Aswath Damodaran

Companies Valued

Company	*Model Used*	*Remarks*
Con Ed	Stable DDM	Dividends=FCFE, Stable D/E, Low g
ABN Amro	2-Stage DDM	FCFE=?, Regulated D/E, g>Stable
S&P 500	2-Stage DDM	Collectively, market is an investment
Sony	Stable FCFE	Understated Earnings?
Nestle	2-Stage FCFE	Dividends FCFE, Stable D/E, High g
Brahma	3-Stage FCFE	Dividends FCFE, Stable D/E,High g
DaimlerChrysler	Stable FCFF	Normalized Earnings; Stable Sector
The Home Depot	2-stage FCFF	Capitalizing Operating Leases
Bristol Myers	2-stage FCFF	Capitalizing R&D
Amazon.com	n-stage FCFF	Varying margins over time

General Information

- The risk premium that I will be using in the 1999 and 2000 valuations for mature equity markets is 4%. This is the average implied equity risk premium from 1960 to 2000.
- For the valuations from 1998 and earlier, I use a risk premium of 5.5%.

Con Ed: Rationale for Model

- The firm is in stable growth; based upon size and the area that it serves. Its rates are also regulated; It is unlikely that the regulators will allow profits to grow at extraordinary rates.
- Firm Characteristics are consistent with stable, DDM model firm
  - The beta is 0.80 and has been stable over time.
  - The firm is in stable leverage.
  - The firm pays out dividends that are roughly equal to FCFE.
    - Average Annual FCFE between 1994 and 1999 = $553 million
    - Average Annual Dividends between 1994 and 1999 = $ 532 million
    - Dividends as % of FCFE = 96.2%

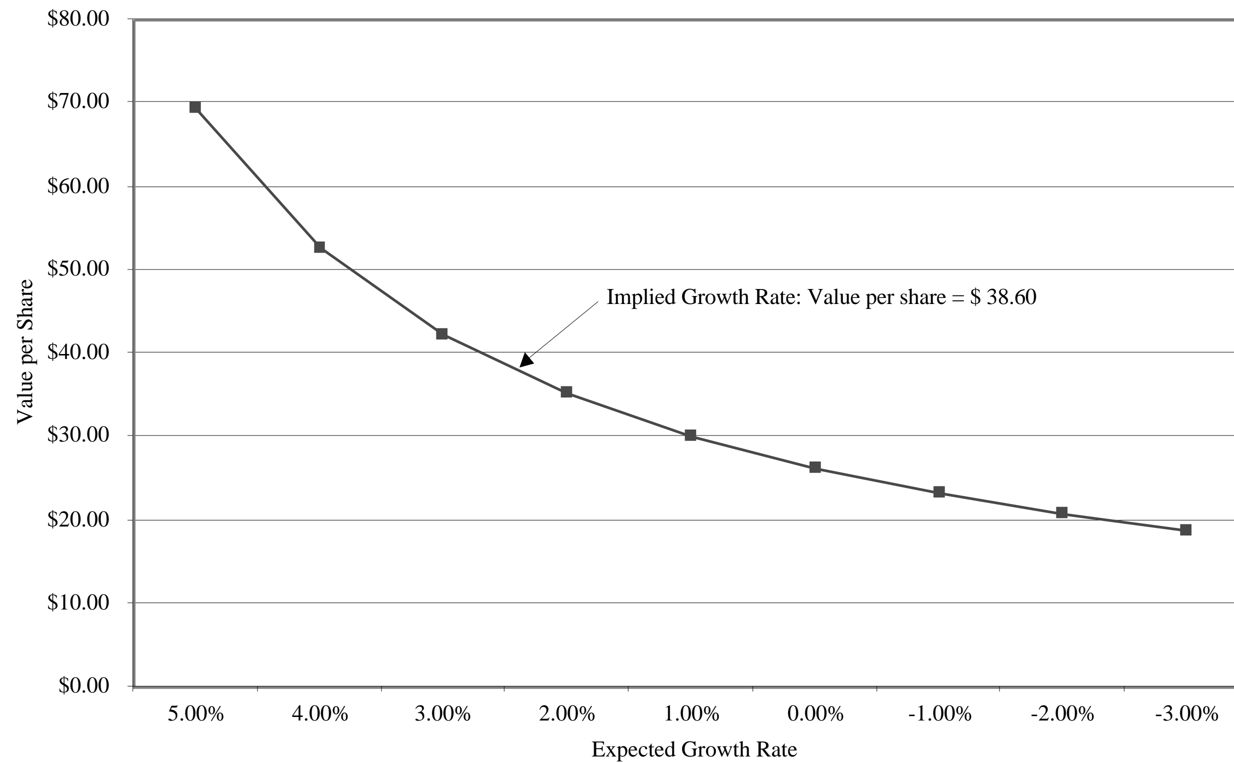
Con Ed: A Stable Growth DDM: December 31, 2000

- Earnings per share for trailing 4 quarters = $ 3.15
- Dividend Payout Ratio over the 4 quarters = 69.21%
- Dividends per share for last 4 quarters = $2.18
- Expected Growth Rate in Earnings and Dividends =3%
- Con Ed Beta = 0.80 (Bottom-up beta estimate)
- Cost of Equity = 5.1% + 0.80*4% = 8.30%

Value of Equity per Share = $2.18 *1.03 / (.083 -.03) = $ 42.37

The stock was trading at $ 38.60 on December 31, 2000

Con Ed: Break Even Growth Rates



Estimating Implied Growth Rate

- To estimate the implied growth rate in Con Ed's current stock price, we set the market price equal to the value, and solve for the growth rate:
  - Price per share = $ 38.60 = $2.18 *(1+g) / (.083 -g)
  - Implied growth rate = 2.51%
- Given its retention ratio of 30.79% and its return on equity in 1999 of 10%, the fundamental growth rate for Con Ed is:

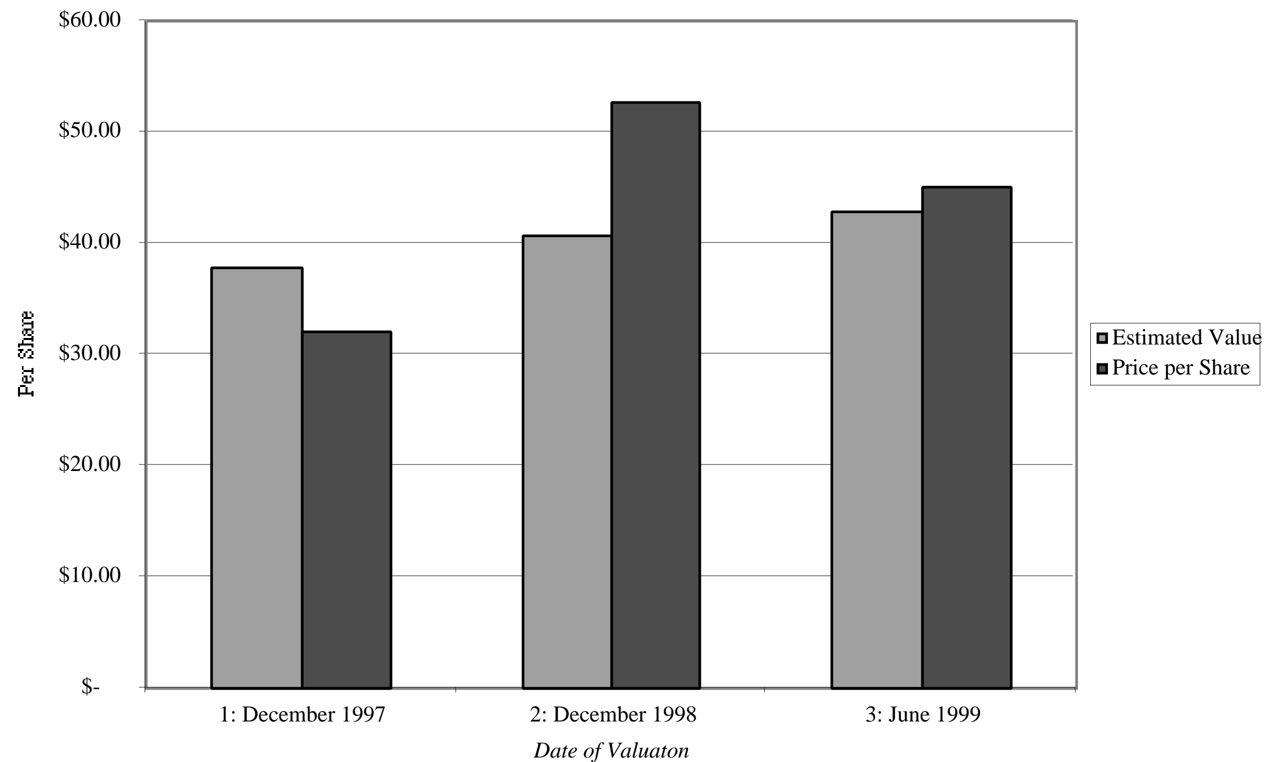
  Fundamental growth rate = (.3079*.10) = 3.08%

Implied Growth Rates and Valuation Judgments

- When you do any valuation, there are three possibilities. The first is that you are right and the market is wrong. The second is that the market is right and that you are wrong. The third is that you are both wrong. In an efficient market, which is the most likely scenario?

