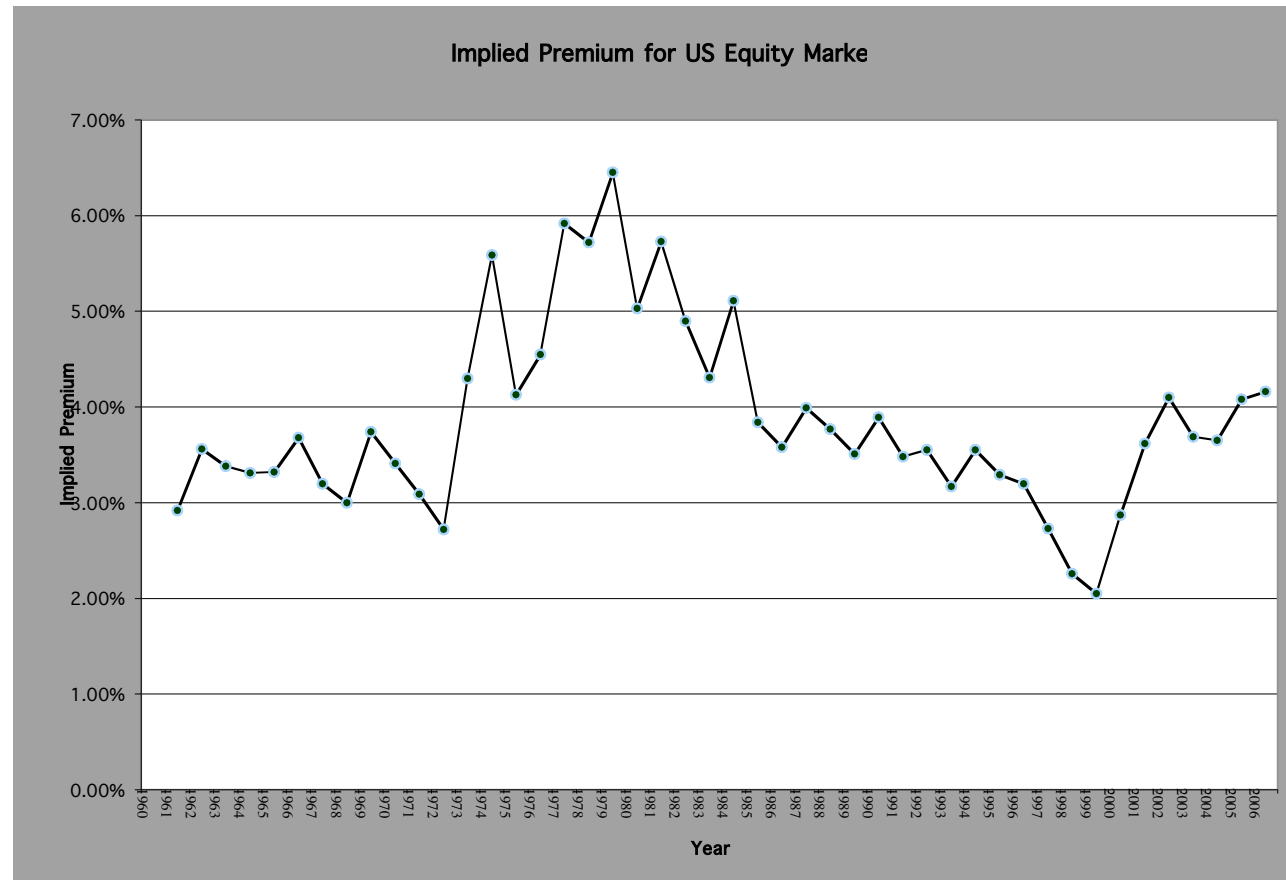
After year 5, we will assume that earnings on the index will grow at 4.7%, the same rate as the entire economy

56.35 59.73 63.32 67.12 71.14

January 1, 2007
S&P 500 is at 1418.3
3.75% of 1418.3 = 53.16

- Implied Equity risk premium = Expected return on stocks - Treasury bond rate = 8.86%-4.70% = 4.16%

Implied Premiums in the US



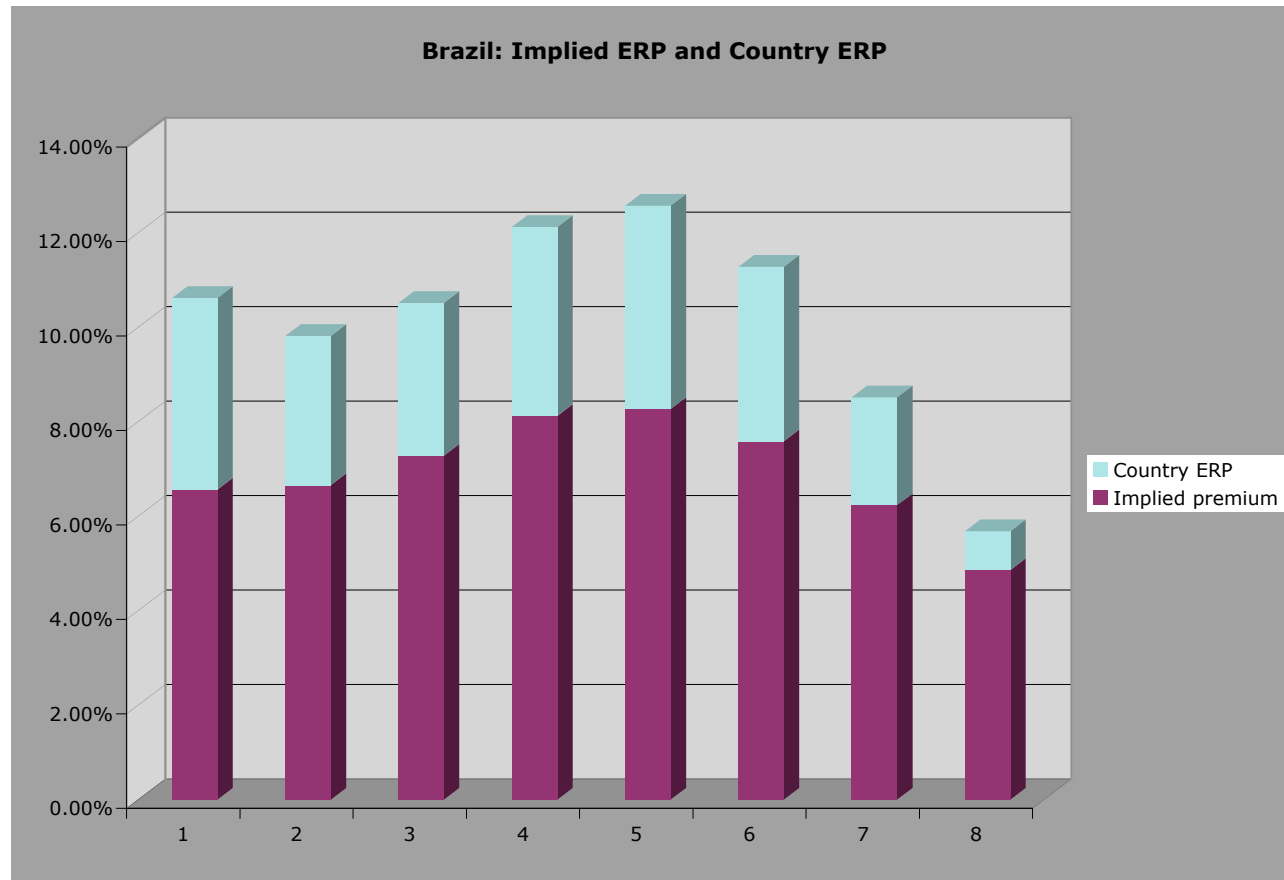
Brazil's implied risk premium - June 2007

- Bovespa on June 1, 2007 = 44473
- Dividend + Stock Buybacks in 2006 = 3.56% of index
- Expected growth in earnings - next 5 years = 11% (in US\$ terms)
- Expected growth in earnings - after year 5 = 4.8%
- Riskfree Rate = US treasury bond rate = 4.8%

Solving,

- Expected Return on stocks = 9.66%
- Implied equity risk premium for Brazil = 4.86%
- Implied equity risk premium for US = 4.04%
- Country ERP for Brazil in June 2007 = 0.82%

Implied Equity Risk Premium - History



V. There is a downside to globalization...

- Emerging markets offer growth opportunities but they are also riskier. If we want to count the growth, we have to also consider the risk.
- Consider, for example, Brazil as a country. In mid-2007, Brazil was rated Baa2, with a default spread of 1.30%. Dollar denominated 10-year bonds issued by the Brazilian government had a yield to maturity of 6.05%, a spread of 1.25% over the treasury bond rate.
- If we accept the proposition that equities are riskier than bonds, the equity risk premium for Brazil can be estimated from this spread:
 - Standard Deviation in Bovepa = 22%
 - Standard Deviation in Brazilian government bond = 11%
 - Additional country risk premium = 1.25% $(22/11) = 2.50\%$

Equity Risk Premiums across the Globe...

