Valuation: Lecture Note Packet 2
Relative Valuation, Asset-based valuation and Private Company Valuation

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The Essence of relative valuation?

- In relative valuation, the value of an asset is compared to the values assessed by the market for similar or comparable assets.
- To do relative valuation then,
  - we need to identify comparable assets and obtain market values for these assets
  - convert these market values into standardized values, since the absolute prices cannot be compared This process of standardizing creates price multiples.
  - compare the standardized value or multiple for the asset being analyzed to the standardized values for comparable asset, controlling for any differences between the firms that might affect the multiple, to judge whether the asset is under or over valued

Relative valuation is pervasive…

- Most asset valuations are relative.
- Most equity valuations on Wall Street are relative valuations.
  - Almost 85% of equity research reports are based upon a multiple and comparables.
  - More than 50% of all acquisition valuations are based upon multiples
  - Rules of thumb based on multiples are not only common but are often the basis for final valuation judgments.
- While there are more discounted cashflow valuations in consulting and corporate finance, they are often relative valuations masquerading as discounted cash flow valuations.
  - The objective in many discounted cashflow valuations is to back into a number that has been obtained by using a multiple.
  - The terminal value in a significant number of discounted cashflow valuations is estimated using a multiple.

Why relative valuation?

"If you think I'm crazy, you should see the guy who lives across the hall"

Jerry Seinfeld talking about Kramer in a Seinfeld episo



" A little inaccuracy sometimes saves tons of explanation"

H.H. Munro

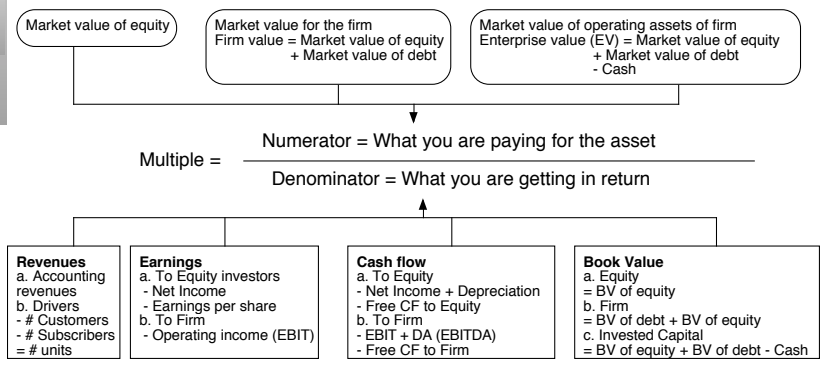
" If you are going to screw up, make sure that you have lots of company"

Ex-portfolio manager

The Market Imperative….

- Relative valuation is much more likely to reflect market perceptions and moods than discounted cash flow valuation. This can be an advantage when it is important that the price reflect these perceptions as is the case when
  - the objective is to sell a security at that price today (as in the case of an IPO)
  - investing on "momentum" based strategies
- With relative valuation, there will always be a significant proportion of securities that are under valued and over valued.
- Since portfolio managers are judged based upon how they perform on a relative basis (to the market and other money managers), relative valuation is more tailored to their needs
- Relative valuation generally requires less information than discounted cash flow valuation (especially when multiples are used as screens)

Multiples are just standardized estimates of price…



The Four Steps to Deconstructing Multiples

- Define the multiple
  - In use, the same multiple can be defined in different ways by different users. When comparing and using multiples, estimated by someone else, it is critical that we understand how the multiples have been estimated
- Describe the multiple
  - Too many people who use a multiple have no idea what its cross sectional distribution is. If you do not know what the cross sectional distribution of a multiple is, it is difficult to look at a number and pass judgment on whether it is too high or low.
- Analyze the multiple
  - It is critical that we understand the fundamentals that drive each multiple, and the nature of the relationship between the multiple and each variable.
- Apply the multiple
  - Defining the comparable universe and controlling for differences is far more difficult in practice than it is in theory.

Definitional Tests

- Is the multiple consistently defined?
  - **Proposition 1: Both the value (the numerator) and the standardizing variable (the denominator) should be to the same claimholders in the firm. In other words, the value of equity should be divided by equity earnings or equity book value, and firm value should be divided by firm earnings or book value.**
- Is the multiple uniformly estimated?
  - The variables used in defining the multiple should be estimated uniformly across assets in the "comparable firm" list.
  - If earnings-based multiples are used, the accounting rules to measure earnings should be applied consistently across assets. The same rule applies with book-value based multiples.

Example 1: Price Earnings Ratio: Definition

PE = Market Price per Share / Earnings per Share

- There are a number of variants on the basic PE ratio in use. They are based upon how the price and the earnings are defined.
- Price: is usually the current price
  is sometimes the average price for the year
- EPS: earnings per share in most recent financial year
  earnings per share in trailing 12 months (Trailing PE)
  forecasted earnings per share next year (Forward PE)
  forecasted earnings per share in future year

Example 2: Staying on PE ratios

- Assuming that you are comparing the PE ratios across technology companies, many of which have options outstanding. What measure of PE ratio would yield the most consistent comparisons?
  - Price/ Primary EPS (actual shares, no options)
  - Price/ Fully Diluted EPS (actual shares + all options)
  - Price/ Partially Diluted EPS (counting only in-the-money options)
  - Other

Example 3: Enterprise Value /EBITDA Multiple

- The enterprise value to EBITDA multiple is obtained by netting cash out against debt to arrive at enterprise value and dividing by EBITDA.

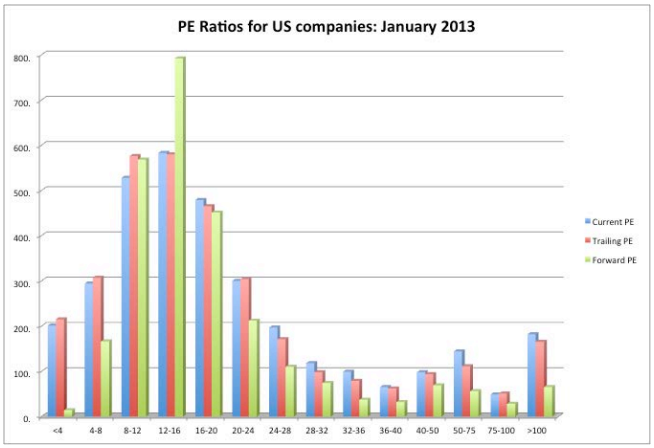
$$\frac{\text{Enterprise Value}}{\text{EBITDA}} = \frac{\text{Market Value of Equity} + \text{Market Value of Debt} - \text{Cash}}{\text{Earnings before Interest, Taxes and Depreciation}}$$

- Why do we net out cash from firm value?
- What happens if a firm has cross holdings which are categorized as:
  - Minority interests?
  - Majority active interests?

Descriptive Tests

- What is the average and standard deviation for this multiple, across the universe (market)?
- What is the median for this multiple?
  - The median for this multiple is often a more reliable comparison point.
- How large are the outliers to the distribution, and how do we deal with the outliers?
  - Throwing out the outliers may seem like an obvious solution, but if the outliers all lie on one side of the distribution (they usually are large positive numbers), this can lead to a biased estimate.
- Are there cases where the multiple cannot be estimated? Will ignoring these cases lead to a biased estimate of the multiple?
- How has this multiple changed over time?

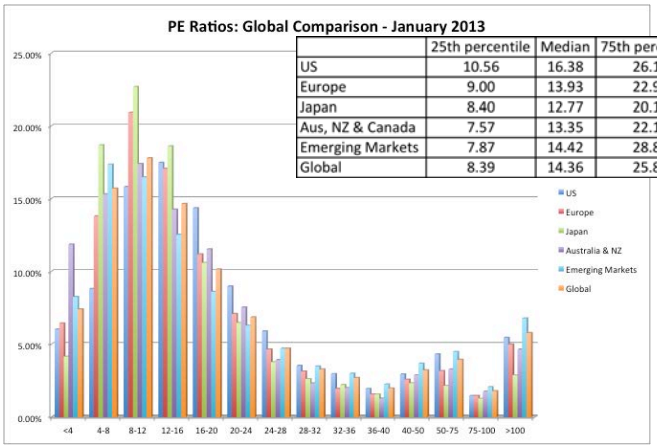
1. Multiples have skewed distributions…



2. Making statistics "dicey"

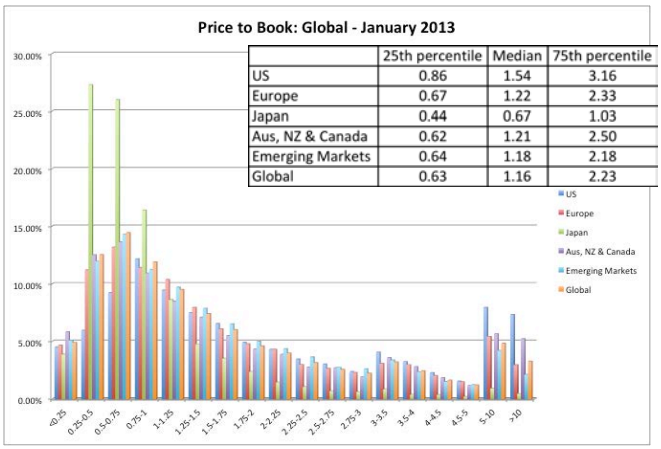
	Current PE	Trailing PE	Forward PE
Total number of firms	7871	7871	7871
Number of firms with PE	3337	3278	2674
Average	83.86	43.88	24.45
Median	16.38	15.79	14.87
Maximum	50,463.64	8,840.31	3,192.76
Standard Deviation	1,299.9	250.87	83.5
Standard Error	22.5	4.38	1.61
Skewness	34.26	22.02	28.92
Kurtosis	1,250.28	620.81	995.61
25th Percentile	10.56	10.17	11.52
75th Percentile	26.15	24.15	20.2

3. Markets have a lot in common
PE Ratios: US, Europe, Japan and Emerging Markets – January 2013



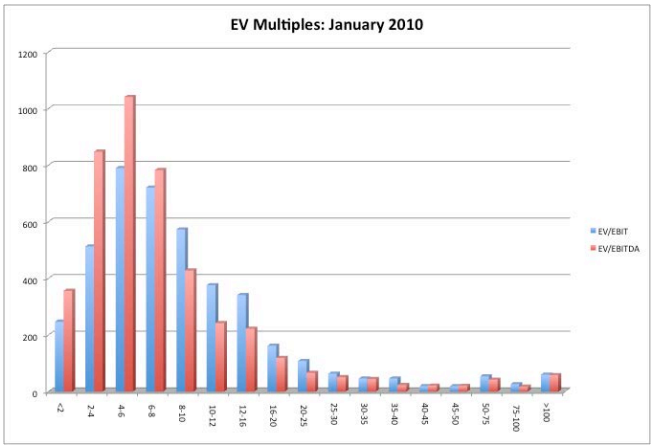
	25th percentile	Median	75th percentile
US	10.56	16.38	26.15
Europe	9.00	13.93	22.94
Japan	8.40	12.77	20.14
Aus, NZ & Canada	7.57	13.35	22.14
Emerging Markets	7.87	14.42	28.81
Global	8.39	14.36	25.88

3a. And the differences are revealing…
Price to Book Ratios across globe – January 2013

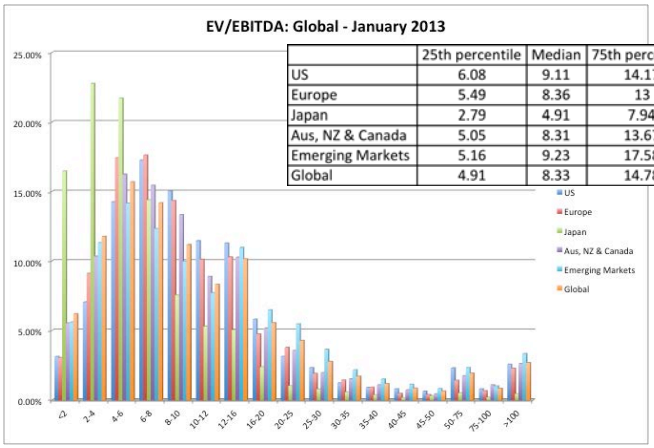


	25th percentile	Median	75th percentile
US	0.86	1.54	3.16
Europe	0.67	1.22	2.33
Japan	0.44	0.67	1.03
Aus, NZ & Canada	0.62	1.21	2.50
Emerging Markets	0.64	1.18	2.18
Global	0.63	1.16	2.23

