LOOSE ENDS IN VALUATION

Aswath Damodaran

Risk Adjusted Value: Three Basic Propositions

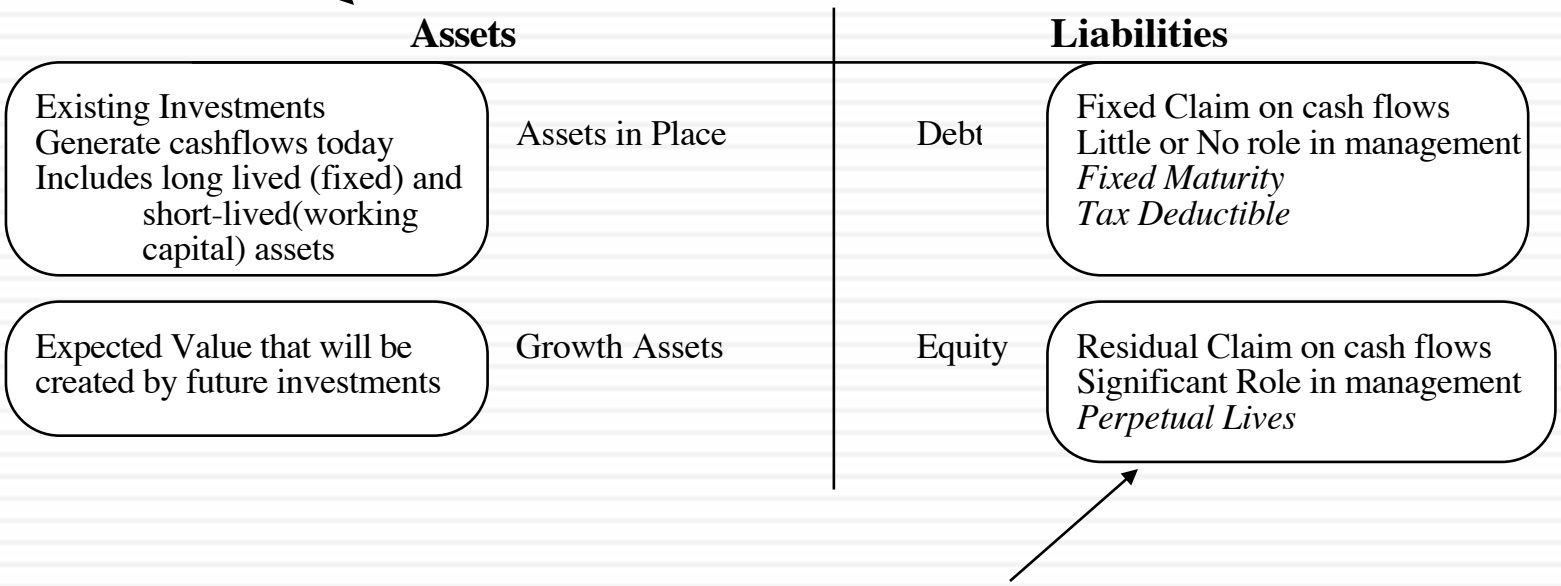
- The value of an asset is the present value of the expected cash flows on that asset, over its expected life:

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

- Proposition 1: If "it" does not affect the cash flows or alter risk (thus changing discount rates), "it" cannot affect value.
- Proposition 2: For an asset to have value, the expected cash flows have to be positive some time over the life of the asset.
- Proposition 3: 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.

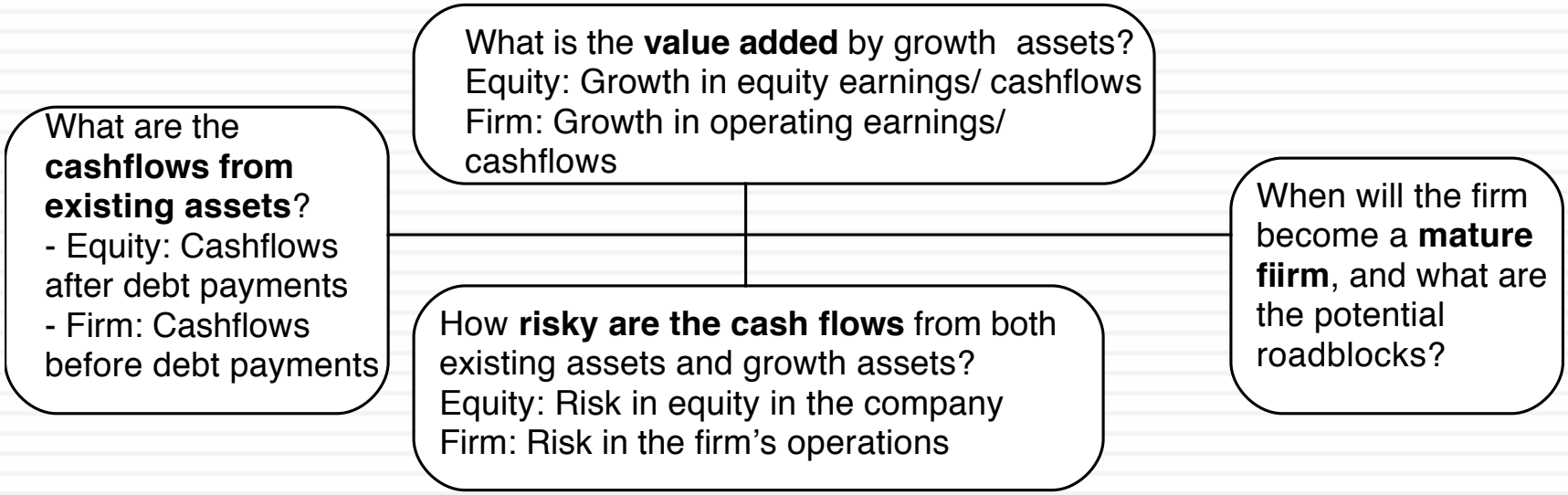
DCF Choices: Equity Valuation versus Firm Valuation

Firm Valuation: Value the entire business

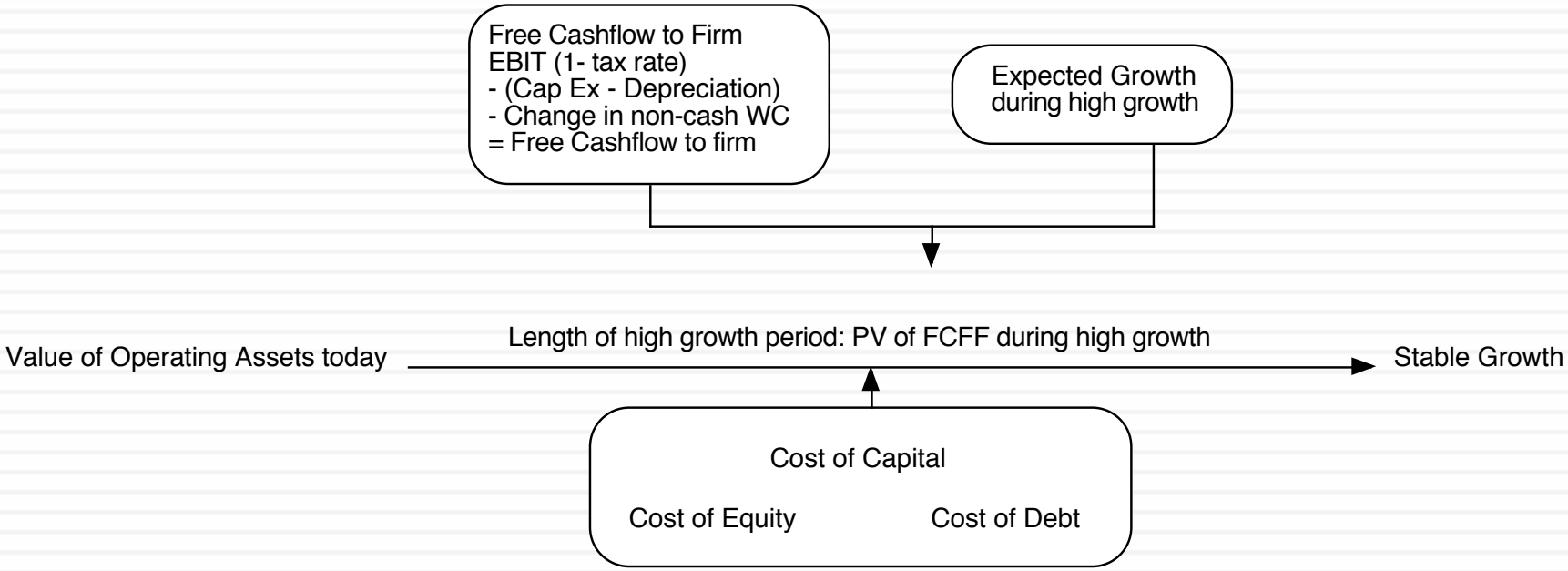


Equity valuation: Value just the equity claim in the business

The fundamental determinants of value…



So, you've valued a firm…



But what comes next?

