



Valuation

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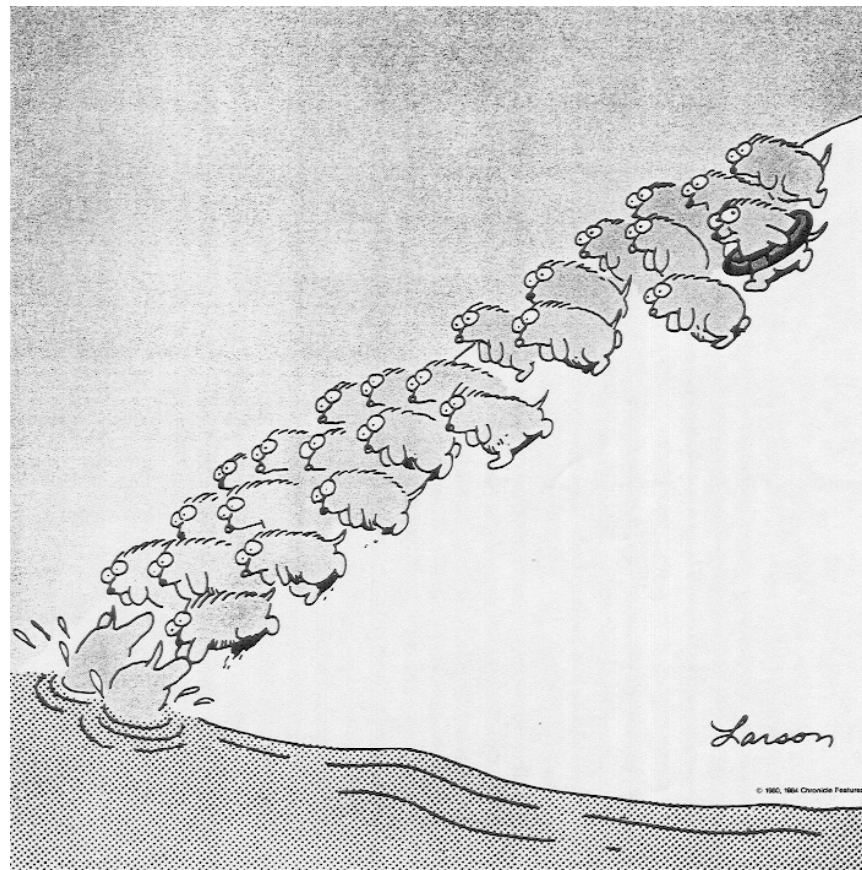
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Some Initial Thoughts

" 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.

Discounted Cashflow Valuation: Basis for Approach

$$\text{Value of asset} = \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \frac{CF_3}{(1+r)^3} + \frac{CF_4}{(1+r)^4} \dots + \frac{CF_n}{(1+r)^n}$$

where CF_t is the expected cash flow in period t , r is the discount rate appropriate given the riskiness of the cash flow and n is the life of the asset.

Proposition 1: For an asset to have value, the expected cash flows have to be positive some time over the life of the asset.

Proposition 2: Assets that generate cash flows early in their life will be worth more than assets that generate cash flows later; the latter may however have greater growth and higher cash flows to compensate.

DCF Choices: Equity Valuation versus Firm Valuation

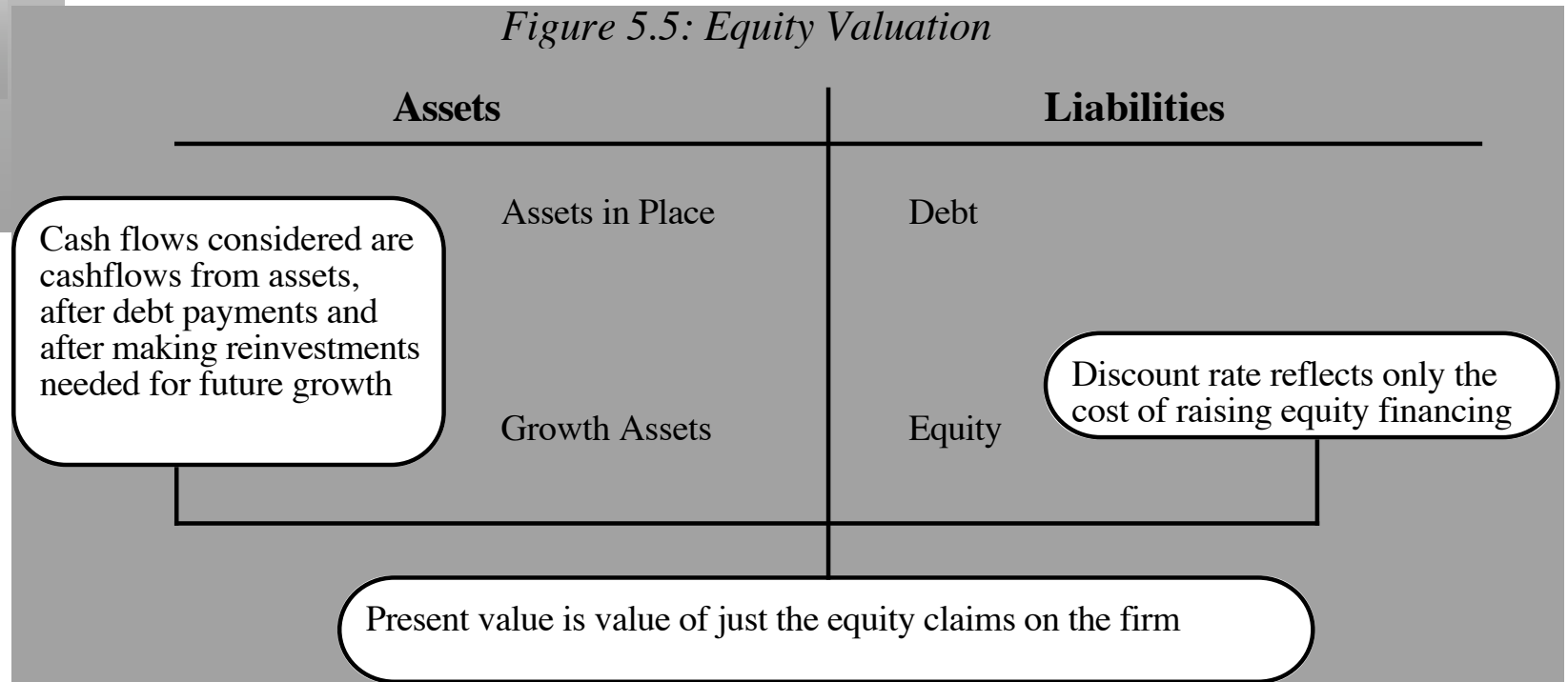
Firm Valuation: Value the entire business

