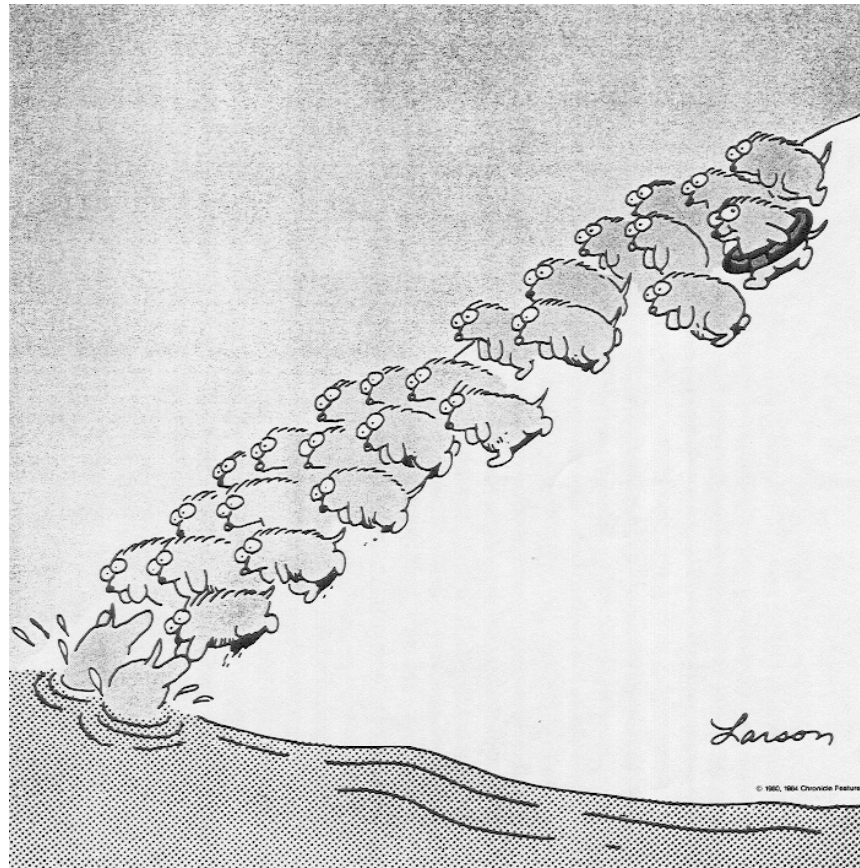# Valuation

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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 <u>life of the asset</u>

  • to estimate the <u>cash flows</u> during the life of the asset

  • to estimate the <u>discount rate</u> to apply to these cash flows to get present value

■ **Market Inefficiency**: Markets are assumed to make <u>mistakes</u> in pricing assets <u>across time</u>, and are assumed to correct themselves over time, as new information comes out about assets.

Valuing a Firm

- The value of the firm is obtained by discounting expected cashflows to the firm, i.e., the residual cashflows after meeting all operating expenses and taxes, but prior to debt payments, at the weighted average cost of capital, which is the cost of the different components of financing used by the firm, weighted by their market value proportions.
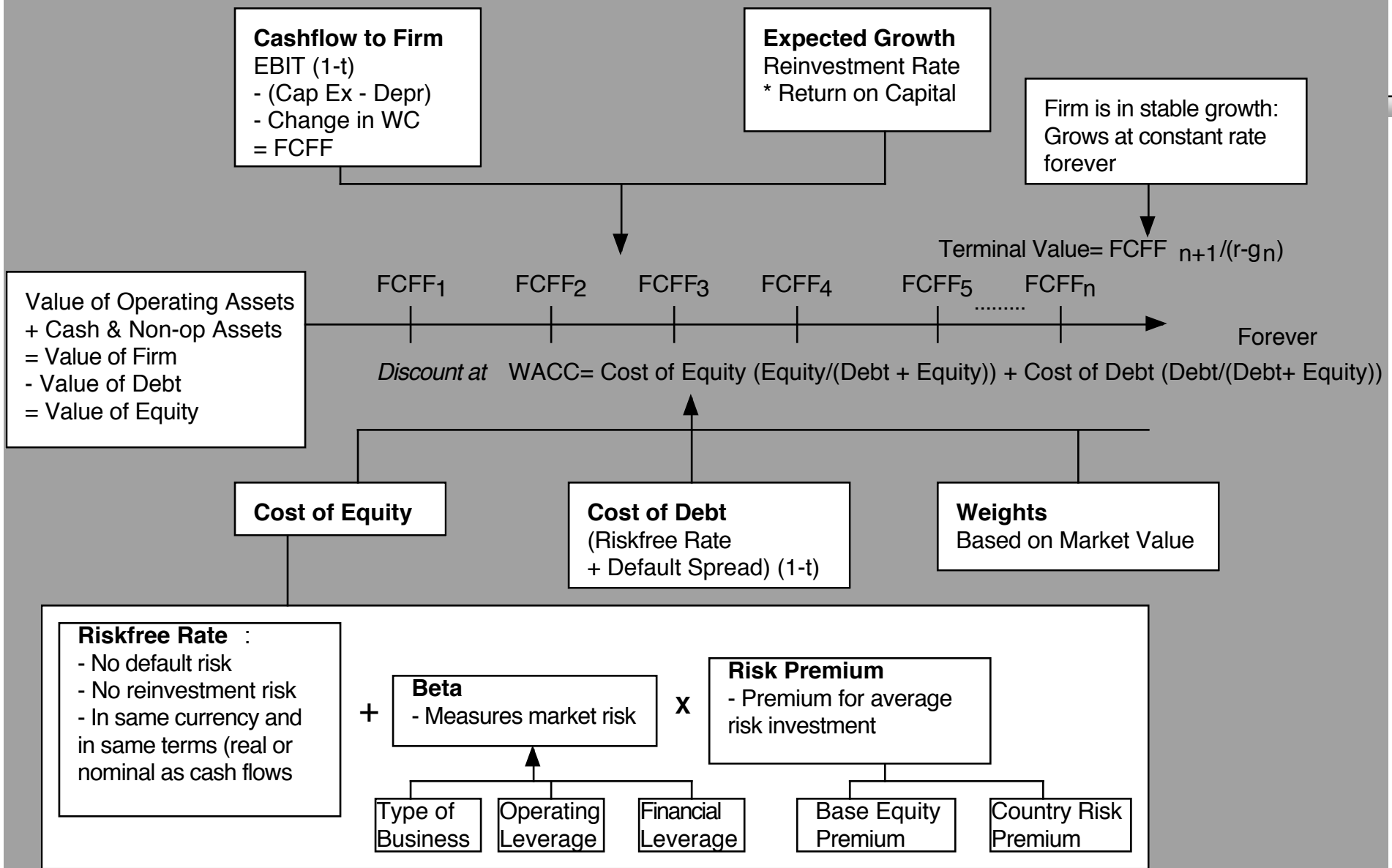
$$\text{Value of Firm} = \sum_{t=1}^{t=n} \frac{\text{CF to Firm}_t}{(1+\text{WACC})^t}$$

where,

$\quad$ CF to Firm$_t$ = Expected Cashflow to Firm in period t

$\quad$ WACC = Weighted Average Cost of Capital

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 |

Embraer: Status Quo ($)

Avg Reinvestment rate = 25.08%

Reinvestment Rate 25.08%

Return on Capital 21.85%

Current Cashflow to Firm
EBIT(1-t) : $ 404
- Nt CpX   23
- Chg WC   9
= FCFF $ 372
Reinvestment Rate = 32/404= 7.9%

Expected Growth in EBIT (1-t)
.2185*.2508=.0548
5.48%

Stable Growth
g = 4.17%; Beta = 1.00;
Country Premium= 5%
Cost of capital = 8.76%
ROC= 8.76%; Tax rate=34%
Reinvestment Rate=g/ROC
=4.17/8.76= 47.62%

Terminal Value$_5$= 288/(.0876-.0417) = 6272

$ Cashflows

Op. Assets $ 5,272
+ Cash: 795
- Debt   717
- Minor. Int.   12
=Equity   5,349
-Options   28
Value/Share $7.47
        R$ 21.75

Year	1	2	3	4	5	Term Yr
EBIT(1-t)	426	449	474	500	527	549
- Reinvestment	107	113	119	126	132	- 261
= FCFF	319	336	355	374	395	= 288

Discount at $ Cost of Capital (WACC) = 10.52% (.84) + 6.05% (0.16) = 9.81%

On October 6, 2003
Embraer Price = R$15.51

Cost of Equity 10.52%

Cost of Debt
(4.17%+1%+4%)(1-.34)
= 6.05%

Weights
E = 84% D = 16%

Riskfree Rate:
$ Riskfree Rate= 4.17%

+

Beta 1.07

X

Mature market premium 4 %

+

Lambda 0.27

X

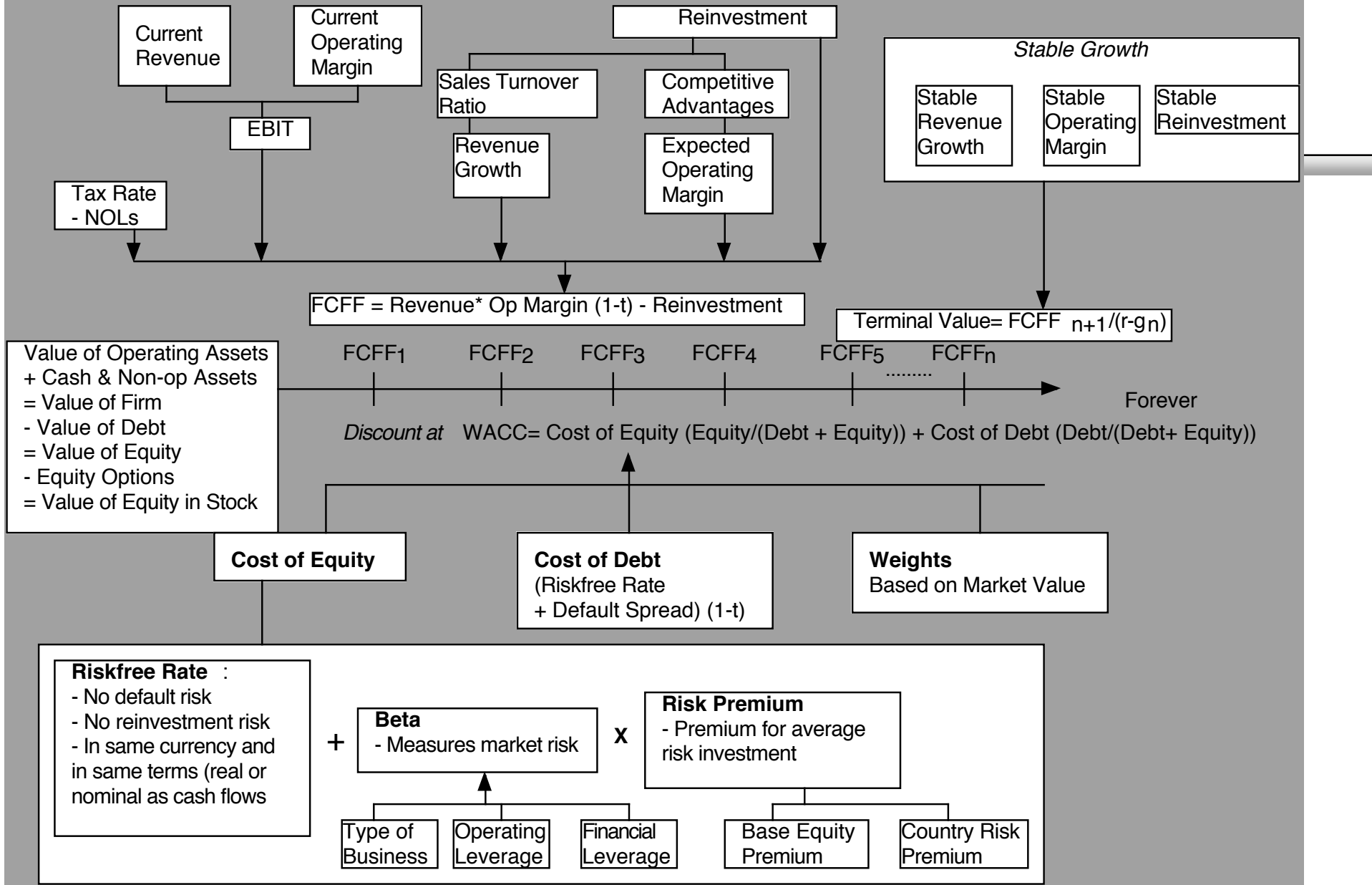Country Equity Risk Premium 7.67%
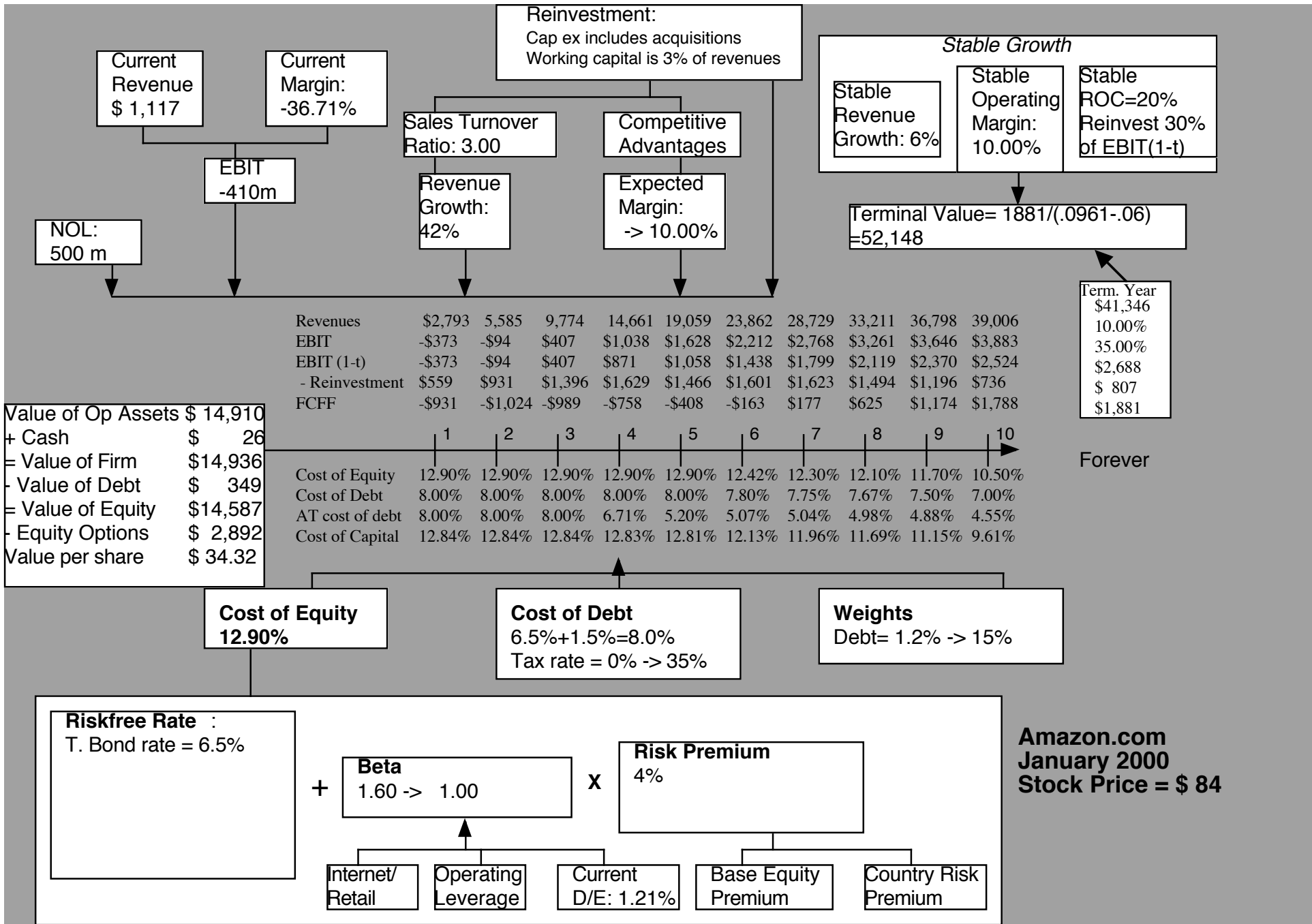
Unlevered Beta for Sectors: 0.95

