Valuations

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Companies Valued

Company	*Model Used*	*Key emphasis*
1. Con Ed	Stable DDM	Stable growth inputs; Implied growth
2a. ABN Amro	2-Stage DDM	Breaking down value; Macro risk?
2b. Goldman	3-Stage DDM	Regulatory overlay?
2c. Wells Fargo	2-stage DDM	Effects of a market meltdown?
2d. Deutsche Bank	2-stage FCFE	Estimating cashflows for a bank
3. S&P 500	2-Stage DDM	Dividends vs FCFE; Risk premiums
4. Tsingtao	3-Stage FCFE	High Growth & Changing fundamentals
5. Toyota	Stable FCFF	Normalized Earnings
6. Tube Invest.	2-stage FCFF	The cost of corporate governance
7. KRKA	2-stage FCFF	Multiple country risk..
8. Tata Group	2-stage FCFF	Cross Holding mess
9. Amazon.com	n-stage FCFF	The Dark Side of Valuation…
10. Amgen	3-stage FCFF	Capitalizing R&D
11. Sears	2-stage FCFF	Negative Growth?
12. LVS	2-stage FCFF	Dealing with Distress

Risk premiums in Valuation

- The equity risk premiums that I have used in the valuations that follow reflect my thinking (and how it has evolved) on the issue.
  - Pre-1998 valuations: In the valuations prior to 1998, I use a risk premium of 5.5% for mature markets (close to both the historical and the implied premiums then)
  - Between 1998 and Sept 2008: In the valuations between 1998 and September 2008, I used a risk premium of 4% for mature markets, reflecting my belief that risk premiums in mature markets do not change much and revert back to historical norms (at least for implied premiums).
  - Valuations done in 2009: After the 2008 crisis and the jump in equity risk premiums to 6.43% in January 2008, I have used a higher equity risk premium (5-6%) for the next 5 years and will assume a reversion back to historical norms (4%) only after year 5.
  - In 2010 & 2011: In 2010, I reverted back to a mature market premium of 4.5%, reflecting the drop in equity risk premiums during 2009. In 2011, I plan to use 5%, reflecting again the change in implied premium over the year.

1. CON ED- AUGUST 2008

Test 1: Is the firm paying dividends like a stable growth firm?
Dividend payout ratio is 73%

Test 2: Is the stable growth rate consistent with fundamentals?
Retention Ratio = 27%
ROE =Cost of equity = 7.7%
Expected growth = 2.1%

In trailing 12 months, through June 2008
Earnings per share = $3.17
Dividends per share = $2.32

Growth rate forever = 2.1%

Value per share today= Expected Dividends per share next year / (Cost of equity - Growth rate)
= 2.32 (1.021)/ (.077 - ,021) = $42.30

Cost of Equity = 4.1% + 0.8 (4.5%) = 7.70%

On August 12, 2008 Con Ed was trading at $ 40.76.

Riskfree rate
4.10%
10-year T.Bond rate

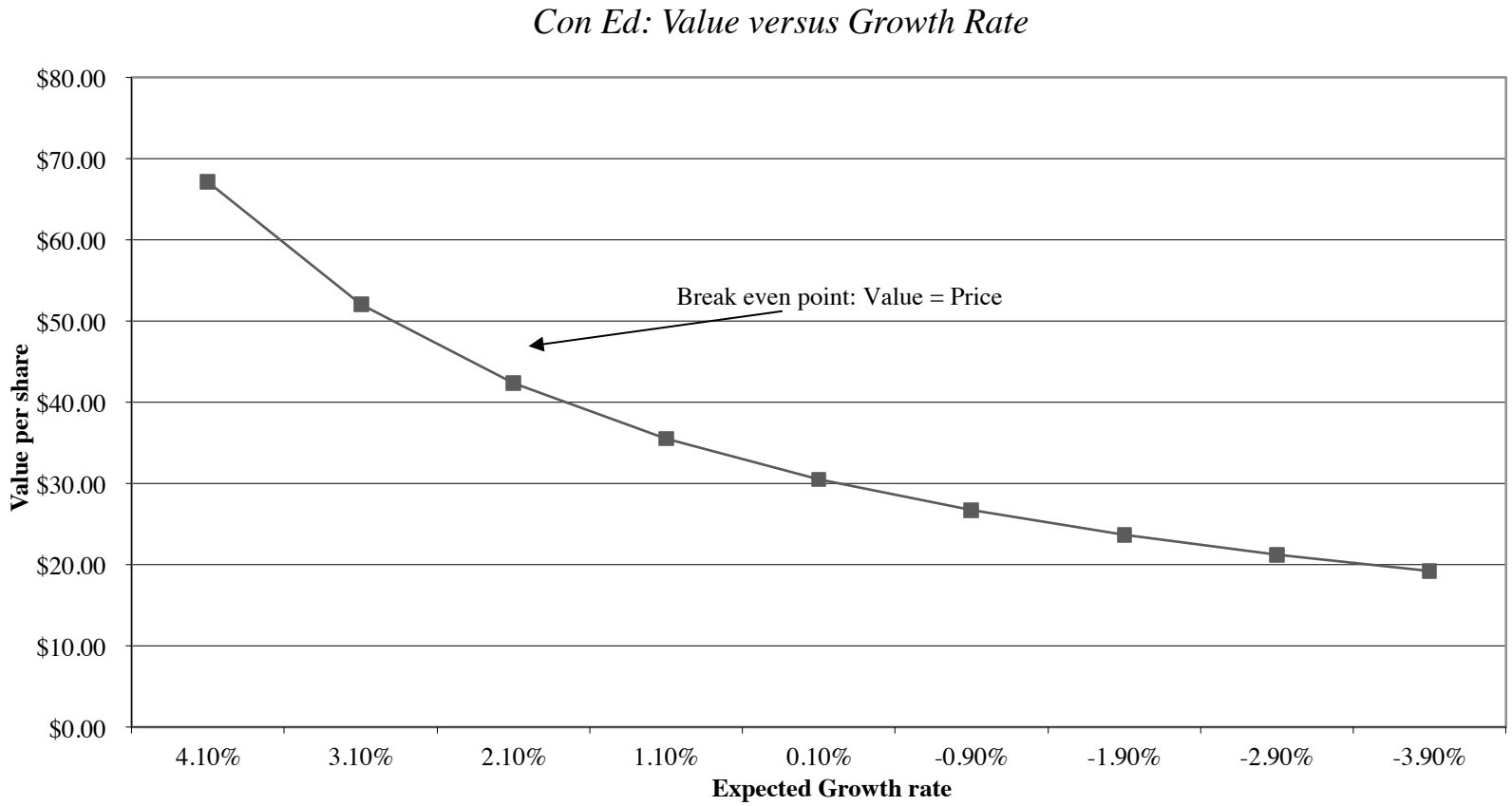
Beta
0.80
Beta for regulated power utilities

Equity Risk Premium
4.5%
Implied Equity Risk Premium - US market in 8/2008

Test 3: Is the firm's risk and cost of equity consistent with a stable growth firm?
Beta of 0.80 is at lower end of the range of stable company betas: 0.8 -1.2

Why a stable growth dividend discount model?
1. Why stable growth: Company is a regulated utility, restricted from investing in new growth markets. Growth is constrained by the fact that the population (and power needs) of its customers in New York are growing at very low rates.
Growth rate forever = 2%
2. Why equity: Company's debt ratio has been stable at about 70% equity, 30% debt for decades.
3. Why dividends: Company has paid out about 97% of its FCFE as dividends over the last five years.

Con Ed: Break Even Growth Rates



Following up on DCF valuation…

- Assume that you believe that your valuation of Con Ed ($42.30) is a fair estimate of the value, 7.70% is a reasonable estimate of Con Ed's cost of equity and that your expected dividends for next year (2.32*1.021) is a fair estimate, what is the expected stock price a year from now (assuming that the market corrects its mistake?)

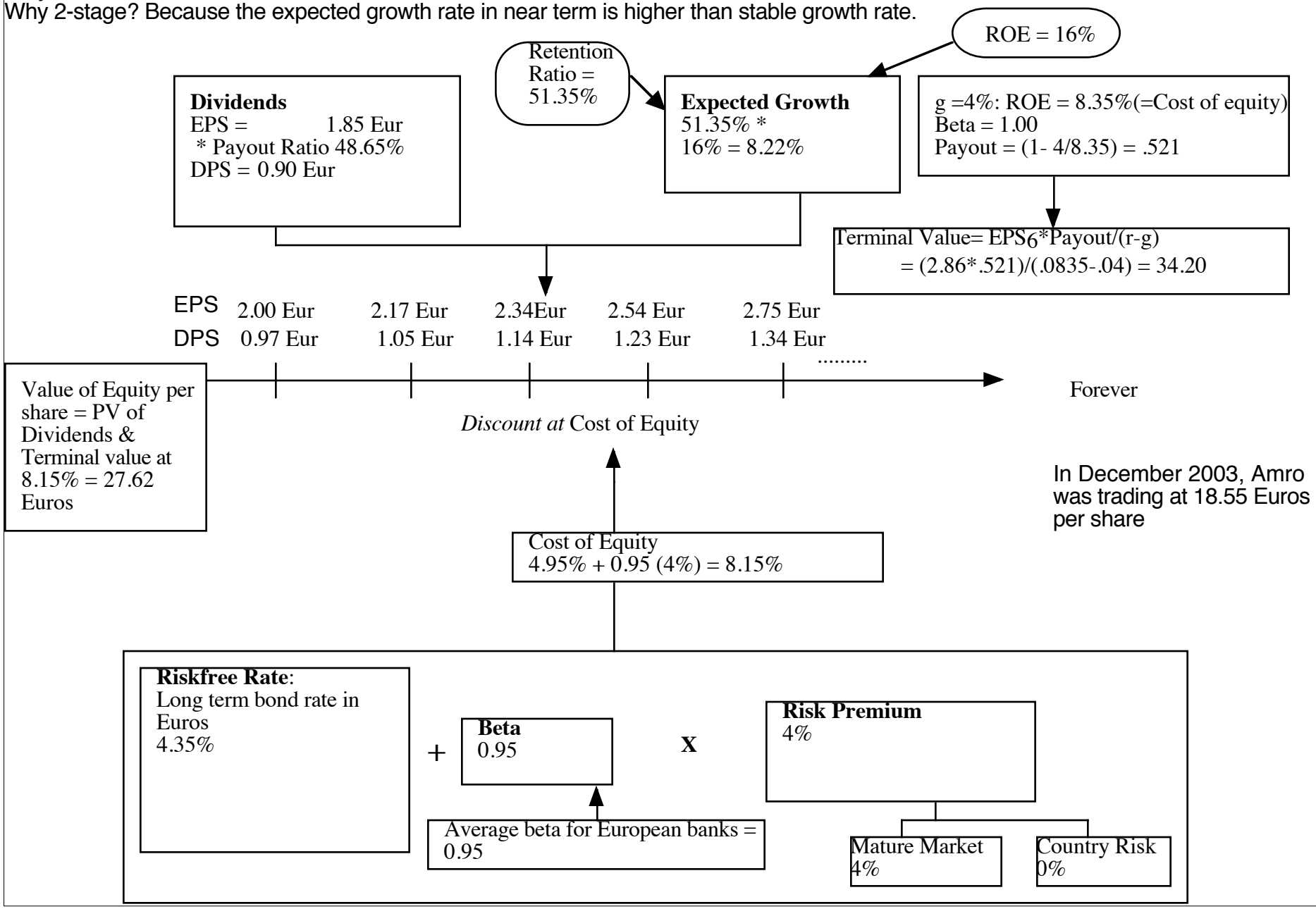
- If you bought the stock today at $40.76, what return can you expect to make over the next year (assuming again that the market corrects its mistake)?

2a. ABN AMRO - December 2003

Rationale for model

Why dividends? Because FCFE cannot be estimated

Why 2-stage? Because the expected growth rate in near term is higher than stable growth rate.



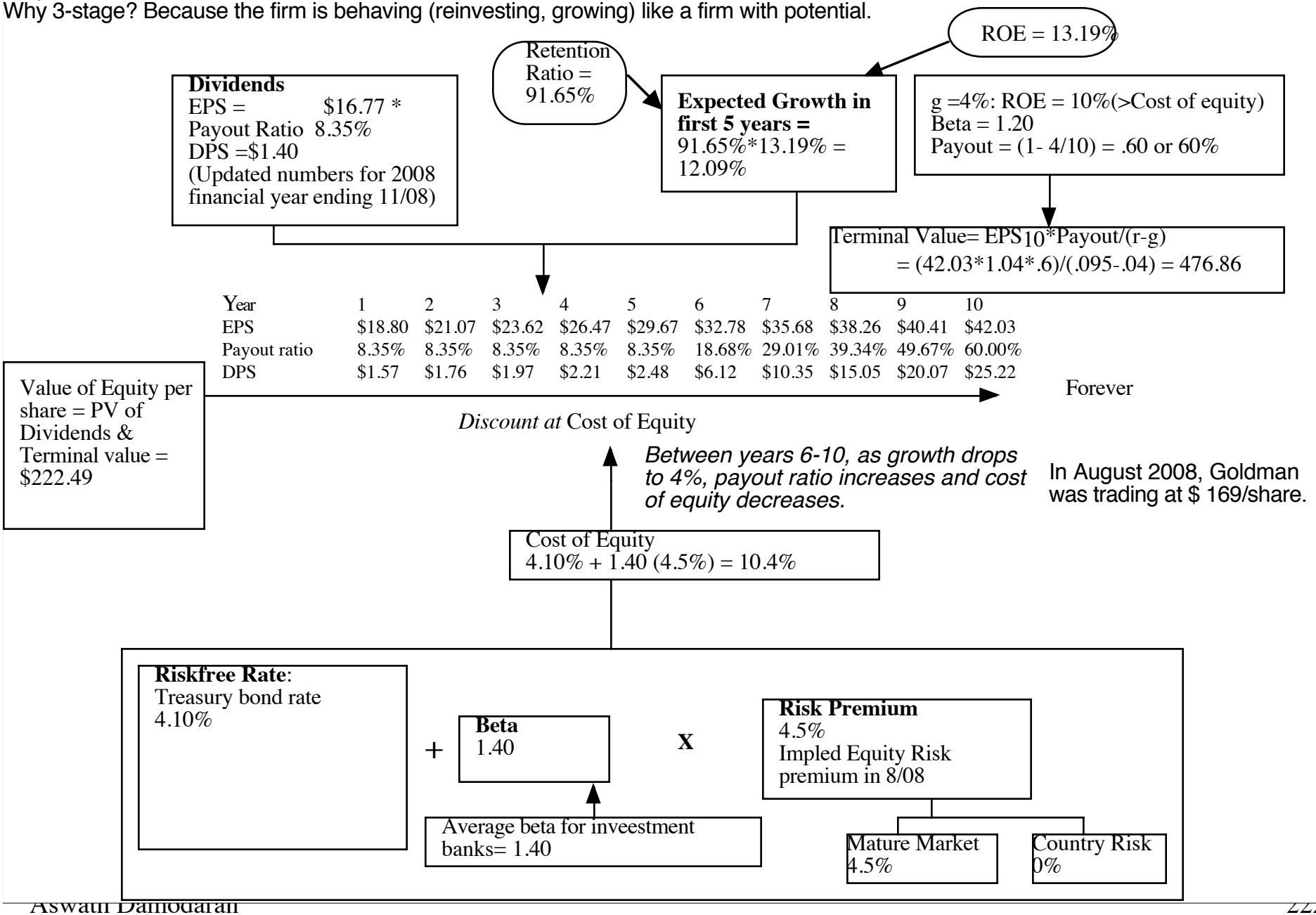
2b. Goldman Sachs: August 2008

Left return on equity at 2008 levels. well below 16% in 2007 and 20% in 2004-2006.