4. Simplistic rules almost always break down…6 times EBITDA was not cheap in 2010…



But it may work in 2013… in some markets…



	25th percentile	Median	75th percentile
US	6.08	9.11	14.17
Europe	5.49	8.36	13
Japan	2.79	4.91	7.94
Aus, NZ & Canada	5.05	8.31	13.67
Emerging Markets	5.16	9.23	17.58
Global	4.91	8.33	14.78

Analytical Tests

- What are the fundamentals that determine and drive these multiples?
  - Proposition 2: Embedded in every multiple are all of the variables that drive every discounted cash flow valuation - growth, risk and cash flow patterns.
- How do changes in these fundamentals change the multiple?
  - The relationship between a fundamental (like growth) and a multiple (such as PE) is almost never linear.
  - **Proposition 3: It is impossible to properly compare firms on a multiple, if we do not know how fundamentals and the multiple move.**

Equity Multiple or Firm Multiple

Equity Multiple	Firm Multiple
1. Start with an equity DCF model (a dividend or FCFE model)	1. Start with a firm DCF model (a FCFF model)
$P_0 = \frac{DPS_1}{r - g_n}$ $\quad P_0 = \frac{FCFE_1}{\text{Cost of equity} - g_n}$	$EV_0 = \frac{FCFF_1}{\text{Cost of capital} - g_n}$
2. Isolate the denominator of the multiple in the model	2. Isolate the denominator of the multiple in the model
3. Do the algebra to arrive at the equation for the multiple	3. Do the algebra to arrive at the equation for the multiple

I . PE Ratios

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

$$P_0 = \frac{DPS_1}{r - g_n}$$

- Dividing both sides by the current earnings per share,

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

- If this had been a FCFE Model,

$$P_0 = \frac{FCFE_1}{r - g_n}$$

$$\frac{P_0}{EPS_0} = PE = \frac{(FCFE/Earnings) * (1 + g_n)}{r - g_n}$$

Using the Fundamental Model to Estimate PE For a High Growth Firm

- The price-earnings ratio for a high growth firm can also be related to fundamentals. In the special case of the two-stage dividend discount model, this relationship can be made explicit fairly simply:

$$P_0 = \frac{EPS_0 * \text{Payout Ratio} * (1+g) * \left(1 - \frac{(1+g)^n}{(1+r)^n}\right)}{r - g} + \frac{EPS_0 * \text{Payout Ratio}_n * (1+g)^n * (1+g_n)}{(r - g_n)(1+r)^n}$$

  - For a firm that does not pay what it can afford to in dividends, substitute FCFE/Earnings for the payout ratio.
- Dividing both sides by the earnings per share:

$$\frac{P_0}{EPS_0} = \frac{\text{Payout Ratio} * (1+g) * \left(1 - \frac{(1+g)^n}{(1+r)^n}\right)}{r - g} + \frac{\text{Payout Ratio}_n * (1+g)^n * (1+g_n)}{(r - g_n)(1+r)^n}$$

A Simple Example

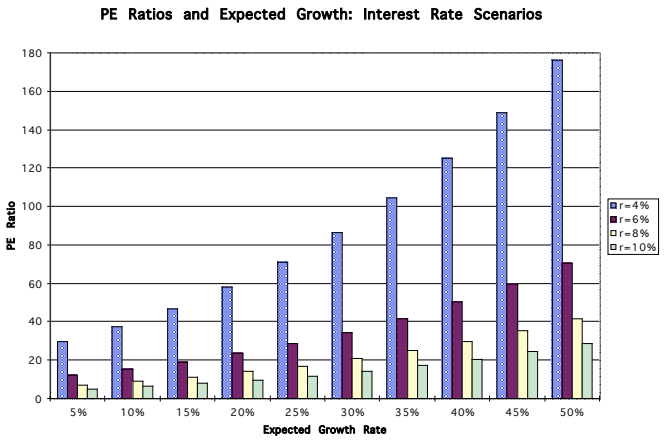
- Assume that you have been asked to estimate the PE ratio for a firm which has the following characteristics:

Variable	High Growth Phase	Stable Growth Phase
Expected Growth Rate	25%	8%
Payout Ratio	20%	50%
Beta	1.00	1.00
Number of years	5 years	Forever after year 5

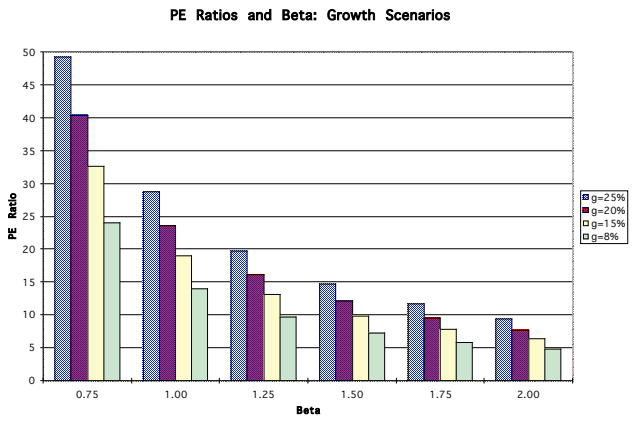
- Riskfree rate = T.Bond Rate = 6%
- Required rate of return = 6% + 1(5.5%)= 11.5%

$$PE = \frac{0.2 * (1.25) * \left(1 - \frac{(1.25)^5}{(1.115)^5}\right)}{(.115 - .25)} + \frac{0.5 * (1.25)^5 * (1.08)}{(.115 - .08)(1.115)^5} = 28.75$$

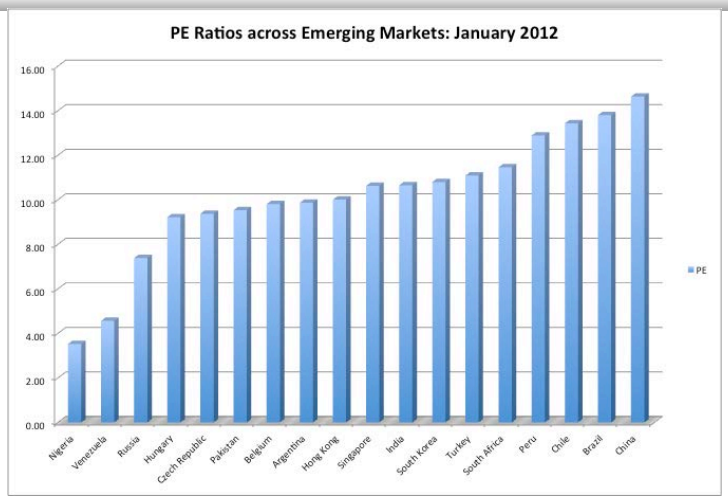
a. PE and Growth: Firm grows at x% for 5 years, 8% thereafter



b. PE and Risk: A Follow up Example



Example 1: Comparing PE ratios across Emerging Markets



Example 2: An Old Example with Emerging Markets: June 2000

Country	*PE Ratio*	*Interest Rates*	*GDP Real Growth*	*Country Risk*
Argentina	14	18.00%	2.50%	45
Brazil	21	14.00%	4.80%	35
Chile	25	9.50%	5.50%	15
Hong Kong	20	8.00%	6.00%	15
India	17	11.48%	4.20%	25
Indonesia	15	21.00%	4.00%	50
Malaysia	14	5.67%	3.00%	40
Mexico	19	11.50%	5.50%	30
Pakistan	14	19.00%	3.00%	45
Peru	15	18.00%	4.90%	50
Phillipines	15	17.00%	3.80%	45
Singapore	24	6.50%	5.20%	5
South Korea	21	10.00%	4.80%	25
Thailand	21	12.75%	5.50%	25
Turkey	12	25.00%	2.00%	35
Venezuela	20	15.00%	3.50%	45

Regression Results

- The regression of PE ratios on these variables provides the following –

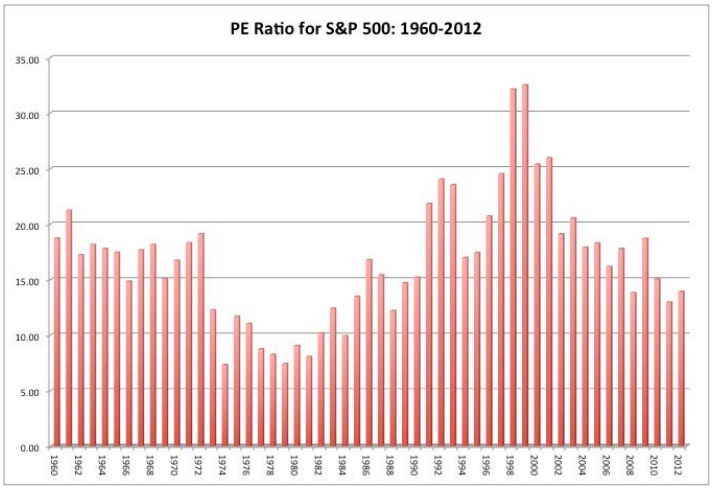
PE = 16.16 - 7.94 Interest Rates
+ 154.40 Growth in GDP
- 0.1116 Country Risk

R Squared = 73%

Predicted PE Ratios

Country	*PE Ratio*	*Interest Rates*	*GDP Real Growth*	*Country Risk*	*Predicted PE*
Argentina	14	18.00%	2.50%	45	13.57
Brazil	21	14.00%	4.80%	35	18.55
Chile	25	9.50%	5.50%	15	22.22
Hong Kong	20	8.00%	6.00%	15	23.11
India	17	11.48%	4.20%	25	18.94
Indonesia	15	21.00%	4.00%	50	15.09
Malaysia	14	5.67%	3.00%	40	15.87
Mexico	19	11.50%	5.50%	30	20.39
Pakistan	14	19.00%	3.00%	45	14.26
Peru	15	18.00%	4.90%	50	16.71
Phillipines	15	17.00%	3.80%	45	15.65
Singapore	24	6.50%	5.20%	5	23.11
South Korea	21	10.00%	4.80%	25	19.98
Thailand	21	12.75%	5.50%	25	20.85
Turkey	12	25.00%	2.00%	35	13.35
Venezuela	20	15.00%	3.50%	45	15.35

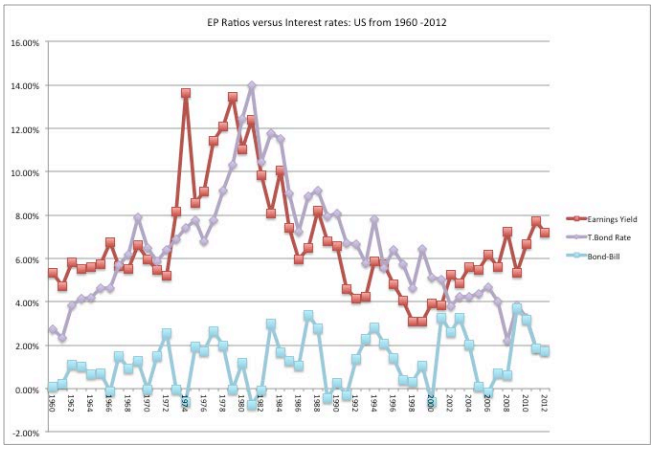
Example 3: Comparisons of PE across time: PE Ratio for the S&P 500



Is low (high) PE cheap (expensive)?

- A market strategist argues that stocks are cheap because the PE ratio today is low relative to the average PE ratio across time. Do you agree?
  - Yes
  - No
- If you do not agree, what factors might explain the lower PE ratio today?

