Valuation

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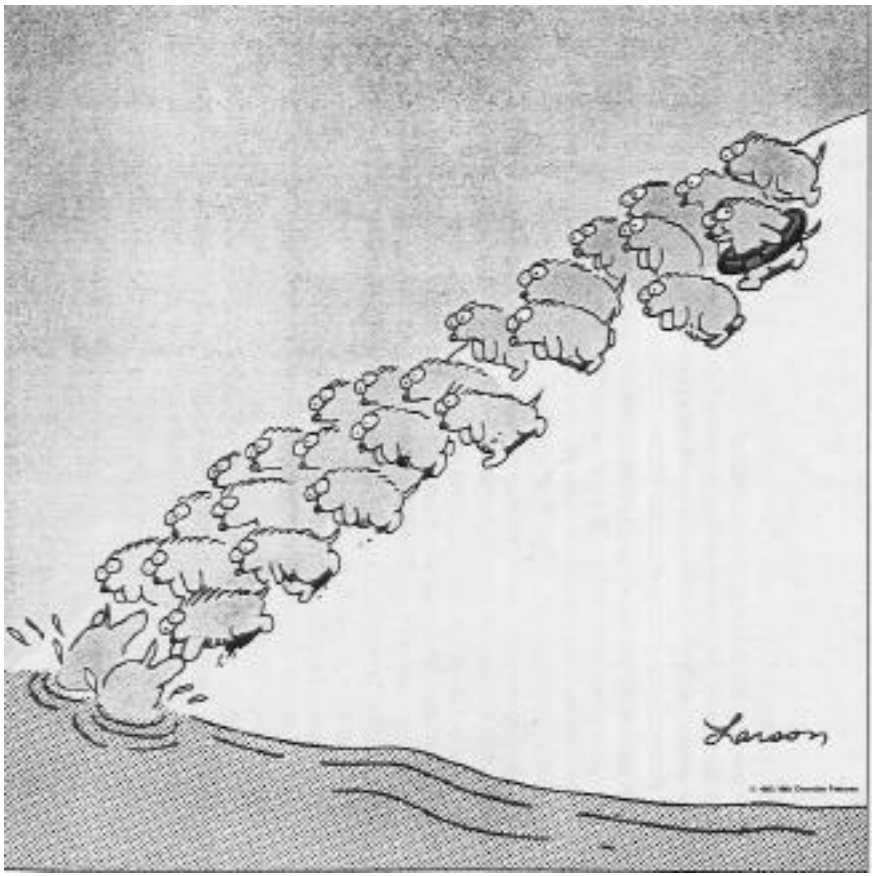
The material for this presentation is available under seminars

Some Initial Thoughts

" One hundred thousand lemmings cannot be wrong"

Graffiti



A philosophical basis for Valuation

- Many investors believe that the pursuit of 'true value' based upon financial fundamentals is a fruitless one in markets where prices often seem to have little to do with value.
- There have always been investors in financial markets who have argued that market prices are determined by the perceptions (and misperceptions) of buyers and sellers, and not by anything as prosaic as cashflows or earnings.
- Perceptions matter, but they cannot be all the matter.
- Asset prices cannot be justified by merely using the "bigger fool" theory.

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.

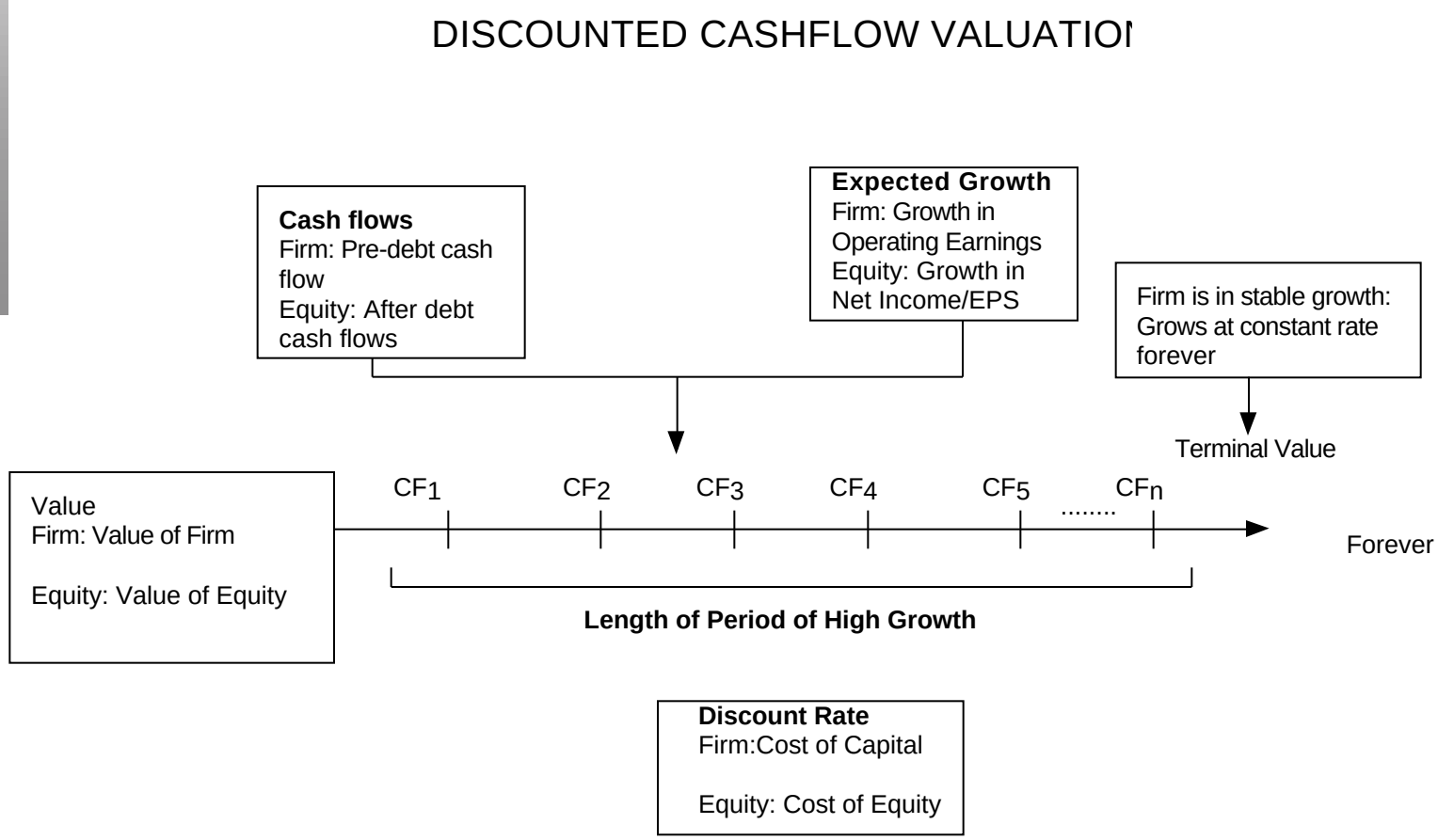
$$\text{Value of Firm} = \sum_{t=1}^{t=n} \frac{\text{CF to Firm}_t}{(1+\text{WACC})^t}$$

where,

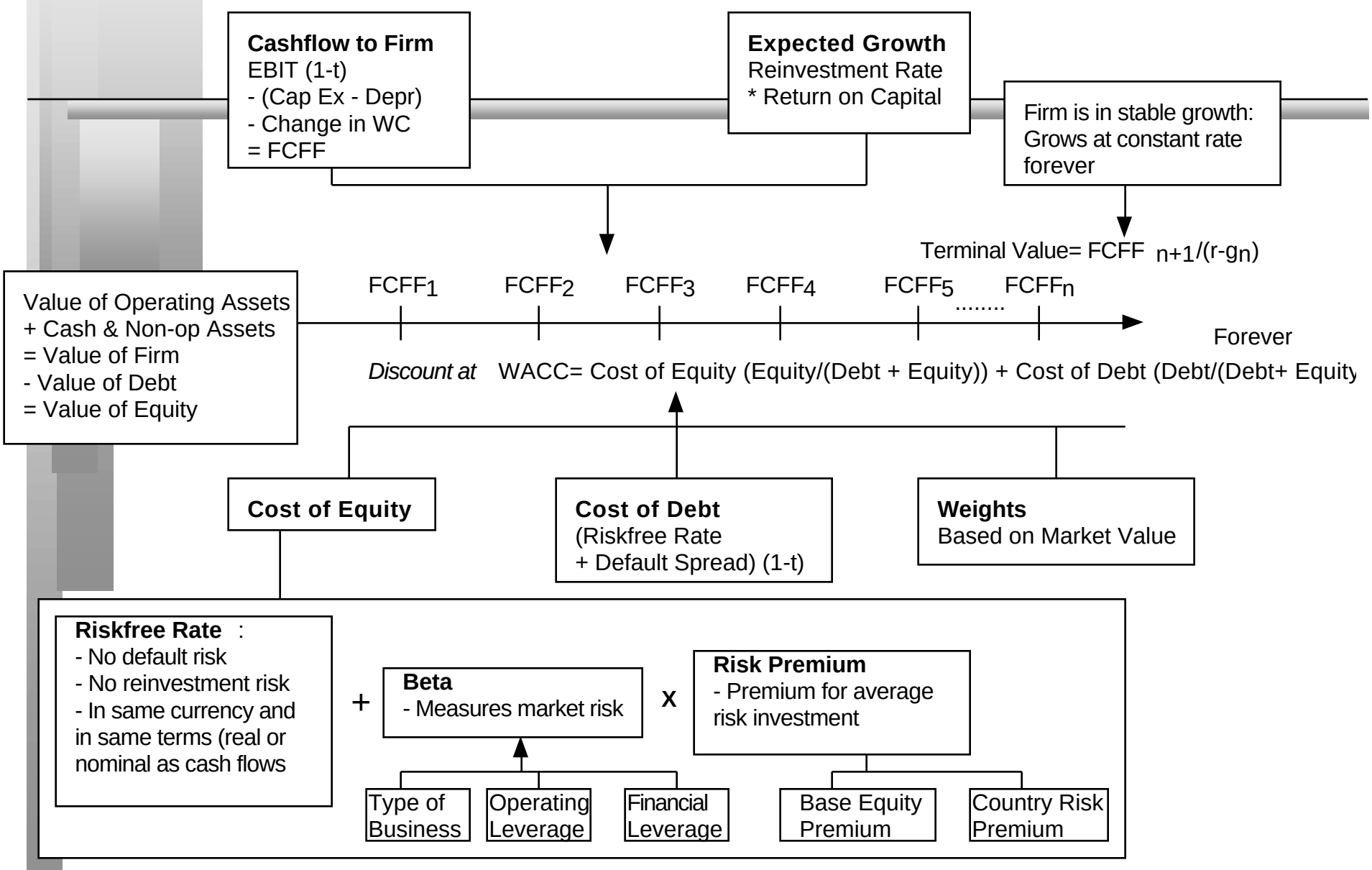
CF to Firm_t = Expected Cashflow to Firm in period t