Rationale for model

Why dividends? Because FCFE cannot be estimated

Why 3-stage? Because the firm is behaving (reinvesting, growing) like a firm with potential.



2c. Wells Fargo: Valuation on October 7, 2008

Assuming that Wells will have to increase its capital base by about 30% to reflect tighter regulatory concerns. (.1756/1.3 =.135

Rationale for model

Why dividends? Because FCFE cannot be estimated

Why 2-stage? Because the expected growth rate in near term is higher than stable growth rate.

ROE = 13.5%

Retention Ratio = 45.37%

Return on equity: 17.56%

Dividends (Trailing 12 months)
EPS = $2.16 *
Payout Ratio 54.63%
DPS = $1.18

Expected Growth
45.37% *
13.5% = 6.13%

g =3%: ROE = 7.6%(=Cost of equity)
Beta = 1.00: ERP = 4%
Payout = (1- 3/7.6) = .60.55%

Terminal Value= EPS_6*Payout/(r-g)
= ($3.00*.6055)/(.076-.03) = $39.41

EPS	$ 2.29	$2.43	$2.58	$2.74	$2.91
DPS	$1.25	$1.33	$1.41	$1.50	$1.59

..... Forever

Value of Equity per share = PV of Dividends & Terminal value at 9.6% = $30.29

Discount at Cost of Equity

In October 2008, Wells Fargo was trading at $33 per share

Cost of Equity
3.60% + 1.20 (5%) = 9.60%

Riskfree Rate:
Long term treasury bond rate
3.60%

+ **Beta**
1.20

Average beta for US Banks over last year: 1.20

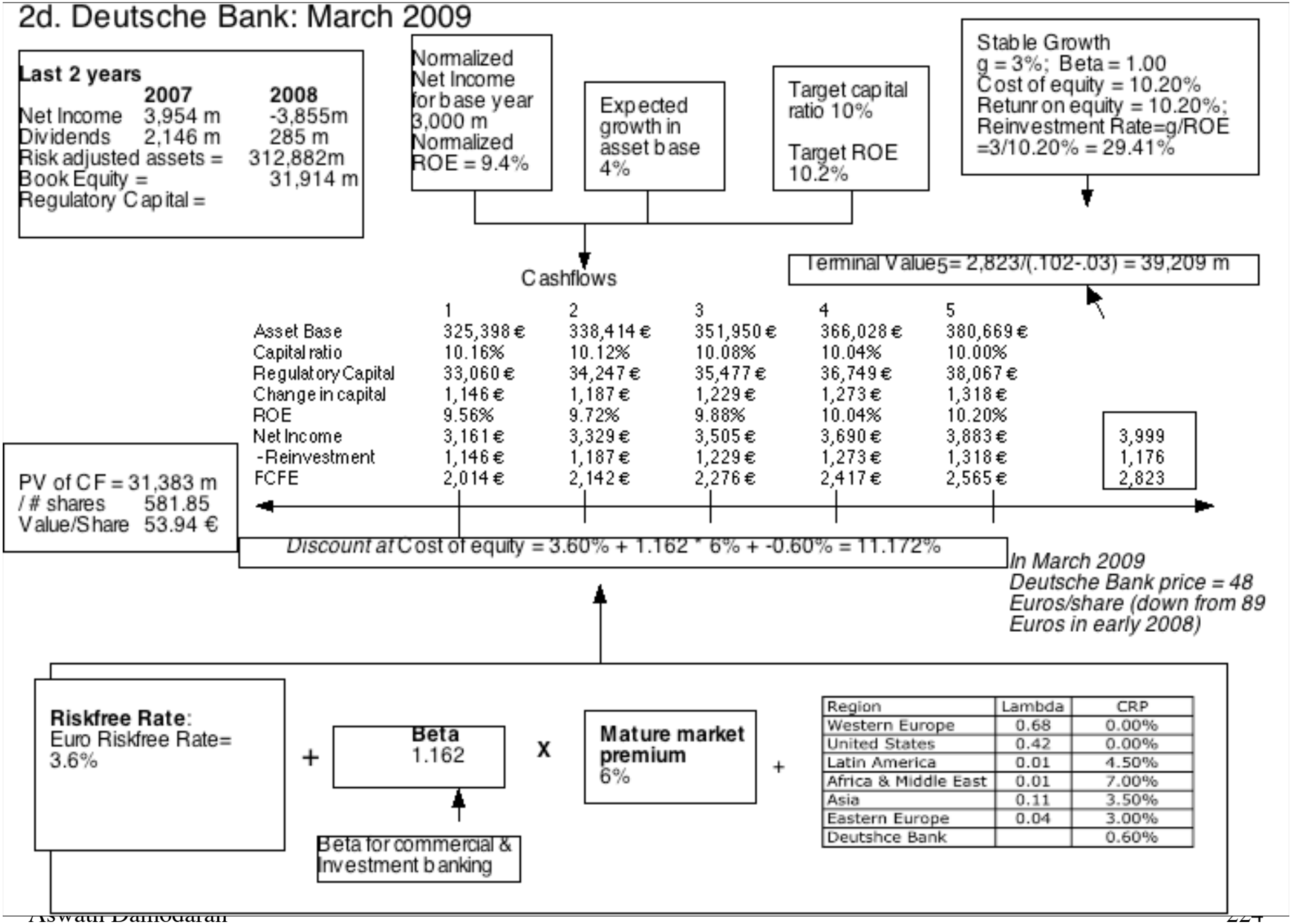
X

Risk Premium
5%
Updated in October 2008

Mature Market 5%

Country Risk 0%

2d. Deutsche Bank: March 2009



Present Value Mechanics – when discount rates are changing…

- Consider the costs of equity for Goldman Sachs over the next 10 years.

Year	1-5	6	7	8	9	10 on…
Cost of equity	10.4%	10.22%	10.04%	9.86%	9.68%	9.50%

In estimating the terminal value, we used the 9.50% cost of equity in stable growth, to arrive at a terminal value of $476.86. What is the present value of this terminal value?

Intuitively, explain why.

The Value of Growth

- In any valuation model, it is possible to extract the portion of the value that can be attributed to growth, and to break this down further into that portion attributable to "high growth" and the portion attributable to "stable growth". In the case of the 2-stage DDM, this can be

$$P_0 = \left\{\left[\sum_{t=1}^{t=n} \frac{DPS_t}{(1+r)^t} + \frac{P_n}{(1+r)^n}\right] - \frac{DPS_0*(1+g_n)}{(r-g_n)}\right\} + \left\{\frac{DPS_0*(1+g_n)}{(r-g_n)} - \frac{DPS_0}{r}\right\} + \frac{DPS_0}{r}$$

Value of High Growth Assets in Place

Value of Stable Growth

DPS_t = Expected dividends per share in year t

r = Cost of Equity

P_n = Price at the end of year n

g_n = Growth rate forever after year n

ABN Amro and Goldman Sachs: Decomposing Value

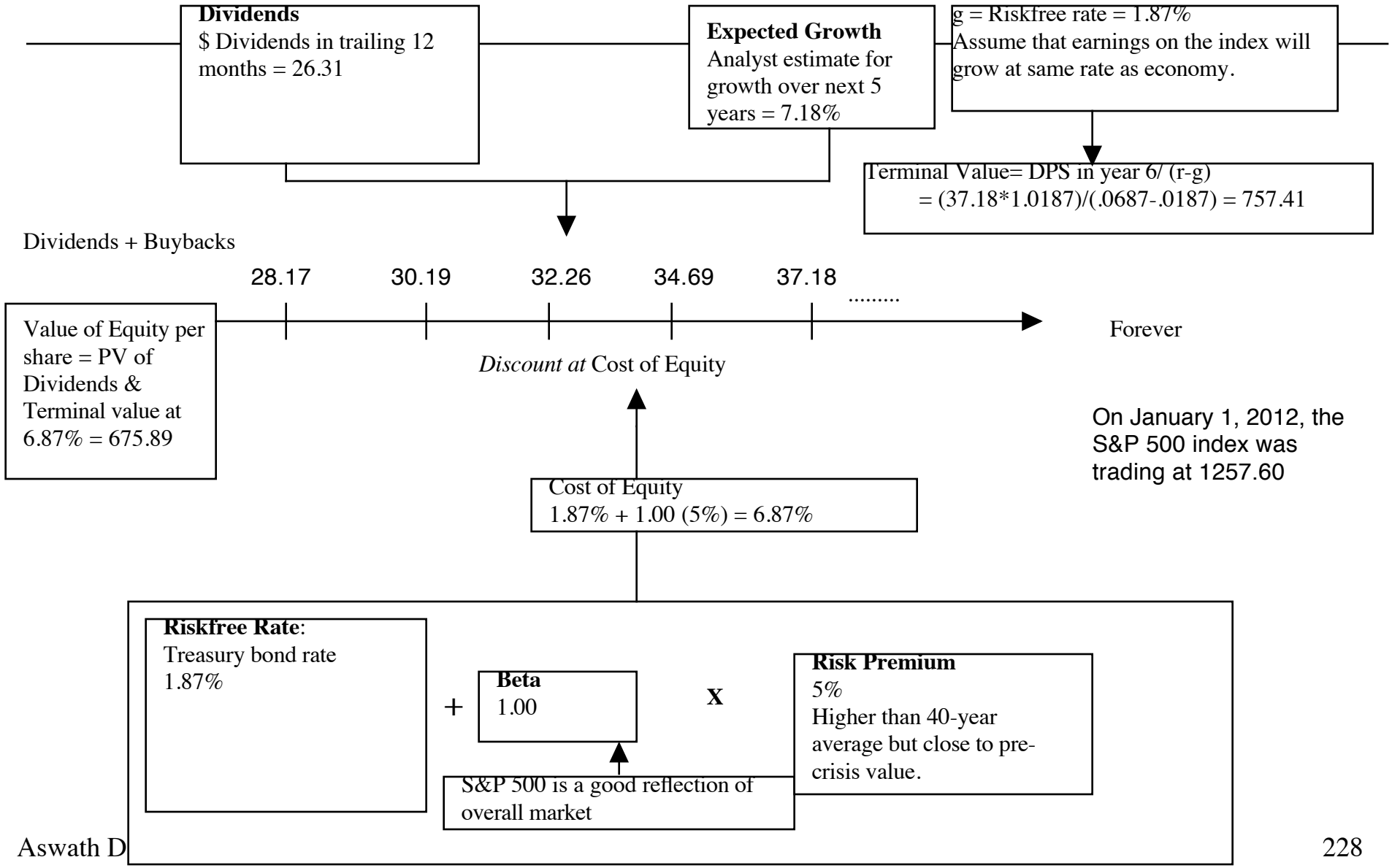
	ABN Amro (2003)	Proportion	Goldman (2008)	Proportions
Assets in place	0.90/.0835 = $10.78	39.02%	1.40/.095 = $14.74	6.62%
Stable Growth	0.90*1.04/(.0835-.04) = $10.74	38.88%	1.40*1.04/(.095-.04) = $11.74	5.27%
Growth Assets	27.62-10.78-10.74 = $6.10	22.10%	222.49-14.74-11.74 = $196.02	88.10%
Total	$27.62		$222.49	

3a. S&P 500: Dividends January 2012

Rationale for model

Why dividends? Because it is the only tangible cash flow, right?

Why 2-stage? Because the expected growth rate in near term is higher than stable growth rate.

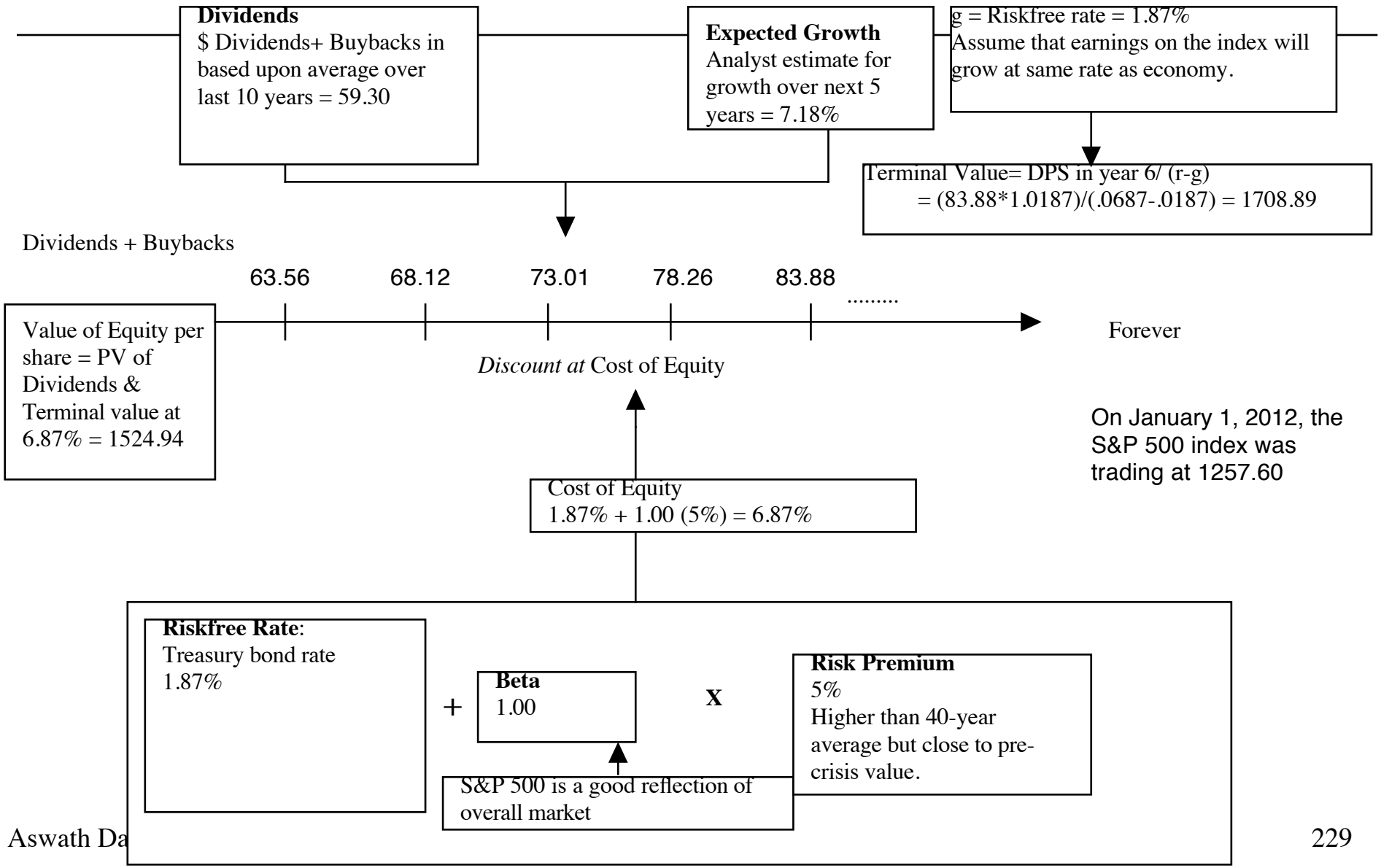


3b. S&P 500: Augmented Dividends - January 2012

Rationale for model

Why dividends and buybacks? Because more and more companies are choosing to return cash with buybacks