E/P Ratios , T.Bond Rates and Term Structure



Regression Results

- There is a strong positive relationship between E/P ratios and T.Bond rates, as evidenced by the correlation of 0.69 between the two variables.,
- In addition, there is evidence that the term structure also affects the PE ratio.
- In the following regression, using 1960-2012 data, we regress E/P ratios against the level of T.Bond rates and a term structure variable (T.Bond - T.Bill rate)

  E/P = 3.45% + 0.5599 T.Bond Rate – 0.1971 (T.Bond Rate-T.Bill Rate)
  (3.98) (5.41) (-0.83)

  R squared = 37.89%

Given the treasury bond rate and treasury bill rate today, is the market under or over valued today?

- The R squared of this regression has dropped from about 50% in 2008 to about 38% today. How would you interpret this result?

II. PEG Ratio

- PEG Ratio = PE ratio/ Expected Growth Rate in EPS
  - For consistency, you should make sure that your earnings growth reflects the EPS that you use in your PE ratio computation.
  - The growth rates should preferably be over the same time period.
- To understand the fundamentals that determine PEG ratios, let us return again to a 2-stage equity discounted cash flow model

$$P_0 = \frac{EPS_0 * \text{Payout Ratio} * (1+g) * \left(1 - \frac{(1+g)^n}{(1+r)^n}\right)}{r - g} + \frac{EPS_0 * \text{Payout Ratio}_n * (1+g)^n * (1+g_n)}{(r - g_n)(1+r)^n}$$

- Dividing both sides of the equation by the earnings gives us the equation for the PE ratio. Dividing it again by the expected growth 'g'

$$PEG = \frac{\text{Payout Ratio} * (1+g) * \left(1 - \frac{(1+g)^n}{(1+r)^n}\right)}{g(r - g)} + \frac{\text{Payout Ratio}_n * (1+g)^n * (1+g_n)}{g(r - g_n)(1+r)^n}$$

PEG Ratios and Fundamentals

- Risk and payout, which affect PE ratios, continue to affect PEG ratios as well.
  - Implication: When comparing PEG ratios across companies, we are making implicit or explicit assumptions about these variables.
- Dividing PE by expected growth does not neutralize the effects of expected growth, since the relationship between growth and value is not linear and fairly complex (even in a 2-stage model)

A Simple Example

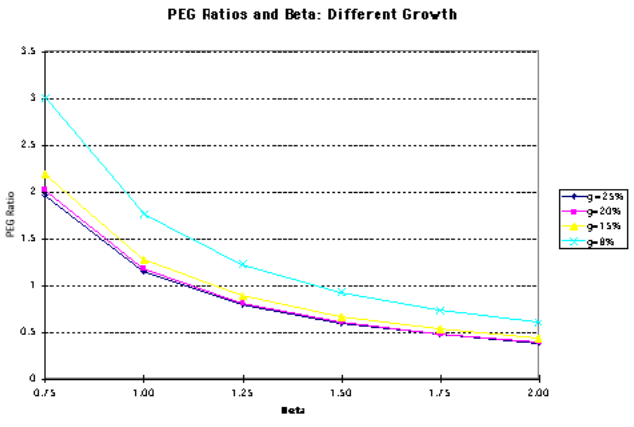
- Assume that you have been asked to estimate the PEG ratio for a firm which has the following characteristics:

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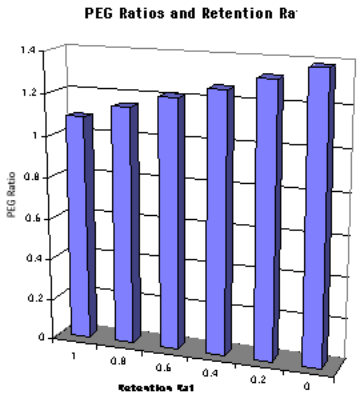
- Riskfree rate = T.Bond Rate = 6%
- Required rate of return = 6% + 1(5.5%)= 11.5%
- The PEG ratio for this firm can be estimated as follows:

$$PEG = \frac{0.2 * (1.25) * \left(1 - \frac{(1.25)^5}{(1.115)^5}\right)}{.25(.115 - .25)} + \frac{0.5 * (1.25)^5 * (1.08)}{.25(.115 - .08)(1.115)^5} = 115 \text{ or } 1.15$$

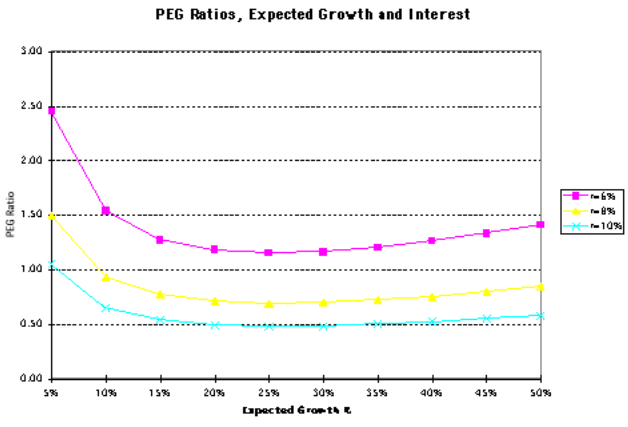
PEG Ratios and Risk



PEG Ratios and Quality of Growth



PE Ratios and Expected Growth



PEG Ratios and Fundamentals: Propositions

- Proposition 1: High risk companies will trade at much lower PEG ratios than low risk companies with the same expected growth rate.
  - Corollary 1: The company that looks most under valued on a PEG ratio basis in a sector may be the riskiest firm in the sector
- Proposition 2: Companies that can attain growth more efficiently by investing less in better return projects will have higher PEG ratios than companies that grow at the same rate less efficiently.
  - Corollary 2: Companies that look cheap on a PEG ratio basis may be companies with high reinvestment rates and poor project returns.
- Proposition 3: Companies with very low or very high growth rates will tend to have higher PEG ratios than firms with average growth rates. This bias is worse for low growth stocks.
  - Corollary 3: PEG ratios do not neutralize the growth effect.

III. Price to Book Ratio

- Going back to a simple dividend discount model,

$$P_0 = \frac{DPS_1}{r - g_n}$$

- Defining the return on equity (ROE) = EPS_0 / Book Value of Equity, the value of equity can be written as:

$$P_0 = \frac{BV_0 * ROE * \text{Payout Ratio} * (1+g_n)}{r - g_n}$$

$$\frac{P_0}{BV_0} = PBV = \frac{ROE * \text{Payout Ratio} * (1+g_n)}{r - g_n}$$

- If the return on equity is based upon expected earnings in the next time period, this can be simplified to,

$$\frac{P_0}{BV_0} = PBV = \frac{ROE * \text{Payout Ratio}}{r - g_n}$$

Price Book Value Ratio: Stable Growth Firm
Another Presentation

- This formulation can be simplified even further by relating growth to the return on equity:

$$g = (1 - \text{Payout ratio}) * ROE$$

- Substituting back into the P/BV equation,

$$\frac{P_0}{BV_0} = PBV = \frac{ROE - g_n}{r - g_n}$$

- The price-book value ratio of a stable firm is determined by the differential between the return on equity and the required rate of return on its projects.
- Building on this equation, a company that is expected to generate a ROE higher (lower than, equal to) its cost of equity should trade at a price to book ratio higher (less than, equal to) one.

Now changing to an Enterprise value multiple
EV/ Book Capital

- To see the determinants of the value/book ratio, consider the simple free cash flow to the firm model:

$$V_0 = \frac{FCFF_1}{WACC - g}$$

- Dividing both sides by the book value, we get:

$$\frac{V_0}{BV} = \frac{FCFF_1/BV}{WACC - g}$$

- If we replace, FCFF = EBIT(1-t) - (g/ROC) EBIT(1-t),we get

$$\frac{V_0}{BV} = \frac{ROC - g}{WACC - g}$$

IV. EV to EBITDA - Determinants

- The value of the operating assets of a firm can be written as:

$$EV_0 = \frac{FCFF_1}{WACC - g}$$

- Now the value of the firm can be rewritten as

$$EV = \frac{EBITDA\,(1 - t) + Depr\,(t) - Cex - \Delta\,Working\ Capital}{WACC - g}$$

- Dividing both sides of the equation by EBITDA,

$$\frac{EV}{EBITDA} = \frac{(1 - t)}{WACC - g} + \frac{Depr\,(t)/EBITDA}{WACC - g} - \frac{CEx/EBITDA}{WACC - g} - \frac{\Delta\,Working\ Capital/EBITDA}{WACC - g}$$

- The determinants of EV/EBITDA are:
  - The cost of capital
  - Expected growth rate
  - Tax rate
  - Reinvestment rate (or ROC)

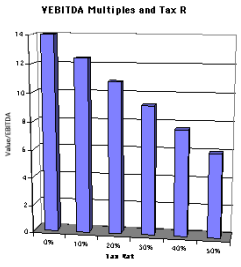
A Simple Example

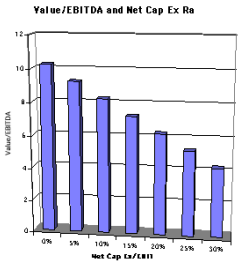
- Consider a firm with the following characteristics:
  - Tax Rate = 36%
  - Capital Expenditures/EBITDA = 30%
  - Depreciation/EBITDA = 20%
  - Cost of Capital = 10%
  - The firm has no working capital requirements
  - The firm is in stable growth and is expected to grow 5% a year forever.
- In this case, the Value/EBITDA multiple for this firm can be estimated as follows:

$$\frac{Value}{EBITDA} = \frac{(1 - .36)}{.10 - .05} + \frac{(0.2)(.36)}{.10 - .05} - \frac{0.3}{.10 - .05} - \frac{0}{.10 - .05} = 8.24$$

The Determinants of EV/EBITDA

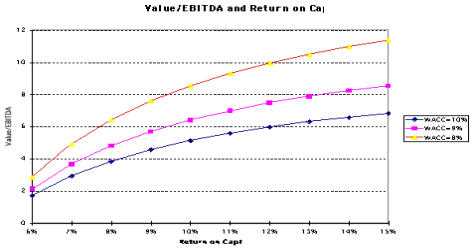
Tax Rates





Reinvestment Needs

Excess Returns



V. EV/Sales Ratio

- If pre-tax operating margins are used, the appropriate value estimate is that of the firm. In particular, if one makes the assumption that
  - Free Cash Flow to the Firm = EBIT (1 - tax rate) (1 - Reinvestment Rate)
- Then the Value of the Firm can be written as a function of the after-tax operating margin= (EBIT (1-t)/Sales

$$\frac{\text{Value}}{\text{Sales}_0} = \text{After - tax Oper. Margin} * \left[\frac{(1 - \text{RIR}_{\text{growth}})(1+g) * \left(1 - \frac{(1+g)^n}{(1+\text{WACC})^n}\right)}{\text{WACC} - g} + \frac{(1 - \text{RIR}_{\text{stable}})(1+g)^n * (1+g_n)}{(\text{WACC} - g_n)(1+\text{WACC})^n} \right]$$

g = Growth rate in after-tax operating income for the first n years

g_n = Growth rate in after-tax operating income after n years forever (Stable growth rate)

$\text{RIR}_{\text{Growth, Stable}}$ = Reinvestment rate in high growth and stable periods

WACC = Weighted average cost of capital

The value of a brand name

- One of the critiques of traditional valuation is that is fails to consider the value of brand names and other intangibles.
- The approaches used by analysts to value brand names are often ad-hoc and may significantly overstate or understate their value.
- One of the benefits of having a well-known and respected brand name is that firms can charge higher prices for the same products, leading to higher profit margins and hence to higher price-sales ratios and firm value. The larger the price premium that a firm can charge, the greater is the value of the brand name.
- In general, the value of a brand name can be written as:

  Value of brand name $=\{(V/S)_b-(V/S)_g\}$* Sales

  $(V/S)_b$ = Value of Firm/Sales ratio with the benefit of the brand name

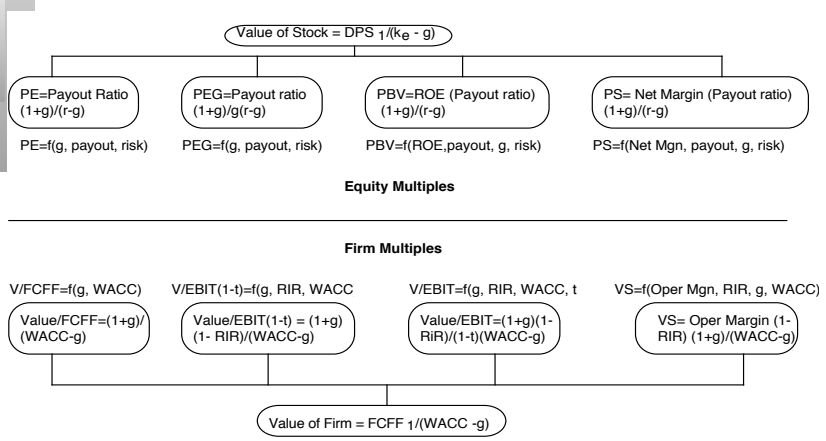
  (V/S)g = Value of Firm/Sales ratio of the firm with the generic product

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**

Value of brand name = $79,611 -$15,371 = $64,240 million

The Determinants of Multiples…



Application Tests

- Given the firm that we are valuing, what is a "comparable" firm?
  - While traditional analysis is built on the premise that firms in the same sector are comparable firms, valuation theory would suggest that a comparable firm is one which is similar to the one being analyzed in terms of fundamentals.
  - **Proposition 4: There is no reason why a firm cannot be compared with another firm in a very different business, if the two firms have the same risk, growth and cash flow characteristics.**
- Given the comparable firms, how do we adjust for differences across firms on the fundamentals?
  - **Proposition 5: It is impossible to find an exactly identical firm to the one you are valuing.**

Valuing one company relative to others… Relative valuation with comparables

- Ideally, you would like to find lots of publicly traded firms that look just like your firm, in terms of fundamentals, and compare the pricing of your firm to the pricing of these other publicly traded firms. Since, they are all just like your firm, there will be no need to control for differences.
- In practice, it is very difficult (and perhaps impossible) to find firms that share the same risk, growth and cash flow characteristics of your firm. Even if you are able to find such firms, they will very few in number. The trade off then becomes:



Techniques for comparing across firms

- Direct comparisons: If the comparable firms are "just like" your firm, you can compare multiples directly across the firms and conclude that your firm is expensive (cheap) if it trades at a multiple higher (lower) than the other firms.
- Story telling: If there is a key dimension on which the firms vary, you can tell a story based upon your understanding of how value varies on that dimension.
  - An example: This company trades at 12 times earnings, whereas the rest of the sector trades at 10 times earnings, but I think it is cheap because it has a much higher growth rate than the rest of the sector.
- Modified multiple: You can modify the multiple to incorporate the dimension on which there are differences across firms.
- Statistical techniques: If your firms vary on more than one dimension, you can try using multiple regressions (or variants thereof) to arrive at a "controlled" estimate for your firm.

Example 1: Let's try some story telling
Comparing PE ratios across firms in a sector

Company Name	*Trailing PE*	*Expected Growth*	*Standard Dev*
Coca-Cola Bottling	29.18	9.50%	20.58%
Molson Inc. Ltd. 'A'	43.65	15.50%	21.88%
Anheuser-Busch	24.31	11.00%	22.92%
Corby Distilleries Ltd.	16.24	7.50%	23.66%
Chalone Wine Group Ltd.	21.76	14.00%	24.08%
Andres Wines Ltd. 'A'	8.96	3.50%	24.70%
Todhunter Int'l	8.94	3.00%	25.74%
Brown-Forman 'B'	10.07	11.50%	29.43%
Coors (Adolph) 'B'	23.02	10.00%	29.52%
PepsiCo, Inc.	33.00	10.50%	31.35%
Coca-Cola	44.33	19.00%	35.51%
Boston Beer 'A'	10.59	17.13%	39.58%
Whitman Corp.	25.19	11.50%	44.26%
Mondavi (Robert) 'A'	16.47	14.00%	45.84%
Coca-Cola Enterprises	37.14	27.00%	51.34%
Hansen Natural Corp	9.70	17.00%	62.45%

A Question

You are reading an equity research report on this sector, and the analyst claims that Andres Wine and Hansen Natural are under valued because they have low PE ratios. Would you agree?

- Yes
- No

- Why or why not?

Example 2: Fact-based story telling
Comparing PE Ratios across a Sector: PE

Company Name	PE	Growth
PT Indosat ADR	7.8	0.06
Telebras ADR	8.9	0.075
Telecom Corporation of New Zealand ADR	11.2	0.11
Telecom Argentina Stet - France Telecom SA ADR B	12.5	0.08
Hellenic Telecommunication Organization SA ADR	12.8	0.12
Telecomunicaciones de Chile ADR	16.6	0.08
Swisscom AG ADR	18.3	0.11
Asia Satellite Telecom Holdings ADR	19.6	0.16
Portugal Telecom SA ADR	20.8	0.13
Telefonos de Mexico ADR L	21.1	0.14
Matav RT ADR	21.5	0.22
Telstra ADR	21.7	0.12
Gilat Communications	22.7	0.31
Deutsche Telekom AG ADR	24.6	0.11
British Telecommunications PLC ADR	25.7	0.07
Tele Danmark AS ADR	27	0.09
Telekomunikasi Indonesia ADR	28.4	0.32
Cable & Wireless PLC ADR	29.8	0.14
APT Satellite Holdings ADR	31	0.33
Telefonica SA ADR	32.5	0.18
Royal KPN NV ADR	35.7	0.13
Telecom Italia SPA ADR	42.2	0.14
Nippon Telegraph & Telephone ADR	44.3	0.2
France Telecom SA ADR	45.2	0.19
Korea Telecom ADR	71.3	0.44

PE, Growth and Risk

Dependent variable is: PE

R squared = 66.2% R squared (adjusted) = 63.1%

Variable	Coefficient	SE	t-ratio	prob
Constant	13.1151	3.471	3.78	0.0010
Growth rate	121.223	19.27	6.29	≤ 0.0001
Emerging Market	-13.8531	3.606	-3.84	0.0009

Emerging Market is a dummy: 1 if emerging market
0 if not

Is Telebras under valued?

- Predicted PE = 13.12 + 121.22 (.075) - 13.85 (1) = 8.35
- At an actual price to earnings ratio of 8.9, Telebras is slightly overvalued.

Example 3: An Eyeballing Exercise with P/BV Ratios European Banks in 2010

Name	*PBV Ratio*	*Return on Equity*	*Standard Deviation*
BAYERISCHE HYPO-UND VEREINSB	0.80	-1.66%	49.06%
COMMERZBANK AG	1.09	-6.72%	36.21%
DEUTSCHE BANK AG -REG	1.23	1.32%	35.79%
BANCA INTESA SPA	1.66	1.56%	34.14%
BNP PARIBAS	1.72	12.46%	31.03%
BANCO SANTANDER CENTRAL HISP	1.86	11.06%	28.36%
SANPAOLO IMI SPA	1.96	8.55%	26.64%
BANCO BILBAO VIZCAYA ARGENTA	1.98	11.17%	18.62%
SOCIETE GENERALE	2.04	9.71%	22.55%
ROYAL BANK OF SCOTLAND GROUP	2.09	20.22%	18.35%
HBOS PLC	2.15	22.45%	21.95%
BARCLAYS PLC	2.23	21.16%	20.73%
UNICREDITO ITALIANO SPA	2.30	14.86%	13.79%
KREDIETBANK SA LUXEMBOURGEOI	2.46	17.74%	12.38%
ERSTE BANK DER OESTER SPARK	2.53	10.28%	21.91%
STANDARD CHARTERED PLC	2.59	20.18%	19.93%
HSBC HOLDINGS PLC	2.94	18.50%	19.66%
LLOYDS TSB GROUP PLC	3.33	32.84%	18.66%
Average	2.05	12.54%	24.99%
Median	2.07	11.82%	21.93%

The median test…

- We are looking for stocks that trade at low price to book ratios, while generating high returns on equity, with low risk. But what is a low price to book ratio? Or a high return on equity? Or a low risk
- One simple measure of what is par for the sector are the median values for each of the variables. A simplistic decision rule on under and over valued stocks would therefore be:
  - Undervalued stocks: Trade at price to book ratios below the median for the sector,(2.07), generate returns on equity higher than the sector median (11.82%) and have standard deviations lower than the median (21.93%).
  - Overvalued stocks: Trade at price to book ratios above the median for the sector and generate returns on equity lower than the sector median.

How about this mechanism?

- We are looking for stocks that trade at low price to book ratios, while generating high returns on equity. But what is a low price to book ratio? Or a high return on equity?
- Taking the sample of 18 banks, we ran a regression of PBV against ROE and standard deviation in stock prices (as a proxy for risk).

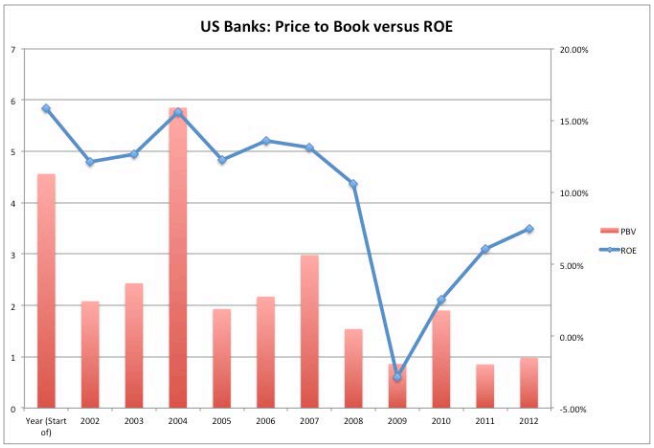
PBV =	2.27	+	3.63 ROE	-	2.68 Std dev
	(5.56)		(3.32)		(2.33)

R squared of regression = 79%

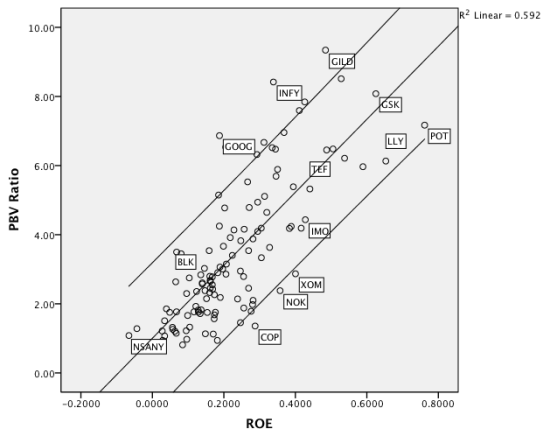
And these predictions?