WACC = Weighted Average Cost of Capital

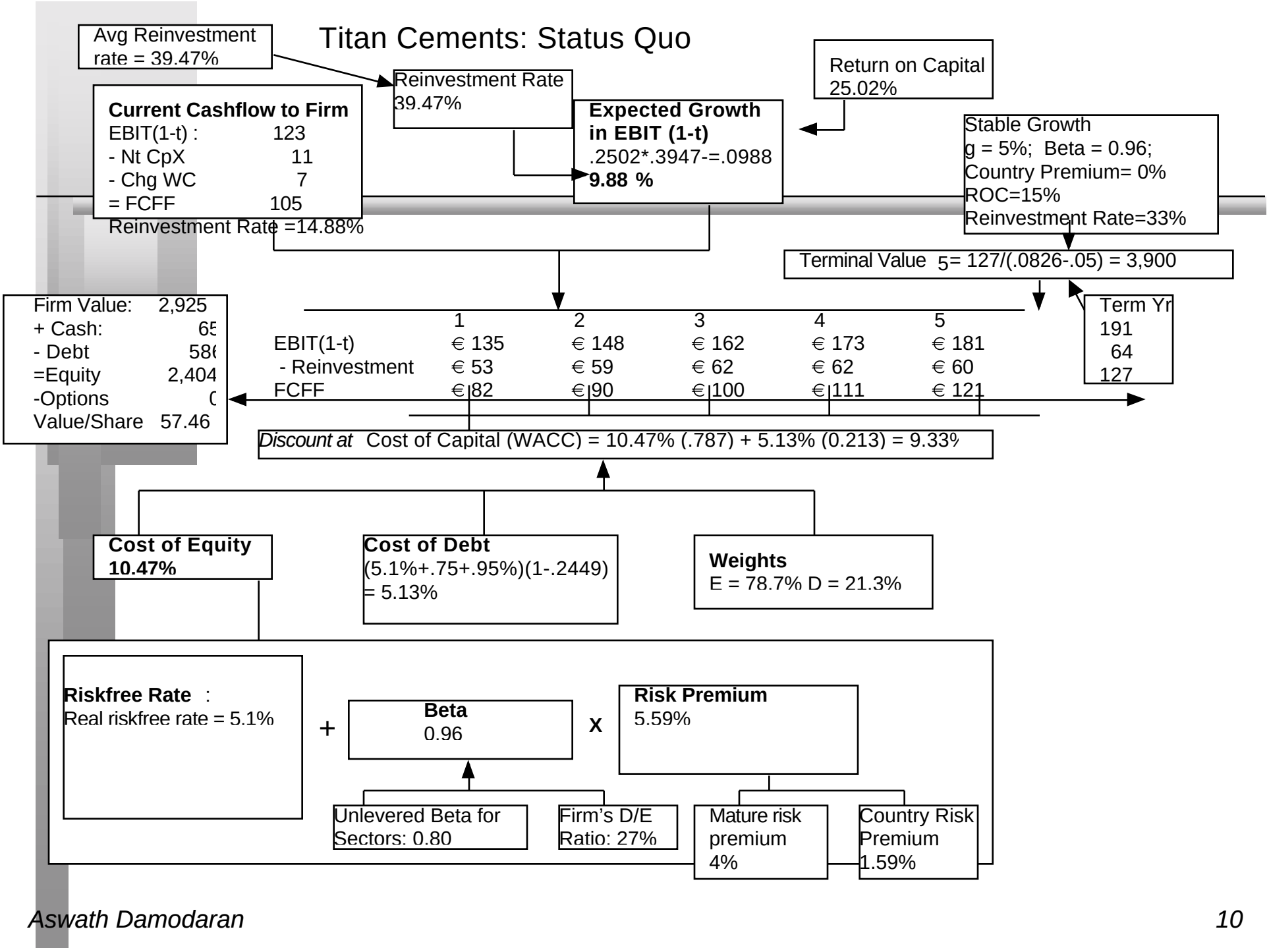
Generic DCF Valuation Model



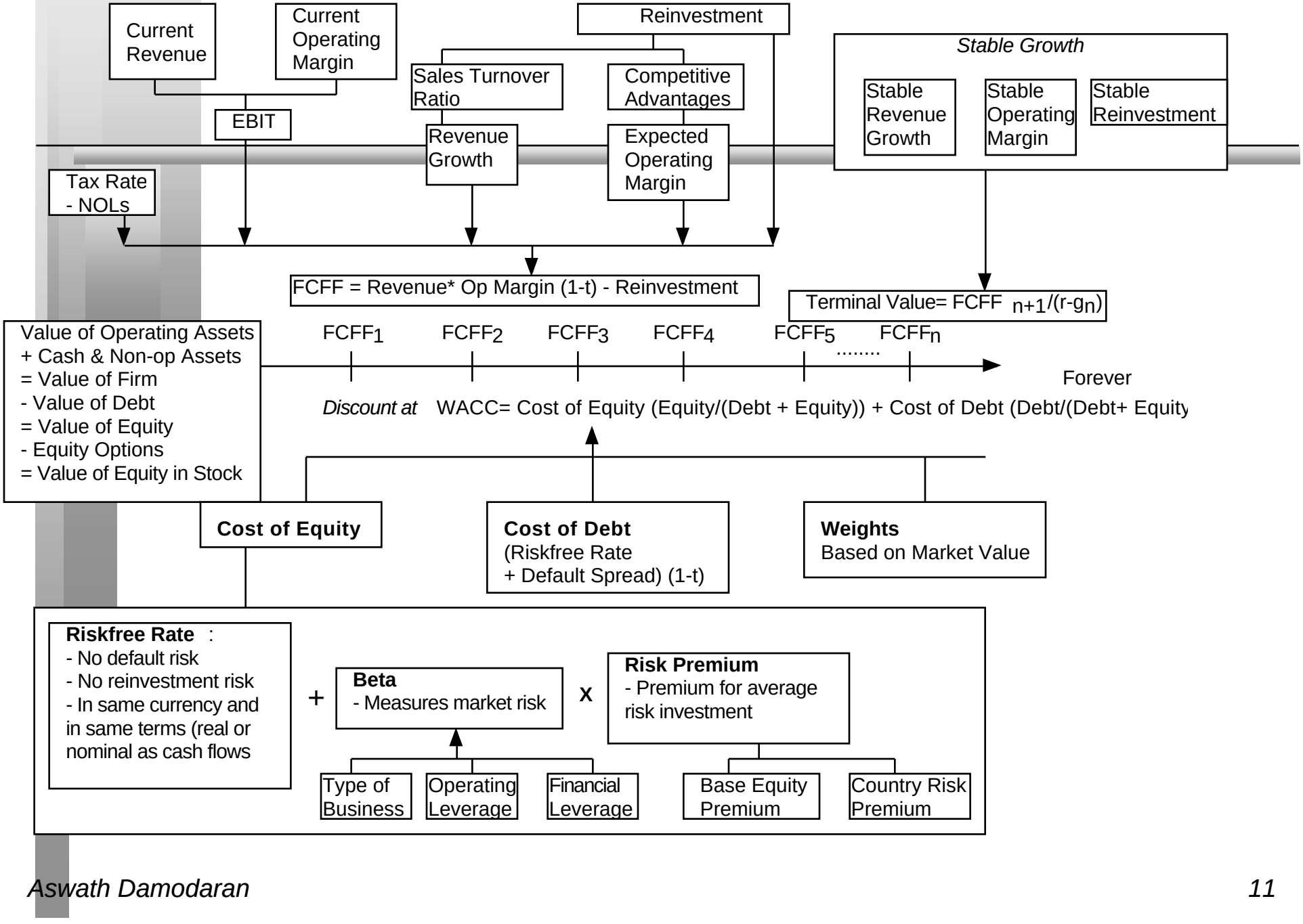
DISCOUNTED CASHFLOW VALUATIOI

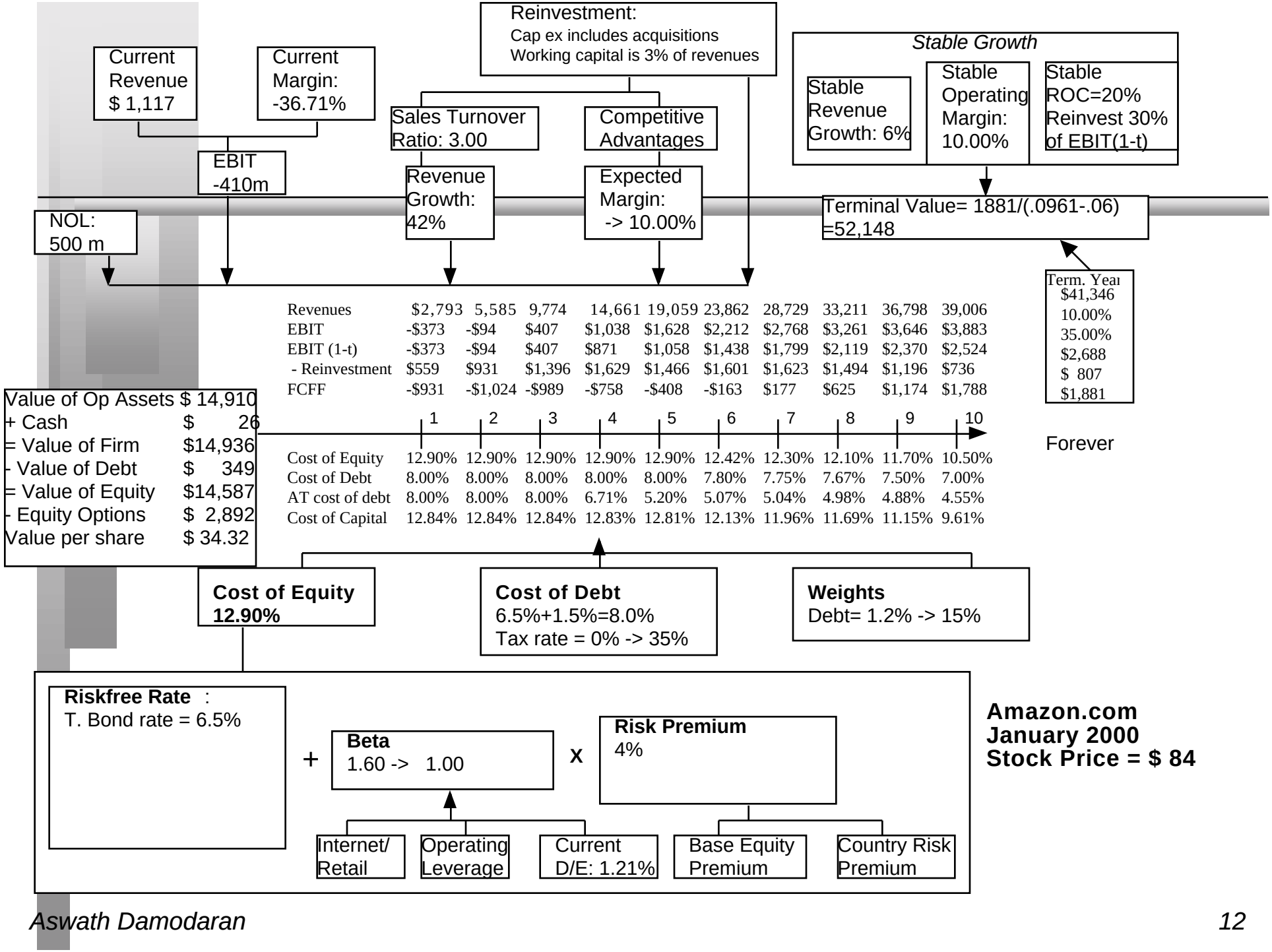


Titan Cements: Status Quo

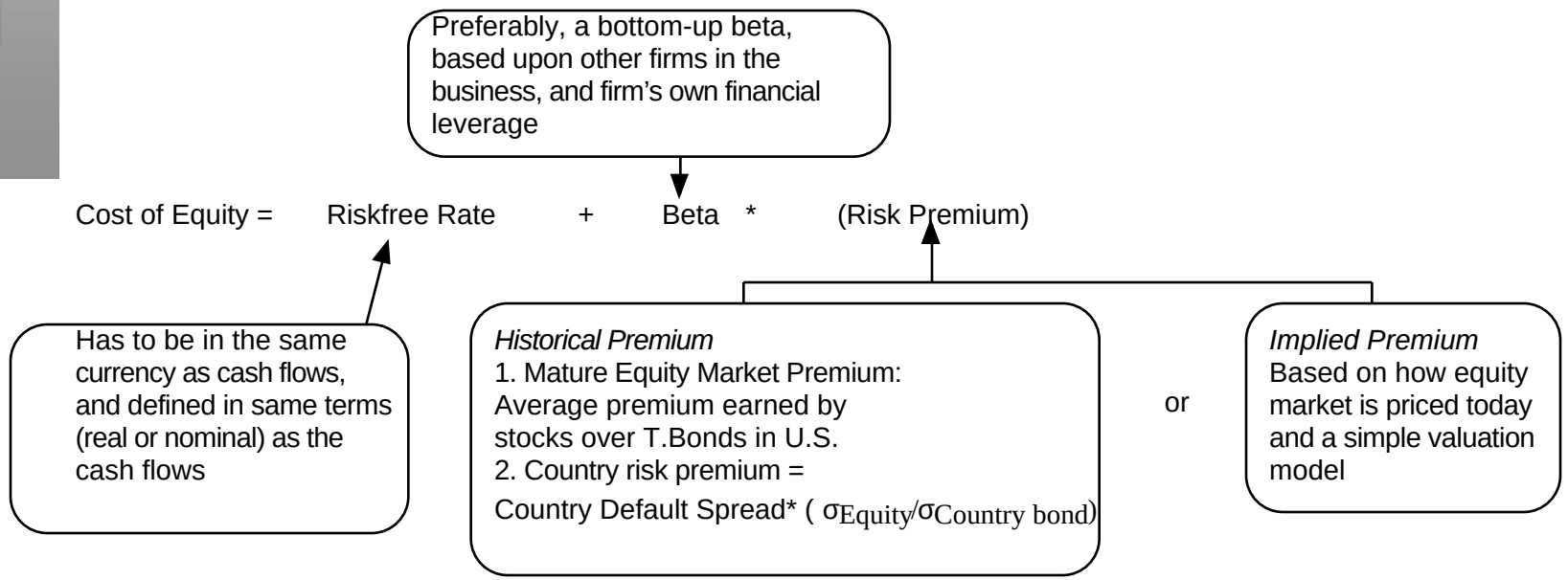


Discounted Cash Flow Valuation: High Growth with Negative Earnings




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
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

I. Discount Rates: Cost of Equity



Short term Governments are not risk free

- On a riskfree asset, the actual return is equal to the expected return. Therefore, there is no variance around the expected return.
- For an investment to be riskfree, then, it has to have
  - No default risk
  - No reinvestment risk
- Thus, the riskfree rates in valuation will depend upon when the cash flow is expected to occur and will vary across time
- A simpler approach is to match the duration of the analysis (generally long term) to the duration of the riskfree rate (also long term)
- In emerging markets, there are two problems:
  - The government might not be viewed as riskfree (Brazil, Indonesia)
  - There might be no market-based long term government rate (China)

Estimating a Riskfree Rate

- Estimate a riskfree rate in local terms:
  - Approach 1: Government bond rate in local currency terms - Default spread for Government in local currency
  - Approach 2: Use forward rates and the riskless rate in an index currency (say Euros or dollars) to estimate the riskless rate in the local currency.
- Do the analysis in real terms (rather than nominal terms) using a real riskfree rate, which can be obtained in one of two ways –
  - from an inflation-indexed government bond, if one exists
  - set equal, approximately, to the long term real growth rate of the economy in which the valuation is being done.
- Do the analysis in another more stable currency, say US dollars.

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
  - The interest rate on a Euro-denominated bond issued by a government with no perceived default risk

In Practice: Choose your riskfree rate

