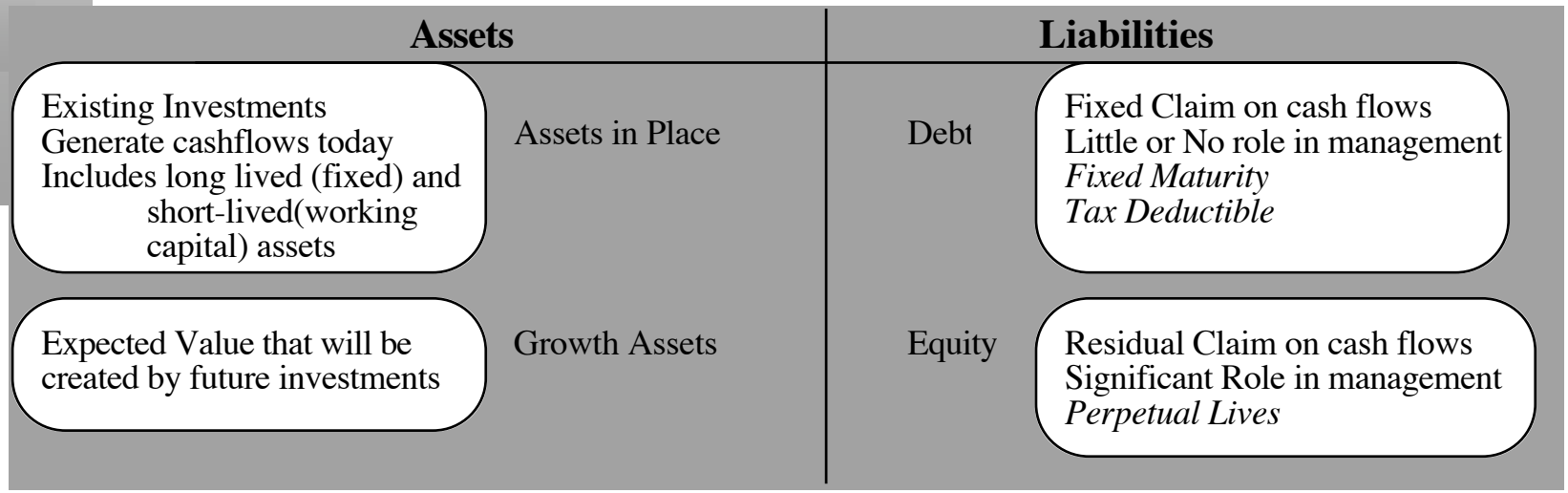
Debt and Value: Beyond Miller-Modigliani

Aswath Damodaran

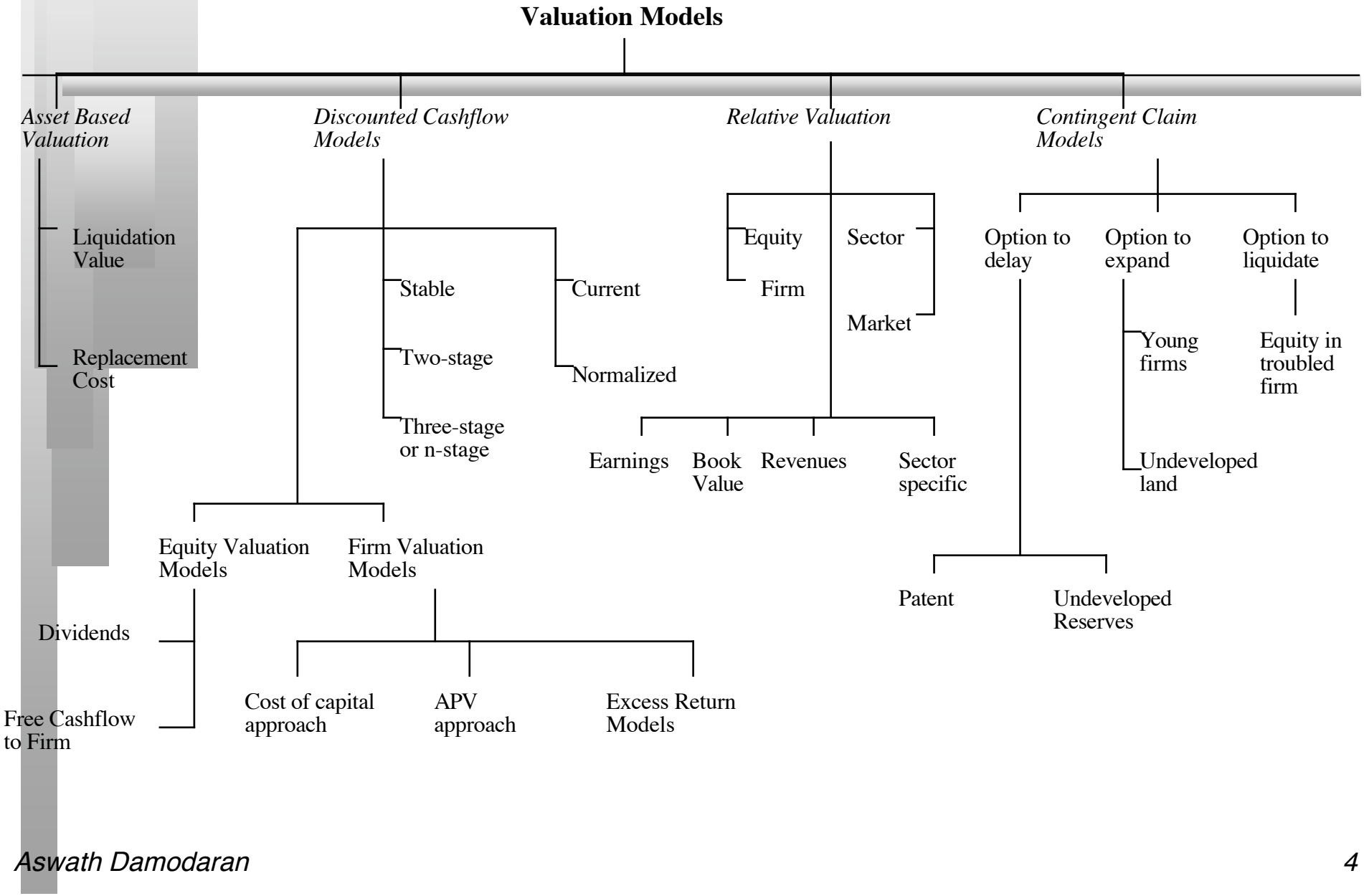
Stern School of Business

The fundamental question: Does the mix of debt and equity affect the value of a business?



Approaches to Valuation

- **Discounted cashflow valuation**, relates the value of an asset to the present value of expected future cashflows on that asset.
- **Relative valuation**, estimates the value of an asset by looking at the pricing of 'comparable' assets relative to a common variable like earnings, cashflows, book value or sales.
- **Contingent claim valuation**, uses option pricing models to measure the value of assets that share option characteristics.


Valuation Models
Asset Based Valuation
Liquidation Value
Replacement Cost
Discounted Cashflow Models
Equity Valuation Models
Dividends
Free Cashflow to Firm
Firm Valuation Models
Cost of capital approach
APV approach
Excess Return Models
Stable
Two-stage
Three-stage or n-stage
Current
Normalized
Relative Valuation
Equity
Firm
Sector
Market
Earnings
Book Value
Revenues
Sector specific
Contingent Claim Models
Option to delay
Patent
Undeveloped Reserves
Option to expand
Young firms
Undeveloped land
Option to liquidate
Equity in troubled firm

Discounted Cashflow Valuation: Basis for Approach

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

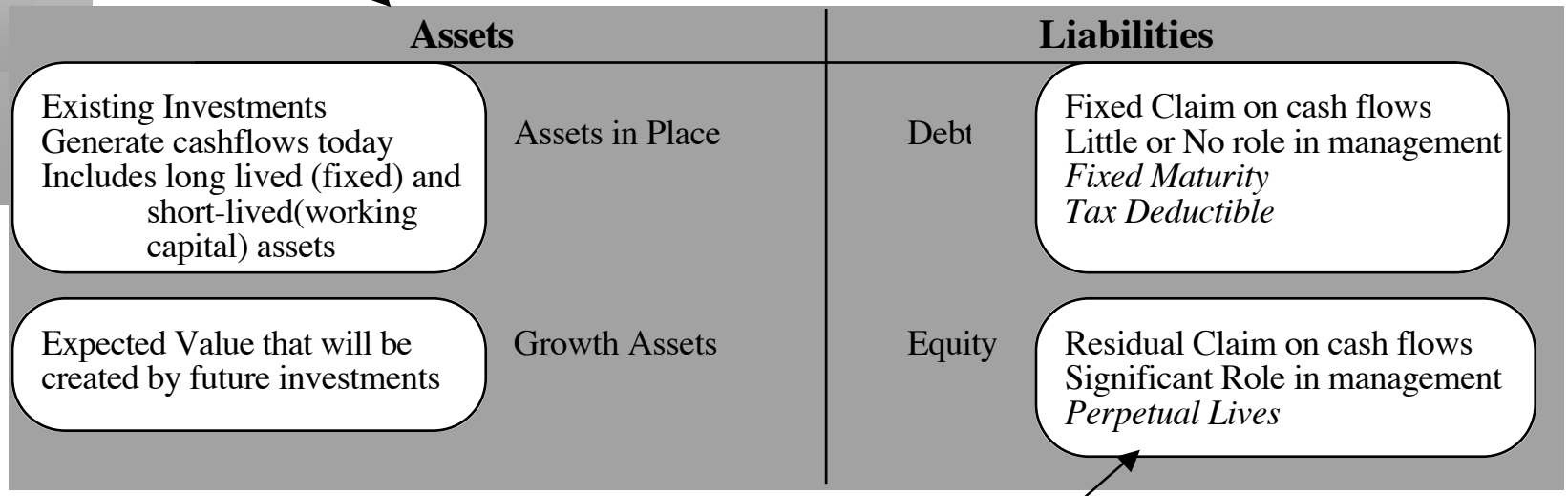
where CF_t is the expected cash flow in period t, r is the discount rate appropriate given the riskiness of the cash flow and n is the life of the asset.