Firm's D/E Ratio: 19%

Country Default Spread 6.01%

X

Rel Equity Mkt Vol 1.28

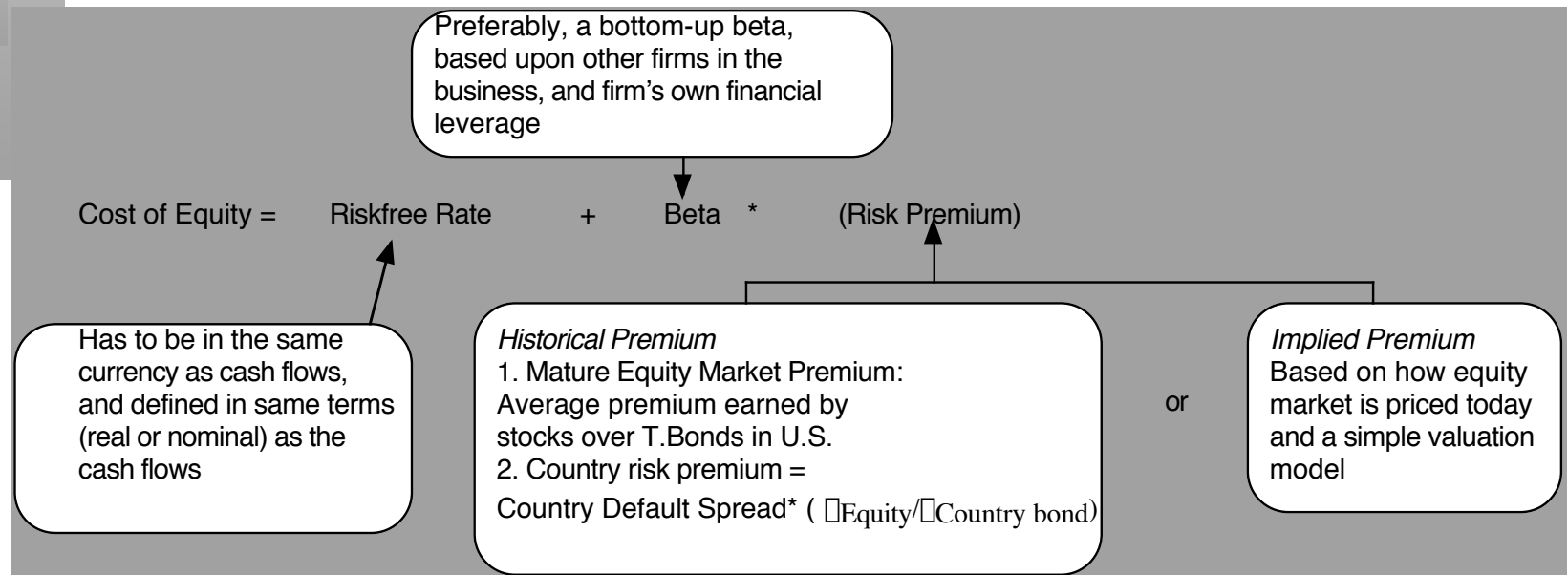# Discounted Cash Flow Valuation: High Growth with Negative Earnings

Current Revenue	Current Operating Margin		Reinvestment	

EBIT

Sales Turnover Ratio		Competitive Advantages

Revenue Growth		Expected Operating Margin

Tax Rate - NOLs

Stable Growth

Stable Revenue Growth	Stable Operating Margin	Stable Reinvestment

$$FCFF = Revenue * Op\ Margin\ (1-t) - Reinvestment$$

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
- Equity Options
= Value of Equity in Stock

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

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

Reinvestment:
Cap ex includes acquisitions
Working capital is 3% of revenues

Current Revenue $ 1,117

Current Margin: -36.71%

EBIT -410m

NOL: 500 m

Sales Turnover Ratio: 3.00

Revenue Growth: 42%

Competitive Advantages

Expected Margin: -> 10.00%

Stable Growth

Stable Revenue Growth: 6%

Stable Operating Margin: 10.00%

Stable ROC=20% Reinvest 30% of EBIT(1-t)

Terminal Value= 1881/(.0961-.06) =52,148

	1	2	3	4	5	6	7	8	9	10	Term. Year
Revenues	$2,793	5,585	9,774	14,661	19,059	23,862	28,729	33,211	36,798	39,006	$41,346
EBIT	-$373	-$94	$407	$1,038	$1,628	$2,212	$2,768	$3,261	$3,646	$3,883	10.00%
EBIT (1-t)	-$373	-$94	$407	$871	$1,058	$1,438	$1,799	$2,119	$2,370	$2,524	35.00%
- Reinvestment	$559	$931	$1,396	$1,629	$1,466	$1,601	$1,623	$1,494	$1,196	$736	$2,688
FCFF	-$931	-$1,024	-$989	-$758	-$408	-$163	$177	$625	$1,174	$1,788	$ 807
											$1,881

	1	2	3	4	5	6	7	8	9	10	
Cost of Equity	12.90%	12.90%	12.90%	12.90%	12.90%	12.42%	12.30%	12.10%	11.70%	10.50%	Forever
Cost of Debt	8.00%	8.00%	8.00%	8.00%	8.00%	7.80%	7.75%	7.67%	7.50%	7.00%	
AT cost of debt	8.00%	8.00%	8.00%	6.71%	5.20%	5.07%	5.04%	4.98%	4.88%	4.55%	
Cost of Capital	12.84%	12.84%	12.84%	12.83%	12.81%	12.13%	11.96%	11.69%	11.15%	9.61%	

Value of Op Assets	$ 14,910
+ Cash	$ 26
= Value of Firm	$14,936
- Value of Debt	$ 349
= Value of Equity	$14,587
- Equity Options	$ 2,892
Value per share	$ 34.32

Cost of Equity 12.90%

Cost of Debt 6.5%+1.5%=8.0% Tax rate = 0% -> 35%

Weights Debt= 1.2% -> 15%

Riskfree Rate : T. Bond rate = 6.5%

+

Beta 1.60 -> 1.00

X

Risk Premium 4%

Internet/ Retail

Operating Leverage

Current D/E: 1.21%

Base Equity Premium

Country Risk Premium

Amazon.com January 2000 Stock Price = $ 84

Choosing a Currency for the Valuation

- Any company can be valued in any currency, as long as you maintain internal consistency by:
  - Using the same currency for cashflows, growth rate and discount rate estimates
  - Being consistent in inflation assumptions when estimating growth rates, discount rates and expected future exchange rates.
- The currency you choose to value a company in is therefore driven by pragmatic concerns. In other words, in which currency will the estimates of the cashflows and discount rates be easiest to make.
- For Embraer, which derives almost all of its cashflows from dollar sources and has almost all dollar denominated debt, both cashflows and discount rates are easier to estimate in US dollars.

I. Discount Rates:Cost of Equity

Preferably, a bottom-up beta, based upon other firms in the business, and firm's own financial leverage

Cost of Equity =   Riskfree Rate   +   Beta   *   (Risk Premium)

Has to be in the same currency as cash flows, and defined in same terms (real or nominal) as the cash flows

Historical Premium
1. Mature Equity Market Premium: Average premium earned by stocks over T.Bonds in U.S.
2. Country risk premium =
Country Default Spread* ($\sigma_{Equity}/\sigma_{Country\ bond}$)

or

Implied Premium
Based on how equity market is priced today and a simple valuation model

A Simple Test

■ You are valuing Embraer in U.S. dollars and are attempting to estimate a risk free rate to use in the analysis. The risk free rate that you should use is

❏ The interest rate on a nominal real denominated Brazilian government bond

❏ The interest rate on an inflation-indexed Brazilian government bond

❏ The interest rate on a dollar denominated Brazilian government bond (10.18%)

❏ The interest rate on a U.S. treasury bond (4.17%)

Everyone uses historical premiums, but..

■ The historical premium is the premium that stocks have historically earned over riskless securities.

■ Practitioners never seem to agree on the premium; it is sensitive to
  - How far back you go in history…
  - Whether you use T.bill rates or T.Bond rates
  - Whether you use geometric or arithmetic averages.

■ For instance, looking at the US:

	Arithmetic average		Geometric Average	
	Stocks -	Stocks -	Stocks -	Stocks -
Historical Period	T.Bills	T.Bonds	T.Bills	T.Bonds
1928-2002	7.67%	6.25%	5.73%	4.53%
1962-2002	5.17%	3.66%	3.90%	2.76%
1992-2002	6.32%	2.15%	4.69%	0.95%

Two Ways of Estimating Country Risk Premiums…

- *Default spread on Country Bond*: In this approach, the country risk premium is based upon the default spread of the bond issued by the country (but only if it is denominated in a currency where a default free entity exists.
  - Brazil was rated B2 by Moody's and the default spread on the Brazilian dollar denominated C.Bond at the end of September 2003 was 6.01%. (10.18%-4.17%)
- *Relative Equity Market approach*: The country risk premium is based upon the volatility of the market in question relative to U.S market.

  Country risk premium = Risk Premium$_{US}$* $\sigma_{Country\ Equity}$ / $\sigma_{US\ Equity}$

  Using a 4.53% premium for the US, this approach would yield:

  Total risk premium for Brazil = 4.53% (33.37%/18.59%) = 8.13%

  Country risk premium for Brazil = 8.13% - 4.53% = 3.60%

  (The standard deviation in weekly returns from 2001 to 2003 for the Bovespa was 33.37% whereas the standard deviation in the S&P 500 was 18.59%)

And a third approach

■ 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. In this approach:

- Country risk premium = Default spread on country bond* $\sigma_{\text{Country Equity}}$ / $\sigma_{\text{Country Bond}}$
    - Standard Deviation in Bovespa (Equity) = 33.37%
    - Standard Deviation in Brazil C-Bond = 26.15%
    - Default spread on C-Bond = 6.01%

- Country Risk Premium for Brazil = 6.01% (33.37%/26.15%) = 7.67%%

From Country Spreads to Corporate Risk premiums

- Approach 1: Assume that every company in the country is equally exposed to country risk. In this case,

    E(Return) = Riskfree Rate + Country Spread + Beta (US premium)

    Implicitly, this is what you are assuming when you use the local Government's dollar borrowing rate as your riskfree rate.

- Approach 2: Assume that a company's exposure to country risk is similar to its exposure to other market risk.

    E(Return) = Riskfree Rate + Beta (US premium + Country Spread)

- Approach 3: Treat country risk as a separate risk factor and allow firms to have different exposures to country risk (perhaps based upon the proportion of their revenues come from non-domestic sales)

    E(Return)=Riskfree Rate+ β (US premium) + λ (Country Spread)

Estimating Company Exposure to Country Risk: Determinants

■ <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.

Estimating Lambdas: The Revenue Approach

- 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

Estimating Lambdas: Earnings Approach

Figure 2: EPS changes versus Country Risk: Embraer and Embratel
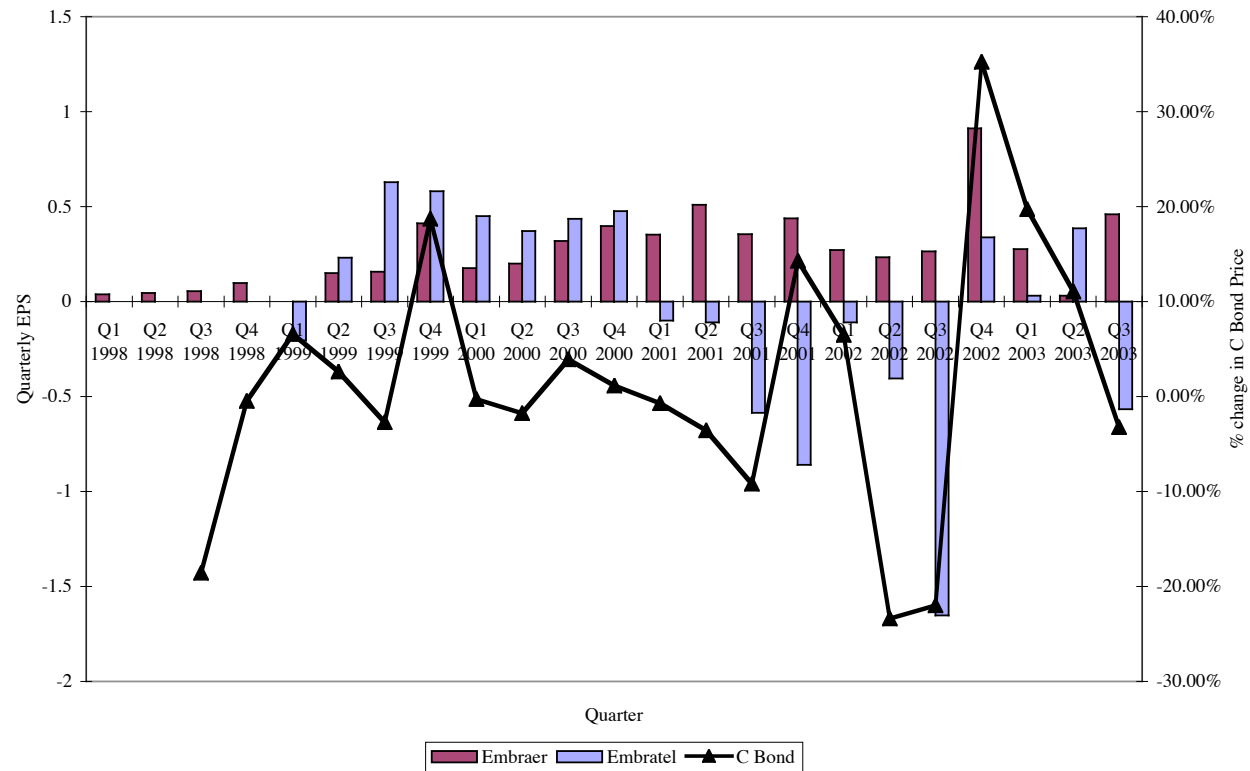
Estimating Lambdas: Stock Returns versus C-Bond Returns