- What riskfree rate will you use in your valuation?
  - Nominal or real
  - Currency
- Why?

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*
1928-2000	8.41%	7.17%	6.53%	5.51%
1962-2000	6.41%	5.25%	5.30%	4.52%
1990-2000	11.42%	7.64%	12.67%	7.09%

If you choose to use historical premiums….

- Go back as far as you can. A risk premium comes with a standard error. Given the annual standard deviation in stock prices is about 25%, the standard error in a historical premium estimated over 25 years is roughly:

  Standard Error in Premium = 25%/√25 = 25%/5 = 5%

- Be consistent in your use of the riskfree rate. Since we argued for long term bond rates, the premium should be the one over T.Bonds
- Use the geometric risk premium. It is closer to how investors think about risk premiums over long periods.
- Never use historical risk premiums estimated over short periods.
- For emerging markets, start with the base historical premium in the US and add a country spread, based upon the country rating and the relative equity market volatility.

Assessing Country Risk Using Currency Ratings: Western Europe

Country	*Rating*	*Typical Spread*	*Actual Spread*
Austria	Aaa	0	
Belgium	Aaa	0	
Denmark	Aaa	0	
Finland	Aaa	0	
France	Aaa	0	
Germany	Aaa	0	
Greece	A3	95	50
Ireland	AA2	65	35
Italy	Aa3	70	30
Netherlands	Aaa	0	
Norway	Aaa	0	
Portugal	A3	95	55
Spain	Aa1	60	30
Sweden	Aa1	60	25
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) = 26.87%
    - Standard Deviation in Greek Euro Bond = 16.1%
    - Adjusted Equity Spread = 0.95% (26.87%/16.1%) = 1.59%
- Ratings agencies make mistakes. They are often late in recognizing and building in risk.

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 0.96, 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% + 1.59% + 0.96 (5.51%) = 11.98%

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

E(Return) = 5.10% + 0.96 (5.51%+ 1.59%) = 11.92%

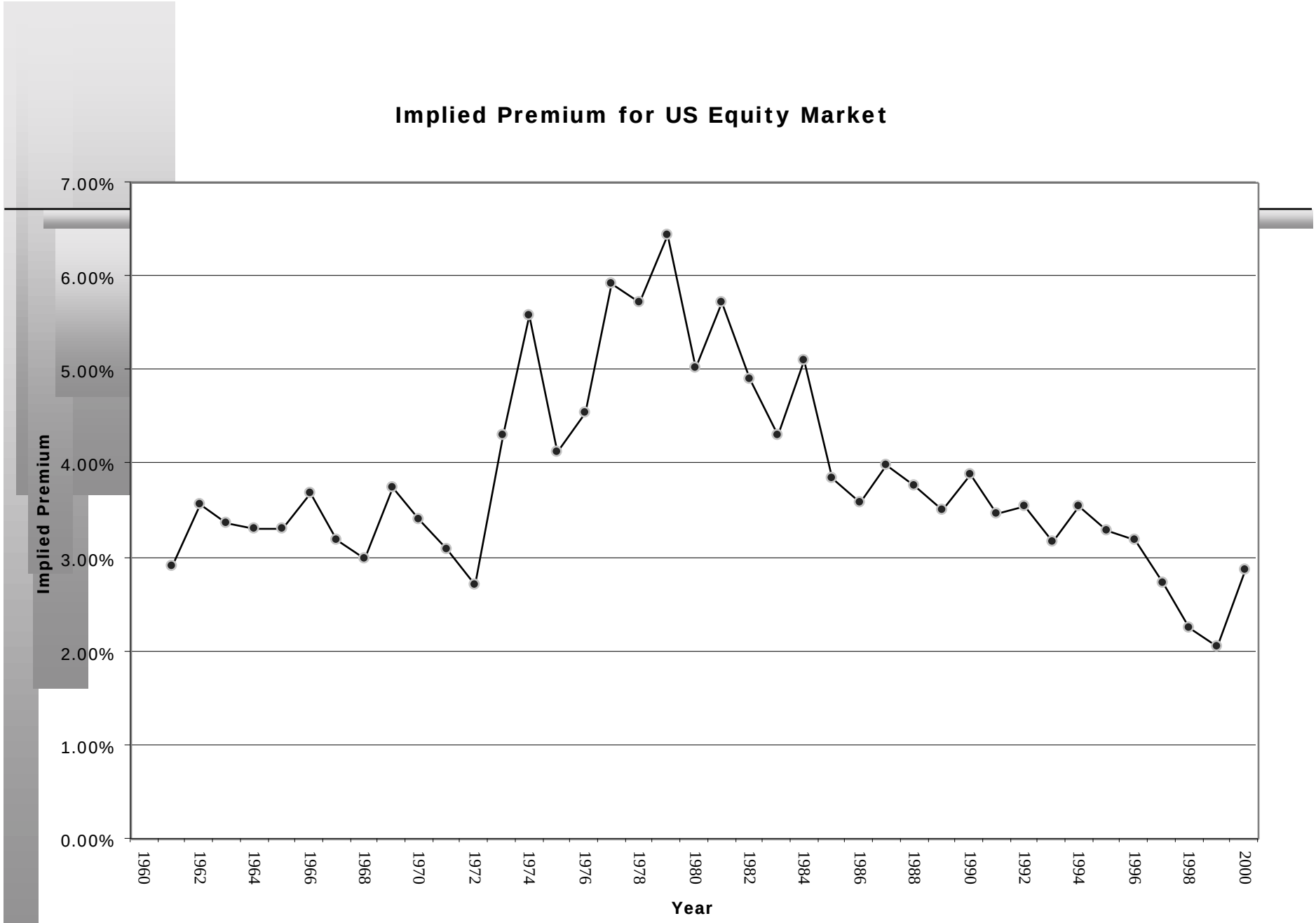
- Approach 3: Treat country risk as a separate risk factor and allow firms to have different exposures to country risk (perhaps based upon the proportion of their revenues come from non-domestic sales)