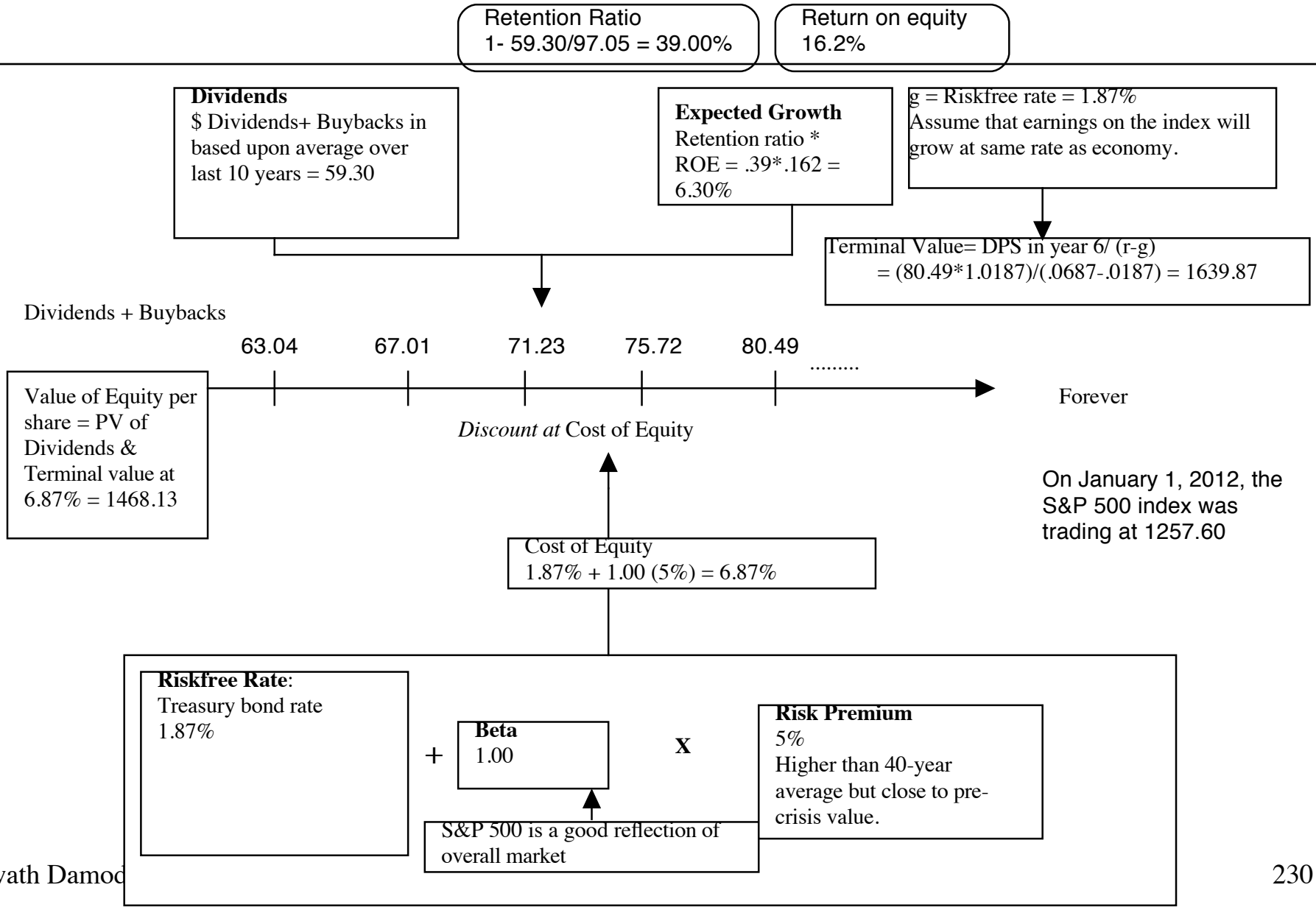
Why 2-stage? Because the expected growth rate in near term is higher than stable growth rate.



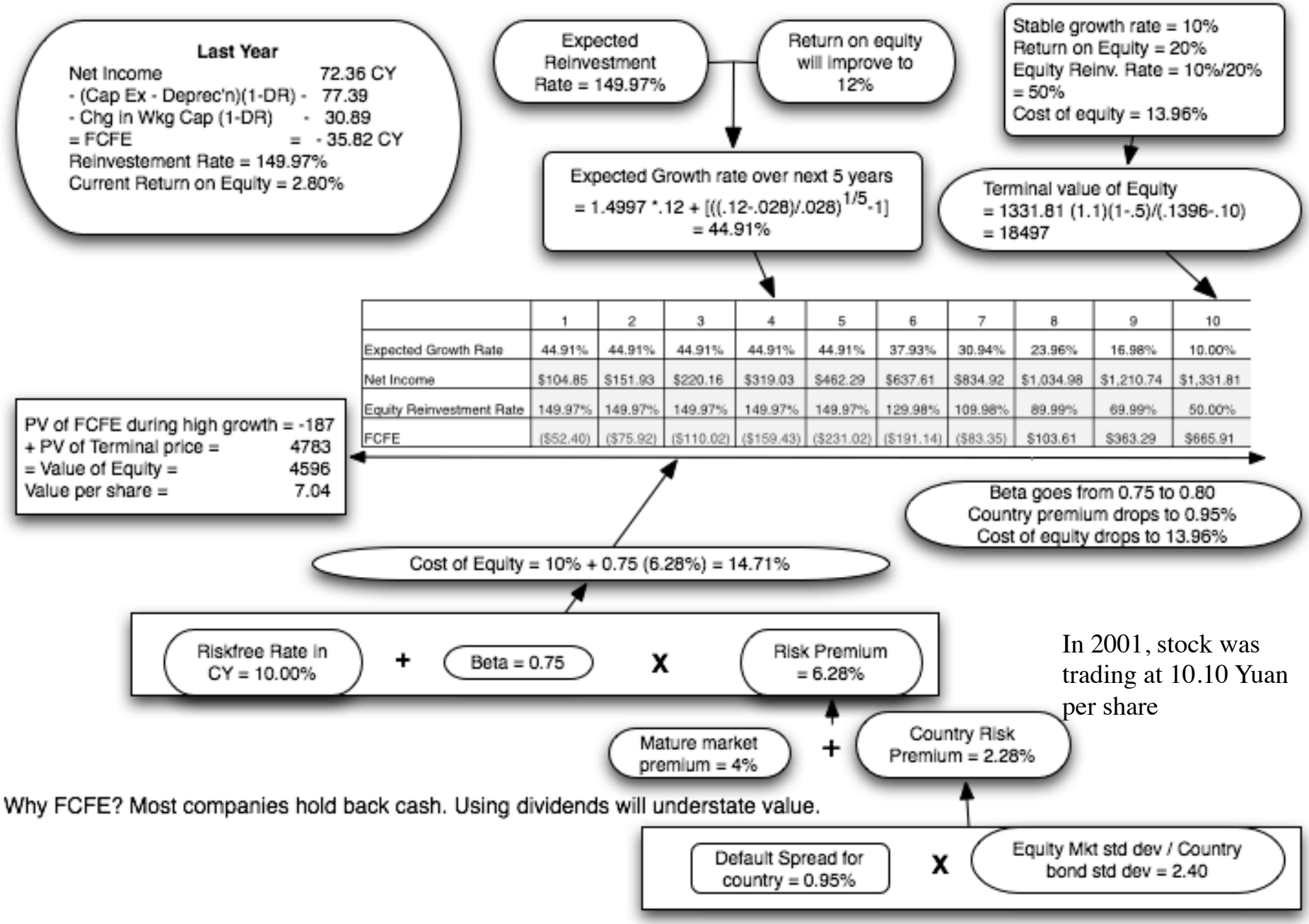
3c. S&P 500: Augmented Dividends & Fundamental growth - January 2012

Rationale for model

Why dividends and buybacks? Because more and more companies are choosing to return cash with buybacks
Why fundamental growth? Because growth cannot be invented, it has to be earned.
Why 2-stage? Because the expected growth rate in near term is higher than stable growth rate.



4. Tsingtao Breweries: A FCFE valuation (2001)



In 2001, stock was trading at 10.10 Yuan per share

Why FCFE? Most companies hold back cash. Using dividends will understate value.

Decomposing value at Tsingtao Breweries…

- Breaking down the value today of Tsingtao Breweries, you arrive at the following:
- PV of Cashflows to Equity over first 10 years = - 187 million
- PV of Terminal Value of Equity = 4783 million
- Value of equity today = 4596 million

More than 100% of the value of equity today comes from the terminal value.

a. Is this a reason for concern?

b. How would you intuitively explain what this means for an equity investor in the firm?

Valuing a Cyclical Company - Toyota in Early 2009

Year	Revenues	Operating Incoı	EBITDA	Operating Marg
FY1 1992	¥10,163,380	¥218,511	¥218,511	2.15%
FY1 1993	¥10,210,750	¥181,897	¥181,897	1.78%
FY1 1994	¥9,362,732	¥136,226	¥136,226	1.45%
FY1 1995	¥8,120,975	¥255,719	¥255,719	3.15%
FY1 1996	¥10,718,740	¥348,069	¥348,069	3.25%
FY1 1997	¥12,243,830	¥665,110	¥665,110	5.43%
FY1 1998	¥11,678,400	¥779,800	¥1,382,950	6.68%
FY1 1999	¥12,749,010	¥774,947	¥1,415,997	6.08%
FY1 2000	¥12,879,560	¥775,982	¥1,430,982	6.02%
FY1 2001	¥13,424,420	¥870,131	¥1,542,631	6.48%
FY1 2002	¥15,106,300	¥1,123,475	¥1,822,975	7.44%
FY1 2003	¥16,054,290	¥1,363,680	¥2,101,780	8.49%
FY1 2004	¥17,294,760	¥1,666,894	¥2,454,994	9.64%
FY1 2005	¥18,551,530	¥1,672,187	¥2,447,987	9.01%
FY1 2006	¥21,036,910	¥1,878,342	¥2,769,742	8.93%
FY1 2007	¥23,948,090	¥2,238,683	¥3,185,683	9.35%
FY1 2008	¥26,289,240	¥2,270,375	¥3,312,775	8.64%
FY 2009 (Estin	¥22,661,325	¥267,904	¥1,310,304	1.18%
		¥1,306,867		7.33%

Normalized Earnings (1)

As a cyclical company, Toyota's earnings have been volatile and 2009 earnings reflect the troubled global economy. We will assume that when economic growth returns, the operating margin for Toyota will revert back to the historical average.

Normalized Operating Income = Revenues in 2009 * Average Operating Margin (98--09)
= 22661 * .0733 =1660.7 billion yen

In early 2009, Toyota Motors had the highest market share in the sector. However, the global economic recession in 2008-09 had pulled earnings down.

Normalized Return on capital and Reinvestment (2)

Once earnings bounce back to normal, we assume that Toyota will be able to earn a return on capital equal to its cost of capital (5.09%). This is a sector, where earning excess returns has proved to be difficult even for the best of firms.

To sustain a 1.5% growth rate, the reinvestment rate has to be:

Reinvestment rate = 1.5%/5.09%
= 29.46%

Operating Assets	19,640
+ Cash	2,288
+ Non-operating assets	6,845
- Debt	11,862
- Minority Interests	583
Value of Equity	
/ No of shares	/3,448
Value per share	¥4735

$$\text{Value of operating assets} = \frac{1660.7\ (1.015)\ (1-\ .407)\ (1-\ .2946)}{(.0509\ -\ .015)} = 19{,}640 \text{ billion}$$

Normalized Cost of capital (3)

The cost of capital is computed using the average beta of automobile companies (1.10), and Toyota's cost of debt (3.25%) and debt ratio (52.9% debt ratio. We use the Japanese marginal tax rate of 40.7% for computing both the after-tax cost of debt and the after-tax operating income

Cost of capital = 8.65% (.471) + 3.25% (1-.407) (.529) = 5.09%

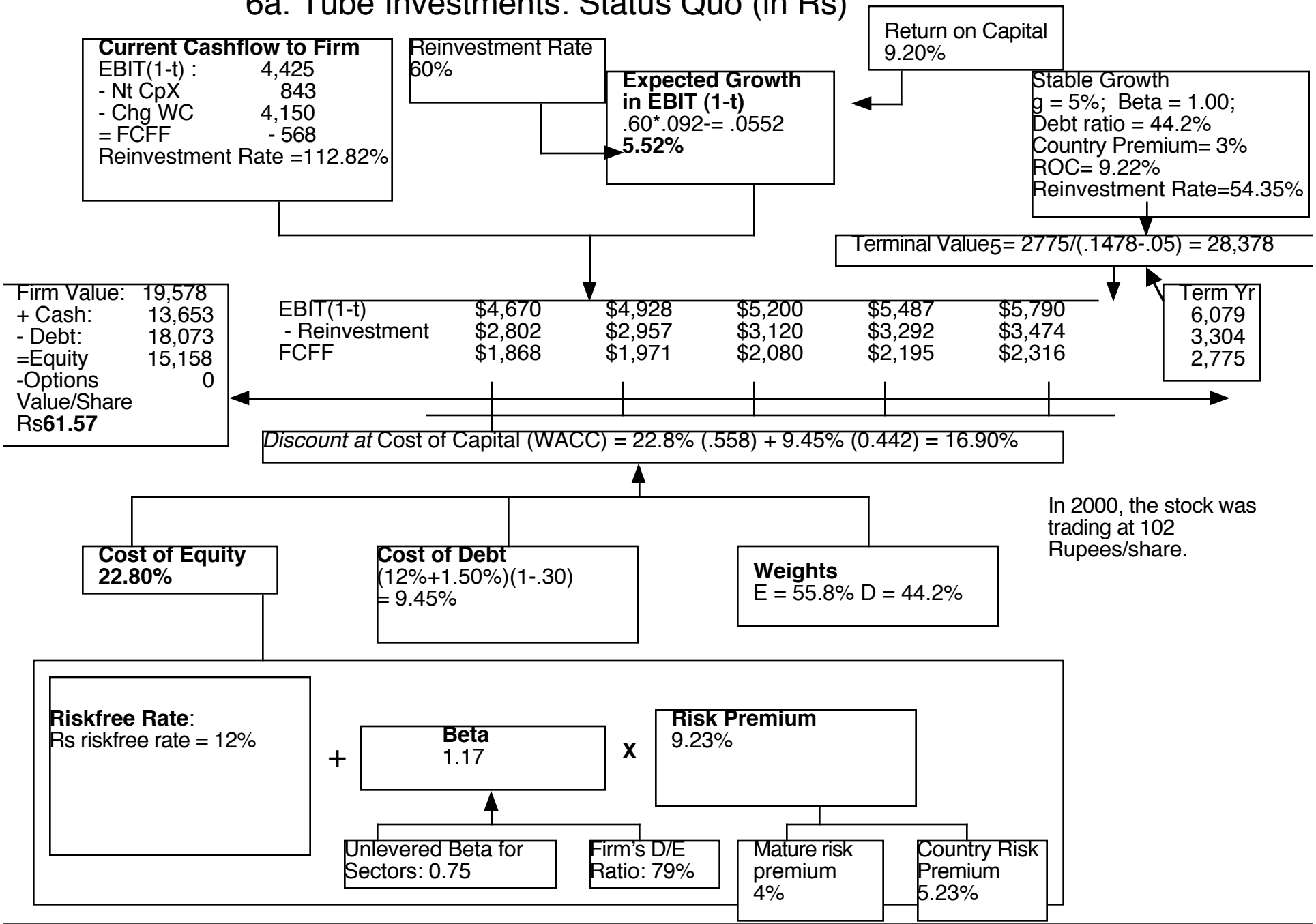
Stable Growth (4)

Once earnings are normalized, we assume that Toyota, as the largest market-share company, will be able to maintain only stable growth (1.5% in Yen terms)

Circular Reasoning in FCFF Valuation

- In discounting FCFF, we use the cost of capital, which is calculated using the market values of equity and debt. We then use the present value of the FCFF as our value for the firm and derive an estimated value for equity. (For instance, in the Toypta valuation, we used the current market value of equity of 3200 yen/share to arrive at the debt ratio of 52.9% which we used in the cost of capital. However, we concluded that the value of Toyota's equity was 4735 yen/share. Is there circular reasoning here?
  - Yes
  - No
- If there is, can you think of a way around this problem?