January 2007

France	0.00%
Germany	0.00%
Greece	1.05%
Italy	0.75%
Poland	1.20%
Portugal	0.75%
Slovenia	0.75%
Spain	0.00%
Sweden	0.00%
Switzerland	0.00%
Turkey	4.50%

Russia	1.73%
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Mexico	1.50%
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China	1.20%
India	3.75%
Indonesia	5.25%
Korea	1.28%
Malaysia	1.28%
Mongolia	5.25%
Pakistan	5.25%
Philippines	5.25%
Singapore	0.00%
Taiwan	0.90%
Thailand	1.50%
Vietnam	3.75%

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Argentina	6.75%
Bolivia	6.75%
Brazil	3.75%
Chile	1.05%
Paraguay	9.00%
Peru	2.03%
Uruguay	5.25%
Venezuela	5.25%

Belize	11.25%
Botswana	1.05%
Egypt	2.03%
Morocco	3.00%
Papua New Guinea	5.25%
South Africa	1.20%
Tunisia	1.73%

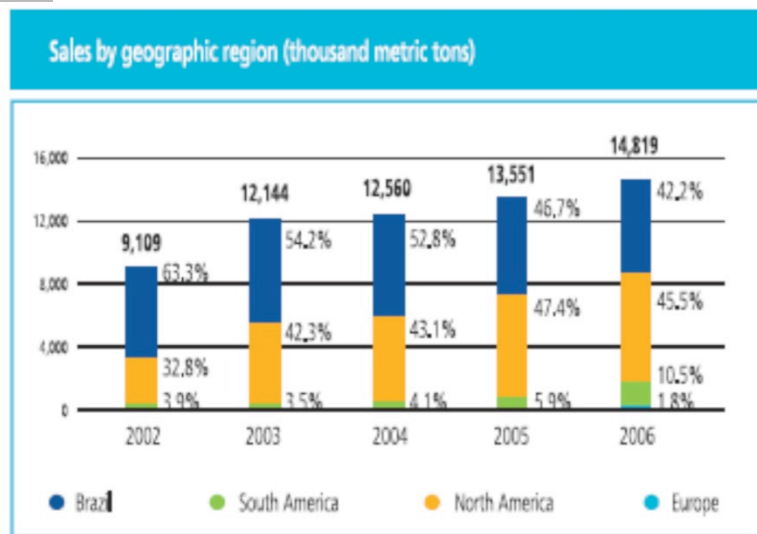
Australia	0.00%
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VI. And country risk exposure cannot just be based upon incorporation..

A company's exposure to country risk should be a function of:

- Source of revenues: 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.
- Manufacturing facilities: 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 accentuated for companies that cannot move their production facilities (mining and petroleum companies, for instance).
- Use of risk management products: Companies can use both options/futures markets and insurance to hedge some or a significant portion of country risk.

Gerdau's Global Exposure



Investments (US\$ million)

	2006
Fixed assets	
Brazil	694.4
North America	238.9
South America	52.4
Europe	17.9
Acquisitions	
North America	298.7
South America	203.1
Europe	497.2
Total	2,002.6

Estimating Lambdas: The Revenue Approach

- The easiest and most accessible data is on revenues. Most companies break their revenues down by region.
 $\lambda = \% \text{ of revenues domestically}_{\text{firm}} / \% \text{ of revenues domestically}_{\text{avg firm}}$
- Consider, for instance, Gerdau and Embratel, both of which are incorporated and traded in Brazil. Gerdau gets 42% of its revenues in Brazil whereas Embratel gets almost all of its revenues in Brazil. The average Brazilian company gets about 70% of its revenues in Brazil:
 - $\text{Lambda}_{\text{Gerdau}} = 42\% / 70\% = .60$
 - $\text{Lambda}_{\text{Embratel}} = 100\% / 70\% = 1.42$
- 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

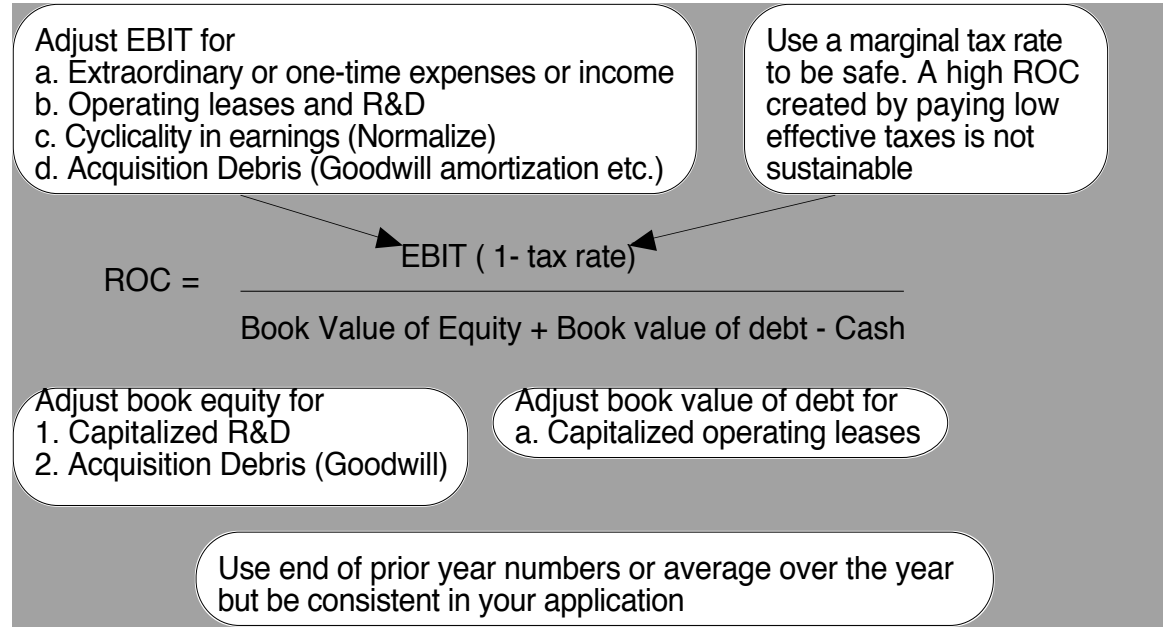
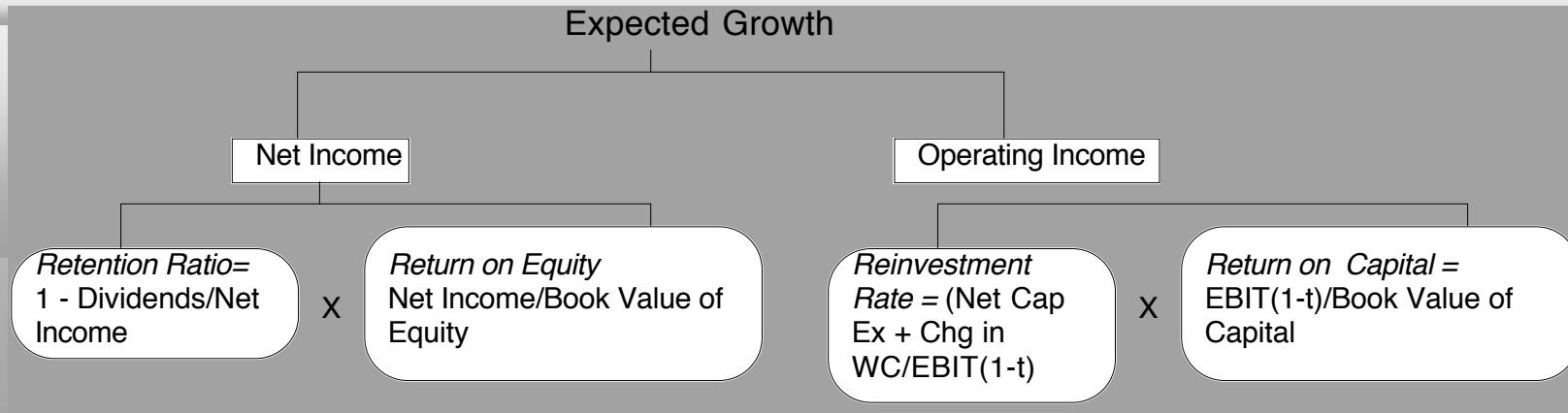
VII. Discount rates can (and often should) change over time...