- Assume that you invest in a misvalued firm, and that you are right and the market is wrong. Will you definitely profit from your investment?
  - ❑ Yes
  - ❑ No

Con Ed: A Look Back



ABN Amro: Rationale for 2-Stage DDM

- As a financial service institution, estimating FCFE or FCFF is very difficult.
- The expected growth rate based upon the current return on equity of 15.56% and a retention ratio of 62.5% is 9.73%. This is higher than what would be a stable growth rate (roughly 5% in Euros)

ABN Amro: Summarizing the Inputs

- Market Inputs
  - Long Term Riskfree Rate (in Euros) = 5.02%
  - Risk Premium = 4% (U.S. premium : Netherlands is AAA rated)
- Current Earnings Per Share = 1.60 Eur; Current DPS = 0.60 Eur;

Variable	*High Growth Phase*	*Stable Growth Phase*
Length	5 years	Forever after yr 5
Return on Equity	15.56%	15% (Industry average)
Payout Ratio	37.5%	66.67%
Retention Ratio	62.5%	33.33% (b=g/ROE)
Expected growth	.1556*.625=.0973	5% (Assumed)
Beta	0.95	1.00
Cost of Equity	5.02%+0.95(4%) =8.82%	5.02%+1.00(4%) =9.02%

ABN Amro: Valuation

Year	EPS	DPS	PV of DPS
1	1.76	0.66	0.60
2	1.93	0.72	0.61
3	2.11	0.79	0.62
4	2.32	0.87	0.62
5	2.54	0.95	0.63

Expected EPS in year 6 = 2.54(1.05) = 2.67 Eur

Expected DPS in year 6 = 2.67*0.667=1.78 Eur

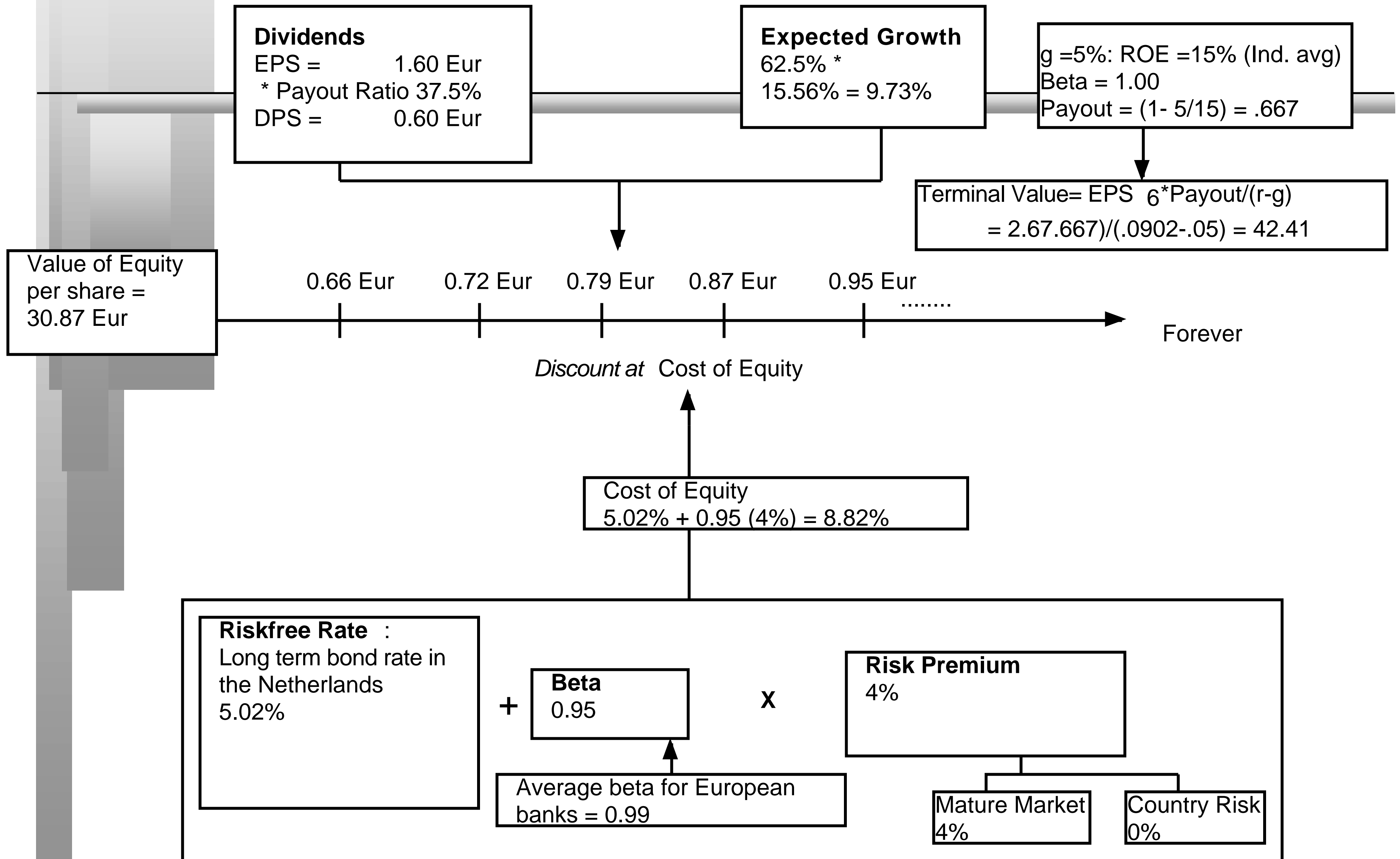
Terminal Price (in year 5) = 1.78/(.0902-.05) = 42.41 Eur

PV of Terminal Price = 42.42/(1.0882)^5 = 27.79 Eur

Value Per Share = 0.60 + 0.61+0.62+0.62+0.63+27.79 = 30.87 Eur

The stock was trading at 24.33 Euros on December 31, 2000

VALUING ABN AMRO



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 accomplished as follows:

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

Value of High Growth | Value of Stable Growth | Assets in Place

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: Decomposing Value

- Value of Assets in Place = Current DPS/Cost of Equity
  = 0.60 Eur/..0882
  = 6.65 Eur
- Value of Stable Growth = 0.60 (1.05)/(.0882-.05) - 6.65 NG
  = 9.02 Eur
- Value of High Growth = Total Value - (6.65+ 9.02)
  = 30.87 - (6.65+9.02) = 15.20 Eur

S & P 500: Rationale for Use of Model

- While markets overall generally do not grow faster than the economies in which they operate, there is reason to believe that the earnings at U.S. companies (which have outpaced nominal GNP growth over the last 5 years) will continue to do so in the next 5 years. The consensus estimate of growth in earnings (from Zacks) is roughly 10%.
- Though it is possible to estimate FCFE for many of the firms in the S&P 500, it is not feasible for several (financial service firms). The dividends during the year should provide a reasonable (albeit conservative) estimate of the cash flows to equity investors from buying the index.

S &P 500: Inputs to the Model (12/31/00)

- General Inputs
  - Long Term Government Bond Rate = 5.1%
  - Risk Premium for U.S. Equities = 4%
  - Current level of the Index = 1320
- Inputs for the Valuation

	High Growth Phase	Stable Growth Phase
Length	5 years	Forever after year 5
Dividend Yield	1.25%	1.25%
Expected Growth	7.5%	5.5% (Nominal US g)
Beta	1.00	1.00

S & P 500: 2-Stage DDM Valuation

	1	2	3	4	5
Expected Dividends =	$17.74	$19.07	$20.50	$22.04	$23.69
Expected Terminal Value=					$691.55
Present Value =	$16.26	$16.02	$15.78	$15.55	$462.73
Intrinsic Value of Index =	$526.35				

Cost of Equity = 5.1% + 1(4%) = 9.1%

Terminal Value = 23.69*1.055/(.091 -.055) = 691.55

Explaining the Difference

- The index is at 1320, while the model valuation comes in at 526. This indicates that one or more of the following has to be true.
  - The dividend discount model understates the value because dividends are less than FCFE.
  - The expected growth in earnings over the next 5 years will be much higher than 7.5%.
  - The risk premium used in the valuation (4%) is too high
  - The market is overvalued.

A More Realistic Valuation of the Index

- The median dividend/FCFE ratio for U.S. firms is about 50%. Thus the FCFE yield for the S&P 500 should be around 2.5% (1.25%/.5).
- The implied risk premium between 1960 and 1970, which was when long term rates were as well behaved as they are today, is 3%.
- With these inputs in the model:

	1	2	3	4	5
Expected Dividends =	$35.48	$38.14	$41.00	$44.07	$47.38
Expected Terminal Value =					$1,915.07
Present Value =	$32.82	$32.63	$32.45	$32.27	$1,329.44
Intrinsic Value of Index =	$1,459.62				

At a level of 1320, the market is undervalued by about 10%.

Sony: Background on Japanese firms

- Japanese firms have proved to be among the most difficult of all firms to value for several reasons:
  - The earnings in 1999 for most Japanese firms was depressed relative to earnings earlier in the decade and in the 1980s, reflecting the Japanese economy
  - Japanese accounting standards tend to understate earnings and overstate book value of equity, as firms are allowed to set aside provisions for unspecified expenses
  - The earnings of many export oriented Japanese firms tends to be heavily influenced by exchange rate movements
  - The cross holdings that Japanese firms have in other firms, and the lack of transparency in these holdings, makes it difficult to value these holdings.

Valuing Sony: August 2000

- Sony had net income of 31 billion JPY in 1999, down from 76 billion JPY in 1997 and 38 billion in 1998. The return on equity at Sony dropped from 5.25% in 1997 to 2.13% in 1999. The firm paid out dividends of 21 billion JPY in 1999.
- Capital expenditures in 1999 amounted to 103 billion JPY, whereas depreciation is 76 billion JPY.
- Non-cash working capital at Sony in 1999 was 220 billion JPY on revenues of 2593 billion yet, yielding a non-cash working capital to revenue ratio of 8.48%.
- The long term government bond rate in Japan was 2% at the time of this valuation.