6a. Tube Investments: Status Quo (in Rs)

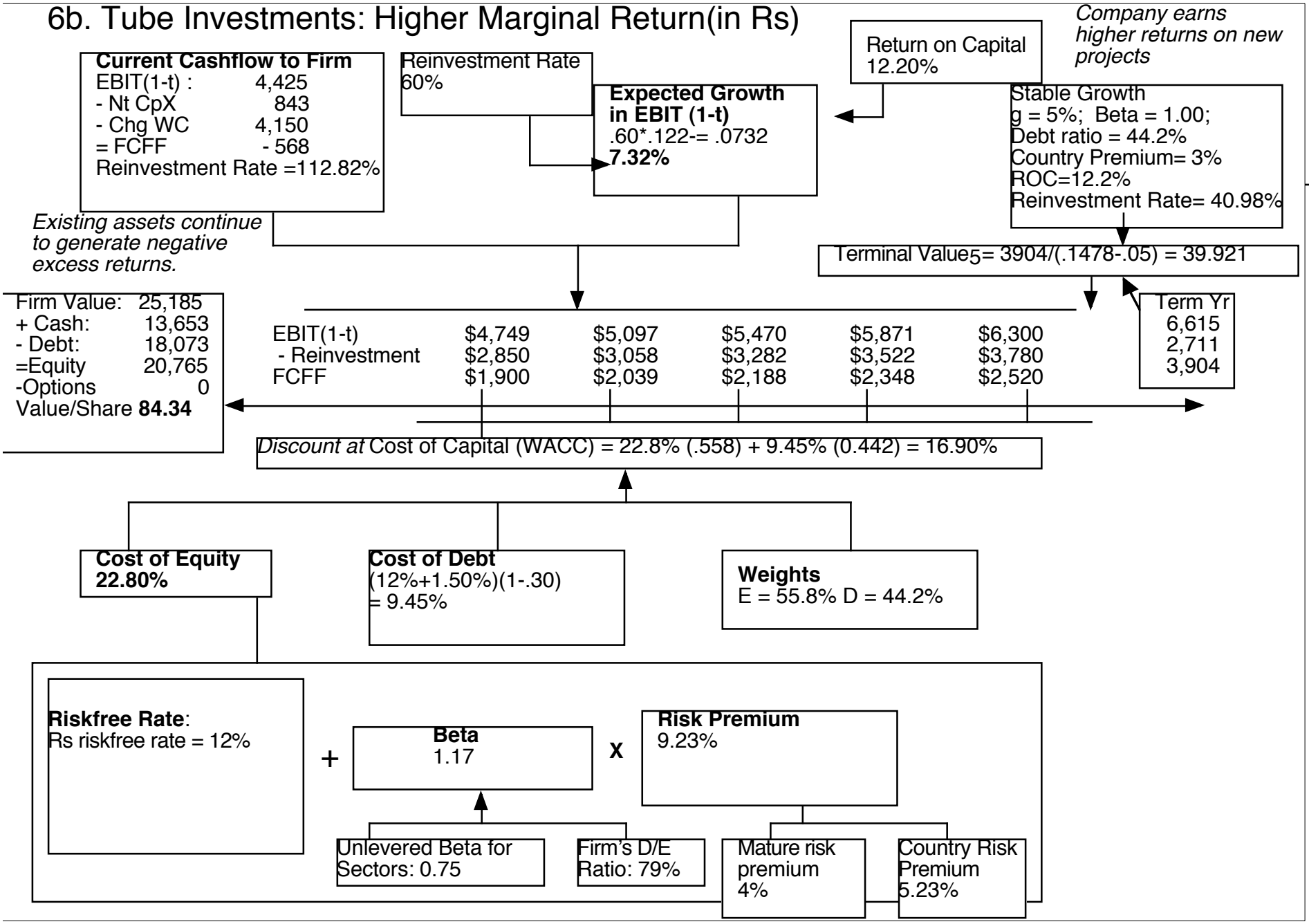


Stable Growth Rate and Value

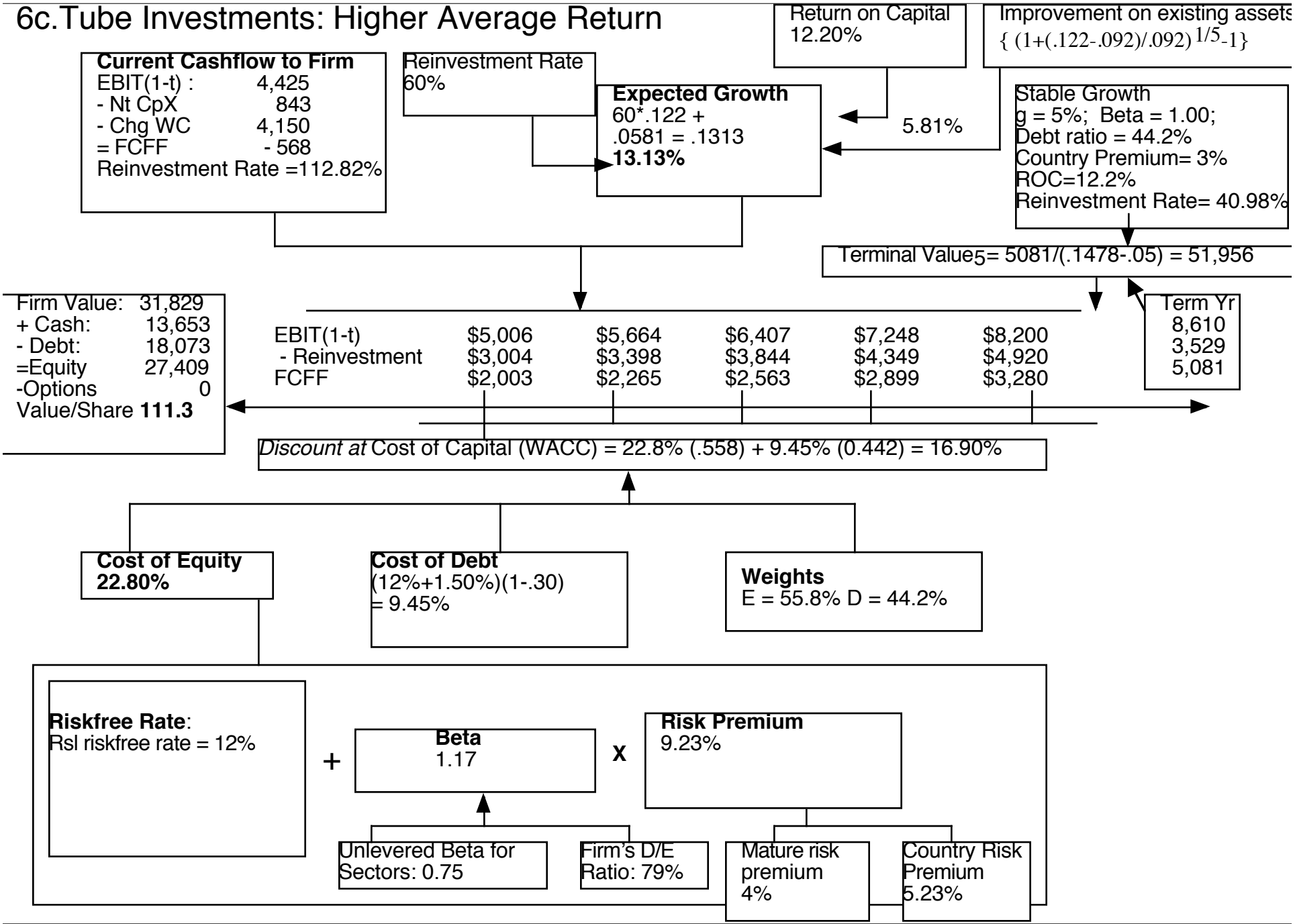
- In estimating terminal value for Tube Investments, I used a stable growth rate of 5%. If I used a 7% stable growth rate instead, what would my terminal value be? (Assume that the cost of capital and return on capital remain unchanged.)

- What are the lessons that you can draw from this analysis for the key determinants of terminal value?

6b. Tube Investments: Higher Marginal Return(in Rs)