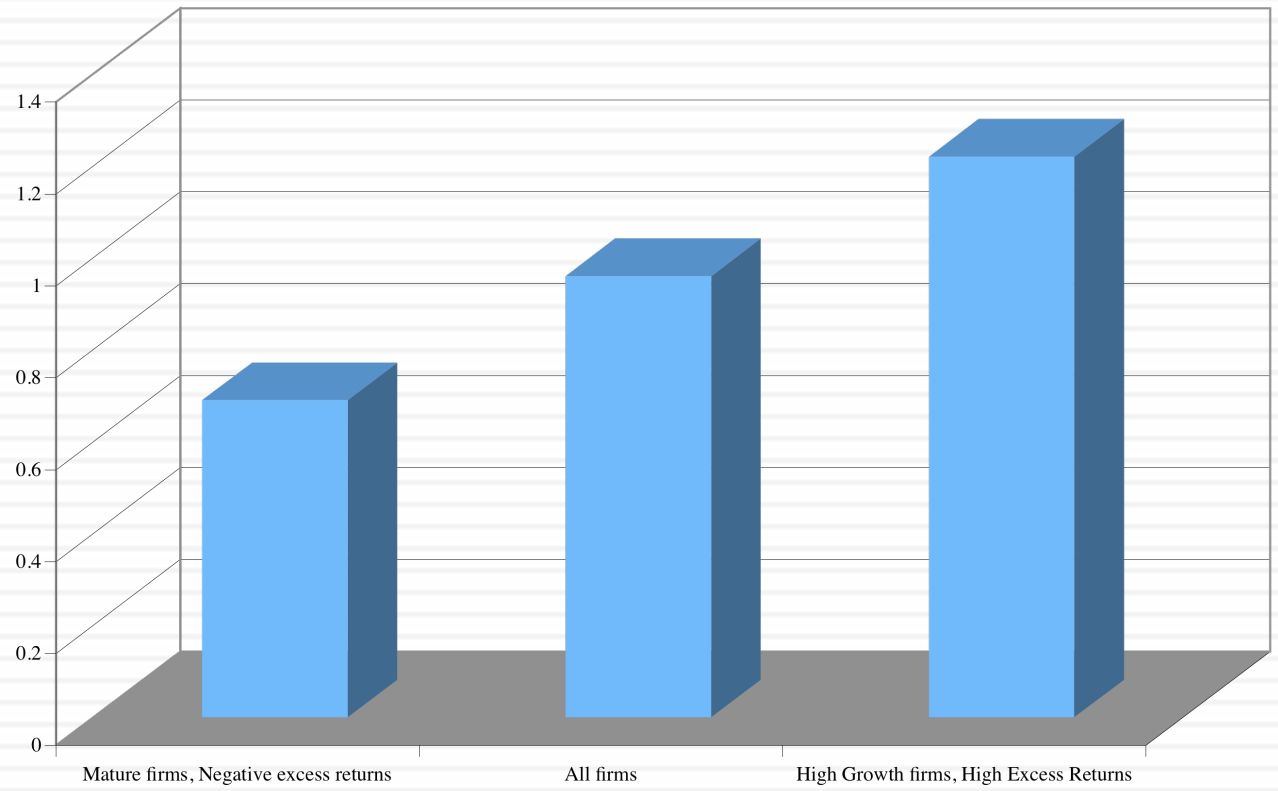
Value of Operating Assets	Since this is a discounted cashflow valuation, should there be a real option premium?
+ Cash and Marketable Securities	Operating versus Non-opeating cash Should cash be discounted for earning a low return?
+ Value of Cross Holdings	How do you value cross holdings in other companies? What if the cross holdings are in private businesses?
+ Value of Other Assets	What about other valuable assets? How do you consider under utlilized assets?
Value of Firm	Should you discount this value for opacity or complexity? How about a premium for synergy? What about a premium for intangibles (brand name)?
- Value of Debt	What should be counted in debt? Should you subtract book or market value of debt? What about other obligations (pension fund and health care? What about contingent liabilities? What about minority interests?
= Value of Equity	Should there be a premium/discount for control? Should there be a discount for distress
- Value of Equity Options	What equity options should be valued here (vested versus non-vested)? How do you value equity options?
= Value of Common Stock	Should you divide by primary or diluted shares?
/ Number of shares	
= Value per share	Should there be a discount for illiquidity/ marketability? Should there be a discount for minority interests?

The Value of Cash
An Exercise in Cash Valuation

	Company A	Company B	Company C
Enterprise Value	$ 1 billion	$ 1 billion	$ 1 billion
Cash	$ 100 mil	$ 100 mil	$ 100 mil
Return on Capital	10%	5%	22%
Cost of Capital	10%	10%	12%
Trades in	US	US	Argentina

Cash: Discount or Premium?

Market Value of $ 1 in cash:
Estimates obtained by regressing Enterprise Value against Cash Balances



2. Dealing with Holdings in Other firms

- Holdings in other firms can be categorized into
  - Minority passive holdings, in which case only the dividend from the holdings is shown in the balance sheet
  - Minority active holdings, in which case the share of equity income is shown in the income statements
  - Majority active holdings, in which case the financial statements are consolidated.
- We tend to be sloppy in practice in dealing with cross holdings. After valuing the operating assets of a firm, using consolidated statements, it is common to add on the balance sheet value of minority holdings (which are in book value terms) and subtract out the minority interests (again in book value terms), representing the portion of the consolidated company that does not belong to the parent company.

How to value holdings in other firms.. In a perfect world..

- In a perfect world, we would strip the parent company from its subsidiaries and value each one separately. The value of the combined firm will be
  - Value of parent company + Proportion of value of each subsidiary
- To do this right, you will need to be provided detailed information on each subsidiary to estimated cash flows and discount rates.

Two compromise solutions…

- The market value solution: When the subsidiaries are publicly traded, you could use their traded market capitalizations to estimate the values of the cross holdings. You do risk carrying into your valuation any mistakes that the market may be making in valuation.
- The relative value solution: When there are too many cross holdings to value separately or when there is insufficient information provided on cross holdings, you can convert the book values of holdings that you have on the balance sheet (for both minority holdings and minority interests in majority holdings) by using the average price to book value ratio of the sector in which the subsidiaries operate.

3. Other Assets that have not been counted yet..

- Unutilized assets: If you have assets or property that are not being utilized (vacant land, for example), you have not valued it yet. You can assess a market value for these assets and add them on to the value of the firm.
- Overfunded pension plans: If you have a defined benefit plan and your assets exceed your expected liabilities, you could consider the over funding with two caveats:
  - Collective bargaining agreements may prevent you from laying claim to these excess assets.
  - There are tax consequences. Often, withdrawals from pension plans get taxed at much higher rates.
  - Do not double count an asset. If you count the income from an asset in your cashflows, you cannot count the market value of the asset in your value.

4. A Discount for Complexity: An Experiment

	Company A	Company B
Operating Income	$ 1 billion	$ 1 billion
Tax rate	40%	40%
ROIC	10%	10%
Expected Growth	5%	5%
Cost of capital	8%	8%
Business Mix	Single	Multiple
Holdings	Simple	Complex
Accounting	Transparent	Opaque

- Which firm would you value more highly?