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

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

DCF Choices: Equity Valuation versus Firm Valuation

Firm Valuation: Value the entire business

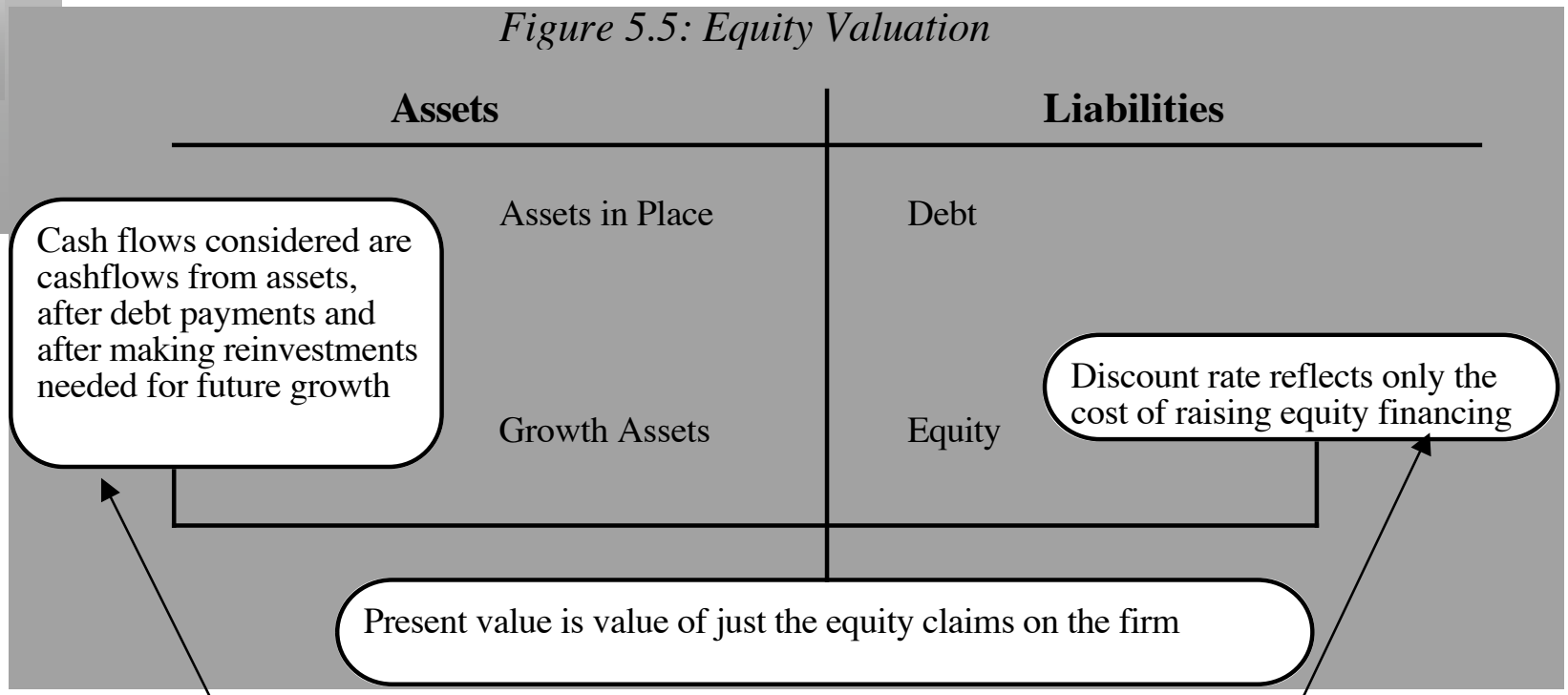


Equity valuation: Value just the equity claim in the business

Debt and Value in Equity Valuation

Will the value of equity per share increase as debt increases?

Figure 5.5: Equity Valuation



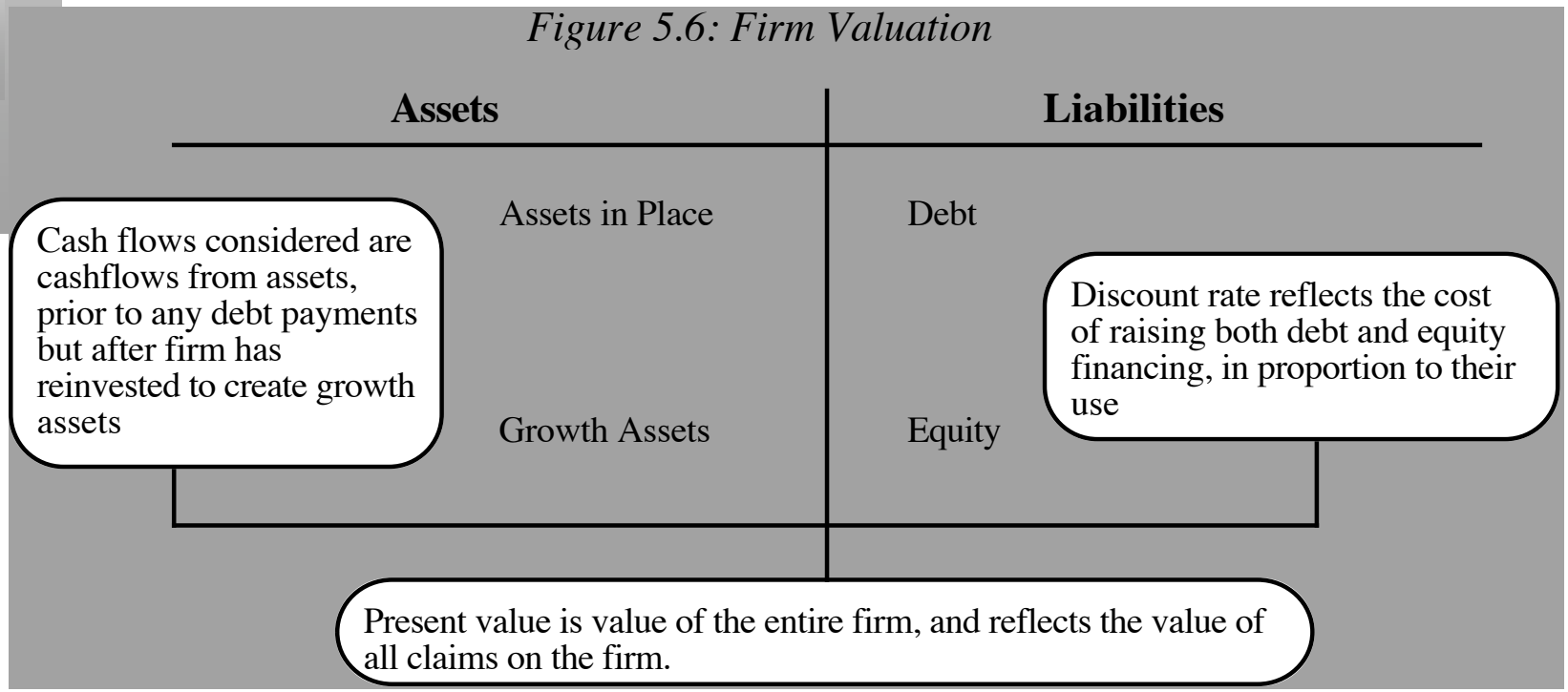
Changing debt will change cash flows to equity

As debt increases, equity will become riskier and cost of equity will go up.

Debt and Value in Firm Valuation

Will the value of operating assets increase as debt goes up?

Figure 5.6: Firm Valuation



Cash flows are before debt payments; Should not be affected by debt (or should they?)

Effects of debt show up in cost of capital. If the cost of capital goes down, value should increase.

Adjusted Present Value Model

- In the adjusted present value approach, the value of the firm is written as the sum of the value of the firm without debt (the unlevered firm) and the effect of debt on firm value
- Firm Value = Unlevered Firm Value + (Tax Benefits of Debt - Expected Bankruptcy Cost from the Debt)
  - The unlevered firm value can be estimated by discounting the free cashflows to the firm at the unlevered cost of equity
  - The tax benefit of debt reflects the present value of the expected tax benefits. In its simplest form,

    Tax Benefit = Tax rate * Debt
  - The expected bankruptcy cost is a function of the probability of bankruptcy and the cost of bankruptcy (direct as well as indirect) as a percent of firm value.

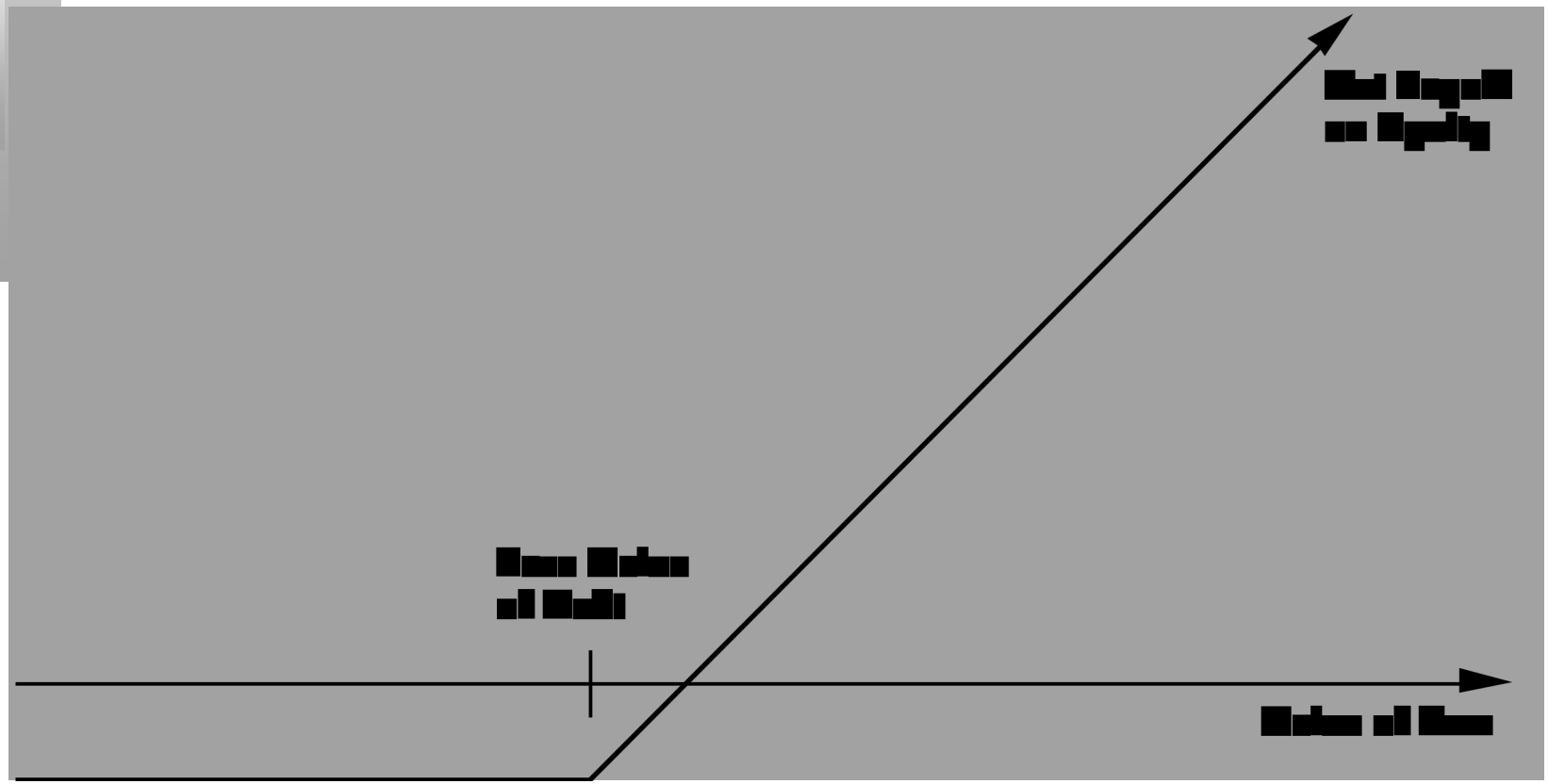
Excess Return Models

- You can present any discounted cashflow model in terms of excess returns, with the value being written as:
  - Value = Capital Invested + Present value of excess returns on current investments + Present value of excess returns on future investments
  - Excess returns = Return on capital - Cost of capital
- In excess returns models, the effect of debt has to show up in the cost of capital, with the cost of capital decreasing as a firm moves towards its optimal debt ratio.