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

Embraer versus C Bond: 2000-2003

Embratel versus C Bond: 2000-2003
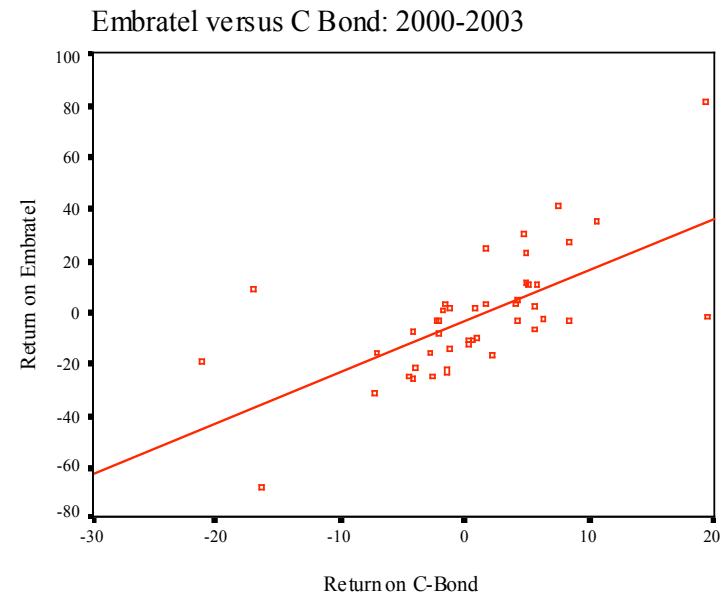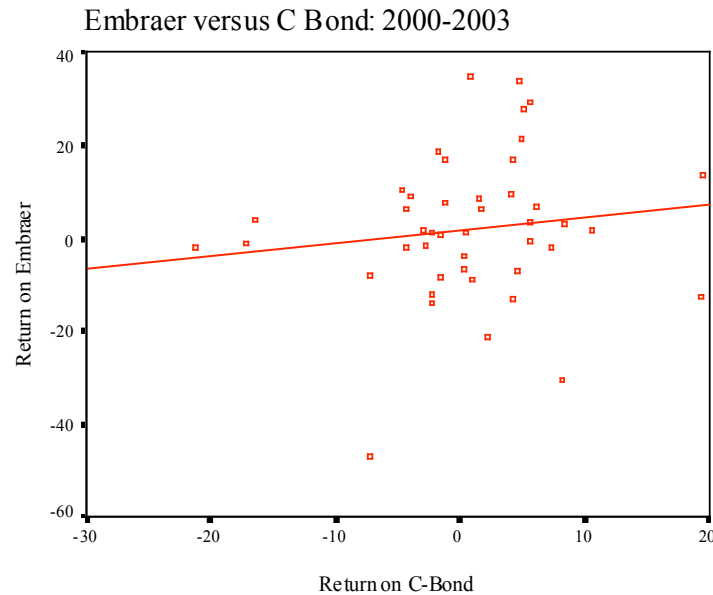
Estimating a US Dollar Cost of Equity for Embraer

■ Assume that the beta for Embraer is 1.07, and that the riskfree rate used is 4.17%. Also assume that the risk premium for the US is 4.53% and the country risk premium for Brazil is 7.67%.

■ Approach 1: Assume that every company in the country is equally exposed to country risk. In this case,

E(Return) = 4.17% + 1.07 (4.53%) + 7.67% = 16.69%

■ Approach 2: Assume that a company's exposure to country risk is similar to its exposure to other market risk.

E(Return) = 4.17 % + 1.07 (4.53%+ 7.67%) = 17.22%

■ Approach 3: Treat country risk as a separate risk factor and allow firms to have different exposures to country risk (perhaps based upon the proportion of their revenues come from non-domestic sales)

E(Return)= 4.17% + 1.07(4.53%) + 0.27 (7.67%) = 11.09%

Implied Equity Risk Premiums

■ An implied equity risk premium is a forward looking estimate, based upon how stocks are priced today and expected cashflows in the future.

■ On January 1, 2003, the S&P was trading at 879.82.

- Treasury bond rate = 3.81%
- Expected Growth rate in earnings (next 5 years) = 8% (Consensus estimate for S&P 500 earnings)
- Expected growth rate after year 5 = 3.81%
- Dividends + stock buybacks = 3.29% of index (in latest year)

	Year 1	Year 2	Year 3	Year 4	Year 5
Expected Dividends =	$31.25	$33.75	$36.45	$39.37	$42.52

+ Stock Buybacks

Expected dividends + buybacks in year 6 = 42.52 (1.0381) = $ 44.14

$879.82 = 31.25/(1+r) + 33.75/(1+r)^2 + 36.45/(1+r)^3 + 39.37/(1+r)^4 + (42.52+(44.14/(r-.0381)))/(1+r)^5$

Solving for r, r = 7.91%. (Only way to do this is trial and error)

Implied risk premium = 7.91% - 3.81% = 4.10%

U.S. Equity Risk Premiums - 1960 - 2002

Implied Premium for US Equity Market
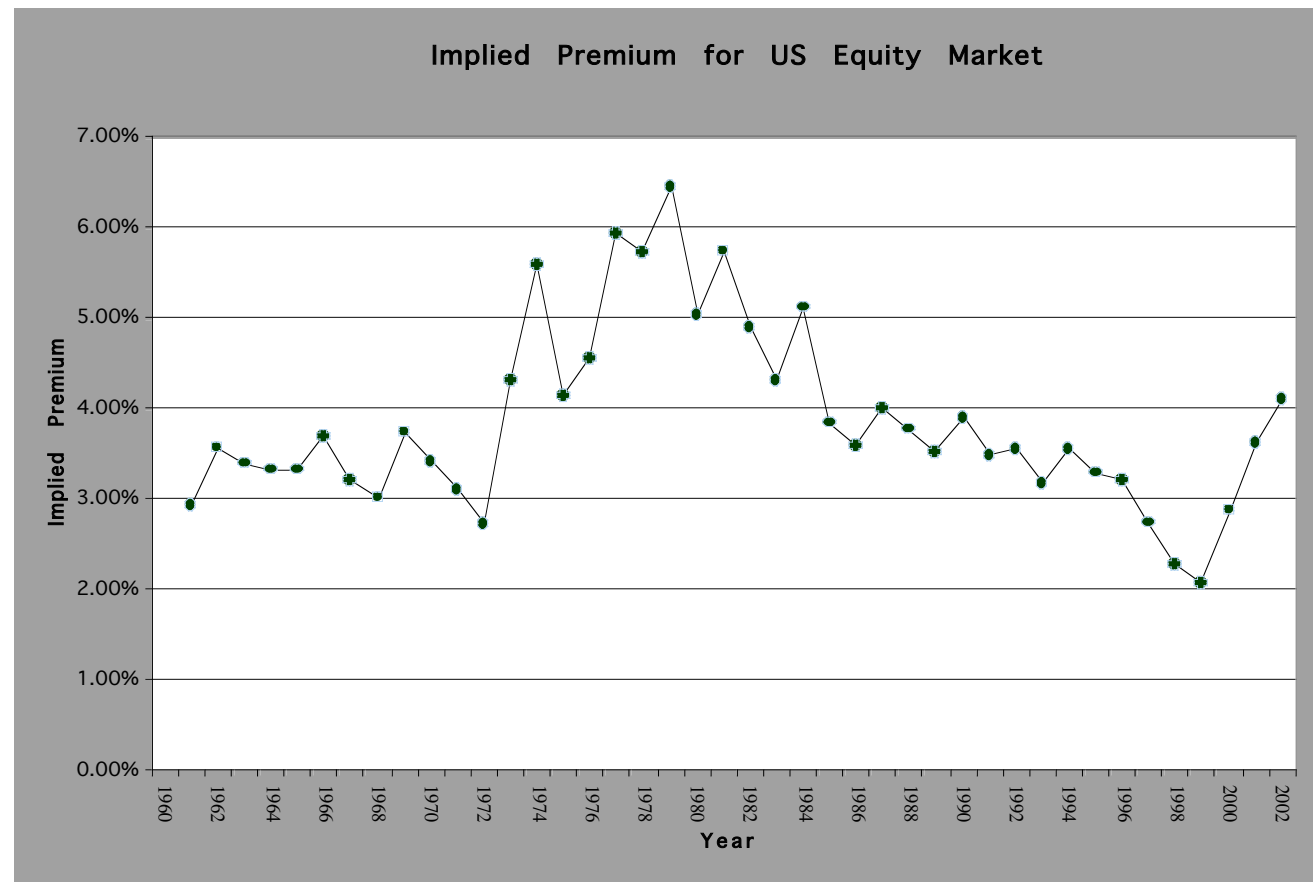
Monthly Premiums: 2000 - 2002

Implied Equity Risk Premiums: Monthly - January 2000 to January 2003
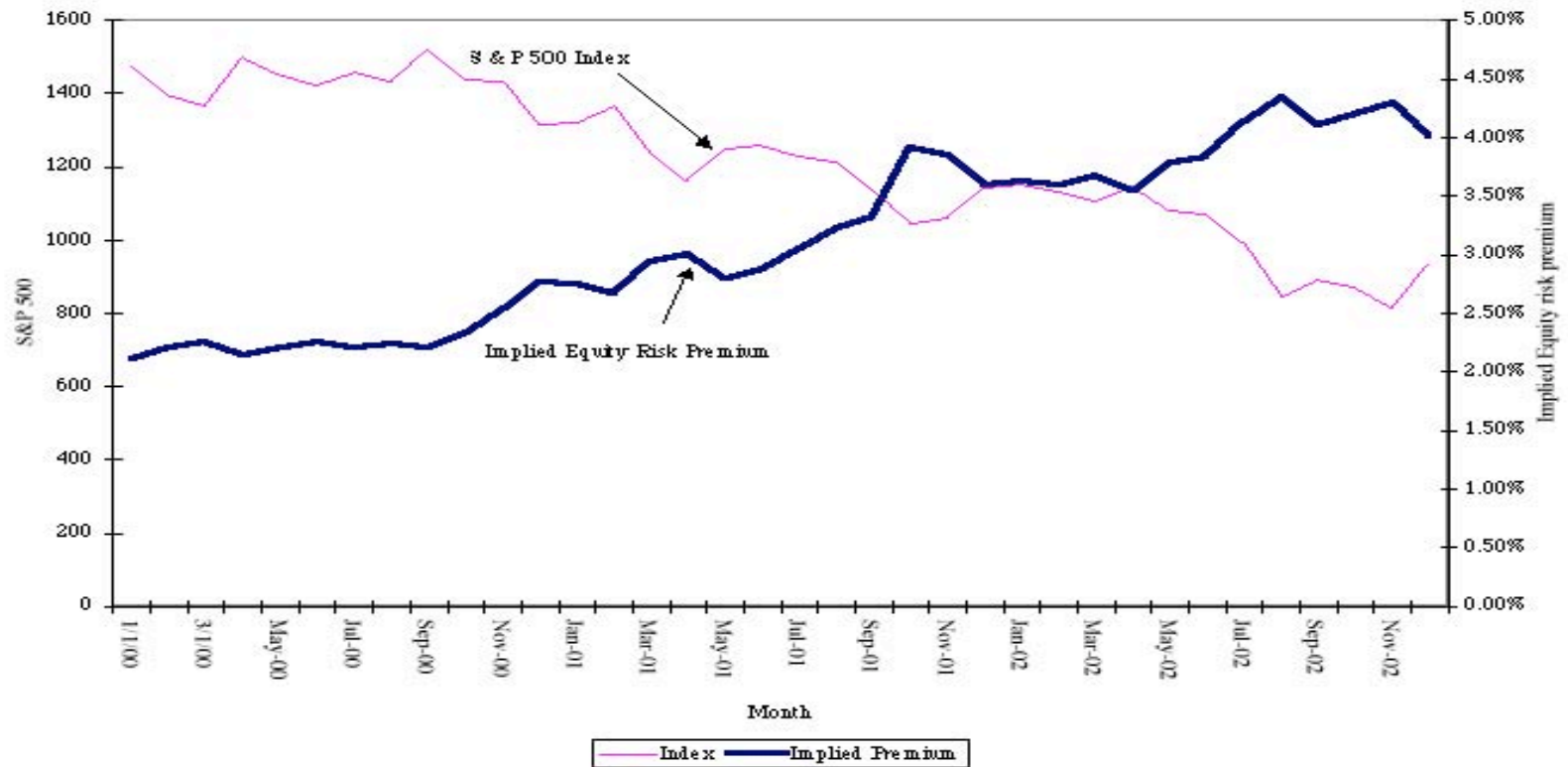
An Intermediate Solution

■ The historical risk premium of 4.53% for the United States is too high a premium to use in valuation. It is much higher than the actual implied equity risk premium in the market

■ The current implied equity risk premium requires us to assume that the market is correctly priced today. (If I were required to be market neutral, this is the premium I would use)

■ The average implied equity risk premium between 1960-2001 in the United States is about 4%. We will use this as the premium for a mature equity market.

Implied Premium for Brazil: September 2003

- Level of the Index = 16889
- Dividends on the Index = 4.55% of 16889
- Other parameters (all in US dollars)
  - Riskfree Rate = 4.17%
  - Expected Growth (in dollars)
    - Next 5 years = 15% (Used expected growth rate in Earnings)
    - After year 5 = 5%
- Solving for the expected return:
  - Expected return on Equity = 12.17%
  - Implied Equity premium = 12.17% - 4.17% = 8.00%
  - Implied Equity premium for US on same day = 3.79%
  - Implied country premium for Brazil = 4.21%

Estimating Beta

■ The standard procedure for estimating betas is to regress stock returns (R_j) against market returns (R_m) -

$$R_j = a + b \, R_m$$

  • where a is the intercept and b is the slope of the regression.

