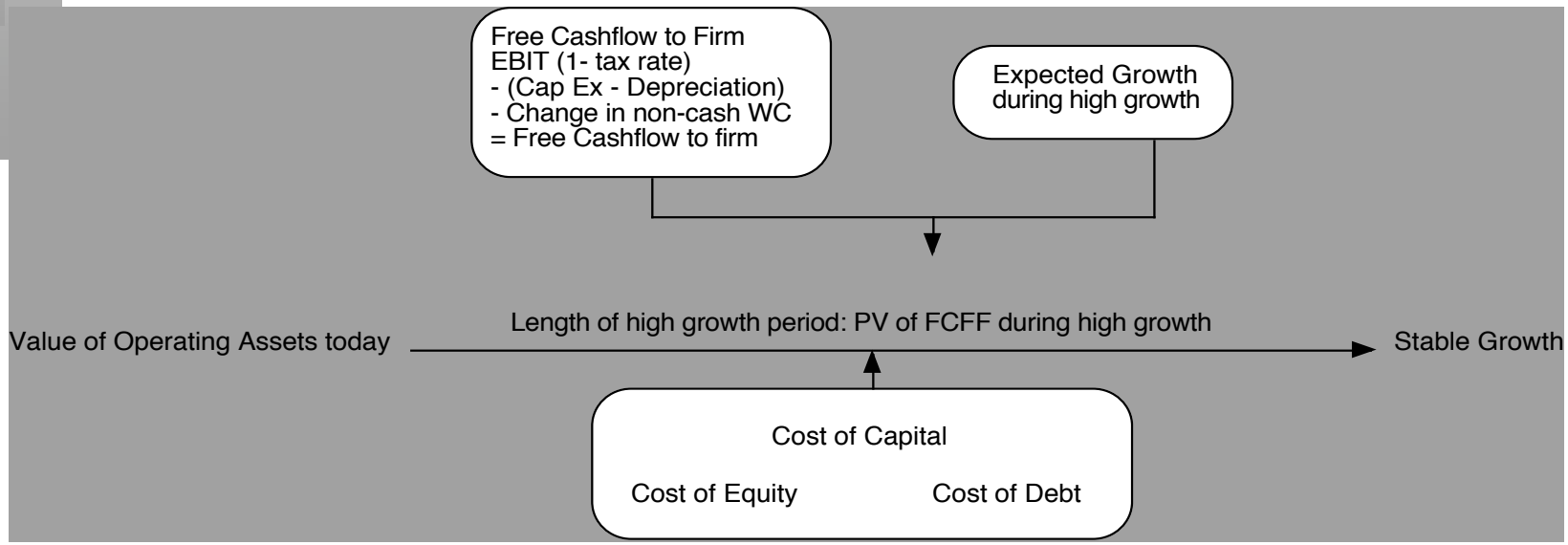
Many a slip…. Loose Ends in Valuation

Aswath Damodaran

Some Overriding Thoughts

- The biggest reason for bad valuations is not bad models but bias. Building a better valuation model is easy, but getting the bias out of valuation is difficult.
- Analysts who fault their models for not being more precise are not only missing the real reason for imprecision (which is that no one can forecast the future with certainty) but are also setting themselves up for false alternatives.
- Valuation is simple. We choose to make it complex. Complexity always come with a cost….

So, you've valued a firm…



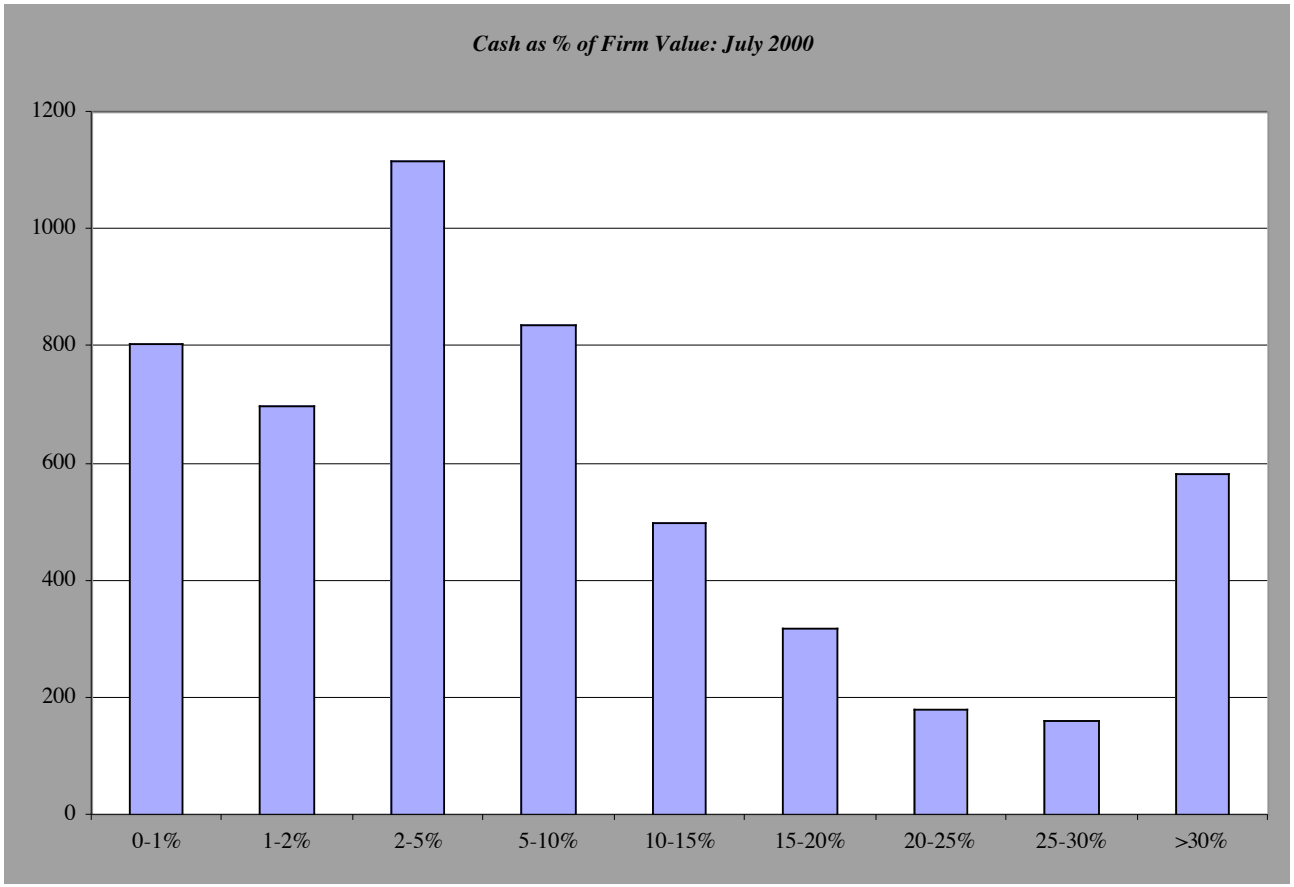
But what comes next?