E(Return)= 5.10% + 0.96(5.51%) + 0.70 (1.59%) = 11.50%

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 Premiums

- If we use a basic discounted cash flow model, we can estimate the implied risk premium from the current level of stock prices.
- For instance, if stock prices are determined by the simple Gordon Growth Model:
  - Value = Expected Dividends next year/ (Required Returns on Stocks - Expected Growth Rate)
  - Plugging in the current level of the index, the dividends on the index and expected growth rate will yield a “implied” expected return on stocks. Subtracting out the riskfree rate will yield the implied premium.
- The problems with this approach are:
  - the discounted cash flow model used to value the stock index has to be the right one.
  - the inputs on dividends and expected growth have to be correct
  - it implicitly assumes that the market is currently correctly valued


Implied Premium for US Equity Market
7.00%
6.00%
5.00%
4.00%
3.00%
2.00%
1.00%
0.00%
Implied Premium
1960
1962
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
Year

An Intermediate Solution

- The historical risk premium of 5.51% for the United States is too high a premium to use in valuation. It is
  - As high as the highest implied equity premium that we have ever seen in the US market (making your valuation a worst case scenario)
  - Much higher than the actual implied equity risk premium in the market
- The current implied equity risk premium is too low because
  - It is lower than the equity risk premiums in the 60s, when inflation and interest rates were as low
- The average implied equity risk premium between 1960-2000 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 15, 2001

- Level of the Index = 3389
- Dividends on the Index = 3.6% of 3389 (Used weighted yield)
- Other parameters
  - Riskfree Rate = 5.10% (Euros)
  - Expected Growth (in Euros)
    - Next 5 years = 8% (Used expected growth rate in Earnings)
    - After year 5 = 5.10%
- Solving for the expected return:
  - Expected return on Equity = 9.39%
  - Implied Equity premium = 9.39% - 5.10% = 4.29%

The Effect of Using Different Equity Premiums on Value

- Titan's value per share (using historical premium for US (4%) + country risk adjustment) = 57.46 Euros
- Titan's value per share (using implied equity premium of 4.22%) = 55.11 Euros
- Titan's stock price (at the time of the valuation) = 51.84 Euros

In Practice: Estimate a risk premium

- If you were using a historical risk premium, what would your estimate of the premium be?
- If you were estimating an implied risk premium, what would your estimate be for your market?
- What would you use as your risk premium in valuation?

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 for Titan Cement: The Index Effect

HISTORICAL BETA

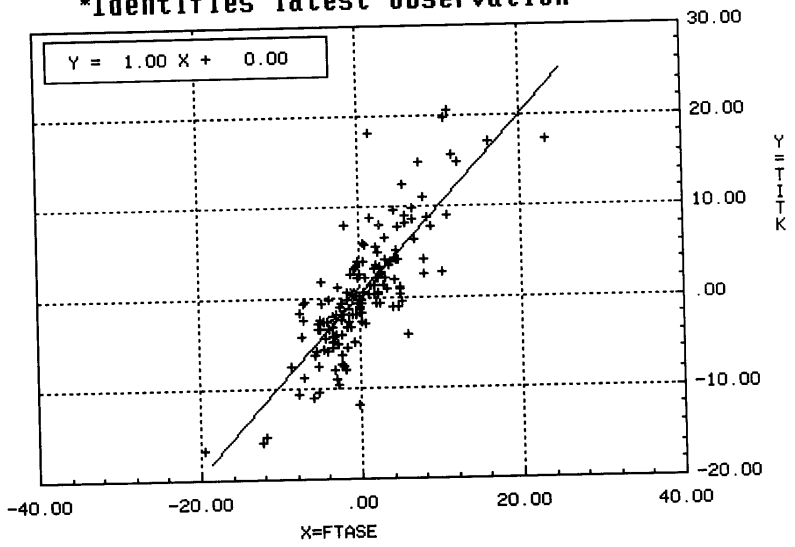
TITK GA Equity

Relative Index FTASE

Period Weekly
Range 5/ 1/98 To 4/27/01
Market Trade

TITAN CEMENT CO. S.A.

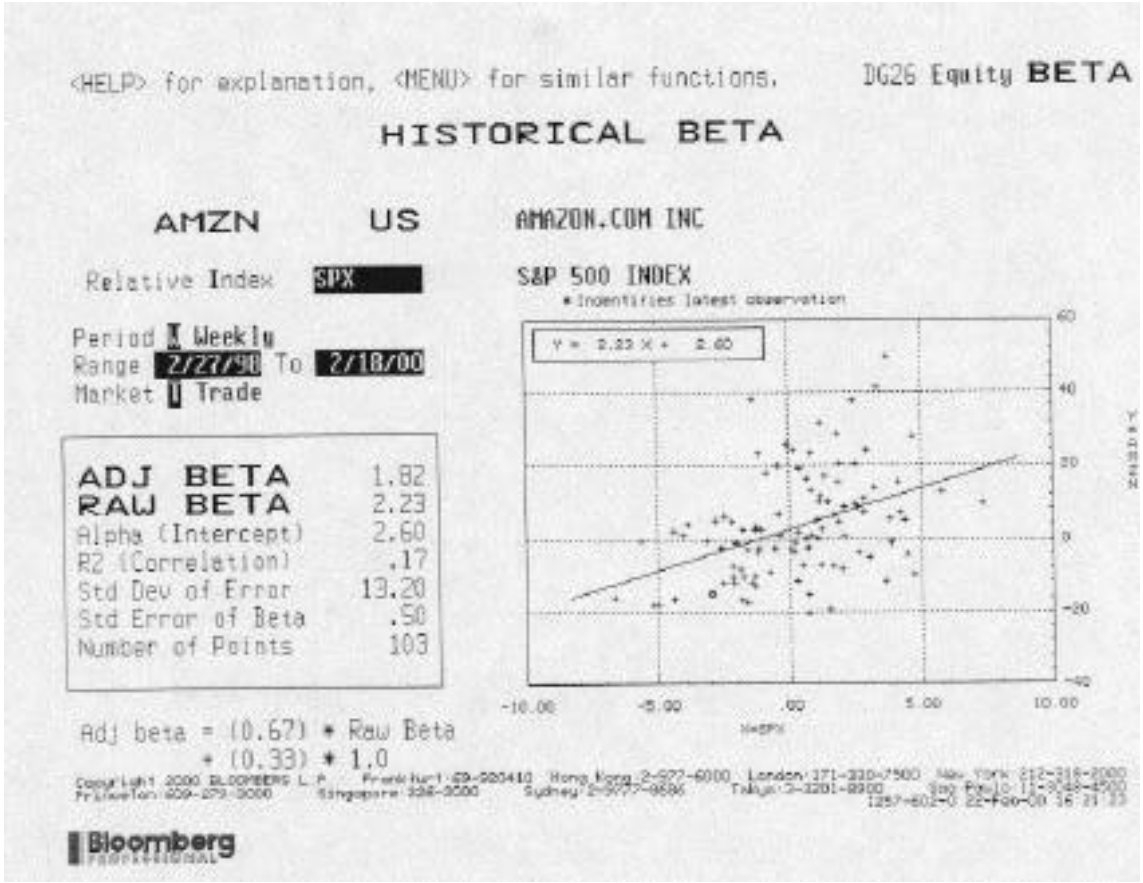
FTSE/ASE 20 INDEX
*Identifies latest observation



ADJ BETA	1.00
RAW BETA	1.00
Alpha(Intercept)	0.00
R2 (Correlation)	0.66
Std Dev of Error	3.85
Std Error of Beta	0.06
Number of Points	156

ADJ BETA = (0.67) * RAW BETA
+ (0.33) * 1.0

Beta Estimation: Amazon



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 Beta*	*D/E Ratio*	*Levered Beta*	*Proportion of Value*
Cement	.80	27.02%	0.96	100%

Levered Beta = Unlevered Beta (1 + (1- tax rate) (D/E Ratio))
= 0.80 (1 + (1-.2449) (.2702)) = 0.96

Notes on calculating debt to equity ratio

- Market value was used for equity
- Book value of debt is assumed equal to market value of debt

Amazon's Bottom-up Beta

Unlevered beta for firms in internet retailing = 1.60

Unlevered beta for firms in specialty retailing = 1.00

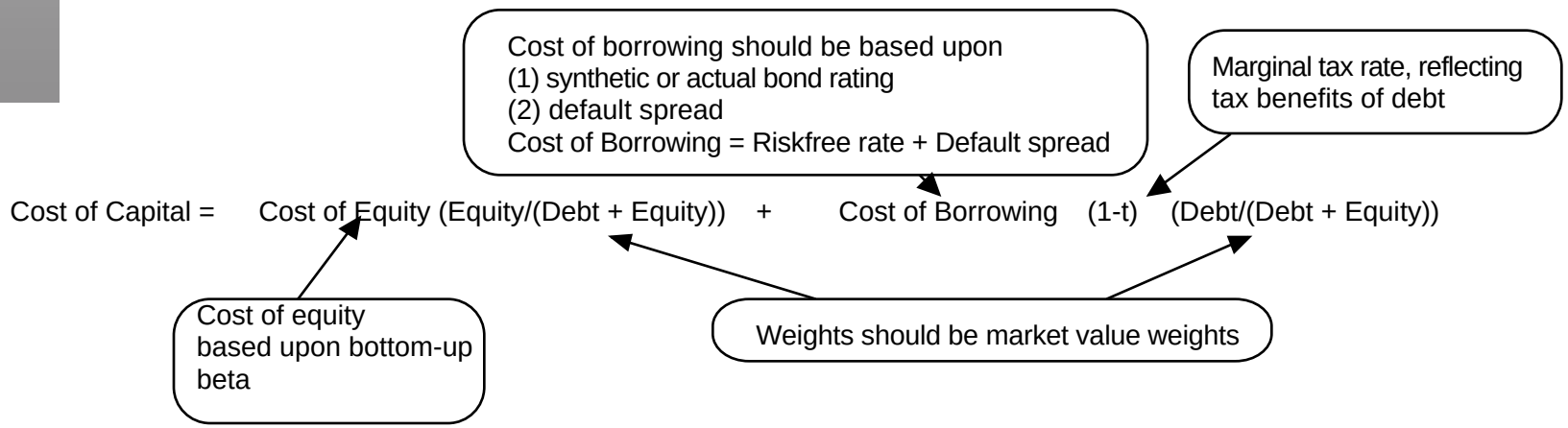
- Amazon is a specialty retailer, but its risk currently seems to be determined by the fact that it is an online retailer. Hence we will use the beta of internet companies to begin the valuation but move the beta, after the first five years, towards to beta of the retailing business.