■ The slope of the regression corresponds to the beta of the stock, and measures the riskiness of the stock.

■ This beta has three problems:

  • It has high standard error

  • It reflects the firm's business mix over the period of the regression, not the current mix

  • It reflects the firm's average financial leverage over the period rather than the current leverage.

Beta Estimation: Amazon
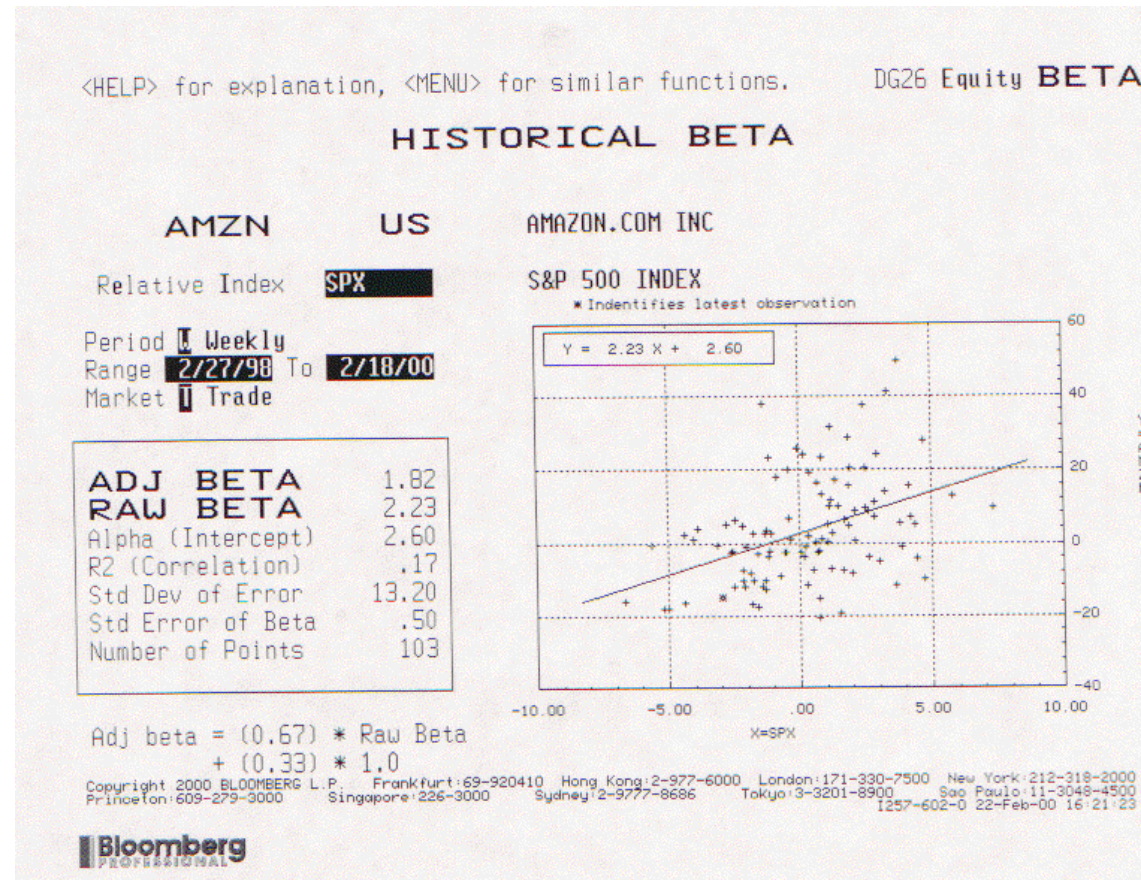
Beta Estimation for Embraer: The Index Effect
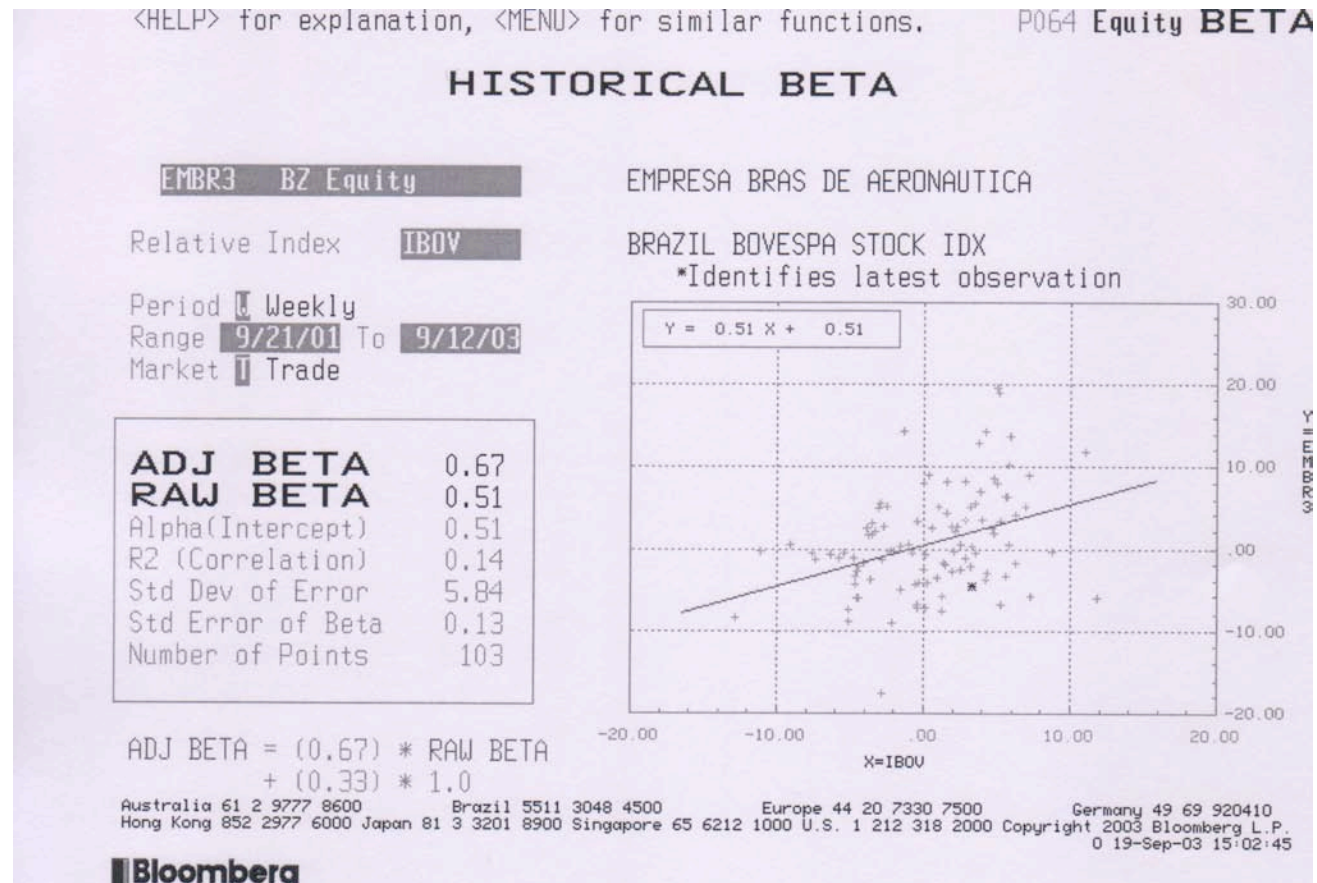
Determinants of Betas

■ **Product or Service**: The beta value for a firm depends upon the sensitivity of the demand for its products and services and of its costs to macroeconomic factors that affect the overall market.

- Cyclical companies have higher betas than non-cyclical firms
- Firms which sell more discretionary products will have higher betas than firms that sell less discretionary products

■ **Operating Leverage**: The greater the proportion of fixed costs in the cost structure of a business, the higher the beta will be of that business. Higher fixed costs increase your exposure to all risk, including market risk.

■ **Financial Leverage**: The more debt a firm takes on, the higher the beta will be of the equity in that business. Debt creates a fixed cost, interest expenses, that increases exposure to market risk. The beta of equity alone can be written as a function of the unlevered beta and the debt-equity ratio

$$\beta_L = \beta_u \, (1 + ((1-t)D/E)$$

β_L = Levered or Equity Beta $\qquad\qquad$ β_u = Unlevered Beta

t = Corporate marginal tax rate $\qquad\qquad$ D = Market Value of Debt

E = Market Value of Equity

The Solution: Bottom-up Betas

■ The bottom up beta can be estimated by :

- Taking a weighted (by sales or operating income) average of the unlevered betas of the different businesses a firm is in.

$$\sum_{j=1}^{j=k} \beta_j \left[\frac{\text{Operating Income }_j}{\text{Operating Income }_{\text{Firm}}} \right]$$

  (The unlevered beta of a business can be estimated by looking at other firms in the same business)

- Lever up using the firm's debt/equity ratio

$$\beta_{\text{levered}} = \beta_{\text{unlevered}} \left[1 + (1 - \text{tax rate}) (\text{Current Debt/Equity Ratio}) \right]$$

■ The bottom up beta will give you a better estimate of the true beta when

- It has lower standard error ($\text{SE}_{\text{average}} = \text{SE}_{\text{firm}} / \sqrt{n}$ (n = number of firms)
- It reflects the firm's current business mix and financial leverage
- It can be estimated for divisions and private firms.

Embraer's Bottom-up Beta

Business	Unlevered	D/E Ratio	Levered beta	Proportion of Value
Aerospace	.95	18.95%	0.90	100%

Levered Beta = Unlevered Beta (1 + (1- tax rate) (D/E Ratio)

= 0.95 (1 + (1-.34) (.1895)) = 1.07

A Hypothetical scenario: Assume that Embraer had been in two businesses- aerospace and transportation. You could estimate a beta for the combined firm as follows

Comparable firms

Business	Revenues	Value/Sales	Unlevered beta	Value	Weight	Weight*Beta
Aerospace	6000	1.50	0.95	9000	60%	.60*.95
Transport	2000	3.00	0.80	6000	40%	.40*.80
Firm						=0.89

Gross Debt versus Net Debt Approaches

- Net Debt Ratio for Embraer = (Debt - Cash)/ Market value of Equity

$$= (1953\text{-}2320)/ 11{,}042 = \text{-}3.32\%$$

- Levered Beta for Embraer = $0.95 (1 + (1\text{-}.34) (\text{-}.0332)) = 0.93$

- The cost of Equity using net debt levered beta for Embraer will be much lower than with the gross debt approach. The cost of capital for Embraer, though, will even out since the debt ratio used in the cost of capital equation will now be a net debt ratio rather than a gross debt ratio.
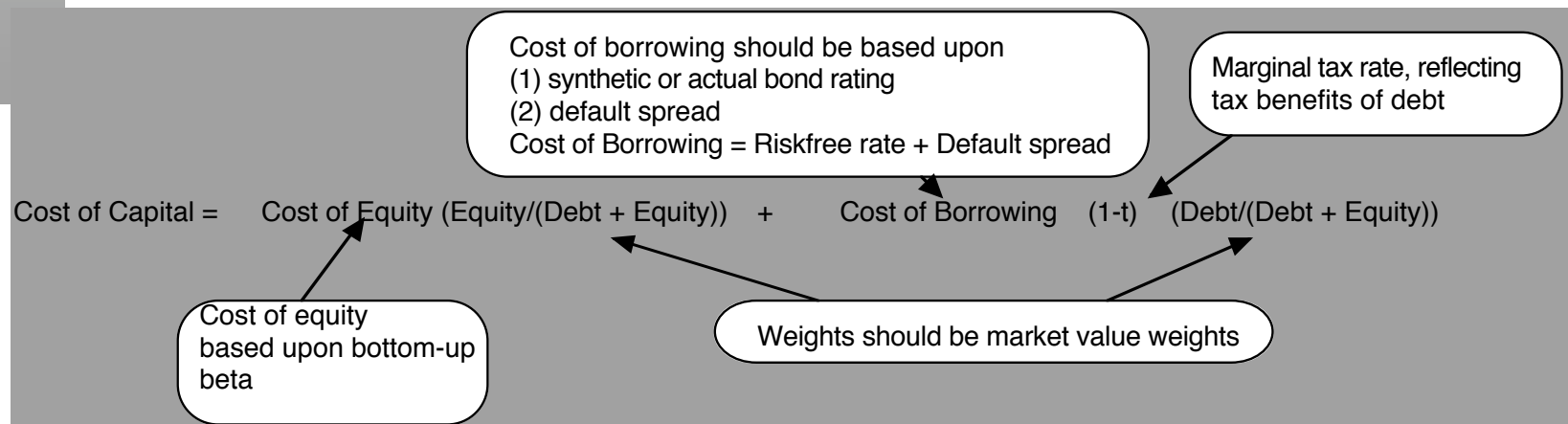
Amazon's Bottom-up Beta

Unlevered beta for firms in internet retailing =   1.60

Unlevered beta for firms in specialty retailing =   1.00

- ■ Amazon is a specialty retailer, but its risk currently seems to be determined by the fact that it is an online retailer. Hence we will use the beta of internet companies to begin the valuation

- ■ By the fifth year, we are estimating substantial revenues for Amazon and we move the beta towards to beta of the retailing business.

From Cost of Equity to Cost of Capital

Cost of borrowing should be based upon
(1) synthetic or actual bond rating
(2) default spread
Cost of Borrowing = Riskfree rate + Default spread

Marginal tax rate, reflecting tax benefits of debt

Cost of Capital =   Cost of Equity (Equity/(Debt + Equity))   +   Cost of Borrowing   (1-t)   (Debt/(Debt + Equity))

Cost of equity based upon bottom-up beta

Weights should be market value weights

Estimating Synthetic Ratings

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

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

■ For Embraer's interest coverage ratio, we used the interest expenses and EBIT from 2002.

$$\text{Interest Coverage Ratio} = 2166/ 222 = 9.74$$

■ Amazon.com has negative operating income; this yields a negative interest coverage ratio, which should suggest a low rating. We computed an average interest coverage ratio of 2.82 over the next 5 years.