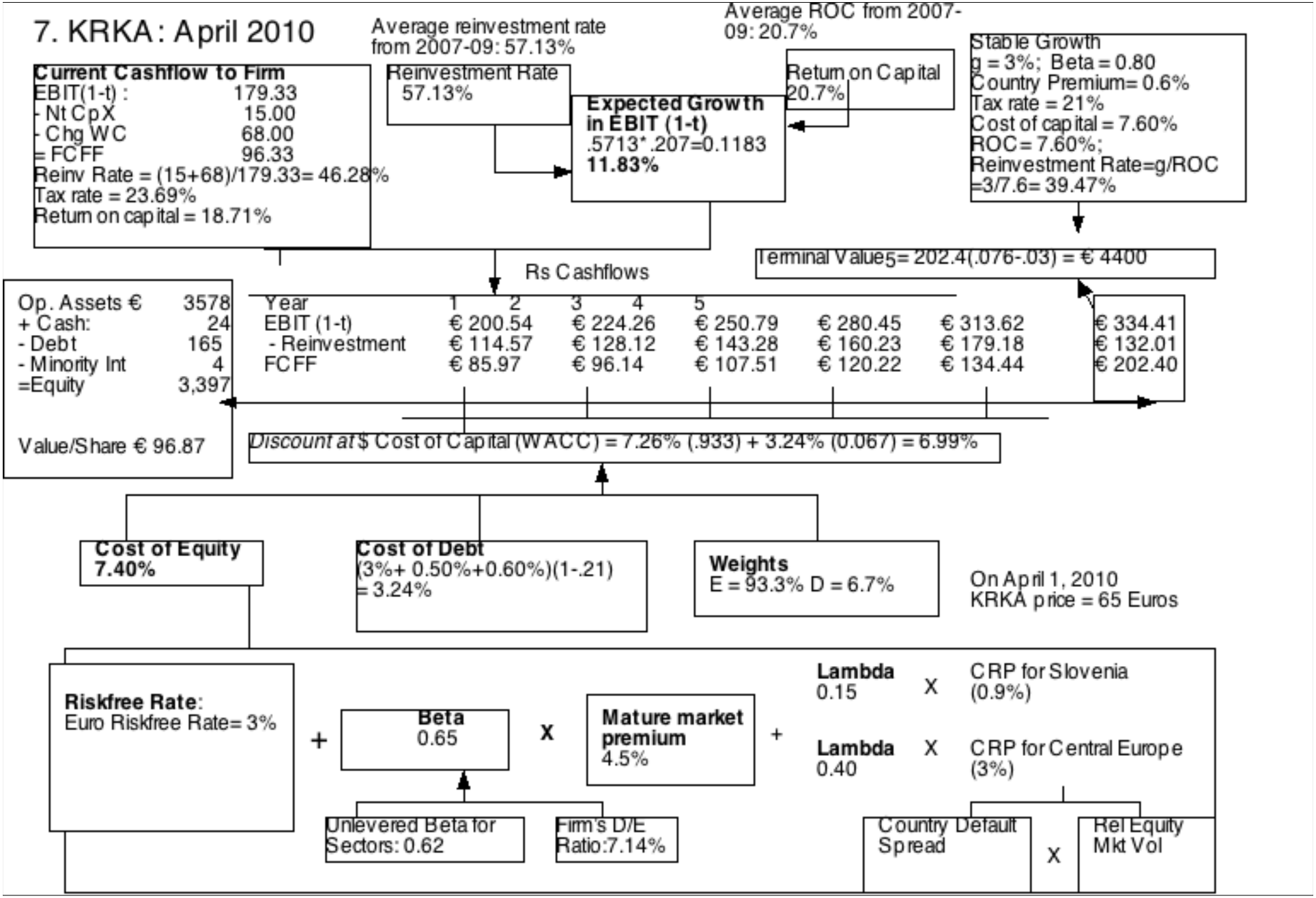


6c.Tube Investments: Higher Average Return

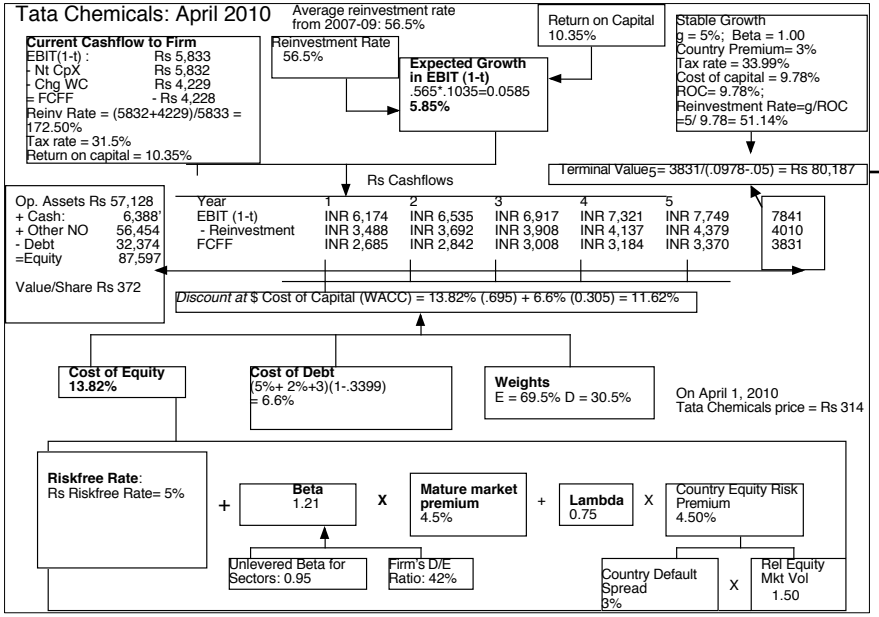


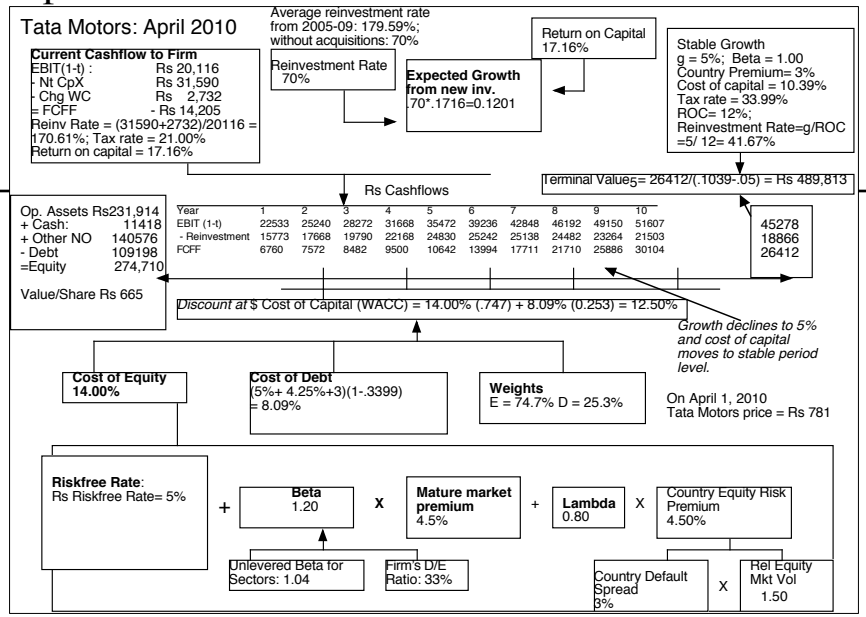
Tube Investments: Should there be a corporate governance discount?

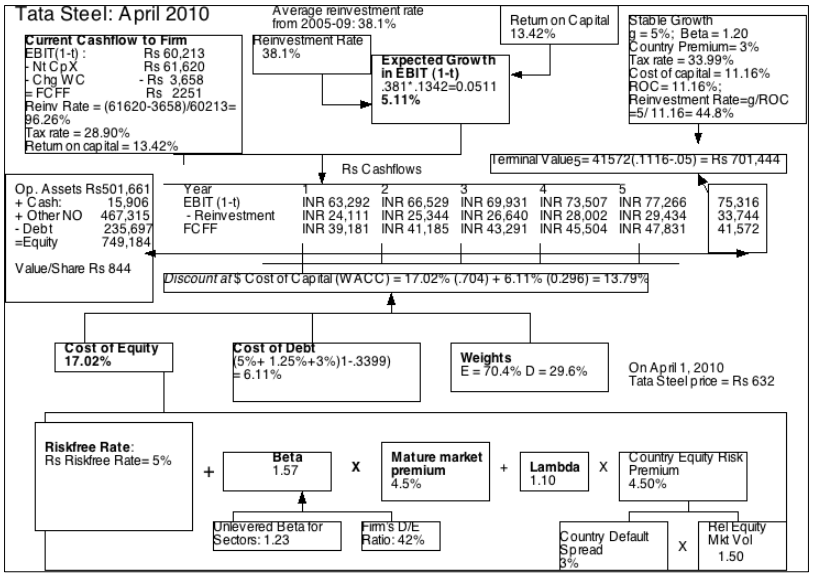
- Stockholders in Asian, Latin American and many European companies have little or no power over the managers of the firm. In many cases, insiders own voting shares and control the firm and the potential for conflict of interests is huge. Would you discount the value that you estimated to allow for this absence of stockholder power?
- Yes
- No.

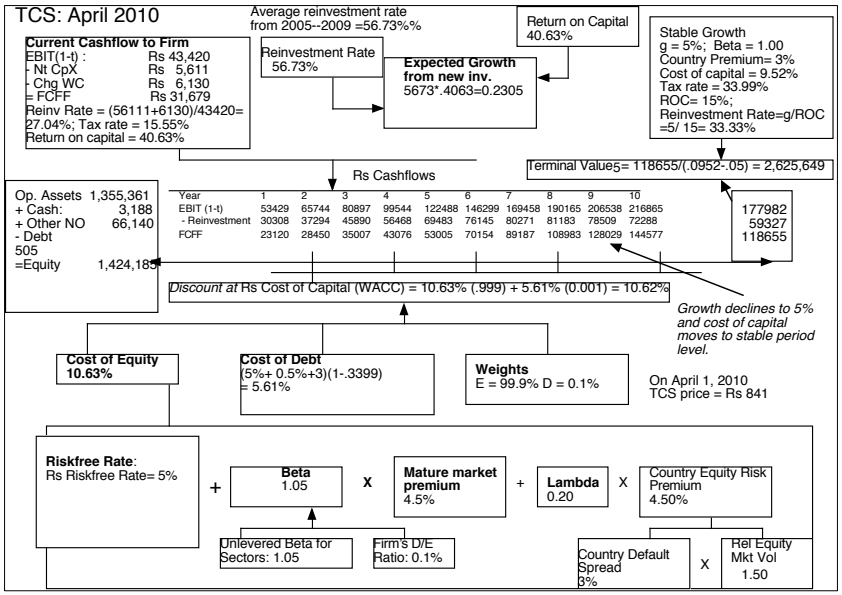

7. KRKA: April 2010
Average reinvestment rate from 2007-09: 57.13%
Average ROC from 2007-09: 20.7%
Current Cashflow to Firm
EBIT(1-t) : 179.33
- Nt CpX 15.00
- Chg WC 68.00
= FCFF 96.33
Reinv Rate = (15+68)/179.33= 46.28%
Tax rate = 23.69%
Return on capital = 18.71%
Reinvestment Rate 57.13%
Expected Growth in EBIT (1-t)
.5713*.207=0.1183
11.83%
Return on Capital 20.7%
Stable Growth
g = 3%; Beta = 0.80
Country Premium= 0.6%
Tax rate = 21%
Cost of capital = 7.60%
ROC= 7.60%;
Reinvestment Rate=g/ROC =3/7.6= 39.47%
Terminal Value5= 202.4(.076-.03) = € 4400
Rs Cashflows
Op. Assets € 3578
+ Cash: 24
- Debt 165
- Minority Int 4
=Equity 3,397
Value/Share € 96.87
Year 1 2 3 4 5
EBIT (1-t) € 200.54 € 224.26 € 250.79 € 280.45 € 313.62
- Reinvestment € 114.57 € 128.12 € 143.28 € 160.23 € 179.18
FCFF € 85.97 € 96.14 € 107.51 € 120.22 € 134.44
€ 334.41
€ 132.01
€ 202.40
Discount at $ Cost of Capital (WACC) = 7.26% (.933) + 3.24% (0.067) = 6.99%
Cost of Equity 7.40%
Cost of Debt (3%+ 0.50%+0.60%)(1-.21) = 3.24%
Weights E = 93.3% D = 6.7%
On April 1, 2010 KRKA price = 65 Euros
Riskfree Rate: Euro Riskfree Rate= 3%
+
Beta 0.65
X
Mature market premium 4.5%
+
Lambda 0.15 X CRP for Slovenia (0.9%)
Lambda 0.40 X CRP for Central Europe (3%)
Unlevered Beta for Sectors: 0.62
Firm's D/E Ratio:7.14%
Country Default Spread
X
Rel Equity Mkt Vol

8. The Tata Group – April 2010









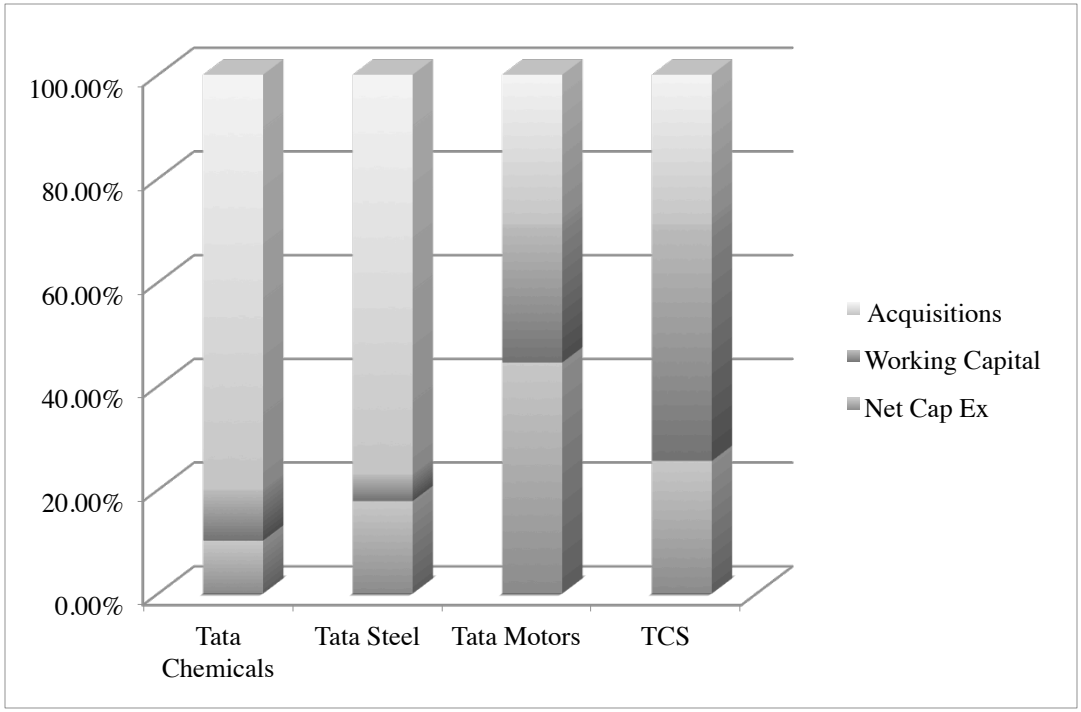
Comparing the Tata Companies: Cost of Capital

	Tata Chemicals	Tata Steel	Tata Motors	TCS
% of production in India	90%	90%	90%	92.00%
% of revenues in India	75%	88.83%	91.37%	7.62%
Lambda	0.75	1.10	0.80	0.20

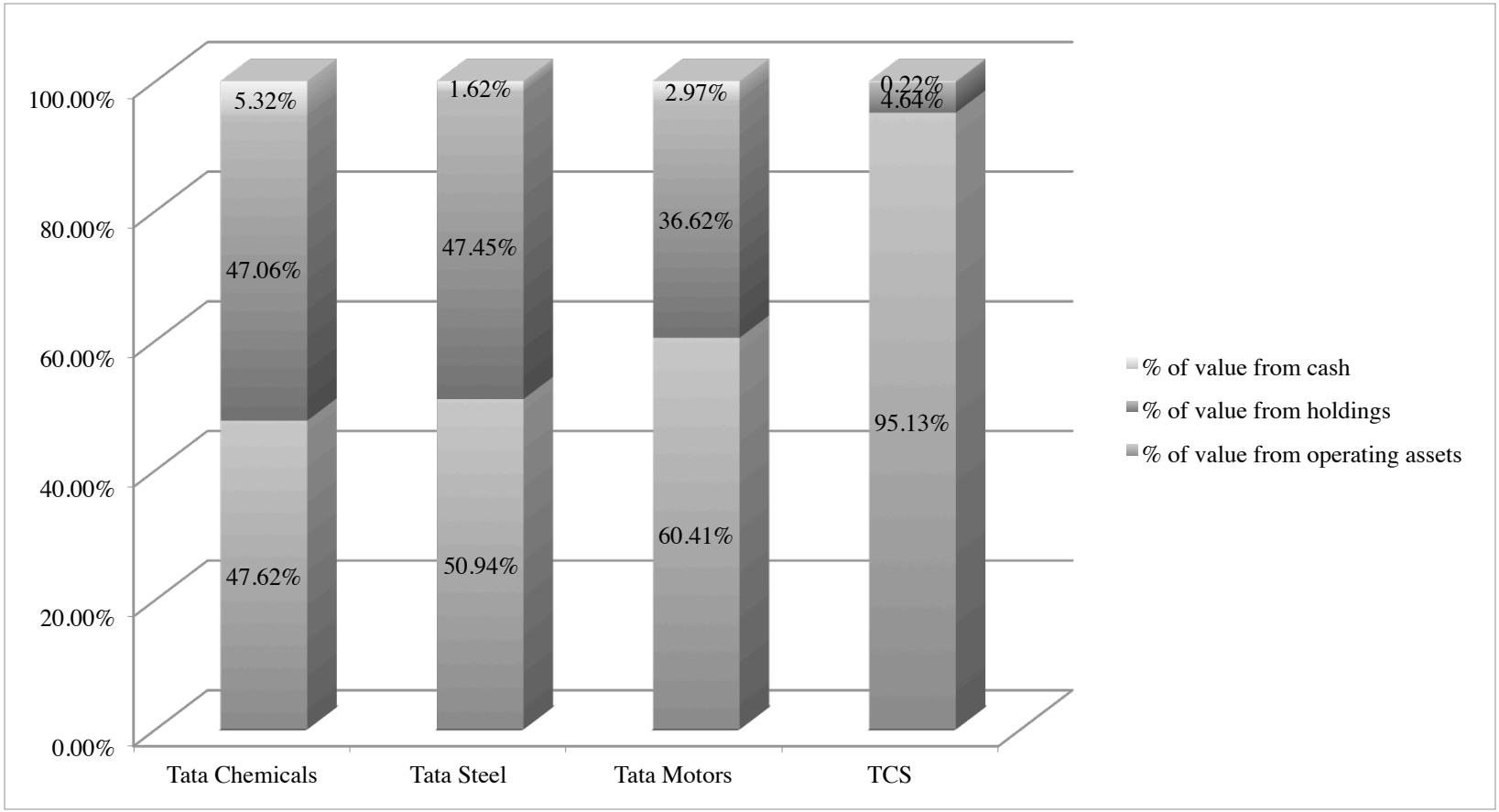
	Tata Chemicals	Tata Steel	Tata Motors	TCS
Beta	1.21	1.57	1.2	1.05
Lambda	0.75	1.1	0.8	0.2
Cost of equity	13.82%	17.02%	14.00%	10.63%
Synthetic rating	BBB	A	B+	AAA
Cost of debt	6.60%	6.11%	8.09%	5.61%
Debt Ratio	30.48%	29.59%	25.30%	0.03%
Cost of Capital	11.62%	13.79%	12.50%	10.62%