Value of Operating Assets	
+ 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?

1. The Value of Cash

- The simplest and most direct way of dealing with cash and marketable securities is to keep it out of the valuation - the cash flows should be before interest income from cash and securities, and the discount rate should not be contaminated by the inclusion of cash. (Use betas of the operating assets alone to estimate the cost of equity).
- Once the operating assets have been valued, you should add back the value of cash and marketable securities.

How much cash is too much cash?



Should you ever discount cash for its low returns?

- There are some analysts who argue that companies with a lot of cash on their balance sheets should be penalized by having the excess cash discounted to reflect the fact that it earns a low return.
  - Excess cash is usually defined as holding cash that is greater than what the firm needs for operations.
  - A low return is defined as a return lower than what the firm earns on its non-cash investments.
- This is the wrong reason for discounting cash. If the cash is invested in riskless securities, it should earn a low rate of return. As long as the return is high enough, given the riskless nature of the investment, cash does not destroy value.
- There is a right reason, though, that may apply to some companies…

The Value of Cash

- Implicitly, we are assuming here that the market will value cash at face value. Assume now that you are buying a firm whose only asset is marketable securities worth $ 100 million. Can you ever consider a scenario where you would not be willing to pay $ 100 million for this firm?
  - Yes
  - No
- What is or are the scenario(s)?

