Valuation

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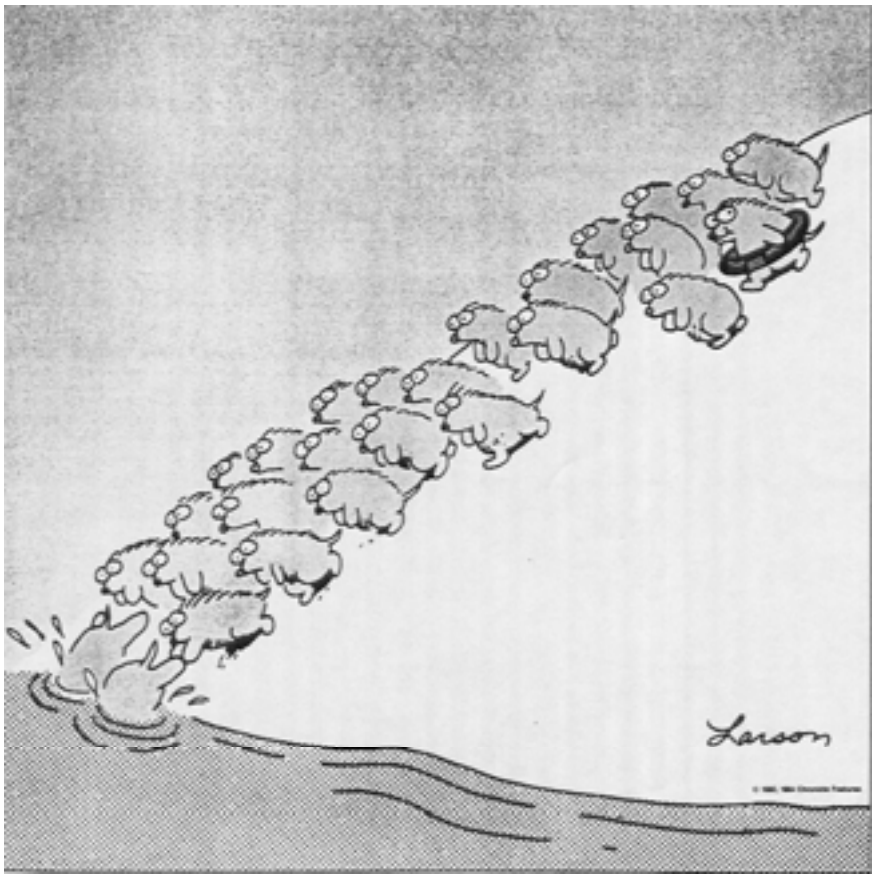
Some Initial Thoughts

" 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 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.

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.

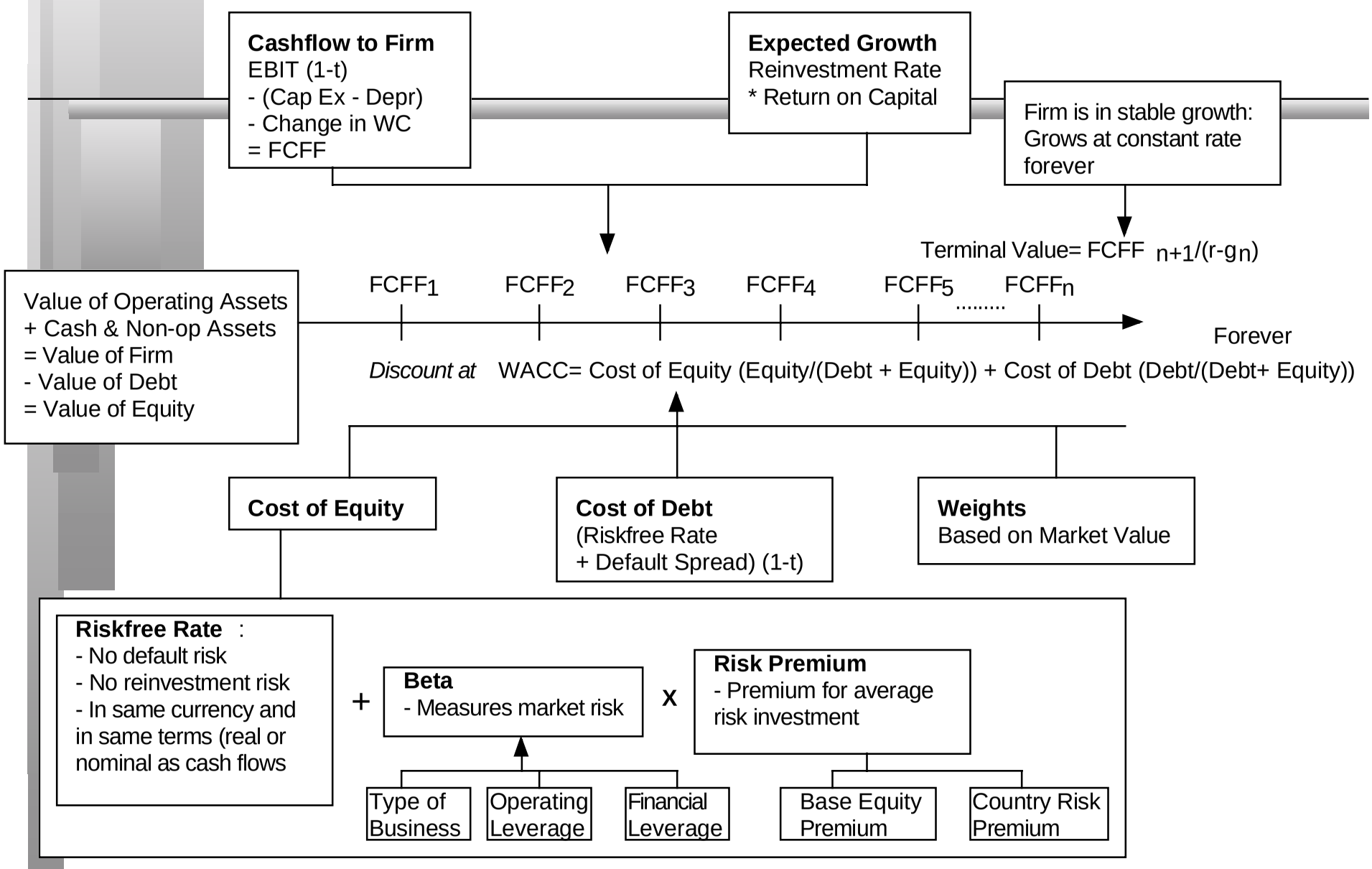
$$\text{Value of Firm} = \sum_{t=1}^{t=n} \frac{\text{CF to Firm}_t}{(1+\text{WACC})^t}$$

where,

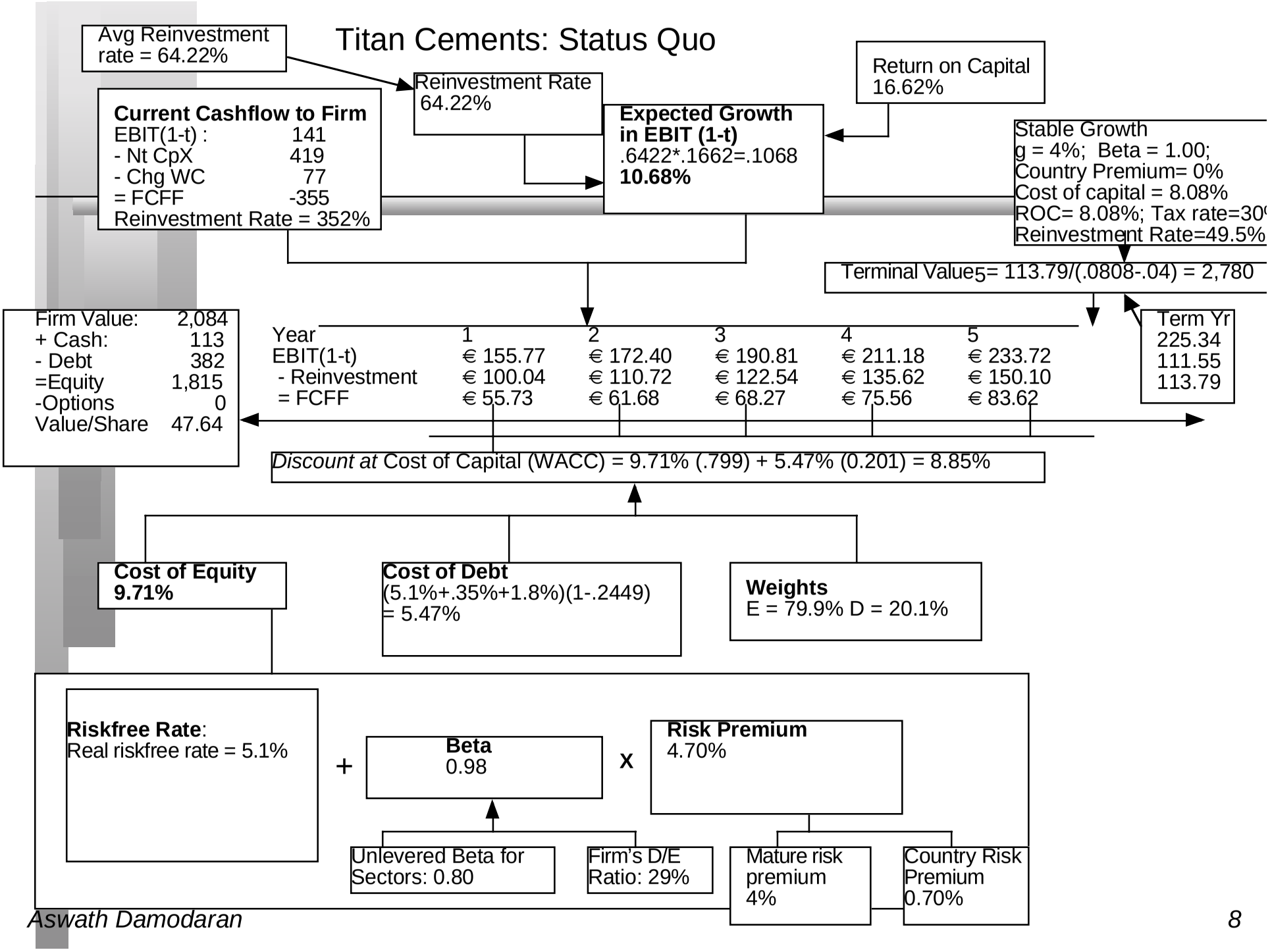
CF to Firm_t = Expected Cashflow to Firm in period t