Measuring Complexity: Volume of Data in Financial Statements

Company	*Number of pages in last 10Q*	*Number of pages in last 10K*
General Electric	65	410
Microsoft	63	218
Wal-mart	38	244
Exxon Mobil	86	332
Pfizer	171	460
Citigroup	252	1026
Intel	69	215
AIG	164	720
Johnson & Johnson	63	218
IBM	85	353

Measuring Complexity: A Complexity Score

Item	*Factors*	*Follow-up Question*	*Answer*	*Complexity score*
Operating Income	1. Multiple Businesses	Number of businesses (with more than 10% of revenues) =	2	4
	2. One-time income and expenses	Percent of operating income =	20%	1
	3. Income from unspecified sources	Percent of operating income =	15%	0.75
	4. Items in income statement that are volatile	Percent of operating income =	5%	0.25
Tax Rate	1. Income from multiple locales	Percent of revenues from non-domestic locales =	100%	3
	2. Different tax and reporting books	Yes or No	Yes	3
	3. Headquarters in tax havens	Yes or No	Yes	3
	4. Volatile effective tax rate	Yes or No	Yes	2
Capital Expenditures	1. Volatile capital expenditures	Yes or No	Yes	2
	2. Frequent and large acquisitions	Yes or No	Yes	4
	3. Stock payment for acquisitions and investments	Yes or No	Yes	4
Working capital	1. Unspecified current assets and current liabilities	Yes or No	Yes	3
	2. Volatile working capital items	Yes or No	Yes	2
Expected Growth rate	1. Off-balance sheet assets and liabilities (operating leases and R&D)	Yes or No	Yes	3
	2. Substantial stock buybacks	Yes or No	Yes	3
	3. Changing return on capital over time	Is your return on capital volatile?	Yes	5
	4. Unsustainably high return	Is your firm's ROC much higher than industry average?	Yes	5
Cost of capital	1. Multiple businesses	Number of businesses (more than 10% of revenues) =	2	2
	2. Operations in emerging markets	Percent of revenues=	30%	1.5
	3. Is the debt market traded?	Yes or No	Yes	0
	4. Does the company have a rating?	Yes or No	Yes	0
	5. Does the company have off-balance sheet debt?	Yes or No	No	0
		Complexity Score =		**51.5**

Dealing with Complexity

- In Discounted Cashflow Valuation
  - The Aggressive Analyst: Trust the firm to tell the truth and value the firm based upon the firm's statements about their value.
  - The Conservative Analyst: Don't value what you cannot see.
  - The Compromise: Adjust the value for complexity
    - Adjust cash flows for complexity
    - Adjust the discount rate for complexity
    - Adjust the expected growth rate/ length of growth period
    - Value the firm and then discount value for complexity
- In relative valuation

  In a relative valuation, you may be able to assess the price that the market is charging for complexity:

With the hundred largest market cap firms, for instance:

PBV = 0.65 + 15.31 ROE – 0.55 Beta + 3.04 Expected growth rate – 0.003 # Pages in 10K

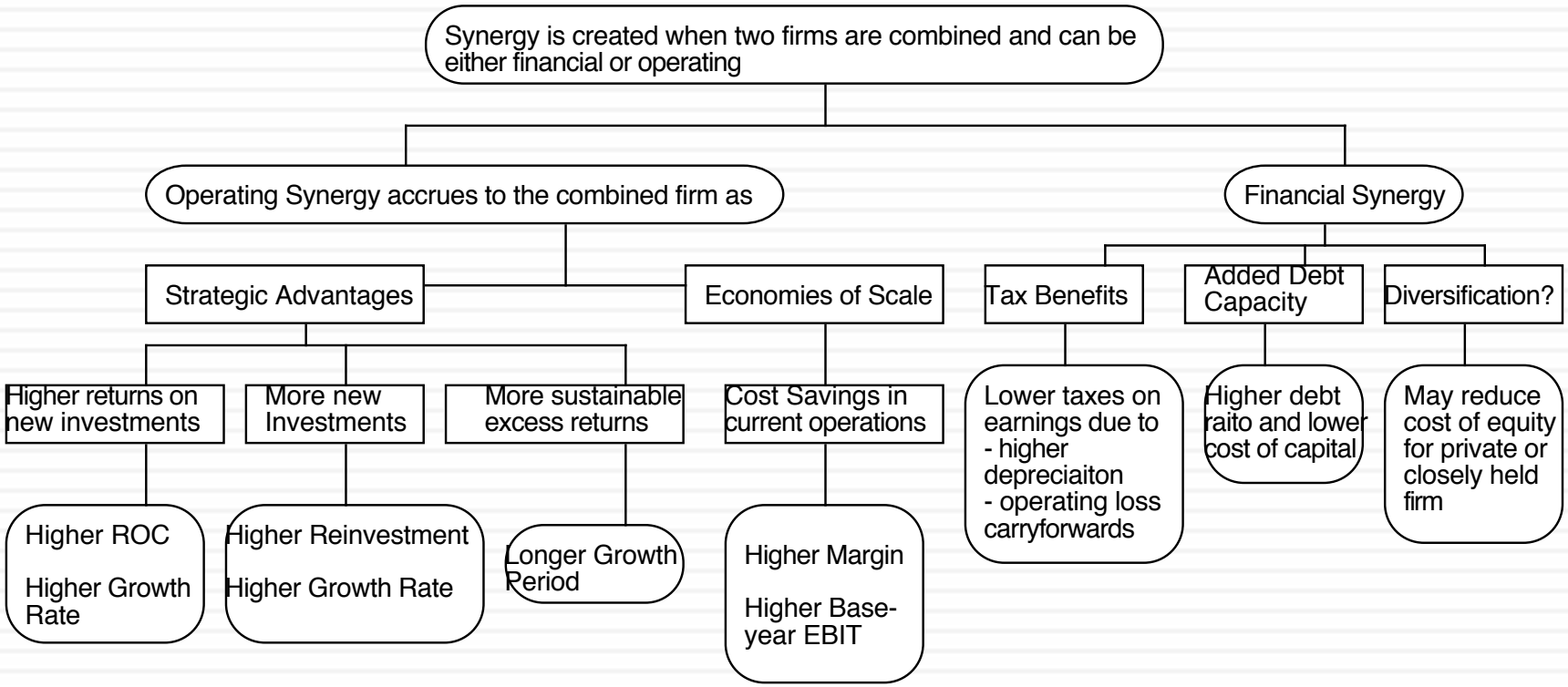
5. The Value of Synergy

- Synergy can be valued. In fact, if you want to pay for it, it should be valued.
- To value synergy, you need to answer two questions:

  (a) What form is the synergy expected to take? Will it reduce costs as a percentage of sales and increase profit margins (as is the case when there are economies of scale)? Will it increase future growth (as is the case when there is increased market power)?)

  (b) When can the synergy be reasonably expected to start affecting cash flows? (Will the gains from synergy show up instantaneously after the takeover? If it will take time, when can the gains be expected to start showing up?)
- If you cannot answer these questions, you need to go back to the drawing board…

Sources of Synergy



Valuing Synergy

(1) the firms involved in the merger are valued independently, by discounting expected cash flows to each firm at the weighted average cost of capital for that firm.

(2) the value of the combined firm, with no synergy, is obtained by adding the values obtained for each firm in the first step.

(3) The effects of synergy are built into expected growth rates and cashflows, and the combined firm is re-valued with synergy.

- Value of Synergy = Value of the combined firm, with synergy - Value of the combined firm, without synergy

Valuing Synergy: P&G + Gillette

	P&G	Gillette	Piglet: No Synergy	Piglet: Synergy	
Free Cashflow to Equity	$5,864.74	$1,547.50	$7,412.24	$7,569.73	Annual operating expenses reduced by $250 million
Growth rate for first 5 years	12%	10%	11.58%	12.50%	Slighly higher growth rate
Growth rate after five years	4%	4%	4.00%	4.00%	
Beta	0.90	0.80	0.88	0.88	
Cost of Equity	7.90%	7.50%	7.81%	7.81%	Value of synergy
Value of Equity	$221,292	$59,878	$281,170	$298,355	**$17,185**

5. Brand name, great management, superb product …Are we short changing the intangibles?

- There is often a temptation to add on premiums for intangibles. Among them are
  - Brand name
  - Great management
  - Loyal workforce
  - Technological prowess
- There are two potential dangers:
  - For some assets, the value may already be in your value and adding a premium will be double counting.
  - For other assets, the value may be ignored but incorporating it will not be easy.

Categorizing Intangibles

	Independent and Cash flow generating intangibles	*Not independent and cash flow generating to the firm*	*No cash flows now but potential for cashflows in future*
Examples	Copyrights, trademarks, licenses, franchises, professional practices (medical, dental)	Brand names, Quality and Morale of work force, Technological expertise, Corporate reputation	Undeveloped patents, operating or financial flexibility (to expand into new products/markets or abandon existing ones)
Valuation approach	Estimate expected cashflows from the product or service and discount back at appropriate discount rate.	• Compare DCF value of firm with intangible with firm without (if you can find one) • Assume that all excess returns of firm are due to intangible. • Compare multiples at which firm trades to sector averages.	Option valuation • Value the undeveloped patent as an option to develop the underlying product. • Value expansion options as call options • Value abandonment options as put options.
Challenges	• Life is usually finite and terminal value may be small. • Cashflows and value may be person dependent (for professional practices)	With multiple intangibles (brand name and reputation for service), it becomes difficult to break down individual components.	• Need exclusivity. • Difficult to replicate and arbitrage (making option pricing models dicey)