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

Equity valuation: Value just the equity claim in the business

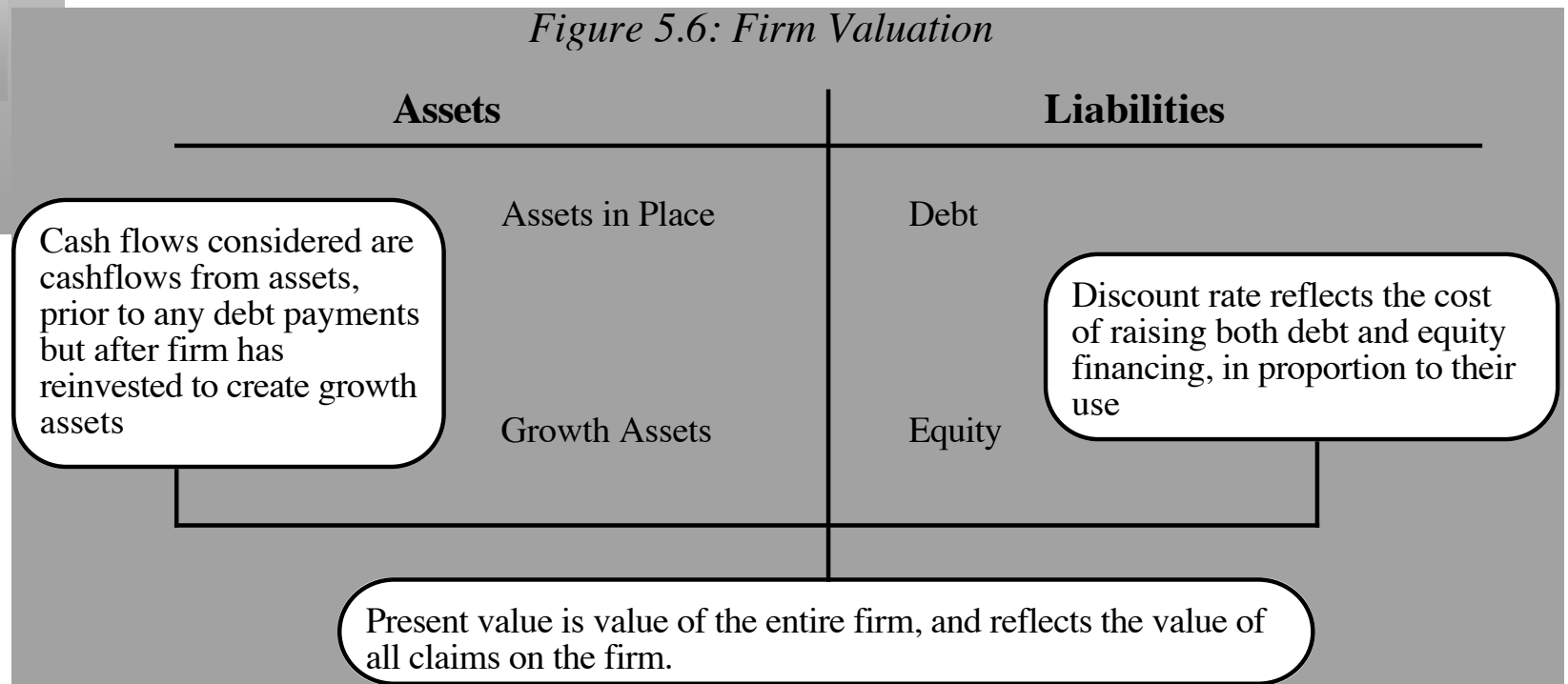
Equity Valuation

Figure 5.5: Equity Valuation

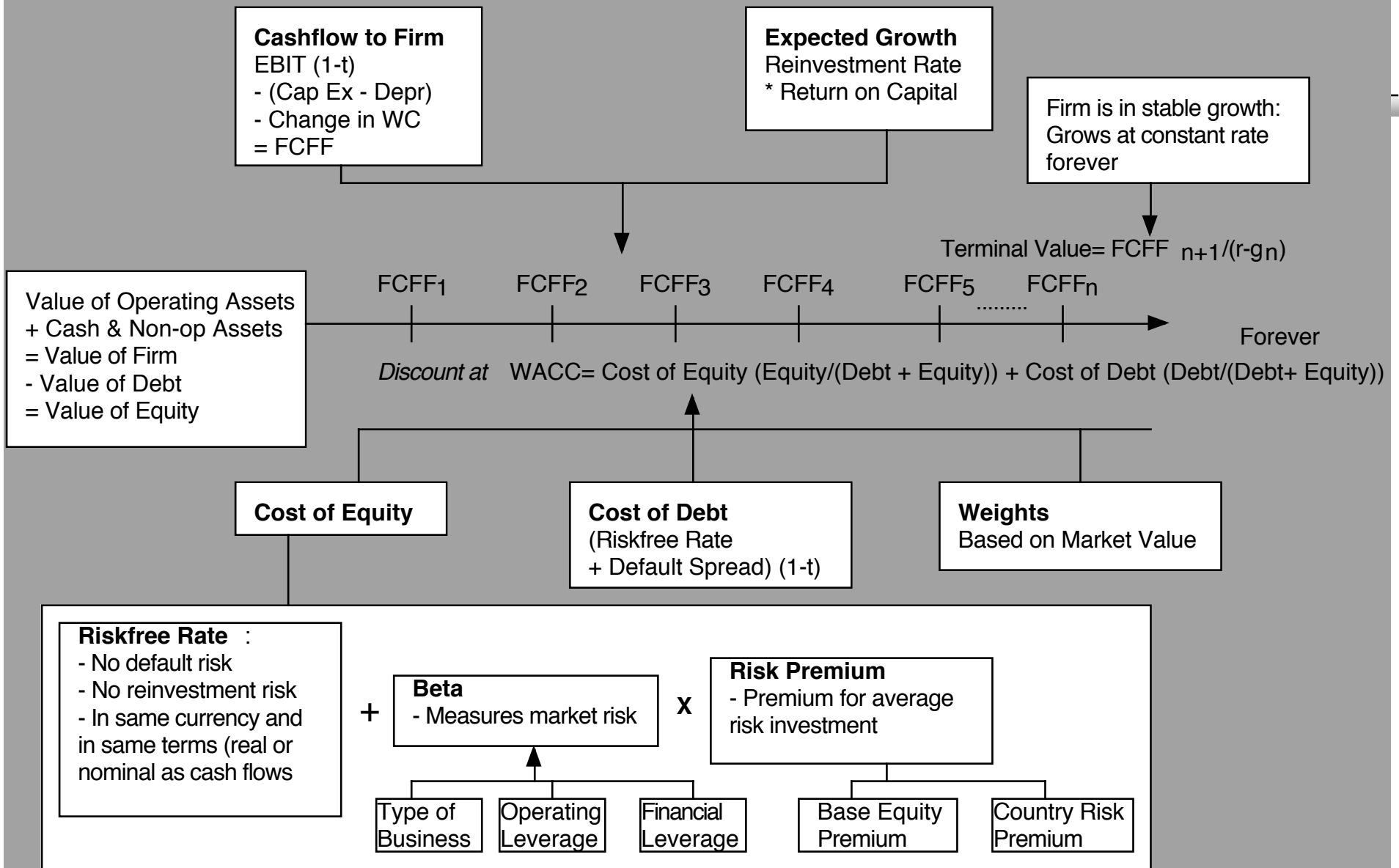


Firm Valuation

Figure 5.6: Firm Valuation



DISCOUNTED CASHFLOW VALUATION



Titan Cements: Status Quo

Avg Reinvestment rate = 28.54%

Current Cashflow to Firm
 EBIT(1-t) : 173
 - Nt CpX 49
 - Chg WC 52
 = FCFF 72
 Reinvestment Rate = 101/173 = 58.5%

Reinvestment Rate 28.54%

Expected Growth in EBIT (1-t)
 $.2854 * .1925 = .0549$
5.49%

Return on Capital 19.25%

Stable Growth
 $g = 3.41\%$; Beta = 1.00;
 Country Premium = 0%
 Cost of capital = 6.57%
 ROC = 6.57%; Tax rate = 33%
 Reinvestment Rate = 51.93%

Terminal Value₅ = $100.9 / (.0657 - .0341) = 3195$

Op. Assets 2,897
 + Cash: 77
 - Debt 414
 - Minor. Int. 46
 = Equity 2,514
 - Options 0
 Value/Share €32.84

Year	1	2	3	4	5
EBIT	€ 244.53	€ 257.96	€ 272.13	€ 287.08	€ 302.85
EBIT(1-t)	€ 182.25	€ 192.26	€ 202.82	€ 213.96	€ 225.7
- Reinvestment	€ 52.01	€ 45.87	€ 57.88	€ 61.06	€ 64.42
= FCFF	€ 130.24	€ 137.39	€ 144.94	€ 152.90	€ 161.30

Term Yr
 313.2
 209.8
 108.9
 100.9

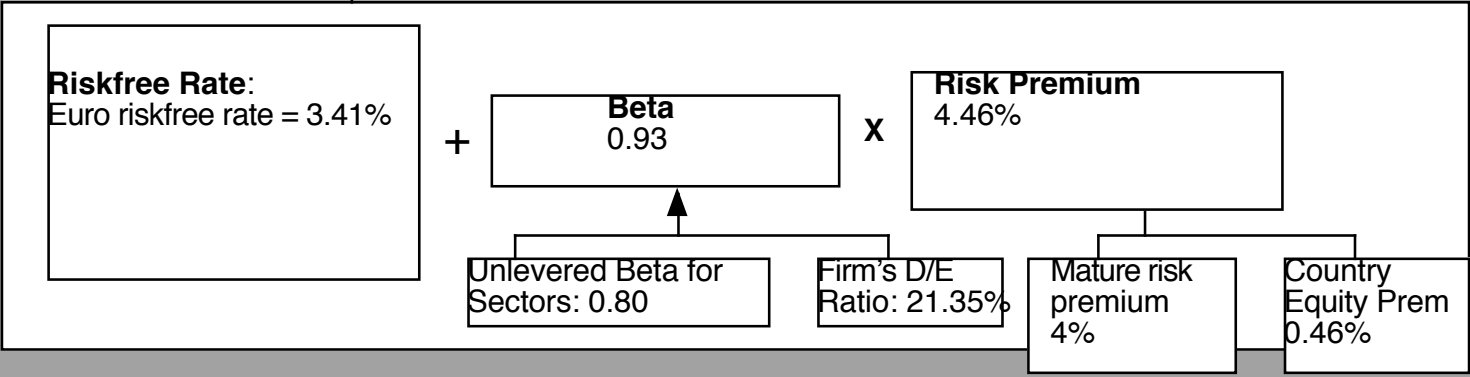
Discount at Cost of Capital (WACC) = 7.56% (.824) + 3.11% (0.176) = 6.78%

Cost of Equity 7.56%

Cost of Debt
 $(3.41\% + .5\% + .26\%)(1 - .2547)$
 = 3.11%

Weights
 E = 82.4% D = 17.6%

On April 27, 2005
 Titan Cement stock
 was trading at € 25 a
 share



Kristin's Kandy: Status Quo

Current Cashflow to Firm
 EBIT(1-t) : 300,000
 - Nt CpX 100,000
 - Chg WC 40,000
 = FCFF 160,000
 Reinvestment Rate = 46.67%

Reinvestment Rate
46.67%

Expected Growth in EBIT (1-t)
 $.4667 \cdot .1364 = .0636$
6.36%

Return on Capital
13.64%

Stable Growth
 $g = 4\%$; Beta = 3.00;
 ROC = 12.54%
 Reinvestment Rate = 31.90%

Terminal Value₁₀ = $289 / (.1254 - .04) = 3,403$

Firm Value: 2,571
 + Cash 125
 - Debt: 900
 = Equity 1,796
 Liq. Discount 12.5%
 Equity value 1572

Year	1	2	3	4	5
EBIT (1-t)	\$319	\$339	\$361	\$384	\$408
- Reinvestment	\$149	\$158	\$168	\$179	\$191
=FCFF	\$170	\$181	\$193	\$205	\$218

Term Yr
 425
 136
 289

Discount at Cost of Capital (WACC) = $16.26\% (.70) + 3.30\% (.30) = 12.37\%$

Cost of Equity
16.26%

Cost of Debt
 $(4.5\% + 1.00)(1 - .40)$
 = 3.30%
 Synthetic rating = A-

Weights
 E = 70% D = 30%

Riskfree Rate:
 Riskfree rate = 4.50%
 (10-year T.Bond rate)