WACC = Weighted Average Cost of Capital

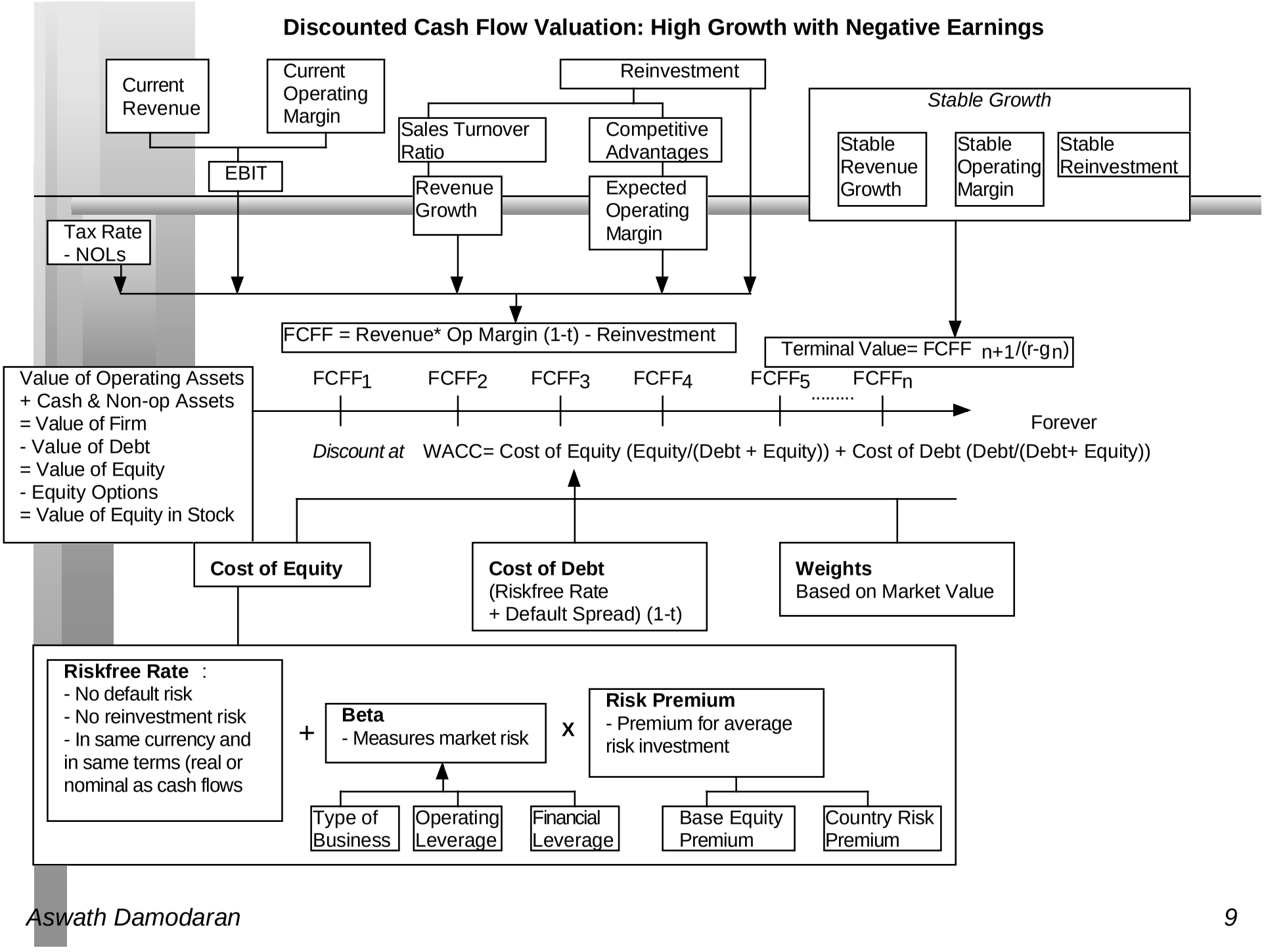
DISCOUNTED CASHFLOW VALUATION

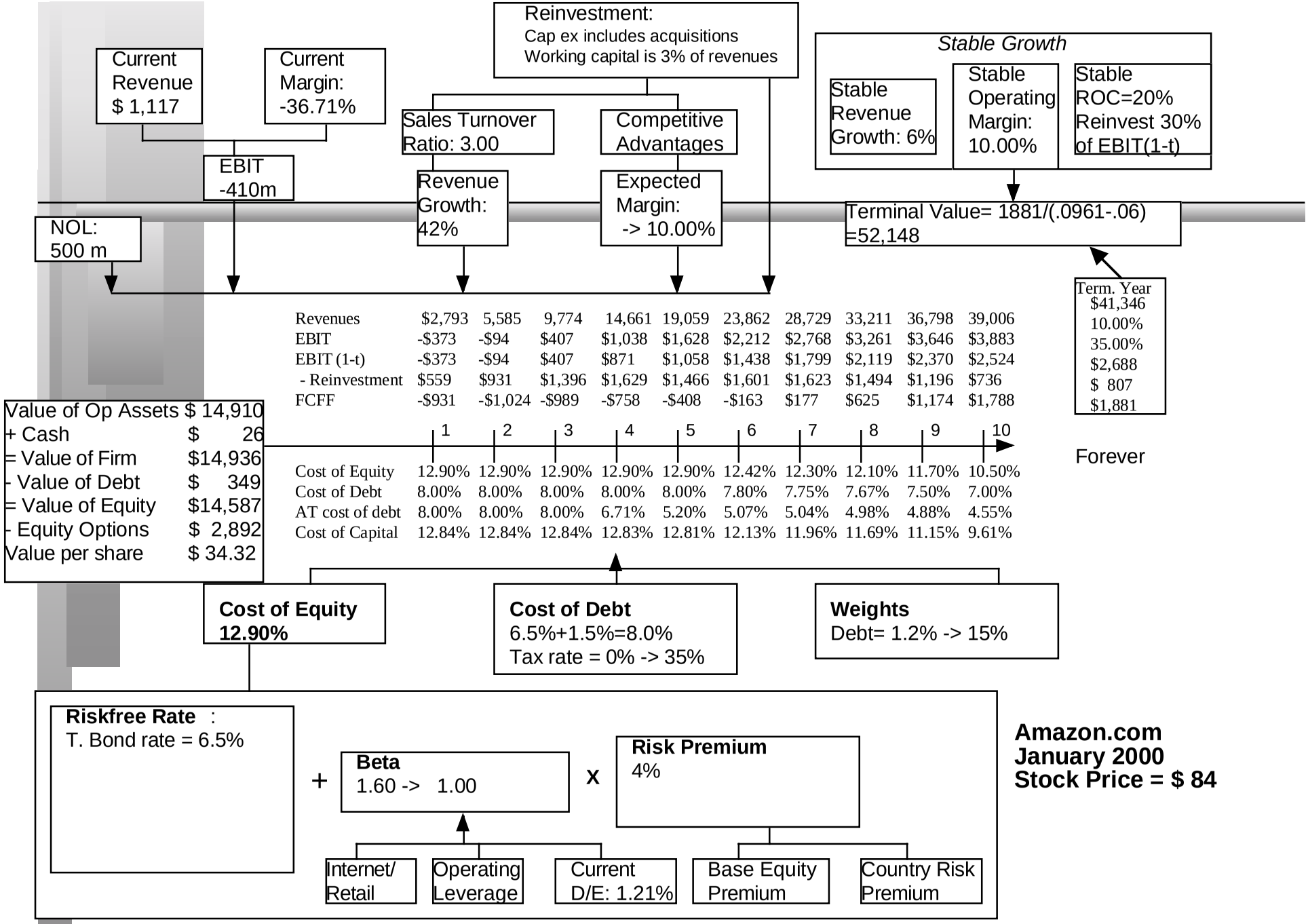


Titan Cements: Status Quo

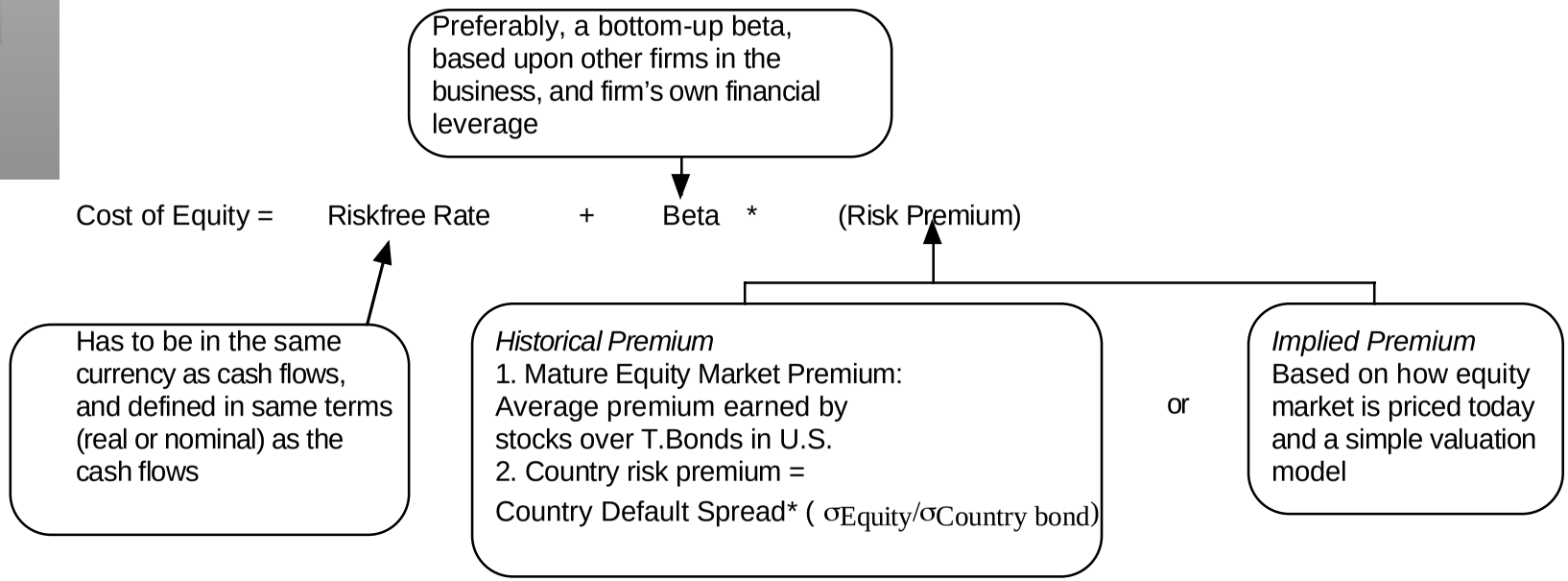


Discounted Cash Flow Valuation: High Growth with Negative Earnings




Current Revenue $ 1,117
Current Margin: -36.71%
EBIT -410m
NOL: 500 m
Reinvestment:
Cap ex includes acquisitions
Working capital is 3% of revenues
Sales Turnover Ratio: 3.00
Competitive Advantages
Revenue Growth: 42%
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
Term. Year
$41,346
10.00%
35.00%
$2,688
$ 807
$1,881
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
1 2 3 4 5 6 7 8 9 10
Forever
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% 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%
+
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