- The inputs into the cost of capital - the cost of equity (beta), the cost of debt (default risk) and the debt ratio - can change over time. For younger firms, they should change over time.
- At the minimum, they should change when you get to your terminal year to inputs that better reflect a mature firm.

Amgen's Cost of Capital..

Year	Beta	Cost of Equity	Cost of Debt	Debt Ratio	Cost of Capital
1	1.73	11.70%	5.63%	9.96%	10.90%
2	1.73	11.70%	5.63%	9.96%	10.90%
3	1.73	11.70%	5.63%	9.96%	10.90%
4	1.73	11.70%	5.63%	9.96%	10.90%
5	1.73	11.70%	5.63%	9.96%	10.90%
6	1.60	11.20%	5.63%	11.97%	10.33%
7	1.48	10.69%	5.63%	13.98%	9.77%
8	1.35	10.19%	5.63%	15.98%	9.21%
9	1.23	9.68%	5.63%	17.99%	8.64%
10	1.10	9.18%	5.63%	20.00%	8.08%

VIII. Growth has to be earned (not endowed or estimated)

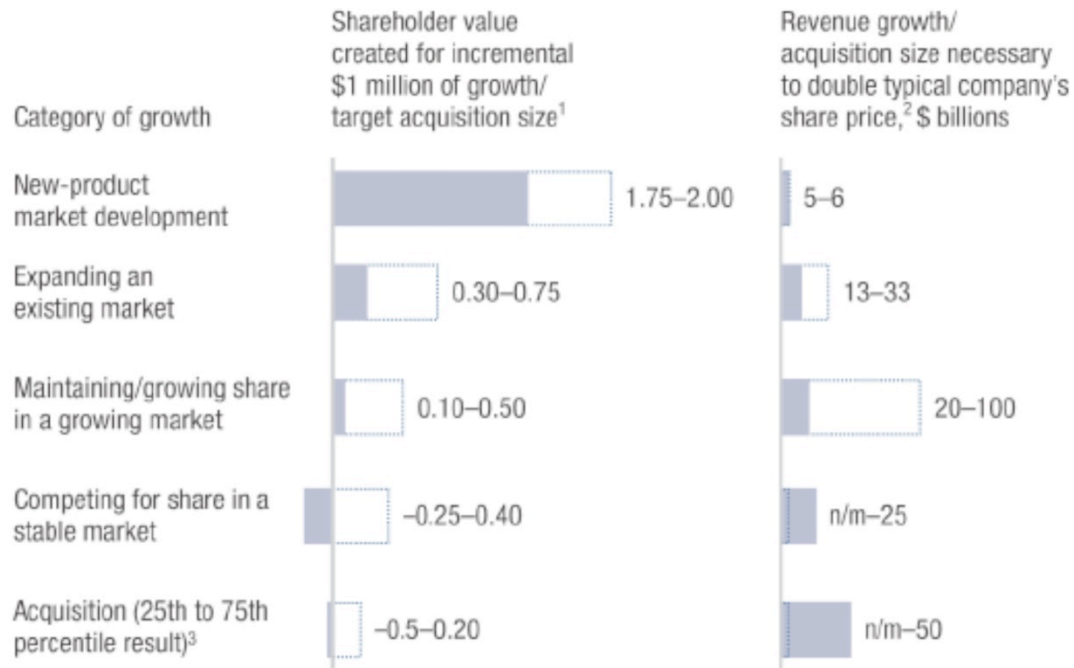


Estimating Return on Capital: Amgen

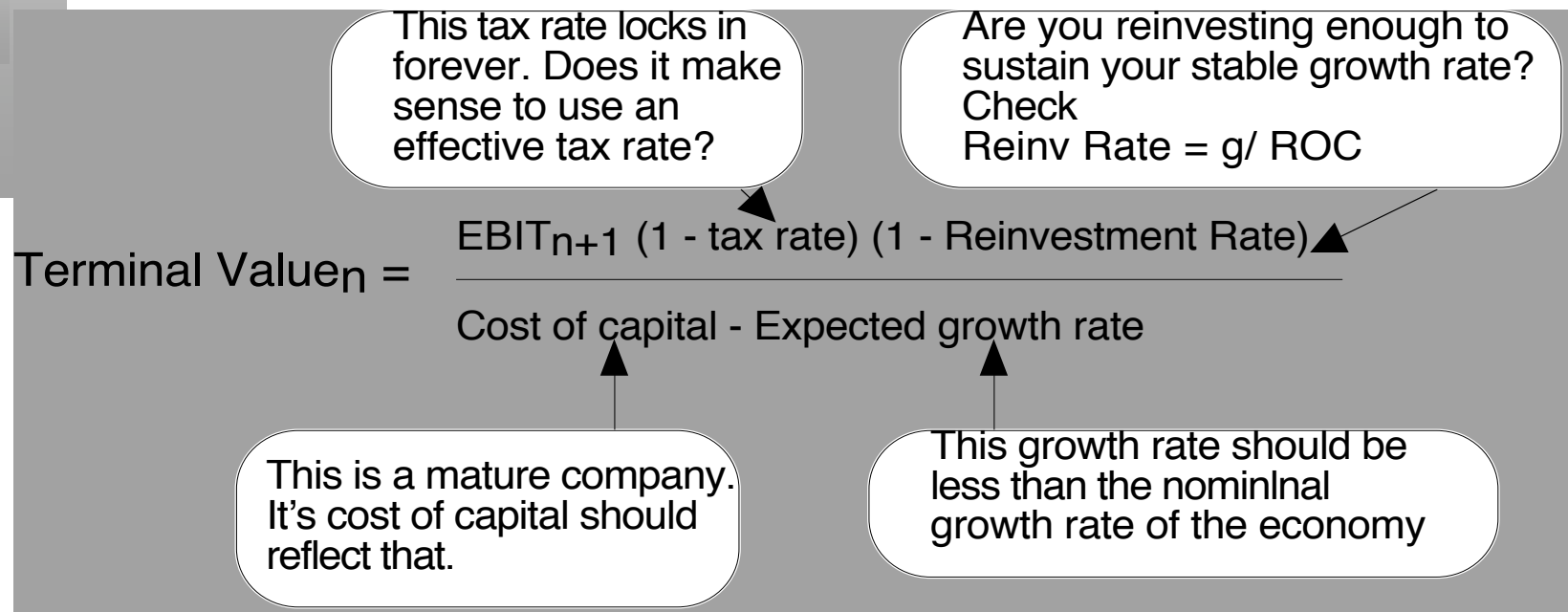
Stated EBIT	R&D Adjustment	Lease Adjustment	
$[5071 + (3366 - 1149) + (870 * .0563)]$			
<hr/>			=
			16.71%
Book Equity	R&D Asset	Book Debt	PV of Oper. Leases

Value Creating Growth... Evaluating the Alternatives..

Modes of organic growth vary in value creation intensity— consumer goods industry



IX. All good things come to an end..And the terminal value is not an ATM...



Some evidence on growth at small firms...

- 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:

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are needed to see this picture.

Growth, Excess Returns and Terminal Value

■ Gerdau (ROC = Cost of capital = 7.82%)

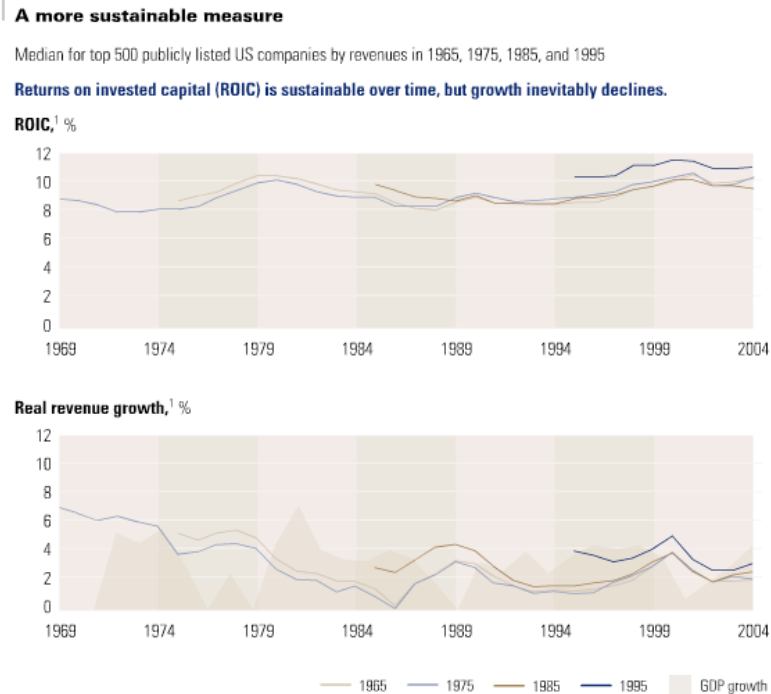
Growth Rate	Reinvestment Rate	FCFF	Terminal value
0%	0.00%	\$2,392	\$30,603
1%	12.79%	\$2,086	\$30,603
2%	25.59%	\$1,780	\$30,603
3%	38.38%	\$1,474	\$30,603
4%	51.18%	\$1,168	\$30,603

■ Amgen (ROC =10%, Cost of capital = 8.08%)

Growth Rate	Reinvestment Rate	FCFF	Terminal value
0%	0.00%	\$12,167	\$150,652
1%	10.00%	\$10,950	\$154,749
2%	20.00%	\$9,733	\$160,194
3%	30.00%	\$8,517	\$167,784
4%	40.00%	\$7,300	\$179,099

How long do excess returns persist?