Beta / Correlation
 0.98 / 0.33
Total Beta
 2.94

Risk Premium
 4.00%

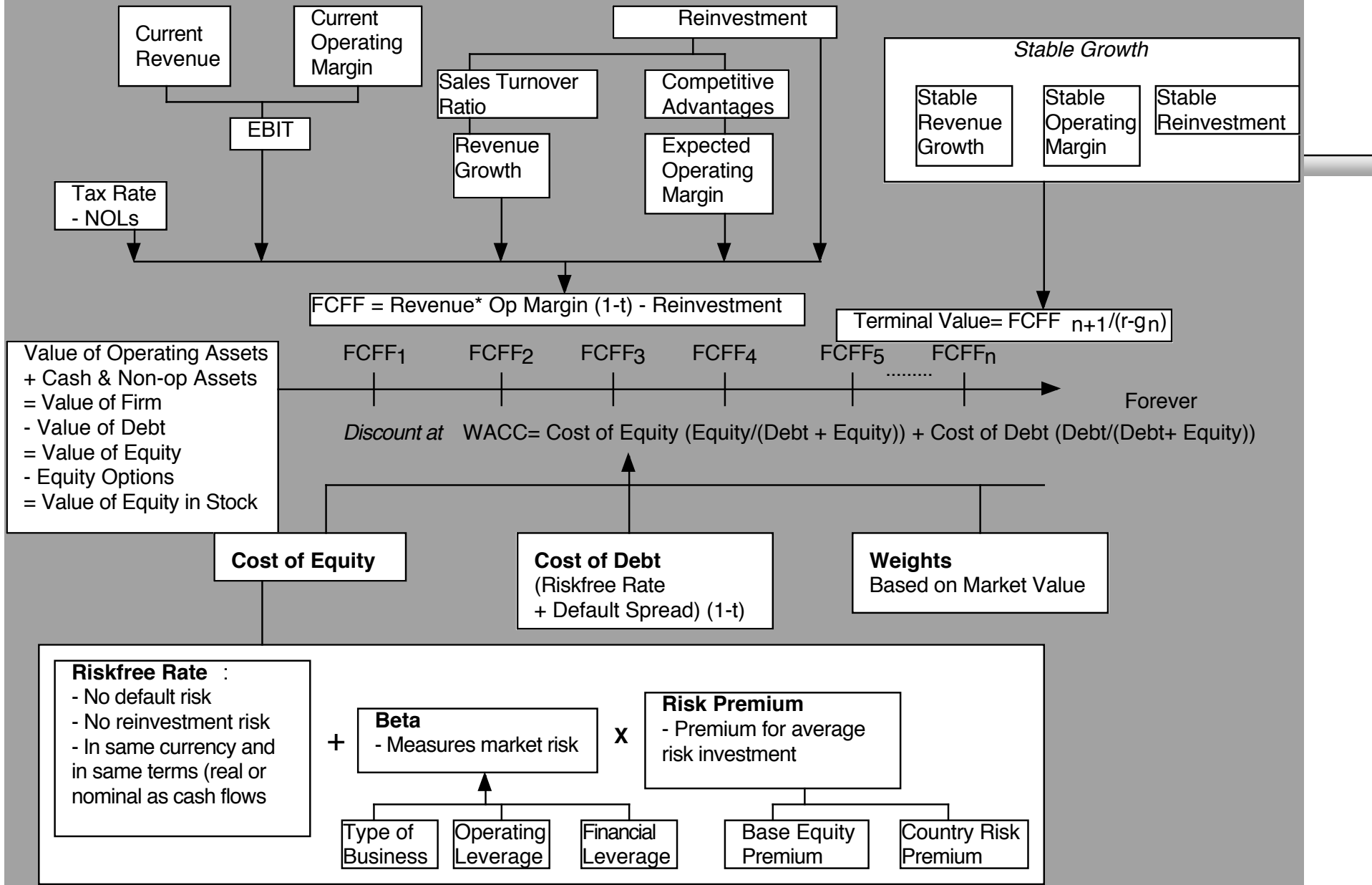
Unlevered Beta for Sectors: 0.82

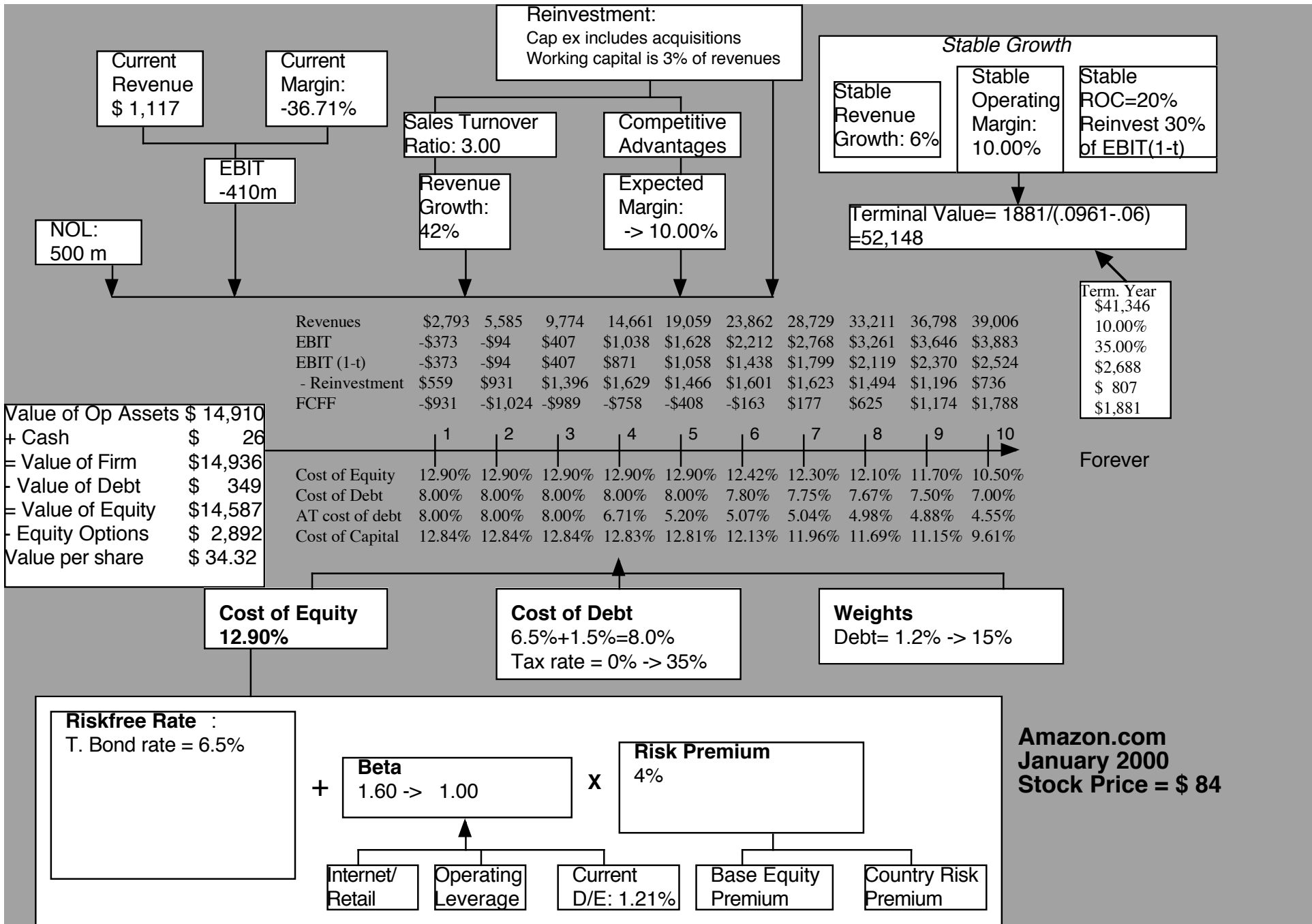
Firm's D/E Ratio: 1.69%

Mature risk premium 4%

Country Risk Premium 0%

Discounted Cash Flow Valuation: High Growth with Negative Earnings

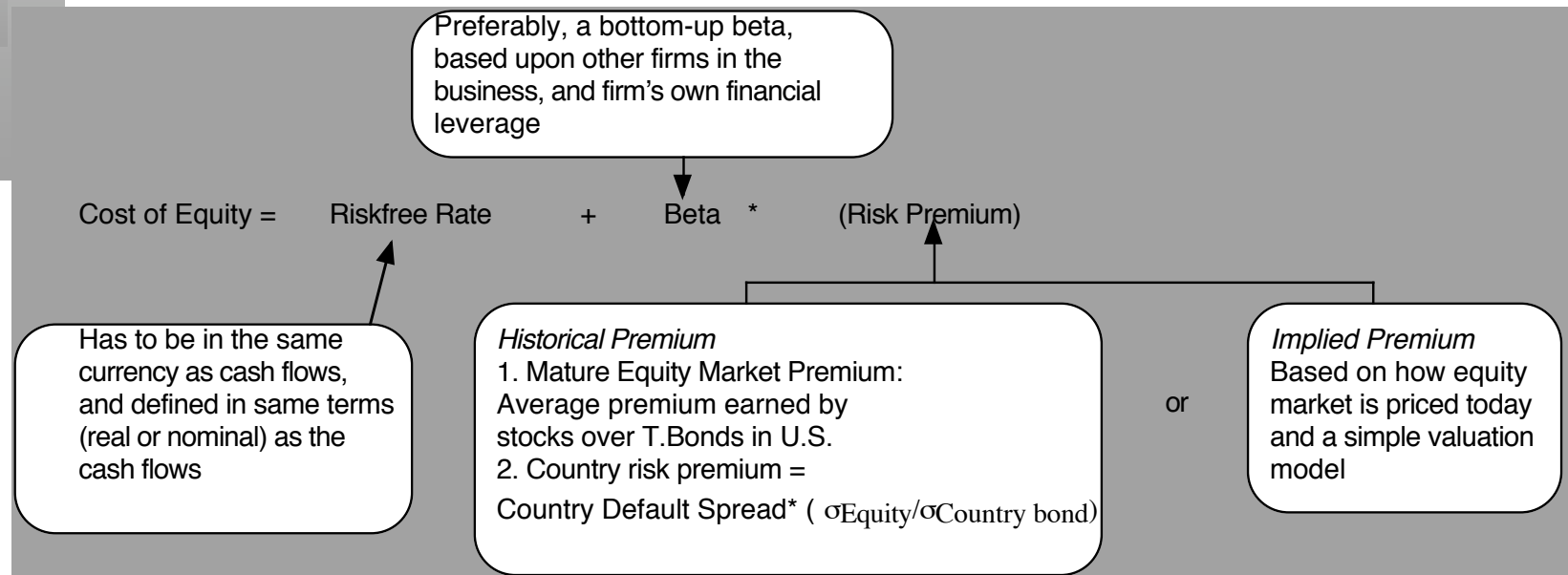






I. Estimating Discount Rates

Cost of Equity



A Simple Test

- You are valuing a Greek company in Euros for a US institutional investor 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 US \$ denominated treasury bond (4.25%)
 - ❑ The interest rate on a Euro-denominated Greek government bond (3.67%)
 - ❑ The interest rate on a Euro-denominated bond issued by the German government (3.41%)

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

Assessing Country Risk Using Currency Ratings: Western Europe

<i>Country</i>	<i>Rating</i>	<i>Default Spread over German Euro (in bp)</i>
Austria	Aaa	0
Belgium	Aaa	10
France	Aaa	4
Germany	Aaa	0
Greece	A1	26
Ireland	Aaa	6
Italy	Aa2	16
Portugal	Aa2	10
Spain	Aaa	3

Assessing Country Risk using Ratings: Beyond the EU

<i>Country</i>	<i>Rating</i>	<i>Default Spread</i>
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) = 16%
 - Standard Deviation in Greek Euro Bond = 9%
 - Adjusted Equity Spread = 0.26% (16/9) = 0.46%

From Country Risk Premiums to Corporate Risk premiums

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

$$E(\text{Return}) = \text{Riskfree Rate} + \text{Country ERP} + \text{Beta (US premium)}$$

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

$$E(\text{Return}) = \text{Riskfree Rate} + \text{Beta (US premium + Country ERP)}$$

- 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)

$$E(\text{Return}) = \text{Riskfree Rate} + \beta (\text{US premium}) + \lambda (\text{Country ERP})$$

Country ERP: Additional country equity risk premium

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:

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

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 0.95, and that the riskfree rate used is 3.41%. Also assume that the historical premium for the US (4.9%) is a reasonable estimate of a mature market risk premium.
- Approach 1: Assume that every company in the country is equally exposed to country risk. In this case,

$$E(\text{Return}) = 3.41\% + 0.46\% + 0.93 (4.90\%) = 8.43\%$$

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

$$E(\text{Return}) = 3.41\% + 0.93 (4.90\% + 0.46\%) = 8.40\%$$

- 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)

$$E(\text{Return}) = 3.41\% + 0.93(4.9\%) + 0.56 (0.46\%) + 0.14(3\%) = 8.65\%$$

Titan is less exposed to Greek country risk than the typical Greek firm since it gets about 40% of its revenues in Greece; the average for Greek firms is 70%. In 2004, though, Titan got about 14% of its revenues from the Balkan states.

An alternate view of ERP: Watch what I pay, not what I say..

- You can back out an equity risk premium from stock prices:

	Dividends	Buybacks	Yield
2001	\$36.27	\$32.75	2.62%
2002	\$39.22	\$30.62	3.39%
2003	\$46.76	\$38.53	2.84%
2004	\$49.68	\$66.42	3.35%
2005	\$54.83	\$104.28	4.90%
2006	\$54.78	\$109.81	5.39%
Average yield between 2001-2006 =			3.75%

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

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

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

56.35 59.73 63.32 67.12 71.14

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

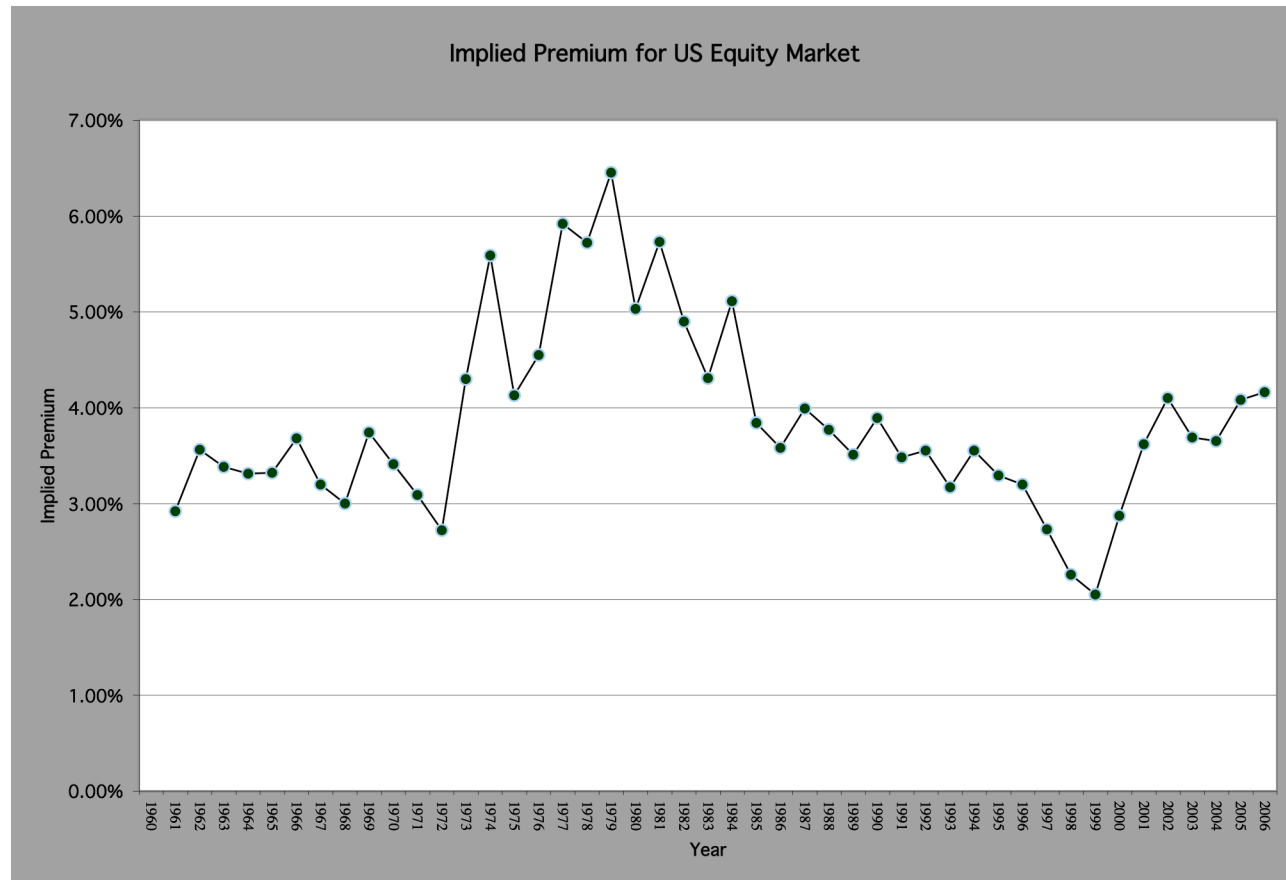
Solving for the implied premium...