Sony: Rationale for Model

- We will normalize earnings to reflect the fact that current earnings are depressed. To normalize earnings, we will use the return on equity of 5.25%, which is the return on equity that Sony had last year and is close to return on equity it used to earn in the early 1990s.
- We will assume that the firm's dominant market share will keep it from posting high growth. Over the last 5 years, the growth rate in revenues has been 3.5%. <u>We will assume a long term stable growth rate of 3%</u> (higher than the Japanese economy due to global exposure)
- We will assume that the net capital expenditures will grow at the same rate and that non-cash working capital will stay at 8.48% of revenues
- Sony's current book debt to capital ratio is 25.8%; we will assume that they will finance reinvestment with this ratio (rather than the market value)
- We will use a beta of 1.10, to reflect the unlevered beta of electronic firms (globally) and Sony's market value debt to equity ratio (16%)

Estimating the Inputs

- Normalized Earnings:
  - Book Value of Equity (3/1999) = 1795 billion JPY
  - Estimated Return on Equity = 5.25%
  - Normalized Net Income next year = 1795 billion * .0525 = 94.24 billion
- Reinvestment Needs
  - Current Net Capital Expenditures = (103 - 76) = 27 billion JPY
  - Expected Net Capital Expenditures = 27 billion (1.03) = 27.81 billion
  - Current Revenues = 2593 billion
  - Expected Revenues next year = 2593(1.03) = 2671 billion
  - Expected Change in non-cash Working Capital = (2671 - 2593)*.0848
    = 6.60 billion JPY
- Book Value Debt Ratio = 25.8%
- Cost of Equity = 2% + 1.10 (4%) = 6.40%

The Valuation

- Expected FCFE next year

Expected Net Income	= 94.24 billion
- (Net Cap Ex) (1- Debt Ratio)= 27.0 (1-.31)	= 20.64
- (Non-cash WC) (1-Debt ratio) = 6.6 (1-.31)	= 4.89
FCFE	=68.71 billion JPY

- Valuation
- Cost of Equity = 6.4%; Stable growth rate = 3%;

Value of Equity = 68.71 billion / (.064 - .03) = 2021 billion JPY

Sony was trading at a market value of equity of 7146 billion JPY

The Effect of Cross-holdings

- When firms have minority passive holdings in other companies, they report only the dividends they receive from these holdings as part of net income.
- Consequently, we tend to understate the value of these crossholdings in valuations.
- To value them right, we have to estimate the value of the companies in which these holdings are, and then take the percentage of the value of these firms owned by the firm you are valuing.

Nestle: Rationale for Using Model

- Earnings per share at the firm has grown about 5% a year for the last 5 years, but the fundamentals at the firm suggest growth in EPS of about 11%. (Analysts are also forecasting a growth rate of 12% a year for the next 5 years)
- Nestle has a debt to capital ratio of about 37.6% and is unlikely to change that leverage materially. (How do I know? I do not. I am just making an assumption.)
- Like many large European firms, Nestle has paid less in dividends than it has available in FCFE.

Nestle: Summarizing the Inputs

- General Inputs
  - Long Term Government Bond Rate (Sfr) = 4%
  - Current EPS = 108.88 Sfr; Current Revenue/share =1,820 Sfr
  - Capital Expenditures/Share=114.2 Sfr; Depreciation/Share=73.8 Sfr

	High Growth	*Stable Growth*
Length	5 years	Forever after yr 5
Beta	0.85	0.85
Return on Equity	23.63%	16%
Retention Ratio	65.10% (Current)	NA
Expected Growth	15.38%	5.00%
WC/Revenues	9.30% (Existing)	9.30% (Grow with earnings)
Debt Ratio	37.60%	37.60%
Cap Ex/Deprecn	Current Ratio	150%

Estimating the Risk Premium for Nestle

	Revenues	*Weight*	*Risk Premium*
North America	17.5	24.82%	4.00%
South America	4.3	6.10%	12.00%
Switzerland	1.1	1.56%	4.00%
Germany/France/UK	18.4	26.10%	4.00%
Italy/Spain	6.4	9.08%	5.50%
Asia	5.8	8.23%	9.00%
Rest of W. Europe	13	18.44%	4.00%
Eastern Europe	4	5.67%	8.00%
Total	**70.5**	**100.00%**	**5.26%**

- The risk premium that we will use in the valuation is 5.26%
- Cost of Equity = 4% + 0.85 (5.26%) = 8.47%

Nestle: Valuation

	1	2	3	4	5
Earnings	$125.63	$144.95	$167.25	$192.98	$222.66
- (Net CpEX)*(1-DR)	$29.07	$33.54	$38.70	$44.65	$51.52
- WC*(1-DR)	$16.25	$18.75	$21.63	$24.96	$28.79
Free Cashflow to Equity	$80.31	$92.67	$106.92	$123.37	$142.35
Present Value	**$74.04**	**$78.76**	**$83.78**	**$89.12**	**$94.7**

Earnings per Share in year 6 = 222.66(1.05) = 231.57

Net Capital Ex $_6$ = Deprecn'n$_6$ * 0.50 =73.8$(1.1538)^5$(1.05)(.5)= 78.5 Sfr

Chg in WC$_6$ =(Rev$_6$ - Rev$_5$)(.093) = 1538$(1.1538)^5$(.05)(.093)=13.85 Sfr

FCFE$_6$ = 231.57 - 78.5(1-.376) - 13.85(1-.376)= 173.93 Sfr

Terminal Value per Share = 173.93/(.0847-.05) = 3890.16 Sfr

Value=$74.04 +$78.76 +$83.78 +$89.12 +$94.7 +3890/$(1.0847)^5$=3011Sf

The stock was trading 2906 Sfr on December 31, 1999

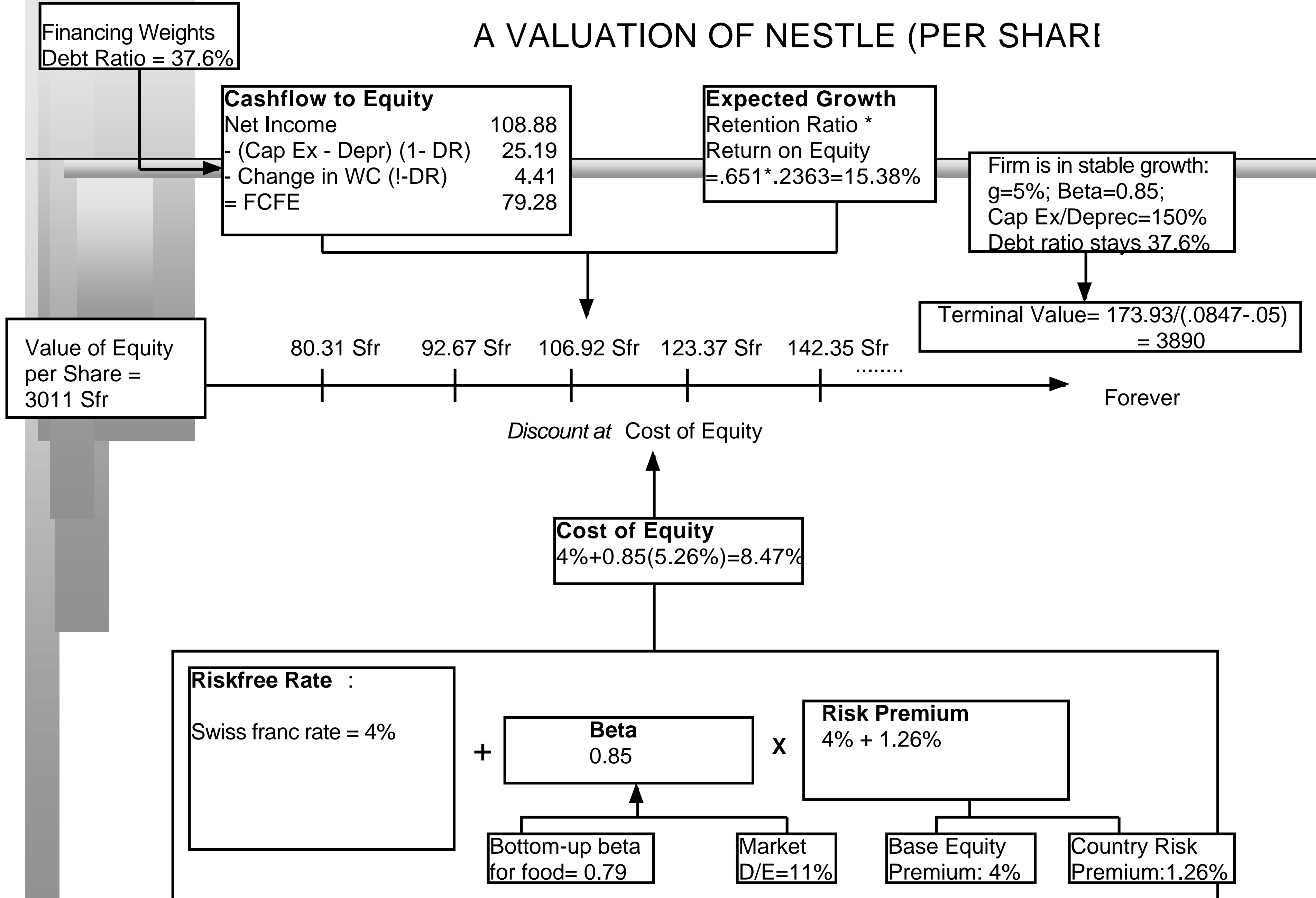
Nestle: The Net Cap Ex Assumption

- In our valuation of Nestle, we assumed that cap ex would be 150% of depreciation in steady state. If, instead, we had assumed that net cap ex was zero, as many analysts do, the terminal value would have been:

$FCFE_6$ = 231.57 - 13.85(1-.376) = 222.93 Sfr

Terminal Value per Share = 222.93/(.0847 -.05) = 4986 Sfr

Value= =\$74.04 +\$78.76 +\$83.78 +\$89.12 +\$94.7 + $4986/(1.0847)^5$= 3740.91 Sfr