In Practice: Estimating a Beta

- What is the regression beta for your firm? What would your concerns be about using this beta?

- Estimate a bottom-up beta for your firm.
  - Bottom-up unlevered beta =
  - Market Equity =
  - Debt =
  - Debt/ Equity ratio =
  - Tax rate =
  - Levered beta = Unlevered Beta (1 + (1- tax rate) (D/E Ratio))
- Cost of Equity = Riskfree rate + Beta * Risk Premium

From Cost of Equity to Cost of Capital



Cost of Debt

- If the firm has bonds outstanding, and the bonds are traded, the yield to maturity on a long-term, straight (no special features) bond can be used as the interest rate.
- If the firm is rated, use the rating and a typical default spread on bonds with that rating to estimate the cost of debt.
- If the firm is not rated,
  - and it has recently borrowed long term from a bank, use the interest rate on the borrowing or
  - estimate a synthetic rating for the company, and use the synthetic rating to arrive at a default spread and a cost of debt
- The cost of debt has to be estimated in the same currency as the cost of equity and the cash flows in the valuation.

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 = 162.75/ 11.82= 13.77

- 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 Cov Ratio is	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 is AAA. The default spread is 0.75%.

  Pre-tax Cost of Debt

  = Riskfree Rate + Company Default Spread+ Country Spread

  = 5.10% + 0.75% + 0.95%= 6.80%

- The synthetic rating for Amazon.com is BBB (in January 2000). The default spread for BBB rated bond is 1.50%

  Pre-tax cost of debt = Riskfree Rate + Default spread = 6.50% + 1.50% = 8.00%

  - After-tax cost of debt right now = 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%

In Practice: Estimating a Cost of Debt

- Estimate an interest coverage ratio for your firm
  - Interest coverage ratio = EBIT/ Interest expenses
- Estimate a synthetic rating for your firm
- Estimate a pre-tax cost of debt for your firm
  - Pre-tax cost = Riskfree rate + Default spread
- Estimate an after-tax cost of debt
  - After-tax cost = Pre-tax cost of debt (1- tax rate)

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%

Amazon.com: Book Value Weights

- Amazon.com has a book value of equity of $ 138 million and a book value of debt of $ 349 million. Estimate the cost of capital using book value weights instead of market value weights.

- Is this more conservative?

Estimating Cost of Capital: Titan Cements

- Equity
  - Cost of Equity = 5.10% + 0.96 (4%+1.59%) = 10.47%
  - Market Value of Equity = 739,217 million GDr (78.7%)
- Debt
  - Cost of debt = 5.10% + 0.75% +0.95%= 6.80%
  - Market Value of Debt = 199,766 million GDr (21.3 %)
- Cost of Capital

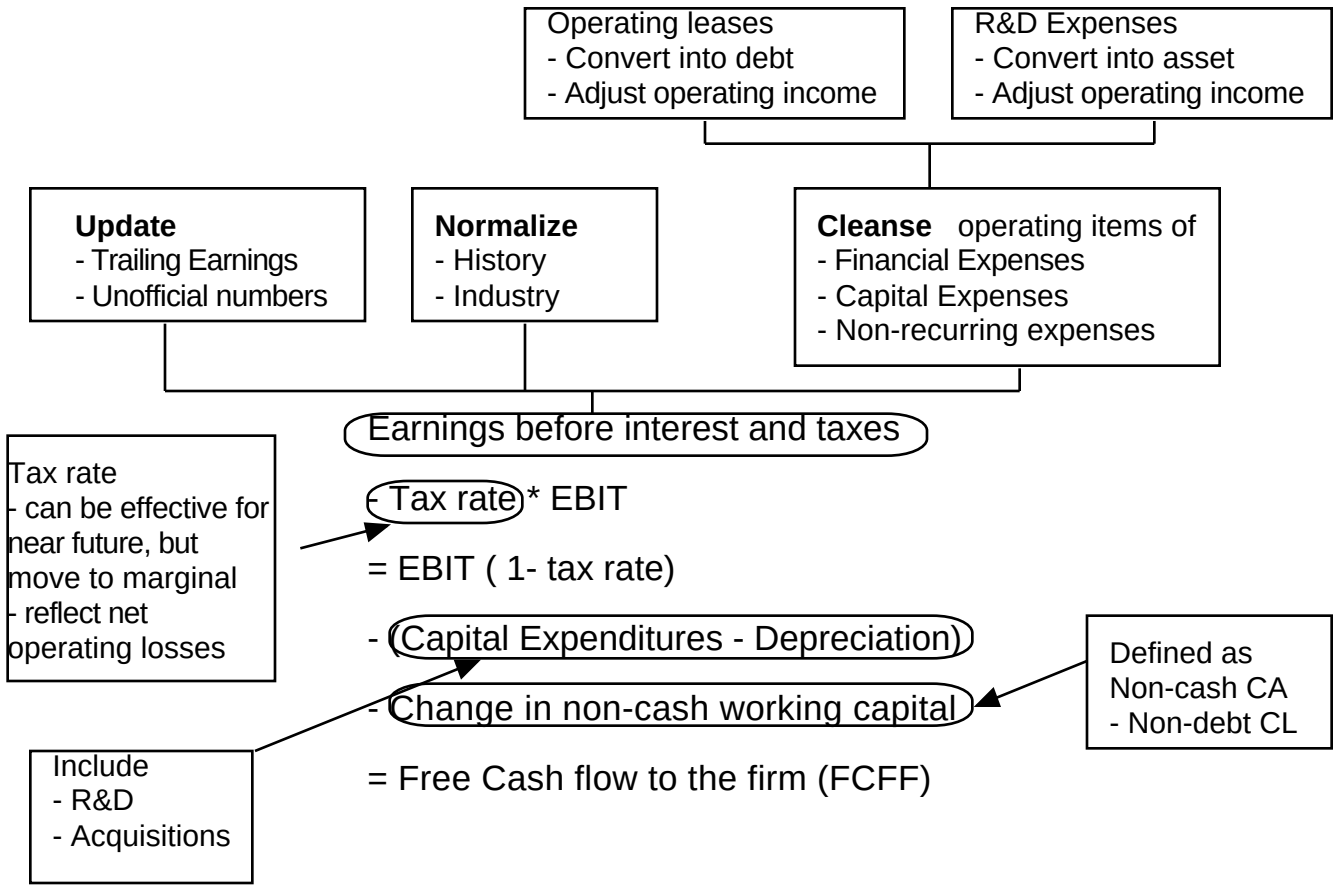
Cost of Capital = 10.47 % (.787) + 6.80% (1- .2449) (0.213)) = 9.33 %

The book value of equity at Titan Cement is 135,857 million GDr.

In Practice: Estimate the cost of capital

- Cost of Equity = See page 39
- After-tax cost of debt = See page 45
- Debt = Equity =
- D/ (D+E) = E/(D+E) =
- Cost of capital =

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

Normalizing Amazon's EBIT

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

What about S, G & A expenses?

- Many internet companies are arguing that selling and G&A expenses are the equivalent of R&D expenses for a high-technology firms and should be treated as capital expenditures.
- If we adopt this rationale, we should be computing earnings before these expenses, which will make many of these firms profitable. It will also mean that they are reinvesting far more than we think they are. It will, however, make not their cash flows less negative.
- Should Amazon.com's selling expenses be treated as cap ex?

The Effect of Net Operating Losses

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%.

Net Capital expenditures should include

- Research and development expenses, once they have been re-categorized as capital expenses. The adjusted cap ex will be

  Adjusted Net Capital Expenditures = Capital Expenditures + Current year's R&D expenses - Amortization of Research Asset

- Acquisitions of other firms, since these are like capital expenditures. The adjusted cap ex will be

  Adjusted Net Cap Ex = Capital Expenditures + Acquisitions of other firms - Amortization of such acquisitions

  Two caveats:

  1. Most firms do not do acquisitions every year. Hence, a normalized measure of acquisitions (looking at an average over time) should be used
  2. The best place to find acquisitions is in the statement of cash flows, usually categorized under other investment activities

Estimating FCFF: Titan Cement

- EBIT = 162.75 million Euros
- Tax rate = 24.49%
- Net Capital expenditures = 11.39 million Euros
- Change in Working Capital =6.89 million Euros (normalized)*

Estimating FCFF (2000)

Current EBIT * (1 - tax rate) =	162.75 (1-.2449) =	122.89	Million Euros
- (Capital Spending - Depreciation)		11.39	
- Change in Working Capital		6.89	
Current FCFF		104.61	Million Euros

- Working capital actually dropped in 2000. We normalized the working capital change by taking working capital as a percent of revenues(11.47%) in 2000 and applying this to the change in revenues in 2000.

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

In Practice: Estimate FCFF

- Earnings before interest and taxes =
- Tax rate =
- Capital Expenditures =
- Depreciation =
- Change in non-cash working capital =

- Estimate FCFF

EBIT (1-t)

- (Capital expenditures - Depreciation)

- Change in non-cash working capital

= FCFF

IV. Estimating Growth

- Reinvestment Rate and Return on Capital

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

  = Reinvestment Rate * ROC
- For Titan Cement
  - ROC = EBIT (1- tax rate) / (BV of Equity + BV of Debt)

    = 162.75(1-.2449)/(354.50+136.56) = 25.02%
  - Reinv. Rate = (Net Cap Ex + Chg in WC)/EBIT (1-t)

    = (11.39+6.89)/ 162.75(1-.2449) = 14.88%
  - Expected Growth Rate = (.2502)*(.1488) = 3.72%
- 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

	1996	1997	1998	1999	2000	Total
Cp Ex	€ 46.78	€ 25.09	€ 37.10	€ 136.63	€ 50.52	€ 296.12
Depreciation	€ 16.33	€ 13.52	€ 20.08	€ 89.51	€ 39.25	€ 178.70
EBIT	€ 62.51	€ 86.37	€ 100.62	€ 122.52	€ 162.75	€ 0.00
EBIT(1-t)	€ 47.20	€ 65.22	€ 75.98	€ 92.51	€ 122.89	€ 403.80
Net Cap Ex as %	64.51%	17.73%	22.40%	50.93%	9.17%	29.08%

Expected Growth Estimate: Titan Cement

- Normalized Change in working capital = (Working capital as percent of revenues) * Change in revenues in 2000 = .1127 (212177-191710) = 2,447
- Normalized Net Cap Ex

  = Net Cap ex as % of EBIT(1-t) * EBIT (1-t) in 2000

  = .2908*(162.75(1-.2449)) = 35.73
- Normalized reinvestment rate = (35.73+6.89)/(162.75(1-.2449)) = 39.47%
- Expected growth rate = .3947*.2502 = 9.88%

Expected Growth and Amazon.com

- 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	Reinvest	Chg Rev/ Chg Reinvest	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.