Valuing Brand Name

	Coca Cola	With Cott Margins
Current Revenues =	$21,962.00	$21,962.00
Length of high-growth period	10	10
Reinvestment Rate =	50%	50%
Operating Margin (after-tax)	15.57%	5.28%
Sales/Capital (Turnover ratio)	1.34	1.34
Return on capital (after-tax)	20.84%	7.06%
Growth rate during period (g) =	10.42%	3.53%
Cost of Capital during period =	7.65%	7.65%
Stable Growth Period		
Growth rate in steady state =	4.00%	4.00%
Return on capital =	7.65%	7.65%
Reinvestment Rate =	52.28%	52.28%
Cost of Capital =	7.65%	7.65%
Value of Firm =	$79,611.25	$15,371.24

6. Be circumspect about defining debt for cost of capital purposes…

- General Rule: Debt generally has the following characteristics:
  - Commitment to make fixed payments in the future
  - The fixed payments are tax deductible
  - Failure to make the payments can lead to either default or loss of control of the firm to the party to whom payments are due.
- Defined as such, debt should include
  - All interest bearing liabilities, short term as well as long term
  - All leases, operating as well as capital
- Debt should not include
  - Accounts payable or supplier credit

But should consider other potential liabilities when getting to equity value…

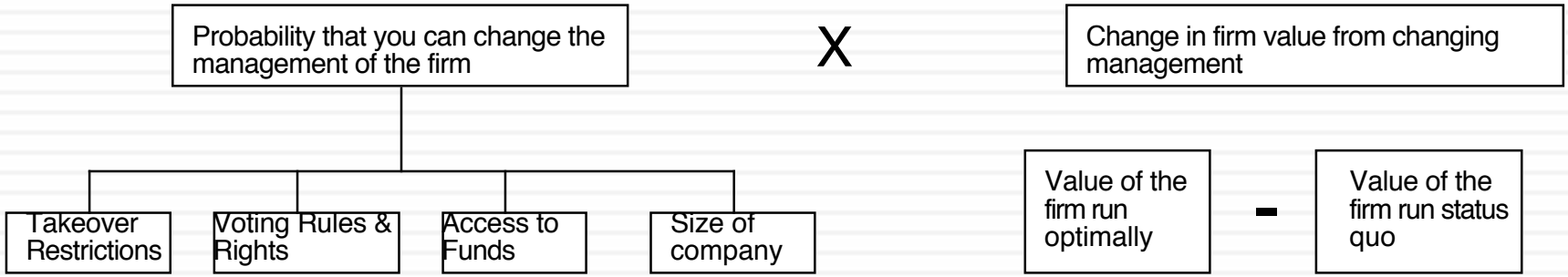
- If you have under funded pension fund or health care plans, you should consider the under funding at this stage in getting to the value of equity.
  - If you do so, you should not double count by also including a cash flow line item reflecting cash you would need to set aside to meet the unfunded obligation.
  - You should not be counting these items as debt in your cost of capital calculations….
- If you have contingent liabilities - for example, a potential liability from a lawsuit that has not been decided - you should consider the expected value of these contingent liabilities
  - Value of contingent liability = Probability that the liability will occur * Expected value of liability

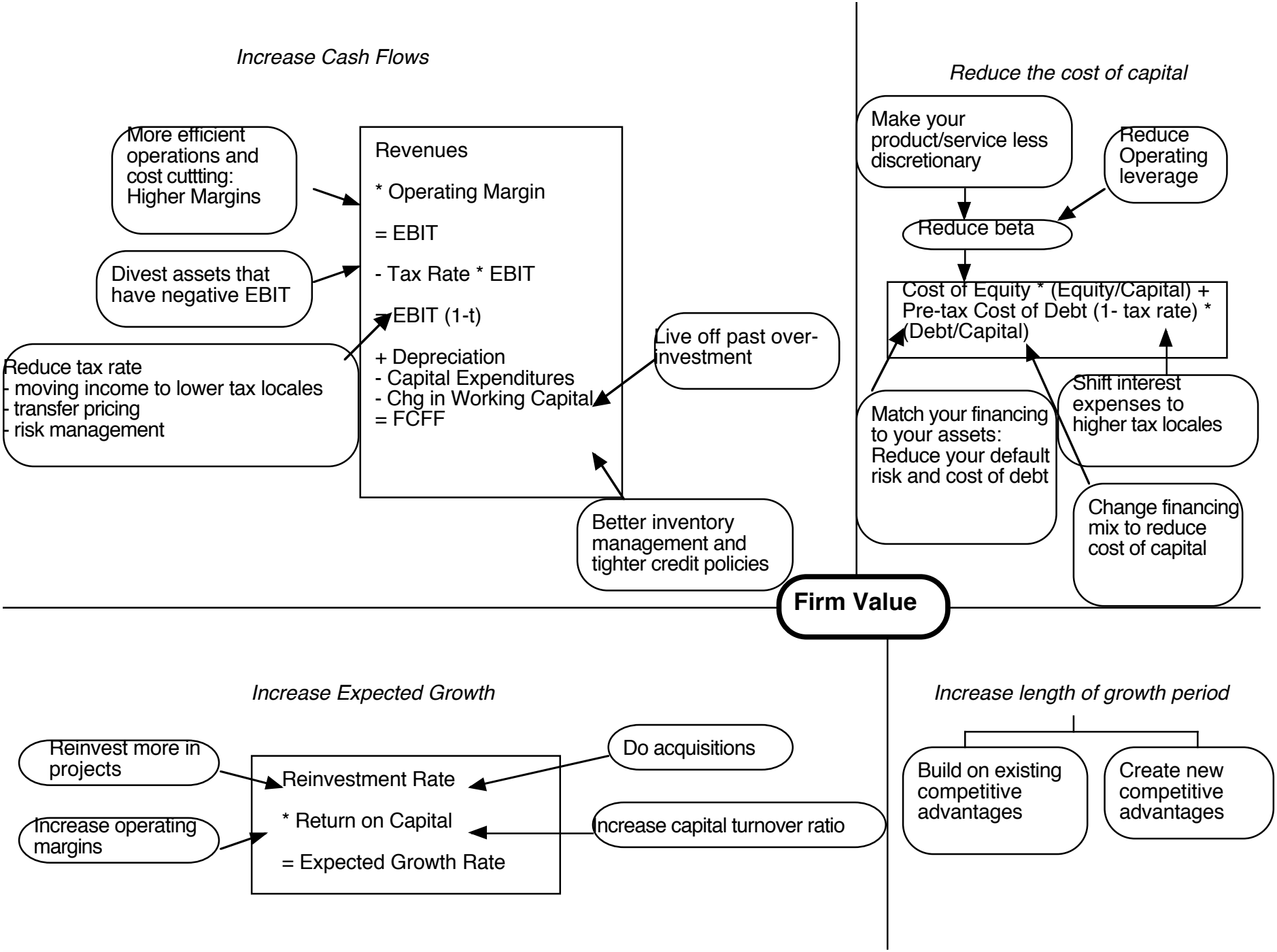
7. The Value of Control

- The value of the control premium that will be paid to acquire a block of equity will depend upon two factors -
  - Probability that control of firm will change: This refers to the probability that incumbent management will be replaced. this can be either through acquisition or through existing stockholders exercising their muscle.
  - Value of Gaining Control of the Company: The value of gaining control of a company arises from two sources - the increase in value that can be wrought by changes in the way the company is managed and run, and the side benefits and perquisites of being in control
  - Value of Gaining Control = Present Value (Value of Company with change in control - Value of company without change in control) + Side Benefits of Control