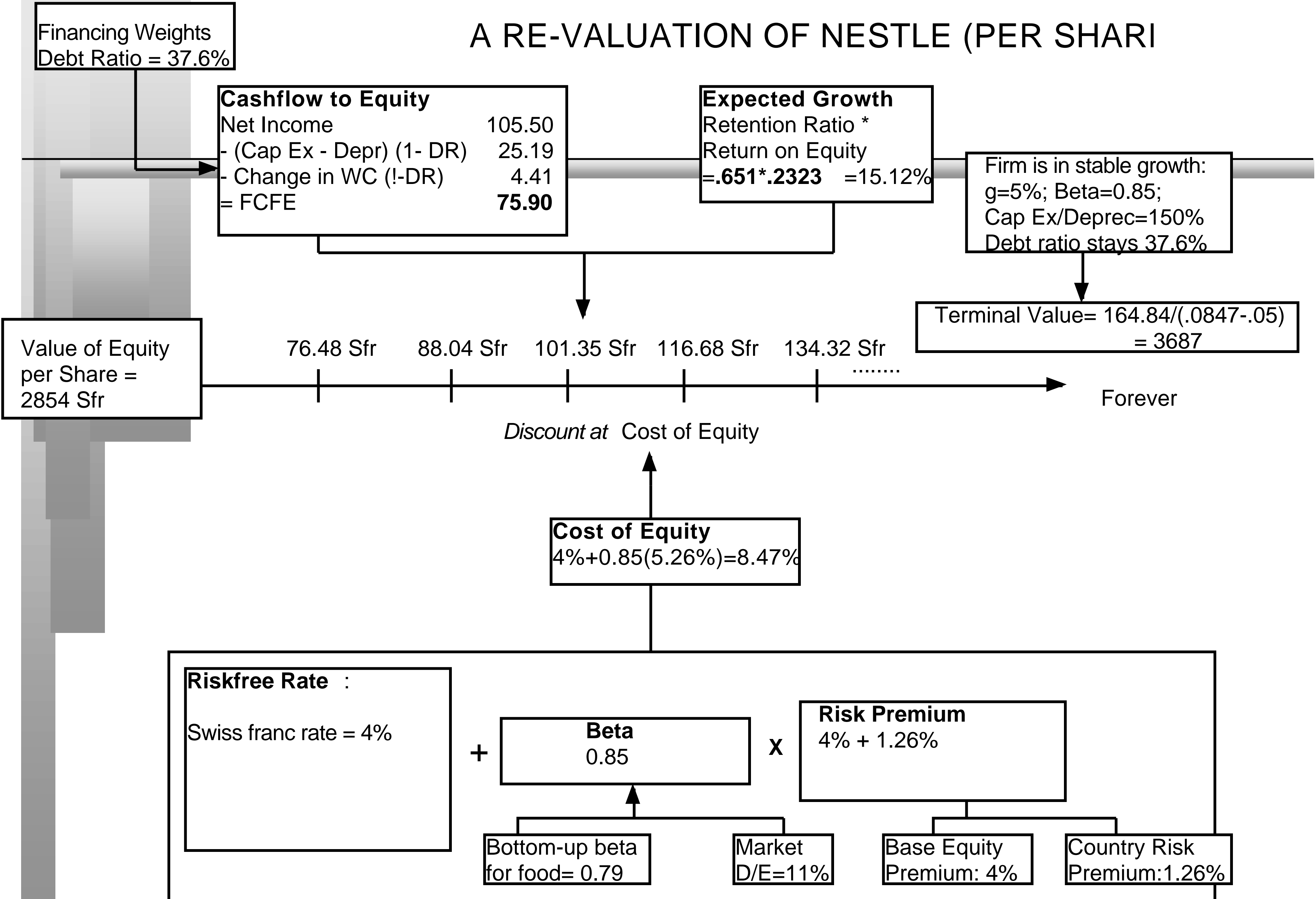

A VALUATION OF NESTLE (PER SHARI
Financing Weights
Debt Ratio = 37.6%
Cashflow to Equity
Net Income 108.88
- (Cap Ex - Depr) (1- DR) 25.19
- Change in WC (!-DR) 4.41
= FCFE 79.28
Expected Growth
Retention Ratio *
Return on Equity
=.651*.2363=15.38%
Firm is in stable growth:
g=5%; Beta=0.85;
Cap Ex/Deprec=150%
Debt ratio stays 37.6%
Terminal Value= 173.93/(.0847-.05)
= 3890
Value of Equity
per Share =
3011 Sfr
80.31 Sfr
92.67 Sfr
106.92 Sfr
123.37 Sfr
142.35 Sfr
....
Forever
Discount at Cost of Equity
Cost of Equity
4%+0.85(5.26%)=8.47%
Riskfree Rate :
Swiss franc rate = 4%
+
Beta
0.85
X
Risk Premium
4% + 1.26%
Bottom-up beta
for food= 0.79
Market
D/E=11%
Base Equity
Premium: 4%
Country Risk
Premium:1.26%

The Effects of New Information on Value

- No valuation is timeless. Each of the inputs to the model are susceptible to change as new information comes out about the firm, its competitors and the overall economy.
  - Market Wide Information
    - Interest Rates
    - Risk Premiums
    - Economic Growth
  - Industry Wide Information
    - Changes in laws and regulations
    - Changes in technology
  - Firm Specific Information
    - New Earnings Reports
    - Changes in the Fundamentals (Risk and Return characteristics)

Nestle: Effects of an Earnings Announcement

- Assume that Nestle makes an earnings announcement which includes two pieces of news:
  - The earnings per share come in lower than expected. The base year earnings per share will be 105.5 Sfr instead of 108.8 Sfr.
  - Increased competition in its markets is putting downward pressure on the net profit margin. The after-tax margin, which was 5.98% in the previous analysis, is expected to shrink to 5.79%.
- There are two effects on value:
  - The drop in earnings will make the projected earnings and cash flows lower, even if the growth rate remains the same
  - The drop in net margin will make the return on equity lower (assuming turnover ratios remain unchanged). This will reduce expected growth.



A RE-VALUATION OF NESTLE (PER SHARI
Financing Weights
Debt Ratio = 37.6%
Cashflow to Equity
Net Income 105.50
- (Cap Ex - Depr) (1- DR) 25.19
- Change in WC (!-DR) 4.41
= FCFE 75.90
Expected Growth
Retention Ratio *
Return on Equity
=.651*.2323 =15.12%
Firm is in stable growth:
g=5%; Beta=0.85;
Cap Ex/Deprec=150%
Debt ratio stays 37.6%
Terminal Value= 164.84/(.0847-.05)
= 3687
Value of Equity
per Share =
2854 Sfr
76.48 Sfr
88.04 Sfr
101.35 Sfr
116.68 Sfr
134.32 Sfr
....
Forever
Discount at Cost of Equity
Cost of Equity
4%+0.85(5.26%)=8.47%
Riskfree Rate :
Swiss franc rate = 4%
+
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Risk Premium
4% + 1.26%
Bottom-up beta
for food= 0.79
Market
D/E=11%
Base Equity
Premium: 4%
Country Risk
Premium:1.26%

Brahma: Rationale for Using Model

- Brahma has not only maintained high growth rates in the face of strong competition in the last few years in Brazil, it has done so while maintaining high returns on capital. The fundamentals suggest that growth will continue to be high.
- Given the size of the market and potential growth (as well as the strong brand name identification), growth seems sustainable for a longer period.
- The leverage is stable. The current debt to capital ratio of 43.50% will remain unchanged.
- The analysis will be done in real BR to avoid inflation estimation problems.

Real 3-Stage FCFE Model

Brahma: Summarizing the Inputs

- General Inputs
  - Riskfree Rate = 5% (Set equal to real growth rate in Brazil)
  - Risk Premium = 11.8% (U.S. Premium + 6.3% based on country risk)
  - Capital Expenditures per Share = 54.70 BR/share
  - Depreciation per Share = 25.28 BR/share
  - Revenues per Share = 328.33 BR/share

Brahma: Inputs for the 3 Stages

	High Growth	Transition Phase	Stable Growth
Length	5 years	5 years	Forever after yr 10
Beta	0.80	Moves to 1.00	1.00
Risk Premium	5.5%+6.3%	5.50%+3%	5.5%+2%
ROE (Real)	22.23%		
Retention Ratio	66.64%	Not used to estimate growth	
Expected Growth	14.82%	Moves to 5%	5%
Cap Ex/Deprecn	Current	Current	150%
Working Capital	5% of Revenues, which grow at same rate as earnings		

Brahma: Projected Cash Flows

- High Growth Phase

Year	1	2	3	4	5
Earnings	BR 51.53	BR 59.16	BR 67.93	BR 77.99	BR 89.55
(CEx-Depr)*(1-DR)	BR 19.09	BR 21.91	BR 25.16	BR 28.89	BR 33.17
Chg. WC*(1-DR)	BR 1.37	BR 1.58	BR 1.81	BR 2.08	BR 2.39
FCFE	BR 31.07	BR 35.67	BR 40.96	BR 47.02	BR 53.99

- Transition Phase

Year	6	7	8	9	10
Real Growth Rate	12.85%	10.89%	8.93%	6.96%	5.00%
Cumulated Growth	12.85%	25.14%	36.31%	45.80%	53.09%
Earnings	BR 101.06	BR 112.06	BR 122.06	BR 130.56	BR 137.09
(CapEx-Deprn)*(1-DR)	BR 37.43	BR 41.51	BR 45.21	BR 48.36	BR 50.78
Chg. WC *(1-DR)	BR 2.38	BR 2.27	BR 2.07	BR 1.76	BR 1.35
FCFE	BR 61.25	BR 68.28	BR 74.78	BR 80.44	BR 84.96

Brahma: Valuation

- Costs of Equity

Year	1-5	6	7	8	9	10
Beta	0.80	0.84	0.88	0.92	0.96	1.00
Cost of Equity	14.44%	12.14%	12.48%	12.82%	13.16%	13.50%

- Terminal Price

Earnings in Year 11 = 137.09 (1.05) = 143.94 BR

Net Cap Ex in year 11 = 40.54 BR

WC change in year 11= 2.51 BR

FCFE in year 11=143.84 - 40.94(1-.435) - 2.51(1-.435) = 119.62 BR

Terminal Price = 119.62 BR/(.125-.05) = 1594.98 BR

- Value = PV of $FCFE_{High\ Growth}$ + PV of $FCFE_{Transition}$+ PV of Term price
  = 136.63+131.31+444.59 = 712.53 BR

The stock was trading at about 650 BR on June 5, 1998

Brahma: Real versus Nominal Valuation

- This valuation was done in real terms. Assume now that you are told that you are over valuing the stock, since the real discount rate is so much lower than the nominal discount rate. Is this true?
  - ❑ Yes
  - ❑ No
- You are also looking at a valuation of Brahma done in U.S. dollars. What inflation rate should you use to estimate the cash flows?

DaimlerChrysler: Rationale for Model

- DaimlerChrysler is a mature firm in a mature industry. We will therefore assume that the firm is in stable growth.
- Since this is a relatively new organization, with two different cultures on the use of debt (Daimler has traditionally been more conservative and bank-oriented in its use of debt than Chrysler), the debt ratio will probably change over time. Hence, we will use the FCFF model.