Interest Coverage Ratios, Ratings and Default Spreads

If Interest Coverage Ratio is		Estimated Bond Rating	Default Spread(1/00)	Default Spread(1/03)
> 8.50	(>12.50)	AAA	0.20%	0.75%
6.50 - 8.50	(9.5-12.5)	AA	0.50%	1.00%
5.50 - 6.50	(7.5-9.5)	A+	0.80%	1.50%
4.25 - 5.50	(6-7.5)	A	1.00%	1.80%
3.00 - 4.25	(4.5-6)	A–	1.25%	2.00%
2.50 - 3.00	(3.5-4.5)	BBB	1.50%	2.25%
2.00 - 2.50	((3-3.5)	BB	2.00%	3.50%
1.75 - 2.00	(2.5-3)	B+	2.50%	4.75%
1.50 - 1.75	(2-2.5)	B	3.25%	6.50%
1.25 - 1.50	(1.5-2)	B –	4.25%	8.00%
0.80 - 1.25	(1.25-1.5)	CCC	5.00%	10.00%
0.65 - 0.80	(0.8-1.25)	CC	6.00%	11.50%
0.20 - 0.65	(0.5-0.8)	C	7.50%	12.70%
< 0.20	(<0.5)	D	10.00%	15.00%

For Embraer, I used the interest coverage ratio table for smaller/riskier firms (the numbers in brackets) which yields a lower rating for the same interest coverage ratio.

Estimating the cost of debt for a firm

■ The synthetic rating for Embraer is AA. Using the 2003 default spread of 1.00%, we estimate a cost of debt of 9.17% (using a riskfree rate of 4.17% and adding in two thirds of the country default spread of 6.01%):

Cost of debt = Riskfree rate + 2/3(Brazil country default spread) + Company default spread

$$=4.17\% + 4.00\% + 1.00\% = 9.17\%$$

■ The synthetic rating for Amazon.com in 2000 was BBB. The default spread for BBB rated bond was 1.50% in 2000 and the treasury bond rate was 6.5%.

Pre-tax cost of debt = Riskfree Rate + Default spread

$$= 6.50\% + 1.50\% = 8.00\%$$

■ The firm is paying no taxes currently. As the firm's tax rate changes and its cost of debt changes, the after tax cost of debt will change as well.

	1	2	3	4	5	6	7	8	9	10
Pre-tax	8.00%	8.00%	8.00%	8.00%	8.00%	7.80%	7.75%	7.67%	7.50%	7.00%
Tax rate	0%	0%	0%	16.13%	35%	35%	35%	35%	35%	35%
After-tax	8.00%	8.00%	8.00%	6.71%	5.20%	5.07%	5.04%	4.98%	4.88%	4.55%

Weights for the Cost of Capital Computation

■ The weights used to compute the cost of capital should be the market value weights for debt and equity.

■ There is an element of circularity that is introduced into every valuation by doing this, since the values that we attach to the firm and equity at the end of the analysis are different from the values we gave them at the beginning.

■ As a general rule, the debt that you should subtract from firm value to arrive at the value of equity should be the same debt that you used to compute the cost of capital.

Estimating Cost of Capital: Amazon.com

- ■ Equity
  - Cost of Equity = 6.50% + 1.60 (4.00%) = 12.90%
  - Market Value of Equity = $ 84/share* 340.79 mil shs = $ 28,626 mil (98.8%)
- ■ Debt
  - Cost of debt = 6.50% + 1.50% (default spread) = 8.00%
  - Market Value of Debt = $ 349 mil (1.2%)
- ■ Cost of Capital

  Cost of Capital = 12.9 % (.988) + 8.00% (1- 0) (.012)) = 12.84%

Estimating Cost of Capital: Embraer

- **Equity**
  - Cost of Equity = 4.17% + 1.07 (4%) + 0.27 (7.67%) = 10.52%
  - Market Value of Equity =11,042 million BR ($ 3,781 million)
- **Debt**
  - Cost of debt = 4.17% + 4.00% +1.00%= 9.17%
  - Market Value of Debt = 2,093 million BR ($717 million)
- **Cost of Capital**

  Cost of Capital = 10.52 % (.84) + 9.17% (1- .34) (0.16)) = 9.81%

The book value of equity at Embraer is 3,350 million BR.

The book value of debt at Embraer is 1,953 million BR; Interest expense is 222 mil; Average maturity of debt = 4 years
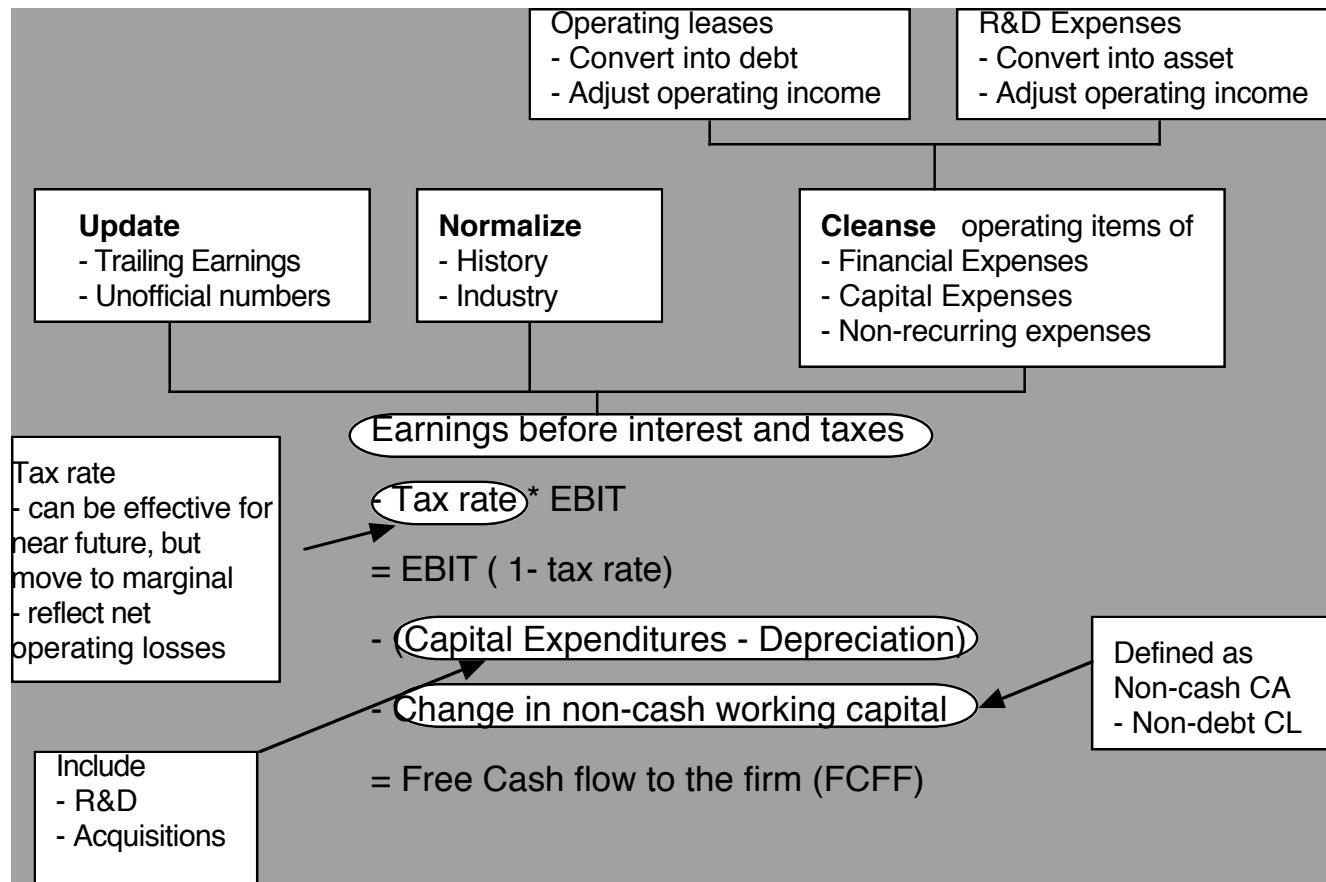
Estimated market value of debt = 222 million (PV of annuity, 4 years, 9.17%) + $361 million/$1.0591^4$ = 2,093 million BR

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

■ Approach 1: Use a BR riskfree rate in all of the calculations above. For instance, if the BR riskfree rate was 12%, the cost of capital would be computed as follows:

- Cost of Equity = 12% + 1.07(4%) + 0.27 (7.67%) = 18.35%
- Cost of Debt = 12% + 1% = 13%
- (This assumes the riskfree rate has no country risk premium embedded in it.)

■ Approach 2: Use the differential inflation rate to estimate the cost of capital. For instance, if the inflation rate in BR is 8% and the inflation rate in the U.S. is 2%

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

$$= 1.0981 \,(1.08/1.02)\text{-}1 \quad = 1627. \text{ or } 16.27\%$$

II. Estimating Cash Flows to Firm

| | Operating leases
- Convert into debt
- Adjust operating income | R&D Expenses
- Convert into asset
- Adjust operating income |

Update
- Trailing Earnings
- Unofficial numbers

Normalize
- History
- Industry

Cleanse   operating items of
- Financial Expenses
- Capital Expenses
- Non-recurring expenses

Earnings before interest and taxes

Tax rate
- can be effective for near future, but move to marginal
- reflect net operating losses

- Tax rate * EBIT

= EBIT (1- tax rate)

- (Capital Expenditures - Depreciation)

- Change in non-cash working capital

Defined as
Non-cash CA
- Non-debt CL

Include
- R&D
- Acquisitions

= Free Cash flow to the firm (FCFF)

The Importance of Updating

■ The operating income and revenue that we use in valuation should be updated numbers. One of the problems with using financial statements is that they are dated.

■ As a general rule, it is better to use 12-month trailing estimates for earnings and revenues than numbers for the most recent financial year. This rule becomes even more critical when valuing companies that are evolving and growing rapidly.

	Last 10-K	*Trailing 12-month*
Revenues	$ 610 million	$1,117 million
EBIT	- $125 million	- $ 410 million

Normalizing Earnings: Amazon

Year	Revenues	Operating Margin	EBIT	
Tr12m	$1,117	-36.71%	-$410	
1	$2,793	-13.35%	-$373	
2	$5,585	-1.68%	-$94	
3	$9,774	4.16%	$407	
4	$14,661	7.08%	$1,038	
5	$19,059	8.54%	$1,628	
6	$23,862	9.27%	$2,212	
7	$28,729	9.64%	$2,768	
8	$33,211	9.82%	$3,261	
9	$36,798	9.91%	$3,646	
10	$39,006	9.95%	$3,883	
TY(11)	$41,346	**10.00%**	$4,135	Industry Average

Operating Leases at The Home Depot in 1998

■ The pre-tax cost of debt at the Home Depot is 6.25%

Yr	Operating Lease Expense		Present Value	
1	$	294	$	277
2	$	291	$	258
3	$	264	$	220
4	$	245	$	192
5	$	236	$	174
6-15	$	270	$	1,450 (PV of 10-yr annuity)
	Present Value of Operating Leases =$		2,571	

■ Debt outstanding at the Home Depot = $1,205 + $2,571 = $3,776 mil

(The Home Depot has other debt outstanding of $1,205 million)

■ Adjusted Operating Income = $2,016 + 2,571 (.0625) = $2,177 mil

Capitalizing R&D Expenses: Shire Pharmaceuticals

- ■ To capitalize R&D,
  - Specify an amortizable life for R&D (2 - 10 years)
  - Collect past R&D expenses for as long as the amortizable life
  - Sum up the unamortized R&D over the period. (Thus, if the amortizable life is 5 years, the research asset can be obtained by adding up 1/5th of the R&D expense from five years ago, 2/5th of the R&D expense from four years ago...:
- ■ R & D was assumed to have a 5-year life.

Year	R&D	Unamortized R&D		Amortization
Current	£48.12	1.00	£48.12	£0.00
-1	£37.42	0.80	£29.94	£7.48
-2	£28.99	0.60	£17.39	£5.80
-3	£17.88	0.40	£7.15	£3.58
-4	£8.18	0.20	£1.64	£1.64
-5	£4.56	0.00	£0.00	£0.91
			£104.24	£19.41

Value of research asset = £104.24

Amortization of research asset in 2000 = £19.41

Adjustment to Operating Income = + R&D - Amortization of R&D

Adjusted Operating Income = £41.03 + £48.12 - £19.41 = £69.74

The Effect of Net Operating Losses: Amazon.com's Tax Rate

Year	1	2	3	4	5
EBIT	-$373	-$94	$407	$1,038	$1,628
Taxes	$0	$0	$0	$167	$570
EBIT(1-t)	-$373	-$94	$407	$871	$1,058
Tax rate	0%	0%	0%	16.13%	35%
NOL	$500	$873	$967	$560	$0

After year 5, the tax rate becomes 35%.

Estimating Actual FCFF: Embraer

- EBIT = 2,166 million BR
- Tax rate = 34%
- Net Capital expenditures = Cap Ex - Depreciation = 271.22-191.30 = 79.92 million BR
- Change in Working Capital = + 33 million BR
- Average exchange rate during 2002 = 3.54 BR/ US $

	BR	US dollars
Current EBIT * (1 - tax rate) =	1,430 m	404 m
- (Capital Spending - Depreciation)	80 m	23 m
- Change in Working Capital	33 m	9 m
Current FCFF	1,317 m	372 m

Estimating FCFF: Amazon.com

- EBIT (Trailing 1999) = -$ 410 million
- Tax rate used = 0% (Assumed Effective = Marginal)
- Capital spending (Trailing 1999) = $ 243 million
- Depreciation (Trailing 1999) = $ 31 million
- Non-cash Working capital Change (1999) = - 80 million
- Estimating FCFF (1999)

  Current EBIT * (1 - tax rate) = - 410 (1-0)   = - $410 million

   - (Capital Spending - Depreciation)   = $212 million

   - Change in Working Capital   = -$ 80 million

  Current FCFF   = - $542 million

IV. Expected Growth in EBIT and Fundamentals

- Reinvestment Rate and Return on Capital

  g_{EBIT} = (Net Capital Expenditures + Change in WC)/EBIT(1-t) * ROC

  = Reinvestment Rate * ROC

- **Proposition**: No firm can expect its operating income to grow over time without reinvesting some of the operating income in net capital expenditures and/or working capital.

- **Proposition**: The net capital expenditure needs of a firm, for a given growth rate, should be inversely proportional to the quality of its investments.