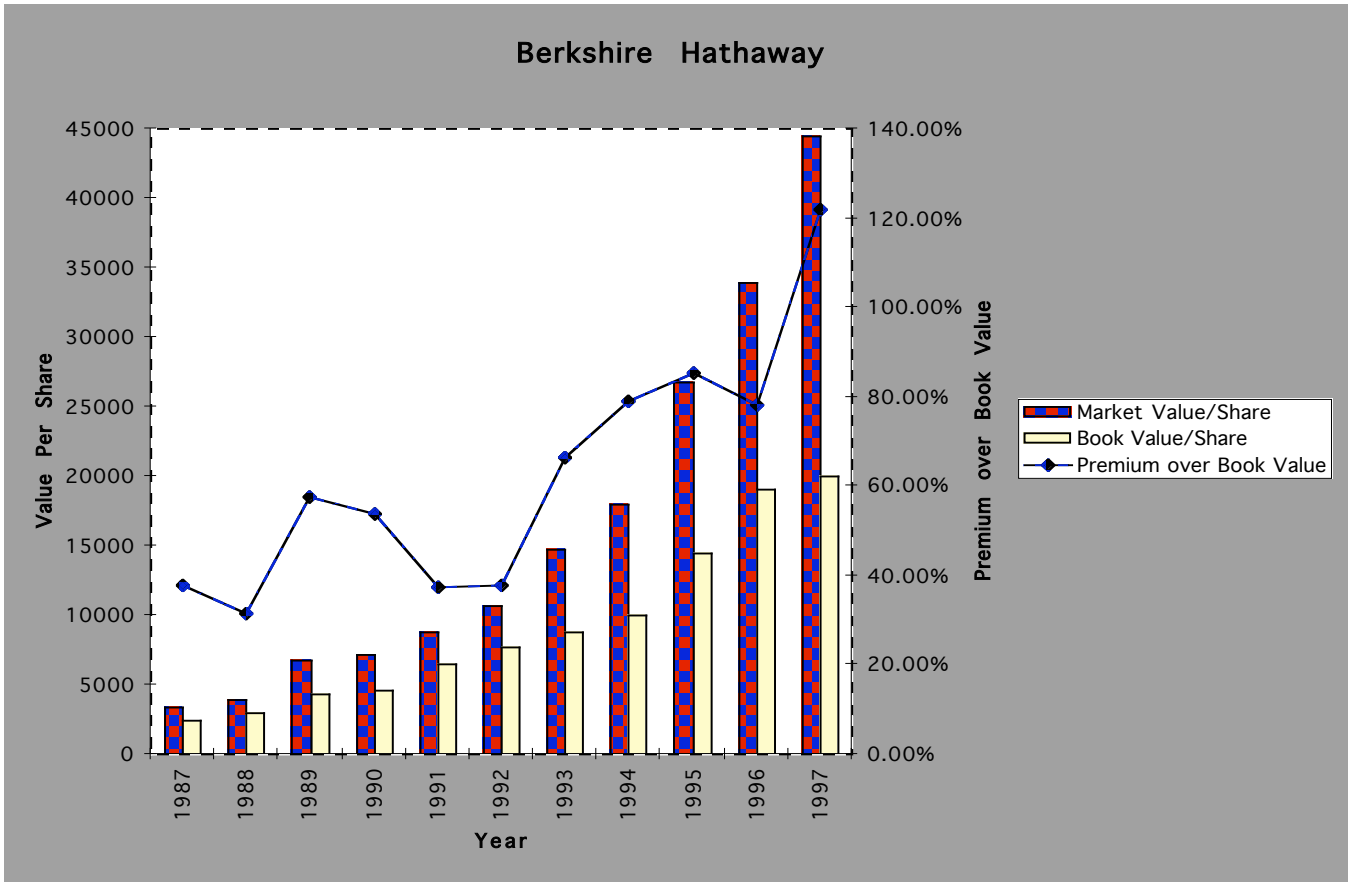
The Case of Closed End Funds

- Closed end funds are mutual funds, with a fixed number of shares. Unlike regular mutual funds, where the shares have to trade at net asset value (which is the value of the securities in the fund), closed end funds shares can and often do trade at prices which are different from the net asset value.
- The average closed end fund has always traded at a discount on net asset value (of between 10 and 20%) in the United States.

A Simple Explanation for the Closed End Discount

- Assume that you have a closed-end fund that invests in 'average risk" stocks. Assume also that you expect the market (average risk investments) to make 11.5% annually over the long term. If the closed end fund underperforms the market by 0.50%, estimate the discount on the fund.

A Premium for Marketable Securities: Berkshire Hathaway



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.

How to value holdings in other firms

Fin Statement	*Valuing*	*What to do…*
Not consolidated	Equity	Value equity in subsidiary and take share of holding.
Not consolidated	Firm	Value subsidiary as a firm and add portion of firm value. Add portion of debt in subsidiary to the debt in estimating equity value.
Consolidated	Firm	Strip operating income of subsidiary and value subsidiary separately. Add portion of this value to value of parent firm.

How some deal with subsidiaries...

- When financial statements are consolidated, some analysts value the firm with the consolidated operating income and then subtract minority interests from the firm value to arrive at the value of the equity in the firm. What is wrong with this approach?

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 Business	Multiple Businesses
Holdings	Simple	Complex
Accounting	Transparent	Opaque

- *Which firm would you value more highly?*

Sources of Complexity

- Accounting Standards
  - Inconsistency in applying accounting principles (Operating leases, R&D etc.)
  - Fuzzy Accounting Standards (One-time charges, hidden assets)
  - Unintended Consequences of Increased Disclosure
- Nature and mix of businesses
  - Multiple businesses (Eg. GE)
  - Multiple countries (Eg. Coca Cola)
- Structuring of businesses
  - Cross Holdings (The Japanese Curse)
  - Creative Holding Structures (Enronitis)
- Financing Choices
  - Growth of Hybrids
  - New Securities (Playing the Ratings Game)

Reasons for Complexity

- Control
  - Complex holding structures were designed to make it more difficult for outsiders (which includes investors) to know how much a firm is worth, how much it is making and what assets it holds.
  - Multiple classes of shares and financing choices also make it more likely that incumbents can retain control in the event of a challenge.
- Tax Benefits
  - Complex tax law begets complex business mixes and holding structures.
    - Different tax rates for different locales and different transactions
    - Tax credits
- Deceit

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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

- 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

Estimate a complexity discount to value

1. One is to develop a rule of thumb, similar to those used by analysts who value private companies to estimate the effect of illiquidity.
2. A slightly more sophisticated option is to use a complexity scoring system, to measure the complexity of a firm's financial statements and to relate the complexity score to the size of the discount.
3. You could compare the valuations of complex firms to the valuation of simple firms in the same business, and estimate the discount being applied by markets 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

Thus, a firm with a 15% return on equity, a beta of 1.15, and expected growth rate of 10% and 350 pages in the 10K would have a price to book ratio of

PBV = 0.65 + 15.31 (.15) – 0.55 (1.20) + 3.04 (.10) - .003 (350) = 1.54

4. If a firm is in multiple businesses, and some businesses are simple and others are complex, you could value the company in pieces attaching no discount to the simple pieces and a greater discount to the more complex parts of the firm.

4. 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 cashflows? (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…

A procedure for 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

Synergy Effects in Valuation Inputs

If synergy is	*Valuation Inputs that will be affected are*
Economies of Scale	*Operating Margin* of combined firm will be greater than the revenue-weighted operating margin of individual firms.
Growth Synergy	More projects: *Higher Reinvestment Rate* (Retention) Better projects: *Higher Return on Capital* (ROE) *Longer Growth Period* Again, these inputs will be estimated for the combined firm.

Synergy can and should be valued…

5. Brand name, great management, superb product …

- There is often a temptation to add on premiums for intangibles. Among them are
  - Brand name
  - Great management
  - Loyal workforce
  - Technological prowess
- If your discounted cashflow valuation is done right, your inputs should already reflect these strengths.
- If you add a premium, you will be double counting the strength.