Leverage in Relative Valuation

- In relative valuation, we value an asset based upon how similar assets are priced. In practice, this translates into the use of a multiple and comparable firms.
- In the form in which it is practiced currently, leverage is either ignored or considered as an after thought in valuation.
  - *Benign neglect*: Analysts routinely compare enterprise value to EBITDA or revenue multiples across companies with vastly different leverage. In fact, many LBO analysts value target firms using EV multiples of comparable firms. Implicitly, they are assuming that financial leverage does not affect the level of these multiples.
  - *The manic depressive*: Analysts who use equity multiples (such as PE ratios) either reward firms with additional debt (because they tend to have fewer shares outstanding and better per share values) in good times or punish them for being riskier (because they have more debt) in bad times.

Equity as an option… to liquidate…



A basic proposition about debt and value

- For debt to affect value, there have to be tangible benefits and costs associated with its use (instead of using equity).
  - If the benefits exceed the costs, there will be a gain in value to equity investors from the use of debt.
  - If the benefits exactly offset the costs, debt will not affect value
  - If the benefits are less than the costs, increasing debt will lower value

Debt: The Basic Trade Off

Advantages of Borrowing

1. Tax Benefit:

Higher tax rates --> Higher tax benefit

2. Added Discipline:

Greater the separation between managers and stockholders --> Greater the benefit

Disadvantages of Borrowing

1. Bankruptcy Cost:

Higher business risk --> Higher Cost

2. Agency Cost:

Greater the separation between stock-holders & lenders --> Higher Cost

3. Loss of Future Financing Flexibility:

Greater the uncertainty about future financing needs --> Higher Cost

A Hypothetical Scenario

(a) There are no taxes

(b) Managers have stockholder interests at hear and do what's best for stockholders.

(c) No firm ever goes bankrupt

(d) Equity investors are honest with lenders; there is no subterfuge or attempt to find loopholes in loan agreements

(e) Firms know their future financing needs with certainty

What happens to the trade off between debt and equity? How much should a firm borrow?

The Miller-Modigliani Theorem

- In an environment, where there are no taxes, default risk or agency costs, capital structure is irrelevant.
- The value of a firm is independent of its debt ratio and the cost of capital will remain unchanged as the leverage changes.

But here is the real world…

- In a world with taxes, default risk and agency costs, it is no longer true that debt and value are unrelated.
- In fact, increasing debt can increase the value of some firms and reduce the value of others.
- For the same firm, debt can increase value up to a point and decrease value beyond that point.

Tools for assessing the effects of debt

- The Cost of Capital Approach: The optimal debt ratio is the one that minimizes the cost of capital for a firm.
- The Adjusted Present Value Approach: The optimal debt ratio is the one that maximizes the overall value of the firm.
- The Sector Approach: The optimal debt ratio is the one that brings the firm closes to its peer group in terms of financing mix.
- The Life Cycle Approach: The optimal debt ratio is the one that best suits where the firm is in its life cycle.

I. The Cost of Capital Approach

- Value of a Firm = Present Value of Cash Flows to the Firm, discounted back at the cost of capital.
- If the cash flows to the firm are held constant, and the cost of capital is minimized, the value of the firm will be maximized.

Measuring Cost of Capital

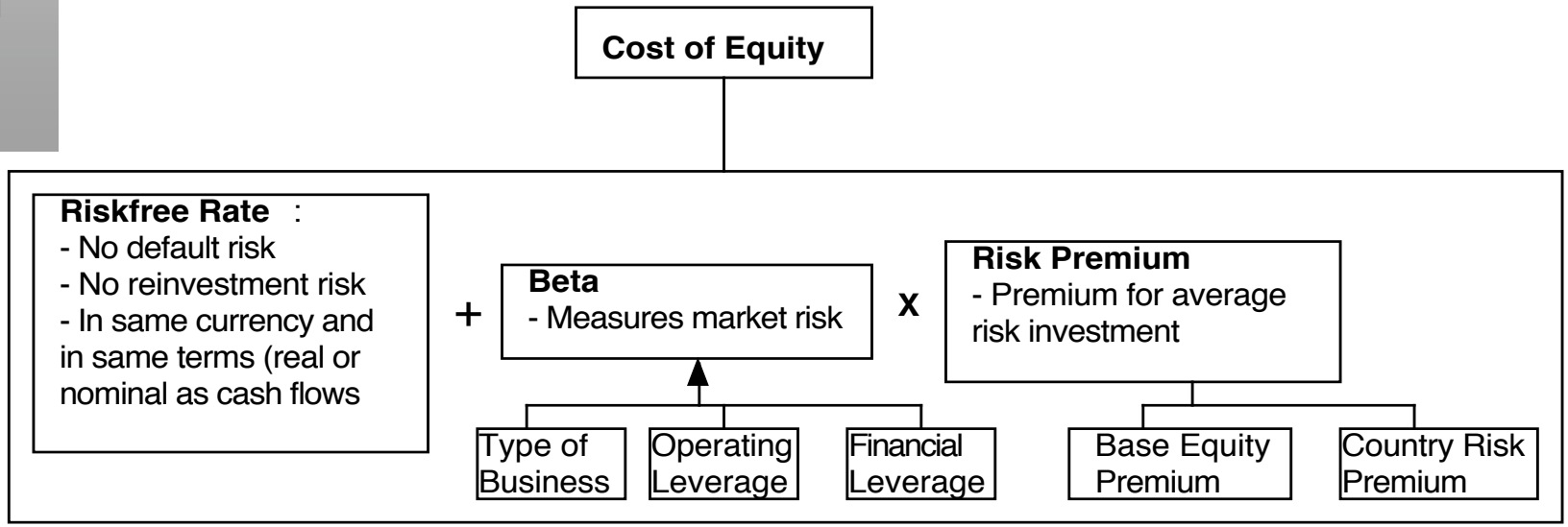
- It will depend upon:
  - (a) the components of financing: Debt, Equity or Preferred stock
  - (b) the cost of each component
- In summary, the cost of capital is the cost of each component weighted by its relative market value.

WACC = Cost of Equity (Equity / (Debt + Equity)) + After-tax Cost of debt (Debt/(Debt + Equity))

What is debt...

- 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.
- Using this principle, you should include the following in debt
  - All interest bearing debt, short as well as long term
  - The present value of operating lease commitments

Estimating the Cost of Equity



What is the riskfree rate?

- On a riskfree asset, the actual return is equal to the expected return. Therefore, there is no variance around the expected return.
- For an investment to be riskfree, i.e., to have an actual return be equal to the expected return, two conditions have to be met –
  - There has to be no default risk, which generally implies that the security has to be issued by the government. Note, however, that not all governments can be viewed as default free.
  - There can be no uncertainty about reinvestment rates, which implies that it is a zero coupon security with the same maturity as the cash flow being analyzed.

Risk Premiums: Historical versus Implied..

- It is standard practice to use historical premiums as forward looking premiums. :

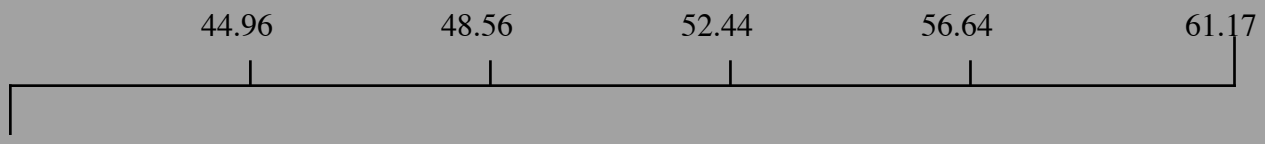
	Arithmetic average		*Geometric Average*	
Historical Period	Stocks - T.Bills	Stocks - T.Bonds	Stocks - T.Bills	Stocks - T.Bonds
1928-2005	7.83%	5.95%	6.47%	4.80%
1964-2005	5.52%	4.29%	4.08%	3.21%
1994-2005	8.80%	7.07%	5.15%	3.76%

- An alternative is to back out the premium from market prices:

In 2005, dividends & stock buybacks were 3.34% of the index, generating 41.63.in cashflows

Analyst estimate of growth in net income for S&P 500 over next 5 years = 8%

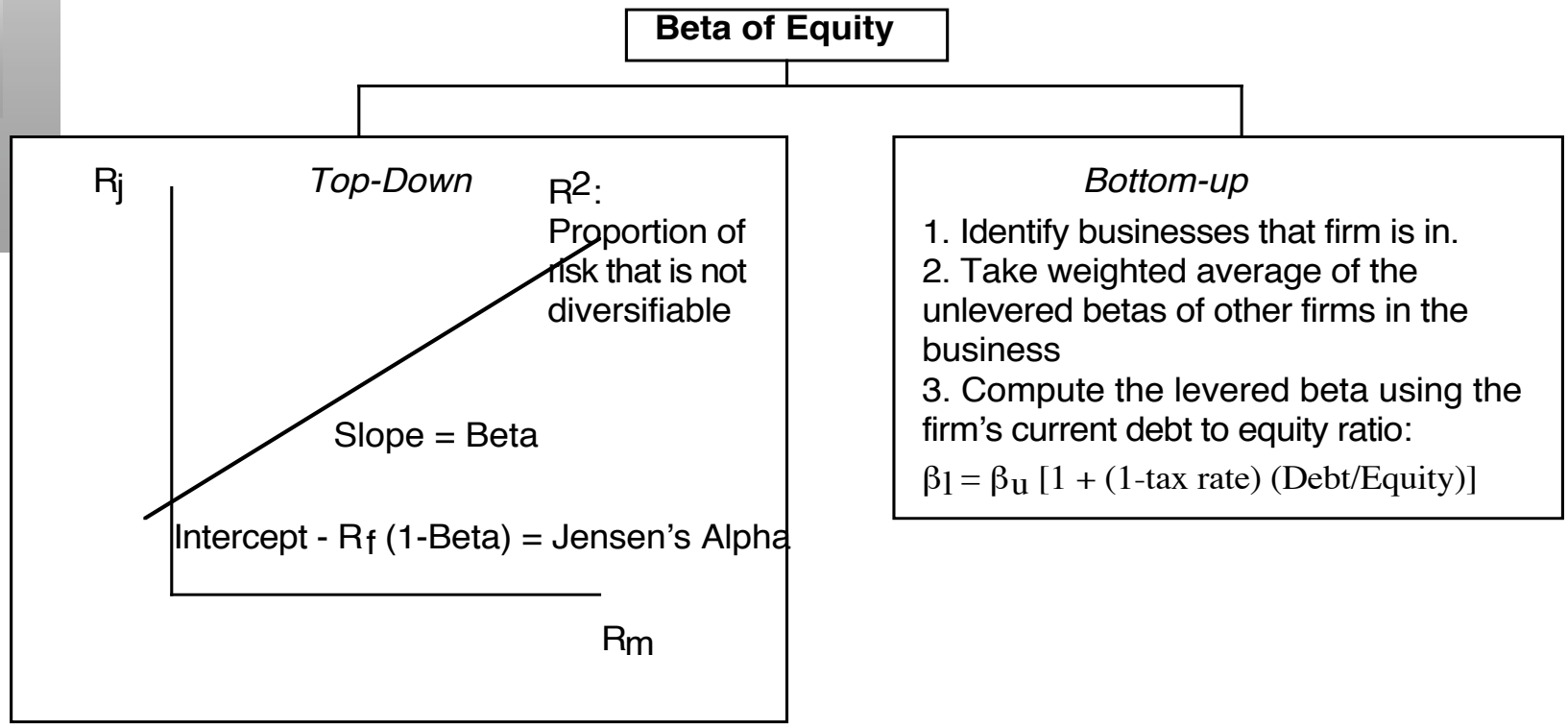
After year 5, we will assume that earnings on the index will grow at 4.39%, the same rate as the entire economy