- If we know what investors paid for equities at the beginning of 2007 and we can estimate the expected cash flows from equities, we can solve for the rate of return that they expect to make (IRR):

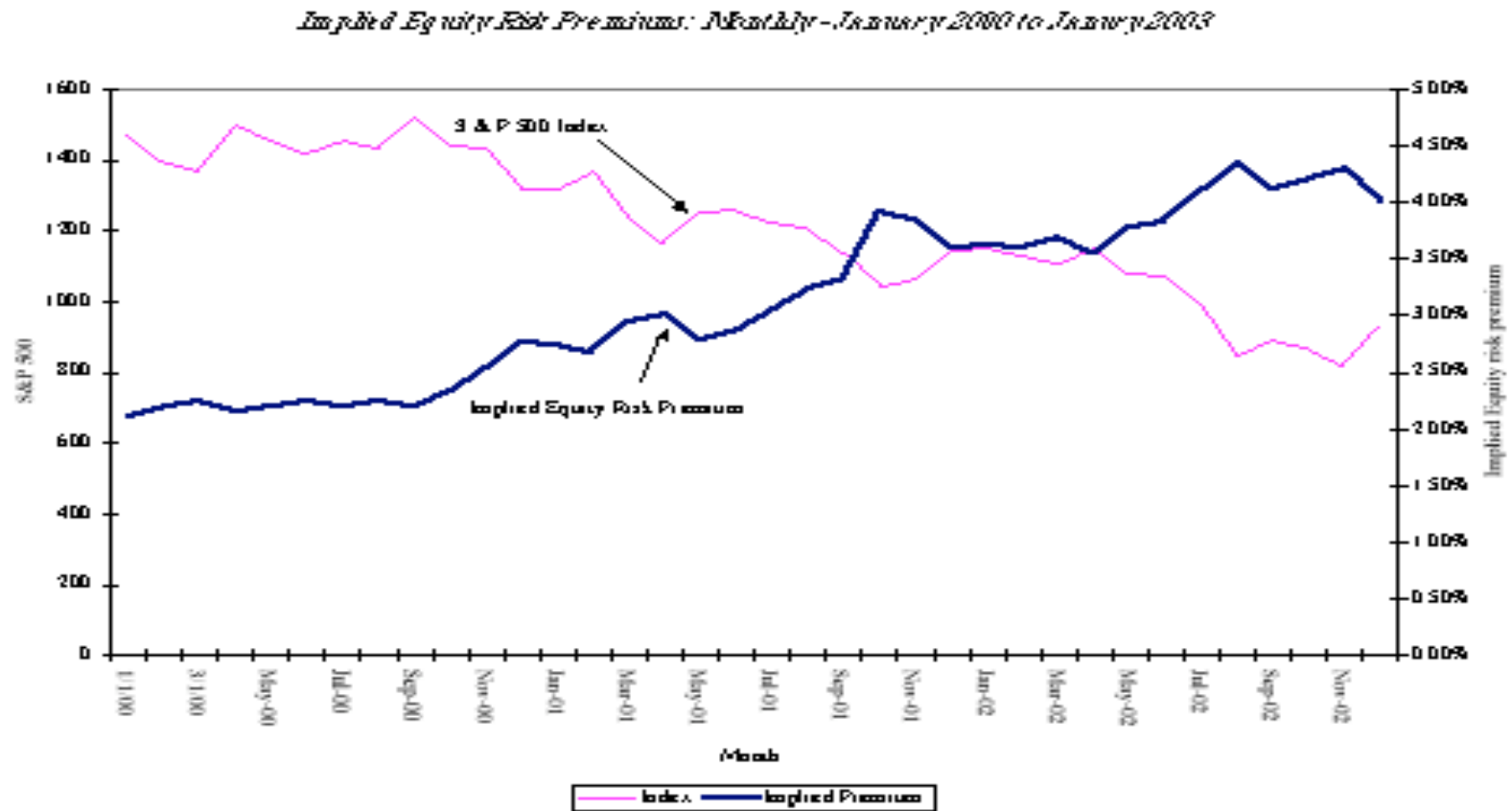
$$1418.3 = \frac{56.35}{(1+r)} + \frac{59.73}{(1+r)^2} + \frac{63.32}{(1+r)^3} + \frac{67.12}{(1+r)^4} + \frac{71.14}{(1+r)^5} + \frac{71.14(1.047)}{(r-.047)(1+r)^5}$$

- Expected Return on Stocks = 8.86%
- Implied Equity Risk Premium = Expected Return on Stocks - T.Bond Rate
= 8.86% - 4.70% = 4.16%

Implied Premiums in the US



Implied Premiums: From Bubble to Bear Market... January 2000 to December 2002



Choosing an Equity Risk Premium

- The historical risk premium of 4.90% 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 1960-2006 in the United States is about 4%. We will use this as the premium for a mature equity market.

Implied Premium for Greek Market: April 27, 2005

- Level of the Index = 2786
- Dividends on the Index = 3.28% of 2467
- Other parameters
 - Riskfree Rate = 3.41% (Euros)
 - Expected Growth (in Euros)
 - Next 5 years = 8% (Used expected growth rate in Earnings)
 - After year 5 = 3.41%
- Solving for the expected return:
 - Expected return on Equity = 7.56%
 - Implied Equity premium = 7.56% - 3.41% = 4.15%
- Effect on valuation
 - Titan's value with historical premium (4%) + country (.46%) : 32.84 Euros/share
 - Titan's value with implied premium: 32.67 Euros per share

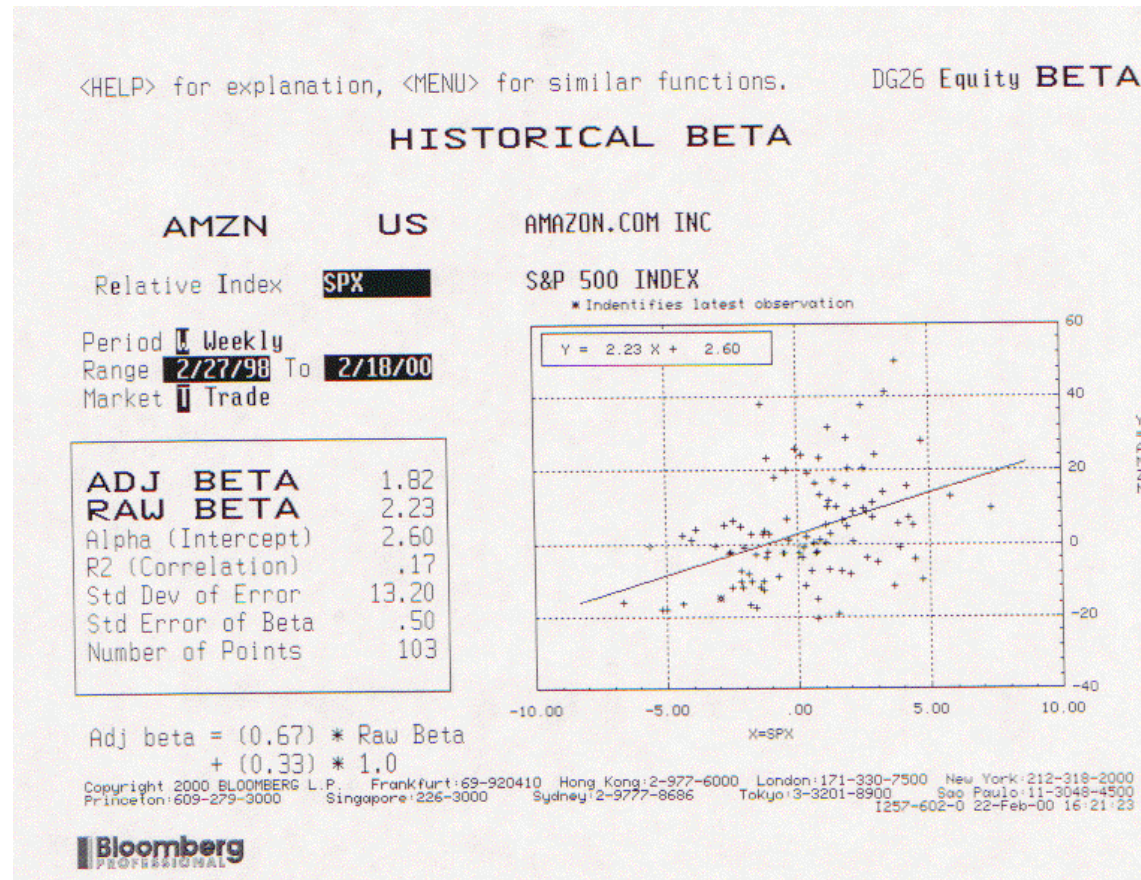
Estimating Beta

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

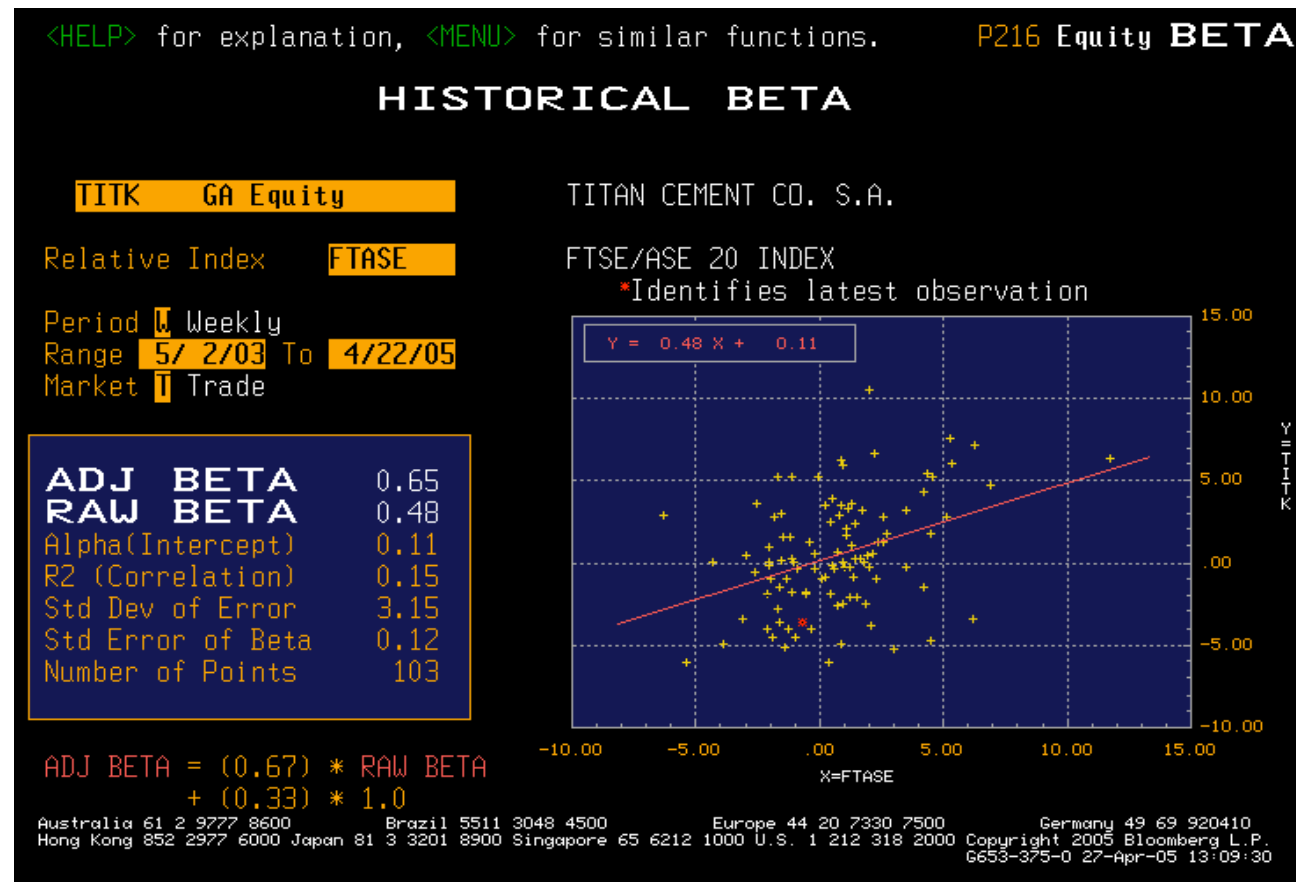
$$R_j = a + b R_m$$

- 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.