Valuing Brand Name

	Coca Cola	Generic Cola Company
AT Operating Margin	**18.56%**	**7.50%**
Sales/BV of Capital	1.67	1.67
ROC	31.02%	12.53%
Reinvestment Rate	65.00% (19.35%)	65.00% (47.90%)
Expected Growth	20.16%	8.15%
Length	10 years	10 yea
Cost of Equity	12.33%	12.33%
E/(D+E)	97.65%	97.65%
AT Cost of Debt	4.16%	4.16%
D/(D+E)	2.35%	2.35%
Cost of Capital	12.13%	12.13%
Value	**$115**	**$13**

6. Defining 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.
- 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

Book Value or Market Value

- For some firms that are in financial trouble, the book value of debt can be substantially higher than the market value of debt. Analysts worry that subtracting out the market value of debt in this case can yield too high a value for equity.
- A discounted cashflow valuation is designed to value a going concern. In a going concern, it is the market value of debt that should count, even if it is much lower than book value.
- In a liquidation valuation, you can subtract out the book value of debt from the liquidation value of the assets.

Converting book debt into market debt,,,,,

But you should consider other potential liabilities

- 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

A Simple Example

- Assume that a firm has a value of $ 100 million run by incumbent managers and $ 150 million run optimally. The firm creates 10 million voting shares and offers 70% to the public.
- Since the potential for changing management is created by this offering, the value per share will fall between $10 and $15, depending upon the probability that is attached to the management change. Thus, if the probability of the management change is 60%, the value per share will be $13.00.

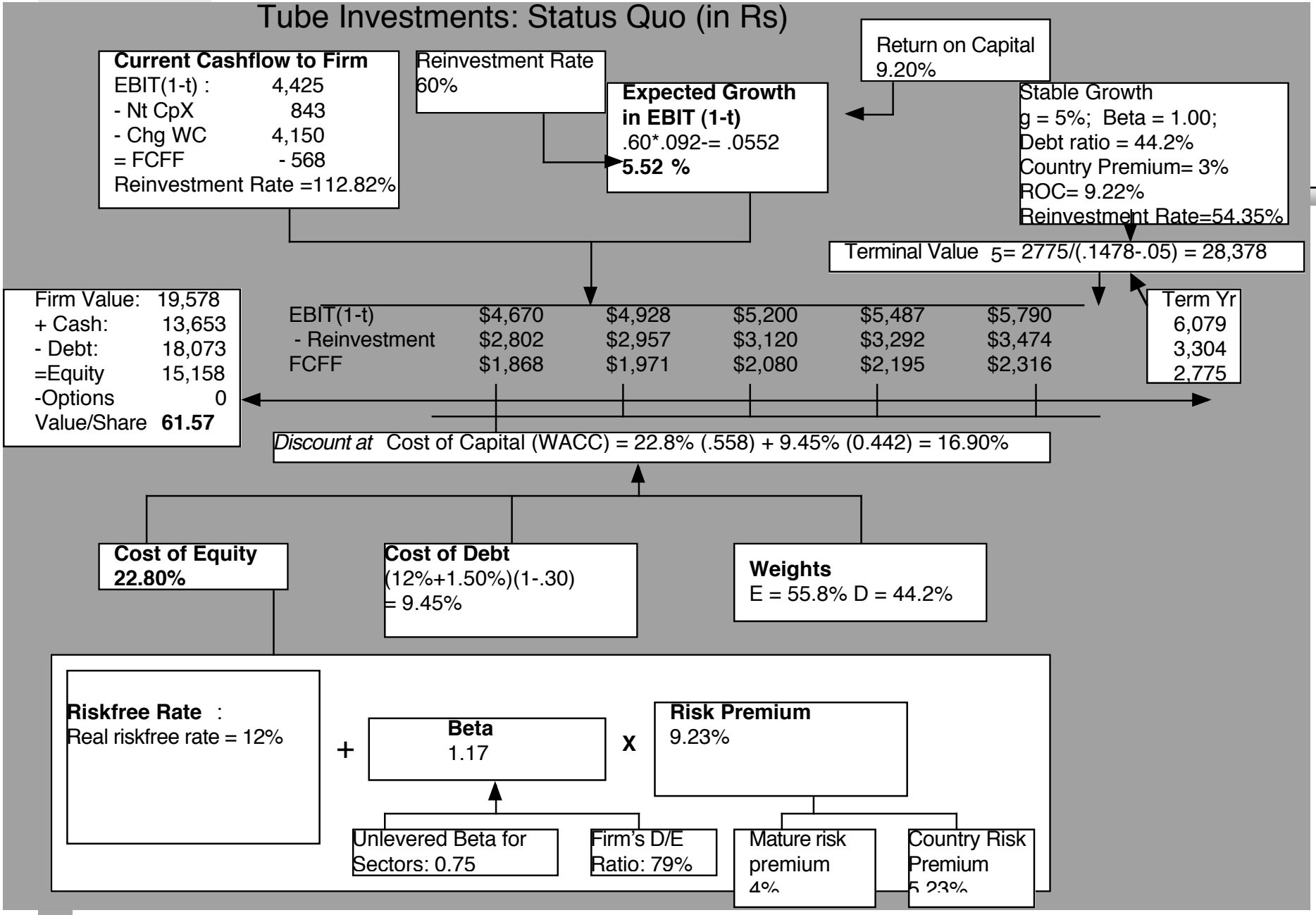
$$\text{Value/Shr} = (150*.6+100*.4)/10 = \$13$$

- If you have shares with different voting rights, the voting shares will get a disproportionate share of the value of control…