January 1, 2006
S&P 500 is at 1248.24

To get a PV of 1248.24, you need a discount rate of 8.47%.
Implied equity risk premium = 8.47% - 4.39% = 4.08%

Beta: Top-down versus Bottom-up



A Regression Beta for Disney…

<HELP> for explanation. N166 Equity BETA

HISTORICAL BETA

Number of points may be insufficient for an accurate beta.

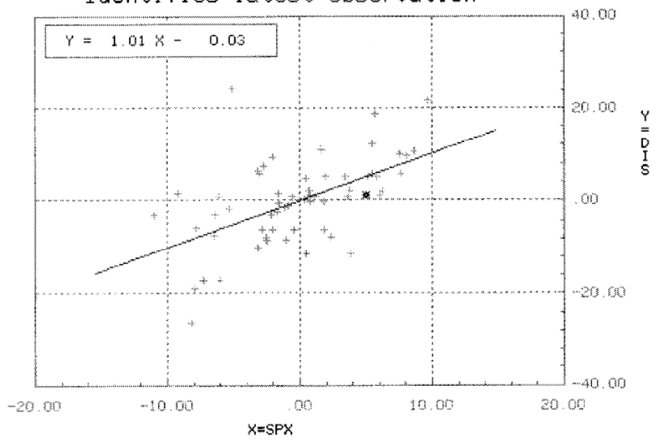
DIS US Equity — THE WALT DISNEY CO.

Relative Index SPX — S&P 500 INDEX

*Identifies latest observation

Period M Monthly
Range 1/29/99 To 12/31/03
Market T Trade

ADJ BETA	1.01
RAW BETA	1.01
Alpha(Intercept)	-0.03
R2 (Correlation)	0.29
Std Dev of Error	7.95
Std Error of Beta	0.21
Number of Points	59



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

Disney's bottom up beta

$$\text{EV/Sales} = \frac{\text{(Market Value of Equity + Debt - Cash)}}{\text{Sales}}$$

Business	*Disney's Revenues*	*EV/Sales*	*Estimated Value*	*Firm Value Proportion*	*Unlevered beta*
Media Networks	$10,941	3.41	$37,278.62	49.25%	1.0850
Parks and Resorts	$6,412	2.37	$15,208.37	20.09%	0.9105
Studio Entertainment	$7,364	2.63	$19,390.14	25.62%	1.1435
Consumer Products	$2,344	1.63	$3,814.38	5.04%	1.1353
Disney	$27,061		$75,691.51	100.00%	1.0674

Disney's Cost of Equity

Business	*Unlevered Beta*	*D/E Ratio*	*Levered Beta*	*Cost of Equity*
Media Networks	1.0850	26.62%	1.2661	10.10%
Parks and Resorts	0.9105	26.62%	1.0625	9.12%
Studio Entertainment	1.1435	26.62%	1.3344	10.43%
Consumer Products	1.1353	26.62%	1.3248	10.39%
Disney	1.0674	26.62%	1.2456	10.00%

What the cost of debt is and is not..

- The cost of debt is
  - The rate at which the company can borrow long term today
  - Composed of the riskfree rate and a default spread
  - Corrected for the tax benefit it gets for interest payments.

    Cost of debt = k_d = Long Term Borrowing Rate(1 - Tax rate)
  - Which tax rate should you use?
- The cost of debt is not
  - the interest rate at which the company obtained the debt it has on its books.

Estimating the Default Spread

- The most common approach that is used to estimate the default spread is to use a company's rating and estimate a spread based upon the rating.
- The problems with this approach are three-fold
  - A firm may not be rated
  - A firm's bond offerings might have multiple ratings
  - The bond that is rated might have been structured by the firm to be less risky than the overall firm (It might be backed up with specific assets)
- In these cases, it is better to estimate a synthetic rating for the firm, based upon its financial ratios, and use the synthetic rating to estimate the default spread and cost of debt.

Estimating Synthetic Ratings

- The rating for a firm can be estimated using the financial characteristics of the firm. In its simplest form, the rating can be estimated from the interest coverage ratio

  Interest Coverage Ratio = EBIT / Interest Expenses

- For Disney's interest coverage ratio, we used the operating income and interest & lease expense from 2003:

  Interest Coverage Ratio = $2,805/($666+$ 275) = 2.98

- The resulting interest coverage ratio is 2.98.

The Ratings Table

Interest Coverage Ratio	Rating	Typical default spread	Market interest rate on debt
> 8.5	AAA	0.35%	4.35%
6.50 - 6.50	AA	0.50%	4.50%
5.50 – 6.50	A+	0.70%	4.70%
4.25 – 5.50	A	0.85%	4.85%
3.00 – 4.25	A-	1.00%	5.00%
2.50 – 3.00	BBB	1.50%	5.50%
2.05 - 2.50	BB+	2.00%	6.00%
1.90 – 2.00	BB	2.50%	6.50%
1.75 – 1.90	B+	3.25%	7.25%
1.50 - 1.75	B	4.00%	8.00%
1.25 – 1.50	B-	6.00%	10.00%
0.80 – 1.25	CCC	8.00%	12.00%
0.65 – 0.80	CC	10.00%	14.00%
0.20 – 0.65	C	12.00%	16.00%
< 0.20	D	20.00%	24.00%

Estimating the cost of debt for a firm

- Since Disney's interest coverage ratio of 2.98 falls on the cusp between BBB and A-, we will give Disney a BBB+ rating (which coincidentally happened to be their actual rating). Adding a default spread of 1.25% to the then prevailing ten-year bond rate of 4% gives us Disney's pre-tax cost of debt of 5.25%.

  Cost of debt = Riskfree rate + Company default spread = 4.00%+ 1.25% = 5.25%

- To estimate the after-tax cost of debt, we use the marginal tax rate for Disney of 37.3%.

  After-tax Cost of Debt = 5.25% (1 - .373) = 3.29%

Estimating Market Values

- Market Value of Equity should include the following
  - Market Value of Shares outstanding
  - Market Value of Warrants outstanding
  - Market Value of Conversion Option in Convertible Bonds
- Market Value of Debt is more difficult to estimate because few firms have only publicly traded debt. There are two solutions:
  - Assume book value of debt is equal to market value
  - Estimate the market value of debt from the book value

Estimating the Market Value of Debt

- The market value of interest bearing debt can be estimated:
  - In 2004, Disney had book value of debt of 13,100 million, interest expenses of $666 million, a current cost of borrowing of 5.25% and an weighted average maturity of 11.53 years.

Estimated MV of Disney Debt = $$666\left[\frac{\left(1-\frac{1}{(1.0525)^{11.53}}\right)}{.0525}\right]+\frac{13,100}{(1.0525)^{11.53}} = \$12,915 \text{ million}$$

Year	Commitment	Present Value
1	$ 271.00	$ 257.48
2	$ 242.00	$ 218.46
3	$ 221.00	$ 189.55
4	$ 208.00	$ 169.50
5	$ 275.00	$ 212.92
6 –9	$ 258.25	$ 704.93
Debt Value of leases =		$ 1,752.85

- Debt outstanding at Disney = $12,915 + $ 1,753= $14,668 million

Current Cost of Capital: Disney

- Equity
  - Cost of Equity = Riskfree rate + Beta * Risk Premium
    = 4% + 1.25 (4.82%) = 10.00%
  - Market Value of Equity = $55.101 Billion
  - Equity/(Debt+Equity) = 79%
- Debt
  - After-tax Cost of debt =(Riskfree rate + Default Spread) (1-t)
    = (4%+1.25%) (1-.373) = 3.29%
  - Market Value of Debt = $ 14.668 Billion
  - Debt/(Debt +Equity) = 21%
- Cost of Capital = 10.00%(.79)+3.29%(.21) = 8.59%

55.101/
(55.101+14.668)

Mechanics of Cost of Capital Estimation

1. Estimate the Cost of Equity at different levels of debt:
   - Equity will become riskier -> Beta will increase -> Cost of Equity will increase.
   - Estimation will use levered beta calculation
2. Estimate the Cost of Debt at different levels of debt:
   - Default risk will go up and bond ratings will go down as debt goes up -> Cost of Debt will increase.
   - To estimating bond ratings, we will use the interest coverage ratio (EBIT/Interest expense)
3. Estimate the Cost of Capital at different levels of debt
4. Calculate the effect on Firm Value and Stock Price.

Estimating Cost of Equity

Unlevered Beta = 1.0674 (Bottom up beta based upon Disney's businesses)

Market premium = 4.82% T.Bond Rate = 4.00% Tax rate=37.3%

Debt Ratio	*D/E Ratio*	*Levered Beta*	*Cost of Equity*
0.00%	0.00%	1.0674	9.15%
10.00%	11.11%	1.1418	9.50%
20.00%	25.00%	1.2348	9.95%
30.00%	42.86%	1.3543	10.53%
40.00%	66.67%	1.5136	11.30%
50.00%	100.00%	1.7367	12.37%
60.00%	150.00%	2.0714	13.98%
70.00%	233.33%	2.6291	16.67%
80.00%	400.00%	3.7446	22.05%
90.00%	900.00%	7.0911	38.18%

Estimating Cost of Debt

Start with the current market value of the firm = 55,101 + 14668 = $69, 769 mil

D/(D+E)	0.00%	10.00%	Debt to capital
D/E	0.00%	11.11%	D/E = 10/90 = .1111
$ Debt	$0	$6,977	10% of $69,769
EBITDA	$3,882	$3,882	Same as 0% debt
Depreciation	$1,077	$1,077	Same as 0% debt
EBIT	$2,805	$2,805	Same as 0% debt
Interest	$0	$303	Pre-tax cost of debt * $ Debt
Pre-tax Int. cov	∞	9.24	EBIT/ Interest Expenses
Likely Rating	AAA	AAA	From Ratings table
Pre-tax cost of debt	4.35%	4.35%	Riskless Rate + Spread

The Ratings Table

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2.50 – 3.00	BBB	1.50%	5.50%
2.05 - 2.50	BB+	2.00%	6.00%
1.90 – 2.00	BB	2.50%	6.50%
1.75 – 1.90	B+	3.25%	7.25%
1.50 - 1.75	B	4.00%	8.00%
1.25 – 1.50	B-	6.00%	10.00%
0.80 – 1.25	CCC	8.00%	12.00%
0.65 – 0.80	CC	10.00%	14.00%
0.20 – 0.65	C	12.00%	16.00%
< 0.20	D	20.00%	24.00%

A Test: Can you do the 20% level?