- While growth rates seem to fade quickly as firms become larger, well managed firms seem to do much better at sustaining excess returns for longer periods¹



¹ROIC shown is 7-year simple average, including goodwill; growth shown is 7-year compound annual growth rate for revenues adjusted for inflation.

X. Uncertainty is endemic to valuation....

Assume that you have valued your firm, using a discounted cash flow model and with the all the information that you have available to you at the time. Which of the following statements about the valuation would you agree with?

- If I know what I am doing, the DCF valuation will be precise
- No matter how careful I am, the DCF valuation gives me an estimate

If you subscribe to the latter statement, how would you deal with the uncertainty?

- Collect more information, since that will make my valuation more precise
- Make my model more detailed
- Do what-if analysis on the valuation
- Use a simulation to arrive at a distribution of value
- Will not buy the company

Option 1: Collect more information

- There are two types of errors in valuation. The first is estimation error and the second is uncertainty error. The former is amenable to information collection but the latter is not.
- Ways of increasing information in valuation
 - Collect more historical data (with the caveat that firms change over time)
 - Look at cross sectional data (hoping the industry averages convey information that the individual firm's financial do not)
 - Try to convert qualitative information into quantitative inputs
- Proposition 1: More information does not always lead to more precise inputs, since the new information can contradict old information.
- Proposition 2: The human mind is incapable of handling too much divergent information. Information overload can lead to valuation trauma.

Option 2: Build bigger models

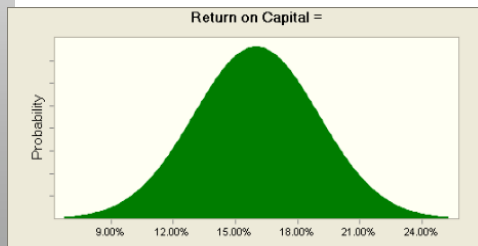
- When valuations are imprecise, the temptation often is to build more detail into models, hoping that the detail translates into more precise valuations. The detail can vary and includes:
 - More line items for revenues, expenses and reinvestment
 - Breaking time series data into smaller or more precise intervals (Monthly cash flows, mid-year conventions etc.)
- More complex models can provide the illusion of more precision.
- Proposition 1: There is no point to breaking down items into detail, if you do not have the information to supply the detail.
- Proposition 2: Your capacity to supply the detail will decrease with forecast period (almost impossible after a couple of years) and increase with the maturity of the firm (it is very difficult to forecast detail when you are valuing a young firm)
- Proposition 3: Less is often more

Option 3: Build What-if analyses

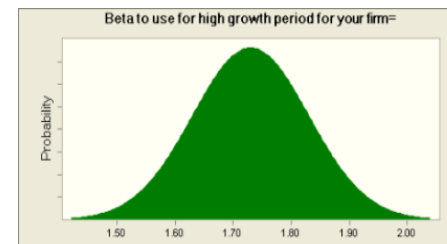
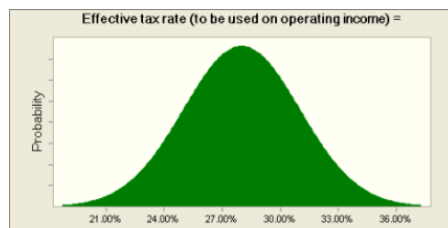
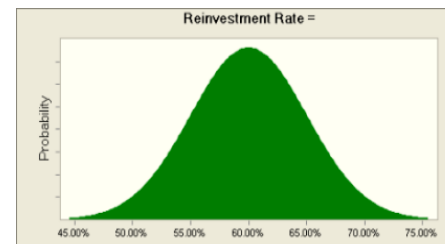
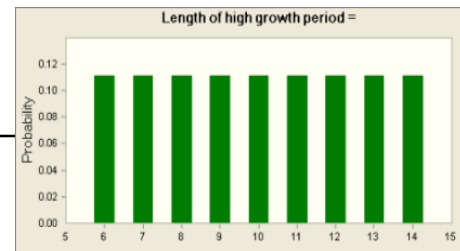
- A valuation is a function of the inputs you feed into the valuation. To the degree that you are pessimistic or optimistic on any of the inputs, your valuation will reflect it.
- There are three ways in which you can do what-if analyses
 - Best-case, Worst-case analyses, where you set all the inputs at their most optimistic and most pessimistic levels
 - Plausible scenarios: Here, you define what you feel are the most plausible scenarios (allowing for the interaction across variables) and value the company under these scenarios
 - Sensitivity to specific inputs: Change specific and key inputs to see the effect on value, or look at the impact of a large event (FDA approval for a drug company, loss in a lawsuit for a tobacco company) on value.
- Proposition 1: As a general rule, what-if analyses will yield large ranges for value, with the actual price somewhere within the range.

Option 4: Simulation

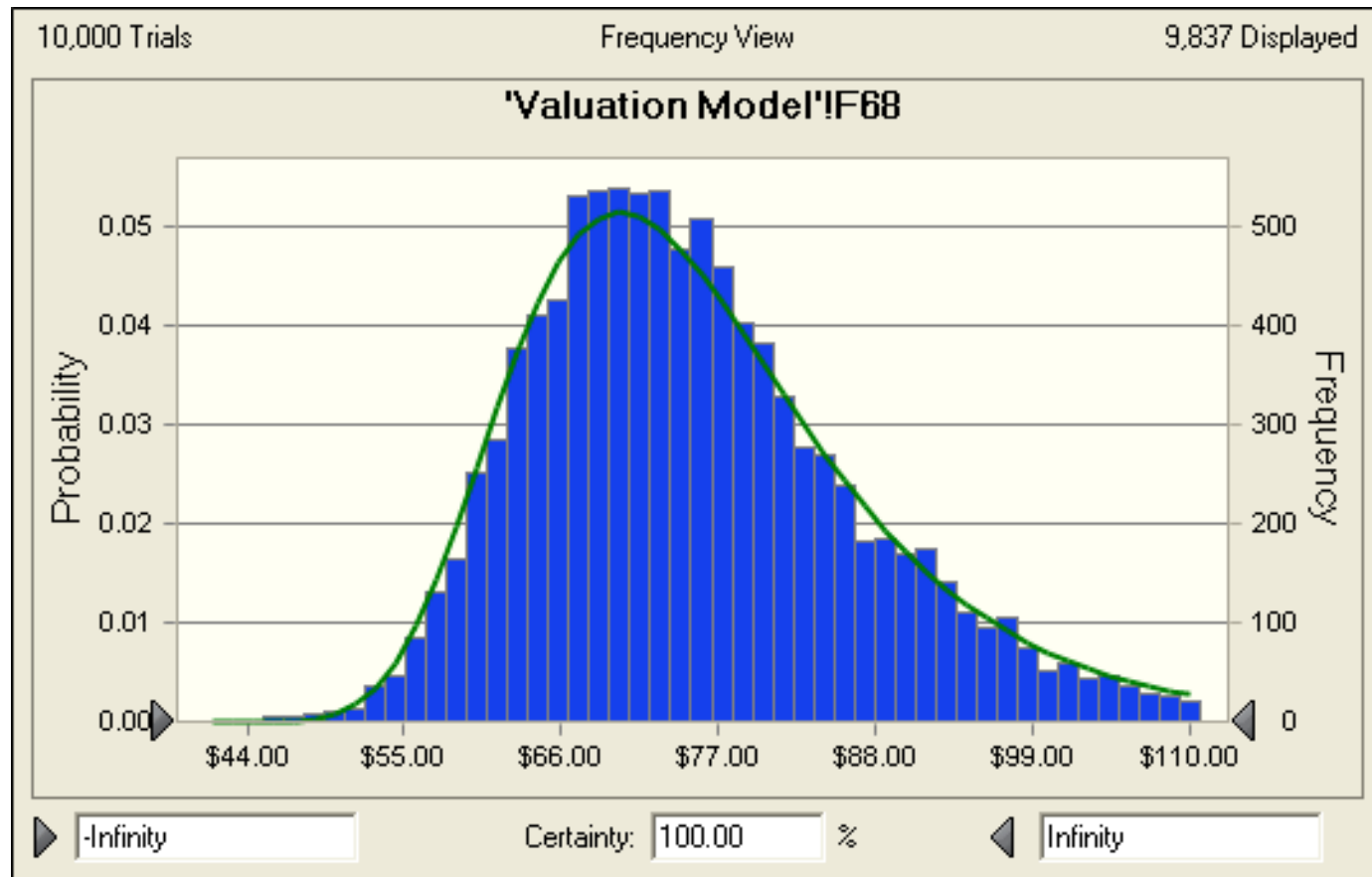
The Inputs for Amgen



Correlation = 0.4



The Simulated Values of Amgen: What do I do with this output?