Not all growth is equal: Disney versus Hansol Paper

- Disney
  - Reinvestment Rate = 50%
  - Return on Capital =18.69%
  - Expected Growth in EBIT =.5(18.69%) = 9.35%
- Hansol Paper
  - Reinvestment Rate = (105,000+1,000)/(109,569*.7) = 138.20%
  - Return on Capital = 6.76%
  - Expected Growth in EBIT = 6.76% (1.382) = 9.35%
- Both these firms have the same expected growth rate in operating income. Are they equivalent from a valuation standpoint?

In Practice: Estimating Expected Growth

- EBIT (1-t) = See page 61
- Reinvestment

= (Capital Expenditures - Depreciation + Change in non-cash working capital)

=

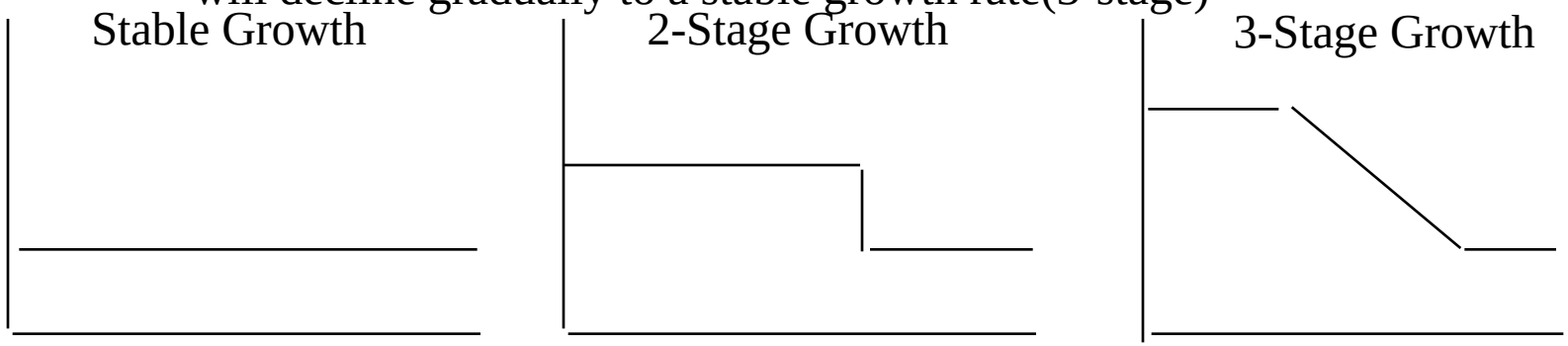
- Reinvestment Rate =

- Book value of debt from previous year =
- Book value of equity from previous year =
- Return on capital = EBIT (1-t)/ (BV of Debt + BV of Equity)

- Expected Growth = Reinvestment rate * ROC =

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.

In Practice; Estimating a Growth Period

- Based upon
  - Firm size, relative to market
  - Earnings growth momentum
  - Barriers to entry
- How long do you expect growth to continue?
  - No high growth
  - 5 years of high growth
  - 10 years of high growth
- Do you expect a transition to stable growth?
  - Yes
  - No

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	0.96	1.00
• Debt Ratio	21.27%	21.27%
• Return on Capital	25.02%	15% (industry average)
• Expected Growth Rate	9.88%	5%
• Reinvestment Rate	39.47%	5%/15% = 33.33%
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%

In Practice: Estimating stable growth inputs

	High Growth	Stable Growth
• Beta		
• Debt Ratio		
• Return on Capital		
• Expected Growth Rate		
• Reinvestment Rate		

Dealing with Cash and Marketable Securities

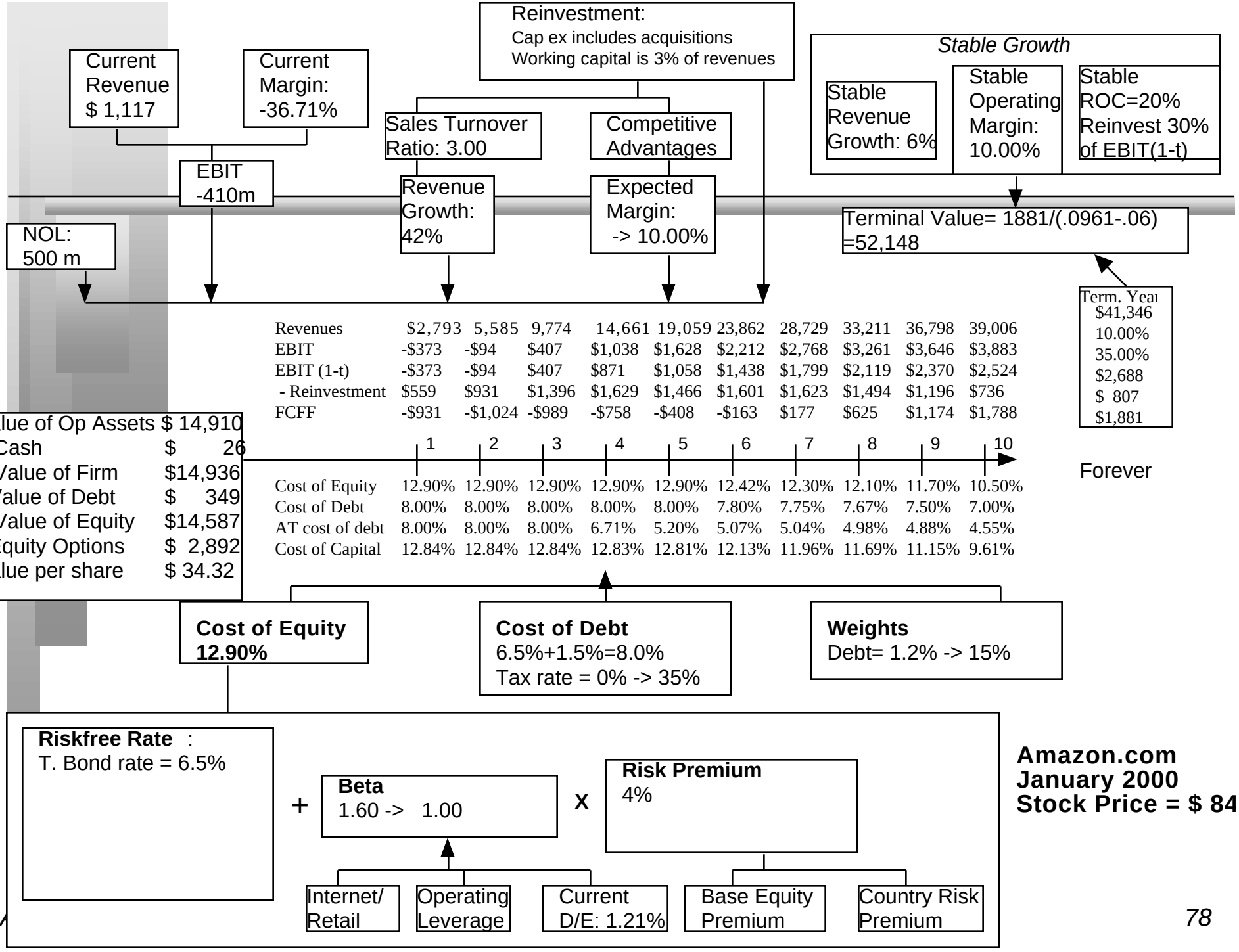
- The simplest and most direct way of dealing with cash and marketable securities is to keep it out of the valuation - the cash flows should be before interest income from cash and securities, and the discount rate should not be contaminated by the inclusion of cash. (Use betas of the operating assets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

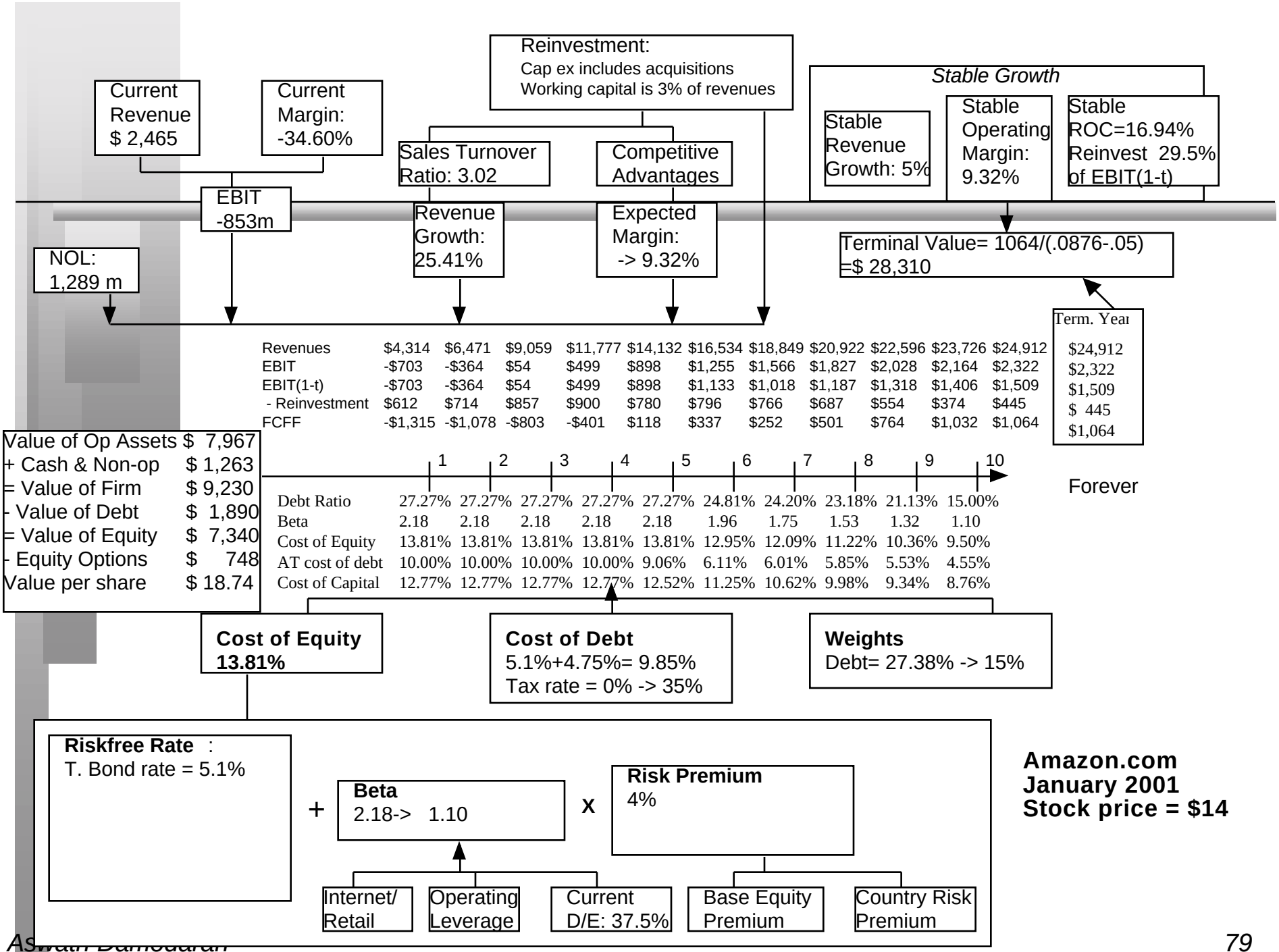
- When the holding is a majority, active stake, the value that we obtain from the cash flows includes the share held by outsiders. While their holding is measured in the balance sheet as a minority interest, it is at book value. To get the correct value, we need to subtract out the estimated market value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