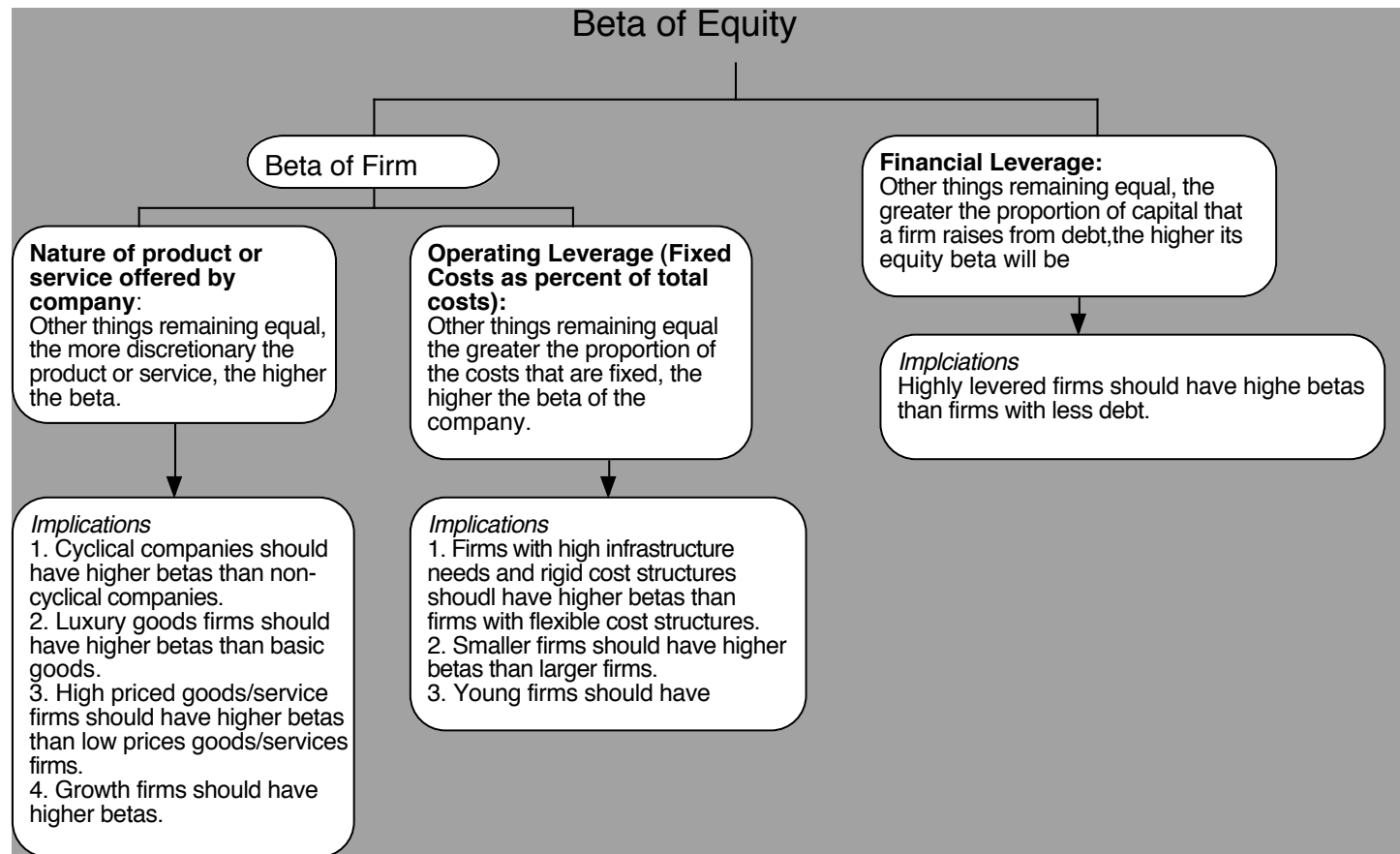
Beta Estimation: Amazon



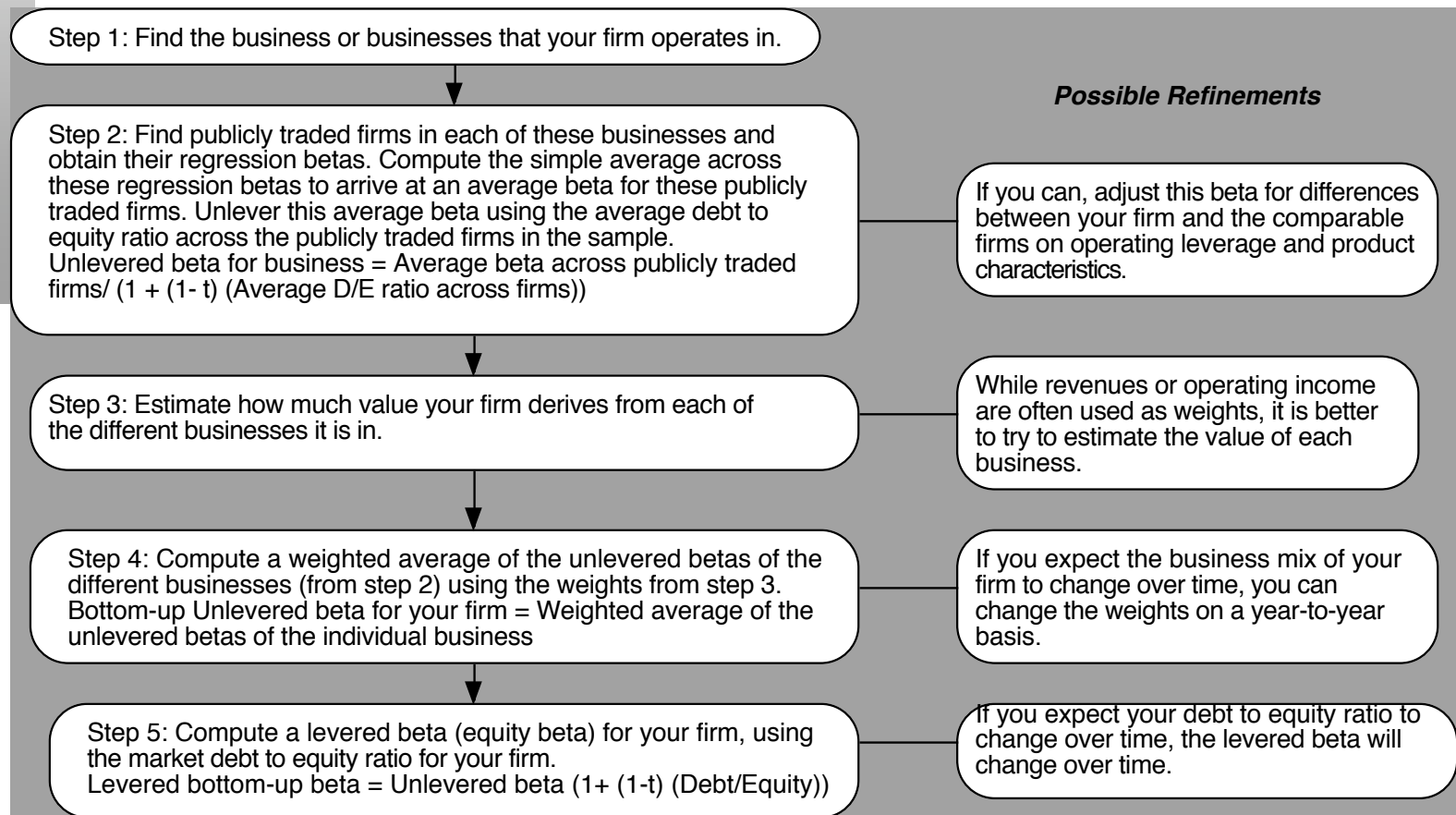
Beta Estimation for Titan Cement: The Index Effect



Determinants of Betas



Bottom-up Betas



Bottom up Beta Estimates

<i>Company</i>	<i>Comparable Companies</i>	<i>Unlevered Beta</i>	<i>Levered Beta</i>
Titan Cement	Global Cement companies	0.80	$0.80 (1 + (1-.2547) (.2135)) = 0.93$
Amazon (First 5 years)	Internet Retailers	1.58	$1.58 (1 - (1-0) (.0121)) = 1.60$
Amazon (After year 5)	Specialty Retailers		1.00
Kristin Kandy	Food Processing companies with market cap < \$ 250 million	0.78	$0.78 (1+(1-.4) (30/70)) = 0.98$

Small Firm and Other Premiums

- It is common practice to add premiums on to the cost of equity for firm-specific characteristics. For instance, many analysts add a small stock premium of 3-3.5% (historical premium for small stocks over the market) to the cost of equity for smaller companies.
- Adding arbitrary premiums to the cost of equity is always a dangerous exercise. If small stocks are riskier than larger stocks, we need to specify the reasons and try to quantify them rather than trust historical averages. (You could argue that smaller companies are more likely to serve niche (discretionary) markets or have higher operating leverage and adjust the beta to reflect this tendency).

Is Beta an Adequate Measure of Risk for a Private Firm?

The owners of most private firms are not diversified. Beta measures the risk added on to a diversified portfolio. Therefore, using beta to arrive at a cost of equity for a private firm will

- a) Under estimate the cost of equity for the private firm
- b) Over estimate the cost of equity for the private firm
- c) Could under or over estimate the cost of equity for the private firm

Total Risk versus Market Risk

- Adjust the beta to reflect total risk rather than market risk. This adjustment is a relatively simple one, since the R squared of the regression measures the proportion of the risk that is market risk.

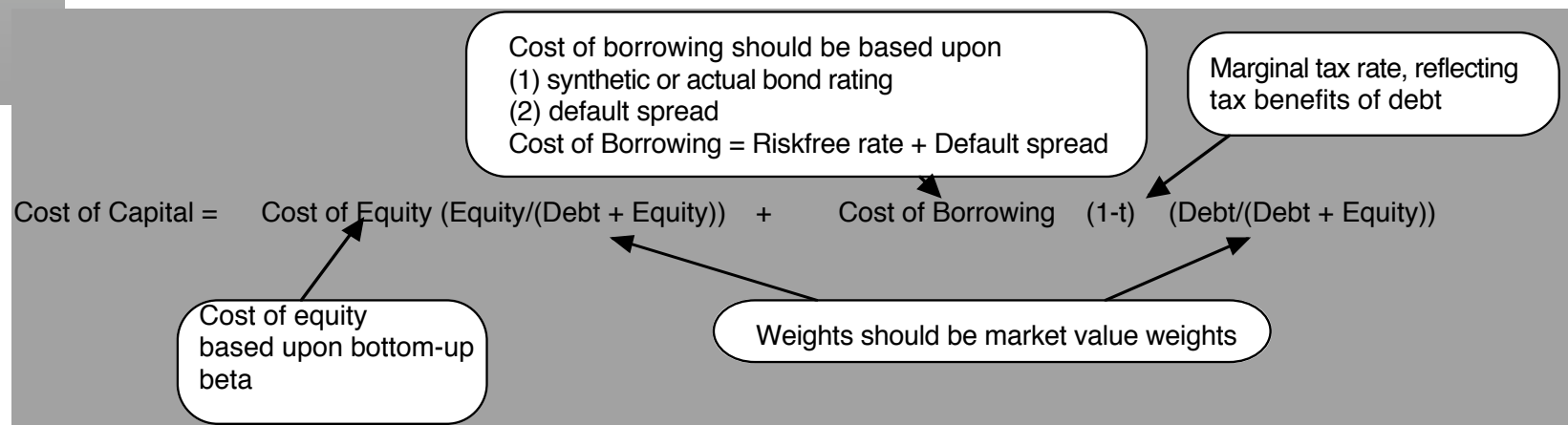
Total Beta = Market Beta / Correlation of the sector with the market

- To estimate the beta for Kristin Kandy, we begin with the bottom-up unlevered beta of food processing companies:
 - Unlevered beta for publicly traded food processing companies = 0.78
 - Average correlation of food processing companies with market = 0.333
 - Unlevered total beta for Kristin Kandy = $0.78/0.333 = 2.34$
 - Debt to equity ratio for Kristin Kandy = $0.3/0.7$ (assumed industry average)
 - Total Beta = $2.34 (1 - (1-.40)(30/70)) = 2.94$
 - Total Cost of Equity = $4.50\% + 2.94 (4\%) = 16.26\%$

When would you use this total risk measure?