Growth and Value

	Tata Chemicals	Tata Steel	Tata Motors	TCS
Return on capital	10.35%	13.42%	11.81%	40.63%
Reinvestment Rate	56.50%	38.09%	70.00%	56.73%
Expected Growth	5.85%	5.11%	8.27%	23.05%
Cost of capital	11.62%	13.79%	12.50%	10.62%



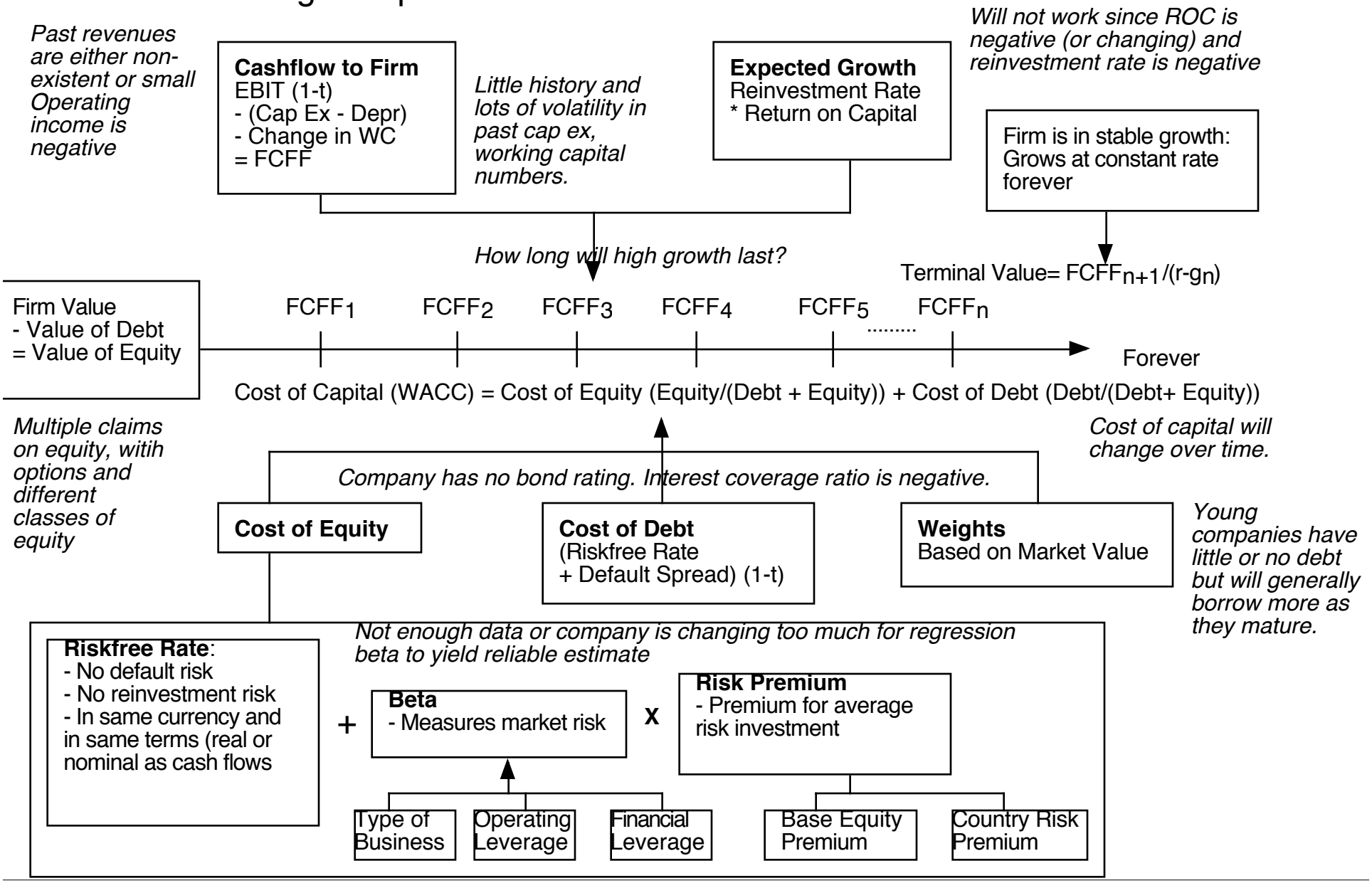
Tata Companies: Value Breakdown



The Dark Side of Valuation…

- Valuing stable, money making companies with understandable accounting, a long history and lots of comparable firms is generally easy to do.
- The true test of your valuation skills is when you have to value "difficult" companies. In particular, the challenges are greatest when valuing:
  - Young companies, early in the life cycle, in young businessses
  - Companies that don't fit the accounting mold
  - Companies that face substantial truncation risk (default or nationalization risk)

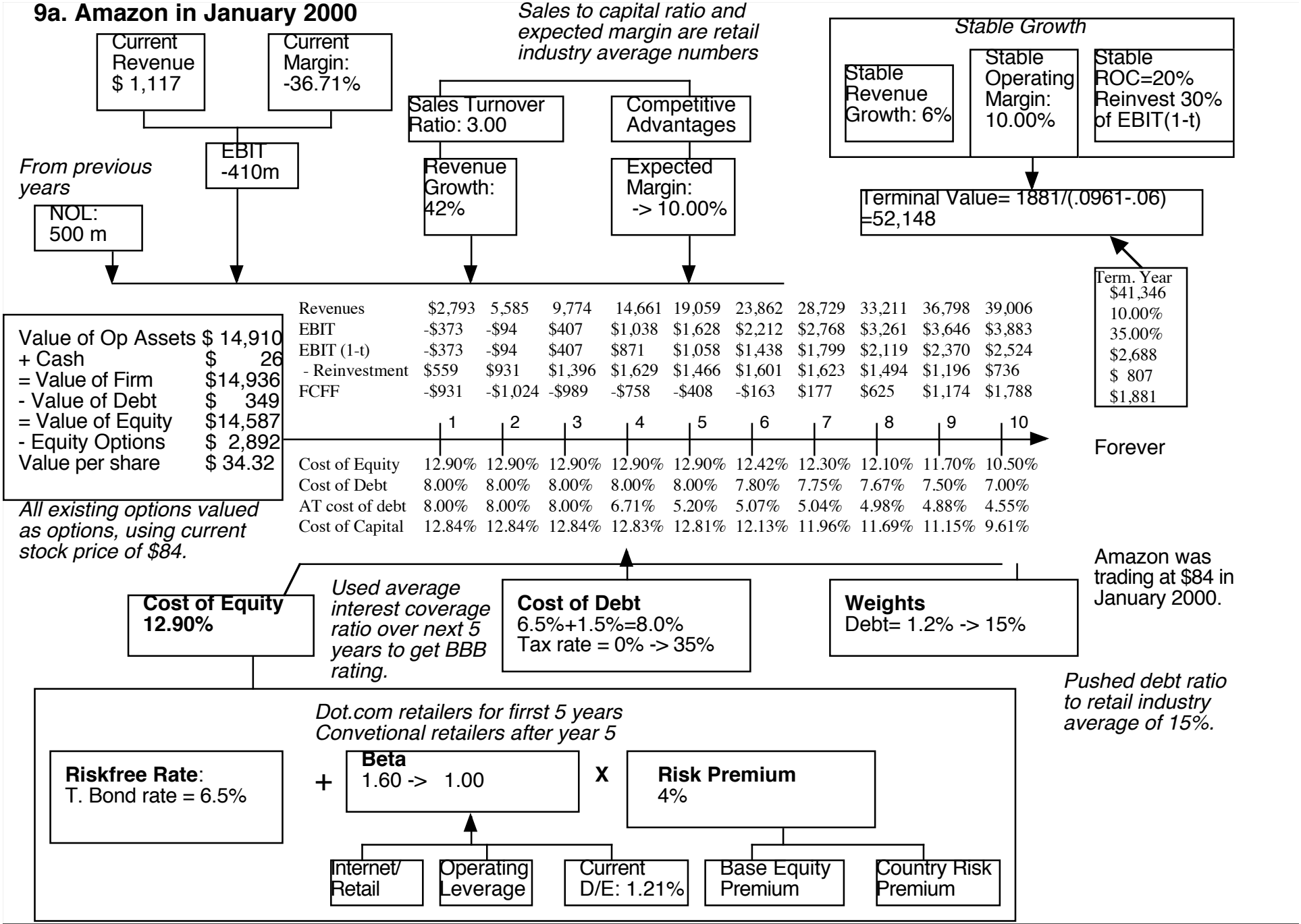
Young Companies: Valuation Issues



The dark side of valuation... With young companies..

- When valuing companies, we draw on three sources of information:
  - The firm's current financial statement
  - The firm's current financial statement
    - How much did the firm sell?
    - How much did it earn?
  - The firm's financial history, usually summarized in its financial statements.
    - How fast have the firm's revenues and earnings grown over time? What can we learn about cost structure and profitability from these trends?
    - Susceptibility to macro-economic factors (recessions and cyclical firms)
  - The industry and comparable firm data
    - What happens to firms as they mature? (Margins.. Revenue growth… Reinvestment needs… Risk)
- Valuation is most difficult when a company
  - Has negative earnings and low revenues in its current financial statements
  - No history
  - No comparables (or even if they exist, they are all at the same stage of the life cycle as the firm being valued)

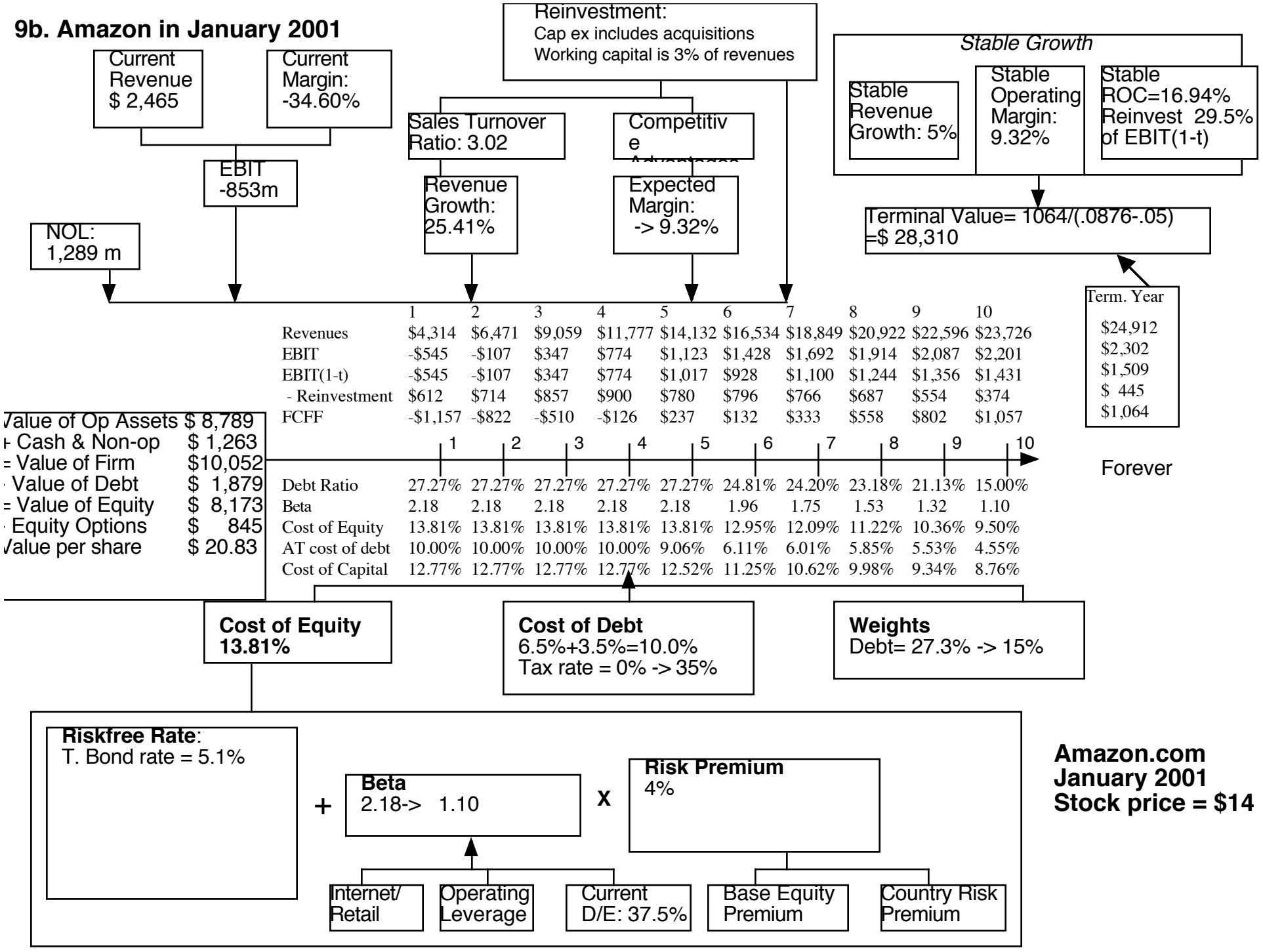
9a. Amazon in January 2000



What do you need to break-even at $ 84?