I. Discount Rates:Cost of Equity



A Simple Test

- You are valuing a Greek company in Euros 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 drachma-denominated Greek government bond
  - The interest rate on a Euro-denominated Greek government bond (5.45%)
  - The interest rate on a Euro-denominated bond issued by the German government (5.10%)

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:

Historical period	*Stocks - T.Bills*		*Stocks - T.Bonds*	
	Arith	*Geom*	*Arith*	*Geom*
1928-2001	8.09%	6.84%	6.21%	5.17%
1962-2001	5.89%	4.68%	4.74%	3.90%
1991-2001	10.62%	6.90%	9.44%	6.17%

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1991-2001	10.62%	6.90%	9.44%	6.17%

Assessing Country Risk Using Currency Ratings: Western Europe

Country	*Rating*	*Default Spread (in basis points)*
Austria	Aaa	0
Belgium	Aaa	0
Denmark	Aaa	0
Finland	Aaa	0
France	Aaa	0
Germany	Aaa	0
Greece	A3	35
Ireland	AA2	24
Italy	Aa3	22
Netherlands	Aaa	0
Norway	Aaa	0
Portugal	A3	20
Spain	Aa1	15
Sweden	Aa1	45
Switzerland	Aaa	0

Assessing Country Risk using Ratings: The Rest of Europe

Country	*Rating*	*Default Spread*
Croatia	Baa3	145
Cyprus	A2	90
Czech Republic	Baa1	120
Hungary	A3	95
Latvia	Baa2	130
Lithuania	Ba1	250
Moldova	B3	650
Poland	Baa1	120
Romania	B3	650
Russia	B2	550
Slovakia	Ba1	250
Slovenia	A2	90
Turkey	B1	450

Using Country Ratings to Estimate Equity Spreads

- 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.
  - One way to adjust the country spread upwards is to use information from the US market. In the US, the equity risk premium has been roughly twice the default spread on junk bonds.
  - Another is to multiply the bond spread by the relative volatility of stock and bond prices in that market. For example,
    - Standard Deviation in Greek ASE(Equity) = 32%
    - Standard Deviation in Greek Euro Bond = 16%
    - Adjusted Equity Spread = 0.35% (32/16) = 0.70%

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

- Different companies should be exposed to different degrees to country risk. For instance, a Greek firm that generates the bulk of its revenues in the rest of Western Europe should be less exposed to country risk than one that generates all its business within Greece.
- The factor "λ" measures the relative exposure of a firm to country risk. One simplistic solution would be to do the following:

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

  For instance, if a firm gets 35% of its revenues domestically while the average firm in that market gets 70% of its revenues domestically

  $$\lambda = 35\%/\ 70\ \% = 0.5$$

- 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 E(Return) for Titan Cements

- Assume that the beta for Titan Cements is 0.98, and that the riskfree rate used is 5.1%.
- Approach 1: Assume that every company in the country is equally exposed to country risk. In this case,

E(Return) = 5.10% + 0.70% + 0.98 (5.17%) = 10.87%

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

E(Return) = 5.10% + 0.98 (5.17%+ 0.70%) = 10.83%

- 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)= 5.10% + 0.98(5.17%) + 0.70 (0.70%) = 10.66%

Titan is less exposed to country risk than the typical Greek firm since it gets about 50% of its revenues in Greece; the average for Greek firms is 70%.

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, 2002, for instance, these were the facts for the United States.
  - Level of the index = 1148
  - Treasury bond rate = 5.05%
  - Expected Growth rate in earnings (next 5 years) = 10.3% (Consensus estimate for S&P 500)
  - Expected growth rate after year 5 = 5.05%
  - Dividends + stock buybacks = 2.74% of index (Current year)

	Year 1	Year 2	Year 3	Year 4	Year 5
Expected Dividends =	$34.72	$38.30	$42.24	$46.59	$51.39
+ Stock Buybacks					

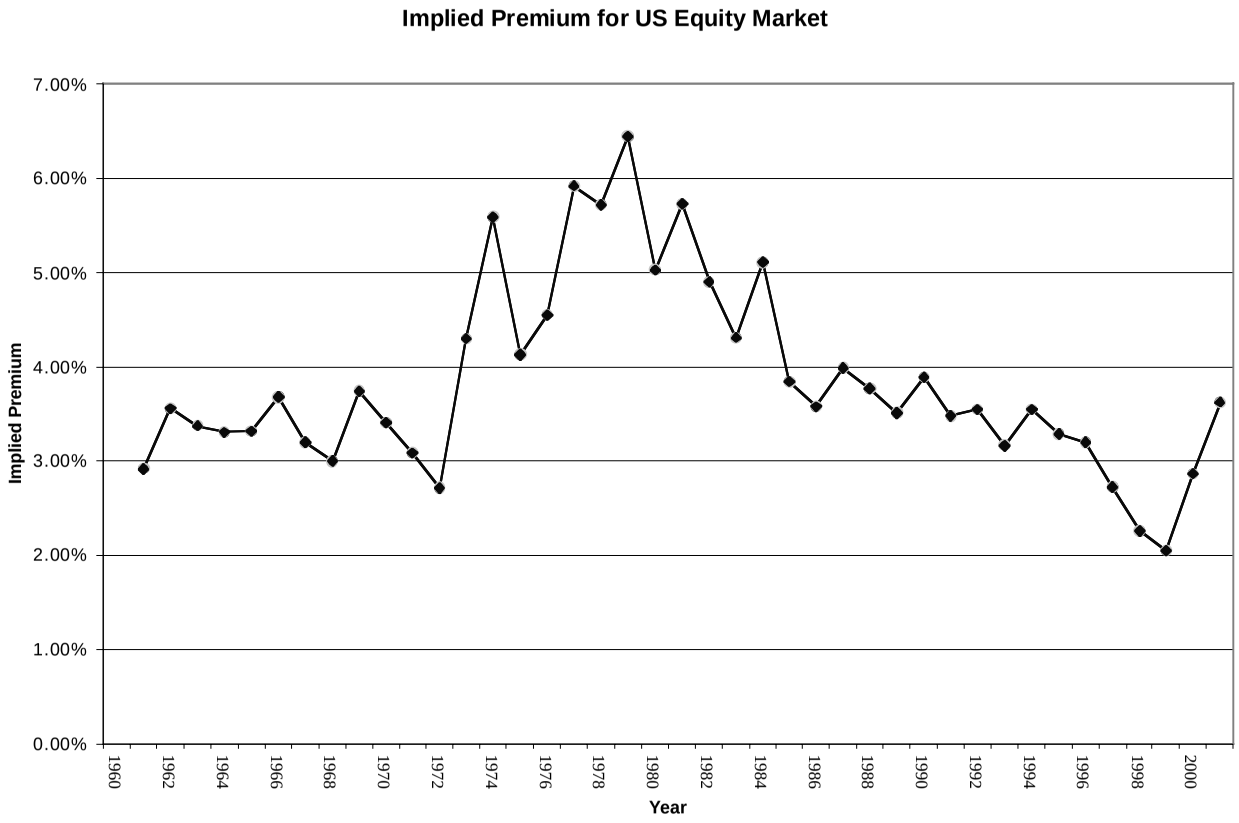
Expected dividends + buybacks in year 6 = 51.39 (1.0505) = $ 54.73

$1148 = 34.72/(1+r) + 38.30/(1+r)^2 + + 42.24/(1+r)^3 + 46.59/(1+r)^4 + (51.39+(54.73/(r-.0505))/(1+r)^5$

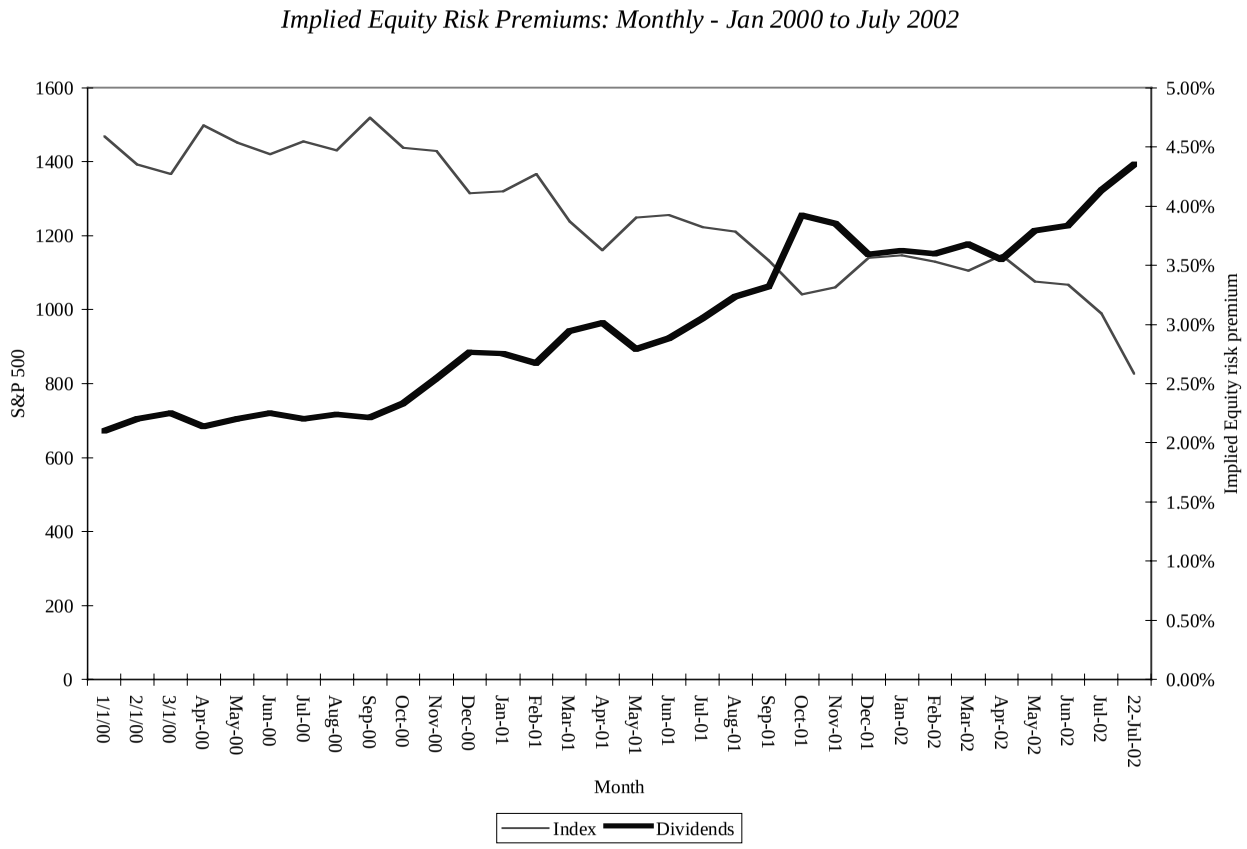
Solving for r, r = 8.67%. (Only way to do this is trial and error)