- Under which of the following scenarios are you most likely to use the total risk measure:
 - when valuing a private firm for an initial public offering
 - when valuing a private firm for sale to a publicly traded firm
 - when valuing a private firm for sale to another private investor
- Assume that you own a private business. What does this tell you about the best potential buyer for your 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

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

- For Titan's interest coverage ratio, we used the interest expenses and EBIT from 2004.

$$\text{Interest Coverage Ratio} = 232 / 19.4 = 11.95$$

- For Kristin Kandy, we used the interest expenses and EBIT from the most recent financial year:

$$\text{Interest Coverage Ratio} = 500,000 / 85,000 = 5.88$$

- Amazon.com has negative operating income; this yields a negative interest coverage ratio, which should suggest a D 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(1/04)
> 8.50	(>12.50)	AAA	0.20%	0.35%
6.50 - 8.50	(9.5-12.5)	AA	0.50%	0.50%
5.50 - 6.50	(7.5-9.5)	A+	0.80%	0.70%
4.25 - 5.50	(6-7.5)	A	1.00%	0.85%
3.00 - 4.25	(4.5-6)	A-	1.25%	1.00%
2.50 - 3.00	(3.5-4.5)	BBB	1.50%	1.50%
2.25 - 2.50	(3.5 -4)	BB+	1.75%	2.00%
2.00 - 2.25	((3-3.5)	BB	2.00%	2.50%
1.75 - 2.00	(2.5-3)	B+	2.50%	3.25%
1.50 - 1.75	(2-2.5)	B	3.25%	4.00%
1.25 - 1.50	(1.5-2)	B -	4.25%	6.00%
0.80 - 1.25	(1.25-1.5)	CCC	5.00%	8.00%
0.65 - 0.80	(0.8-1.25)	CC	6.00%	10.00%
0.20 - 0.65	(0.5-0.8)	C	7.50%	12.00%
< 0.20	(<0.5)	D	10.00%	20.00%

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

Estimating the cost of debt for a firm

- The synthetic rating for Titan Cement is AA. Using the 2004 default spread of 0.50%, we estimate a cost of debt of 4.17% (using a riskfree rate of 3.41% and adding in the country default spread of 0.26%):

$$\begin{aligned}\text{Cost of debt} &= \text{Riskfree rate} + \text{Greek default spread} + \text{Company default spread} \\ &= 3.41\% + 0.26\% + 0.50\% = 4.17\%\end{aligned}$$

- The synthetic rating for Kristin Kandy is A-. Using the 2004 default spread of 1.00% and a riskfree rate of 4.50%, we estimate a cost of debt of 5.50%.

$$\text{Cost of debt} = \text{Riskfree rate} + \text{Default spread} = 4.50\% + 1.00\% = 5.50\%$$

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

$$\text{Cost of debt} = \text{Riskfree Rate} + \text{Default spread} = 6.50\% + 1.50\% = 8.00\%$$

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.
- For private companies, neither the market value of equity nor the market value of debt is observable. Rather than use book value weights, you should try
 - Industry average debt ratios for publicly traded firms in the business
 - Target debt ratio (if management has such a target)
 - Estimated value of equity and debt from valuation (through an iterative process)

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

$$\text{Cost of Capital} = 12.9 \% (.988) + 8.00\% (1 - 0) (.012) = 12.84\%$$

Estimating Cost of Capital: Titan Cements

■ Equity

- Cost of Equity = $3.41\% + 0.93(4\% + 0.46\%) = 7.56\%$
- Market Value of Equity = 1940 million Euros (82.4%)

■ Debt

- Cost of debt = $3.41\% + 0.26\% + 0.50\% = 4.17\%$
- Market Value of Debt = 414 million Euros (17.6%)

■ Cost of Capital

$$\text{Cost of Capital} = 7.56\% (.824) + 4.17\% (1 - .2547) (0.176) = 6.78\%$$

The book value of equity at Titan Cement is 542 million Euros

The book value of debt at Titan Cement is 405 million; Interest expense is 19 mil; Average maturity of debt = 4 years

Estimated market value of debt = 19 million (PV of annuity, 4 years, 4.17%) + \$ 405 million / $1.0417^4 = 414$ million Euros

Estimating Cost of Capital: Kristin Kandy

■ Equity

- Cost of Equity = $4.50\% + 2.94 (4\%) = 16.26\%$
- Equity as percent of capital = 70%

■ Debt

- Pre-tax Cost of debt = $4.50\% + 1.00\% = 5.50\%$
- Marginal tax rate = 40%
- Debt as percent of capital = 30% (Industry average)

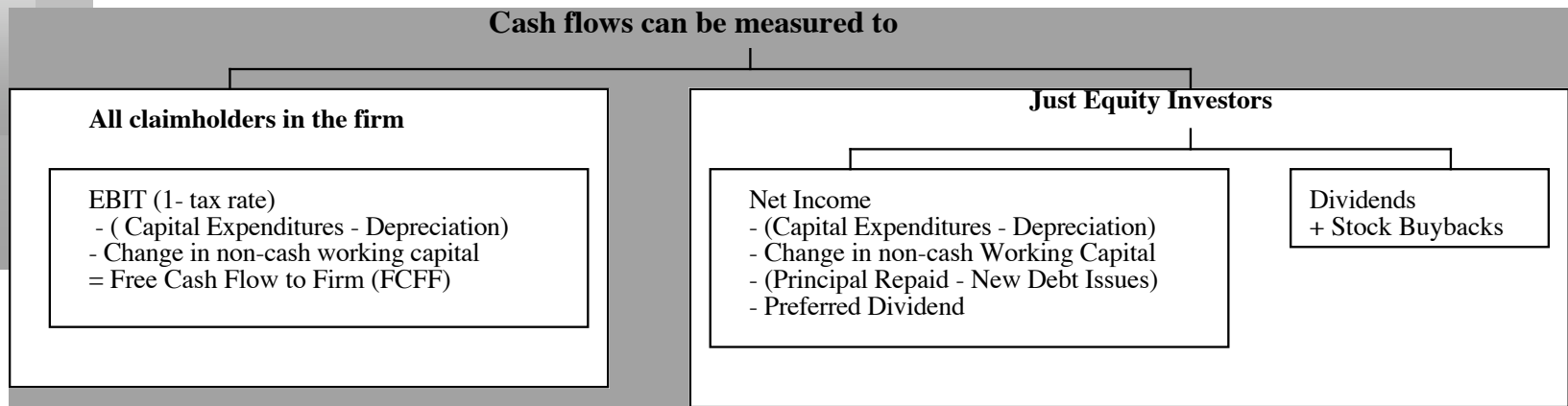
■ Cost of Capital

$$\text{Cost of Capital} = 16.26\% (.70) + 5.50\% (1-.40) (.30) = 12.37\%$$

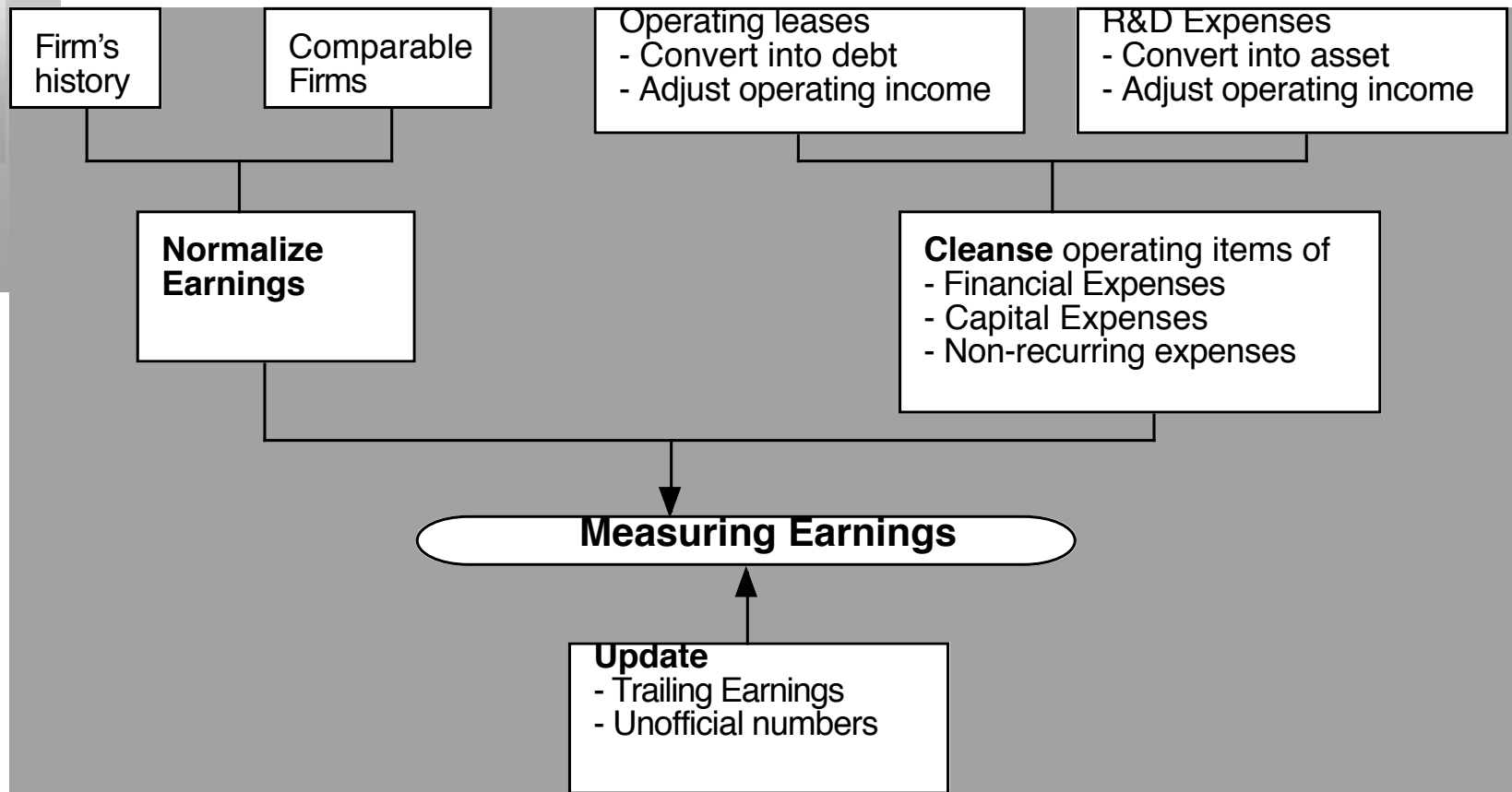


II. Estimating Cashflows and Growth

Defining Cashflow



From Reported to Actual Earnings



Dealing with Operating Lease Expenses

- Operating Lease Expenses are treated as operating expenses in computing operating income. In reality, operating lease expenses should be treated as financing expenses, with the following adjustments to earnings and capital:
- Debt Value of Operating Leases = Present value of Operating Lease Commitments at the pre-tax cost of debt
- When you convert operating leases into debt, you also create an asset to counter it of exactly the same value.
- Adjusted Operating Earnings
 - Adjusted Operating Earnings = Operating Earnings + Operating Lease Expenses - Depreciation on Leased Asset
 - As an approximation, this works:
Adjusted Operating Earnings = Operating Earnings + Pre-tax cost of Debt * PV of Operating Leases.