D/(D+E)	*0.00%*	*10.00%*	*20.00%*	*2nd Iteration 3rd?*
D/E	0.00%	11.11%	25.00%	
$ Debt	$0	$6,977	$13,954	
EBITDA	$3,882	$3,882	$3,882	
Depreciation	$1,077	$1,077	$1,077	
EBIT	$2,805	$2,805	$2,805	
Interest	$0	$303	$ 606	.0485*13954=676
Pre-tax Int. cov	∞	9.24	4.62	2805/676=4.15
Likely Rating	AAA	AAA	A	A-
Cost of debt	4.35%	4.35%	4.85%	5.00%

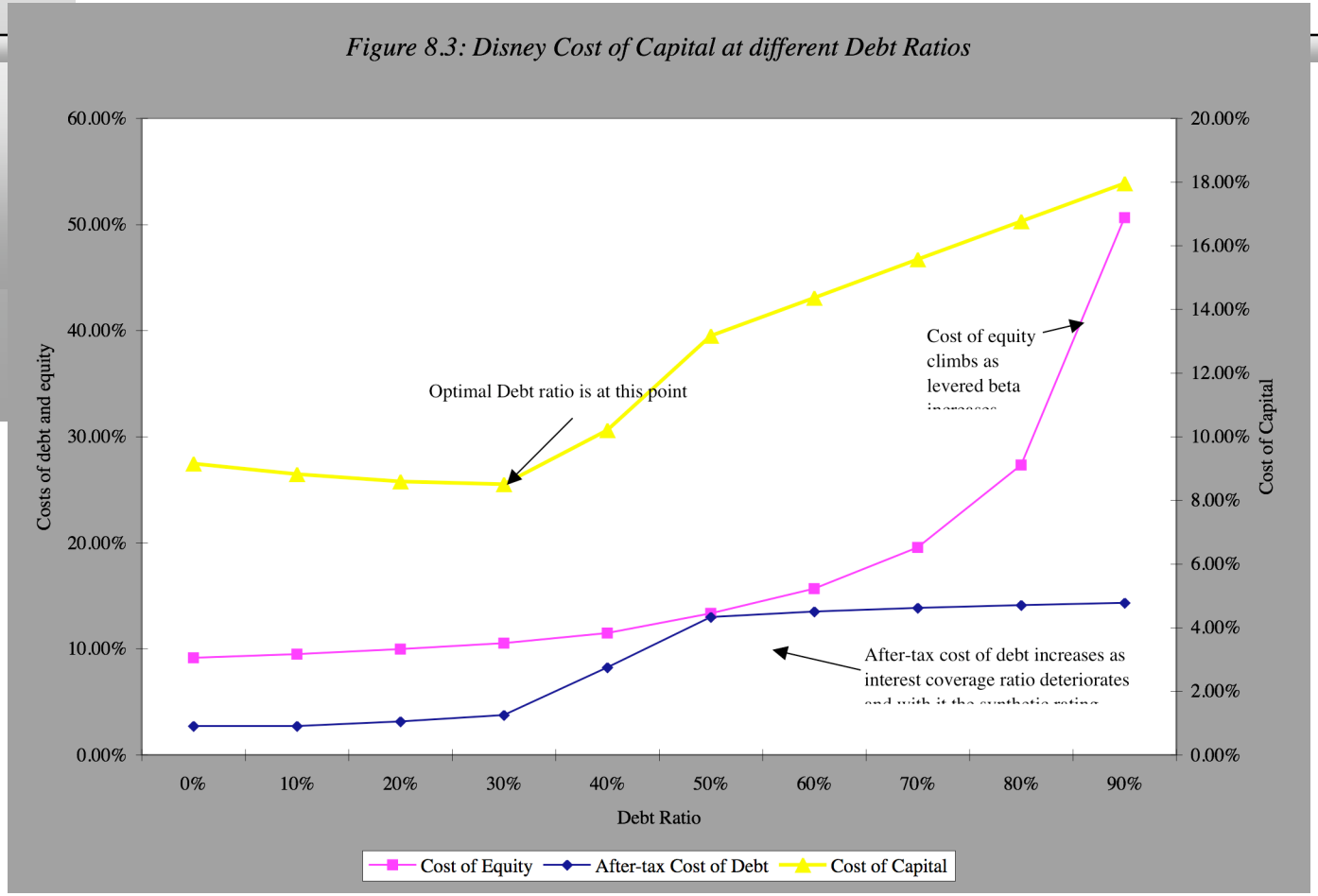
Bond Ratings, Cost of Debt and Debt Ratios

Debt Ratio	Debt	Interest expense	Interest Coverage Ratio	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)
0%	$0	$0	∞	AAA	4.35%	37.30%	2.73%
10%	$6,977	$303	9.24	AAA	4.35%	37.30%	2.73%
20%	$13,954	$698	4.02	A-	5.00%	37.30%	3.14%
30%	$20,931	$1,256	2.23	BB+	6.00%	37.30%	3.76%
40%	$27,908	$3,349	0.84	CCC	12.00%	31.24%	8.25%
50%	$34,885	$5,582	0.50	C	16.00%	18.75%	13.00%
60%	$41,861	$6,698	0.42	C	16.00%	15.62%	13.50%
70%	$48,838	$7,814	0.36	C	16.00%	13.39%	13.86%
80%	$55,815	$8,930	0.31	C	16.00%	11.72%	14.13%
90%	$62,792	$10,047	0.28	C	16.00%	10.41%	14.33%

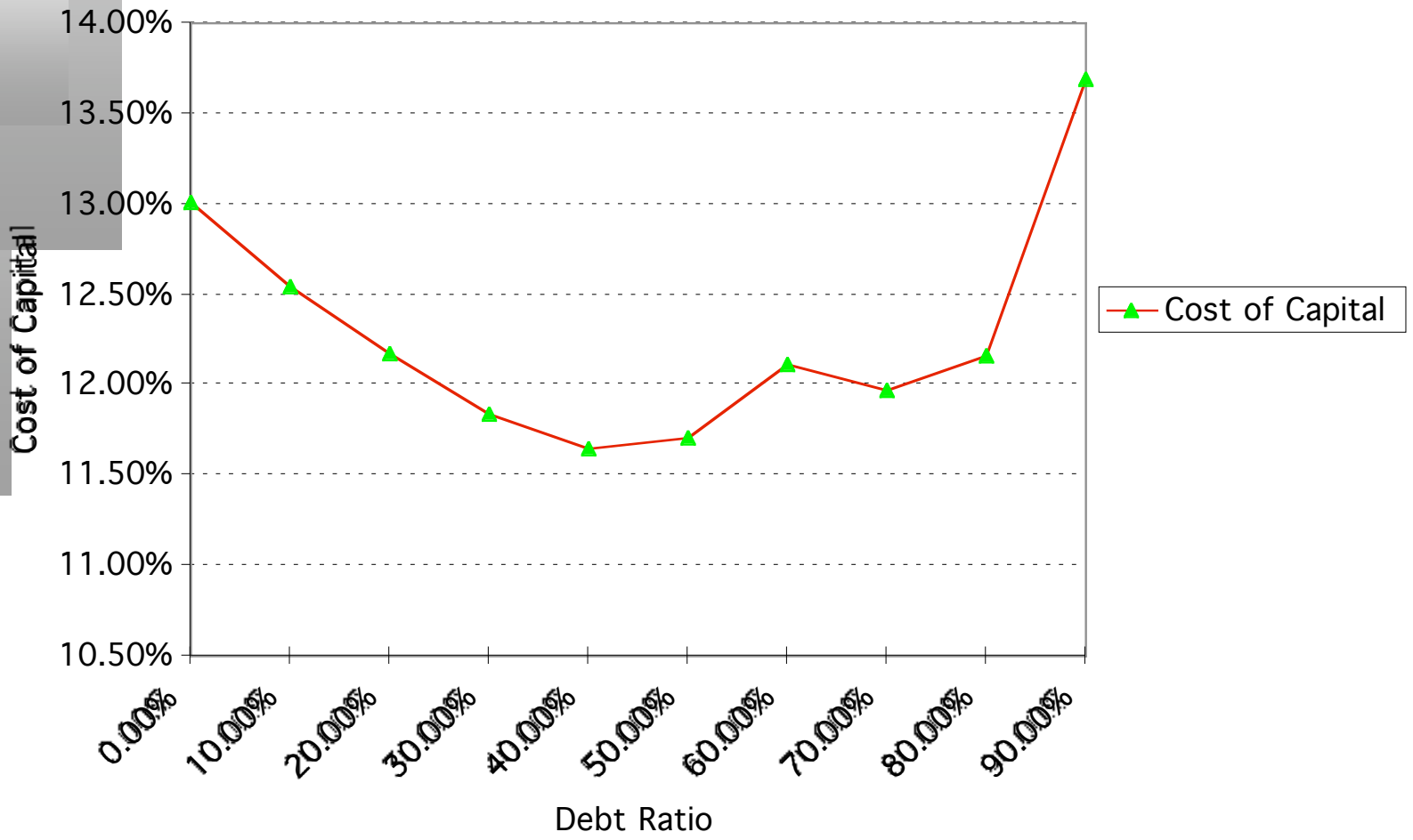
Disney's Cost of Capital Schedule

Debt Ratio	Cost of Equity	Cost of Debt (after-tax)	Cost of Capital
0%	9.15%	2.73%	9.15%
10%	9.50%	2.73%	8.83%
20%	9.95%	3.14%	8.59%
30%	10.53%	3.76%	8.50%
40%	11.50%	8.25%	10.20%
50%	13.33%	13.00%	13.16%
60%	15.66%	13.50%	14.36%
70%	19.54%	13.86%	15.56%
80%	27.31%	14.13%	16.76%
90%	50.63%	14.33%	17.96%