The Loose Ends

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-operating 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 utilized 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?

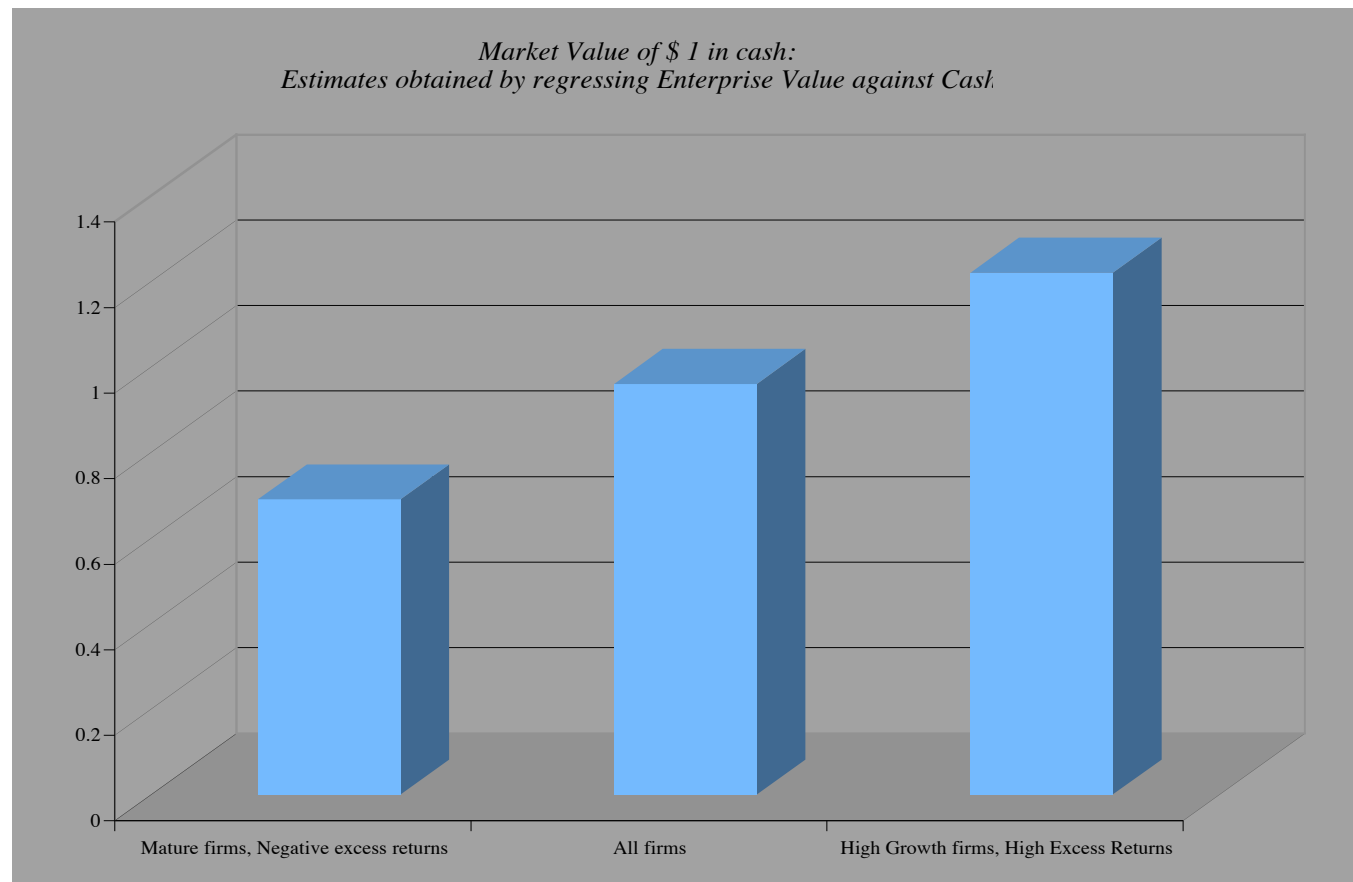
I. The Value of Cash

An Exercise in Cash Valuation

	<i>Company A</i>	<i>Company B</i>	<i>Company C</i>
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

In which of these companies is cash most likely to trade at face value, at a discount and at a premium?

Cash: Discount or Premium?



Cash at Brazilian companies... You be the judge..

	Cash/Firm Value	ROC
USIMINAS SA-PF A	9.22%	22.18%
ACESITA-PREF	9.58%	8.76%
ELETROBRAS	9.86%	3.27%
BANCO ITAU-PREF	11.57%	5.24%
BRASKEM SA	12.06%	7.40%
BRADERSCO SA-PREF	13.77%	5.85%
EMBRAER	18.71%	8.78%
BRASIL	22.27%	5.31%

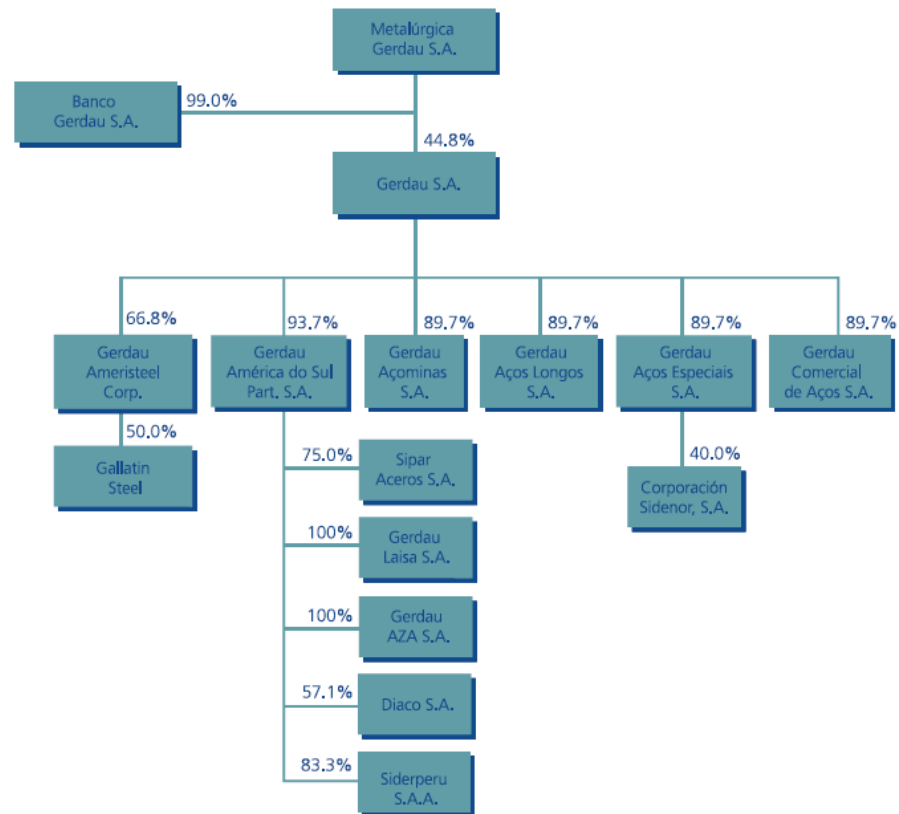
2. Dealing with Holdings in Other firms

- Holdings in other firms can be categorized into
 - Minority passive holdings, in which case only the dividend from the holdings is shown in the balance sheet
 - Minority active holdings, in which case the share of equity income is shown in the income statements
 - Majority active holdings, 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.

Gerdau's Cross Holdings...



Gerdau's Cross Holdings...

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.
- Do not double count an asset. If you count the income from an asset in your cashflows, you cannot count the market value of the asset in your value.