Daimler Chrysler: Inputs to the Model

- In 1999, Daimler Chrysler had earnings before interest and taxes of 9,324 million DM and had an effective tax rate of 46.94%.
- Based upon this operating income and the book values of debt and equity as of 1998, DaimlerChrysler had an after-tax return on capital of 7.15%.
- The market value of equity is 62.3 billion DM, while the estimated market value of debt is 64.5 billion
- The bottom-up unlevered beta for automobile firms is 0.61, and Daimler is AAA rated.
- The long term German bond rate is 4.87% (in DM) and the mature market premium of 4% is used.
- We will assume that the firm will maintain a long term growth rate of 3%.

Daimler/Chrysler: Analyzing the Inputs

- Expected Reinvestment Rate = g/ ROC = 3%/7.15% = 41.98%
- Cost of Capital
  - Bottom-up Levered Beta = 0.61 (1+(1-.4694)(64.5/62.3)) = 0.95
  - Cost of Equity = 4.87% + 0.94 (4%) = 8.65%
  - After-tax Cost of Debt = (4.87% + 0.20%) (1-.4694)= 2.69%
  - Cost of Capital = 8.1%(62.3/(62.3+64.5))+ 2.69% (64.5/(62.3+64.5)) = 5.62%

Daimler Chrysler Valuation

- Estimating FCFF

Expected EBIT (1-t) = 9324 (1.03) (1-.4694) =	5,096 mil DM
Expected Reinvestment needs = 5,096(.412) =	2,139 mil DM
Expected FCFF next year =	2,957 mil DM

- Valuation of Firm

Value of operating assets = 5096 / (.056-.03) =	112,847 mil DM
+ Cash + Marketable Securities =	18,068 mil DM
Value of Firm =	130,915 mil DM
- Debt Outstanding =	64,488 mil DM
Value of Equity =	66,427 mil DM

Value per Share = 72.7 DM per share

Stock was trading at 62.2 DM per share on August 14, 2000

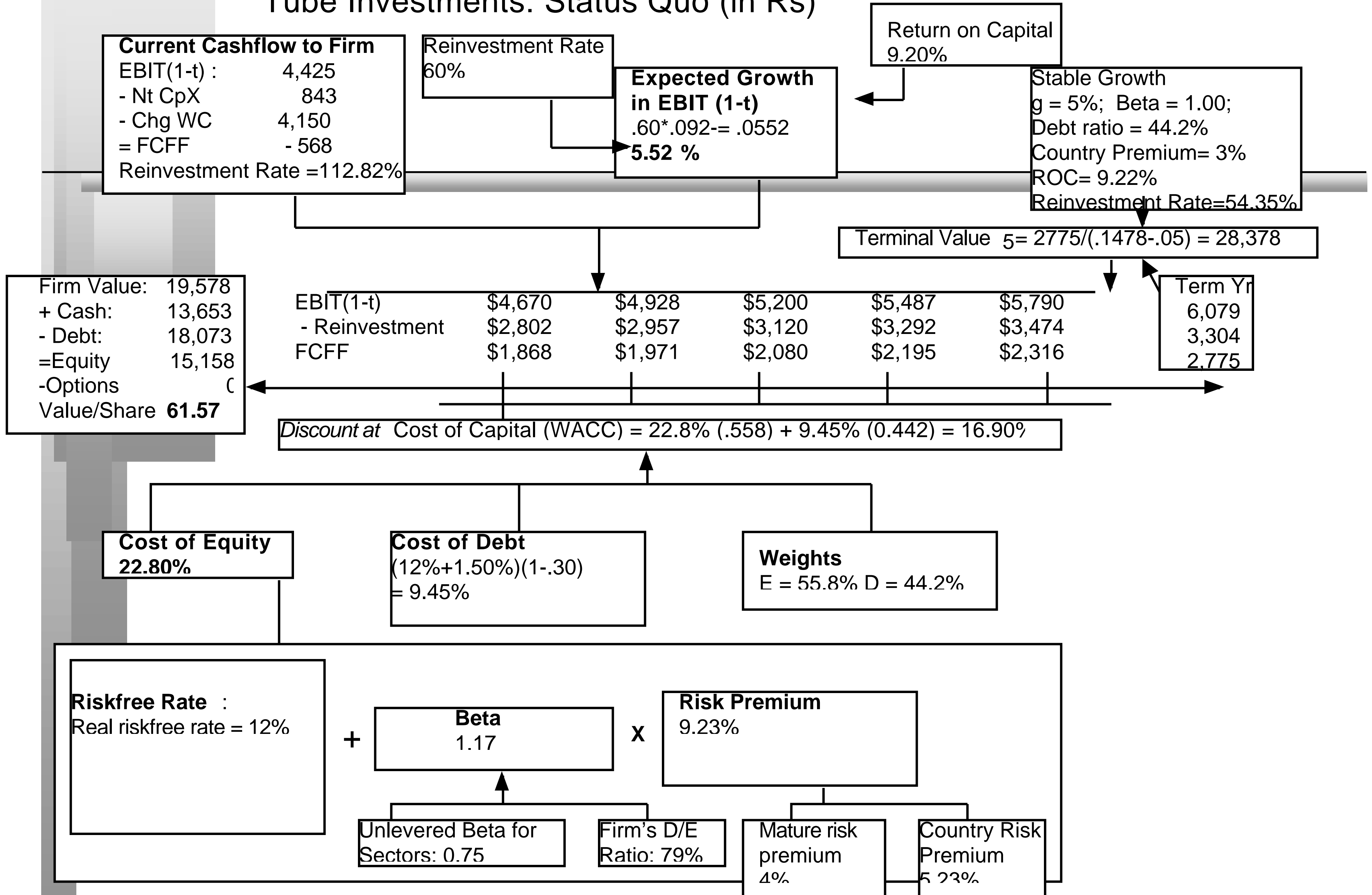
Circular Reasoning in FCFF Valuation

- 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. Is there circular reasoning here?
  - Yes
  - No
- If there is, can you think of a way around this problem?

Tube Investment: Rationale for Using 2-Stage FCFF Model

- Tube Investments is a diversified manufacturing firm in India. While its growth rate has been anemic, there is potential for high growth over the next 5 years.
- The firm’s financing policy is also in a state of flux as the family running the firm reassesses its policy of funding the firm.

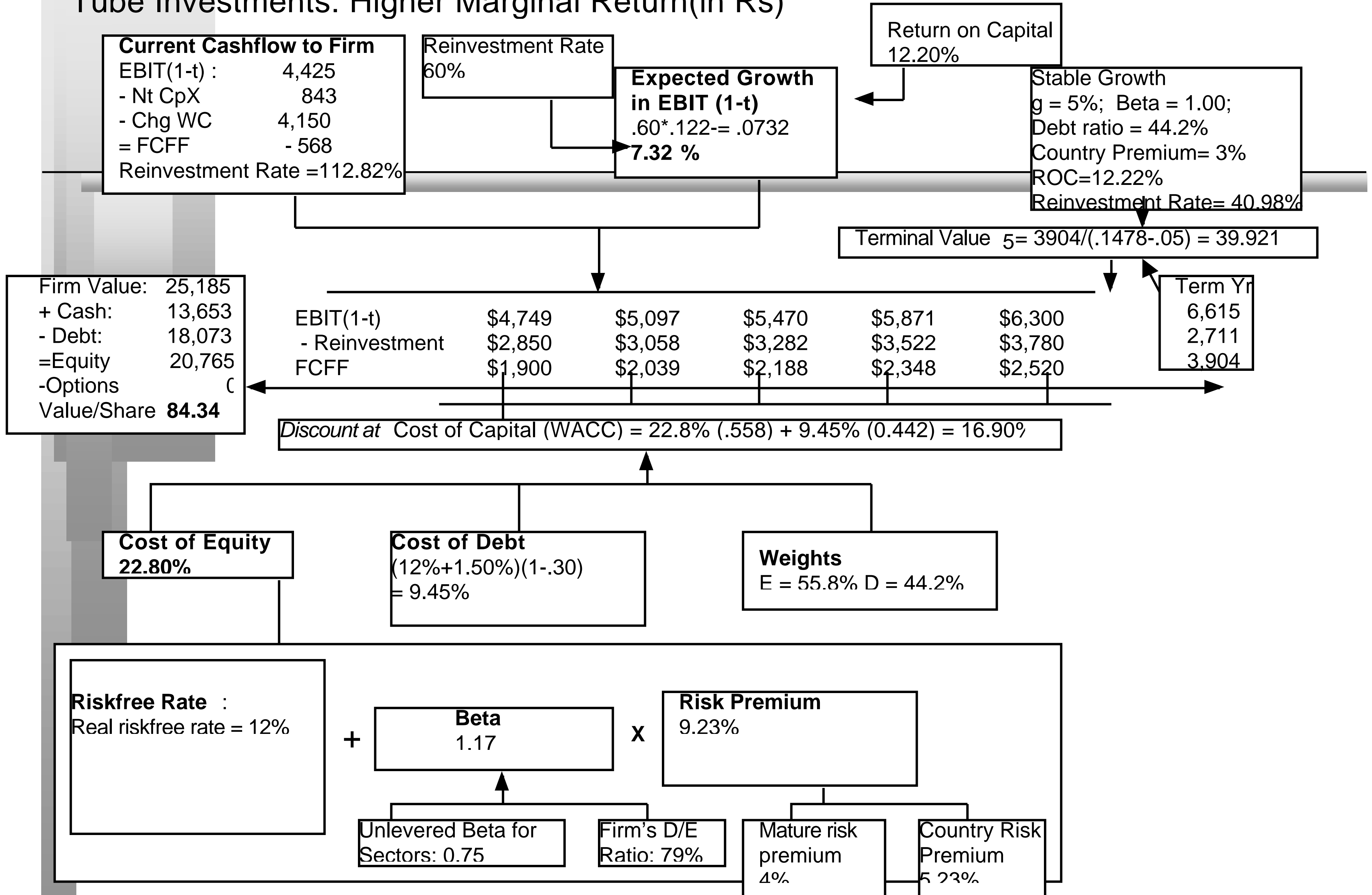
Tube Investments: Status Quo (in Rs)



The Effects of Return Improvements on Value

- The firm is considering changes in the way in which it invests, which management believes will increase the return on capital to 12.20% on just new investments (and not on existing investments) over the next 5 years.
- The value of the firm will be higher, because of higher expected growth.