Disney: Cost of Capital Chart



Disney: Cost of Capital Chart: 1997



Effect on Firm Value

- Firm Value before the change = 55,101+14,668= $ 69,769

  $WACC_b$ = 8.59% Annual Cost = $69,769 *8.59%= $5,993 million

  $WACC_a$ = 8.50% Annual Cost = $69,769 *8.50% = $5,930 million

  Δ WACC = 0.09% Change in Annual Cost = $ 63 million

- If there is no growth in the firm value, (Conservative Estimate)
  - Increase in firm value = $63 / .0850= $ 741 million
  - Change in Stock Price = $741/2047.6= $0.36 per share
- If we assume a perpetual growth of 4% in firm value over time,
  - Increase in firm value = $63 /(.0850-.04) = $ 1,400 million
  - Change in Stock Price = $1,400/2,047.6 = $ 0.68 per share

Implied Growth Rate obtained by

Firm value Today =FCFF(1+g)/(WACC-g): Perpetual growth formula

$69,769 = $1,722(1+g)/(.0859-g): Solve for g -> Implied growth = 5.98%

Determinants of Optimal Debt Ratios

- Firm Specific Factors
  - 1. Tax Rate
  - Higher tax rates - - > Higher Optimal Debt Ratio
  - Lower tax rates - - > Lower Optimal Debt Ratio
  - 2. Pre-Tax Returns on Firm = (Operating Income) / MV of Firm
  - Higher Pre-tax Returns - - > Higher Optimal Debt Ratio
  - Lower Pre-tax Returns - - > Lower Optimal Debt Ratio
  - 3. Variance in Earnings [Shows up when you do 'what if' analysis]
  - Higher Variance - - > Lower Optimal Debt Ratio
  - Lower Variance - - > Higher Optimal Debt Ratio
- Macro-Economic Factors
  - 1. Default Spreads

    Higher - - > Lower Optimal Debt Ratio

    Lower - - > Higher Optimal Debt Ratio

II. The APV Approach to Optimal Capital Structure

- In the adjusted present value approach, the value of the firm is written as the sum of the value of the firm without debt (the unlevered firm) and the effect of debt on firm value
- Firm Value = Unlevered Firm Value + (Tax Benefits of Debt - Expected Bankruptcy Cost from the Debt)
- The optimal dollar debt level is the one that maximizes firm value

Implementing the APV Approach

- Step 1: Estimate the unlevered firm value. This can be done in one of two ways:
  1. Estimating the unlevered beta, a cost of equity based upon the unlevered beta and valuing the firm using this cost of equity (which will also be the cost of capital, with an unlevered firm)
  2. Alternatively, Unlevered Firm Value = Current Market Value of Firm - Tax Benefits of Debt (Current) + Expected Bankruptcy cost from Debt
- Step 2: Estimate the tax benefits at different levels of debt. The simplest assumption to make is that the savings are perpetual, in which case
  - Tax benefits = Dollar Debt * Tax Rate
- Step 3: Estimate a probability of bankruptcy at each debt level, and multiply by the cost of bankruptcy (including both direct and indirect costs) to estimate the expected bankruptcy cost.

Estimating Expected Bankruptcy Cost

- Probability of Bankruptcy
  - Estimate the synthetic rating that the firm will have at each level of debt
  - Estimate the probability that the firm will go bankrupt over time, at that level of debt (Use studies that have estimated the empirical probabilities of this occurring over time - Altman does an update every year)
- Cost of Bankruptcy
  - The direct bankruptcy cost is the easier component. It is generally between 5-10% of firm value, based upon empirical studies
  - The indirect bankruptcy cost is much tougher. It should be higher for sectors where operating income is affected significantly by default risk (like airlines) and lower for sectors where it is not (like groceries)

Ratings and Default Probabilities: Results from Altman study of bonds

Bond Rating	*Default Rate*
D	100.00%
C	80.00%
CC	65.00%
CCC	46.61%
B-	32.50%
B	26.36%
B+	19.28%
BB	12.20%
BBB	2.30%
A-	1.41%
A	0.53%
A+	0.40%
AA	0.28%
AAA	0.01%

Disney: Estimating Unlevered Firm Value

Current Market Value of the Firm = $55,101+$14,668 = $ 69,789

- Tax Benefit on Current Debt = $14,668* 0.373 = $ 5,479 million

+ Expected Bankruptcy Cost = 1.41% * (0.25* 69,789)= $ 984 million

Unlevered Value of Firm = $65,294 million

Cost of Bankruptcy for Disney = 25% of firm value

Probability of Bankruptcy = 1.41%, based on firm's current rating of A-

Tax Rate = 37.3%

Disney: APV at Debt Ratios

Debt Ratio	$ Debt	Tax Rate	Unlevered Firm Value	Tax Benefits	Bond Rating	Probability of Default	Expected Bankruptcy Cost	Value of Levered Firm
0%	$0	37.30%	$64,556	$0	AAA	0.01%	$2	$64,555
10%	$6,979	37.30%	$64,556	$2,603	AAA	0.01%	$2	$67,158
20%	$13,958	37.30%	$64,556	$5,206	A-	1.41%	$246	$69,517
30%	$20,937	37.30%	$64,556	$7,809	BB+	7.00%	$1,266	$71,099
40%	$27,916	31.20%	$64,556	$8,708	CCC	50.00%	$9,158	$64,107
50%	$34,894	18.72%	$64,556	$6,531	C	80.00%	$14,218	$56,870
60%	$41,873	15.60%	$64,556	$6,531	C	80.00%	$14,218	$56,870
70%	$48,852	13.37%	$64,556	$6,531	C	80.00%	$14,218	$56,870
80%	$55,831	11.70%	$64,556	$6,531	C	80.00%	$14,218	$56,870
90%	$62,810	10.40%	$64,556	$6,531	C	80.00%	$14,218	$56,870

III. Relative Analysis

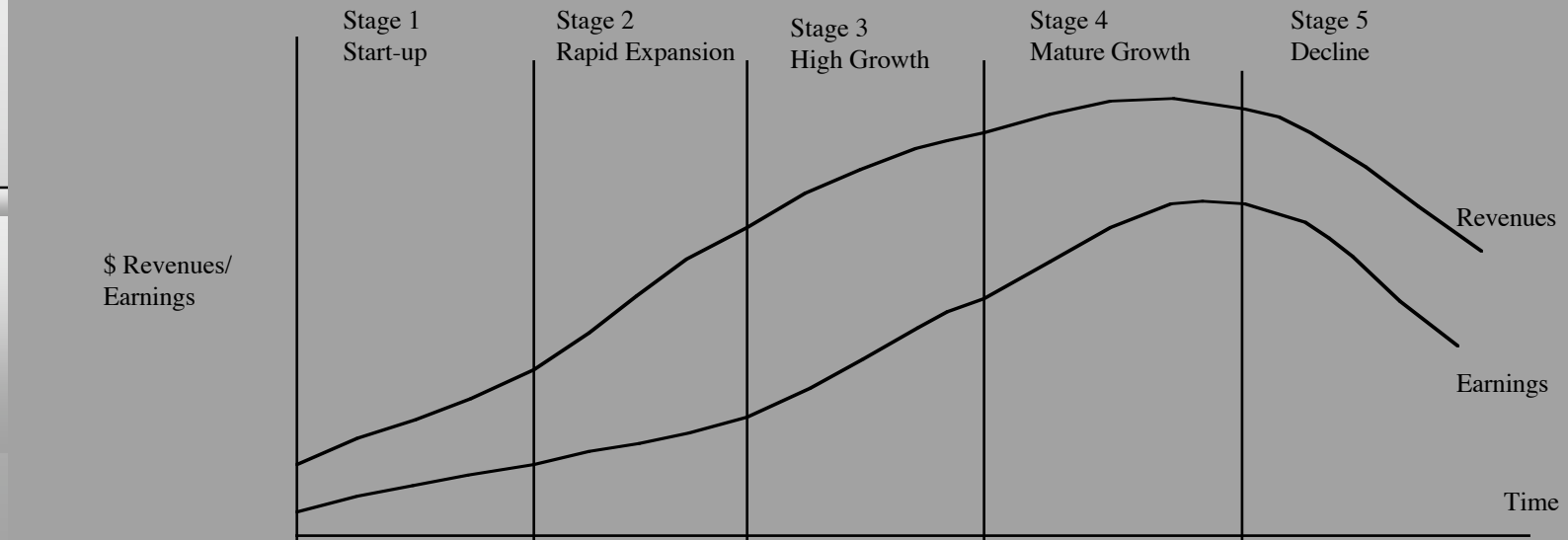
I. Industry Average with Subjective Adjustments

- The "safest" place for any firm to be is close to the industry average
- Subjective adjustments can be made to these averages to arrive at the right debt ratio.
  - Higher tax rates -> Higher debt ratios (Tax benefits)
  - Lower insider ownership -> Higher debt ratios (Greater discipline)
  - More stable income -> Higher debt ratios (Lower bankruptcy costs)
  - More intangible assets -> Lower debt ratios (More agency problems)

Comparing to industry averages

	Disney	*Entertainment*	*Aracruz*	*Paper and Pulp (Emerging Market)*
Market Debt Ratio	21.02%	19.56%	30.82%	27.71%
Book Debt Ratio	35.10%	28.86%	43.12%	49.00%