4. A Discount for Complexity: An Experiment

	<i>Company A</i>	<i>Company B</i>
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

<i>Company</i>	<i>Number of pages in last 10Q</i>	<i>Number of pages in last 10K</i>
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

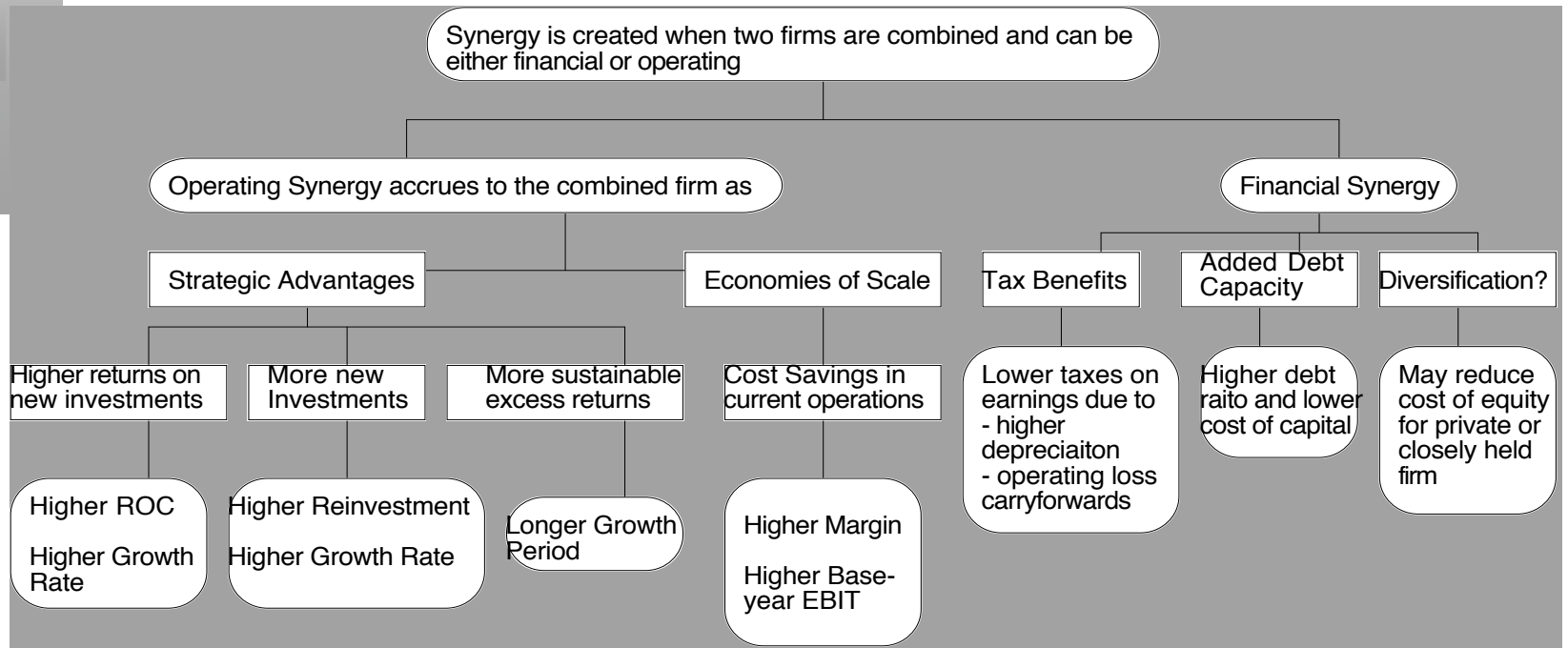
In relative valuation

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:

$PBV = 0.65 + 15.31 \text{ ROE} - 0.55 \text{ Beta} + 3.04 \text{ Expected growth rate} - 0.003 \text{ # Pages in 10K}$

5. The Value of Synergy



Valuing Synergy

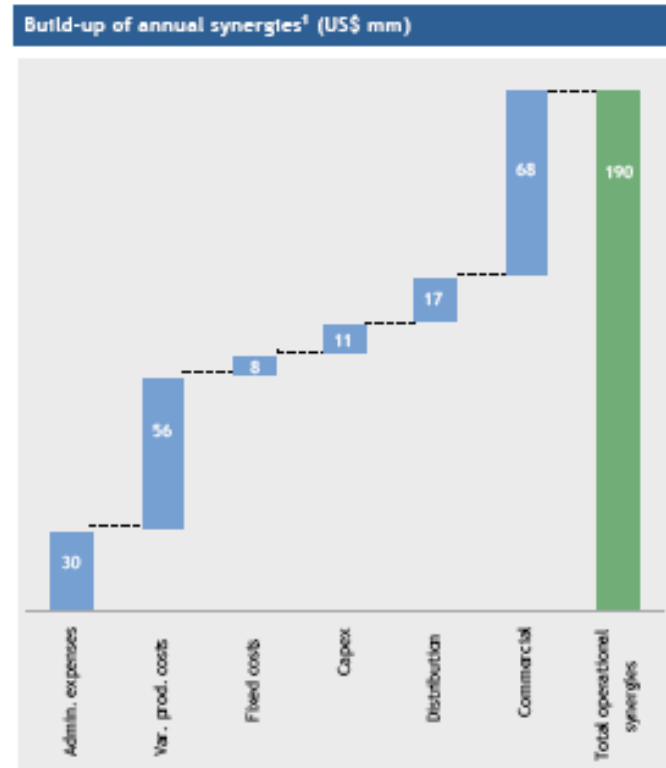
- (1) the firms involved in the merger are **valued independently**, by discounting expected cash flows to each firm at the weighted average cost of capital for that firm.
- (2) the **value of the combined firm, with no synergy**, is obtained by adding the values obtained for each firm in the first step.
- (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

UNIVERSITY OF LABATT CANADA AND FEMSA CERVEZA

Details on operational synergies ¹ (US\$ mm)		
Area	Annual synergies	Action Items
Costs	Admin. Expenses	<ul style="list-style-type: none"> Reduction of corporate expenses such as travel and office expenses Rationalization of corporate HQ Optimization of IT systems
	Var. prod costs	<ul style="list-style-type: none"> Efficiency improvement in the use of variable production inputs such as water, malt, hops, energy in line with AmBev standards Reduction in packaging cost (cans, glass bottles)
	Fixed costs	<ul style="list-style-type: none"> Implementation of AmBev's proprietary maintenance planning tool
	Capex	<ul style="list-style-type: none"> Usage of assets available at AmBev Brazil Implementation of AmBev's proprietary Capex planning tool
	Distribution	<ul style="list-style-type: none"> Optimization of current distribution systems
Revenues	Margin expansion from cross licensing agreement	<ul style="list-style-type: none"> Commercialization of AmBev brands in Canada and the US by Labatt and vice versa
Total	\$190.2	



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

Valuation methodology for synergies

Cost synergies

- Achievement of full synergies by 2008
 - Synergies are gradually phased in over four years with 0%, 30%, 30%, 40% and 100% being realized in 2004 through 2008
 - Realization of synergies requires cash outlays in the 2005-2007 period which are reflected in the net present value
 - Capex synergies only begin in 2008
- Decreased tax shield taken into account at full statutory tax rate, does not take into account potential additional upside as a result of lower effective historical tax rate
- Synergies realized in Canada discounted at Labatt Canada's WACC (6.5%) while synergies realized in Brazil discounted at AmBev's WACC (12.4%)

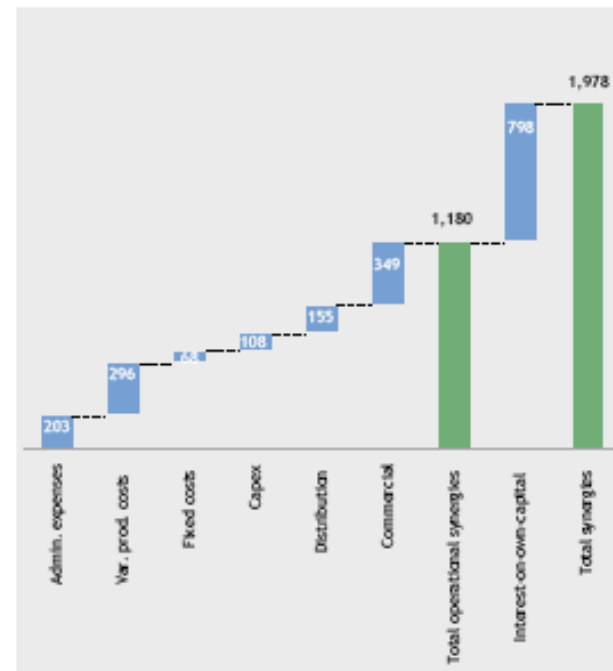
Revenue synergies

- Achievement of full synergies by 2008
 - Synergies are gradually phased in over four years with 0%, 30%, 30%, 40% and 100% being realized in 2004 through 2008
- Discounted at 14.4%, reflecting AmBev's WACC plus an additional spread to reflect higher risk of realizing such synergies