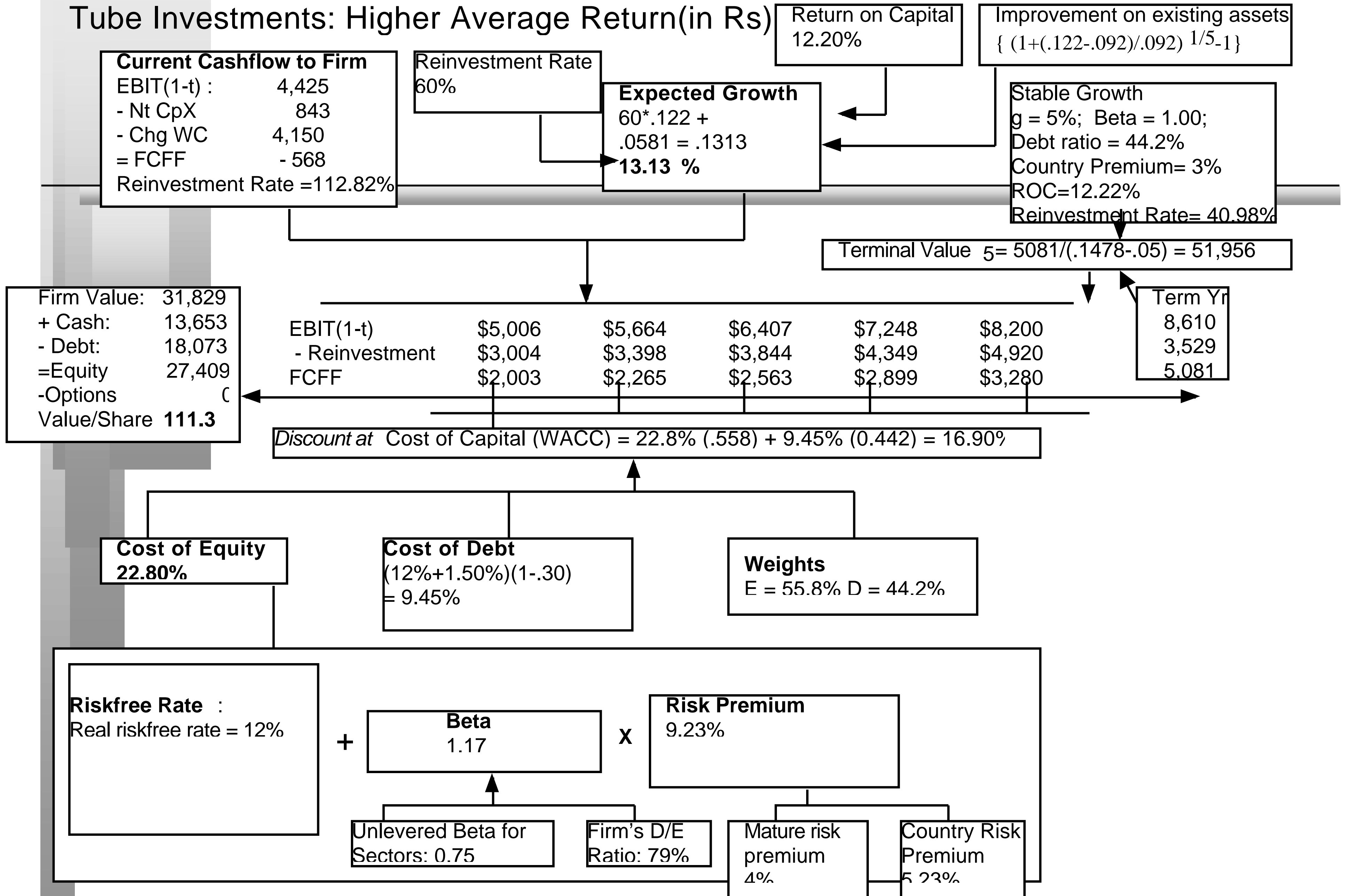
Tube Investments: Higher Marginal Return(in Rs)



Return Improvements on Existing Assets

- If Tube Investments is also able to increase the return on capital on existing assets to 12.20% from 9.20%, its value will increase even more.
- The expected growth rate over the next 5 years will then have a second component arising from improving returns on existing assets:
- Expected Growth Rate = $.122*.60 +\{ (1+(.122-.092)/.092)^{1/5}-1\}$
  $=.1313$ or 13.13%

Tube Investments: Higher Average Return(in Rs)



Dealing with Operating Leases: A Valuation of the Home Depot

- The Home Depot does not carry much in terms of traditional debt on its balance sheet. However, it does have significant operating leases.
- When doing firm valuation, these operating leases have to be treated as debt. This, in turn, will mean that operating income has to get restated.

Operating Leases at The Home Depot in 1998

- The pre-tax cost of debt at the Home Depot is 5.80%

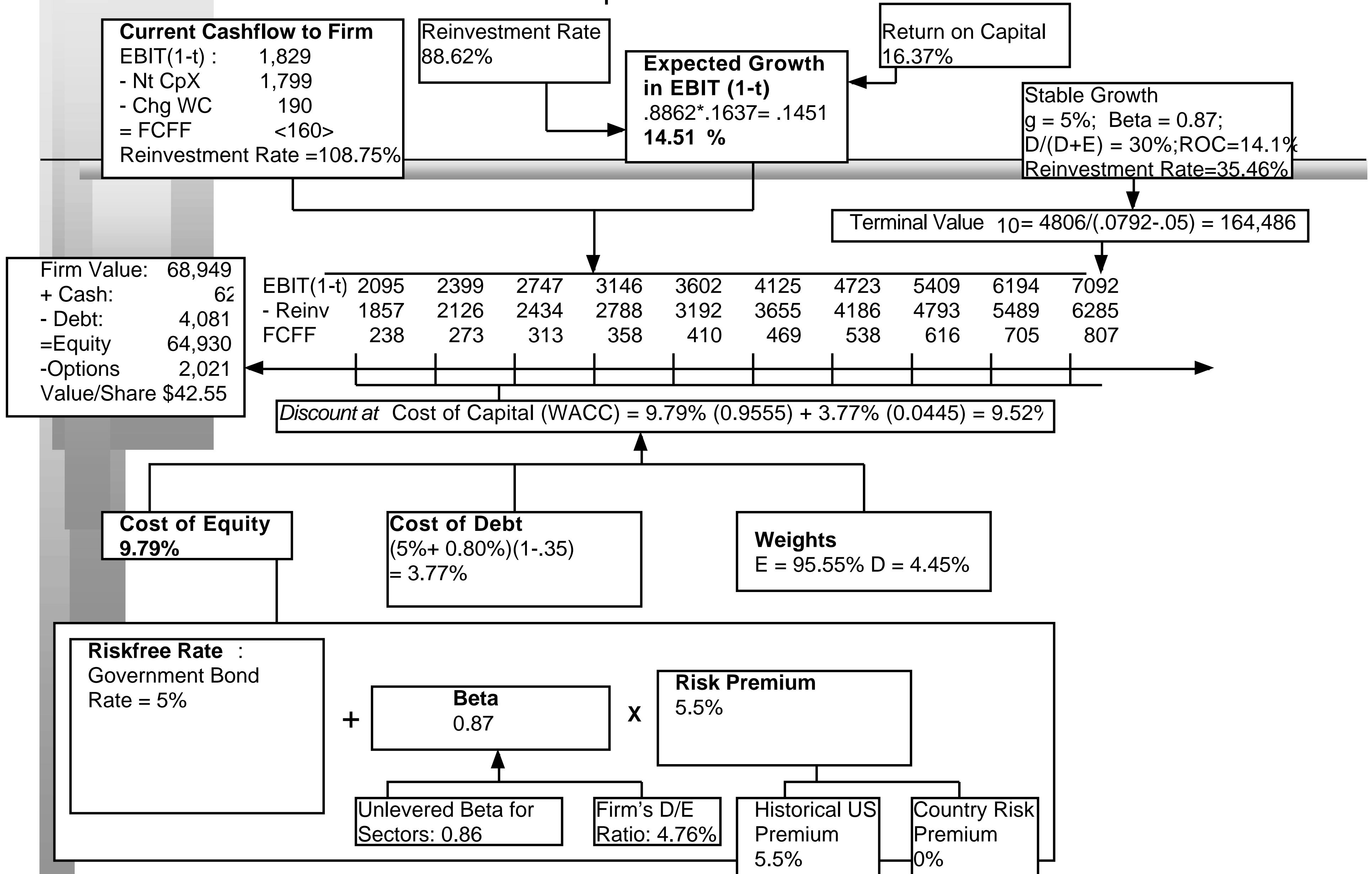
Year	Commitment	Present Value
1	$ 294.00	$277.88
2	$ 291.00	$259.97
3	$ 264.00	$222.92
4	$ 245.00	$195.53
5	$ 236.00	$178.03
6 and beyond	$ 270.00	$1,513.37

- Debt Value of leases = $ 2,647.70

Other Adjustments from Operating Leases

	Operating Lease Expensed	Operating Lease converted to Debt
EBIT	$ 2,661mil	$ 2,815 mil
EBIT (1-t)	$1,730 mil	$1,829 mil
Debt	$1,433 mil	$ 4,081 mil

The Home Depot: A Valuatic



Dealing with R&D: Bristol Myers

- Bristol Myers, like most pharmaceutical firms, has a significant amount of research and development expenses. These expenses, though treated as operating expenditures, by accountants, are really capital expenditures.
- When R&D expenses are reclassified as capital expenditures, there is a ripple effect on the following:
  - Operating income
  - Capital Expendiutures
  - Depreciation and Amortization
  - Reinvestment Rates
  - Return on Capital

Converting R&D Expenses to Capital Expenses

Year	R&D Expense	Unamortized portion	
-1	1577.00	1.00	1577.00
-2	1385.00	0.90	1246.50
-3	1276.00	0.80	1020.80
-4	1199.00	0.70	839.30
-5	1108.00	0.60	664.80
-6	1128.00	0.50	564.00
-7	1083.00	0.40	433.20
-8	983.00	0.30	294.90
-9	881.00	0.20	176.20
-10	789.00	0.10	78.90
Value of Research Asset =			$6,895.60