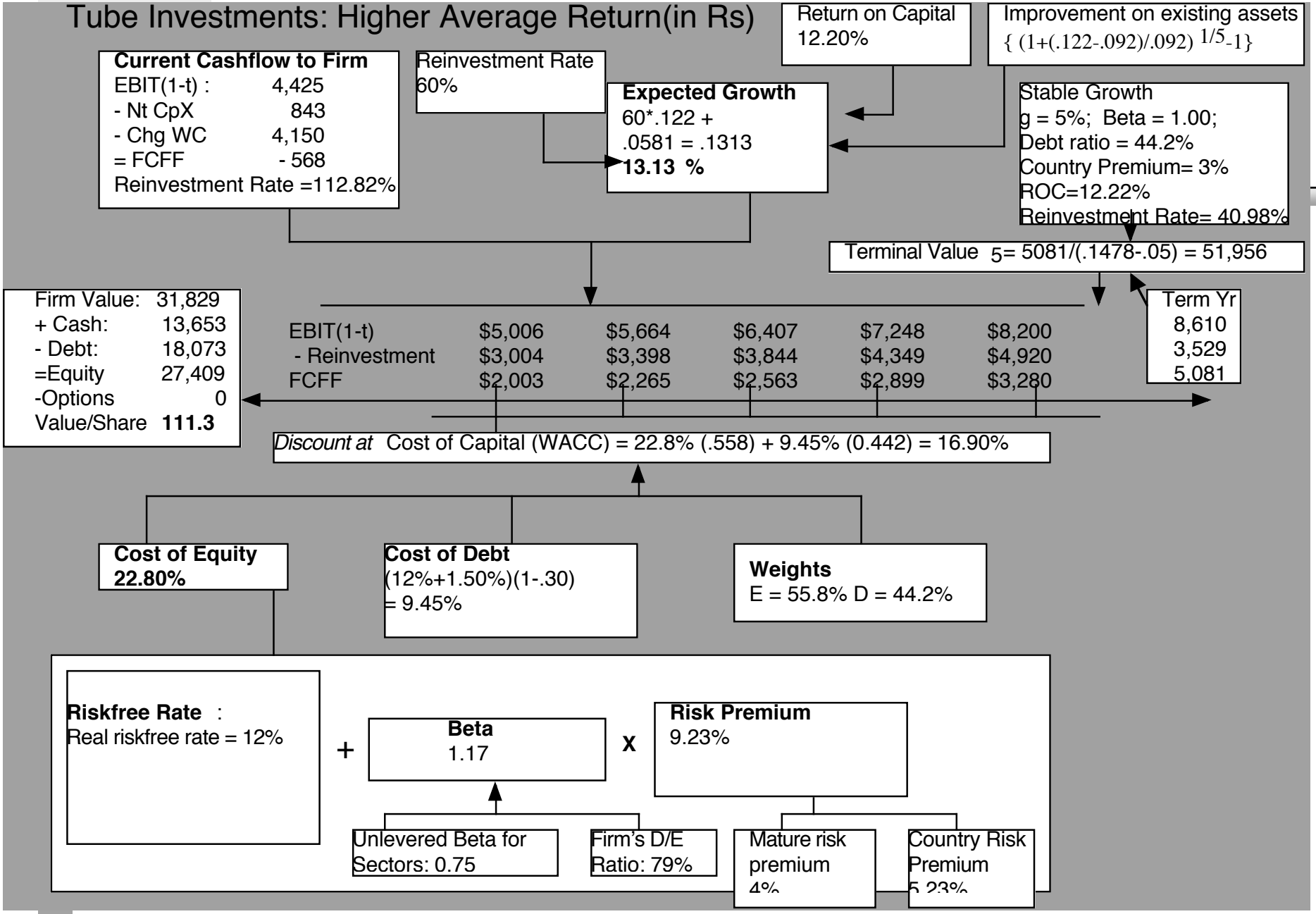
Valuing minority interests…

- Assume that this is a private firm(with a status quo value of $ 100 million and an optimal value of $ 150 million) and that you are buying 49% of this firm, with the current owner holding on to 51%. How much you would pay for the 49%?

- How would your answer differ if you were buying 51%?


Tube Investments: Status Quo (in Rs)
Current Cashflow to Firm
EBIT(1-t) : 4,425
- Nt CpX 843
- Chg WC 4,150
= FCFF - 568
Reinvestment Rate =112.82%
Reinvestment Rate
60%
Expected Growth in EBIT (1-t)
.60*.092-= .0552
5.52 %
Return on Capital
9.20%
Stable Growth
g = 5%; Beta = 1.00;
Debt ratio = 44.2%
Country Premium= 3%
ROC= 9.22%
Reinvestment Rate=54.35%
Terminal Value 5= 2775/(.1478-.05) = 28,378
Term Yr
6,079
3,304
2,775
EBIT(1-t) $4,670 $4,928 $5,200 $5,487 $5,790
- Reinvestment $2,802 $2,957 $3,120 $3,292 $3,474
FCFF $1,868 $1,971 $2,080 $2,195 $2,316
Firm Value: 19,578
+ Cash: 13,653
- Debt: 18,073
=Equity 15,158
-Options 0
Value/Share 61.57
Discount at Cost of Capital (WACC) = 22.8% (.558) + 9.45% (0.442) = 16.90%
Cost of Equity
22.80%
Cost of Debt
(12%+1.50%)(1-.30)
= 9.45%
Weights
E = 55.8% D = 44.2%
Riskfree Rate :
Real riskfree rate = 12%
+
Beta
1.17
X
Risk Premium
9.23%
Unlevered Beta for Sectors: 0.75
Firm's D/E Ratio: 79%
Mature risk premium
4%
Country Risk Premium
5.23%