Name	PBV Ratio	Return on Equity	Standard Deviation	Predicted PBV	Under/Over (%)
BAYERISCHE HYPO-UND VEREINSB	0.80	-1.66%	49.06%	0.89	-10.60%
COMMERZBANK AG	1.09	-6.72%	36.21%	1.05	3.25%
DEUTSCHE BANK AG -REG	1.23	1.32%	35.79%	1.36	-9.26%
BANCA INTESA SPA	1.66	1.56%	34.14%	1.41	17.83%
BNP PARIBAS	1.72	12.46%	31.03%	1.89	-8.75%
BANCO SANTANDER CENTRAL HISP	1.86	11.06%	28.36%	1.91	-2.66%
SANPAOLO IMI SPA	1.96	8.55%	26.64%	1.86	5.23%
BANCO BILBAO VIZCAYA ARGENTA	1.98	11.17%	18.62%	2.17	-9.12%
SOCIETE GENERALE	2.04	9.71%	22.55%	2.02	1.37%
ROYAL BANK OF SCOTLAND GROUP	2.09	20.22%	18.35%	2.51	-16.65%
HBOS PLC	2.15	22.45%	21.95%	2.49	-13.71%
BARCLAYS PLC	2.23	21.16%	20.73%	2.48	-9.96%
UNICREDITO ITALIANO SPA	2.30	14.86%	13.79%	2.44	-5.72%
KREDIETBANK SA LUXEMBOURGEOI	2.46	17.74%	12.38%	2.58	-4.79%
ERSTE BANK DER OESTER SPARK	2.53	10.28%	21.91%	2.05	23.11%
STANDARD CHARTERED PLC	2.59	20.18%	19.93%	2.47	5.00%
HSBC HOLDINGS PLC	2.94	18.50%	19.66%	2.41	21.91%
LLOYDS TSB GROUP PLC	3.33	32.84%	18.66%	2.96	12.40%

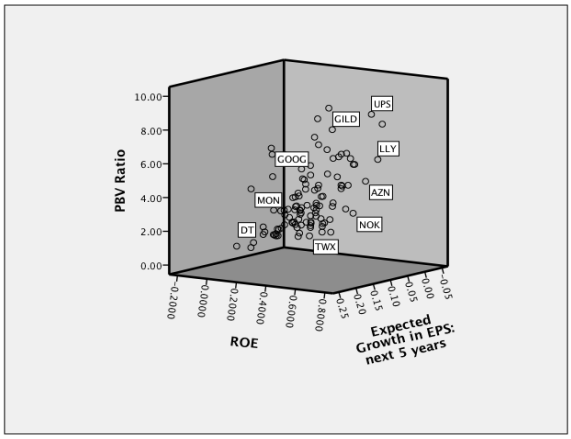
A follow up on US Banks



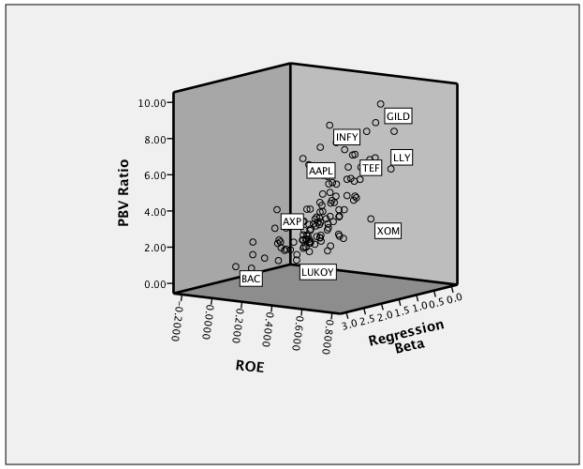
Example 4: A larger sample
Price to Book vs ROE: Largest Market Cap Firms in the United States: January 2010



Missing growth?



PBV, ROE and Risk: Large Cap US firms



al

Bringing it all together… Largest US stocks in January 2010

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.819[a]	.670	.661	1.19253

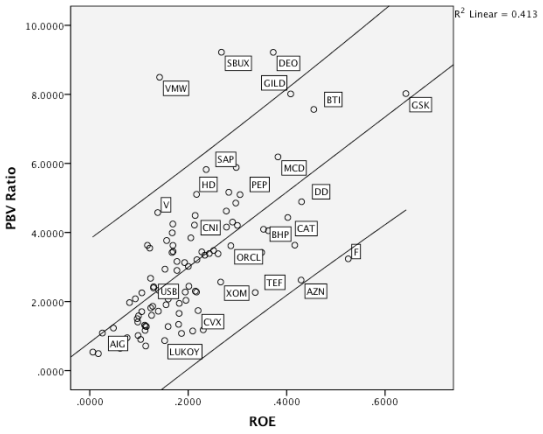
a. Predictors: (Constant), ROE, Expected Growth in EPS: next 5 years, Regression Beta

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.406	.424		.958	.340
	Regression Beta	-.065	.253	-.015	-.256	.799
	Expected Growth in EPS: next 5 years	9.340	2.366	.228	3.947	.000
	ROE	10.546	.771	.777	13.672	.000

a. Dependent Variable: PBV Ratio

Updated PBV Ratios – Largest Market Cap US companies
Updated to January 2013



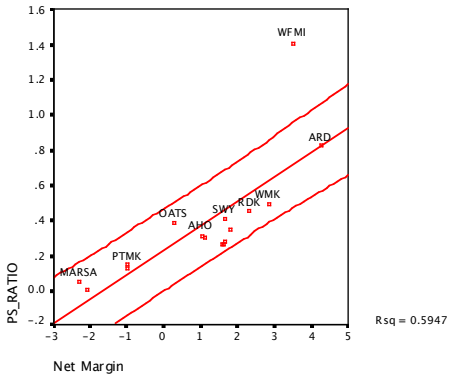
Example 5: Overlooked fundamentals?
EV/EBITDA Multiple for Trucking Companies

Company Name	Value	EBITDA	Value/EBITDA
KLLM Trans. Svcs.	$ 114.32	$ 48.81	2.34
Ryder System	$ 5,158.04	$ 1,838.26	2.81
Rollins Truck Leasing	$ 1,368.35	$ 447.67	3.06
Cannon Express Inc.	$ 83.57	$ 27.05	3.09
Hunt (J.B.)	$ 982.67	$ 310.22	3.17
Yellow Corp.	$ 931.47	$ 292.82	3.18
Roadway Express	$ 554.96	$ 169.38	3.28
Marten Transport Ltd.	$ 116.93	$ 35.62	3.28
Kenan Transport Co.	$ 67.66	$ 19.44	3.48
M.S. Carriers	$ 344.93	$ 97.85	3.53
Old Dominion Freight	$ 170.42	$ 45.13	3.78
Trimac Ltd	$ 661.18	$ 174.28	3.79
Matlack Systems	$ 112.42	$ 28.94	3.88
XTRA Corp.	$ 1,708.57	$ 427.30	4.00
Covenant Transport Inc	$ 259.16	$ 64.35	4.03
Builders Transport	$ 221.09	$ 51.44	4.30
Werner Enterprises	$ 844.39	$ 196.15	4.30
Landstar Sys.	$ 422.79	$ 95.20	4.44
AMERCO	$ 1,632.30	$ 345.78	4.72
USA Truck	$ 141.77	$ 29.93	4.74
Frozen Food Express	$ 164.17	$ 34.10	4.81
Arnold Inds.	$ 472.27	$ 96.88	4.87
Greyhound Lines Inc.	$ 437.71	$ 89.61	4.88
USFreightways	$ 983.86	$ 198.91	4.95
Golden Eagle Group Inc.	$ 12.50	$ 2.33	5.37
Arkansas Best	$ 578.78	$ 107.15	5.40
Airlease Ltd.	$ 73.64	$ 13.48	5.46
Celadon Group	$ 182.30	$ 32.72	5.57
Amer. Freightways	$ 716.15	$ 120.94	5.92
Transfinancial Holdings	$ 56.92	$ 8.79	6.47
Vitran Corp. 'A'	$ 140.68	$ 21.51	6.54
Interpool Inc.	$ 1,002.20	$ 151.18	6.63
Intrenet Inc.	$ 70.23	$ 10.38	6.77
Swift Transportation	$ 835.58	$ 121.34	6.89
Landair Services	$ 212.95	$ 30.38	7.01
CNF Transportation	$ 2,700.69	$ 366.99	7.36
Budget Group Inc	$ 1,247.30	$ 166.71	7.48
Caliber System	$ 2,514.99	$ 333.13	7.55
Knight Transportation Inc	$ 269.01	$ 28.20	9.54
Heartland Express	$ 727.50	$ 64.62	11.26
Greyhound CDA Transn Corp	$ 83.25	$ 6.99	11.91
Mark VII	$ 160.45	$ 12.96	12.38
Coach USA Inc	$ 678.38	$ 51.76	13.11
US 1 Inds Inc.	$ 5.60	$ (0.17)	NA
Average			**5.61**

A Test on EBITDA

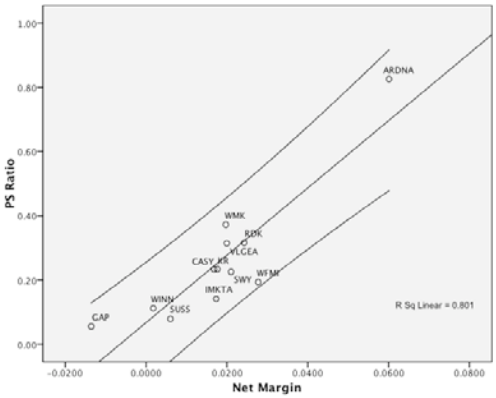
- Ryder System looks very cheap on a Value/EBITDA multiple basis, relative to the rest of the sector. What explanation (other than misvaluation) might there be for this difference?
- What general lessons would you draw from this on the EV/EBITDA multiples for infrastructure companies as their infrastructure ages?

Example 6: Relative valuation across time Price to Sales Multiples: Grocery Stores - US in January 2007



Whole Foods: In 2007: Net Margin was 3.41% and Price/ Sales ratio was 1.41
Predicted Price to Sales = 0.07 + 10.49 (0.0341) = 0.43

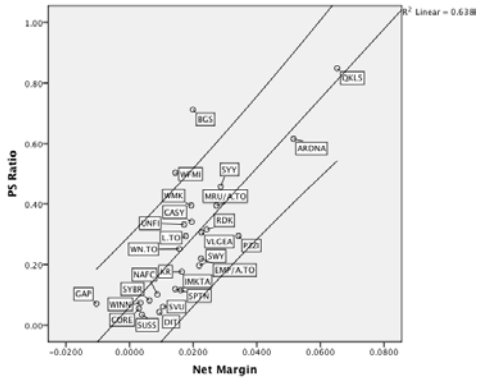
Reversion to normalcy: Grocery Stores - US in January 2009



Whole Foods: In 2009, Net Margin had dropped to 2.77% and Price to Sales ratio was down to 0.31.

Predicted Price to Sales = 0.07 + 10.49 (.0277) = 0.36

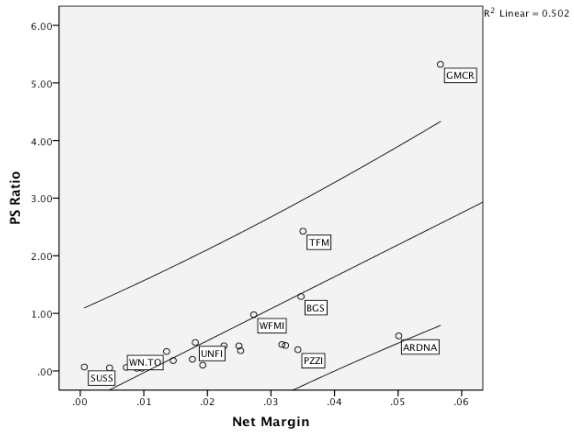
And again in 2010..



Whole Foods: In 2010, Net Margin had dropped to 1.44% and Price to Sales ratio increased to 0.50.

Predicted Price to Sales = 0.06 + 11.43 (.0144) = 0.22

Here is 2011…

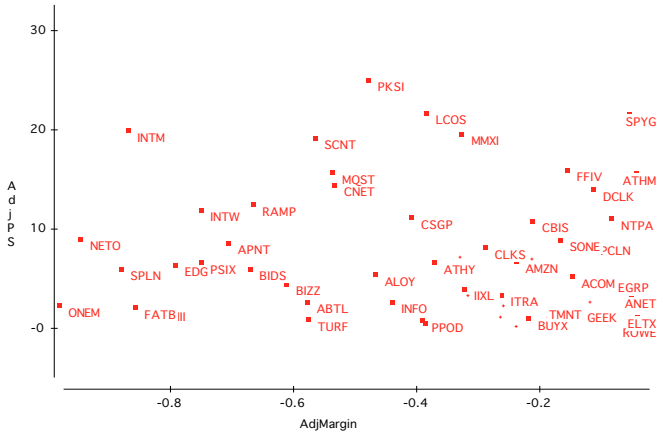


PS Ratio= - 0.585 + 55.50 (Net Margin) R^2= 48.2%

PS Ratio for WFMI = -0.585 + 55.50 (.0273) = 0.93

At a PS ratio of 0.98, WFMI is slightly over valued.