The Consequences of a Research Asset

- Amortization of asset for current year = $ 689.56
- Adjustment to Operating Income :
  - Add back the R& D Expenses $1,577 million
  - Subtract out the amortization $ 690 million
  - Net Effect on Operating Expenses $ 887 million (Increase)
- Tax Effect of R&D Expensing
  - The entire R&D expense of $1,577 million is tax-deductible, rather than just the net effect of $ 887 million
  - This creates a tax benefit that can be computed as follows:

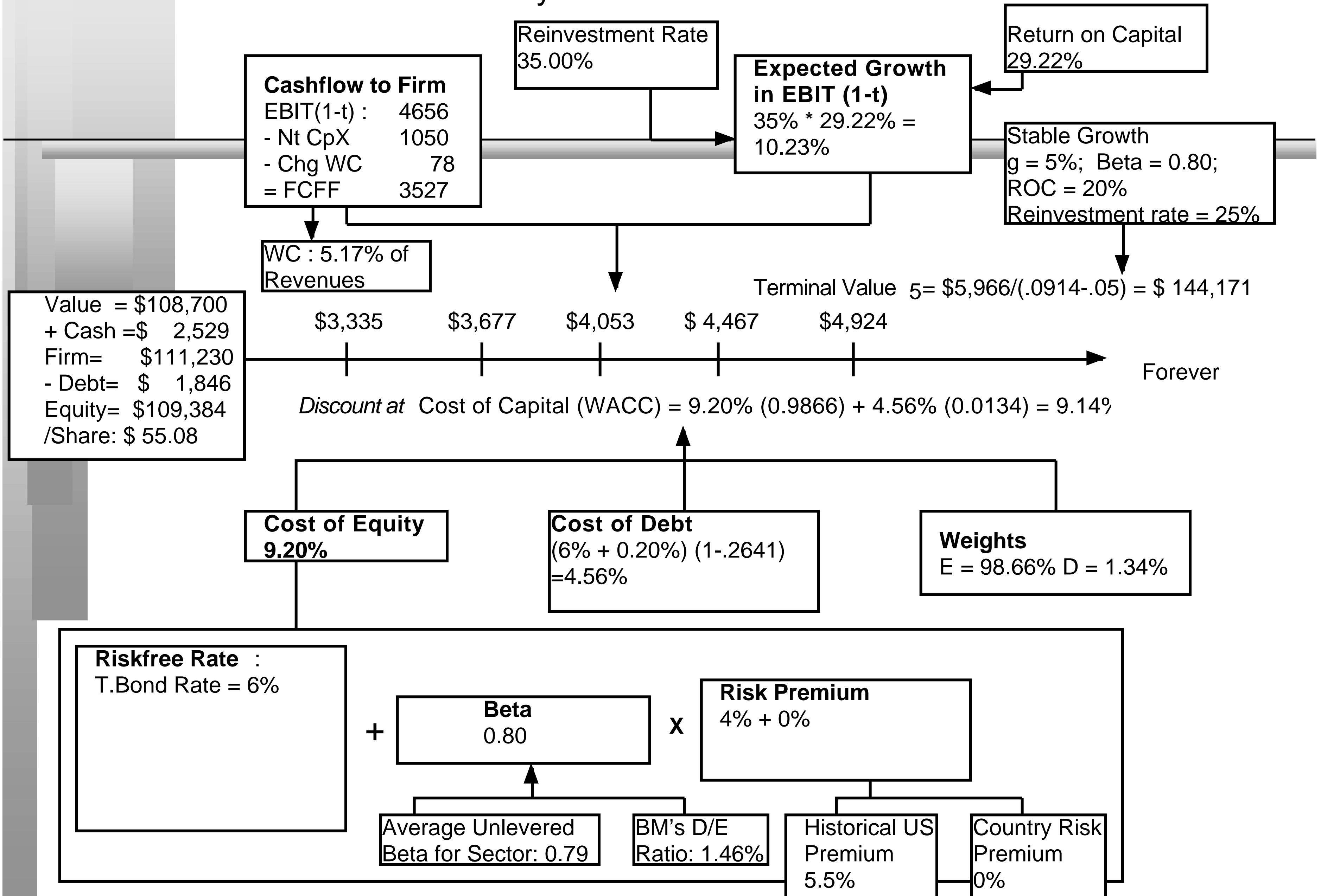
Additional tax benefit of expensing = (1577 - 887) (.2641) = $234

(26.41% is the tax rate)

Capitalizing R& D: The Effects

	R&D expensed	R&D capitalized	In general
EBIT	$5,121 mil	$6,008 mil	Increase
EBIT(1-t)	$3,769 mil	$4,656 mil	Increase
Capital Exp	$ 788 mil	$2,365 mil	Increase
Depr & Amortn	$ 625 mil	$1,315 mil	Increase
Net Cap Ex	$ 163 mil	$1,050 mil	Increase
Reinvestment Rate	6.4%	24.24%	Increase
BV of Equity	$7,219 mil	$14,114 mil	Increase
ROC	41.68%	29.22%	Decrease

Bristol Myers: A Valuatio



Aswath Damodaran

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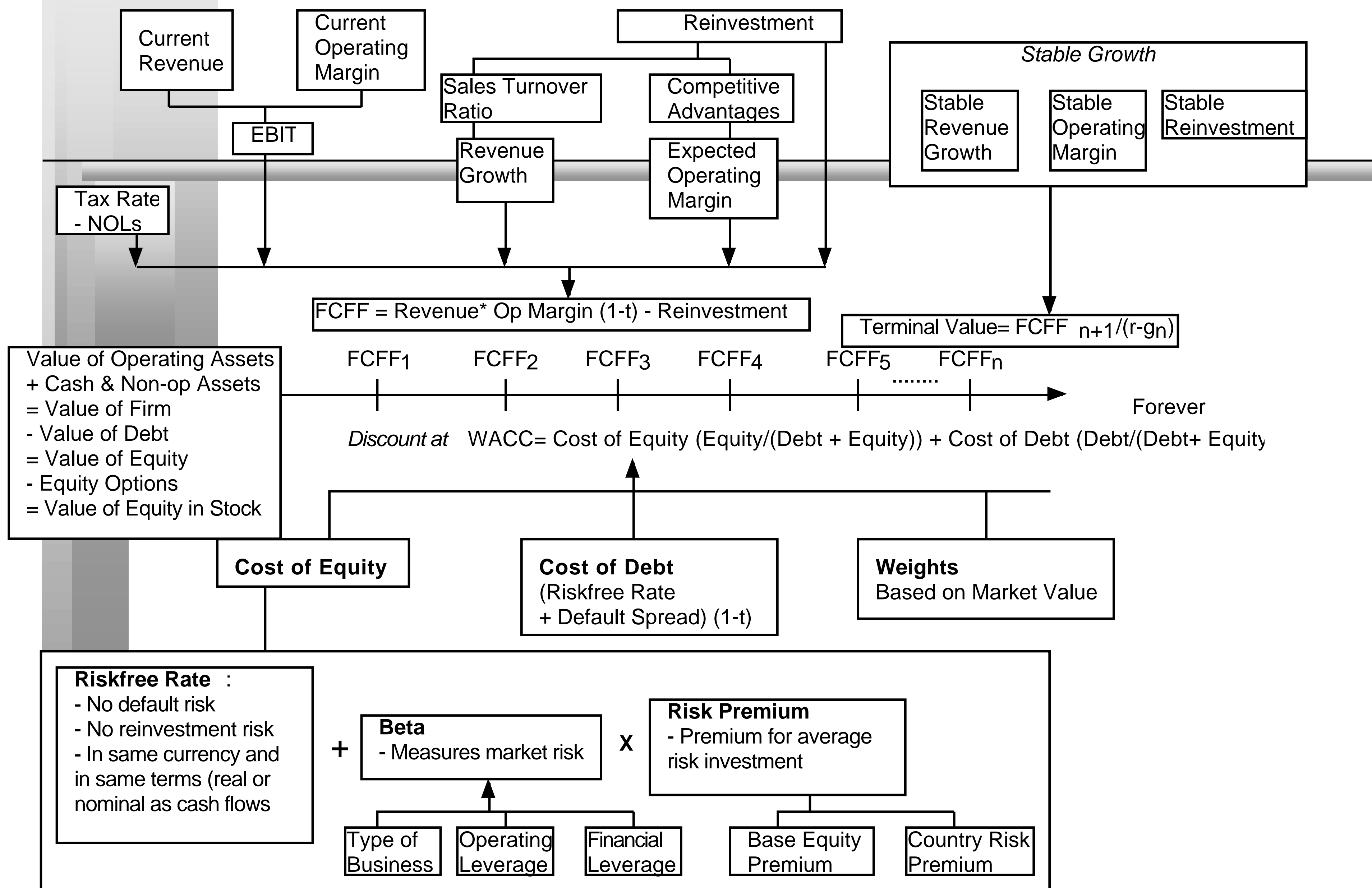
To make our estimates, we draw our information from..

- 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)
- We often substitute one type of information for another; for instance, in valuing Ford, we have 70 years+ of historical data, but not too many comparable firms; in valuing a software firm, we might not have too much historical data but we have lots of comparable firms.

The Dark Side...

- 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)



Discounted Cash Flow Valuation: High Growth with Negative Earnings
Current Revenue
Current Operating Margin
Reinvestment
Sales Turnover Ratio
Competitive Advantages
EBIT
Revenue Growth
Expected Operating Margin
Tax Rate - NOLs
Stable Growth
Stable Revenue Growth
Stable Operating Margin
Stable Reinvestment
FCFF = Revenue* Op Margin (1-t) - Reinvestment
Terminal Value= FCFF n+1/(r-gn)
Value of Operating Assets
+ Cash & Non-op Assets
= Value of Firm
- Value of Debt
= Value of Equity
- Equity Options
= Value of Equity in Stock
FCFF1
FCFF2
FCFF3
FCFF4
FCFF5
FCFFn
....
Forever
Discount at WACC= Cost of Equity (Equity/(Debt + Equity)) + Cost of Debt (Debt/(Debt+ Equity
Cost of Equity
Cost of Debt
(Riskfree Rate
+ Default Spread) (1-t)
Weights
Based on Market Value
Riskfree Rate :
- No default risk
- No reinvestment risk
- In same currency and
in same terms (real or
nominal as cash flows
+
Beta
- Measures market risk
X
Risk Premium
- Premium for average
risk investment
Type of Business
Operating Leverage
Financial Leverage
Base Equity Premium
Country Risk Premium

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 the beta of the retailing business.