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

9b. Amazon in January 2001

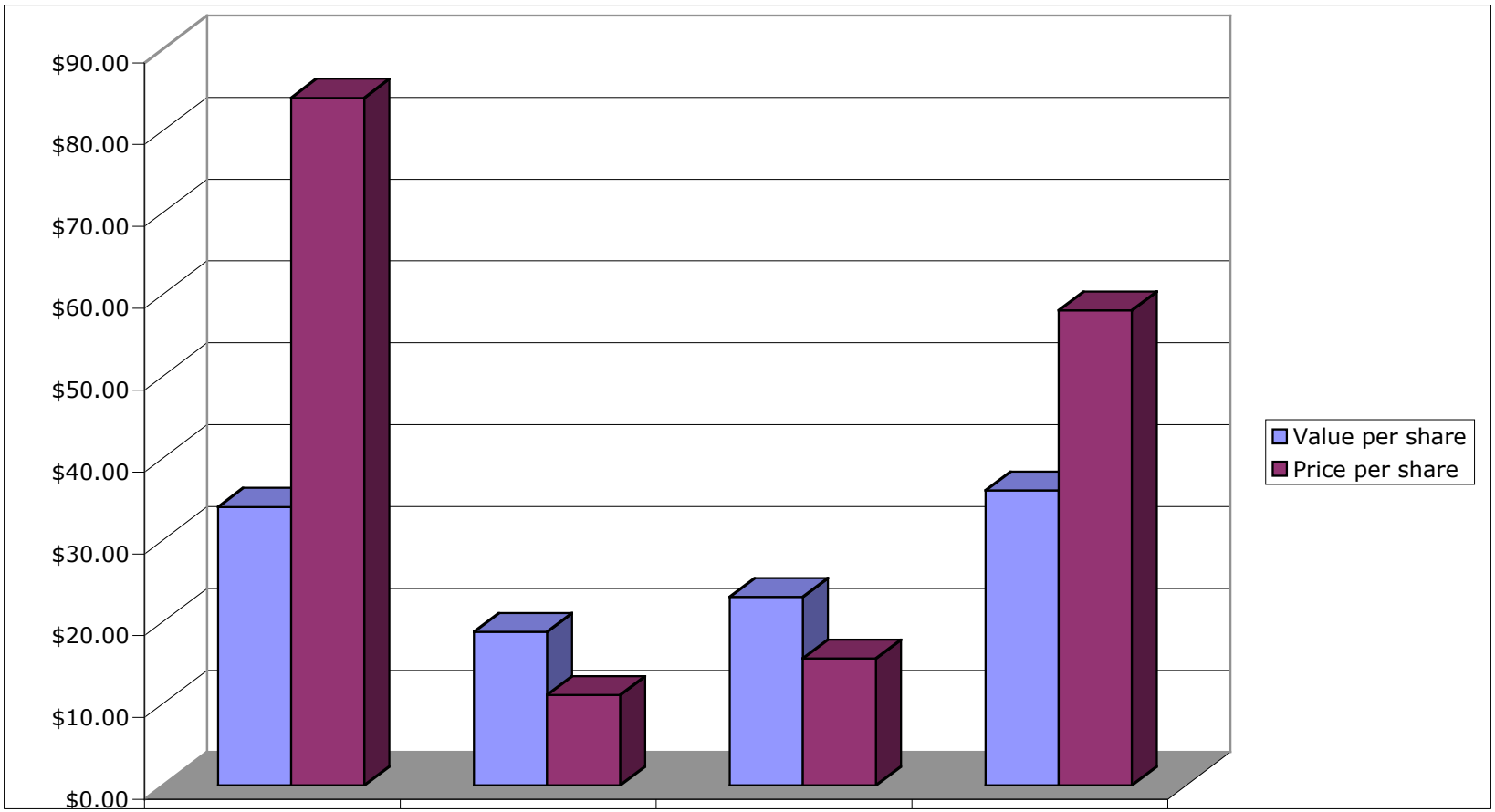


	1	2	3	4	5	6	7	8	9	10
Revenues	$4,314	$6,471	$9,059	$11,777	$14,132	$16,534	$18,849	$20,922	$22,596	$23,726
EBIT	-$545	-$107	$347	$774	$1,123	$1,428	$1,692	$1,914	$2,087	$2,201
EBIT(1-t)	-$545	-$107	$347	$774	$1,017	$928	$1,100	$1,244	$1,356	$1,431
- Reinvestment	$612	$714	$857	$900	$780	$796	$766	$687	$554	$374
FCFF	-$1,157	-$822	-$510	-$126	$237	$132	$333	$558	$802	$1,057

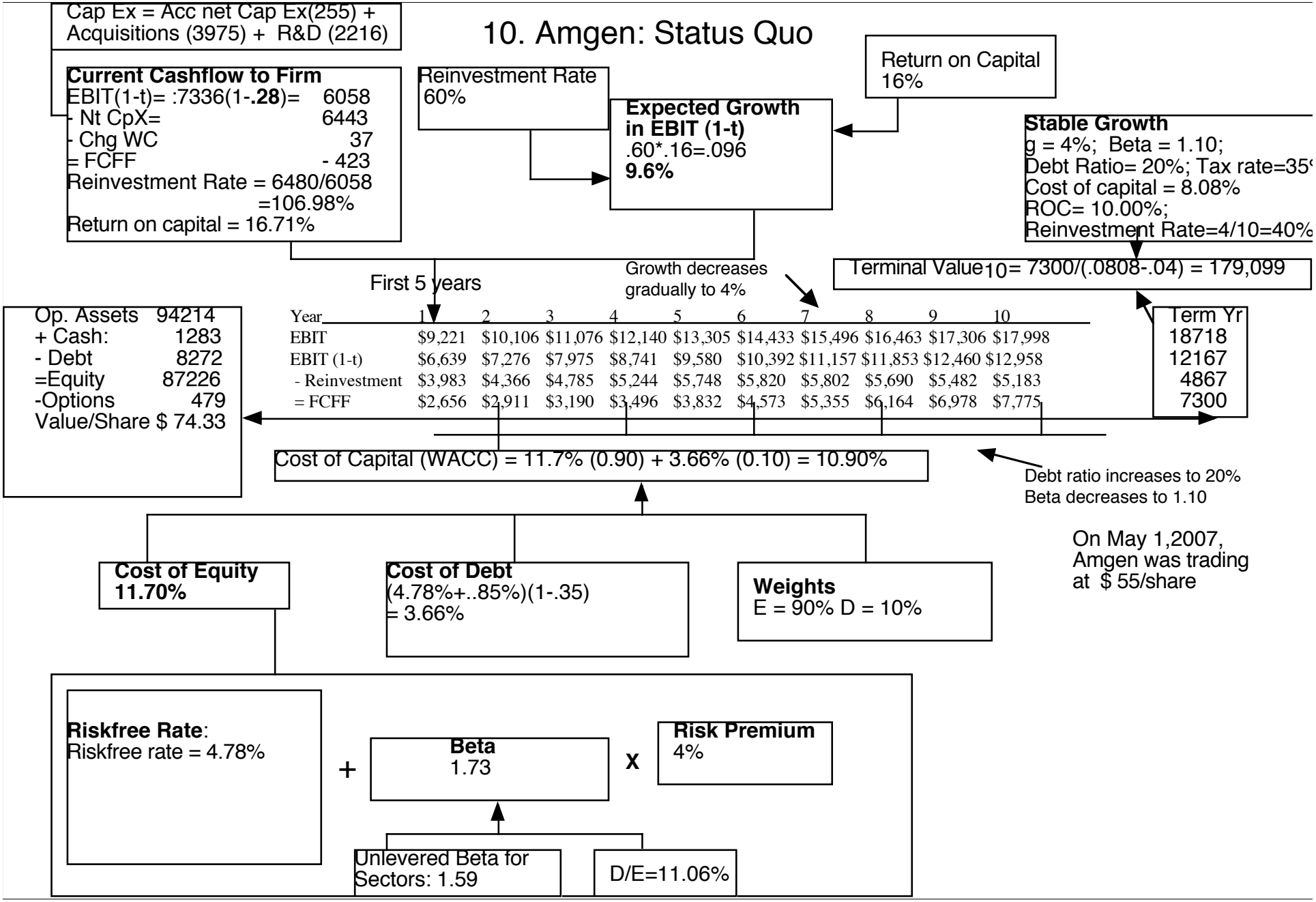
	1	2	3	4	5	6	7	8	9	10
Debt Ratio	27.27%	27.27%	27.27%	27.27%	27.27%	24.81%	24.20%	23.18%	21.13%	15.00%
Beta	2.18	2.18	2.18	2.18	2.18	1.96	1.75	1.53	1.32	1.10
Cost of Equity	13.81%	13.81%	13.81%	13.81%	13.81%	12.95%	12.09%	11.22%	10.36%	9.50%
AT cost of debt	10.00%	10.00%	10.00%	10.00%	9.06%	6.11%	6.01%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

Amazon.com
January 2001
Stock price = $14

Amazon over time…



10. Amgen: Status Quo



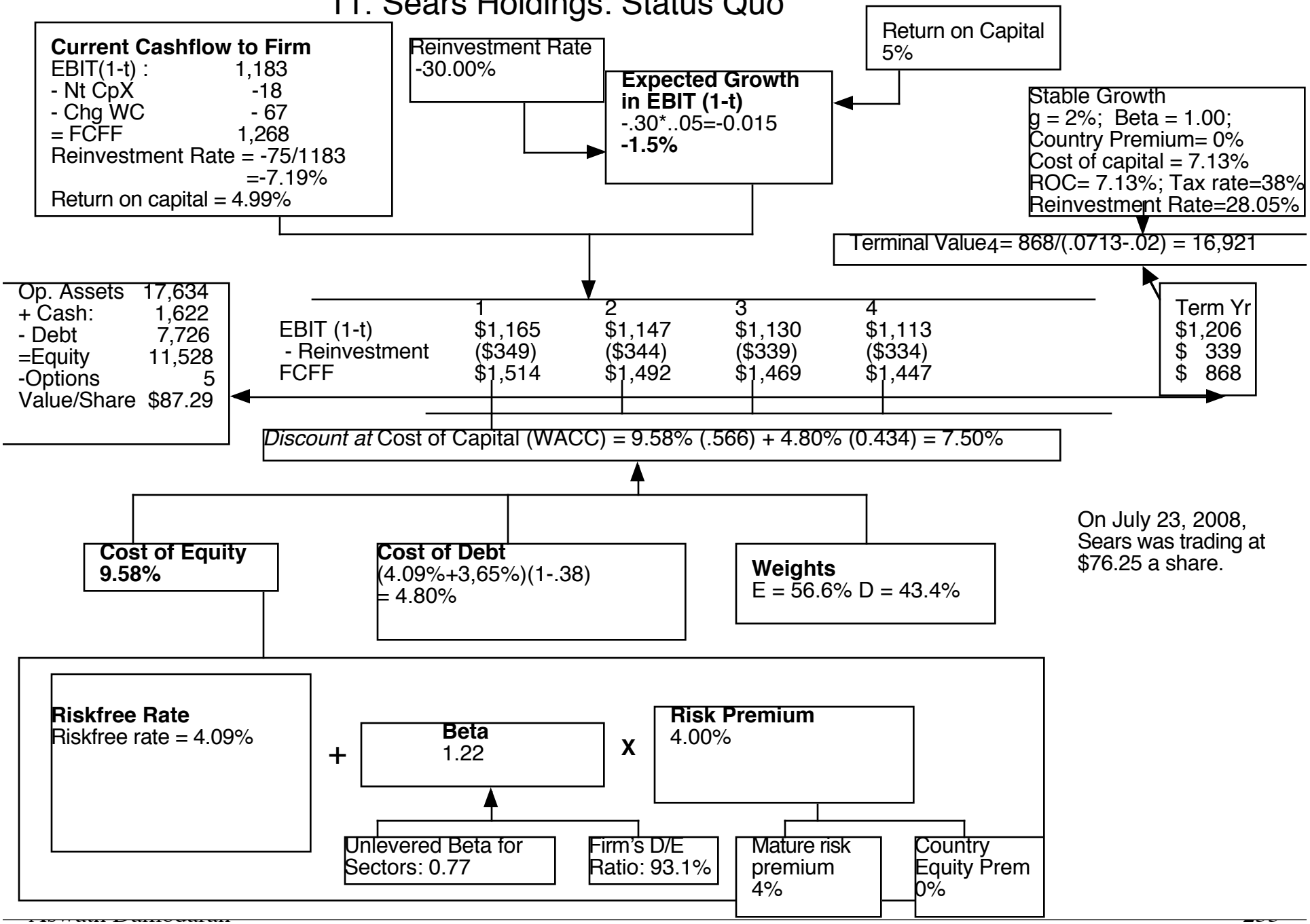
Amgen: The R&D Effect?

	No R&D adjustment	R&D adjustment
EBIT	$5,071	$7,336
Invested Capital	$25,277	$33,173
ROIC	14.58%	18.26%
Reinvestment Rate	115.68%	106.98%
Value of firm	$58,617	$95,497
Value of equity	$50,346	$87,226
Value/share	$42.73	$74.33

Dealing with Decline & Distress

- A DCF valuation values a firm as a going concern. If there is a significant likelihood of the firm failing before it reaches stable growth and if the assets will then be sold for a value less than the present value of the expected cashflows (a distress sale value), DCF valuations will understate the value of the firm.
- Value of Equity= DCF value of equity (1 - Probability of distress) + Distress sale value of equity (Probability of distress)
- There are three ways in which we can estimate the probability of distress:
  - Use the bond rating to estimate the cumulative probability of distress over 10 years
  - Estimate the probability of distress with a probit
  - Estimate the probability of distress by looking at market value of bonds..
- The distress sale value of equity is usually best estimated as a percent of book value (and this value will be lower if the economy is doing badly and there are other firms in the same business also in distress).

11. Sears Holdings: Status Quo



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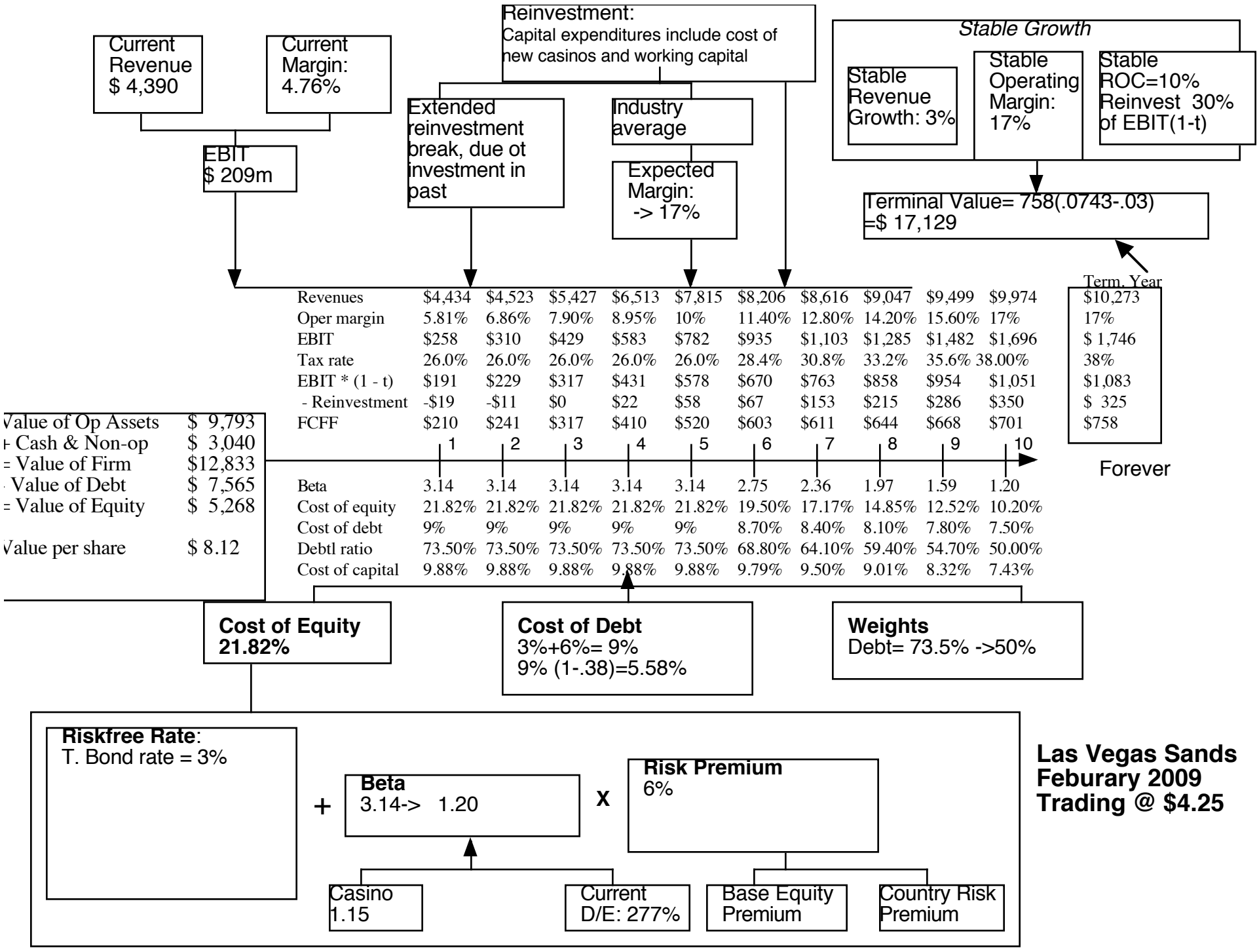