Implied risk premium = 8.67% - 5.05% = **3.62**%

U.S. Equity Risk Premiums - 1960 - 2002



Monthly Premiums: 2000 - 2002



An Intermediate Solution

- The historical risk premium of 5.17% 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 Greek Market: May 1, 2002

- Level of the Index = 2592
- Dividends on the Index = 3.55% of 2592 (Used weighted yield)
- Other parameters
  - Riskfree Rate = 5.10% (Euros)
  - Expected Growth (in Euros)
    - Next 5 years = 9.31% (Used expected growth rate in Earnings)
    - After year 5 = 5.10%
- Solving for the expected return:
  - Expected return on Equity = 9.53%
  - Implied Equity premium = 9.53% - 5.10% = 4.43%
- Effect on valuation
  - Titan's value with historiucal premium (4%) plus country (.7%) : $ 47.64
  - Tian's value with implied premium: $ 44.41

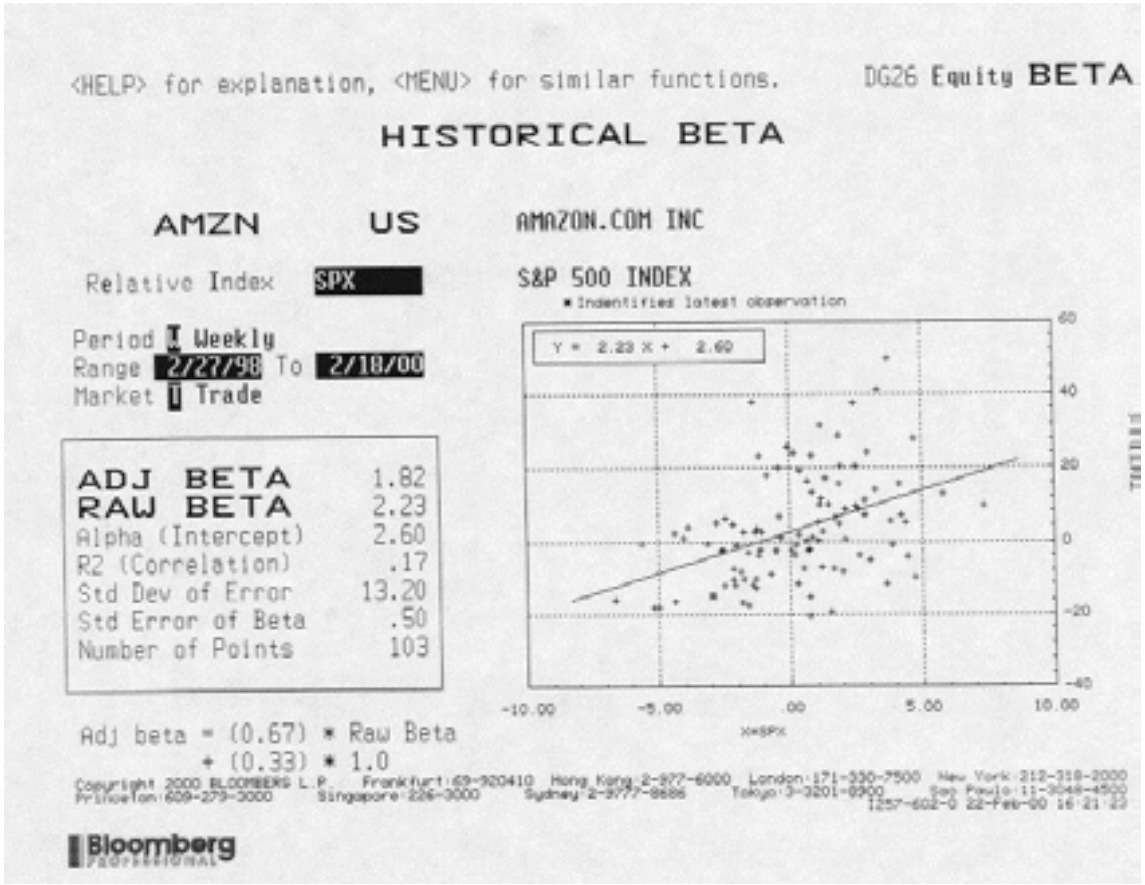
Estimating Beta

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

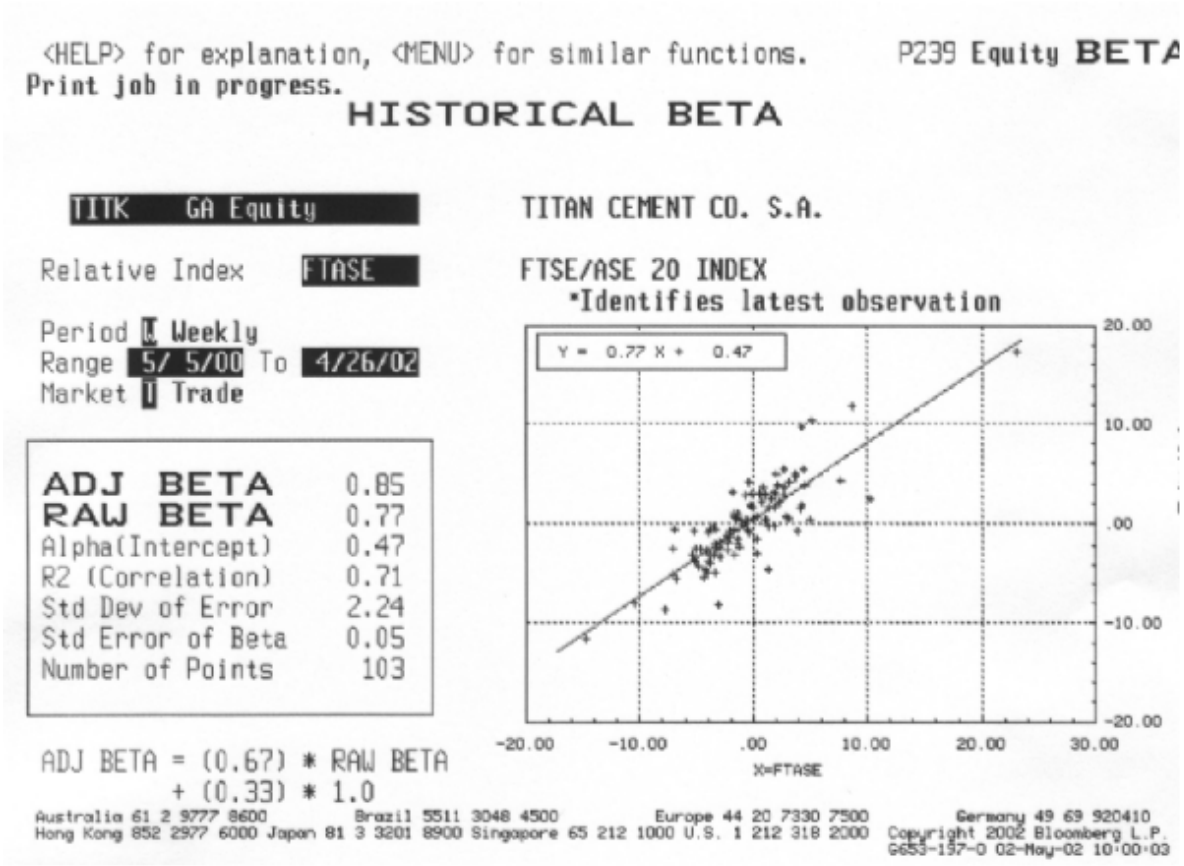
$$R_j = a + b\ R_m$$

  - 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 Titan Cement: 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. This is because 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

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

where

β_L = Levered or Equity Beta

β_u = Unlevered Beta

t = Corporate marginal tax rate

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

Titan's Bottom-up Beta

Business	*Unlevered*	*D/E Ratio*	*Levered beta*	*Proportion of Value*
Cement	.82	25.21%	0.98	100%

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

= 0.82 (1 + (1-.2449) (.2521)) = 0.98

A Hypothetical scenario: Assume that Titan had been in two businesses- cement and technology. You could estmate a beta for the combined firm as follows

		Comparable firms				
Business	*Revenues*	*Value/Sales*	*Unlevered beta*	*Value*	*Weight*	*Weight*Beta*
Cement	623	3.0	0.82	1869	79%	.79*.82
Technology	100	5.0	1.20	500	21%	.21*1.20
Firm						=.90

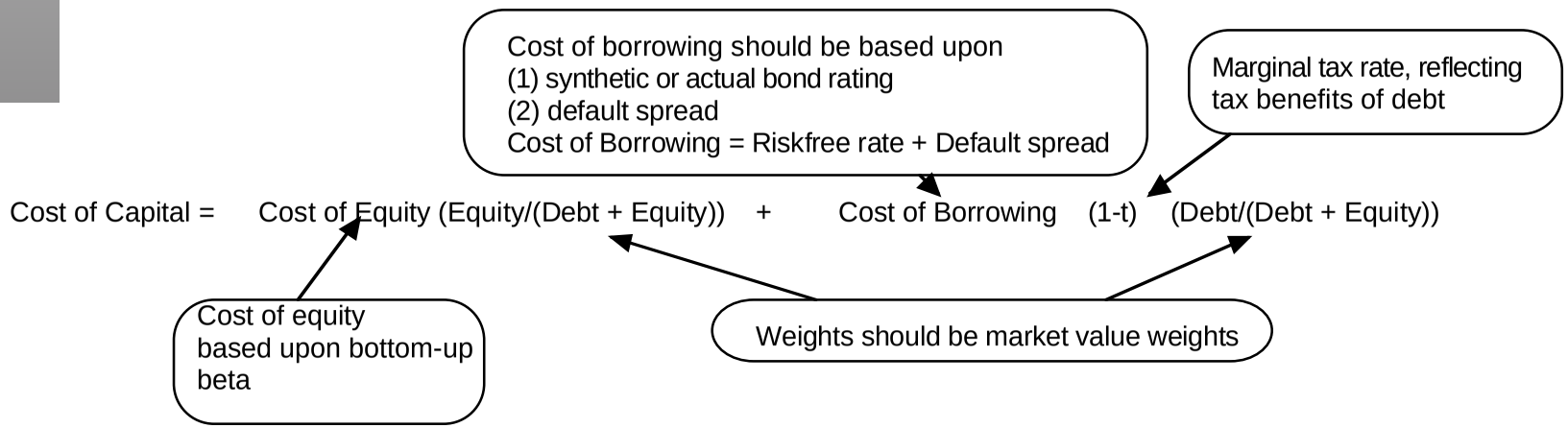
Amazon's Bottom-up Beta

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



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

  Interest Coverage Ratio = EBIT / Interest Expenses

- For Titan's interest coverage ratio, we used the interest expenses and EBIT from 2000.