Tube Investments: Higher Average Return(in Rs)

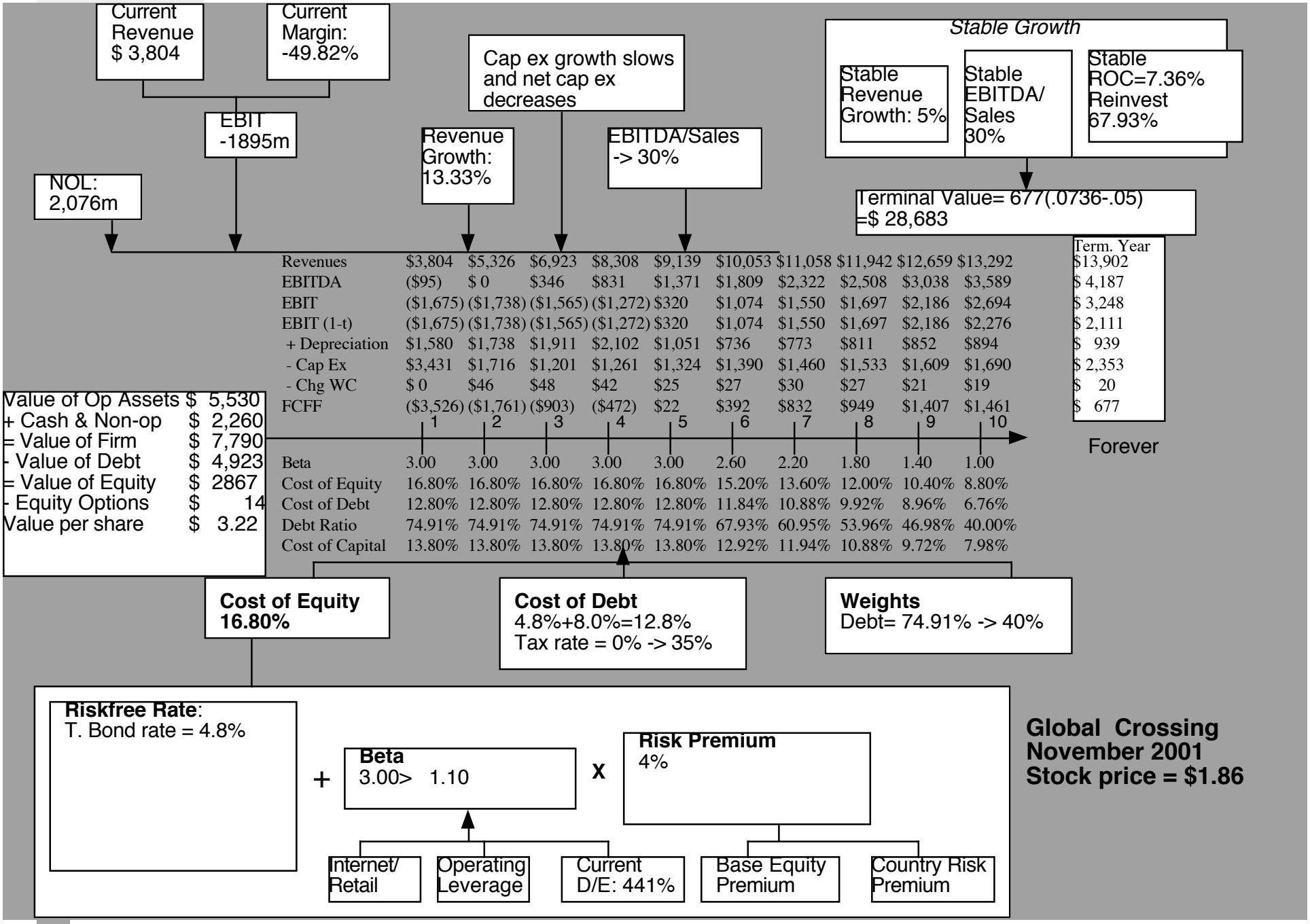


Tube Investments : Should there be a corporate governance discount?

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

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 $ 3,804
Current Margin: -49.82%
EBIT -1895m
NOL: 2,076m
Revenue Growth: 13.33%
Cap ex growth slows and net cap ex decreases
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
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
Forever
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