Example 7: Desperation Time
Nothing's working!!! Internet Stocks in early 2000..



PS Ratios and Margins are not highly correlated

- Regressing PS ratios against current margins yields the following

  PS = 81.36 - 7.54(Net Margin) $R^2 = 0.04$
  (0.49)

- This is not surprising. These firms are priced based upon expected margins, rather than current margins.

Solution 1: Use proxies for survival and growth: Amazon in early 2000

- Hypothesizing that firms with higher revenue growth and higher cash balances should have a greater chance of surviving and becoming profitable, we ran the following regression: (The level of revenues was used to control for size)

PS = 30.61 - 2.77 ln(Rev) + 6.42 (Rev Growth) + 5.11 (Cash/Rev)
(0.66) (2.63) (3.49)

R squared = 31.8%

Predicted PS = 30.61 - 2.77(7.1039) + 6.42(1.9946) + 5.11 (.3069) = 30.42

Actual PS = 25.63

Stock is undervalued, relative to other internet stocks.

Solution 2: Use forward multiples

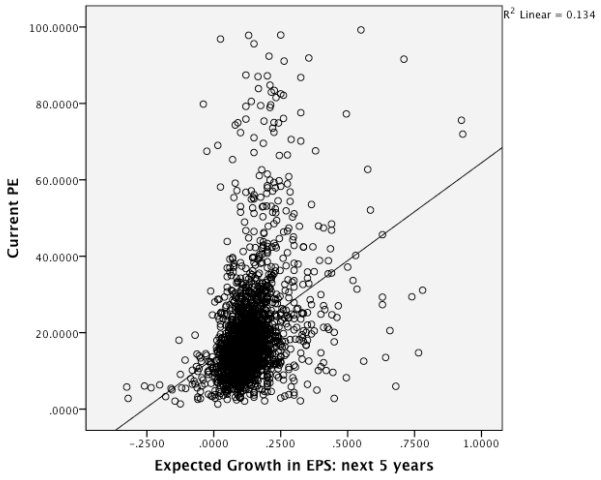
- Global Crossing lost $1.9 billion in 2001 and is expected to continue to lose money for the next 3 years. In a discounted cashflow valuation (see notes on DCF valuation) of Global Crossing, we estimated an expected EBITDA for Global Crossing in five years of $ 1,371 million.
- The average enterprise 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 cost of capital for Global Crossing is 13.80%)
  - 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

Relative valuation across the entire market: Why not?

- In contrast to the 'comparable firm' approach, the information in the entire cross-section of firms can be used to predict PE ratios.
- The simplest way of summarizing this information is with a multiple regression, with the PE ratio as the dependent variable, and proxies for risk, growth and payout forming the independent variables.

I. PE Ratio versus the market
PE versus Expected EPS Growth: January 2013



PE Ratio: Standard Regression for US stocks - January 2013

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.595[a]	.354	.352	780.421220

a. Predictors: (Constant), Payout Ratio, Expected Growth in EPS: next 5 years, 3-yr Regression Beta

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7.949	.748		10.625	.000
	Expected Growth in EPS: next 5 years	57.720	3.184	.470	18.128	.000
	3-yr Regression Beta	-3.596	.447	-.231	-8.040	.000
	Payout Ratio	11.480	.905	.349	12.686	.000

a. Dependent Variable: Current PE

b. Weighted Least Squares Regression - Weighted by Market Cap

Problems with the regression methodology

- The basic regression assumes a linear relationship between PE ratios and the financial proxies, and that might not be appropriate.
- The basic relationship between PE ratios and financial variables itself might not be stable, and if it shifts from year to year, the predictions from the model may not be reliable.
- The independent variables are correlated with each other. For example, high growth firms tend to have high risk. This multi-collinearity makes the coefficients of the regressions unreliable and may explain the large changes in these coefficients from period to period.

The Multicollinearity Problem

Correlations

		Current PE	Expected Growth in EPS: next 5 years	3-yr Regression Beta	Payout Ratio
Current PE	Pearson Correlation	1	.366**	-.010	.383**
	Sig. (2-tailed)		.000	.592	.000
	N	3313	1986	2983	1377
Expected Growth in EPS: next 5 years	Pearson Correlation	.366**	1	.148**	-.015
	Sig. (2-tailed)	.000		.000	.622
	N	1986	2389	2150	1095
3-yr Regression Beta	Pearson Correlation	-.010	.148**	1	-.279**
	Sig. (2-tailed)	.592	.000		.000
	N	2983	2150	4972	1340
Payout Ratio	Pearson Correlation	.383**	-.015	-.279**	1
	Sig. (2-tailed)	.000	.622	.000	
	N	1377	1095	1340	1386

**. Correlation is significant at the 0.01 level (2-tailed).

Using the PE ratio regression

- Assume that you were given the following information for Dell. The firm has an expected growth rate of 8%, a beta of 1.20 and pays no dividends. Based upon the regression, estimate the predicted PE ratio for Dell.

  Predicted PE =

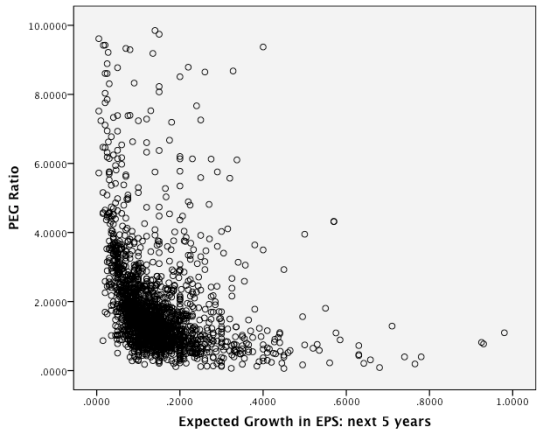
- Dell is actually trading at 10 times earnings. What does the predicted PE tell you?

- Assume now that you value Dell against just its peer group. Will you come to the same valuation judgment as you did when you looked at it relative to the market? Why or why not?

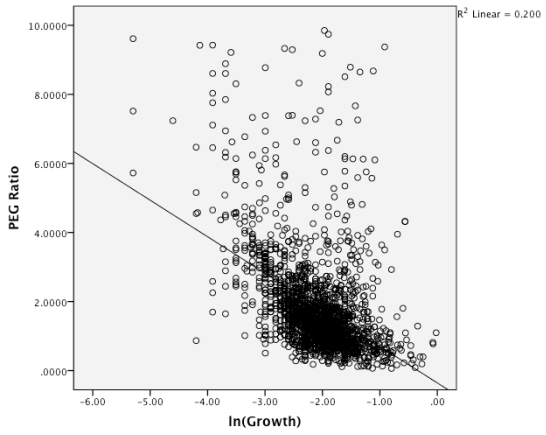
The value of growth

Time Period	*PE Value of extra 1% of growth*	*Equity Risk Premium*
January 2013	0.577	5.78%
January 2012	0.408	6.04%
January 2011	0.836	5.20%
January 2010	0.550	4.36%
January 2009	0.780	6.43%
January 2008	1.427	4.37%
January 2007	1.178	4.16%
January 2006	1.131	4.07%
January 2005	0.914	3.65%
January 2004	0.812	3.69%
January 2003	2.621	4.10%
January 2002	1.003	3.62%
January 2001	1.457	2.75%
January 2000	2.105	2.05%

II. PEG Ratio versus the market
PEG versus Growth – January 2013



PEG versus ln(Expected Growth) – January 2013



PEG Ratio Regression - US stocks
January 2013

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.758[a]	.574	.573	72.7967486

a. Predictors: (Constant), ln(Growth), Payout Ratio, 3-yr Regression Beta

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-.915	.123		-7.410	.000
	3-yr Regression Beta	-.293	.043	-.162	-6.870	.000
	Payout Ratio	1.299	.086	.343	15.056	.000
	ln(Growth)	-.995	.042	-.511	-23.916	.000

a. Dependent Variable: PEG Ratio

b. Weighted Least Squares Regression - Weighted by Market Cap

Negative intercepts…and problem forecasts..

- When the intercept in a multiples regression is negative, there is the possibility that forecasted values can be negative as well. One way (albeit imperfect) is to re-run the regression without an intercept.

Coefficients[a,b,c]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	3-yr Regression Beta	-.505	.032	-.317	-15.546	.000
	ln(Growth)	-.739	.024	-.940	-31.095	.000
	Payout Ratio	1.045	.081	.278	12.868	.000

a. Dependent Variable: PEG Ratio

b. Linear Regression through the Origin

c. Weighted Least Squares Regression - Weighted by Market Cap

PE ratio regressions across markets

Region	Regression – January 2013	R squared
Europe	PE = 11.39 + 50.75 Expected Growth – 2.77 Beta + 8.53 Payout	32.2%
Japan	PE = 8.29 + 31.39 Expected Growth + 17.98 Payout	44.9%
Emerging Markets	PE = 15.22 + 43.52 Expected Growth – 3.67 Beta + 2.01 Payout	32.9%

Expected Growth: Expected growth in EPS/ Net Income: Next 5 years
Beta: Regression or Bottom up Beta
Payout ratio: Dividends/ Net income from most recent year. Set to zero, if net income < 0

III. Price to Book Ratio
Fundamentals hold in every market: - January 2013

Region	Regression – January 2013	R squared
US	PBV = 0.18 + 1.17 Payout – 0.77 Beta + 11.28 ROE + 6.44 Expected Growth	60.6%
Europe	PBV = 2.13 Payout – 0.57 Beta + 2.20 Expected Growth + 12.33 ROE	67.6%
Japan	PBV = 1.13– 0.13 Beta + 2.57 ROE	16.4%
Emerging Markets	PBV = 0.43 + 0.95 Payout – 0.42 Beta + 2.57 Expected Growth + 8.86 ROE	47.9%

Expected Growth: Expected growth in EPS/ Net Income: Next 5 years
Beta: Regression or Bottom up Beta
Payout ratio: Dividends/ Net income from most recent year. Set to zero, if net income < 0
ROE: Net Income/ Book value of equity in most recent year.

IV. EV/EBITDA – January 2013

Region	Regression – January 2011	R squared
United States	EV/EBITDA= 13.68 + 69.213 Expected Revenue Growth – 10.067 Tax Rate – 87.517 Cost of Capital	27.3%
Europe	EV/EBITDA= 10.59 - 8.39Tax Rate - 11.82 Cost of Capital + 31.11 Expected Revenue Growth + 2.40 Return on Capital	20.9%
Japan	V/EBITDA= 23.76 - 16.32 Tax Rate - 139.39 Cost of Capital + 5.97 Expected Revenue Growth	45.0%
Emerging Markets	EV/EBITDA= 22.16 - 20.70 Tax Rate - 67.57 Cost of Capital + 4.87 Expected Revenue Growth	9.2%

Expected Revenue Growth: Expected growth in revenues: Near term (2 or 5 years)
Cost of capital: Cost of capital in US $ terms (Use dollar risk free + ERP for country)
Tax Rate: Effective tax rate in most recent year
Return on Capital: After-tax Operating Income/ (BV of debt + BV of equity – Cash)

V. EV/Sales Regressions across markets…

Region	Regression – January 2011	R Squared
United States	EV/Sales = 2.43 + 8.548 Expected Revenue Growth – 20.266 Cost of Capital -2.964 Tax Rate + 8.292 Pre-tax Operating Margin	53.3%
Europe	EV/Sales = 3.93 - 2.73 Tax rate + 7.36 Pre-tax Operating Margin – 33.13 Cost of Capital + 6.41 Expected Revenue Growth	27.7%
Japan	EV/Sales = 4.03 - 1.77 Tax rate + 6.69 Pre-tax Operating Margin – 38.49 Cost of Capital	29.9%
Emerging Markets	EV/Sales = 6.03 - 2.27 Tax rate + 7.17 Pre-tax Operating Margin – 48.37 Cost of Capital + 0.425 Expected Revenue Growth	26.7%

Expected Revenue Growth: Expected growth in revenues: Near term (2 or 5 years)
Cost of capital: Cost of capital in US $ terms (Use dollar risk free + ERP for country)
Tax Rate: Effective tax rate in most recent year
Operating Margin: Operating Income/ Sales

Relative Valuation: Some closing propositions

- Proposition 1: In a relative valuation, all that you are concluding is that a stock is under or over valued, relative to your comparable group.
  - Your relative valuation judgment can be right and your stock can be hopelessly over valued at the same time.
- Proposition 2: In asset valuation, there are no similar assets. Every asset is unique.
  - If you don't control for fundamental differences in risk, cashflows and growth across firms when comparing how they are priced, your valuation conclusions will reflect your flawed judgments rather than market misvaluations.