  Interest Coverage Ratio = 186.40/ 26 = 7.17

- 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(1/01)
> 8.50	AAA	0.20%	0.75%
6.50 - 8.50	AA	0.50%	1.00%
5.50 - 6.50	A+	0.80%	1.50%
4.25 - 5.50	A	1.00%	1.80%
3.00 - 4.25	A–	1.25%	2.00%
2.50 - 3.00	BBB	1.50%	2.25%
2.00 - 2.50	BB	2.00%	3.50%
1.75 - 2.00	B+	2.50%	4.75%
1.50 - 1.75	B	3.25%	6.50%
1.25 - 1.50	B –	4.25%	8.00%
0.80 - 1.25	CCC	5.00%	10.00%
0.65 - 0.80	CC	6.00%	11.50%
0.20 - 0.65	C	7.50%	12.70%
< 0.20	D	10.00%	15.00%

Estimating the cost of debt for a firm

- The synthetic rating for Titan Cement is A. Using the 2002 default spread of 1.80%, we estimate a cost of debt of 7.25% (using a riskfree rate of 5.1% and adding in the country defualt spread of 0.35%):

  Cost of debt = Riskfree rate + Greek default spread + Company default spread

  =5.1% + 0.35%+ 1.80% = 7.25%

- The synthetic rating for Amazon.com in 2000was 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%

- After-tax cost of debt = 8.00% (1- 0) = 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: Titan Cements

- Equity
  - Cost of Equity = 5.10% + 0.98 (4%+ 0.70%) = 9.71 %
  - Market Value of Equity =1517 million Euros (79.9%)
- Debt
  - Cost of debt = 5.10% + 0.35% +1.80%= 7.25%
  - Market Value of Debt = 382 million Euros (20.1%)
- Cost of Capital

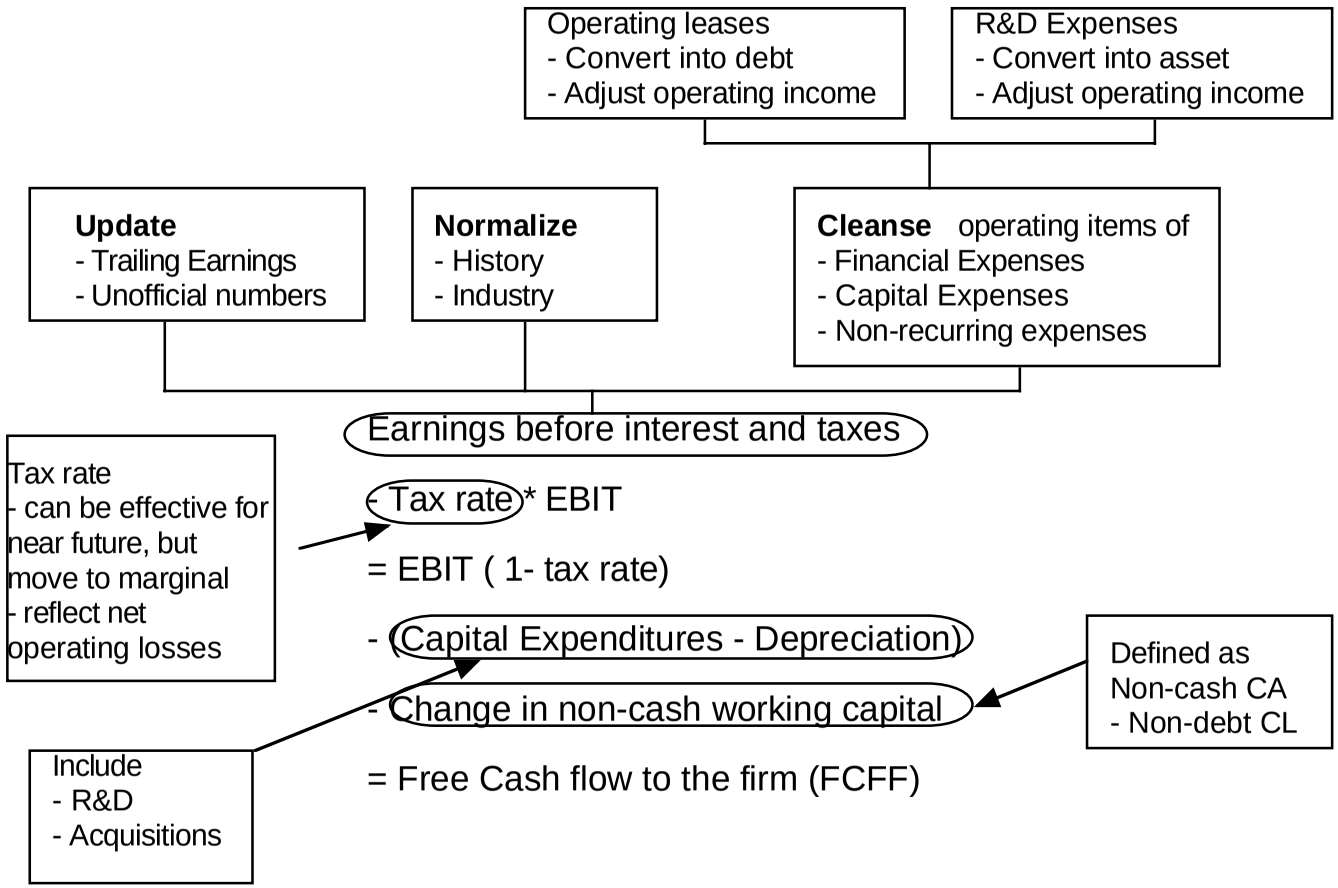
Cost of Capital = 9.71 % (.799) + 7.25% (1- .2449) (0.201)) = 8.85%

The book value of equity at Titan Cement is 458 million Euros

The book value of debt at Titan Cement is 390 million; Interest expense is 26 mil; Average maturity of debt = 4 years

Estimated market value of debt = 26 million (PV of annuity, 4 years, 7.25%) + \$390 million/1.0725^4 = \$382 million

II. Estimating Cash Flows to Firm



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

- The valuation of Titan is dated because there have been no financial statements released since the last 10K.

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 = Add back R&D and subtract 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: Titan Cement

- EBIT = 186.4 million Euros
- Tax rate = 24.49%
- Net Capital expenditures = Cap Ex - Depreciation = 459-41 = 418 million
- Change in Working Capital = 77.1 million

Estimating FCFF (2000)

Current EBIT * (1 - tax rate) =	186.4 (1-.2449) = 141	Million Euros
- (Capital Spending - Depreciation)	418	
- Change in Working Capital	77	
Current FCFF	-355	Million Euros

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 Net Cap Ex: Titan Cements

	1997	*1998*	*1999*	*2000*	*2001*	*Total*
Cp Ex	$25.09	$37.11	$136.65	$50.54	$81.00	$330.39
Depreciation	$13.53	$20.08	$89.53	$39.26	$40.87	$203.27
EBIT	$86.39	$100.64	$122.55	$162.78	$186.39	
EBIT(1-t)	$65.23	$75.99	$92.54	$122.91	$140.74	$497.41
Net Cap Ex as %	17.72%	22.41%	50.92%	9.18%	28.51%	25.56%

Expected Growth Estimate: Titan Cement

- Normalized Change in working capital = (Working capital as percent of revenues) * Change in revenues in 2000 = .1511 (982.9-622.7) = 54.42 mil Eu
- Normalized Net Cap Ex = Net Cap ex as % of EBIT(1-t) * EBIT (1-t) in 2001
  = .2556*(186.4(1-.2449)) = 35.98 million Euros
- Normalized reinvestment rate = (54.42+35.98)/(186.4(1-.2449)) = 64.22%
- Return on capital = 186.4 (1-.2449)/ (448+399) = 16.62%
  - The book value of debt and equity from last year was used.
- Expected growth rate = .6422*.1662 = 10.68%

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.

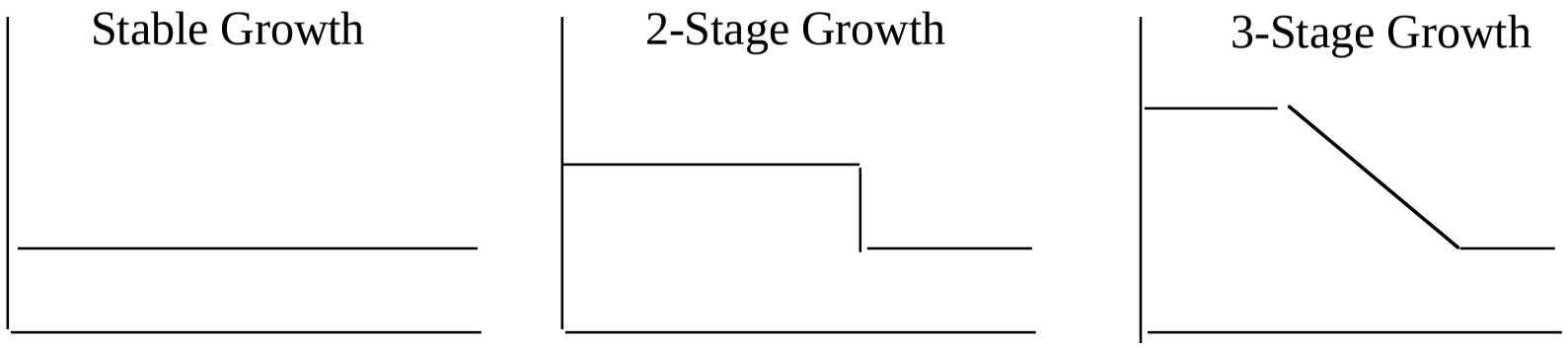
Growth in Revenues, Earnings and Reinvestment: Amazon

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)



Determinants of Growth Patterns

- Size of the firm
  - Success usually makes a firm larger. As firms become larger, 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 correlation between current growth and future growth. 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 barriers to entry and differential advantages.
  - The question of how long growth will last and how high it will be can therefore be framed as a question about what the barriers to entry are, how long they will stay up and how strong they will remain.