Estimating Synthetic Ratings and cost of debt

- 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

- 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. This yields an average rating of BBB for Amazon.com for the first 5 years. (In effect, the rating will be lower in the earlier years and higher in the later years than BBB)

Estimating the cost of debt

- The synthetic rating for Amazon.com is BBB. The default spread for BBB rated bonds 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%	16.1%	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%

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 has a book value of equity of $ 138 million and a book value of debt of $ 349 million. Shows you how irrelevant book value is in this process.

Calendar Years, Financial Years and Updated Information

- 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

Are S, G & A expenses capital expenditures?

- 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?

Amazon.com's Tax Rate

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

After year 5, the tax rate becomes 35%.

Estimating FCFF: Amazon.com

- EBIT (Trailing 1999) = -$ 410 million
- Tax rate used = 0% (Assumed Effective = Marginal)
- Capital spending (Trailing 1999) = $ 243 million (includes acquisitions)
- 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 Revenues, Earnings and Reinvestment: Amazon

Year	Revenue Growth	Chg in Revenue	New Investment	Sales/Capital	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%

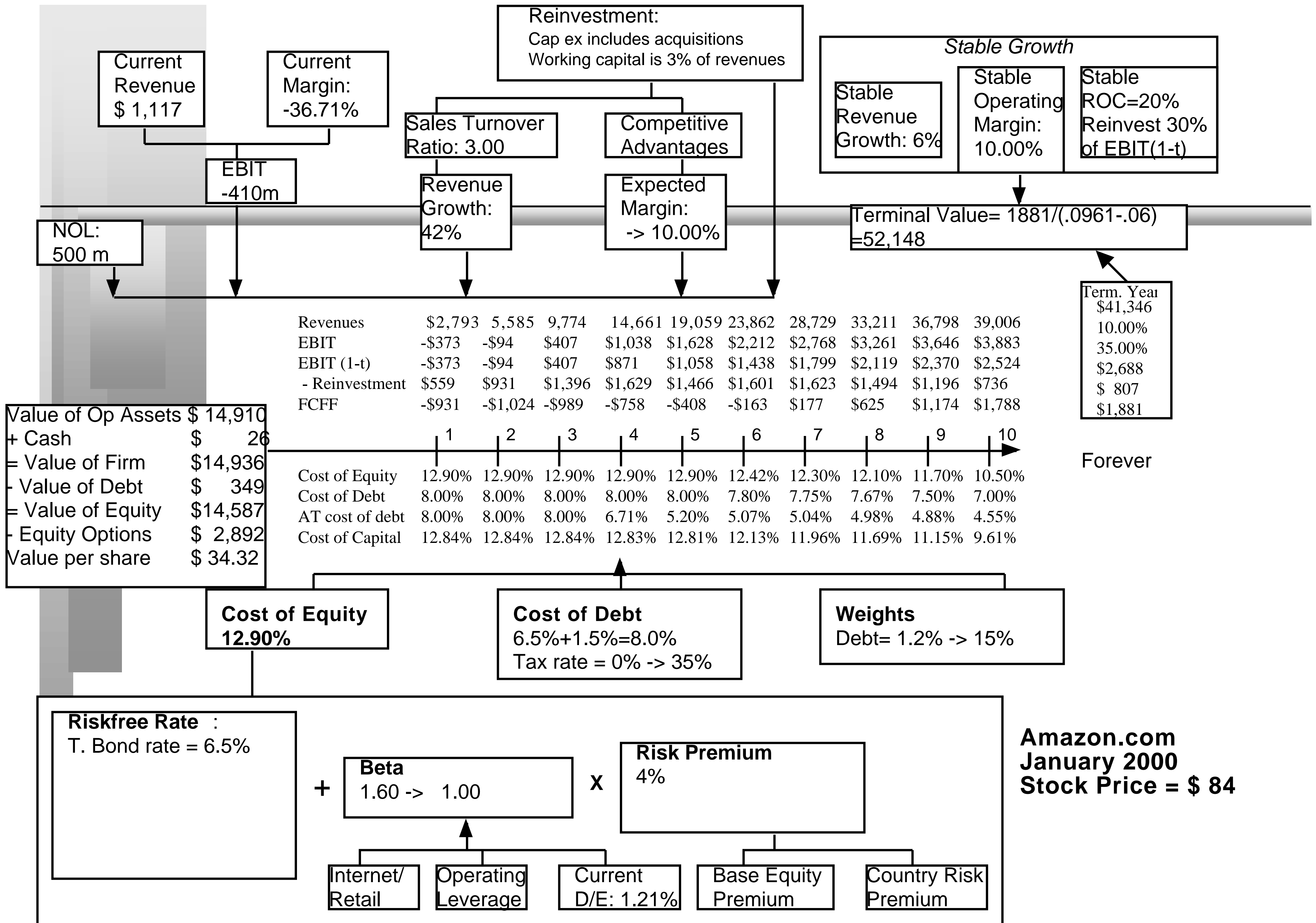
The sales/capital ratio of 3.00 was based on what Amazon accomplished last year and the averages for the industry.

Amazon.com: Stable Growth Inputs

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

Estimating the Value of Equity Options

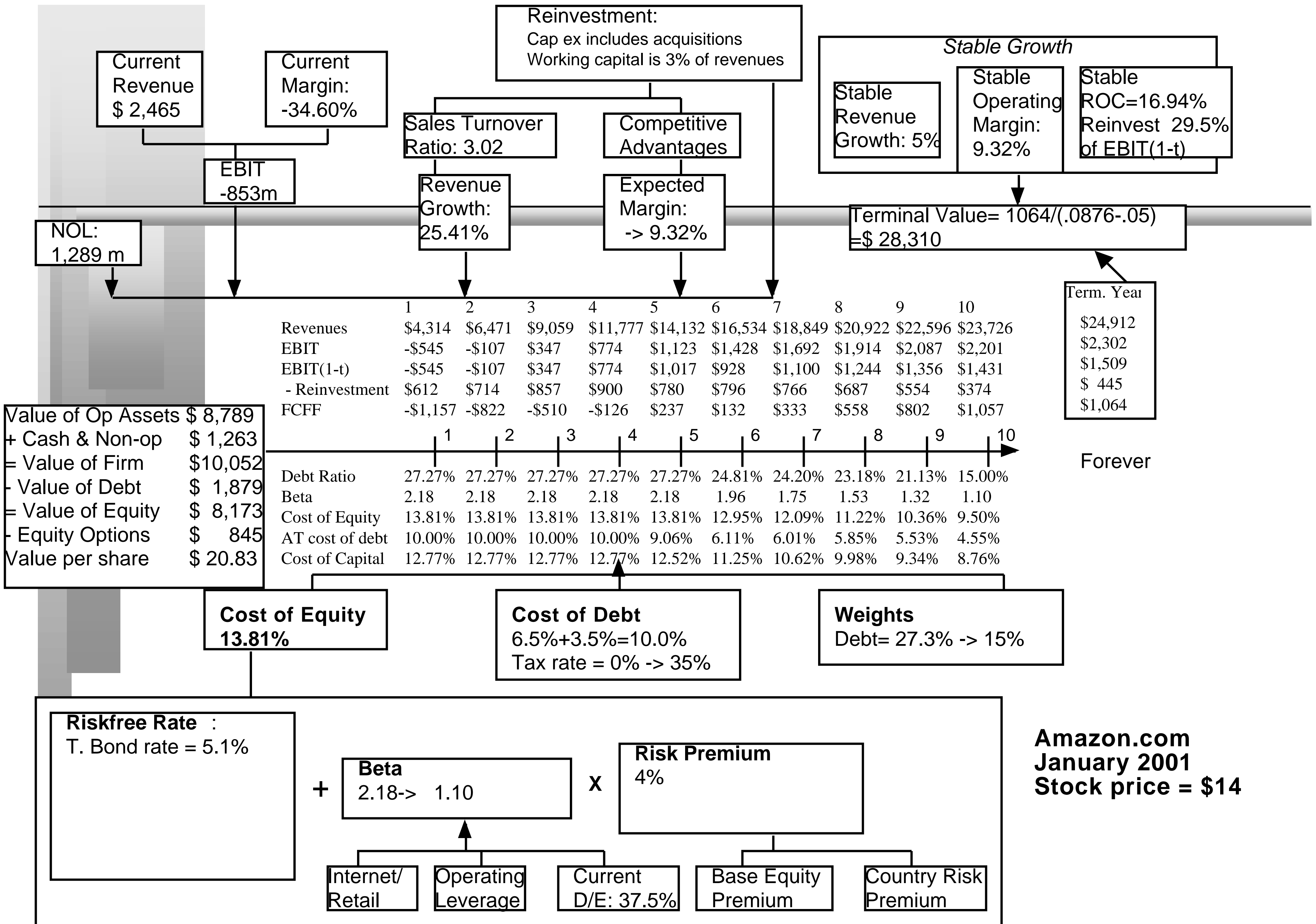
- Details of options outstanding
  - Average strike price of options outstanding = $ 13.375
  - Average maturity of options outstanding = 8.4 years
  - Standard deviation in ln(stock price) = 50.00%
  - Annualized dividend yield on stock = 0.00%
  - Treasury bond rate = 6.50%
  - Number of options outstanding = 38 million
  - Number of shares outstanding = 340.79 million
- Value of options outstanding (using dilution-adjusted Black-Scholes model)
  - Value of equity options = $ 2,892 million



Reinvestment:
Cap ex includes acquisitions
Working capital is 3% of revenues
Stable Growth
Stable Revenue Growth: 6%
Stable Operating Margin: 10.00%
Stable ROC=20%
Reinvest 30% of EBIT(1-t)
Current Revenue $ 1,117
Current Margin: -36.71%
Sales Turnover Ratio: 3.00
Competitive Advantages
EBIT -410m
Revenue Growth: 42%
Expected Margin: -> 10.00%
Terminal Value= 1881/(.0961-.06) =52,148
NOL: 500 m
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
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
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%
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

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



	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%