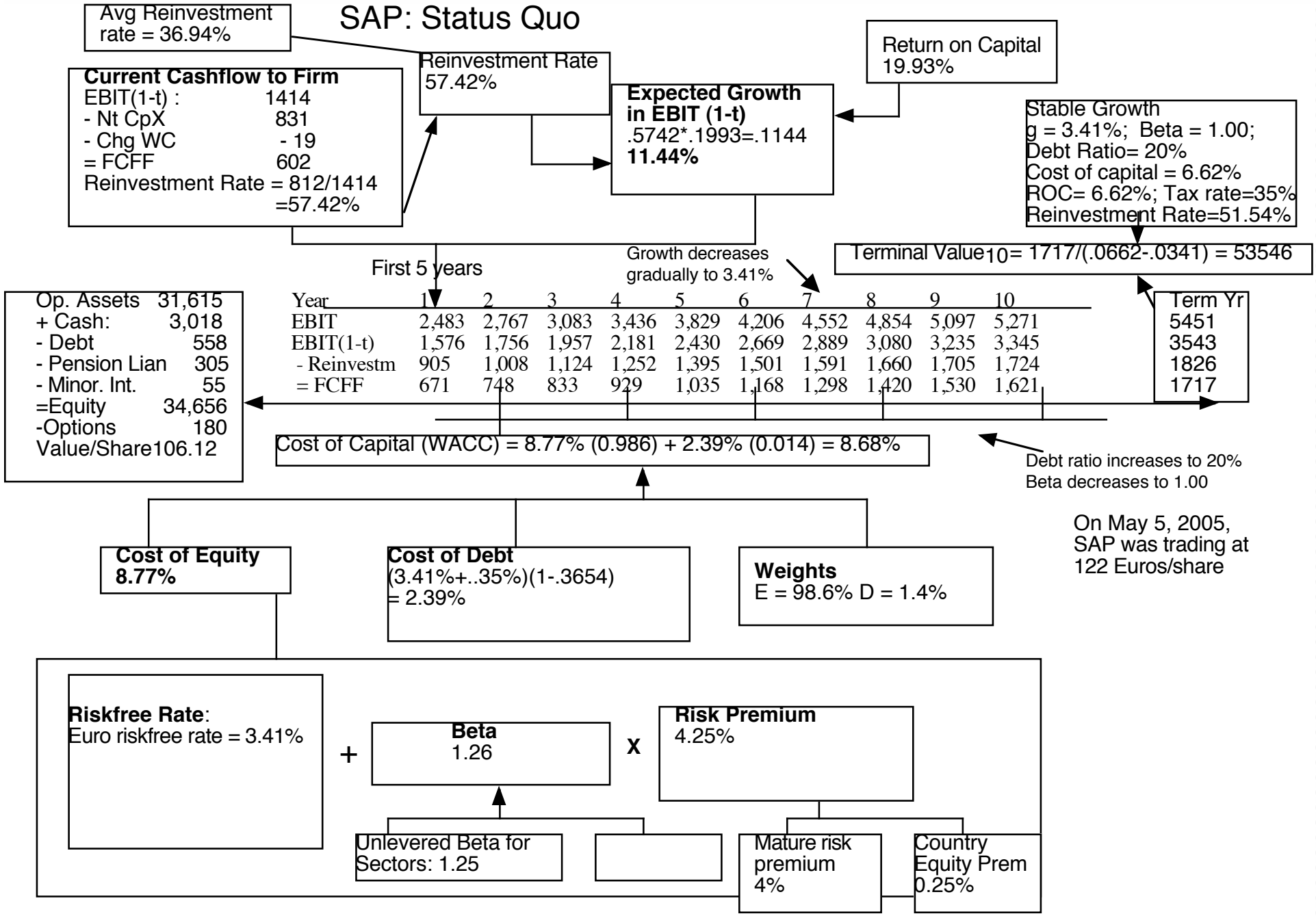
What is control worth?

The Value of Control



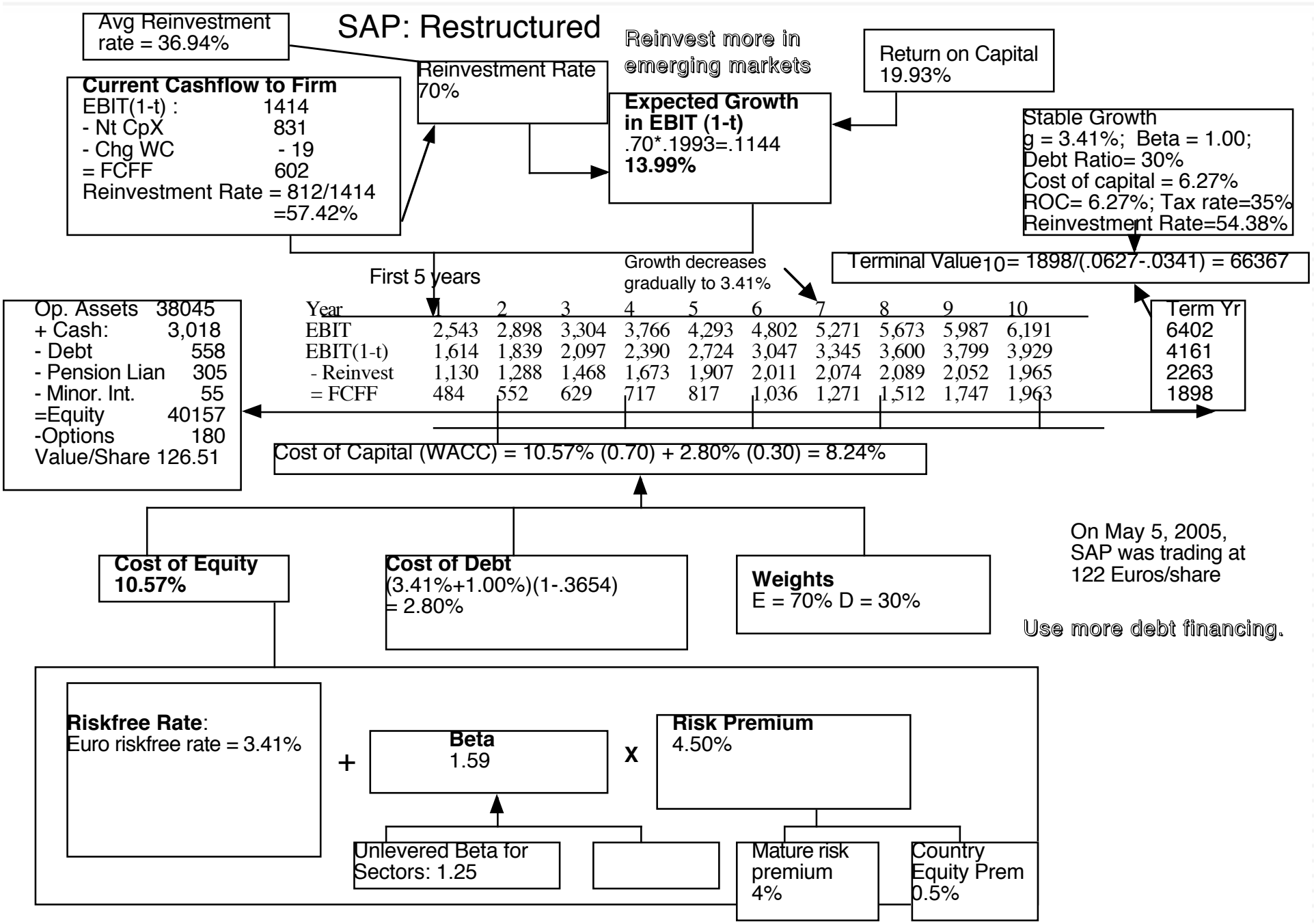

Increase Cash Flows
More efficient operations and cost cuttting: Higher Margins
Divest assets that have negative EBIT
Reduce tax rate
- moving income to lower tax locales
- transfer pricing
- risk management
Revenues
* Operating Margin
= EBIT
- Tax Rate * EBIT
= EBIT (1-t)
+ Depreciation
- Capital Expenditures
- Chg in Working Capital
= FCFF
Live off past over-investment
Better inventory management and tighter credit policies
Reduce the cost of capital
Make your product/service less discretionary
Reduce Operating leverage
Reduce beta
Cost of Equity * (Equity/Capital) + Pre-tax Cost of Debt (1- tax rate) * (Debt/Capital)
Match your financing to your assets: Reduce your default risk and cost of debt
Shift interest expenses to higher tax locales
Change financing mix to reduce cost of capital
Firm Value
Increase Expected Growth
Reinvest more in projects
Increase operating margins
Reinvestment Rate
* Return on Capital
= Expected Growth Rate
Do acquisitions
Increase capital turnover ratio
Increase length of growth period
Build on existing competitive advantages
Create new competitive advantages