In Practice: Mopping up

- Estimate cash and marketable securities possessed by your firm
- Are there any cross holdings that have to be valued? If yes, is there sufficient information to value them?



Amazon.com
January 2000
Stock Price = $ 84


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
EBIT -$703 -$364 $54 $499 $898 $1,255 $1,566 $1,827 $2,028 $2,164 $2,322
EBIT(1-t) -$703 -$364 $54 $499 $898 $1,133 $1,018 $1,187 $1,318 $1,406 $1,509
- Reinvestment $612 $714 $857 $900 $780 $796 $766 $687 $554 $374 $445
FCFF -$1,315 -$1,078 -$803 -$401 $118 $337 $252 $501 $764 $1,032 $1,064
$24,912
$2,322
$1,509
$ 445
$1,064
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
Forever
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

Variations on DCF Valuation

- A DCF valuation can be presented in two other formats:
  - In an adjusted present value (APV) valuation, the value of a firm can be broken up into its operating and leverage components separately

  Firm Value = Value of Unlevered Firm + (PV of Tax Benefits - Exp. Bankruptcy Cost)
  - In an excess return model, the value of a firm can be written in terms of the existing capital invested in the firm and the present value of the excess returns that the firm will make on both existing assets and all new investments

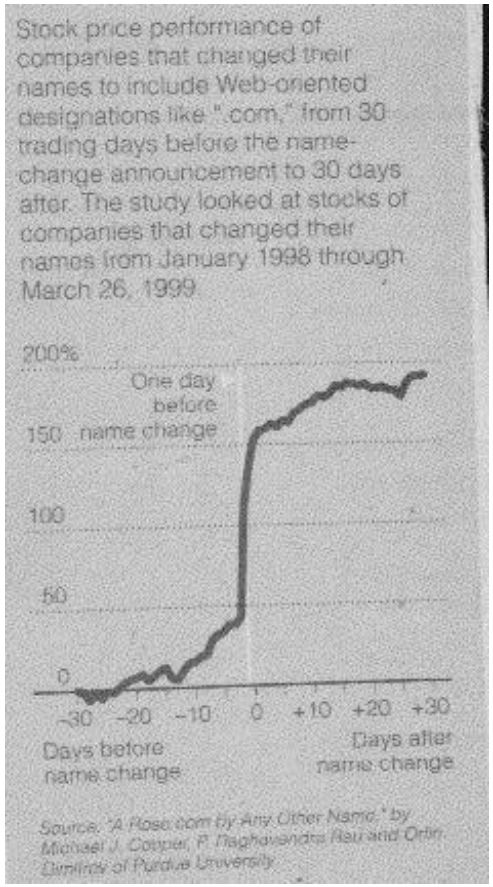
  Firm Value = Capital Invested in Assets in Place + PV of Dollar Excess Returns on Assets in Place + PV of Dollar Excess Returns on All Future Investments
- Done right, slicing a DCF valuation and presenting it differently should not change the value of the firm.

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.

Value Creation 1: Increase Cash Flows from Assets in Place

- The assets in place for a firm reflect investments that have been made historically by the firm. To the extent that these investments were poorly made and/or poorly managed, it is possible that value can be increased by increasing the after-tax cash flows generated by these assets.
- The cash flows discounted in valuation are after taxes and reinvestment needs have been met:

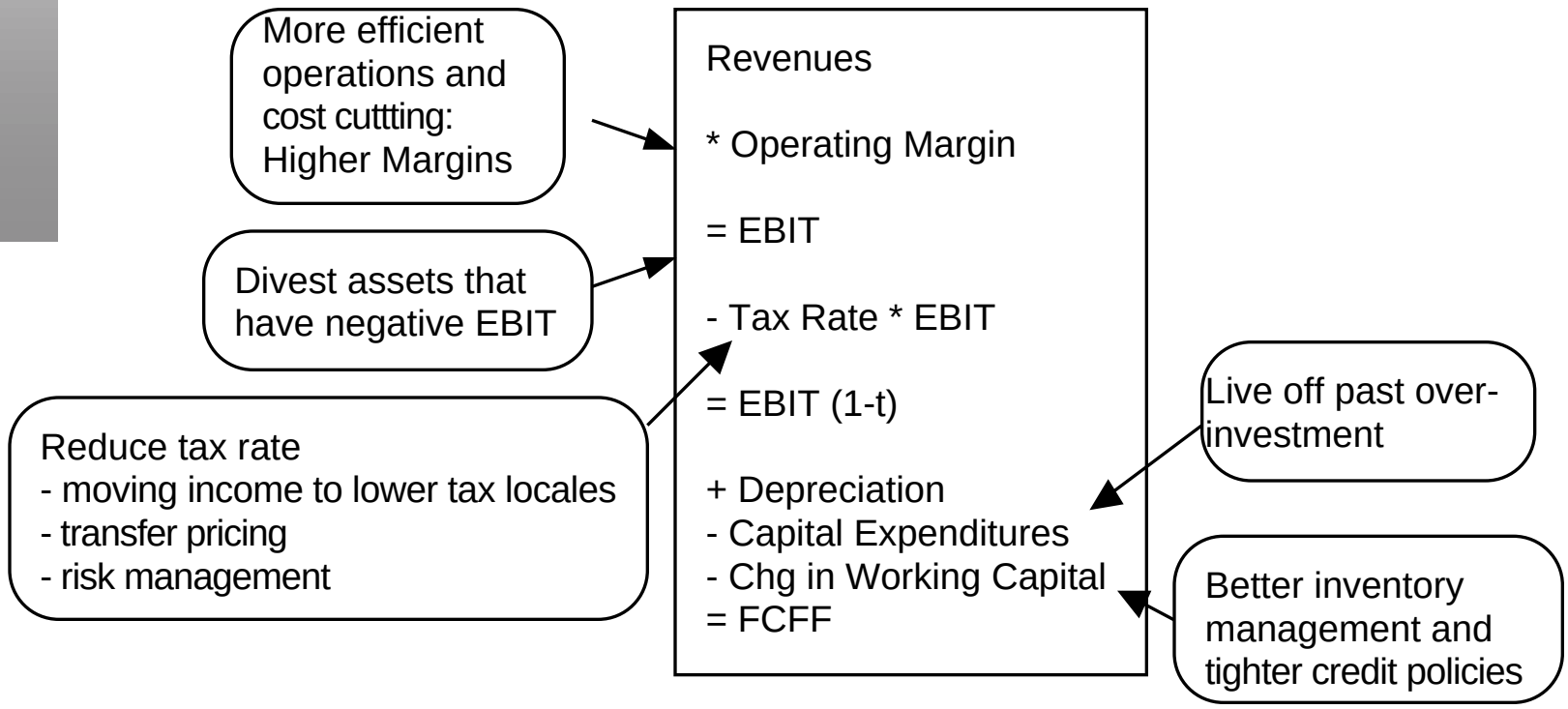
  EBIT (1-t)

  - (Capital Expenditures - Depreciation)

  - Change in Non-cash Working Capital

  = Free Cash Flow to Firm
- Proposition 2: A firm that can increase its current cash flows, without significantly impacting future growth or risk, will increase its value.

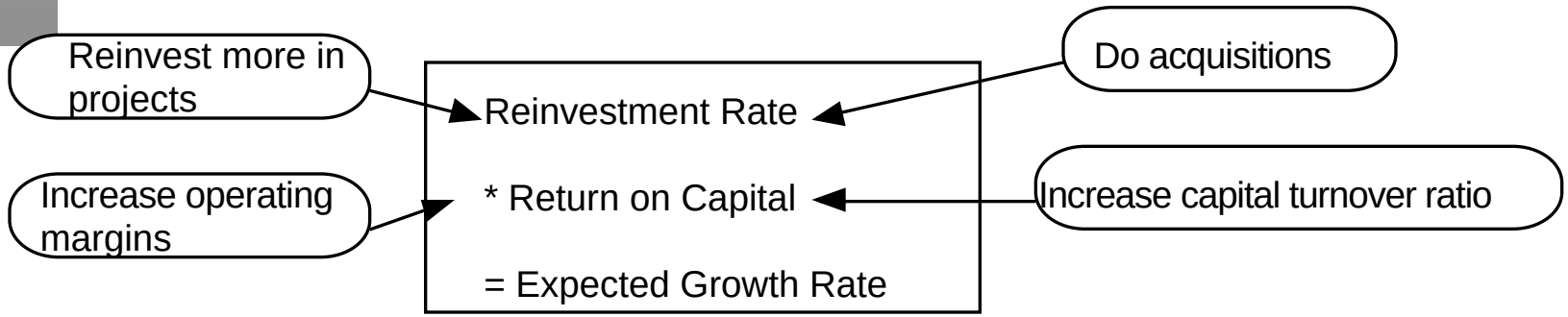
Ways of Increasing Cash Flows from Assets in Place



Value Creation 2: Increase Expected Growth

- Keeping all else constant, increasing the expected growth in earnings will increase the value of a firm.
- The expected growth in earnings of any firm is a function of two variables:
  - The amount that the firm reinvests in assets and projects
  - The quality of these investments

Value Enhancement through Growth



Value Creation 3: Increase Length of High Growth Period

- Every firm, at some point in the future, will become a stable growth firm, growing at a rate equal to or less than the economy in which it operates.
- The high growth period refers to the period over which a firm is able to sustain a growth rate greater than this "stable" growth rate.
- If a firm is able to increase the length of its high growth period, other things remaining equal, it will increase value.
- The length of the high growth period is a direct function of the competitive advantages that a firm brings into the process. Creating new competitive advantage or augmenting existing ones can create value.