Current Revenue $ 4,390
Current Margin: 4.76%
EBIT $ 209m
Reinvestment: Capital expenditures include cost of new casinos and working capital
Extended reinvestment break, due ot investment in past
Industry average
Expected Margin: -> 17%
Stable Growth
Stable Revenue Growth: 3%
Stable Operating Margin: 17%
Stable ROC=10% Reinvest 30% of EBIT(1-t)
Terminal Value= 758(.0743-.03) =$ 17,129
Term. Year
Revenues $4,434 $4,523 $5,427 $6,513 $7,815 $8,206 $8,616 $9,047 $9,499 $9,974 $10,273
Oper margin 5.81% 6.86% 7.90% 8.95% 10% 11.40% 12.80% 14.20% 15.60% 17% 17%
EBIT $258 $310 $429 $583 $782 $935 $1,103 $1,285 $1,482 $1,696 $ 1,746
Tax rate 26.0% 26.0% 26.0% 26.0% 26.0% 28.4% 30.8% 33.2% 35.6% 38.00% 38%
EBIT * (1 - t) $191 $229 $317 $431 $578 $670 $763 $858 $954 $1,051 $1,083
- Reinvestment -$19 -$11 $0 $22 $58 $67 $153 $215 $286 $350 $ 325
FCFF $210 $241 $317 $410 $520 $603 $611 $644 $668 $701 $758
1 2 3 4 5 6 7 8 9 10
Forever
Value of Op Assets $ 9,793
+ Cash & Non-op $ 3,040
= Value of Firm $12,833
- Value of Debt $ 7,565
= Value of Equity $ 5,268
Value per share $ 8.12
Beta 3.14 3.14 3.14 3.14 3.14 2.75 2.36 1.97 1.59 1.20
Cost of equity 21.82% 21.82% 21.82% 21.82% 21.82% 19.50% 17.17% 14.85% 12.52% 10.20%
Cost of debt 9% 9% 9% 9% 9% 8.70% 8.40% 8.10% 7.80% 7.50%
Debtl ratio 73.50% 73.50% 73.50% 73.50% 73.50% 68.80% 64.10% 59.40% 54.70% 50.00%
Cost of capital 9.88% 9.88% 9.88% 9.88% 9.88% 9.79% 9.50% 9.01% 8.32% 7.43%
Cost of Equity 21.82%
Cost of Debt 3%+6%= 9% 9% (1-.38)=5.58%
Weights Debt= 73.5% ->50%
Riskfree Rate: T. Bond rate = 3%
+
Beta 3.14-> 1.20
X
Risk Premium 6%
Casino 1.15
Current D/E: 277%
Base Equity Premium
Country Risk Premium
Las Vegas Sands Feburary 2009 Trading @ $4.25

Adjusting the value of LVS for distress..

- In February 2009, LVS was rated B+ by S&P. Historically, 28.25% of B+ rated bonds default within 10 years. LVS has a 6.375% bond, maturing in February 2015 (7 years), trading at $529. If we discount the expected cash flows on the bond at the riskfree rate, we can back out the probability of distress from the bond price:

$$529 = \sum_{t=1}^{t=7} \frac{63.75(1-\Pi_{Distress})^t}{(1.03)^t} + \frac{1000(1-\Pi_{Distress})^7}{(1.03)^7}$$

- Solving for the probability of bankruptcy, we get:

$$\pi_{Distress} = \text{Annual probability of default} = 13.54\%$$

  - Cumulative probability of surviving 10 years = $(1 - .1354)^{10} = 23.34\%$
  - Cumulative probability of distress over 10 years = 1 - .2334 = .7666 or 76.66%
- If LVS is becomes distressed:
  - Expected distress sale proceeds = $2,769 million < Face value of debt
  - Expected equity value/share = $0.00
- Expected value per share = $8.12 (1 - .7666) + $0.00 (.7666) = $1.92

Another type of truncation risk?

- Assume that you are valuing Gazprom, the Russian oil company and have estimated a value of US $180 billion for the operating assets. The firm has $30 billion in debt outstanding. What is the value of equity in the firm?

- Now assume that the firm has 15 billion shares outstanding. Estimate the value of equity per share.

- The Russian government owns 42% of the outstanding shares. Would that change your estimate of value of equity per share?

Uncertainty is endemic to valuation….

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

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

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

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

Option 1: Collect more information

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

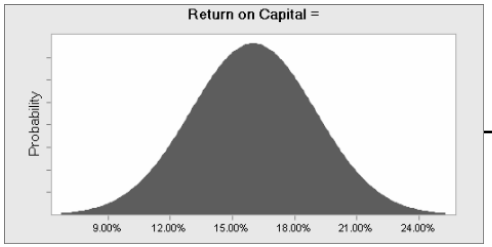
Option 2: Build bigger models

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

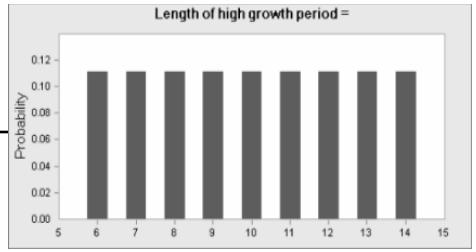
Option 3: What if?

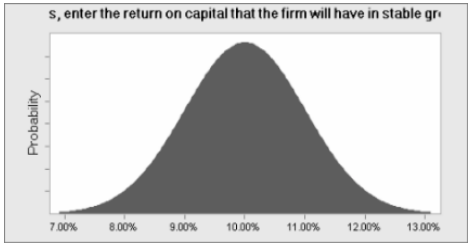
- A valuation is a function of the inputs you feed into the valuation. To the degree that you are pessimistic or optimistic on any of the inputs, your valuation will reflect it.
- There are three ways in which you can do what-if analyses
  - Best-case, Worst-case analyses, where you set all the inputs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

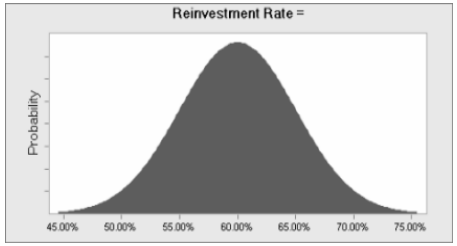
Option 4: Simulation
The Inputs for Amgen

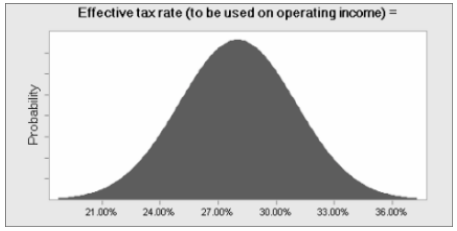


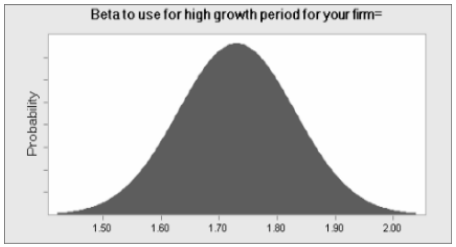
Correlation =0.4



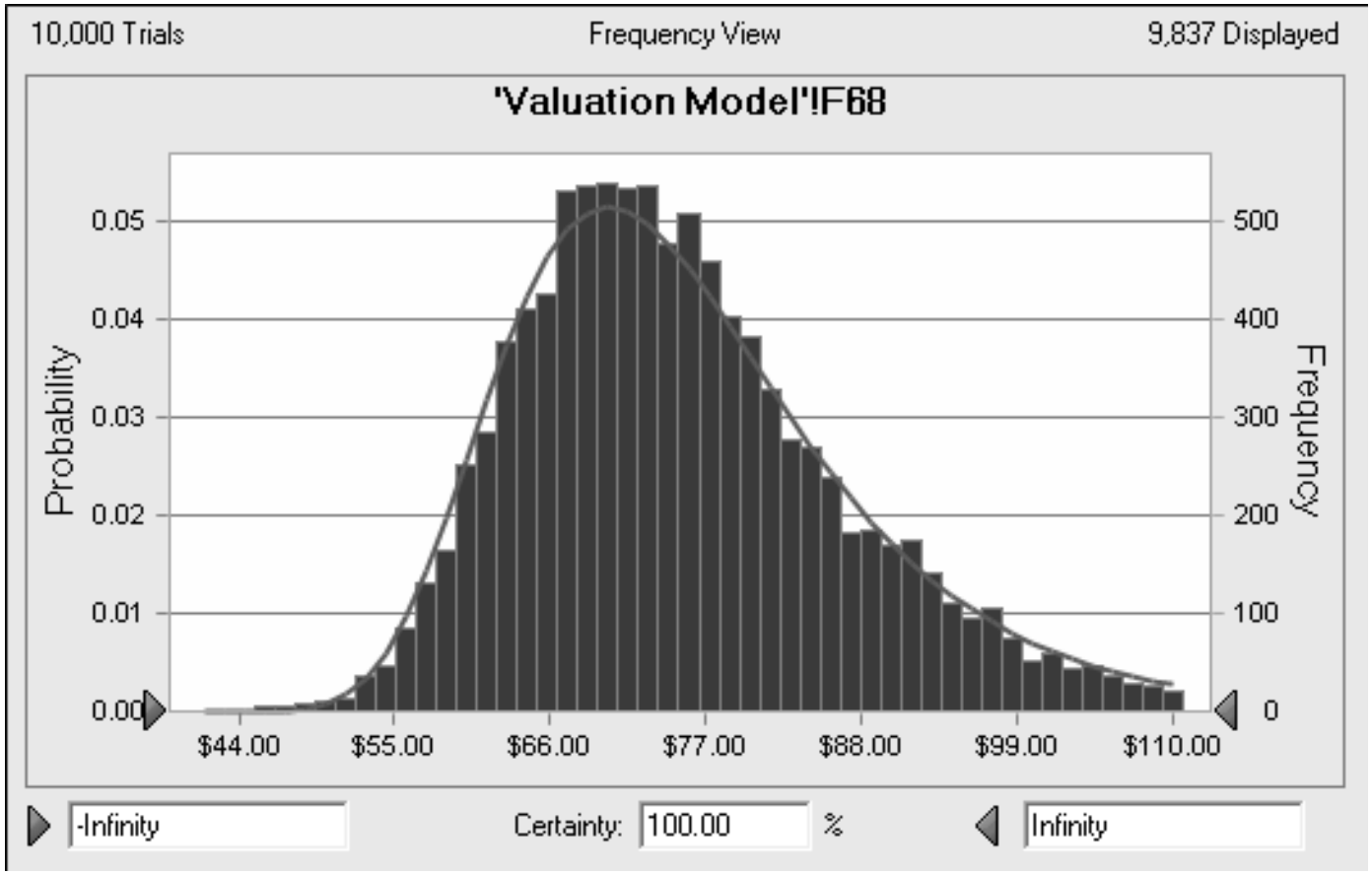




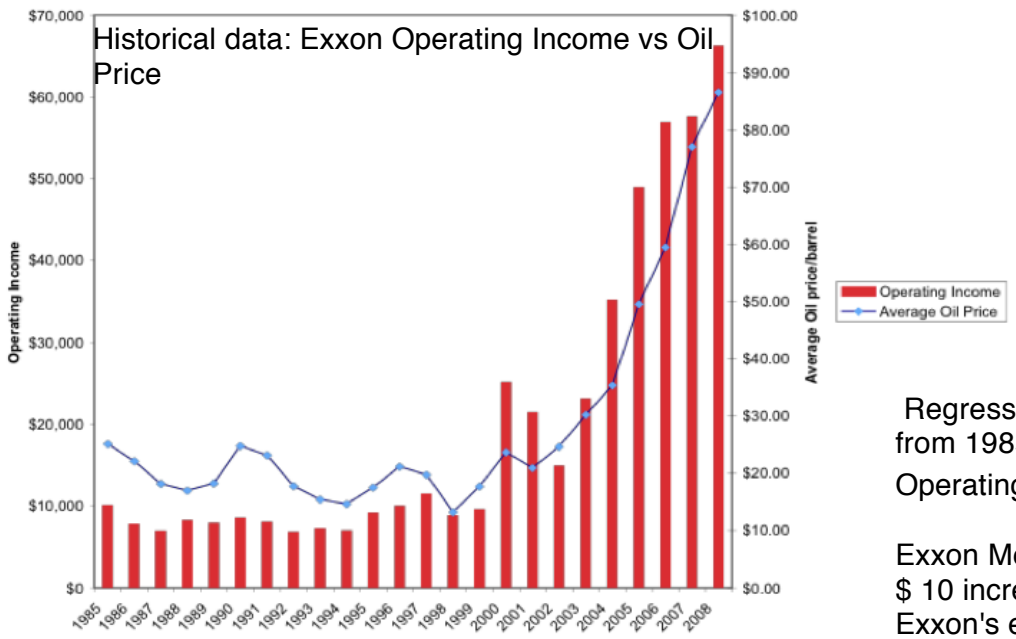




The Simulated Values of Amgen: What do I do with this output?



Valuing a commodity company - Exxon in Early 2009



Regressing Exxon's operating income against the oil price per barrel from 1985-2008:

Operating Income = -6,395 + 911.32 (Average Oil Price) R^2 = 90.2%
(2.95) (14.59)

Exxon Mobil's operating income increases about $9.11 billion for every $ 10 increase in the price per barrel of oil and 90% of the variation in Exxon's earnings over time comes from movements in oil prices.

Estiimate normalized income based on current oil price (1)

At the time of the valuation, the oil price was $ 45 a barrel. Exxon's operating income based on thisi price is

Normalized Operating Income = -6,395 + 911.32 ($45) = $34,614

Estimate return on capital and reinvestment rate based on normalized income (2)

This operating income translates into a return on capital of approximately 21% and a reinvestment rate of 9.52%, based upon a 2% growth rate.

Reinvestment Rate = g/ ROC = 2/21% = 9.52%

$$\text{Value of operating assets} = \frac{34{,}614(1-.38)(1-.0952)}{(.0818-.02)} = \$320{,}472 \text{ million}$$

Exxon's cost of capital (4)

Exxon has been a predominantly equtiy funded company, and is explected to remain so, with a deb ratio of onlly 2.85%: It's cost of equity is 8.35% (based on a beta of 0.90) and its pre-tax cost of debt is 3.75% (given AAA rating). The marginal tax rate is 38%.

Cost of capital = 8.35% (.9715) + 3.75% (1-.38) (.0285) = 8.18%.

Expected growth in operating income (3)

Since Exxon Mobile is the largest oil company in the world, we will assume an expected growth of only 2% in perpetuity.

Exxon Mobil Valuation: Simulation