SAP: Status Quo

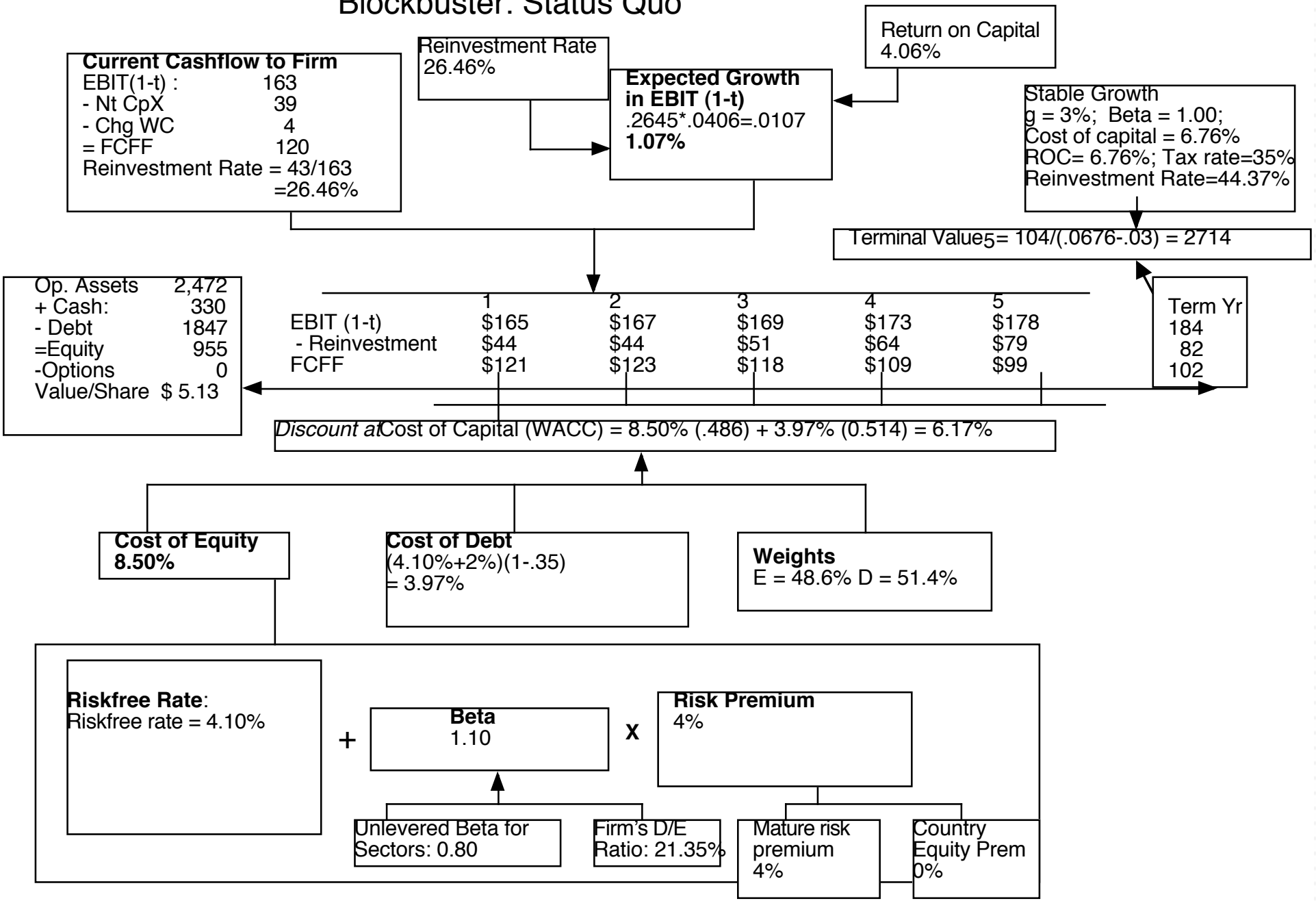


SAP : Optimal Capital Structure

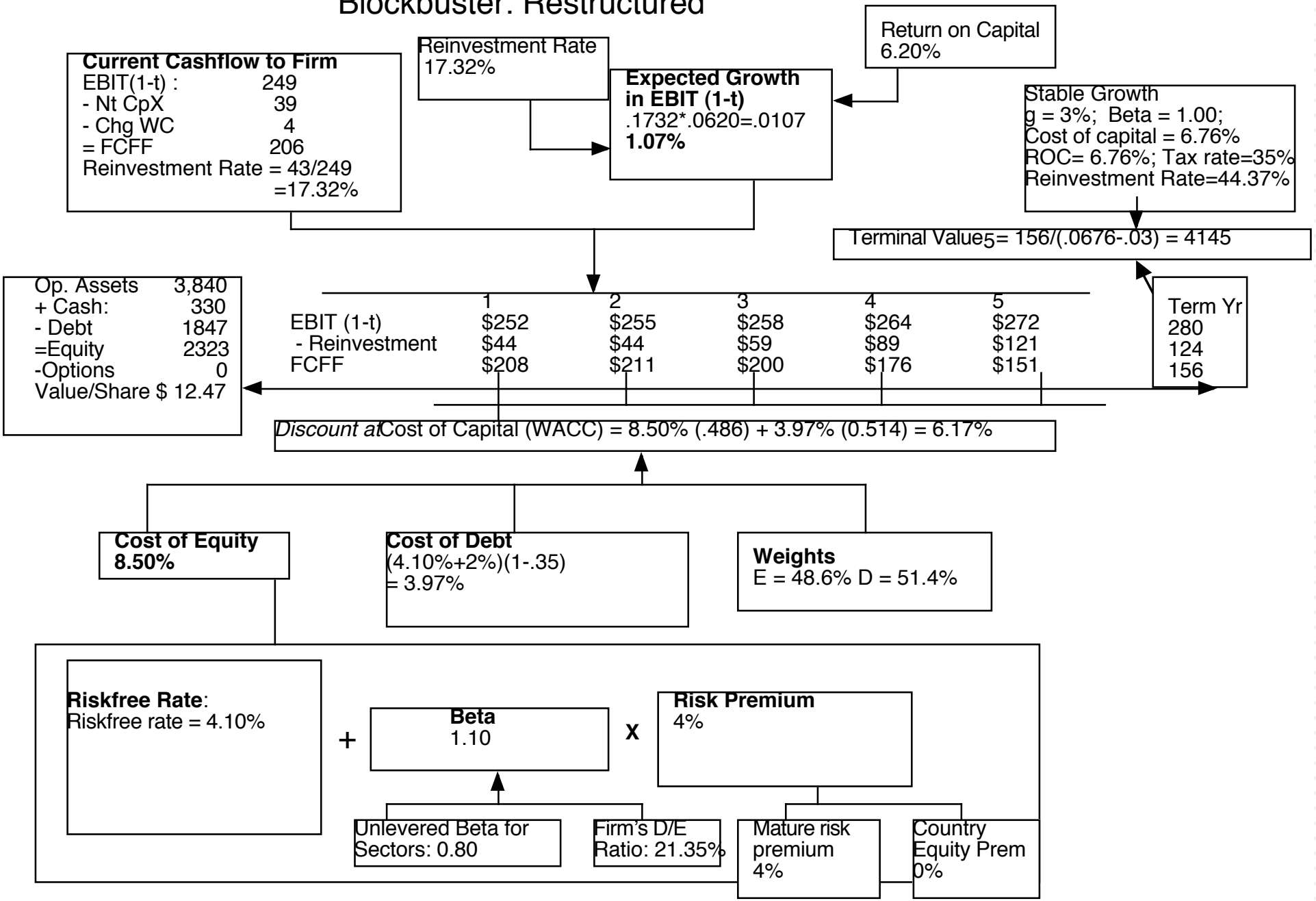
Debt Ratio	Beta	Cost of Equity	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)	WACC	Firm Value (G)
0%	1.25	8.72%	AAA	3.76%	36.54%	2.39%	8.72%	$39,088
10%	1.34	9.09%	AAA	3.76%	36.54%	2.39%	8.42%	$41,480
20%	1.45	9.56%	A	4.26%	36.54%	2.70%	8.19%	$43,567
30%	1.59	10.16%	A-	4.41%	36.54%	2.80%	7.95%	$45,900
40%	1.78	10.96%	CCC	11.41%	36.54%	7.24%	9.47%	$34,043
50%	2.22	12.85%	C	15.41%	22.08%	12.01%	12.43%	$22,444
60%	2.78	15.21%	C	15.41%	18.40%	12.58%	13.63%	$19,650
70%	3.70	19.15%	C	15.41%	15.77%	12.98%	14.83%	$17,444
80%	5.55	27.01%	C	15.41%	13.80%	13.28%	16.03%	$15,658
90%	11.11	50.62%	C	15.41%	12.26%	13.52%	17.23%	$14,181


SAP: Restructured
Avg Reinvestment rate = 36.94%
Reinvestment Rate 70%
Reinvest more in emerging markets
Return on Capital 19.93%
Current Cashflow to Firm
EBIT(1-t) : 1414
- Nt CpX 831
- Chg WC - 19
= FCFF 602
Reinvestment Rate = 812/1414 =57.42%
Expected Growth in EBIT (1-t)
.70*.1993=.1144
13.99%
Stable Growth
g = 3.41%; Beta = 1.00;
Debt Ratio= 30%
Cost of capital = 6.27%
ROC= 6.27%; Tax rate=35%
Reinvestment Rate=54.38%
First 5 years
Growth decreases gradually to 3.41%
Terminal Value10= 1898/(.0627-.0341) = 66367
Op. Assets 38045
+ Cash: 3,018
- Debt 558
- Pension Lian 305
- Minor. Int. 55
=Equity 40157
-Options 180
Value/Share 126.51
Year 1 2 3 4 5 6 7 8 9 10 Term Yr
EBIT 2,543 2,898 3,304 3,766 4,293 4,802 5,271 5,673 5,987 6,191 6402
EBIT(1-t) 1,614 1,839 2,097 2,390 2,724 3,047 3,345 3,600 3,799 3,929 4161
- Reinvest 1,130 1,288 1,468 1,673 1,907 2,011 2,074 2,089 2,052 1,965 2263
= FCFF 484 552 629 717 817 1,036 1,271 1,512 1,747 1,963 1898
Cost of Capital (WACC) = 10.57% (0.70) + 2.80% (0.30) = 8.24%
Cost of Equity 10.57%
Cost of Debt (3.41%+1.00%)(1-.3654) = 2.80%
Weights E = 70% D = 30%
On May 5, 2005, SAP was trading at 122 Euros/share
Use more debt financing.
Riskfree Rate: Euro riskfree rate = 3.41%
+
Beta 1.59
x
Risk Premium 4.50%
Unlevered Beta for Sectors: 1.25
Mature risk premium 4%
Country Equity Prem 0.5%