Normalizing Reinvestment: Embraer

	-5	-4	-3	-2	-1	Total
Revenues	824	1570	3367	5099	6891	17751
EBIT	91.86	230.51	588.63	944.64	1927	3782.64
Operating Margin	11.15%	14.68%	17.48%	18.53%	27.96%	21.31%
Net Cap ex	-5.6	2.59	68.2	151.76	196.02	412.97
Non-cash WC	26.07	305.82	915.03	-222.74	1502.9	2527.08

Net Cap ex as % of EBIT (1-t)	16.54%
Non-cash WC as % of Revenue	14.24%

Expected Growth Estimate: Embraer

- Estimating normalized reinvestment rate
  - Normalized Change in working capital = (Working capital as percent of revenues) * Change in revenues in 2002 = .1424 (7748- 6891) = 122 mil BR
  - Normalized Net Cap Ex = Net Cap ex as % of EBIT(1-t) * EBIT (1-t) in 2001 = .1654*(2166 (1-.34)) = 236 million BR
  - Normalized reinvestment rate = (236+122)/(2166 (1-.34))= 25.04% (This will be the same, if estimated in U.S. dollars)
- Estimating return on capital in $ terms
  - Estimate after-tax operating income in dollars = 2166 (1-.34)) / 3.54 = $ 404 m
  - Divide by dollar value book value of capital at start of period = Book value of equity (1073) + Book value of debt (776) = $ 1, 849 million
  - Return on capital = 404 / 1,849 = 21.85%
- Expected growth rate = .2504*.2185 = 5.48%

Revenue Growth and Operating Margins

■ With negative operating income and a negative return on capital, the fundamental growth equation is of little use for Amazon.com

■ For Amazon, the effect of reinvestment shows up in revenue growth rates and changes in expected operating margins:

Expected Revenue Growth in $ = Reinvestment (in $ terms) * (Sales/ Capital)

■ The effect on expected margins is more subtle. Amazon's reinvestments (especially in acquisitions) may help create barriers to entry and other competitive advantages that will ultimately translate into high operating margins and high profits.

Growth in Revenues, Earnings and Reinvestment: Amazon

Year	Revenue Growth	Chg in Revenue	Reinvestment	Chg Rev/ Chg Reinvestment	ROC
1	150.00%	$1,676	$559	3.00	-76.62%
2	100.00%	$2,793	$931	3.00	-8.96%
3	75.00%	$4,189	$1,396	3.00	20.59%
4	50.00%	$4,887	$1,629	3.00	25.82%
5	30.00%	$4,398	$1,466	3.00	21.16%
6	25.20%	$4,803	$1,601	3.00	22.23%
7	20.40%	$4,868	$1,623	3.00	22.30%
8	15.60%	$4,482	$1,494	3.00	21.87%
9	10.80%	$3,587	$1,196	3.00	21.19%
10	6.00%	$2,208	$736	3.00	20.39%

Assume that firm can earn high returns because of established economies of scale.

V. Growth Patterns

■ A key assumption in all discounted cash flow models is the period of high growth, and the pattern of growth during that period. In general, we can make one of three assumptions:

- there is no high growth, in which case the firm is already in stable growth
- there will be high growth for a period, at the end of which the growth rate will drop to the stable growth rate (2-stage)
- there will be high growth for a period, at the end of which the growth rate will decline gradually to a stable growth rate(3-stage)

| Stable Growth | 2-Stage Growth | 3-Stage Growth |
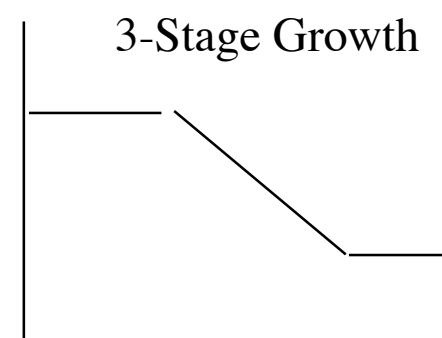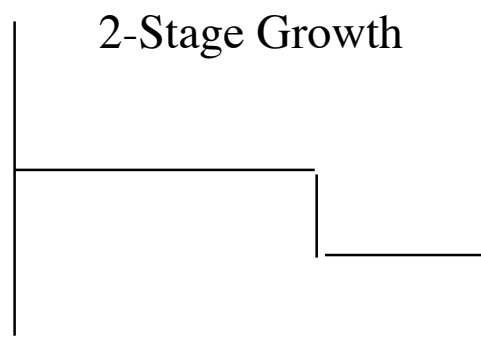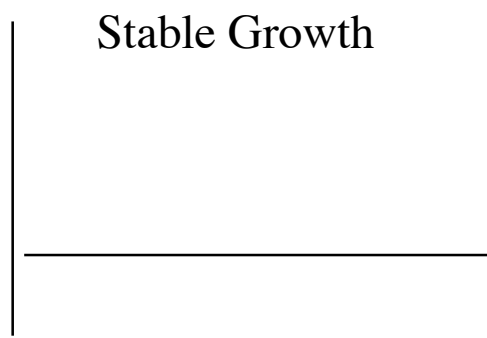
Determinants of Growth Patterns

- Size of the firm
  - Success usually makes a firm larger. As firms <u>become larger</u>, it becomes much more difficult for them to maintain high growth rates
- Current growth rate
  - While past growth is not always a reliable indicator of future growth, there is a <u>correlation between current growth and future growth</u>. Thus, a firm growing at 30% currently probably has higher growth and a longer expected growth period than one growing 10% a year now.
- Barriers to entry and differential advantages
  - Ultimately, high growth comes from high project returns, which, in turn, comes from <u>barriers to entry</u> and <u>differential advantages</u>.
  - The question of how long growth will last and how high it will be can therefore be framed as a question about <u>what the barriers to entry are, how long they will stay up and how strong they will remain.</u>

Stable Growth Characteristics

■ In stable growth, firms should have the characteristics of other stable growth firms. In particular,

- The risk of the firm, as measured by beta and ratings, should reflect that of a stable growth firm.
    - Beta should move towards one
    - The cost of debt should reflect the safety of stable firms (BBB or higher)
- The debt ratio of the firm might increase to reflect the larger and more stable earnings of these firms.
    - The debt ratio of the firm might moved to the optimal or an industry average
    - If the managers of the firm are deeply averse to debt, this may never happen
- The reinvestment rate of the firm should reflect the expected growth rate and the firm's return on capital
    - Reinvestment Rate = Expected Growth Rate / Return on Capital

Embraer and Amazon.com: Stable Growth Inputs

Embraer	High Growth	Stable Growth
• Beta	1.07	1.00
• Lambda	0.27	0.27
• Counry risk premium	7.67%	5.00%
• Debt Ratio	15.93%	15.93%
• Return on Capital	21.85%	8.76%
• Cost of Capital	9.81%	8.76%
• Expected Growth Rate	5.48%	4.17%
• Reinvestment Rate	25.04%	4.17%/8.76% = 47.62%

■ Amazon.com

	High Growth	Stable Growth
• Beta	1.60	1.00
• Debt Ratio	1.20%	15%
• Return on Capital	Negative	20%
• Expected Growth Rate	NMF	6%
• Reinvestment Rate	>100%	6%/20% = 30%

Dealing with Cash and Marketable Securities

■ The simplest and most direct way of dealing with cash and marketable securities is to keep them out of the valuation - the cash flows should be before interest income from cash and securities, and the discount rate should not be contaminated by the inclusion of cash. (Use betas of the operating assets alone to estimate the cost of equity).

■ Once the firm has been valued, add back the value of cash and marketable securities.

• If you have a particularly incompetent management, with a history of overpaying on acquisitions, markets may discount the value of this cash.

Dealing with Cross Holdings

■ When the holding is a majority, active stake, the value that we obtain from the cash flows includes the share held by outsiders. While their holding is measured in the balance sheet as a minority interest, it is at book value. To get the correct value, we need to subtract out the estimated market value of the minority interests from the firm value.

■ When the holding is a minority, passive interest, the problem is a different one. The firm shows on its income statement only the share of dividends it receives on the holding. Using only this income will understate the value of the holdings. In fact, we have to value the subsidiary as a separate entity to get a measure of the market value of this holding.

■ **Proposition 1**: It is almost impossible to correctly value firms with minority, passive interests in a large number of private subsidiaries.

Embraer's Cash and Cross Holdings

■ Embraer has a 60% interest in an equipment company and the financial statements of that company are consolidated with those of Embraer. The minority interests (representing the equity in the subsidiary that does not belong to Embraer) are shown on the balance sheet at 23 million BR.

■ Estimated market value of minority interests = Book value of minority interest * P/BV of sector that subsidiary belongs to = 23.12 *1.5 = 34.68 million BR

Present Value of FCFF in high growth phase =	$1,342.97
Present Value of Terminal Value of Firm =	$3,928.67
Value of operating assets of the firm =	$5,271.64
Value of Cash, Marketable Securities =	$794.52
Value of Firm =	$6,066.16
Market Value of outstanding debt =	$716.74
Minority Interest in consolidated holdings =34.68/2.92 =	$11.88
Market Value of Equity =	$5,349.42
Value of Equity in Options =	$27.98
Value of Equity in Common Stock =	$5,321.44
Market Value of Equity/share =	$7.47
Market Value of Equity/share in BR =7.47 *2.92 BR/$ =	R$ 21.75

Amazon: Estimating the Value of Equity Options

■ Details of options outstanding

- Average strike price of options outstanding = $ 13.375
- Average maturity of options outstanding = 8.4 years
- Standard deviation in ln(stock price) = 50.00%
- Annualized dividend yield on stock = 0.00%
- Treasury bond rate = 6.50%
- Number of options outstanding = 38 million
- Number of shares outstanding = 340.79 million

■ Value of options outstanding (using dilution-adjusted Black-Scholes model)

- Value of equity options = $ 2,892 million

Reinvestment:
Cap ex includes acquisitions
Working capital is 3% of revenues

Current Revenue $ 1,117

Current Margin: -36.71%

EBIT -410m

NOL: 500 m

Sales Turnover Ratio: 3.00

Revenue Growth: 42%

Competitive Advantages

Expected Margin: -> 10.00%

Stable Growth

Stable Revenue Growth: 6%

Stable Operating Margin: 10.00%

Stable ROC=20% Reinvest 30% of EBIT(1-t)

Terminal Value= 1881/(.0961-.06) =52,148

		Revenues	EBIT	EBIT (1-t)	- Reinvestment	FCFF
Revenues	$2,793	5,585	9,774	14,661	19,059	23,862	28,729	33,211	36,798	39,006

	1	2	3	4	5	6	7	8	9	10
Revenues	$2,793	5,585	9,774	14,661	19,059	23,862	28,729	33,211	36,798	39,006
EBIT	-$373	-$94	$407	$1,038	$1,628	$2,212	$2,768	$3,261	$3,646	$3,883
EBIT (1-t)	-$373	-$94	$407	$871	$1,058	$1,438	$1,799	$2,119	$2,370	$2,524
- Reinvestment	$559	$931	$1,396	$1,629	$1,466	$1,601	$1,623	$1,494	$1,196	$736
FCFF	-$931	-$1,024	-$989	-$758	-$408	-$163	$177	$625	$1,174	$1,788

Term. Year
$41,346
10.00%
35.00%
$2,688
$ 807
$1,881

	Value of Op Assets	$ 14,910
+ Cash	$ 26
= Value of Firm	$14,936
- Value of Debt	$ 349
= Value of Equity	$14,587
- Equity Options	$ 2,892
Value per share	$ 34.32

Forever

	1	2	3	4	5	6	7	8	9	10
Cost of Equity	12.90%	12.90%	12.90%	12.90%	12.90%	12.42%	12.30%	12.10%	11.70%	10.50%
Cost of Debt	8.00%	8.00%	8.00%	8.00%	8.00%	7.80%	7.75%	7.67%	7.50%	7.00%
AT cost of debt	8.00%	8.00%	8.00%	6.71%	5.20%	5.07%	5.04%	4.98%	4.88%	4.55%
Cost of Capital	12.84%	12.84%	12.84%	12.83%	12.81%	12.13%	11.96%	11.69%	11.15%	9.61%

Cost of Equity
12.90%

Cost of Debt
6.5%+1.5%=8.0%
Tax rate = 0% -> 35%

Weights
Debt= 1.2% -> 15%

Riskfree Rate :
T. Bond rate = 6.5%

Risk Premium
4%

+

Beta
1.60 -> 1.00

X

Amazon.com
January 2000
Stock Price = $ 84

Internet/ Retail

Operating Leverage

Current D/E: 1.21%

Base Equity Premium

Country Risk Premium

Amazon.com: Break Even at $84?

	6%	8%	10%	12%	14%
30%	$ (1.94)	$ 2.95	$ 7.84	$ 12.71	$ 17.57
35%	$ 1.41	$ 8.37	$ 15.33	$ 22.27	$ 29.21
40%	$ 6.10	$ 15.93	$ 25.74	$ 35.54	$ 45.34
45%	$ 12.59	$ 26.34	$ 40.05	$ 53.77	$ 67.48
50%	$ 21.47	$ 40.50	$ 59.52	$ 78.53	$ 97.54
55%	$ 33.47	$ 59.60	$ 85.72	$ 111.84	$ 137.95
60%	$ 49.53	$ 85.10	$ 120.66	$ 156.22	$ 191.77

Reinvestment:
Cap ex includes acquisitions
Working capital is 3% of revenues

Current Revenue $ 2,465

Current Margin: -34.60%

EBIT -853m

NOL: 1,289 m

Sales Turnover Ratio: 3.02

Revenue Growth: 25.41%

Competitive Advantages

Expected Margin: -> 9.32%

Stable Growth

Stable Revenue Growth: 5%

Stable Operating Margin: 9.32%

Stable ROC=16.94% Reinvest 29.5% of EBIT(1-t)

Terminal Value= 1064/(.0876-.05) =$ 28,310

												Term. Year
Revenues	$4,314	$6,471	$9,059	$11,777	$14,132	$16,534	$18,849	$20,922	$22,596	$23,726	$24,912	$24,912
EBIT	-$703	-$364	$54	$499	$898	$1,255	$1,566	$1,827	$2,028	$2,164	$2,322	$2,322
EBIT(1-t)	-$703	-$364	$54	$499	$898	$1,133	$1,018	$1,187	$1,318	$1,406	$1,509	$1,509
- Reinvestment	$612	$714	$857	$900	$780	$796	$766	$687	$554	$374	$445	$ 445
FCFF	-$1,315	-$1,078	-$803	-$401	$118	$337	$252	$501	$764	$1,032	$1,064	$1,064

		1	2	3	4	5	6	7	8	9	10	

Forever

Value of Op Assets $ 7,967
+ Cash & Non-op $ 1,263
= Value of Firm $ 9,230
- Value of Debt $ 1,890
= Value of Equity $ 7,340
- Equity Options $ 748
Value per share $ 18.74