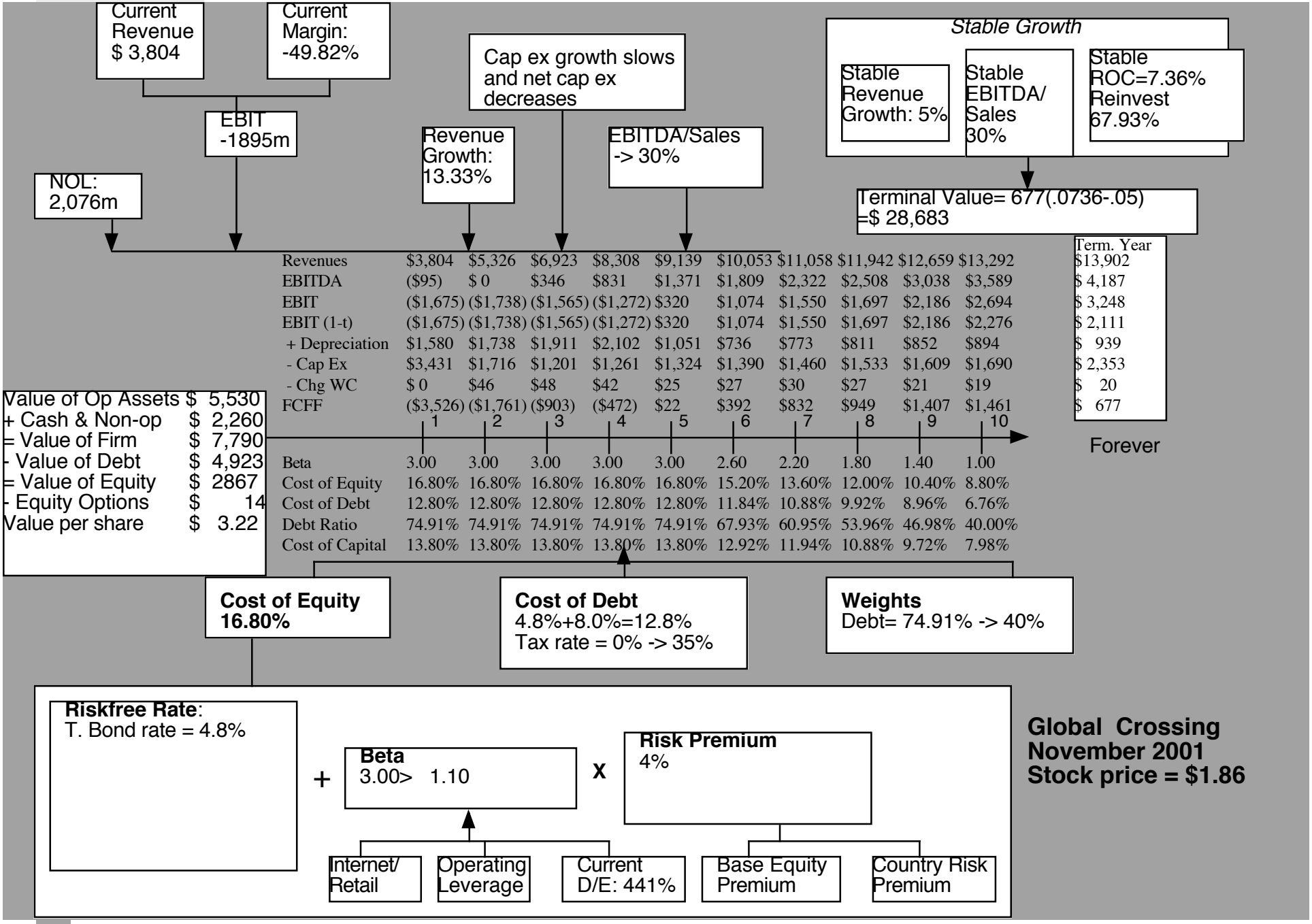
IV. The Debt-Equity Trade off and Life Cycle



	Stage 1 Start-up	Stage 2 Rapid Expansion	Stage 3 High Growth	Stage 4 Mature Growth	Stage 5 Decline
Tax Benefits	Zero, if losing money	Low, as earnings are limited	Increase, with earnings	High	High, but declining
Added Disceipline of Debt	Low, as owners run the firm	Low. Even if public, firm is closely held.	Increasing, as managers own less of firm	High. Managers are separated from owners	Declining, as firm does not take many new investments
Bamkruptcy Cost	Very high. Firm has no or negative earnings.	Very high. Earnings are low and volatile	High. Earnings are increasing but still volatile	Declining, as earnings from existing assets increase.	Low, but increases as existing projects end.
Agency Costs	Very high, as firm has almost no assets	High. New investments are difficult to monitor	High. Lots of new investments and unstable risk.	Declining, as assets in place become a larger portion of firm.	Low. Firm takes few new investments
Need for Flexibility	Very high, as firm looks for ways to establish itself	High. Expansion needs are large and unpredicatble	High. Expansion needs remain unpredictable	Low. Firm has low and more predictable investment needs.	Non-existent. Firm has no new investment needs.
Net Trade Off	Costs exceed benefits Minimal debt	Costs still likely to exceed benefits. Mostly equity	Debt starts yielding net benefits to the firm	Debt becomes a more attractive option.	Debt will provide benefits.

Concern 1: Changing Debt Ratios and Firm Value

- In some cases, you may expect the debt ratio to change in predictable ways over the next few years. You have two choices:
  - Use a target debt ratio for the entire valuation and assume that the transition to the target will be relatively painless and easy.
  - Use year-specific debt ratios, with appropriate costs of capital, to value the firm.
- In many leveraged buyout deals, it is routine to overshoot in the initial years (have a debt ratio well above the optimal) and to use asset sales and operating cash flows to bring the debt down to manageable levels. The same can be said for distressed firms with too much debt: a combination of operating improvements and debt restructuring is assumed to bring the debt ratio down.


Current Revenue $ 3,804
Current Margin: -49.82%
EBIT -1895m
NOL: 2,076m
Cap ex growth slows and net cap ex decreases
Revenue Growth: 13.33%
EBITDA/Sales -> 30%
Stable Growth
Stable Revenue Growth: 5%
Stable EBITDA/ Sales 30%
Stable ROC=7.36% Reinvest 67.93%
Terminal Value= 677(.0736-.05) =$ 28,683
Term. Year
Forever
Revenues $3,804 $5,326 $6,923 $8,308 $9,139 $10,053 $11,058 $11,942 $12,659 $13,292 $13,902
EBITDA ($95) $ 0 $346 $831 $1,371 $1,809 $2,322 $2,508 $3,038 $3,589 $ 4,187
EBIT ($1,675) ($1,738) ($1,565) ($1,272) $320 $1,074 $1,550 $1,697 $2,186 $2,694 $ 3,248
EBIT (1-t) ($1,675) ($1,738) ($1,565) ($1,272) $320 $1,074 $1,550 $1,697 $2,186 $2,276 $ 2,111
+ Depreciation $1,580 $1,738 $1,911 $2,102 $1,051 $736 $773 $811 $852 $894 $ 939
- Cap Ex $3,431 $1,716 $1,201 $1,261 $1,324 $1,390 $1,460 $1,533 $1,609 $1,690 $ 2,353
- Chg WC $ 0 $46 $48 $42 $25 $27 $30 $27 $21 $19 $ 20
FCFF ($3,526) ($1,761) ($903) ($472) $22 $392 $832 $949 $1,407 $1,461 $ 677
1 2 3 4 5 6 7 8 9 10
Beta 3.00 3.00 3.00 3.00 3.00 2.60 2.20 1.80 1.40 1.00
Cost of Equity 16.80% 16.80% 16.80% 16.80% 16.80% 15.20% 13.60% 12.00% 10.40% 8.80%
Cost of Debt 12.80% 12.80% 12.80% 12.80% 12.80% 11.84% 10.88% 9.92% 8.96% 6.76%
Debt Ratio 74.91% 74.91% 74.91% 74.91% 74.91% 67.93% 60.95% 53.96% 46.98% 40.00%
Cost of Capital 13.80% 13.80% 13.80% 13.80% 13.80% 12.92% 11.94% 10.88% 9.72% 7.98%
Value of Op Assets $ 5,530
+ Cash & Non-op $ 2,260
= Value of Firm $ 7,790
- Value of Debt $ 4,923
= Value of Equity $ 2867
- Equity Options $ 14
Value per share $ 3.22
Cost of Equity 16.80%
Cost of Debt 4.8%+8.0%=12.8% Tax rate = 0% -> 35%
Weights Debt= 74.91% -> 40%
Riskfree Rate: T. Bond rate = 4.8%
+
Beta 3.00> 1.10
X
Risk Premium 4%
Internet/ Retail
Operating Leverage
Current D/E: 441%
Base Equity Premium
Country Risk Premium
Global Crossing November 2001 Stock price = $1.86

Concern 2: 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.

Estimating the probability of distress…

- Global Crossing has a 12% coupon bond with 8 years to maturity trading at $ 653. To estimate the probability of default (with a treasury bond rate of 5% used as the riskfree rate):

$$653 = \sum_{t=1}^{t=8} \frac{120(1-\pi_{Distress})^t}{(1.05)^t} + \frac{1000(1-\pi_{Distress})^8}{(1.05)^N}$$

- Solving for the probability of bankruptcy, we get
  - With a 10-year bond, it is a process of trial and error to estimate this value. The solver function in excel accomplishes the same in far less time.

$\pi_{Distress}$ = Annual probability of default = 13.53%

- To estimate the cumulative probability of distress over 10 years:
- Cumulative probability of surviving 10 years = $(1 - .1353)^{10}$ = 23.37%
- Cumulative probability of distress over 10 years = 1 - .2337 = .7663 or 76.63%

Valuing Global Crossing with Distress

- Probability of distress
  - Cumulative probability of distress = 76.63%
- Distress sale value of equity
  - Book value of capital = $14,531 million
  - Distress sale value = 25% of book value = .25*14531 = $3,633 million
  - Book value of debt = $7,647 million
  - Distress sale value of equity = $ 0
- Distress adjusted value of equity
  - Value of Global Crossing = $3.22 (1-.7663) + $0.00 (.7663) = $ 0.75

Concern 3: The false security of using multiples and per share earnings..

- There are some analysts who examine the effect of debt on value per share by computing the expected earnings per share of the firm as it borrows money (to either buy back stock or instead of issuing new equity). In most cases, using more debt (instead of equity) will cause earnings per share to go up.
- These expected earnings per share are then multiplied by a predicted price earnings ratio to arrive at the expected stock price. If the PE ratio is left unchanged at pre-debt issue levels, this will lead to the obvious conclusion that more debt = higher stock price.

The first catch: PE ratios will change as you change your debt ratio..

- To understand the fundamentals, start with a basic <u>equity</u> discounted cash flow model.
- With the dividend discount model,