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

Titan and Amazon.com: Stable Growth Inputs

	High Growth	Stable Growth
Titan Cement		
• Beta	0.98	1.00
• Debt Ratio	20.10%	20.10%
• Return on Capital	16.62%	8.08%
• Cost of Capital	8.85%	8.08%
• Expected Growth Rate	10.68%	4%
• Reinvestment Rate	64.22%	4%/8.08% = 49.5%
Amazon.com		
• 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

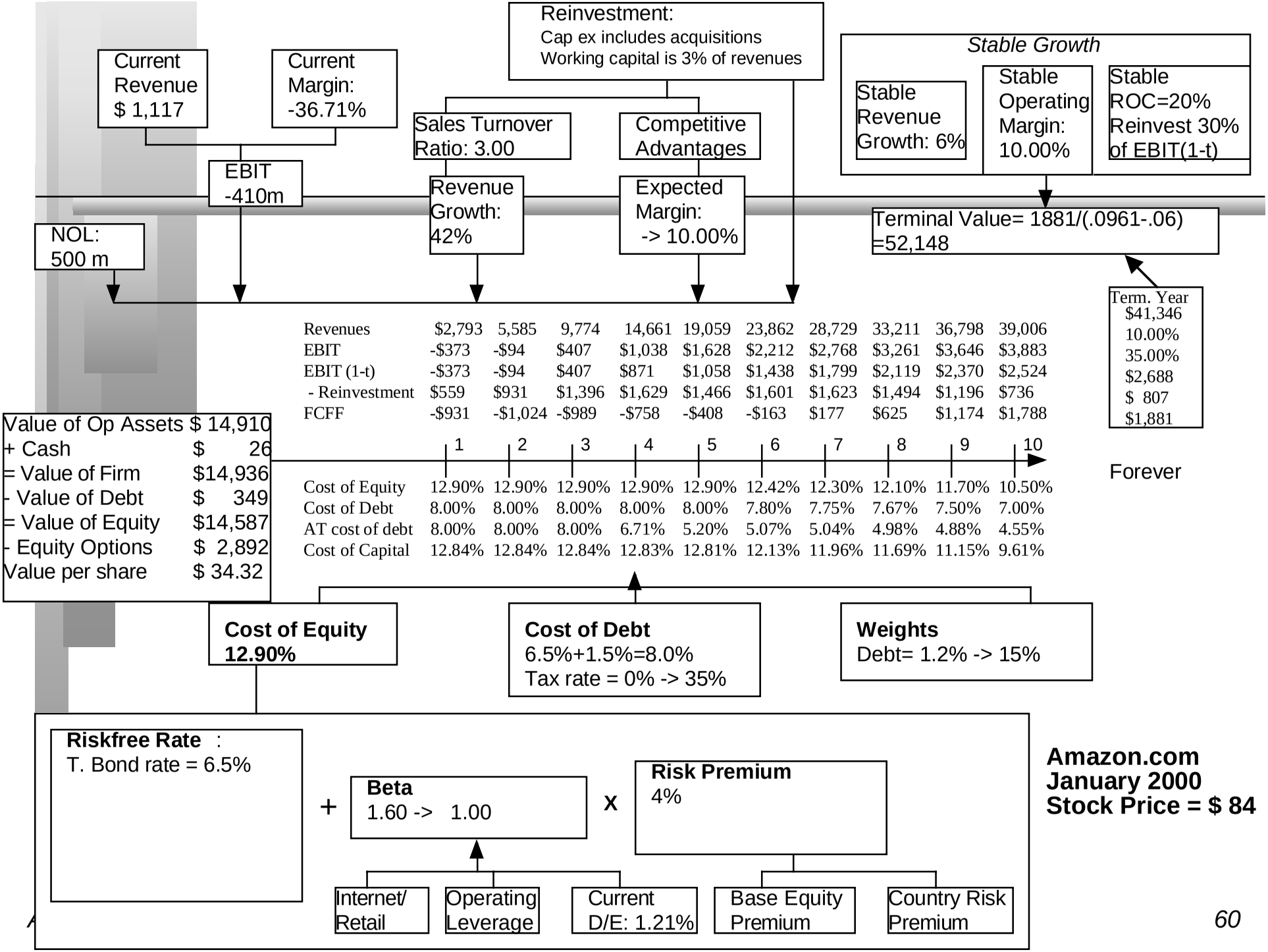
- The simplest and most direct way of dealing with cash and marketable securities is to keep them out of the valuation - the cash flows should be before interest income from cash and securities, and the discount rate should not be contaminated by the inclusion of cash. (Use betas of the operating assets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

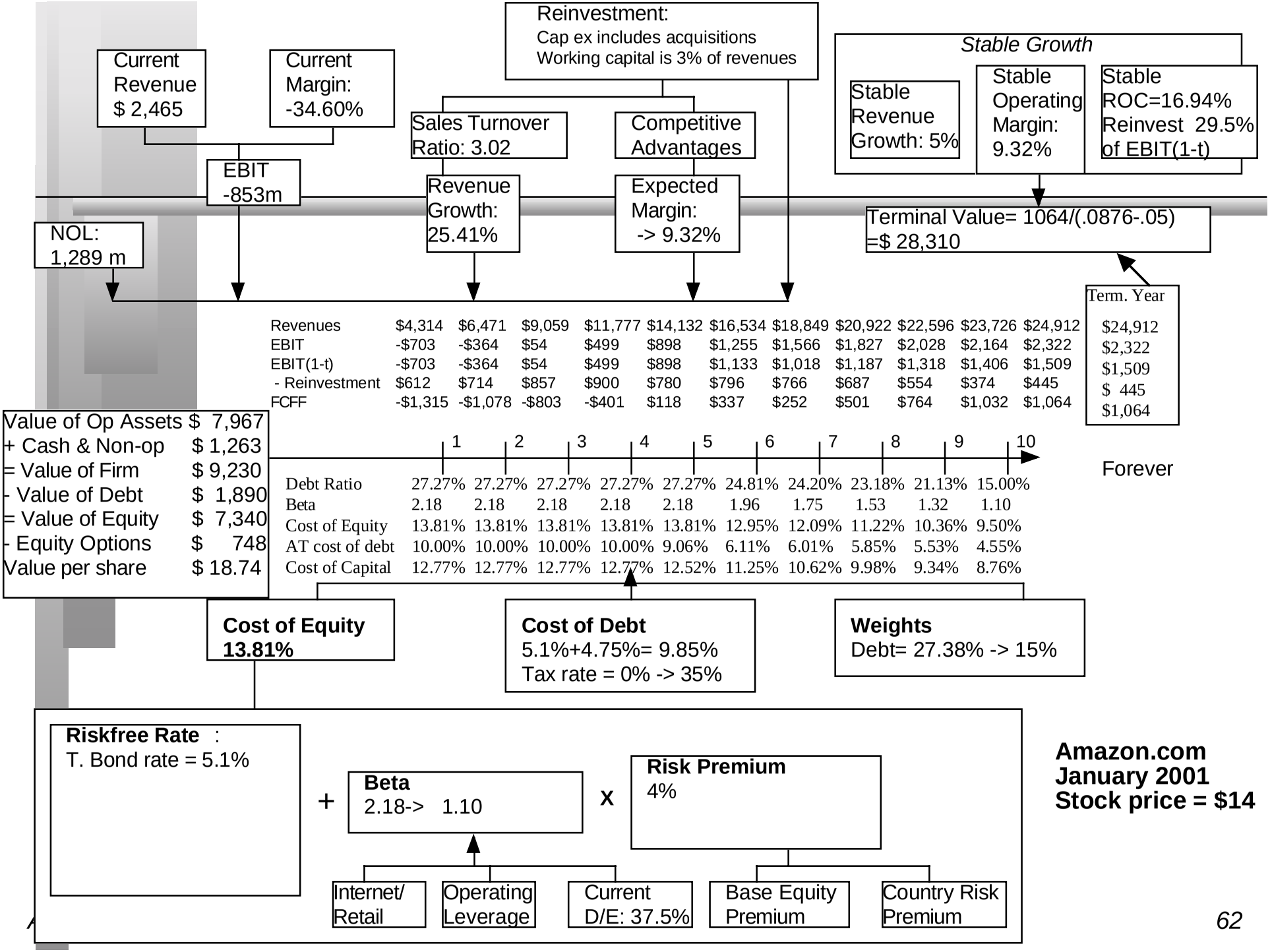
Amazon: Estimating the Value of Equity Options

- 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

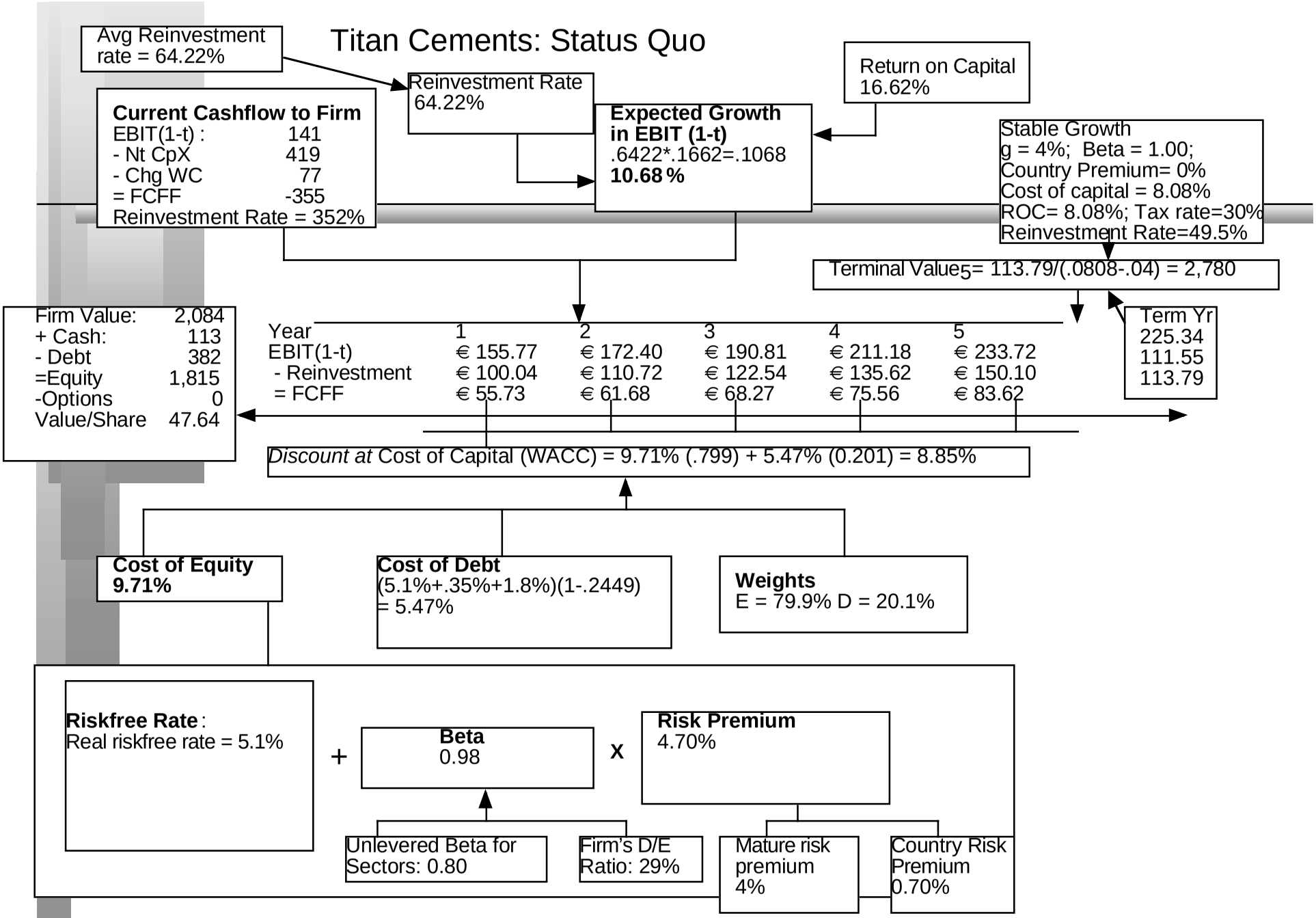

Current Revenue $ 1,117
Current Margin: -36.71%
EBIT -410m
NOL: 500 m
Reinvestment:
Cap ex includes acquisitions
Working capital is 3% of revenues
Sales Turnover Ratio: 3.00
Competitive Advantages
Revenue Growth: 42%
Expected Margin: -> 10.00%
Stable Growth
Stable Revenue Growth: 6%
Stable Operating Margin: 10.00%
Stable ROC=20% Reinvest 30% of EBIT(1-t)
Terminal Value= 1881/(.0961-.06) =52,148
Term. Year
$41,346
10.00%
35.00%
$2,688
$ 807
$1,881
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
1 2 3 4 5 6 7 8 9 10
Forever
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%
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