Blockbuster: Status Quo



Blockbuster: Restructured



Where control matters…

- In publicly traded firms, control is a factor
  - In the pricing of every publicly traded firm, since a portion of every stock can be attributed to the market's views about control.
  - In acquisitions, it will determine how much you pay as a premium for a firm to control the way it is run.
  - When shares have voting and non-voting shares, the value of control will determine the price difference.
- In private firms, control usually becomes an issue when you consider how much to pay for a private firm.
  - You may pay a premium for a badly managed private firm because you think you could run it better.
  - The value of control is directly related to the discount you would attach to a minority holding (<50%) as opposed to a majority holding.
  - The value of control also becomes a factor in how much of an ownership stake you will demand in exchange for a private equity investment.

Value of stock in a publicly traded firm

- When a firm is badly managed, the market still assesses the probability that it will be run better in the future and attaches a value of control to the stock price today:

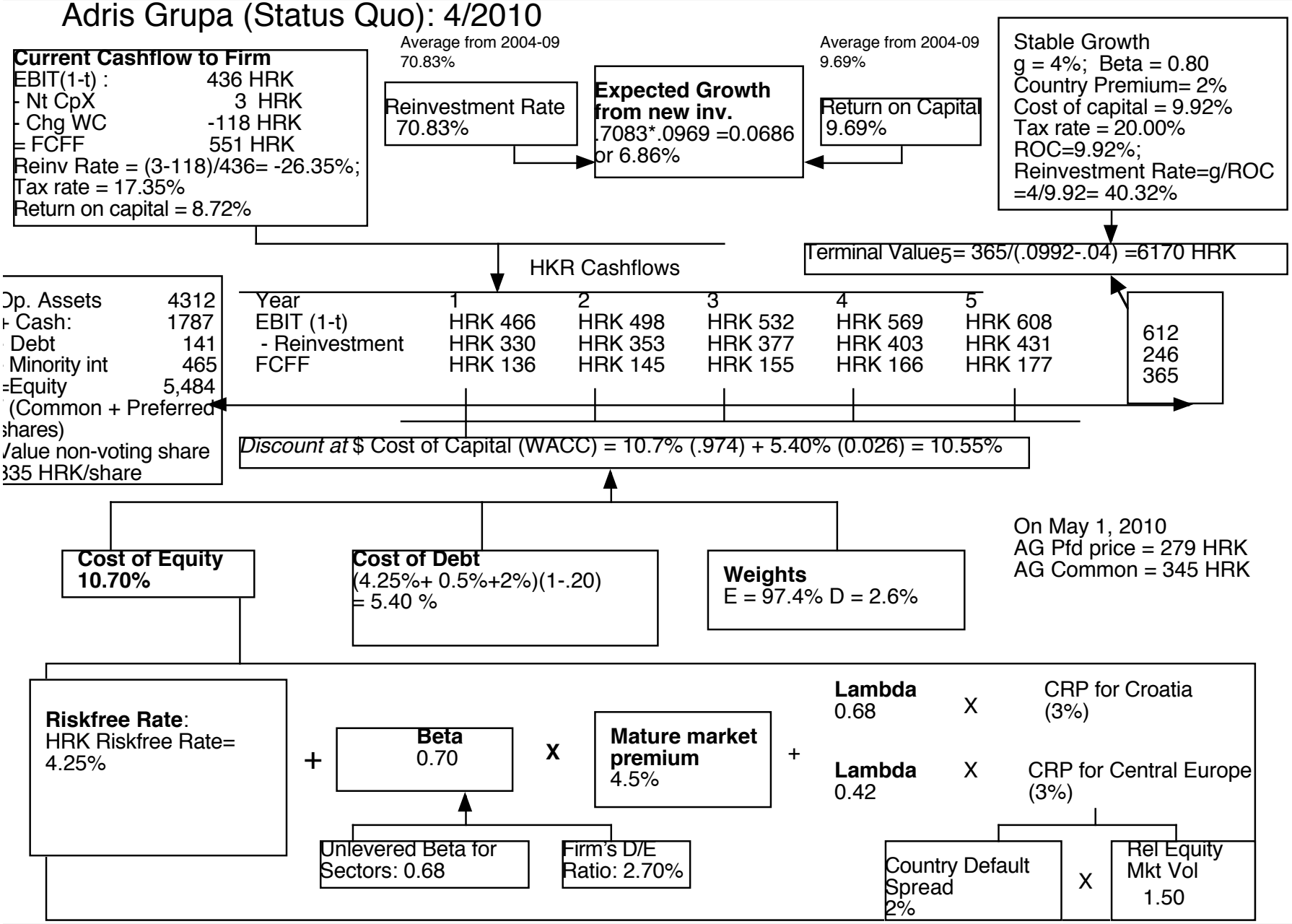
$$\text{Value per share} = \frac{\text{Status Quo Value} + \text{Probability of control change (Optimal - Status Quo Value)}}{\text{Number of shares outstanding}}$$

- With voting shares and non-voting shares, a disproportionate share of the value of control will go to the voting shares. In the extreme scenario where non-voting shares are completely unprotected:

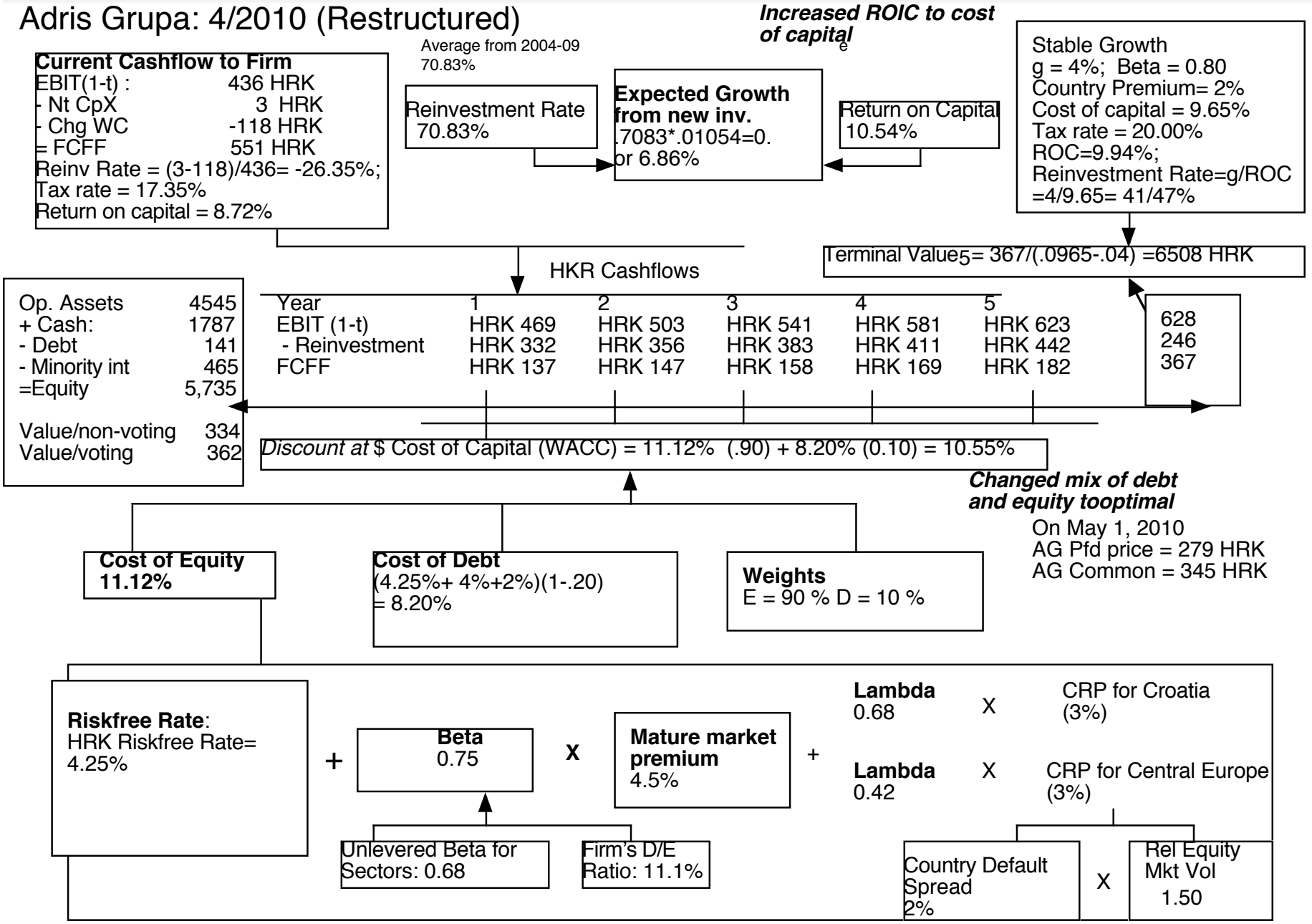
$$\text{Value per non-voting share} = \frac{\text{Status Quo Value}}{\#\ \text{Voting Shares} + \#\ \text{Non-voting shares}}$$