$$P_0 = \frac{DPS_1}{\text{Cost of equity} - g_n}$$

- Dividing both sides by the current earnings per share,

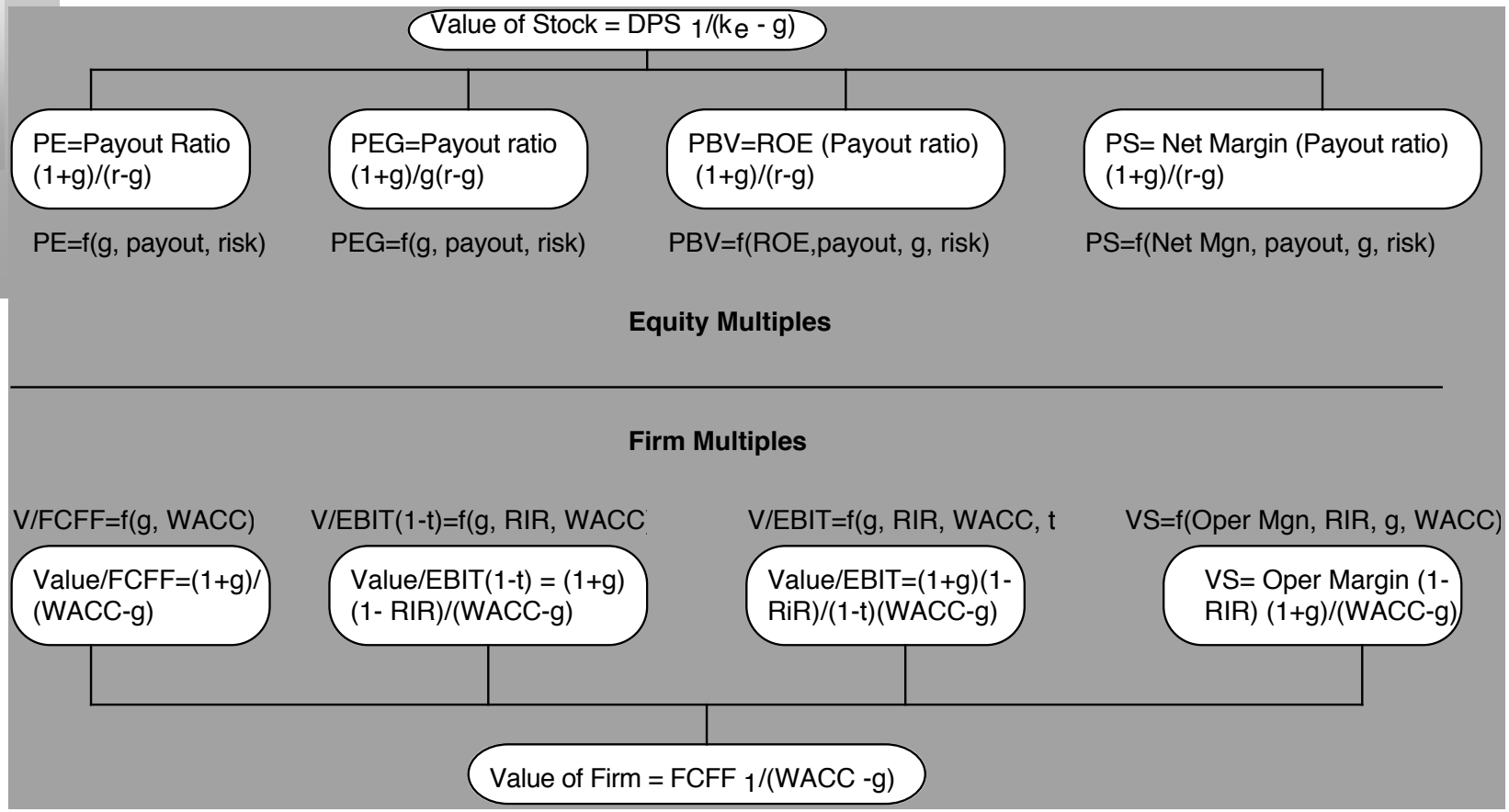
PE r

$$\frac{P_0}{EPS_0} = PE = \frac{\text{Payout Ratio} * (1 + g_n)}{\text{Cost of Equity} - g_n}$$

↗

As you borrow more, your cost of equity should increase

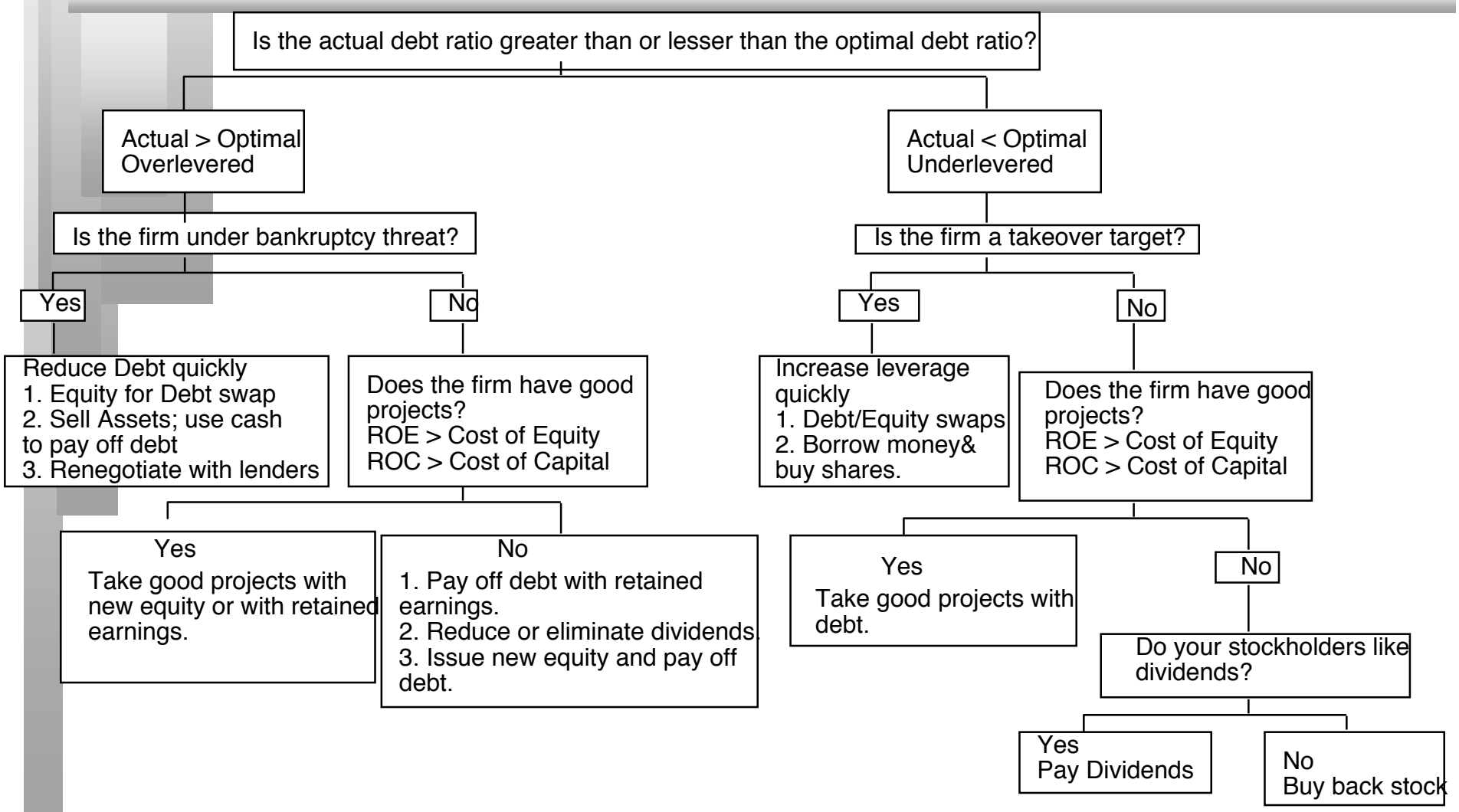
And it is not just PE that is affected by debt…



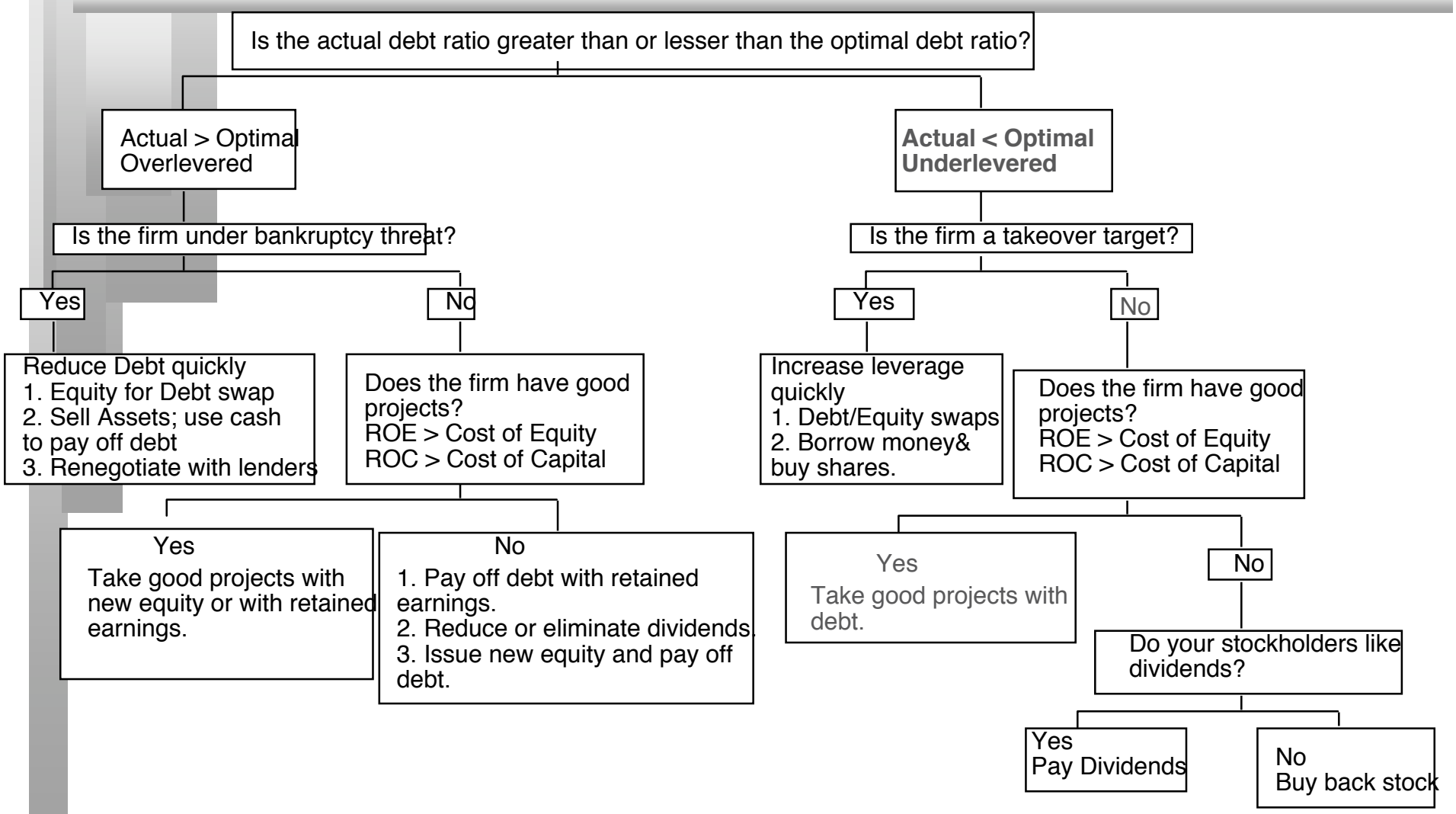
The second catch: Your exit multiple may be a mirage if you don't make it..

- Consider a relative valuation of Global Crossing in 2001. Global Crossing lost $1.9 billion in 2001 and wass expected to continue to lose money for the next 3 years. In a discounted cashflow valuation of Global Crossing, we estimated an expected EBITDA for Global Crossing in five years of $ 1,371 million.
- The average enterprise value/ EBITDA multiple for healthy telecomm firms is 7.2 currently.
- Applying this multiple to Global Crossing's EBITDA in year 5, yields a value in year 5 of
  - Enterprise Value in year 5 = 1371 * 7.2 = $9,871 million
  - Enterprise Value today = $ 9,871 million/ 1.138^5 = $5,172 million
- The problem with this valuation is that it does not take into account the likelihood that the firm will not make it.
  - The probability that Global Crossing will not make it as a going concern is 77%.
  - Expected Enterprise value today = 0.23 (5172) = $1,190 million

A Framework for Getting to the Optimal



Disney: Applying the Framework



In conclusion: Debt matters in valuation. It can both create and destroy value..