Operating Leases at The Gap in 2003

- The Gap has conventional debt of about \$ 1.97 billion on its balance sheet and its pre-tax cost of debt is about 6%. Its operating lease payments in the 2003 were \$978 million and its commitments for the future are below:

Year	Commitment (millions)	Present Value (at 6%)
1	\$899.00	\$848.11
2	\$846.00	\$752.94
3	\$738.00	\$619.64
4	\$598.00	\$473.67
5	\$477.00	\$356.44
6&7	\$982.50 each year	\$1,346.04
Debt Value of leases =		\$4,396.85 (Also value of leased asset)

- Debt outstanding at The Gap = \$1,970 m + \$4,397 m = \$6,367 m
- Adjusted Operating Income = Stated OI + OL exp this year - Deprec'n
= \$1,012 m + 978 m - 4397 m /7 = \$1,362 million (7 year life for assets)
- Approximate OI = \$1,012 m + \$ 4397 m (.06) = \$1,276 m

The Collateral Effects of Treating Operating Leases as Debt

<i>Conventional Accounting</i>	<i>Operating Leases Treated as Debt</i>				
<p><i>Income Statement</i></p> <p>EBIT & Leases = 1,990 - Op Leases = 978 EBIT = 1,012</p>	<p><i>Income Statement</i></p> <p>EBIT & Leases = 1,990 - Deprecn: OL = 628 EBIT = 1,362</p> <p>Interest expense will rise to reflect the conversion of operating leases as debt. Net income should not change.</p>				
<p><i>Balance Sheet</i></p> <p>Off balance sheet (Not shown as debt or as an asset). Only the conventional debt of \$1,970 million shows up on balance sheet</p>	<p><i>Balance Sheet</i></p> <table> <tr> <td>Asset</td> <td>Liability</td> </tr> <tr> <td>OL Asset 4397</td> <td>OL Debt 4397</td> </tr> </table> <p>Total debt = 4397 + 1970 = \$6,367 million</p>	Asset	Liability	OL Asset 4397	OL Debt 4397
Asset	Liability				
OL Asset 4397	OL Debt 4397				
<p>Cost of capital = 8.20%(7350/9320) + 4%(1970/9320) = 7.31%</p> <p>Cost of equity for The Gap = 8.20%</p> <p>After-tax cost of debt = 4%</p> <p>Market value of equity = 7350</p>	<p>Cost of capital = 8.20%(7350/13717) + 4%(6367/13717) = 6.25%</p>				
<p>Return on capital = 1012 (1-.35)/(3130+1970) = 12.90%</p>	<p>Return on capital = 1362 (1-.35)/(3130+6367) = 9.30%</p>				

R&D Expenses: Operating or Capital Expenses

- Accounting standards require us to consider R&D as an operating expense even though it is designed to generate future growth. It is more logical to treat it as capital expenditures.
- 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...:

Capitalizing R&D Expenses: Cisco in 1999

- R & D was assumed to have a 5-year life.

<i>Year</i>	<i>R&D Expense</i>	<i>Unamortized portion</i>	<i>Amortization this year</i>	
1999 (current)	1594.00		1.00	1594.00
1998	1026.00	0.80	820.80	\$205.20
1997	698.00	0.60	418.80	\$139.60
1996	399.00	0.40	159.60	\$79.80
1995	211.00	0.20	42.20	\$42.20
1994	89.00	0.00	0.00	\$17.80
Total			\$ 3,035.40	\$ 484.60
Value of research asset =				\$ 3,035.4 million
Amortization of research asset in 1998 =			\$ 484.6 million	
Adjustment to Operating Income = \$ 1,594 million - 484.6 million = 1,109.4 million				

The Effect of Capitalizing R&D

<i>Conventional Accounting</i>	<i>R&D treated as capital expenditure</i>						
<p><i>Income Statement</i></p> <p>EBIT& R&D = 5,049 - R&D = 1,594 EBIT = 3,455 EBIT (1-t) = 2,246</p>	<p><i>Income Statement</i></p> <p>EBIT& R&D = 5,049 - Amort: R&D = 485 EBIT = 4,564 (Increase of 1,109) EBIT (1-t) = 2,967</p> <p>Ignored tax benefit = $(1594-485)(.35) = 388$ Adjusted EBIT (1-t) = $2967 + 388 = 3354$ (Increase of \$1,109 million) Net Income will also increase by \$1,109 million</p>						
<p><i>Balance Sheet</i></p> <p>Off balance sheet asset. Book value of equity at \$11,722 million is understated because biggest asset is off the books.</p>	<p><i>Balance Sheet</i></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; text-align: center;">Asset</td> <td style="width: 50%; text-align: center;">Liability</td> </tr> <tr> <td style="text-align: center;">R&D Asset 3035</td> <td style="text-align: center;">Book Equity +3035</td> </tr> <tr> <td colspan="2" style="text-align: center;">Total Book Equity = $11722+3035 = 14757$</td> </tr> </table>	Asset	Liability	R&D Asset 3035	Book Equity +3035	Total Book Equity = $11722+3035 = 14757$	
Asset	Liability						
R&D Asset 3035	Book Equity +3035						
Total Book Equity = $11722+3035 = 14757$							
<p><i>Capital Expenditures</i></p> <p>Conventional net cap ex of \$98 million</p>	<p><i>Capital Expenditures</i></p> <p>Net Cap ex = $98 + 1594 - 485 = 1206$</p>						
<p><i>Cash Flows</i></p> <p>EBIT (1-t) = 2246 - Net Cap Ex = 98 FCFF = 2148</p>	<p><i>Cash Flows</i></p> <p>EBIT (1-t) = 3354 - Net Cap Ex = 1206 FCFF = 2148</p>						
<p>Return on capital = $2246/11722$ (no debt) = 19.16%</p>	<p>Return on capital = $3354/14757$ = 22.78%</p>						

What tax rate?

- The tax rate that you should use in computing the after-tax operating income should be
 - ❑ The effective tax rate in the financial statements (taxes paid/Taxable income)
 - ❑ The tax rate based upon taxes paid and EBIT (taxes paid/EBIT)
 - ❑ The marginal tax rate for the country in which the company operates
 - ❑ The weighted average marginal tax rate across the countries in which the company operates
 - ❑ None of the above
 - ❑ Any of the above, as long as you compute your after-tax cost of debt using the same tax rate

Capital expenditures should include

- Research and development expenses, once they have been re-categorized as capital expenses. The adjusted net cap ex will be
$$\text{Adjusted Net Capital Expenditures} = \text{Net Capital Expenditures} + \text{Current year's R\&D expenses} - \text{Amortization of Research Asset}$$

- Acquisitions of other firms, since these are like capital expenditures. The adjusted net cap ex will be
$$\text{Adjusted Net Cap Ex} = \text{Net Capital Expenditures} + \text{Acquisitions of other firms} - \text{Amortization of such acquisitions}$$

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

Cisco's Net Capital Expenditures in 1999

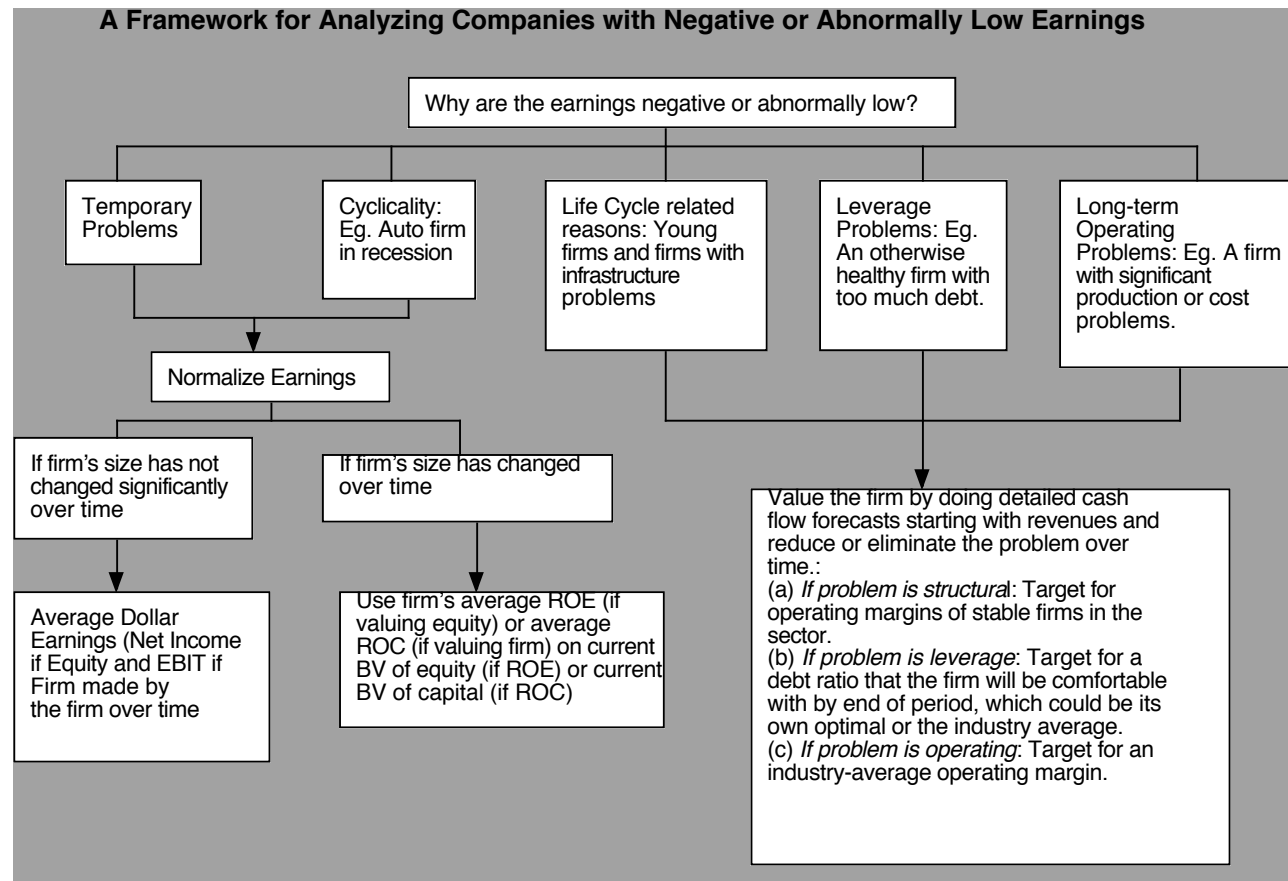
Cap Expenditures (from statement of CF)	= \$ 584 mil
- Depreciation (from statement of CF)	= \$ 486 mil
Net Cap Ex (from statement of CF)	= \$ 98 mil
+ R & D expense	= \$ 1,594 mil
- Amortization of R&D	= \$ 485 mil
+ Acquisitions	= \$ 2,516 mil
Adjusted Net Capital Expenditures	= \$3,723 mil

(Amortization was included in the depreciation number)

Working Capital Investments

- In accounting terms, the working capital is the difference between current assets (inventory, cash and accounts receivable) and current liabilities (accounts payables, short term debt and debt due within the next year)
- A cleaner definition of working capital from a cash flow perspective is the difference between non-cash current assets (inventory and accounts receivable) and non-debt current liabilities (accounts payable)
- Any investment in this measure of working capital ties up cash. Therefore, any increases (decreases) in working capital will reduce (increase) cash flows in that period.
- When forecasting future growth, it is important to forecast the effects of such growth on working capital needs, and building these effects into the cash flows.