$$\text{Value per voting share} = \text{Value of non-voting share} + \frac{\text{Probability of control change (Optimal - Status Quo Value)}}{\#\ \text{Voting Shares}}$$

Adris Grupa (Status Quo): 4/2010

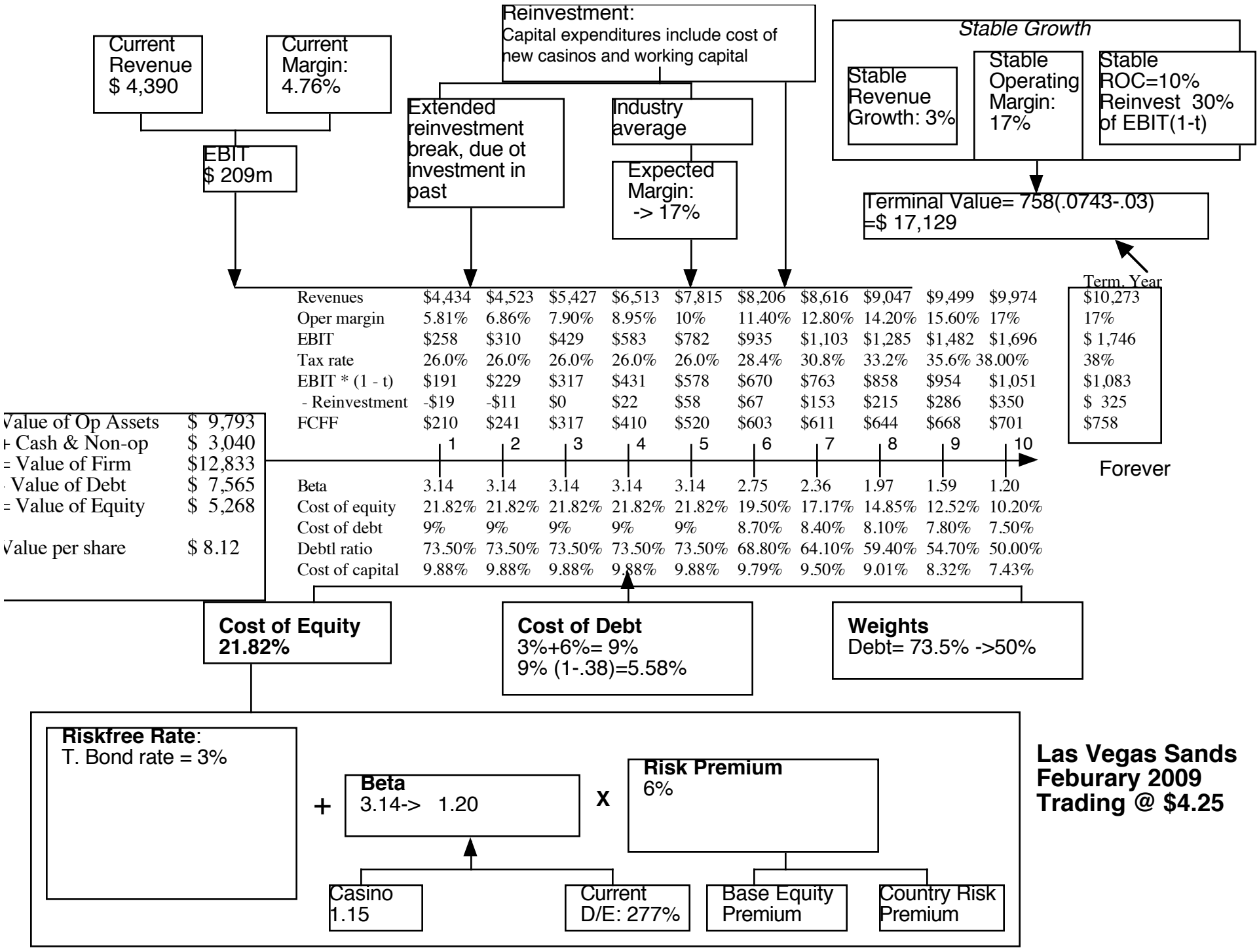


Adris Grupa: 4/2010 (Restructured)



8. Distress and the Going Concern Assumption

- Traditional valuation techniques are built on the assumption of a going concern, i.e., a firm that has continuing operations and there is no significant threat to these operations.
  - In discounted cashflow valuation, this going concern assumption finds its place most prominently in the terminal value calculation, which usually is based upon an infinite life and ever-growing cashflows.
  - In relative valuation, this going concern assumption often shows up implicitly because a firm is valued based upon how other firms - most of which are healthy - are priced by the market today.
- When there is a significant likelihood that a firm will not survive the immediate future (next few years), traditional valuation models may yield an over-optimistic estimate of value.


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

The Distress Factor

- 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:

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

- Solving for the probability of bankruptcy, we get:
- $\pi_{Distress}$ = 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

9. Equity to Employees: Effect on Value

- In recent years, firms have turned to giving employees (and especially top managers) equity option packages as part of compensation. These options are usually
  - Long term
  - At-the-money when issued
  - On volatile stocks
- Are they worth money? And if yes, who is paying for them?
- Two key issues with employee options:
  - How do options granted in the past affect equity value per share today?
  - How do expected future option grants affect equity value today?

Equity Options and Value

- Options outstanding
  - Step 1: List all options outstanding, with maturity, exercise price and vesting status.
  - Step 2: Value the options, taking into accoutning dilution, vesting and early exercise considerations
  - Step 3: Subtract from the value of equity and divide by the actual number of shares outstanding (not diluted or partially diluted).
- Expected future option and restricted stock issues
  - Step 1: Forecast value of options that will be granted each year as percent of revenues that year. (As firm gets larger, this should decrease)
  - Step 2: Treat as operating expense and reduce operating income and cash flows
  - Step 3: Take present value of cashflows to value operations or equity.

10. Analyzing the Effect of Illiquidity on Value

- Investments which are less liquid should trade for less than otherwise similar investments which are more liquid.
- The size of the illiquidity discount should vary across firms and also across time. The conventional practice of relying upon studies of restricted stocks or IPOs will fail sooner rather than later.
  - Restricted stock studies are based upon small samples of troubled firms
  - The discounts observed in IPO studies are too large for these to be arms length transactions. They just do not make sense.

Illiquidity Discounts from Bid-Ask Spreads

- Using data from the end of 2000, for instance, we regressed the bid-ask spread against annual revenues, a dummy variable for positive earnings (DERN: 0 if negative and 1 if positive), cash as a percent of firm value and trading volume.
- Spread = 0.145 – 0.0022 ln (Annual Revenues) -0.015 (DERN) – 0.016 (Cash/Firm Value) – 0.11 ($ Monthly trading volume/ Firm Value)
- Consider a private firm with revenues of 4 5 million, positive earnings and a cash balance that is 8% of revenues. The synthetic bid-ask spread for this firm would be:
- Spread = 0.145 – 0.0022 ln (Annual Revenues) -0.015 (DERN) – 0.016 (Cash/Firm Value) – 0.11 ($ Monthly trading volume/ Firm Value)
- = 0.145 – 0.0022 ln (5) -0.015 (1) – 0.016 (.08) – 0.11 (0) = 12.52%
- Based on this approach, we would estimate an illiquidity discount of 12.52% for Kristin Kandy.