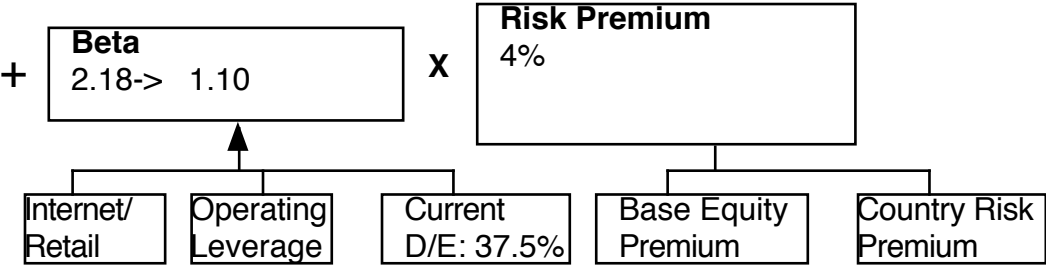|	1	2	3	4	5	6	7	8	9	10
Debt Ratio	27.27%	27.27%	27.27%	27.27%	27.27%	24.81%	24.20%	23.18%	21.13%	15.00%
Beta	2.18	2.18	2.18	2.18	2.18	1.96	1.75	1.53	1.32	1.10
Cost of Equity	13.81%	13.81%	13.81%	13.81%	13.81%	12.95%	12.09%	11.22%	10.36%	9.50%
AT cost of debt	10.00%	10.00%	10.00%	10.00%	9.06%	6.11%	6.01%	5.85%	5.53%	4.55%
Cost of Capital	12.77%	12.77%	12.77%	12.77%	12.52%	11.25%	10.62%	9.98%	9.34%	8.76%

Cost of Equity 13.81%

Cost of Debt
5.1%+4.75%= 9.85%
Tax rate = 0% -> 35%

Weights
Debt= 27.38% -> 15%

Riskfree Rate :
T. Bond rate = 5.1%

+

Beta
2.18-> 1.10

X

Risk Premium
4%

Internet/ Retail

Operating Leverage

Current D/E: 37.5%

Base Equity Premium

Country Risk Premium

**Amazon.com
January 2001
Stock price = $14**

Embraer: Status Quo ($)

Avg Reinvestment rate = 25.08%	**Return on Capital 21.85%**

Reinvestment Rate 25.08%

Current Cashflow to Firm
EBIT(1-t) : $ 404
- Nt CpX   23
- Chg WC   9
= FCFF $ 372
Reinvestment Rate = 32/404= 7.9%

Expected Growth in EBIT (1-t)
.2185*.2508=.0548
5.48%

Stable Growth
g = 4.17%; Beta = 1.00;
Country Premium= 5%
Cost of capital = 8.76%
ROC= 8.76%; Tax rate=34%
Reinvestment Rate=g/ROC
       =4.17/8.76= 47.62%

Terminal Value$_5$= 288/(.0876-.0417) = 6272

$ Cashflows

Op. Assets $ 5,272
+ Cash: 795
- Debt   717
- Minor. Int.   12
=Equity   5,349
-Options   28
Value/Share $7.47
         R$ 21.75

Year	1	2	3	4	5	Term Yr
EBIT(1-t)	426	449	474	500	527	549
- Reinvestment	107	113	119	126	132	- 261
= FCFF	319	336	355	374	395	= 288

Discount at $ Cost of Capital (WACC) = 10.52% (.84) + 6.05% (0.16) = 9.81%

On October 6, 2003
Embraer Price = R$15.51

Cost of Equity
10.52%

Cost of Debt
(4.17%+1%+4%)(1-.34)
= 6.05%

Weights
E = 84% D = 16%

Riskfree Rate:
$ Riskfree Rate= 4.17%

+

Beta
1.07

X

Mature market premium
4 %

+

Lambda
0.27

X

Country Equity Risk Premium
7.67%

Unlevered Beta for Sectors: 0.95

Firm's D/E Ratio: 19%

Country Default Spread
6.01%

X

Rel Equity Mkt Vol
1.28

Value Enhancement: Back to Basics

Aswath Damodaran

http://www.damodaran.com

Price Enhancement versus Value E...

Stock price performance of companies that changed their names to include Web-oriented designations like ".com," from 30 trading days before the name-change announcement to 30 days after. The study looked at stocks of companies that changed their names from January 1998 through March 26, 1999.
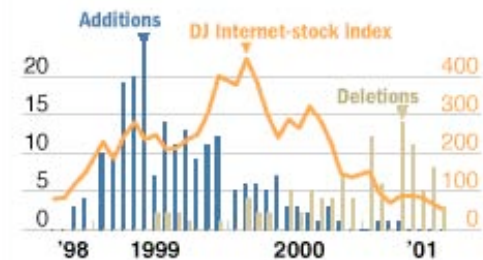
200%

150 One day before name change

100

50

0

−30 −20 −10 0 +10 +20 +30

Days before name change   Days after name change
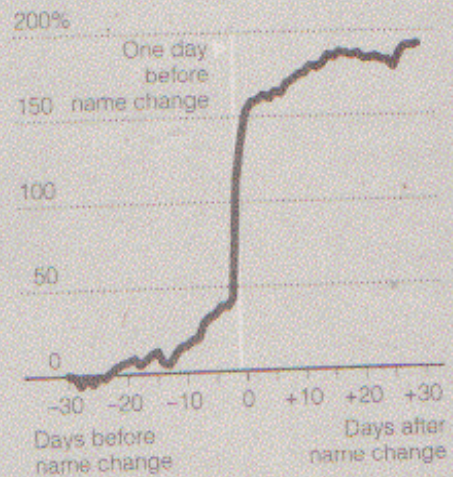
Source: "A Rose.com by Any Other Name," by Michael J. Cooper, P. Raghavendra Rau and Orlin Dimitrov of Purdue University.

NAME THAT STOCK

### New Markets, New Names
In the bull market, adding dot-com to a company name made a stock soar. Lately those zippy new monikers are disappearing.

Additions   DJ Internet-stock index

20   400
15   Deletions   300
10   200
5   100
0   0
'98   1999   2000   '01

New Name, Higher Price
But the stocks still get a bounce when dot-com goes away. Chart shows returns in the days before and after the name change.

20%

10

0

−10

−20

−30

−40

100   75   50   25   0   25
←——— days ———→ ← days →
before   since
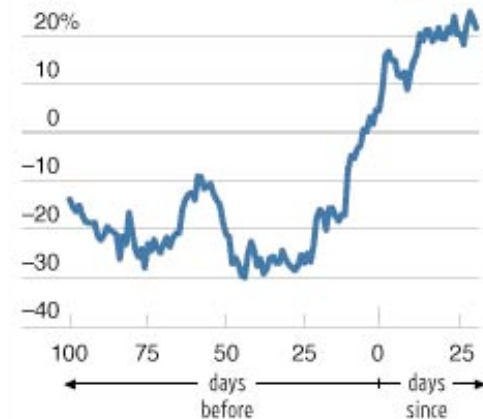
Sources: Thomson Datastream; P. Raghavendra Rau, Michael J. Cooper, Igor Osobov, Purdue Univ.; Ajay Khorana, Virginia Univ.; Ajay Patel, Wake Forest Univ.

The Paths to Value Creation

■ Using the DCF framework, there are four basic ways in which the value of a firm can be enhanced:

- The cash flows from existing assets to the firm can be increased, by either
  - increasing after-tax earnings from assets in place or
  - reducing reinvestment needs (net capital expenditures or working capital)
- The expected growth rate in these cash flows can be increased by either
  - Increasing the rate of reinvestment in the firm
  - Improving the return on capital on those reinvestments
- The length of the high growth period can be extended to allow for more years of high growth.
- The cost of capital can be reduced by
  - Reducing the operating risk in investments/assets
  - Changing the financial mix
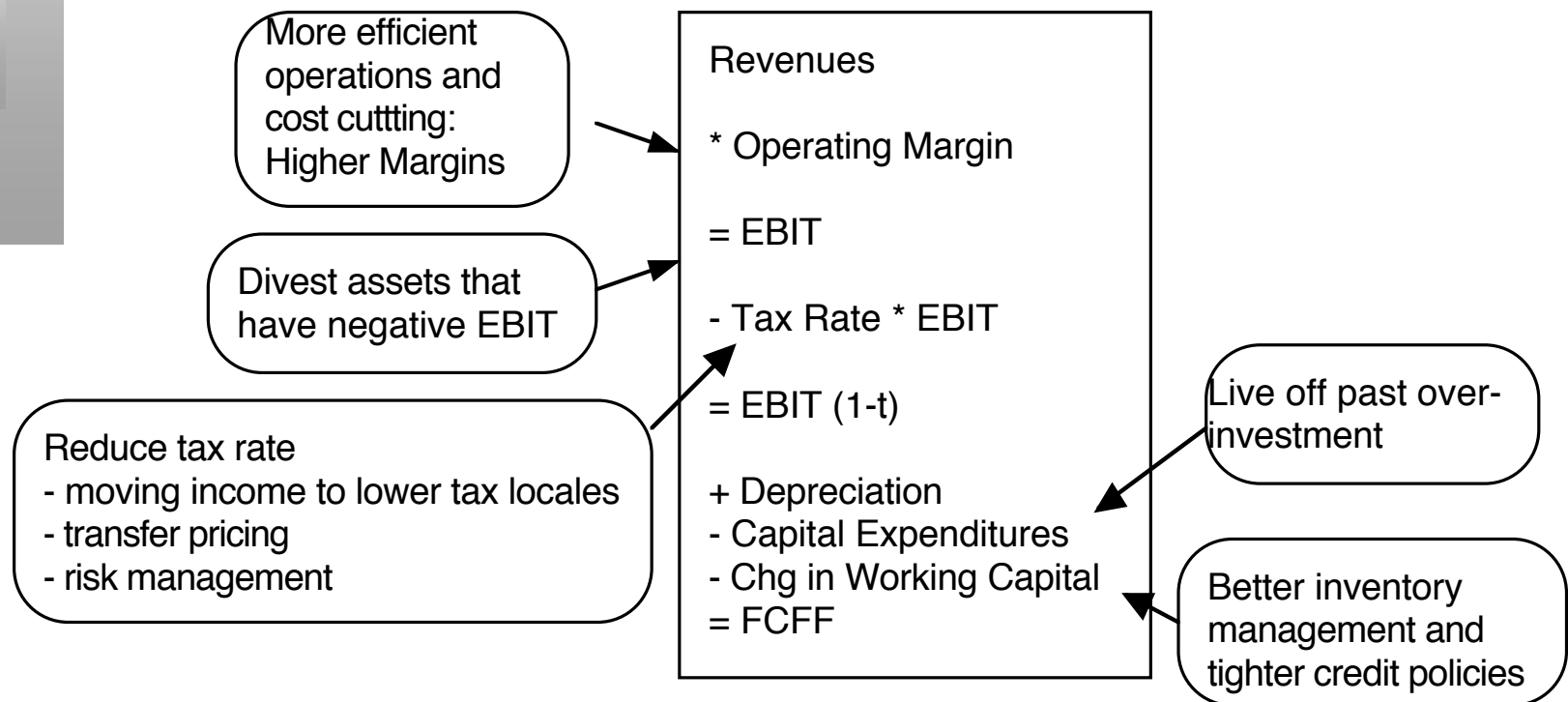 - Changing the financing composition

A Basic Proposition

■ For an action to affect the value of the firm, it has to
  - Affect current cash flows (or)
  - Affect future growth (or)
  - Affect the length of the high growth period (or)
  - Affect the discount rate (cost of capital)

■ **Proposition 1: Actions that do not affect current cash flows, future growth, the length of the high growth period or the discount rate cannot affect value.**
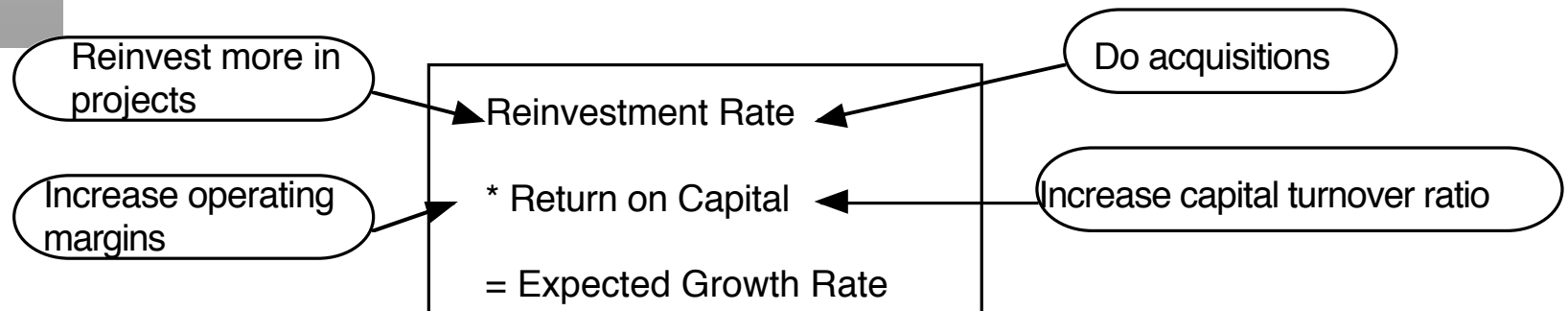
Value-Neutral Actions