Dealing with Negative or Abnormally Low Earnings



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

Estimating FCFF: Titan Cement

- EBIT = 232 million Euros
- Tax rate = 25.47%
- Net Capital expenditures = Cap Ex - Depreciation = 109.5 - 60.3 = 49.2 million
- Change in Working Capital = +51.80 million

Estimating FCFF

Current EBIT * (1 - tax rate) =	232 (1-.2547) =	172.8 Million
- (Capital Spending - Depreciation)	49.2	
- Change in Working Capital		51.8
Current FCFF		71.8 Million Euros

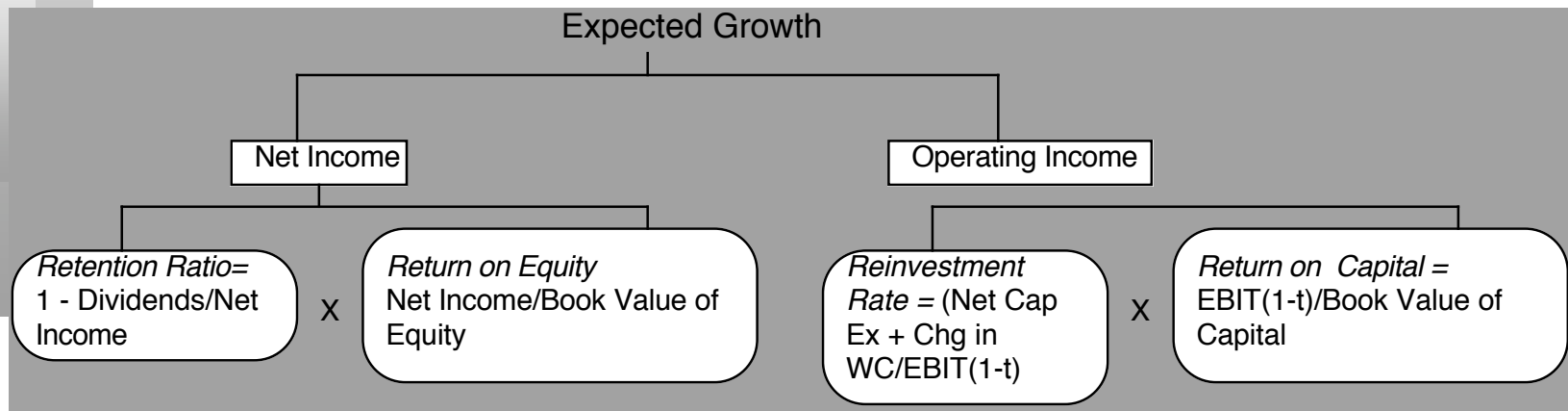
Estimating FCFF: Amazon.com

- 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

Growth in Earnings

- Look at the past
 - The historical growth in earnings per share is usually a good starting point for growth estimation
- Look at what others are estimating
 - Analysts estimate growth in earnings per share for many firms. It is useful to know what their estimates are.
- Look at fundamentals
 - Ultimately, all growth in earnings can be traced to two fundamentals - how much the firm is investing in new projects, and what returns these projects are making for the firm.

Fundamental Growth when Returns are stable



Measuring Return on Capital (Equity)

Adjust EBIT for

- Extraordinary or one-time expenses or income
- Operating leases and R&D
- Cyclicality in earnings (Normalize)
- Acquisition Debris (Goodwill amortization etc.)

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

ROC =

EBIT (1- tax rate)

Book Value of Equity + Book value of debt - Cash

Adjust book equity for

- Capitalized R&D
- Acquisition Debris (Goodwill)

Adjust book value of debt for

- Capitalized operating leases

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

Normalizing Reinvestment: Titan Cement

	2000	2001	2002	2003	2004	Total
Cp Ex	\$50.54	\$81.00	\$113.30	\$102.30	\$109.50	\$456.64
Depreciation	\$39.26	\$40.87	\$80.94	\$73.70	\$60.30	\$295.07
EBIT	\$162.78	\$186.39	\$200.60	\$222.00	\$231.80	
EBIT(1-t)	\$121.32	\$138.92	\$149.51	\$154.42	\$172.76	\$736.92
Net Cap Ex as % of EBIT(1-t)	9.30%	28.89%	21.64%	18.52%	28.48%	21.92%
Revenues	622.7	982.9	1036.1	1035.7	1104.4	4781.8
Non-cashh Current assets	248.55	342.95	352.93	\$402.10	\$398.90	
Non-debt current liabilities	133.33	177.15	194.57	255	190	
Non-cash WC	115.22	165.8	158.36	147.1	208.9	795.38
as % of revenues	18.50%	16.87%	15.28%	14.20%	18.92%	16.63%

Expected Growth Estimate: Titan Cement

- Normalized Change in working capital = (Working capital as percent of revenues) * Change in revenues in 2004 = $.1663 (1104.4 - 1035.7) = 11.4$ mil Euros
- Normalized Net Cap Ex = Net Cap ex as % of EBIT(1-t) * EBIT (1-t) in 2004 = $.2192 * (232 (1 - .2547)) = 37.90$ million Euros
- Normalized reinvestment rate = $(11.4 + 37.9) / (232 (1 - .2547)) = 28.54\%$
- Return on capital = $232 (1 - .2547) / (499 + 399) = 19.25\%$
 - The book value of debt and equity from last year was used.
- Expected growth rate = $.2854 * .1925 = 5.49\%$

Fundamental Growth when return on equity (capital) is changing

- When the return on equity or capital is changing, there will be a second component to growth, positive if the return is increasing and negative if the return is decreasing.
- If ROC_t is the return on capital in period t and ROC_{t+1} is the return on capital in period t+1, the expected growth rate in operating income will be:

$$\begin{aligned} \text{Expected Growth Rate} = & ROC_{t+1} * \text{Reinvestment rate} \\ & + (ROC_{t+1} - ROC_t) / ROC_t \end{aligned}$$

An example: Motorola

- Motorola's current return on capital is 12.18% and its reinvestment rate is 52.99%.
- We expect Motorola's return on capital to rise to 17.22% over the next 5 years (which is half way towards the industry average)

Expected Growth Rate

$$\begin{aligned} &= \text{ROC}_{\text{New Investments}} * \text{Reinvestment Rate}_{\text{current}} + \{ [1 + (\text{ROC}_{\text{In 5 years}} - \text{ROC}_{\text{Current}}) / \text{ROC}_{\text{Current}}]^{1/5} - 1 \} \\ &= .1722 * .5299 + \{ [1 + (.1722 - .1218) / .1218]^{1/5} - 1 \} \\ &= .174 \text{ or } 17.40\% \end{aligned}$$

- One way to think about this is to decompose Motorola's expected growth into
 - Growth from new investments: $.1722 * .5299 = 9.12\%$
 - Growth from more efficiently using existing investments: $17.40\% - 9.12\% = 8.28\%$

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.



III. The Tail that wags the dog... Terminal Value

Getting Closure in Valuation

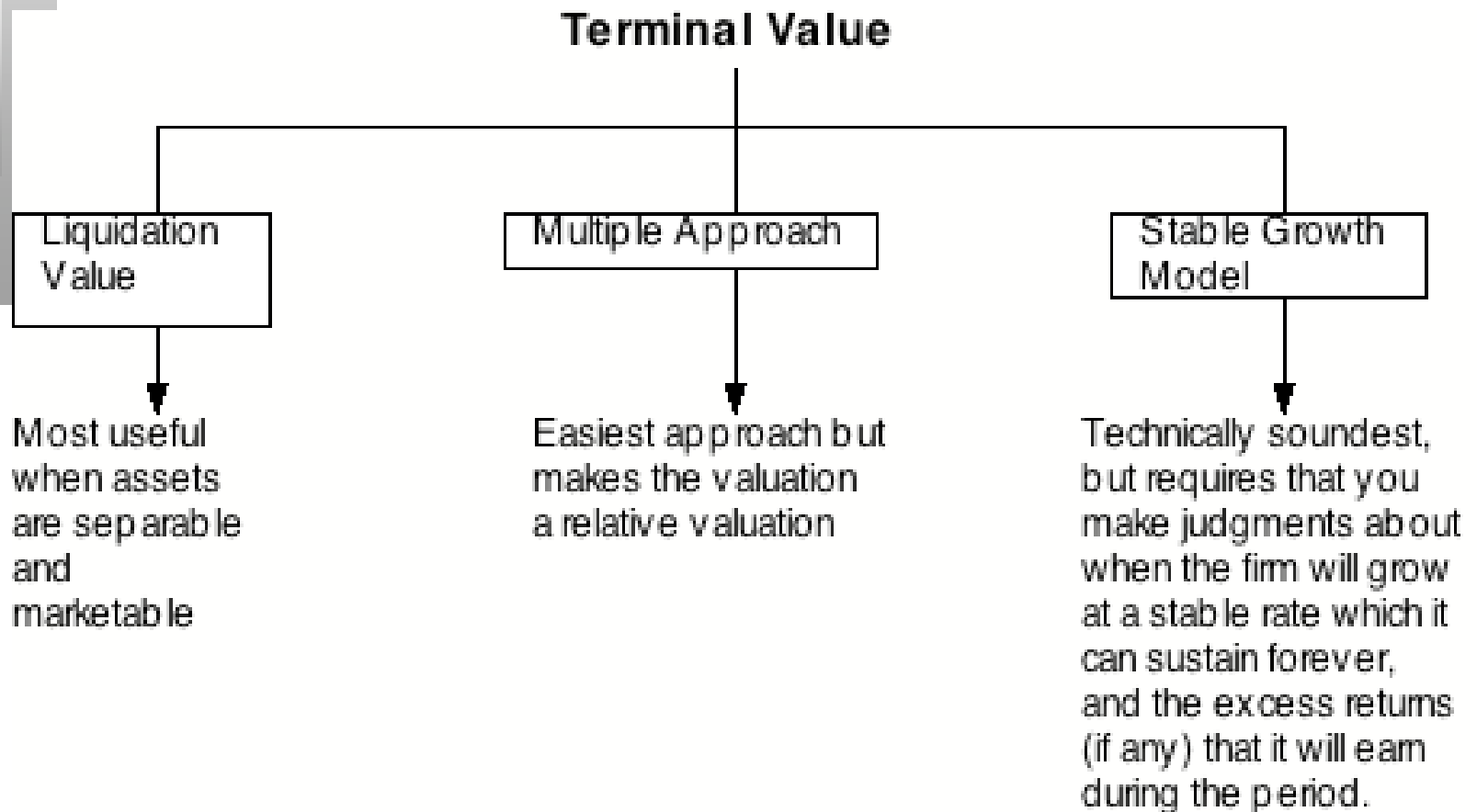
- A publicly traded firm potentially has an infinite life. The value is therefore the present value of cash flows forever.

$$\text{Value} = \sum_{t=1}^{t=\infty} \frac{CF_t}{(1+r)^t}$$

- Since we cannot estimate cash flows forever, we estimate cash flows for a “growth period” and then estimate a terminal value, to capture the value at the end of the period:

$$\text{Value} = \sum_{t=1}^{t=N} \frac{CF_t}{(1+r)^t} + \frac{\text{Terminal Value}}{(1+r)^N}$$

Ways of Estimating Terminal Value



Stable Growth and Terminal Value

- When a firm's cash flows grow at a “constant” rate forever, the present value of those cash flows can be written as:
Value = Expected Cash Flow Next Period / (r - g)
where,
r = Discount rate (Cost of Equity or Cost of Capital)
g = Expected growth rate
- This “constant” growth rate is called a stable growth rate and cannot be higher than the growth rate of the economy in which the firm operates.
- While companies can maintain high growth rates for extended periods, they will all approach “stable growth” at some point in time.

Limits on Stable Growth

- The stable growth rate cannot exceed the growth rate of the economy but it can be set lower.
 - If you assume that the economy is composed of high growth and stable growth firms, the growth rate of the latter will probably be lower than the growth rate of the economy.
 - The stable growth rate can be negative. The terminal value will be lower and you are assuming that your firm will disappear over time.
 - If you use nominal cashflows and discount rates, the growth rate should be nominal in the currency in which the valuation is denominated.
- One simple proxy for the nominal growth rate of the economy is the riskfree rate.

Stable Growth and Excess Returns

- Strange though this may seem, the terminal value is not as much a function of stable growth as it is a function of what you assume about excess returns in stable growth.
- In the scenario where you assume that a firm earns a return on capital equal to its cost of capital in stable growth, the terminal value will not change as the growth rate changes.
- If you assume that your firm will earn positive (negative) excess returns in perpetuity, the terminal value will increase (decrease) as the stable growth rate increases.

Getting to stable growth: Determinants

- 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
 - $\text{Reinvestment Rate} = \text{Expected Growth Rate} / \text{Return on Capital}$

Titan and Amazon.com: Stable Growth Inputs

	<i>High Growth</i>	<i>Stable Growth</i>
■ Titan Cement		
• Beta	0.93	1.00
• Debt Ratio	17.6%	17.6%
• Return on Capital	19.25%	6.57%
• Cost of Capital	6.78%	6.57%
• Expected Growth Rate	5.49%	3.41%
• Reinvestment Rate	28.54%	$3.41\% \times 6.57\% = 51.93\%$
■ 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%	$6\% / 20\% = 30\%$