Bottom line: Relative valuation is pricing, not valuation.

Choosing Between the Multiples

- As presented in this section, there are dozens of multiples that can be potentially used to value an individual firm.
- In addition, relative valuation can be relative to a sector (or comparable firms) or to the entire market (using the regressions, for instance)
- Since there can be only one final estimate of value, there are three choices at this stage:
  - Use a simple average of the valuations obtained using a number of different multiples
  - Use a weighted average of the valuations obtained using a nmber of different multiples
  - Choose one of the multiples and base your valuation on that multiple

Picking one Multiple

- This is usually the best way to approach this issue. While a range of values can be obtained from a number of multiples, the "best estimate" value is obtained using one multiple.
- The multiple that is used can be chosen in one of two ways:
  - Use the multiple that best fits your objective. Thus, if you want the company to be undervalued, you pick the multiple that yields the highest value.
  - Use the multiple that has the highest R-squared in the sector when regressed against fundamentals. Thus, if you have tried PE, PBV, PS, etc. and run regressions of these multiples against fundamentals, use the multiple that works best at explaining differences across firms in that sector.
  - Use the multiple that seems to make the most sense for that sector, given how value is measured and created.

A More Intuitive Approach

- Managers in every sector tend to focus on specific variables when analyzing strategy and performance. The multiple used will generally reflect this focus. Consider three examples.
  - In retailing: The focus is usually on same store sales (turnover) and profit margins. Not surprisingly, the revenue multiple is most common in this sector.
  - In financial services: The emphasis is usually on return on equity. Book Equity is often viewed as a scarce resource, since capital ratios are based upon it. Price to book ratios dominate.
  - In technology: Growth is usually the dominant theme. PEG ratios were invented in this sector.

Conventional usage…

Sector	Multiple Used	Rationale
Cyclical Manufacturing	PE, Relative PE	Often with normalized earnings
Growth firms	PEG ratio	Big differences in growth rates
Young growth firms w/ losses	Revenue Multiples	What choice do you have?
Infrastructure	EV/EBITDA	Early losses, big DA
REIT	P/CFE (where CFE = Net income + Depreciation)	Big depreciation charges on real estate
Financial Services	Price/ Book equity	Marked to market?
Retailing	Revenue multiples	Margins equalize sooner or later

Relative versus Intrinsic Value

- If you do intrinsic value right, you will bring in a company's risk, cash flow and growth characteristics into the inputs, preserve internal consistency and derive intrinsic value. If you do relative value right, you will find the right set of comparables, control well for differences in risk, cash flow and growth characteristics. Assume you value the same company doing both DCF and relative valuation correctly, should you get the same value?
  a) Yes
  b) No
- If not, how would you explain the difference?
- If the numbers are different, which value would you use?
  a) Intrinsic value
  b) Relative value
  c) A composite of the two values
  d) The higher of the two values
  e) The lower of the two values
  f) Depends on what my valuation "mission" is.

Reviewing: The Four Steps to Understanding Multiples

- Define the multiple
  - Check for consistency
  - Make sure that they are estimated uniformly
- Describe the multiple
  - Multiples have skewed distributions: The averages are seldom good indicators of typical multiples
  - Check for bias, if the multiple cannot be estimated
- Analyze the multiple
  - Identify the companion variable that drives the multiple
  - Examine the nature of the relationship
- Apply the multiple

A Detour: Asset Based Valuation

Aswath Damodaran

What is asset based valuation?

- In intrinsic valuation, you value a business based upon the cash flows you expect that business to generate over time.
- In relative valuation, you value a business based upon how similar businesses are priced.
- In asset based valuation, you value a business by valuing its individual assets. These individual assets can be tangible or intangible.

Why would you do asset based valuation?

- Liquidation: If you are liquidating a business by selling its assets piece meal, rather than as a composite business, you would like to estimate what you will get from each asset or asset class individually.
- Accounting mission: As both US and international accounting standards have turned to "fair value" accounting, accountants have been called upon to redo balance sheet to reflect the assets at their fair rather than book value.
- Sum of the parts: If a business is made up of individual divisions or assets, you may want to value these parts individually for one of two groups:
  - Potential acquirers may want to do this, as a precursor to restructuring the business.
  - Investors may be interested because a business that is selling for less than the sum of its parts may be "cheap".

How do you do asset based valuation?

- Intrinsic value: Estimate the expected cash flows on each asset or asset class, discount back at a risk adjusted discount rate and arrive at an intrinsic value for each asset.
- Relative value: Look for similar assets that have sold in the recent past and estimate a value for each asset in the business.
- Accounting value: You could use the book value of the asset as a proxy for the estimated value of the asset.

When is asset-based valuation easiest to do?

- Separable assets: If a company is a collection of separable assets (a set of real estate holdings, a holding company of different independent businesses), asset-based valuation is easier to do. If the assets are interrelated or difficult to separate, asset-based valuation becomes problematic. Thus, while real estate or a long term licensing/ franchising contract may be easily valued, brand name (which cuts across assets) is more difficult to value separately.
- Stand alone earnings/ cash flows: An asset is much simpler to value if you can trace its earnings/cash flows to it. It is much more difficult to value when the business generates earnings, but the role of individual assets in generating these earnings cannot be isolated.
- Active market for similar assets: If you plan to do a relative valuation, it is easier if you can find an active market for "similar" assets which you can draw on for transactions prices.

I. Liquidation Valuation

- In liquidation valuation, you are trying to assess how much you would get from selling the assets of the business today, rather than the business as a going concern.
- Consequently, it makes more sense to price those assets (i.e., do relative valuation) than it is to value them (do intrinsic valuation). For assets that are separable and traded (example: real estate), pricing is easy to do. For assets that are not, you often see book value used either as a proxy for liquidation value or as a basis for estimating liquidation value.
- To the extent that the liquidation is urgent, you may attach a discount to the estimated value.

II. Accounting Valuation: Glimmers from FAS 157

- The ubiquitous "market participant": Through FAS 157, accountants are asked to attach values to assets/liabilities that market participants would have been willing to pay/ receive.
- Tilt towards relative value: "The definition focuses on the price that would be received to sell the asset or paid to transfer the liability (an exit price), not the price that would be paid to acquire the asset or received to assume the liability (an entry price)." The hierarchy puts "market prices", if available for an asset, at the top with intrinsic value being accepted only if market prices are not accessible.
- Split mission: While accounting fair value is titled towards relative valuation, accountants are also required to back their relative valuations with intrinsic valuations. Often, this leads to reverse engineering, where accountants arrive at values first and develop valuations later.

III. Sum of the parts valuation

- You can value a company in pieces, using either relative or intrinsic valuation. Which one you use will depend on who you are and your motives for doing the sum of the parts valuation.
- If you are long term, passive investor in the company, your intent may be to find market mistakes that you hope will get corrected over time. If that is the case, you should do an intrinsic valuation of the individual assets.
- If you are an activist investor that plans to acquire the company or push for change, you should be more focused on relative valuation, since your intent is to get the company to split up and gain the increase in value.

Private Company Valuation

Aswath Damodaran

Process of Valuing Private Companies

- The process of valuing private companies is not different from the process of valuing public companies. You estimate cash flows, attach a discount rate based upon the riskiness of the cash flows and compute a present value. As with public companies, you can either value
  - The entire business, by discounting cash flows to the firm at the cost of capital.
  - The equity in the business, by discounting cashflows to equity at the cost of equity.
- When valuing private companies, you face two standard problems:
  - There is not market value for either debt or equity
  - The financial statements for private firms are likely to go back fewer years, have less detail and have more holes in them.

1. No Market Value?

- Market values as inputs: Since neither the debt nor equity of a private business is traded, any inputs that require them cannot be estimated.
  1. Debt ratios for going from unlevered to levered betas and for computing cost of capital.
  2. Market prices to compute the value of options and warrants granted to employees
- Market value as output: When valuing publicly traded firms, the market value operates as a measure of reasonableness. In private company valuation, the value stands alone.
- Market price based risk measures, such as beta and bond ratings, will not be available for private businesses.

2. Cash Flow Estimation Issues

- **Shorter history**: Private firms often have been around for much shorter time periods than most publicly traded firms. There is therefore less historical information available on them.
- **Different Accounting Standards**: The accounting statements for private firms are often based upon different accounting standards than public firms, which operate under much tighter constraints on what to report and when to report.
- **Intermingling of personal and business expenses**: In the case of private firms, some personal expenses may be reported as business expenses.
- **Separating "Salaries" from "Dividends"**: It is difficult to tell where salaries end and dividends begin in a private firm, since they both end up with the owner.

Private Company Valuation: Motive matters

- You can value a private company for
  - 'Show' valuations
    - Curiosity: How much is my business really worth?
    - Legal purposes: Estate tax and divorce court
  - Transaction valuations
    - Sale or prospective sale to another individual or private entity.
    - Sale of one partner's interest to another
    - Sale to a publicly traded firm
  - As prelude to setting the offering price in an initial public offering
- You can value a division or divisions of a publicly traded firm
  - As prelude to a spin off
  - For sale to another entity
  - To do a sum-of-the-parts valuation to determine whether a firm will be worth more broken up or if it is being efficiently run.

Private company valuations: Three broad scenarios

- Private to private transactions: You can value a private business for sale by one individual to another.
- Private to public transactions: You can value a private firm for sale to a publicly traded firm.
- Private to IPO: You can value a private firm for an initial public offering.
- Private to VC to Public: You can value a private firm that is expected to raise venture capital along the way on its path to going public.

I. Private to Private transaction

- In private to private transactions, a private business is sold by one individual to another. There are three key issues that we need to confront in such transactions:

1. Neither the buyer nor the seller is diversified. Consequently, risk and return models that focus on just the risk that cannot be diversified away will seriously under estimate the discount rates.
2. The investment is illiquid. Consequently, the buyer of the business will have to factor in an "illiquidity discount" to estimate the value of the business.
3. Key person value: There may be a significant personal component to the value. In other words, the revenues and operating profit of the business reflect not just the potential of the business but the presence of the current owner.

An example: Valuing a restaurant

- Assume that you have been asked to value a upscale French restaurant for sale by the owner (who also happens to be the chef). Both the restaurant and the chef are well regarded, and business has been good for the last 3 years.
- The potential buyer is a former investment banker, who tired of the rat race, has decide to cash out all of his savings and use the entire amount to invest in the restaurant.
- You have access to the financial statements for the last 3 years for the restaurant. In the most recent year, the restaurant reported $ 1.2 million in revenues and $ 400,000 in pre-tax operating profit . While the firm has no conventional debt outstanding, it has a lease commitment of $120,000 each year for the next 12 years.