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


Current Revenue $ 2,465
Current Margin: -34.60%
EBIT -853m
NOL: 1,289 m
Reinvestment:
Cap ex includes acquisitions
Working capital is 3% of revenues
Sales Turnover Ratio: 3.02
Competitive Advantages
Revenue Growth: 25.41%
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
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

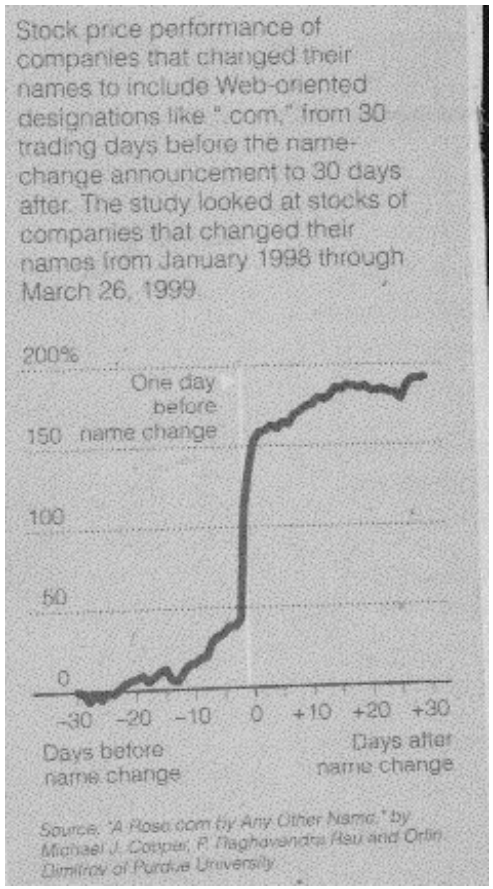
Titan Cements: Status Quo



Value Enhancement: Back to Basics

Aswath Damodaran
http://www.stern.nyu.edu/~adamodar

Price Enhancement versus Value Enhancement



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

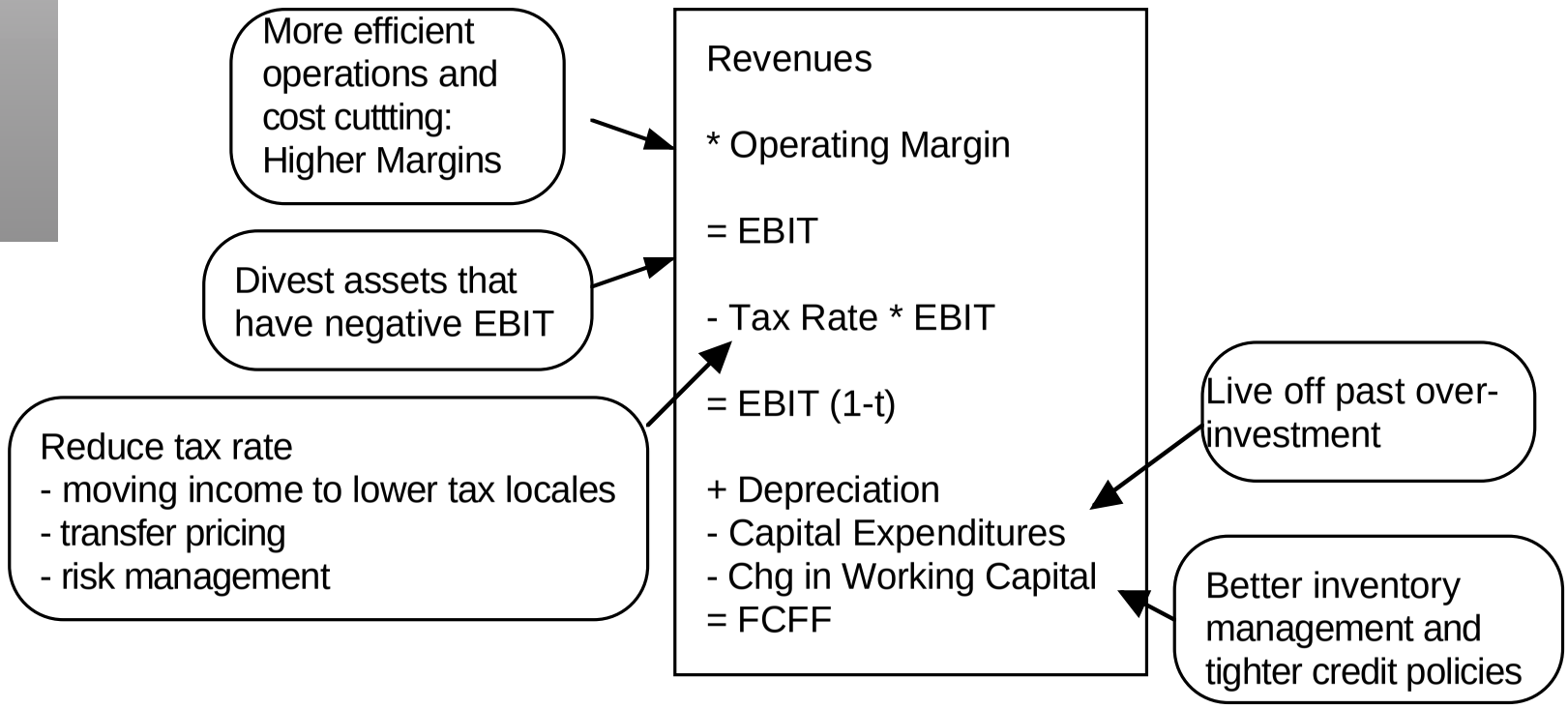
A Basic Proposition

- 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.**

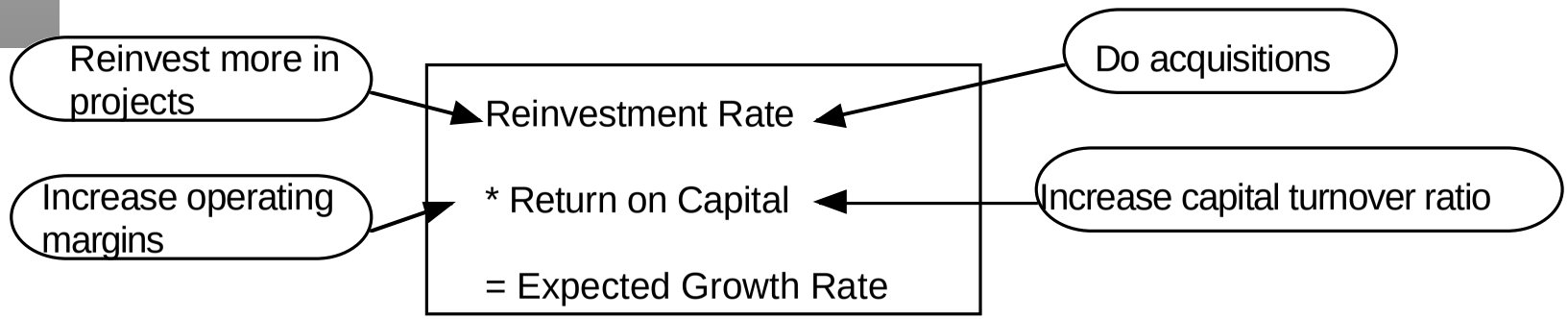
Value-Neutral Actions

- Stock splits and stock dividends 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.
- Accounting decisions that affect reported earnings but not cash flows should have no effect on value.
  - Changing inventory valuation methods from FIFO to LIFO or vice versa in financial reports but not for tax purposes
  - Changing the depreciation method used in financial reports (but not the tax books) from accelerated to straight line depreciation
  - Major non-cash restructuring charges that reduce reported earnings but are not tax deductible
  - Using pooling instead of purchase 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 tracking stock cannot create value, though they might affect perceptions and hence the price.