Valuing Global Crossing with Distress

- Probability of distress
  - Price of [illegible] $ 653

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

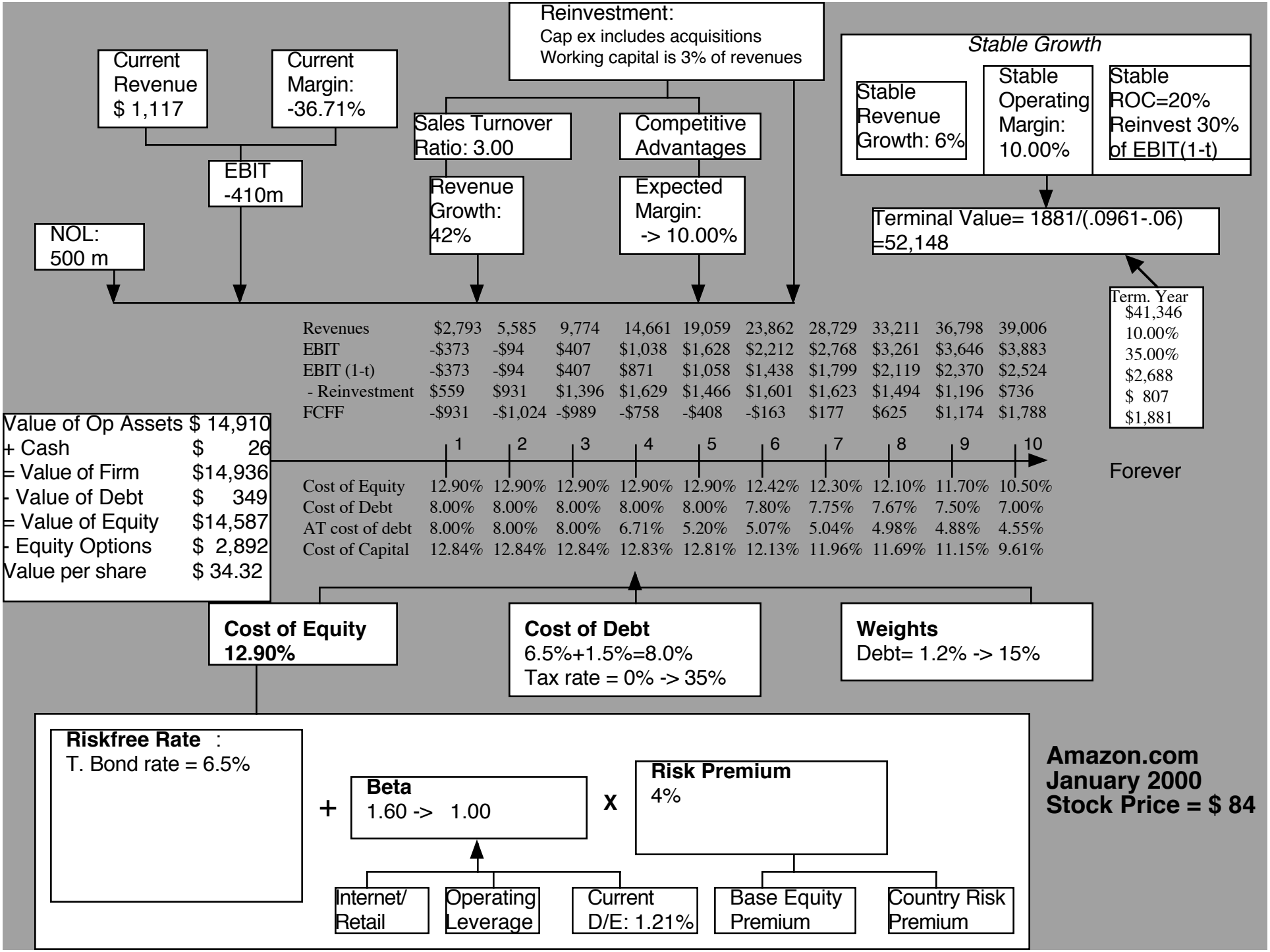
  - Probability of distress = 13.53% a year
  - Cumulative probability of survival over 10 years = $(1- .1353)^{10} = 23.37\%$
- Distress sale value of equity
  - Book value of capital = $14,531 million
  - Distress sale value = 15% of book value = .15*14531 = $2,180 million
  - Book value of debt = $7,647 million
  - Distress sale value of equity = $ 0
- Distress adjusted value of equity
  - Value of Global Crossing = $3.22 (.2337) + $0.00 (.7663) = $0.75

9. Equity Value and Per Share Value

- The conventional way of getting from equity value to per share value is to divide the equity value by the number of shares outstanding. This approach assumes, however, that common stock is the only equity claim on the firm.
- In many firms, there are other equity claims as well including:
  - warrants, that are publicly traded
  - management and employee options, that have been granted, but do not trade
  - conversion options in convertible bonds
  - contingent value rights, that are also publicly traded.
- The value of these non-stock equity claims has to be subtracted from the value of equity before dividing by the number of shares outstanding.

Amazon: 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


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

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 depend upon
  - *Type of Assets owned by the Firm*: The more liquid the assets owned by the firm, the lower should be the liquidity discount for the firm
  - *Size of the Firm*: The larger the firm, the smaller should be size of the liquidity discount.
  - *Health of the Firm*: Stock in healthier firms should sell for a smaller discount than stock in troubled firms.
  - *Cash Flow Generating Capacity*: Securities in firms which are generating large amounts of cash from operations should sell for a smaller discounts than securities in firms which do not generate large cash flows.
  - *Size of the Block*: The liquidity discount should increase with the size of the portion of the firm being sold.

Empirical Evidence on Illiquidity Discounts: Restricted Stock

- Restricted securities are securities issued by a company, but not registered with the SEC, that can be sold through private placements to investors, but cannot be resold in the open market for a two-year holding period, and limited amounts can be sold after that. Restricted securities trade at significant discounts on publicly traded shares in the same company.
  - Maher examined restricted stock purchases made by four mutual funds in the period 1969-73 and concluded that they traded an average discount of 35.43% on publicly traded stock in the same companies.
  - Moroney reported a mean discount of 35% for acquisitions of 146 restricted stock issues by 10 investment companies, using data from 1970.
  - In a recent study of this phenomenon, Silber finds that the median discount for restricted stock is 33.75%.