- ■ <u>Stock splits and stock dividends</u> change the number of units of equity in a firm, but cannot affect firm value since they do not affect cash flows, growth or risk.
- ■ <u>Accounting decisions</u> that affect reported earnings but not cash flows should have no effect on value.
  - <u>Changing inventory valuation methods</u> from FIFO to LIFO or vice versa in financial reports but not for tax purposes
  - <u>Changing the depreciation method</u> used in financial reports (but not the tax books) from accelerated to straight line depreciation
  - <u>Major non-cash restructuring charges</u> that reduce reported earnings but are not tax deductible
  - <u>Using pooling instead of purchase</u> in acquisitions cannot change the value of a target firm.
- ■ Decisions that create new securities on the existing assets of the firm (without altering the financial mix) such as <u>tracking stock</u> cannot create value, though they might affect perceptions and hence the price.
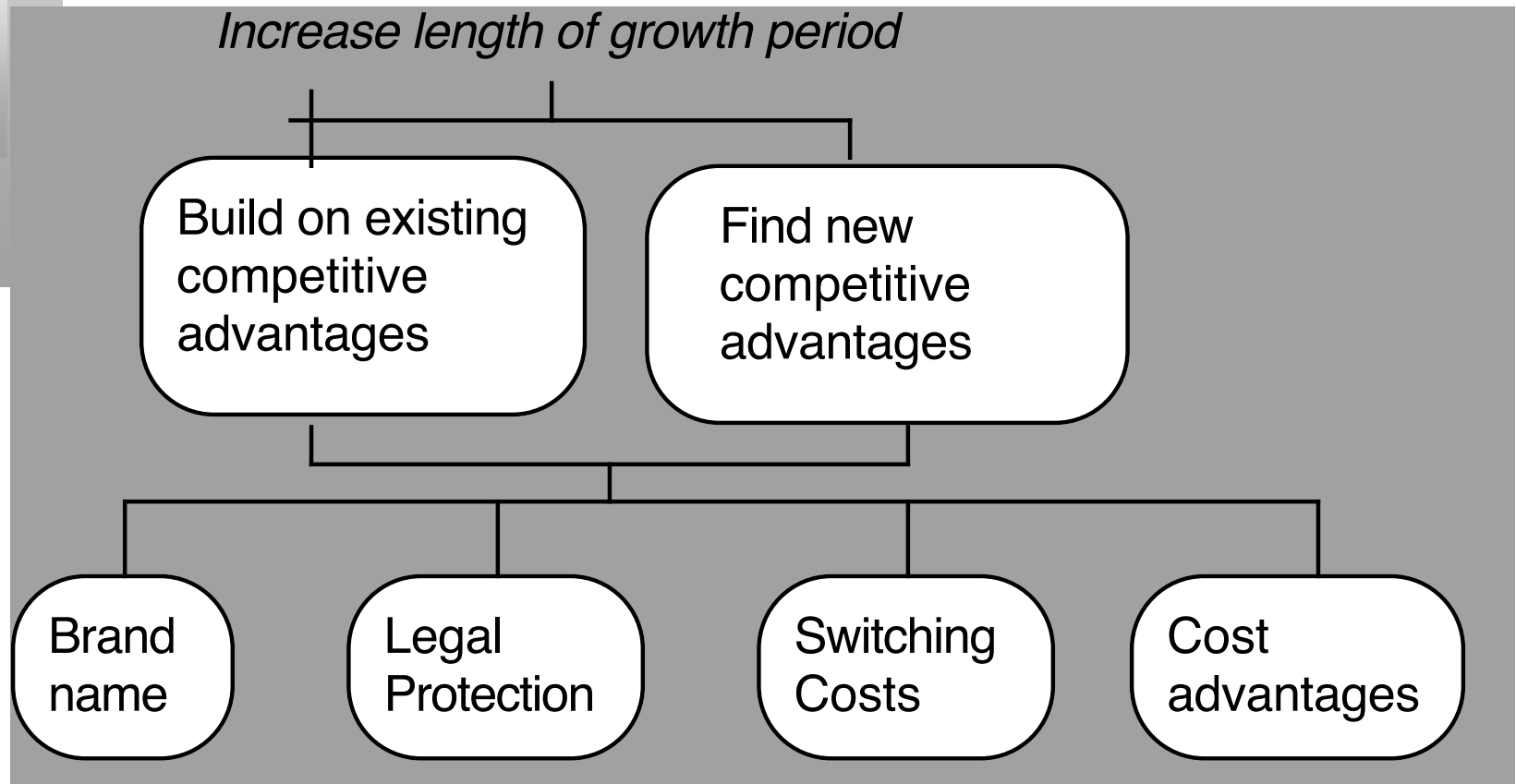
I. Ways of Increasing Cash Flows from Assets in Place

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

II. Value Enhancement through Growth

Reinvest more in projects

Do acquisitions

Increase operating margins

Reinvestment Rate

* Return on Capital

= Expected Growth Rate

Increase capital turnover ratio

III. Building Competitive Advantages: Increase length of the growth period

Increase length of growth period

- Build on existing competitive advantages
- Find new competitive advantages

- Brand name
- Legal Protection
- Switching Costs
- Cost advantages

3.1: The Brand Name Advantage

■ Some firms are able to sustain above-normal returns and growth because they have well-recognized brand names that allow them to charge higher prices than their competitors and/or sell more than their competitors.

■ Firms that are able to improve their brand name value over time can increase both their growth rate and the period over which they can expect to grow at rates above the stable growth rate, thus increasing value.

Illustration: Valuing a brand name: Coca Cola

	Coca Cola	Generic Cola Company
AT Operating Margin	**18.56%**	**7.50%**
Sales/BV of Capital	1.67	1.67
ROC	31.02%	12.53%
Reinvestment Rate	65.00% (19.35%)	65.00% (47.90%)
Expected Growth	20.16%	8.15%
Length	10 years	10 yea
Cost of Equity	12.33%	12.33%
E/(D+E)	97.65%	97.65%
AT Cost of Debt	4.16%	4.16%
D/(D+E)	2.35%	2.35%
Cost of Capital	12.13%	12.13%
Value	**$115**	**$13**

3.2: Patents and Legal Protection

■ The most complete protection that a firm can have from competitive pressure is to own a patent, copyright or some other kind of legal protection allowing it to be the sole producer for an extended period.

■ Note that patents only provide partial protection, since they cannot protect a firm against a competitive product that meets the same need but is not covered by the patent protection.

■ Licenses and government-sanctioned monopolies also provide protection against competition. They may, however, come with restrictions on excess returns; utilities in the United States, for instance, are monopolies but are regulated when it comes to price increases and returns.

3.3: Switching Costs

- Another potential barrier to entry is the cost associated with switching from one firm's products to another.

- The greater the switching costs, the more difficult it is for competitors to come in and compete away excess returns.

- Firms that devise ways to increase the cost of switching from their products to competitors' products, while reducing the costs of switching from competitor products to their own will be able to increase their expected length of growth.
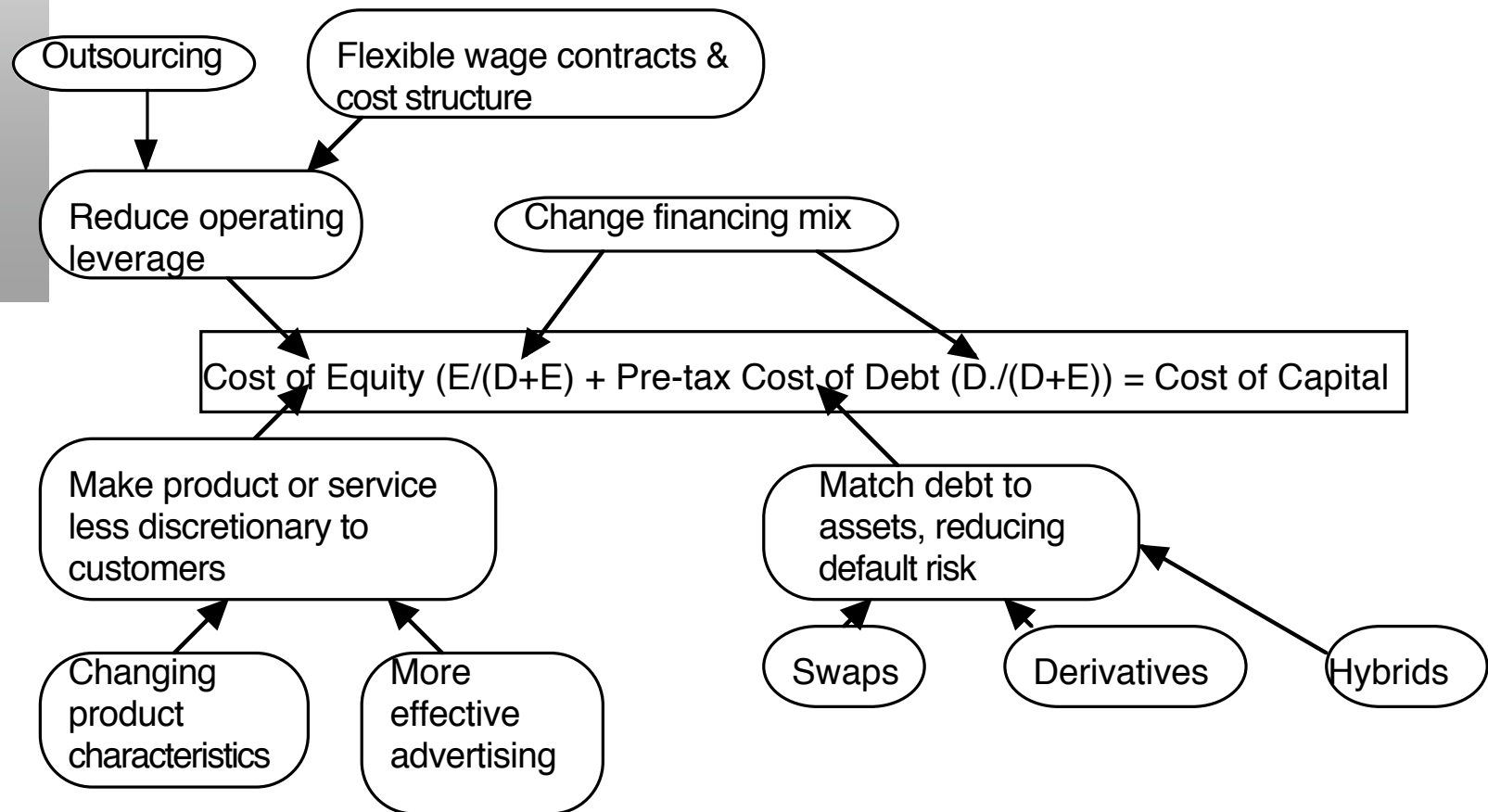
3.4: Cost Advantages

■ There are a number of ways in which firms can establish a cost advantage over their competitors, and use this cost advantage as a barrier to entry:
  - In businesses, where scale can be used to reduce costs, economies of scale can give bigger firms advantages over smaller firms
  - Owning or having exclusive rights to a distribution system can provide firms with a cost advantage over its competitors.
  - Owning or having the rights to extract a natural resource which is in restricted supply (The undeveloped reserves of an oil or mining company, for instance)

■ These cost advantages will show up in valuation in one of two ways:
  - The firm may charge the same price as its competitors, but have a much higher operating margin.
  - The firm may charge lower prices than its competitors and have a much higher capital turnover ratio.

Gauging Barriers to Entry

■ Which of the following barriers to entry are most likely to work for Embraer?

❑ Brand Name

❑ Patents and Legal Protection

❑ Switching Costs

❑ Cost Advantages

■ What about for Amazon.com?

❑ Brand Name

❑ Patents and Legal Protection

❑ Switching Costs

❑ Cost Advantages

Reducing Cost of Capital

Outsourcing

Flexible wage contracts & cost structure

Reduce operating leverage

Change financing mix

Cost of Equity (E/(D+E) + Pre-tax Cost of Debt (D./(D+E)) = Cost of Capital

Make product or service less discretionary to customers

Match debt to assets, reducing default risk

Changing product characteristics

More effective advertising

Swaps

Derivatives

Hybrids

Amazon.com: Optimal Debt Ratio

Debt Ratio	Beta	Cost of Equity	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)	WACC	Firm Value (G)
0%	1.58	12.82%	AAA	6.80%	0.00%	6.80%	12.82%	$29,192
10%	1.76	13.53%	D	18.50%	0.00%	18.50%	14.02%	$24,566
20%	1.98	14.40%	D	18.50%	0.00%	18.50%	15.22%	$21,143
30%	2.26	15.53%	D	18.50%	0.00%	18.50%	16.42%	$18,509
40%	2.63	17.04%	D	18.50%	0.00%	18.50%	17.62%	$16,419
50%	3.16	19.15%	D	18.50%	0.00%	18.50%	18.82%	$14,719
60%	3.95	22.31%	D	18.50%	0.00%	18.50%	20.02%	$13,311
70%	5.27	27.58%	D	18.50%	0.00%	18.50%	21.22%	$12,125
80%	7.90	38.11%	D	18.50%	0.00%	18.50%	22.42%	$11,112
90%	15.81	69.73%	D	18.50%	0.00%	18.50%	23.62%	$10,237

Embraer : Optimal Capital Structure

Debt Ratio	Beta	Cost of Equity	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)	WACC	Firm Value (G)
0%	0.95	10.05%	AAA	8.92%	34.00%	5.89%	10.05%	$3,577
10%	1.02	10.32%	AAA	8.92%	34.00%	5.89%	9.88%	$3,639
20%	1.11	10.67%	AA	9.17%	34.00%	6.05%	9.75%	$3,690
30%	1.22	11.12%	A	9.97%	34.00%	6.58%	9.76%	$3,686
40%	1.37	11.72%	A-	10.17%	34.00%	6.71%	9.72%	$3,703
50%	1.58	12.56%	B	14.67%	34.00%	9.68%	11.12%	$3,218
60%	1.89	13.81%	CCC	18.17%	34.00%	11.99%	12.72%	$2,799
70%	2.42	15.90%	CC	19.67%	34.00%	12.98%	13.86%	$2,562
80%	3.48	20.14%	CC	19.67%	33.63%	13.05%	14.47%	$2,450
90%	6.95	34.05%	CC	19.67%	29.90%	13.79%	15.81%	$2,236

Embraer: Restructured ($)

Current Cashflow to Firm
EBIT(1-t) : $ 404
- Nt CpX   23
- Chg WC   9
= FCFF $ 372
Reinvestment Rate = 32/404= 7.9%

Reinvestment Rate
40.00%

Return on Capital
20%

Expected Growth in EBIT (1-t)
.40*.20=.08
8.00%

Stable Growth
g = 4.17%; Beta = 1.00;
Country Premium= 5%
Cost of capital = 7.87%
ROC= 7.87%; Tax rate=34%
Reinvestment Rate=g/ROC
=4.17/7.87= 52.99%

Terminal Value5= 291/(.0876-.0417) = 7855

$ Cashflows

Op. Assets $ 6,096
+ Cash: 795
- Debt   717
- Minor. Int.   12
=Equity   6,196
-Options   28
Value/Share $8.66
        R$ 25.21

Year	1	2	3	4	5	Term Yr
EBIT(1-t)	436	471	509	549	593	618
- Reinvestment	174	188	204	219	237	- 327
= FCFF	262	283	305	330	356	= 291

Discount at $ Cost of Capital (WACC) = 11.72% (.60) + 6.71% (0.40) = 9.72%

On October 6, 2003
Embraer Price = R$15

Cost of Equity
11.72%

Cost of Debt
(4.17%+2%+4%)(1-.34)
= 6.71%

Weights
E = 60% D = 40%

Riskfree Rate:
$ Riskfree Rate= 4.17%

+

Beta
1.37

X

Mature market premium
4 %

+

Lambda
0.27

X

Country Equity Risk Premium
7.67%

Unlevered Beta for Sectors: 0.95

Firm's D/E Ratio: 19%

Country Default Spread
6.01%

X

Rel Equity Mkt Vol
1.28

The Value of Control?

- If the value of a firm run optimally is significantly higher than the value of the firm with the status quo (or incumbent management), you can write the value that you should be willing to pay as:

- Value of control = Value of firm optimally run - Value of firm with status quo

- Implications:
  - The value of control is greatest at poorly run firms.
  - Voting shares in poorly run firms should trade at a premium on non-voting shares if the votes associated with the shares will give you a chance to have a say in a hostile acquisition.
  - When valuing private firms, your estimate of value will vary depending upon whether you gain control of the firm. For example, 49% of a private firm may be worth less than 51% of the same firm.
    49% stake = 49% of status quo value
    51% stake = 51% of optimal value

Back to Lemmings...

WHAT LEMMINGS BELIEVE