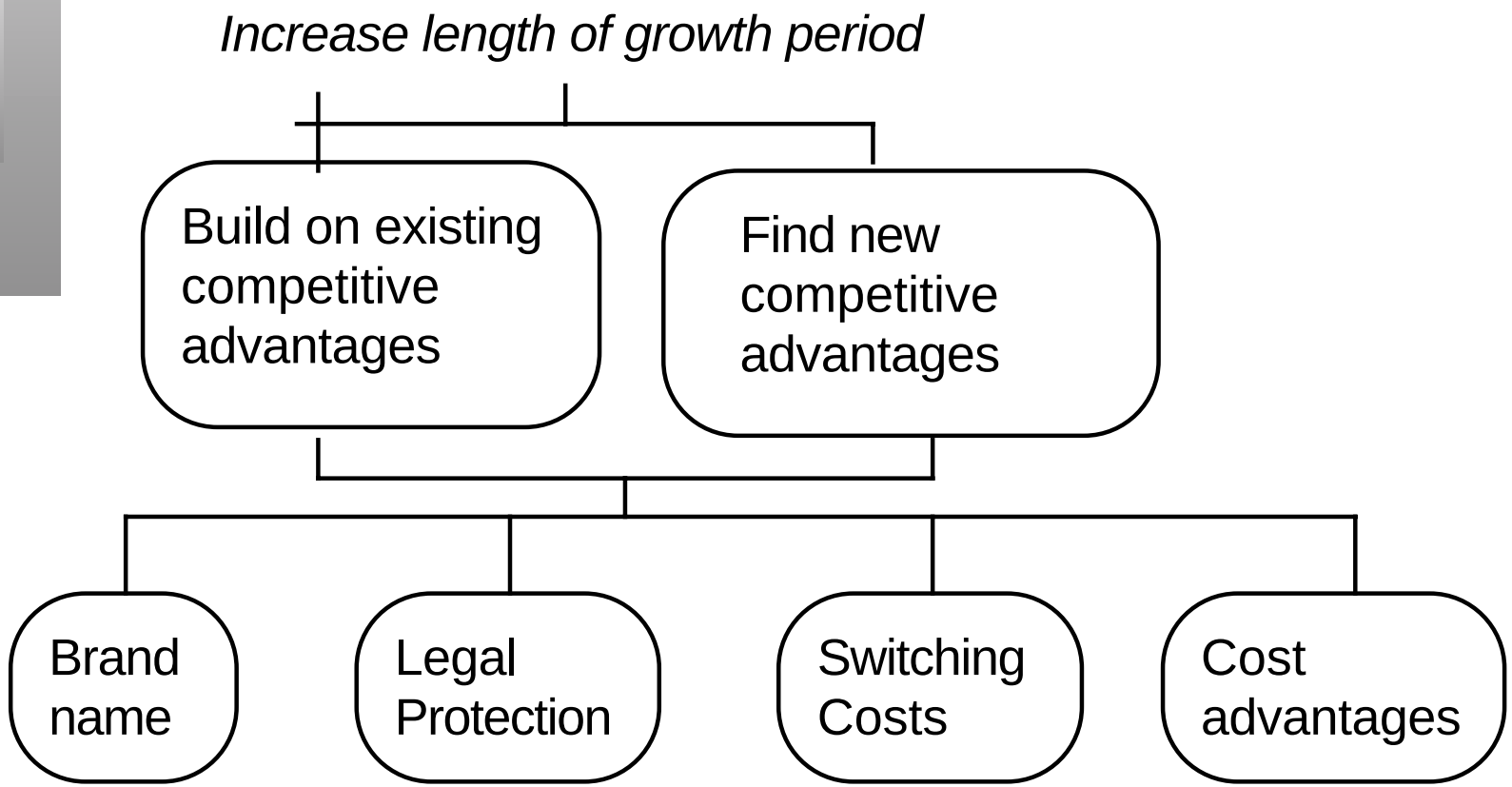
I. Ways of Increasing Cash Flows from Assets in Place



II. Value Enhancement through Growth



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



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.

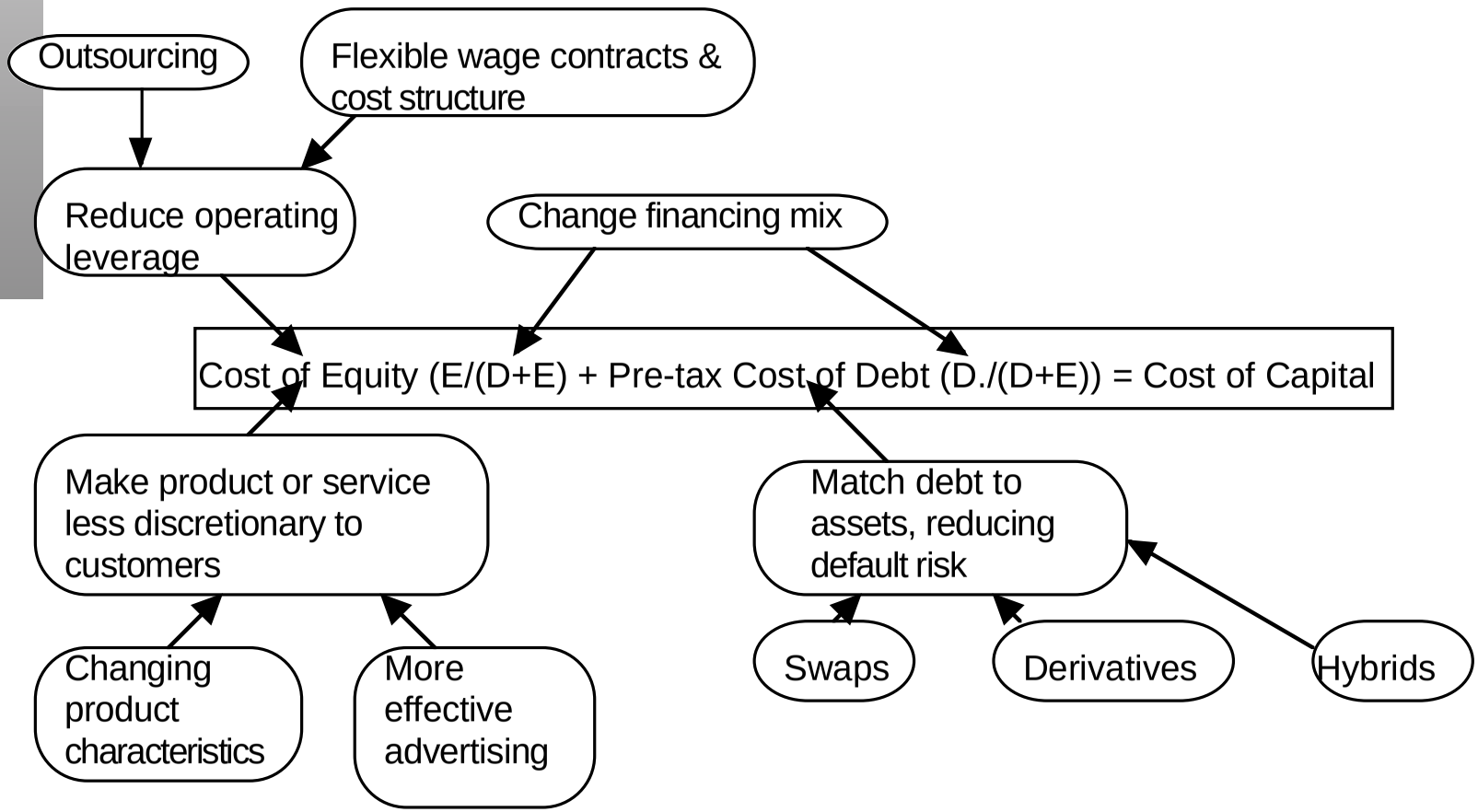
3.4: Cost Advantages

- 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 Titan Cement?
  - 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



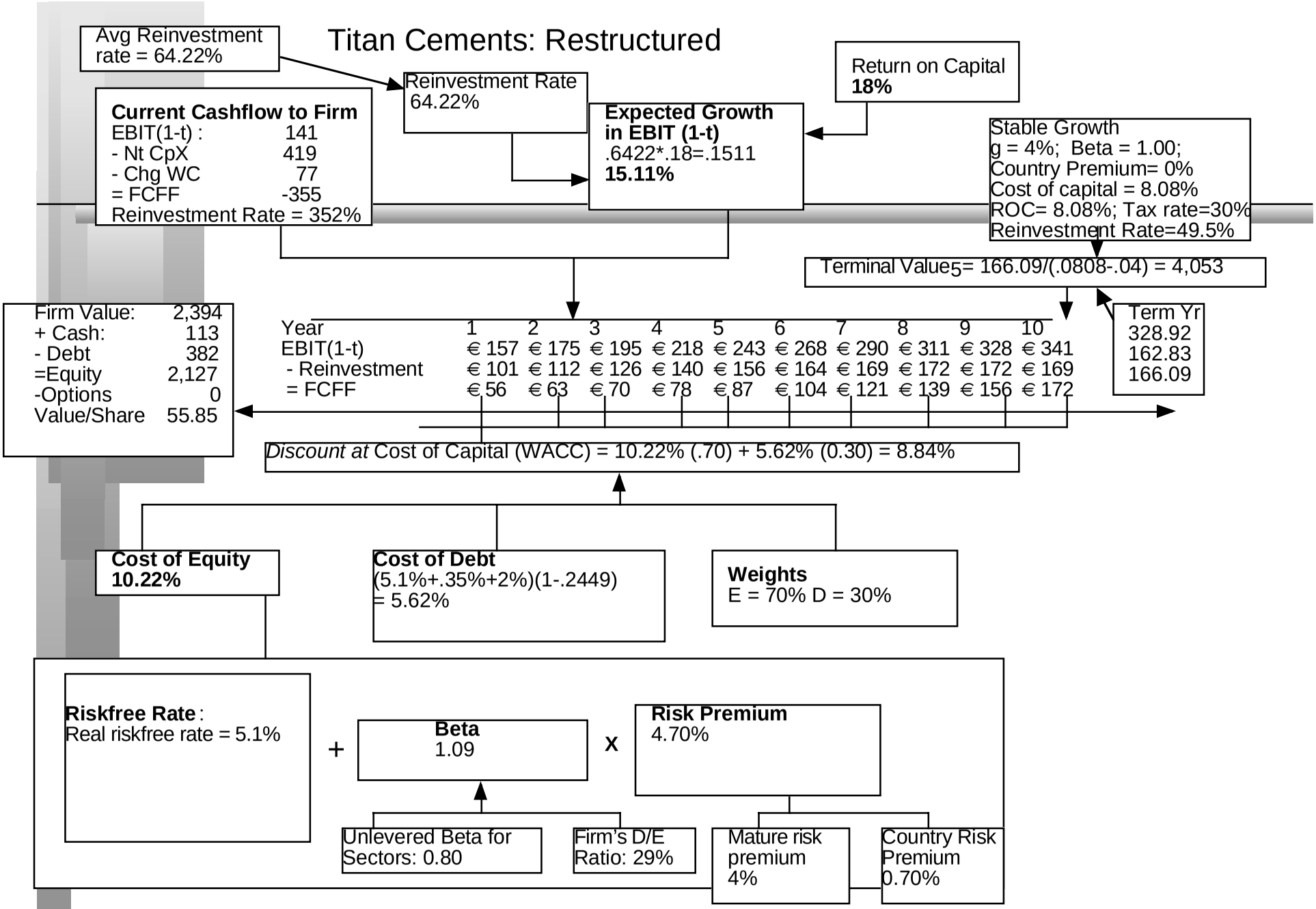
Amazon.com: Optimal Debt Ratio

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

Titan : 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%	0.83	9.02%	AAA	5.85%	30.00%	4.10%	9.02%	$1,805
10%	0.90	9.32%	AAA	5.85%	30.00%	4.10%	8.80%	$1,890
20%	0.98	9.70%	A	6.90%	30.00%	4.83%	8.73%	$1,920
30%	1.08	10.19%	A-	7.10%	30.00%	4.97%	8.62%	$1,964
40%	1.22	10.84%	B	11.60%	30.00%	8.12%	9.75%	$1,564
50%	1.42	11.76%	CCC	15.10%	30.00%	10.57%	11.16%	$1,242
60%	1.71	13.15%	CC	16.60%	29.55%	11.69%	12.28%	$1,065
70%	2.28	15.84%	CC	16.60%	25.33%	12.40%	13.43%	$926
80%	3.48	21.44%	C	17.80%	20.67%	14.12%	15.58%	$740
90%	6.95	37.78%	C	17.80%	18.37%	14.53%	16.85%	$659

Titan Cements: Restructured



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

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