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?
  - 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

Value Creation 4: Reduce Cost of Capital

- The cost of capital for a firm can be written as:

$$\text{Cost of Capital} = k_e \left(E/(D+E)\right) + k_d \left(D/(D+E)\right)$$

Where,

k_e = Cost of Equity for the firm

k_d = Borrowing rate (1 - tax rate)

- The cost of equity reflects the rate of return that equity investors in the firm would demand to compensate for risk, while the borrowing rate reflects the current long-term rate at which the firm can borrow, given current interest rates and its own default risk.
- The cash flows generated over time are discounted back to the present at the cost of capital. Holding the cash flows constant, reducing the cost of capital will increase the value of the firm.

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

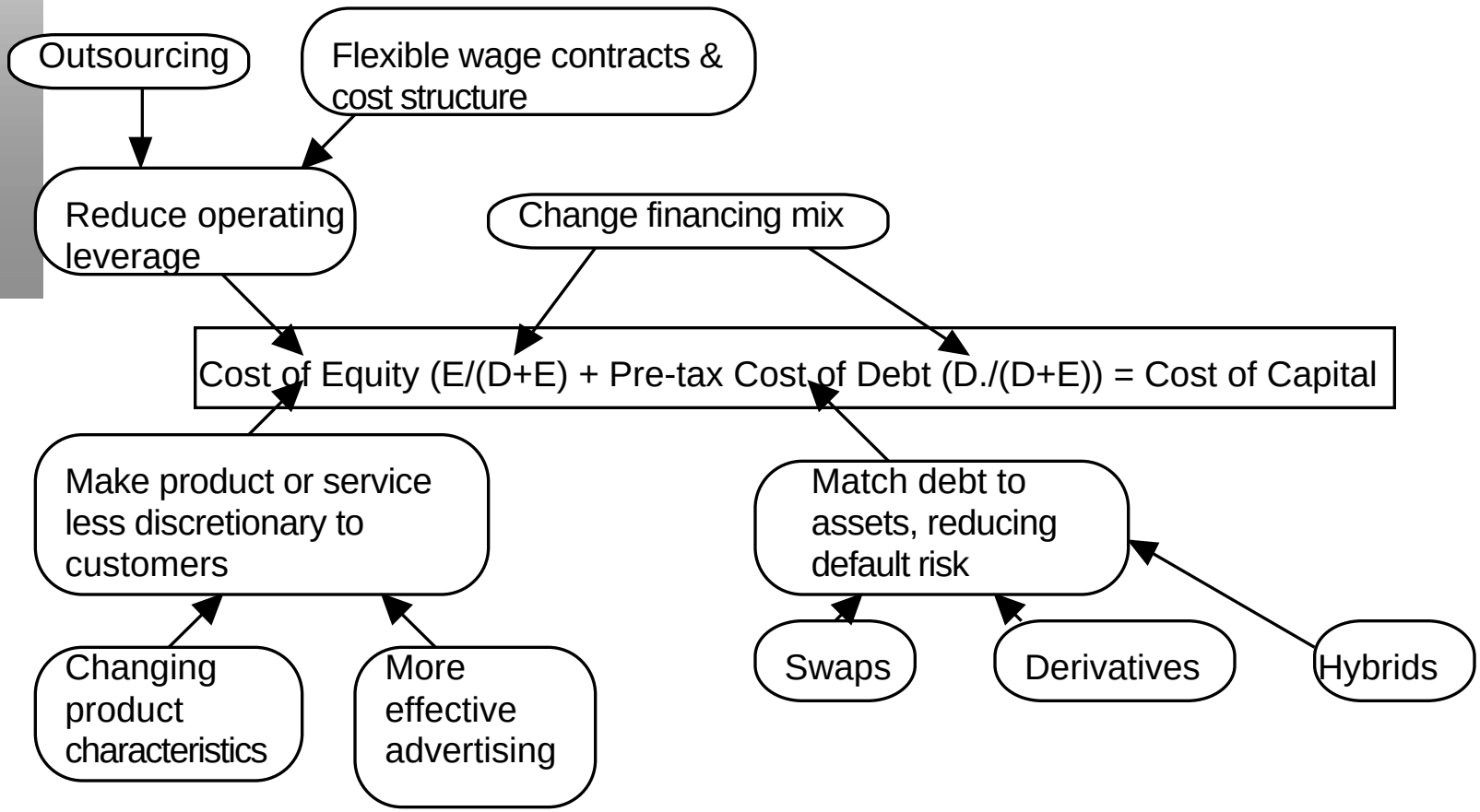
Cost of Capital = 12.9 % (.988) + 8.00% (1- 0) (.012)) = 12.84%

Estimating Cost of Capital: Titan Cements

- Equity
  - Cost of Equity = 5.10% + 0.96 (4%+1.59%) = 10.47%
  - Market Value of Equity = 739,217 million GDr (78.7%)
- Debt
  - Cost of debt = 5.10% + 0.75% +0.95%= 6.80%
  - Market Value of Debt = 199,766 million GDr (21.3 %)
- Cost of Capital

Cost of Capital = 10.47 % (.787) + 6.80% (1- .2449) (0.213)) = 9.33 %

Reducing Cost of Capital



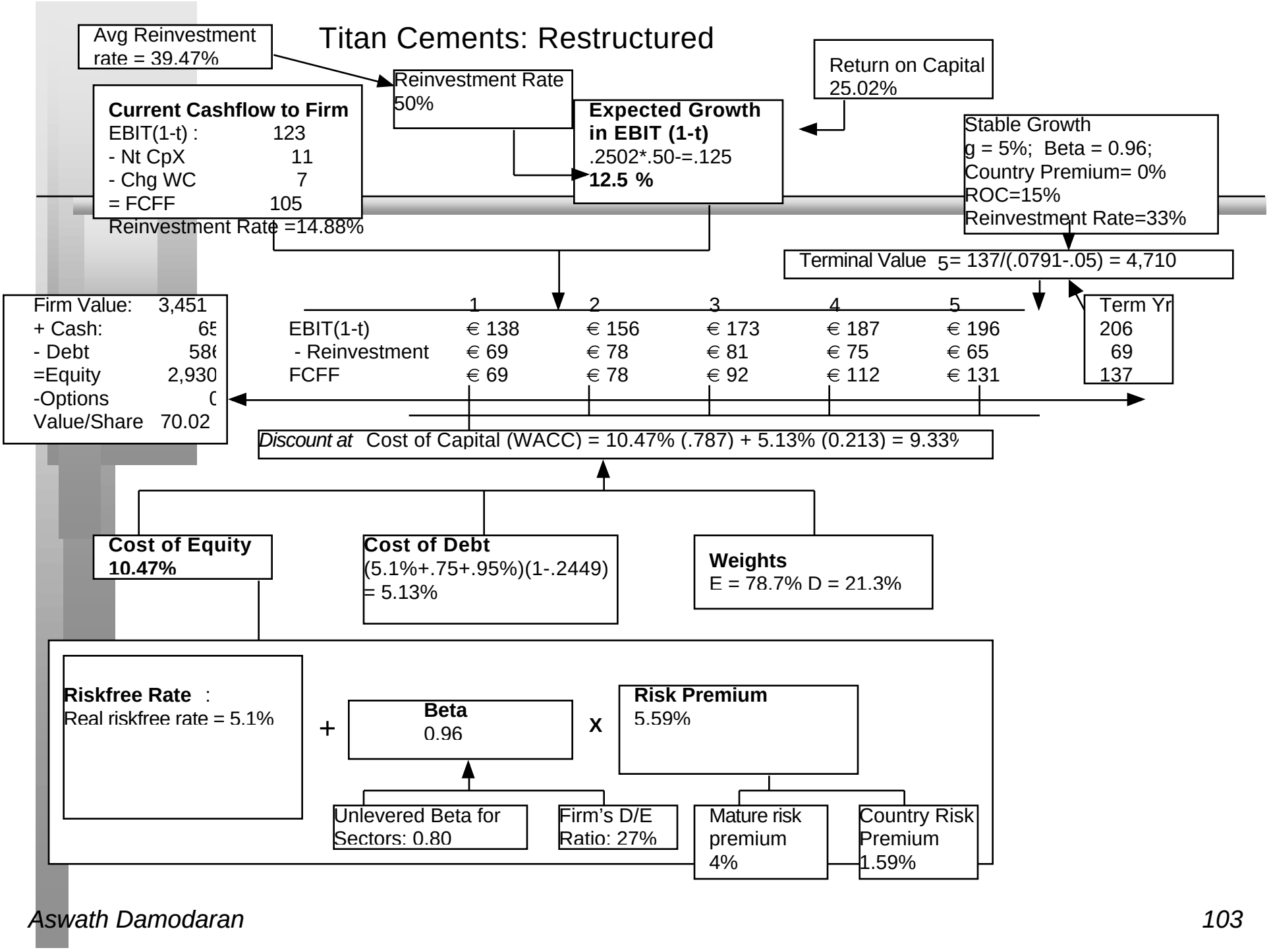
Amazon.com: Optimal Debt Ratio

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%	0.81	9.61%	AAA	5.85%	30.00%	4.10%	9.61%	$855,714
10%	0.87	9.96%	AAA	5.85%	30.00%	4.10%	9.38%	$908,543
20%	0.95	10.40%	A-	7.10%	30.00%	4.97%	9.32%	$923,194
30%	1.05	10.97%	B	11.60%	30.00%	8.12%	10.11%	$760,997
40%	1.19	11.74%	CCC	15.10%	29.34%	10.67%	11.31%	$598,419
50%	1.44	13.16%	CC	16.60%	21.35%	13.06%	13.11%	$448,491
60%	1.82	15.26%	C	17.80%	16.59%	14.85%	15.01%	$350,494
70%	2.42	18.64%	C	17.80%	14.22%	15.27%	16.28%	$304,030
80%	3.63	25.42%	C	17.80%	12.44%	15.58%	17.55%	$267,226
90%	7.27	45.73%	C	17.80%	11.06%	15.83%	18.82%	$237,352

Titan Cements: Restructured



Amazon.com: Break Even Points

	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