Interest on own capital

- Tax benefits generated through increased interest on AmBev's capital payments due to AmBev's increased shareholders' equity after acquisition of Labatt
- Discounted at AmBev's cost of equity (13.6%)

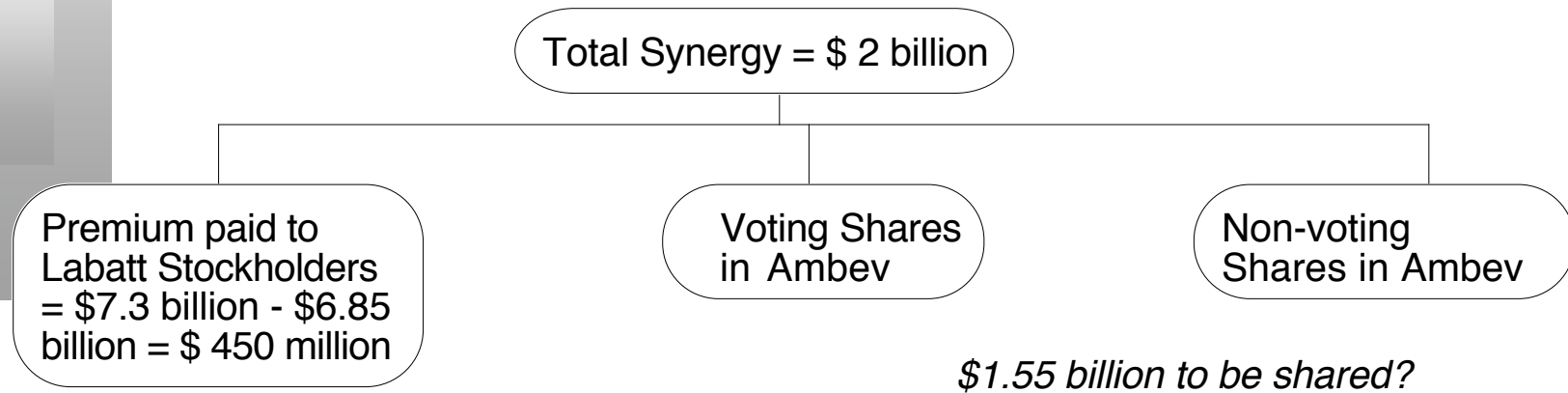
Present value of potential synergies¹ (US\$ mm)



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 = $g / \text{ROC} = 3/9 = 33.33\%$
 - 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?



6. Brand name, great management, superb product ...Are we short changing 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.

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

7. 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

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.
 - **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

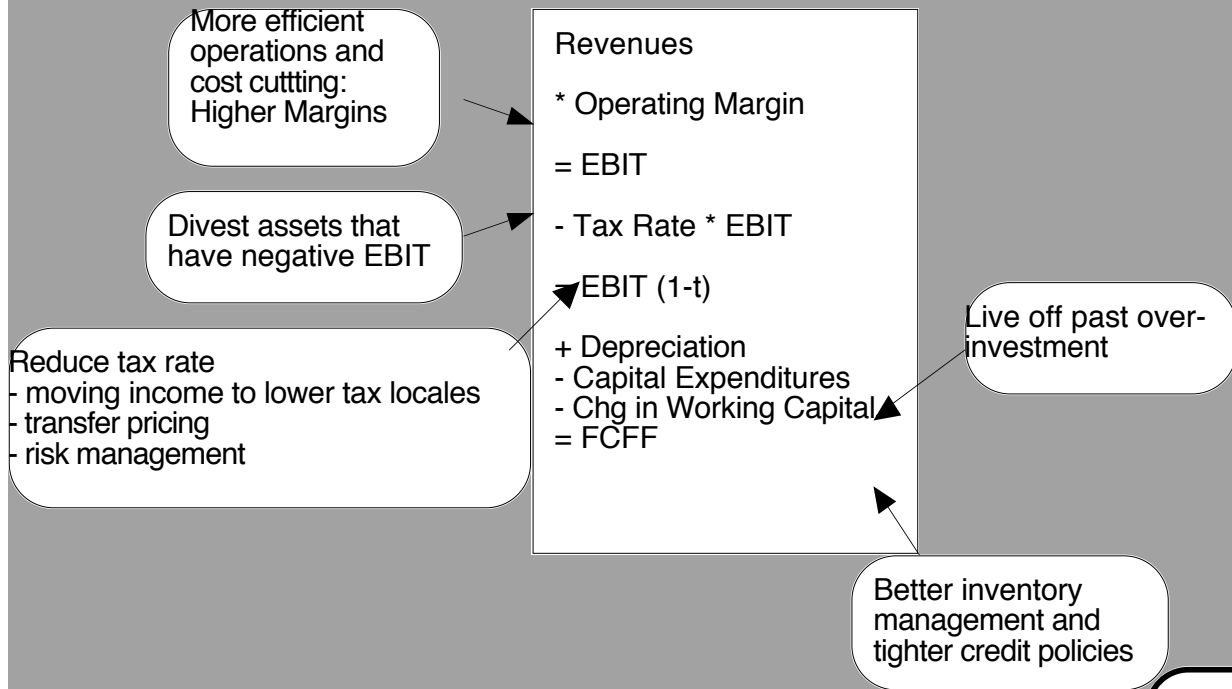
Value of Gaining Control = Present Value (Value of Company with change in control - Value of company without change in control) + Side Benefits of Control

Assessing the Probability of Control Change at Gerdau

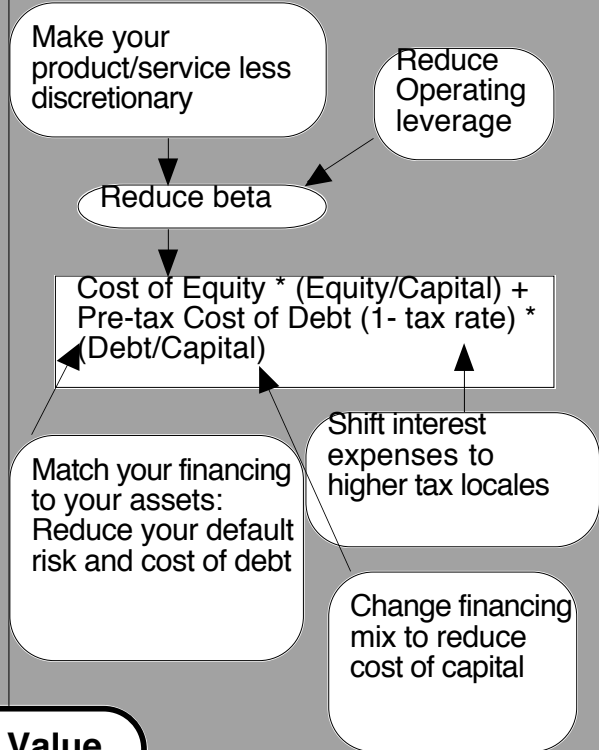
- On the minus side, the company has voting and non-voting shares and the Gerdau family is firmly in control of the firm (as attested to by their holding of the voting shares and their presence in top management and the board of directors).
- On the plus side, the non-voting shareholders have been provided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

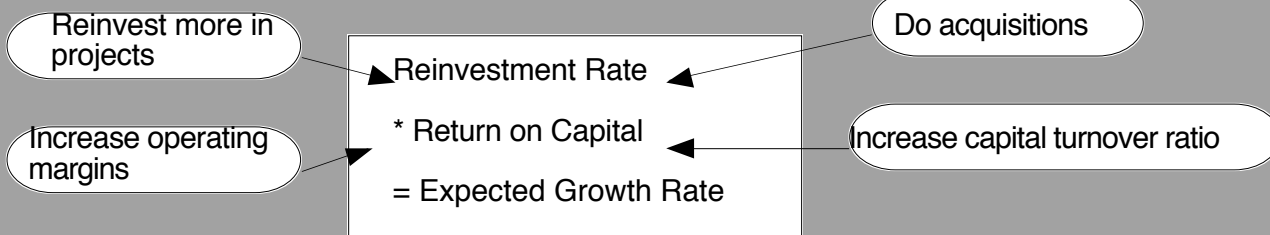


Reduce the cost of capital

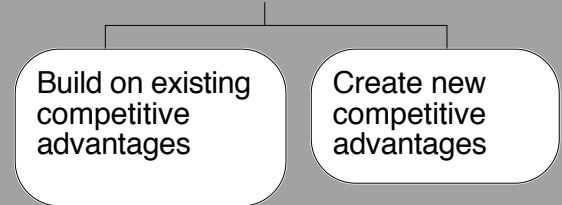


Firm Value

Increase Expected Growth



Increase length of growth period



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

Blockbuster: Status Quo

Current Cashflow to Firm

EBIT(1-t) : 163
 - Nt CpX 39
 - Chg WC 4
 = FCFF 120
 Reinvestment Rate = $43/163 = 26.46\%$