Cross Sectional Differences : Restricted Stock

- Silber (1991) develops the following relationship between the size of the discount and the characteristics of the firm issuing the registered stock –

  LN(RPRS) = 4.33 +0.036 LN(REV) - 0.142 LN(RBRT) + 0.174 DERN + 0.332 DCUST

  where,

  RPRS = Relative price of restricted stock (to publicly traded stock)

  REV = Revenues of the private firm (in millions of dollars)

  RBRT = Restricted Block relative to Total Common Stock in %

  DERN = 1 if earnings are positive; 0 if earnings are negative;

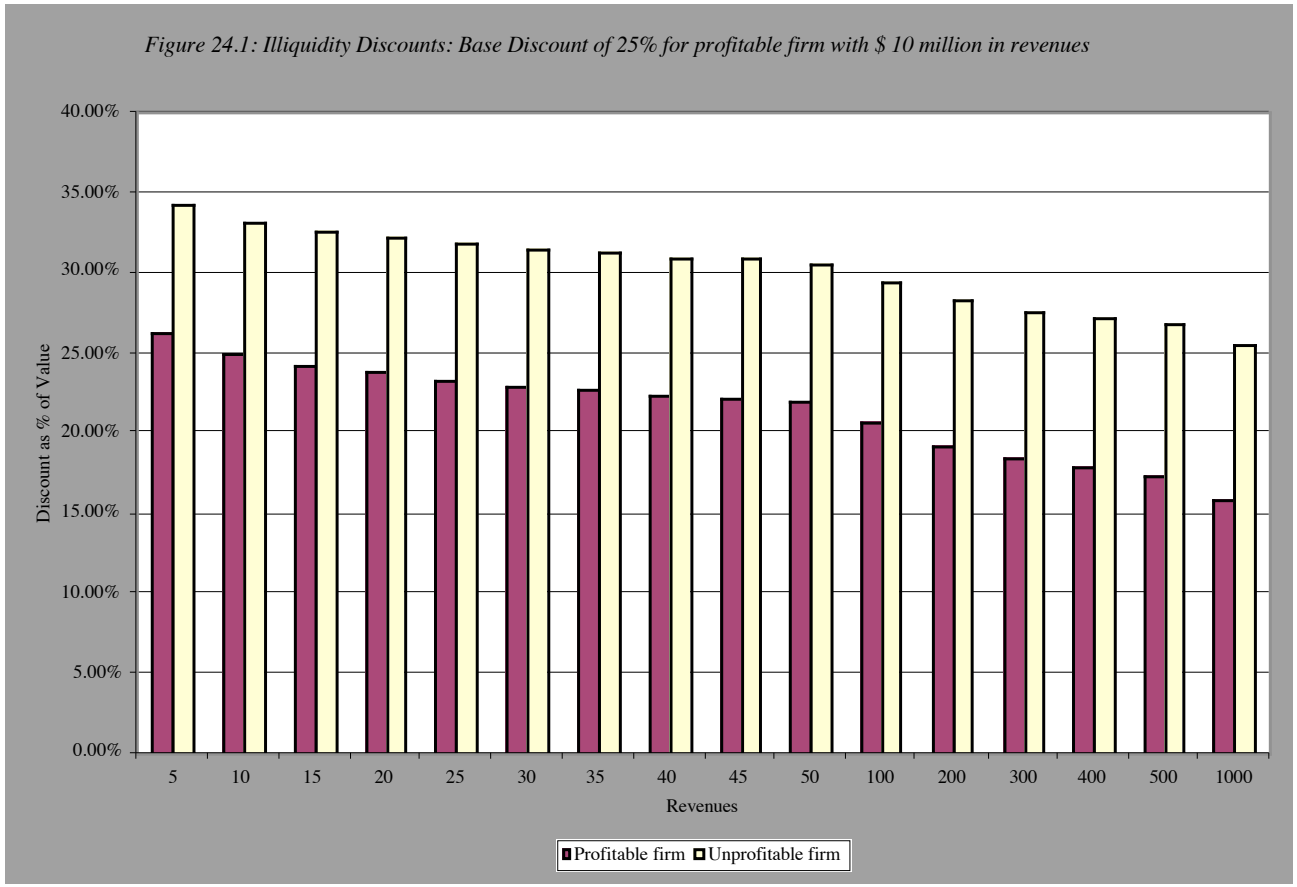
  DCUST = 1 if there is a customer relationship with the investor; 0 otherwise;

- Interestingly, Silber finds no effect of introducing a control dummy - set equal to one if there is board representation for the investor and zero otherwise.

Using the Study Results to Estimate Illiquidity Discounts

- Approach 1: Use the average liquidity discount, based upon past studies, of 25% for private firms. Adjust subjectively for size - make the discount smaller for larger firms.
- Approach 2: Estimate the discount as a function of the determinants - the size of the firm, the stability of cash flows, the type of assets and cash flow generating capacity. Plug in the values for your company into the regression to estimate the liquidity discount.

Liquidity Discount and Revenues



An Alternate Approach to the Illiquidity Discount: Bid Ask Spread

- The bid ask spread is the difference between the price at which you can buy a security and the price at which you can sell it, at the same point.
- In other words, it is the illiqudity discount on a publicly traded stock.
- Studies have tied the bid-ask spread to
  - the size of the firm
  - the trading volume on the stock
  - the degree
- Regressing the bid-ask spread against variables that can be measured for a private firm (such as revenues, cash flow generating capacity, type of assets, variance in operating income) and are also available for publicly traded firms offers promise.

A Bid-Ask Spread Regression

- 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)

- You could plug in the values for a private firm into this regression (with zero trading volume) and estimate the spread for the firm.
- To estimate the illiquidity discount for a private firm with $209 million in revenues, 3% in cash as a percent of value and positive earnings.

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 (209) -0.015 (1) – 0.016 (.03) – 0.11 (0) = .1178 or 11.78%

Returning to the beginning…

Value of Operating Assets	
+ 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?