Reinvestment Rate
26.46%

Expected Growth
in EBIT (1-t)
 $.2645 * .0406 = .0107$
1.07%

Return on Capital
4.06%

Stable Growth
 $g = 3\%$; Beta = 1.00;
Cost of capital = 6.76%
ROC = 6.76%; Tax rate = 35%
Reinvestment Rate = 44.37%

Terminal Value₅ = $104 / (.0676 - .03) = 2714$

Op. Assets 2,472
 + Cash: 330
 - Debt 1847
 = Equity 955
 - Options 0
 Value/Share \$ 5.13

	1	2	3	4	5
EBIT (1-t)	\$165	\$167	\$169	\$173	\$178
- Reinvestment	\$44	\$44	\$51	\$64	\$79
FCFF	\$121	\$123	\$118	\$109	\$99

Term Yr
184
82
102

Discount at Cost of Capital (WACC) = $8.50\% (.486) + 3.97\% (0.514) = 6.17\%$

Cost of Equity
8.50%

Cost of Debt
 $(4.10\% + 2\%) (1 - .35)$
= 3.97%

Weights
E = 48.6% D = 51.4%

Riskfree Rate:
Riskfree rate = 4.10%

+

Beta
1.10

X

Risk Premium
4%

Unlevered Beta for
Sectors: 0.80

Firm's D/E
Ratio: 21.35%

Mature risk
premium
4%

Country
Equity Prem
0%

Blockbuster: Restructured

Current Cashflow to Firm

EBIT(1-t) :	249
- Nt CpX	39
- Chg WC	4
= FCFF	206
Reinvestment Rate = 43/249	=17.32%

Reinvestment Rate
17.32%

Expected Growth
in EBIT (1-t)
 $.1732 * .0620 = .0107$
1.07%

Return on Capital
6.20%

Stable Growth
g = 3%; Beta = 1.00;
Cost of capital = 6.76%
ROC = 6.76%; Tax rate = 35%
Reinvestment Rate = 44.37%

Terminal Value₅ = $156 / (.0676 - .03) = 4145$

Op. Assets	3,840
+ Cash:	330
- Debt	1847
= Equity	2323
- Options	0
Value/Share \$	12.47

	1	2	3	4	5
EBIT (1-t)	\$252	\$255	\$258	\$264	\$272
- Reinvestment	\$44	\$44	\$59	\$89	\$121
FCFF	\$208	\$211	\$200	\$176	\$151

Term Yr	280
	124
	156

Discount at Cost of Capital (WACC) = 8.50% (.486) + 3.97% (0.514) = 6.17%

Cost of Equity
8.50%

Cost of Debt
 $(4.10\% + 2\%)(1 - .35)$
= 3.97%

Weights
E = 48.6% D = 51.4%

Riskfree Rate:
Riskfree rate = 4.10%

+

Beta
1.10

X

Risk Premium
4%

Unlevered Beta for
Sectors: 0.80

Firm's D/E
Ratio: 21.35%

Mature risk
premium
4%

Country
Equity Prem
0%

Minority Discounts and Voting Shares

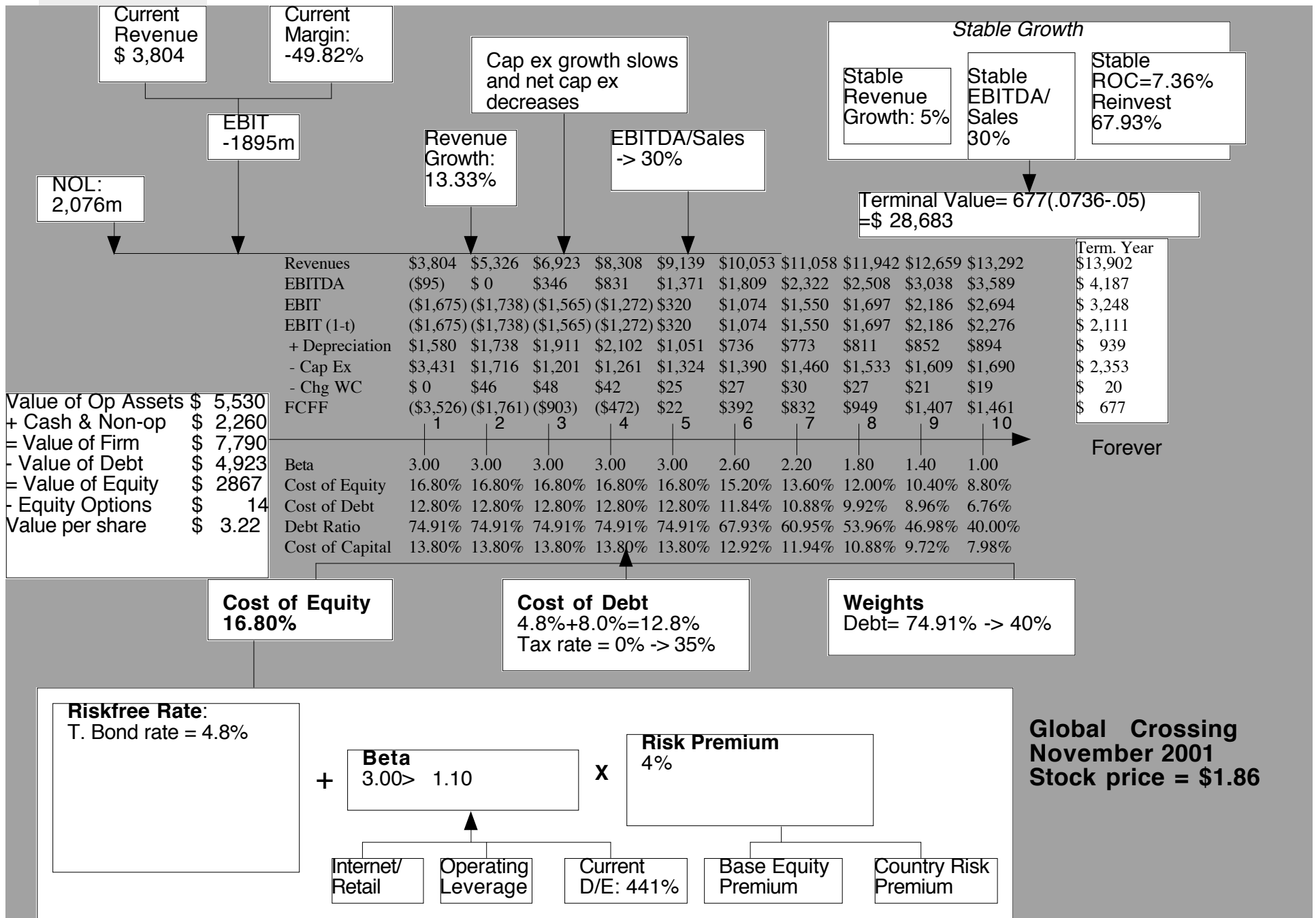
- Assume that a firm has a value of \$ 100 million run by incumbent managers and \$ 150 million run optimally.
- Proposition 1: The market price will reflect the expected value of control
 - The firm has 10 million voting shares outstanding.
 - Since the potential for changing management is created by 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.

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

- 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 than the value of a majority stake in the same business if control has value.

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.



Valuing Global Crossing with Distress

■ Probability of distress

- Price of 8 year, 12% bond issued by Global Crossing = \$ 653

$$653 = \sum_{t=1}^{t=8} \frac{120(1 - \pi_{Distress})^t}{(1.05)^t} + \frac{1000(1 - \pi_{Distress})^8}{(1.05)^8}$$

- Probability of distress = 13.53% a year
- 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 account 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.

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

- 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%):

$$\begin{aligned} \text{Spread} &= 0.145 - 0.0022 \ln(\text{Annual Revenues}) - 0.015 (\text{DERN}) - 0.016 (\text{Cash/Firm Value}) - 0.11 (\text{\$ Monthly trading volume/ Firm Value}) \\ &= 0.145 - 0.0022 \ln(5) - 0.015 (1) - 0.016 (.08) - 0.11 (0) = .1252\% \end{aligned}$$

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

Back to Lemmings...

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"Wait a minute. We're lemurs! Lemurs!"