Past income statements…

	3 years ago	2 years ago	Last year	
Revenues	$800	$1,100	$1,200	Operating at full capacity
- Operating lease expense	$120	$120	$120	(12 years left on the lease)
- Wages	$180	$200	$200	(Owner/chef does not draw salary)
- Material	$200	$275	$300	(25% of revenues)
- Other operating expenses	$120	$165	$180	(15% of revenues)
Operating income	$180	$340	$400	
- Taxes	$72	$136	$160	(40% tax rate)
Net Income	$108	$204	$240	

All numbers are in thousands

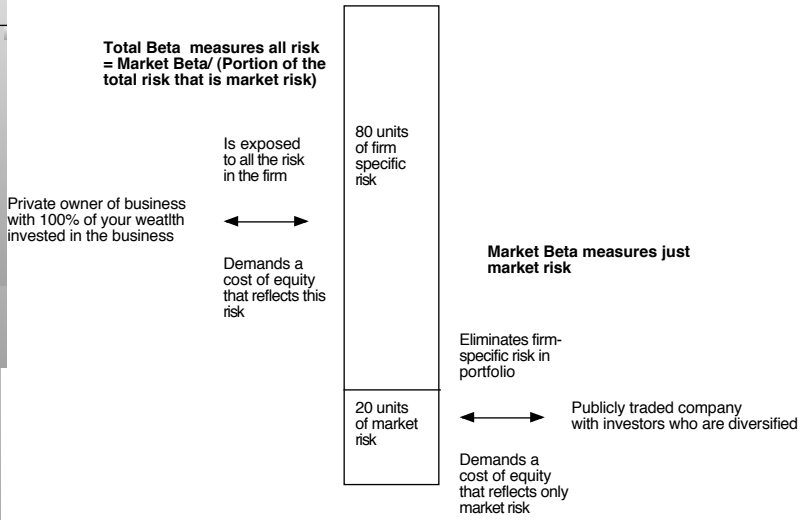
Step 1: Estimating discount rates

- Conventional risk and return models in finance are built on the presumption that the marginal investors in the company are diversified and that they therefore care only about the risk that cannot be diversified. That risk is measured with a beta or betas, usually estimated by looking at past prices or returns.
- In this valuation, both assumptions are likely to be violated:
  - As a private business, this restaurant has no market prices or returns to use in estimation.
  - The buyer is not diversified. In fact, he will have his entire wealth tied up in the restaurant after the purchase.

No market price, no problem… Use bottom-up betas to get the unlevered beta

- The average unlevered beta across 75 publicly traded restaurants in the US is 0.86.
- A caveat: Most of the publicly traded restaurants on this list are fast-food chains (McDonald's, Burger King) or mass restaurants (Applebee's, TGIF…) There is an argument to be made that the beta for an upscale restaurant is more likely to be reflect high-end specialty retailers than it is restaurants. The unlevered beta for 45 high-end retailers is 1.18.

Private Owner versus Publicly Traded Company Perceptions of Risk in an Investment



Estimating a total beta

- To get from the market beta to the total beta, we need a measure of how much of the risk in the firm comes from the market and how much is firm-specific.
- Looking at the regressions of publicly traded firms that yield the bottom-up beta should provide an answer.
  - The average R-squared across the high-end retailer regressions is 25%.
  - Since betas are based on standard deviations (rather than variances), we will take the correlation coefficient (the square root of the R-squared) as our measure of the proportion of the risk that is market risk.

Total Unlevered Beta = Market Beta/ Correlation with the market

= 1.18 / 0.5 = 2.36

The final step in the beta computation: Estimate a Debt to equity ratio and cost of equity

- With publicly traded firms, we re-lever the beta using the market D/E ratio for the firm. With private firms, this option is not feasible. We have two alternatives:
  - Assume that the debt to equity ratio for the firm is similar to the average market debt to equity ratio for publicly traded firms in the sector.
  - Use your estimates of the value of debt and equity as the weights in the computation. (There will be a circular reasoning problem: you need the cost of capital to get the values and the values to get the cost of capital.)
- We will assume that this privately owned restaurant will have a debt to equity ratio (14.33%) similar to the average publicly traded restaurant (even though we used retailers to the unlevered beta).
  - Levered beta = 2.36 (1 + (1-.4) (.1433)) = 2.56
  - Cost of equity =4.25% + 2.56 (4%) = 14.50%

  (T Bond rate was 4.25% at the time; 4% is the equity risk premium)

Estimating a cost of debt and capital

- While the firm does not have a rating or any recent bank loans to use as reference, it does have a reported operating income and lease expenses (treated as interest expenses)
  - Coverage Ratio = Operating Income/ Interest (Lease) Expense
    = 400,000/ 120,000 = 3.33
  - Rating based on coverage ratio = BB+ Default spread = 3.25%
  - After-tax Cost of debt = (Riskfree rate + Default spread) (1 – tax rate)
    = (4.25% + 3.25%) (1 - .40) = 4.50%
- To compute the cost of capital, we will use the same industry average debt ratio that we used to lever the betas.
  - Cost of capital = 14.50% (100/114.33) + 4.50% (14.33/114.33) = 13.25%

  (The debt to equity ratio is 14.33%; the cost of capital is based on the debt to capital ratio)

Step 2: Clean up the financial statements

	Stated	Adjusted	
Revenues	$1,200	$1,200	
- Operating lease expens	$120		Leases are financial expenses
- Wages	$200	$350	! Hire a chef for $150,000/year
- Material	$300	$300	
- Other operating expenses	$180	$180	
Operating income	$400	$370	
- Interest expnses	$0	$69.62	7.5% of $928.23 (see below)
Taxable income	$400	$300.38	
- Taxes	$160	$120.15	
Net Income	$240	$180.23	

Debt	0	$928.23	! PV of $120 million for 12 years at 7.5%

Step 3: Assess the impact of the "key" person

- Part of the draw of the restaurant comes from the current chef. It is possible (and probable) that if he sells and moves on, there will be a drop off in revenues. If you are buying the restaurant, you should consider this drop off when valuing the restaurant. Thus, if 20% of the patrons are drawn to the restaurant because of the chef's reputation, the expected operating income will be lower if the chef leaves.
  - Adjusted operating income (existing chef) = $ 370,000
  - Operating income (adjusted for chef departure) = $296,000
- As the owner/chef of the restaurant, what might you be able to do to mitigate this loss in value?

Step 4: Don't forget valuation fundamentals

- To complete the valuation, you need to assume an expected growth rate. As with any business, assumptions about growth have to be consistent with reinvestment assumptions. In the long term,

  Reinvestment rate = Expected growth rate/Return on capital
- In this case, we will assume a 2% growth rate in perpetuity and a 20% return on capital.

  Reinvestment rate = g/ ROC = 2%/ 20% = 10%
- Even if the restaurant does not grow in size, this reinvestment is what you need to make to keep the restaurant both looking good (remodeling) and working well (new ovens and appliances).

Step 5: Complete the valuation

- Inputs to valuation
  - Adjusted EBIT = $ 296,000
  - Tax rate = 40%
  - Cost of capital = 13.25%
  - Expected growth rate = 2%
  - Reinvestment rate = 10%
- Valuation

  Value of the restaurant = Expected FCFF next year / (Cost of capital –g)

  = Expected EBIT next year (1- tax rate) (1- Reinv Rate)/ (Cost of capital –g)

  = 296,000 (1.02) (1-.4) (1-.10)/ (.1325 - .02)

  = $1.449 million

  Value of equity in restaurant = $1.449 million - $0.928 million (PV of leases)

  = $ 0.521 million

Step 6: Consider the effect of illiquidity

- In private company valuation, illiquidity is a constant theme. All the talk, though, seems to lead to a rule of thumb. The illiquidity discount for a private firm is between 20-30% and does not vary across private firms.
- But illiquidity should vary across*:*
  - *Companies:* Healthier and larger companies, with more liquid assets, should have smaller discounts than money-losing smaller businesses with more illiquid assets.
  - *Time:* Liquidity is worth more when the economy is doing badly and credit is tough to come by than when markets are booming.
  - *Buyers*: Liquidity is worth more to buyers who have shorter time horizons and greater cash needs than for longer term investors who don't need the cash and are willing to hold the investment.

The Standard Approach: Illiquidity discount based on illiquid publicly traded assets

- Restricted stock: These are stock issued by publicly traded companies to the market that bypass the SEC registration process but the stock cannot be traded for one year after the issue.
- Pre-IPO transactions: These are transactions prior to initial public offerings where equity investors in the private firm buy (sell) each other's stakes.
- In both cases, the discount is estimated the be the difference between the market price of the liquid asset and the observed transaction price of the illiquid asset.
  - Discount $_{\text{Restricted stock}}$ = Stock price – Price on restricted stock offering
  - Discount$_{\text{IPO}}$ = IPO offering price – Price on pre-IPO transaction

The Restricted Stock Discount

- Aggregate discount studies
  - 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 study of restricted stock offerings from the 1980s, Silber (1991) finds that the median discount for restricted stock is 33.75%.
- Silber related the size of the discount to characteristics of the offering:

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

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

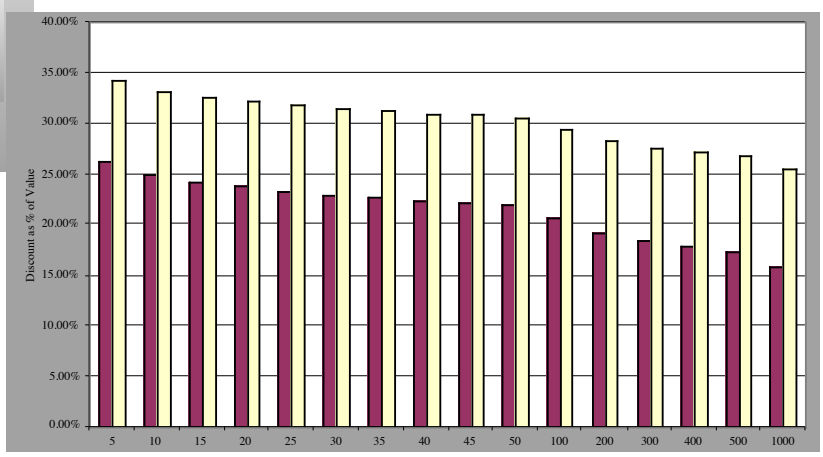
  REV = Revenues of the private firm (in millions of dollars)

  RBRT = Restricted Block relative to Total Common Stock in %

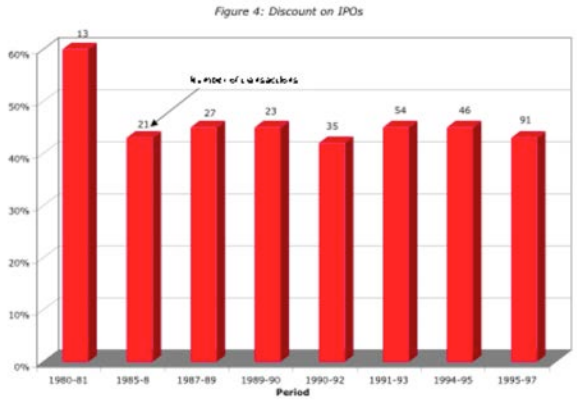
  DERN = 1 if earnings are positive; 0 if earnings are negative;

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

Cross sectional differences in Illiquidity: Extending the Silber regression



The IPO discount: Pricing on pre-IPO transactions (in 5 months prior to IPO)



The "sampling" problem

- With both restricted stock and the IPO studies, there is a significant sampling bias problem.
  - The companies that make restricted stock offerings are likely to be small, troubled firms that have run out of conventional financing options.
  - The types of IPOs where equity investors sell their stake in the five months prior to the IPO at a huge discount are likely to be IPOs that have significant pricing uncertainty associated with them.
- With restricted stock, the magnitude of the sampling bias was estimated by comparing the discount on all private placements to the discount on restricted stock offerings. One study concluded that the "illiquidity" alone accounted for a discount of less than 10% (leaving the balance of 20-25% to be explained by sampling problems).

An alternative approach: Use the whole sample

- All traded assets are illiquid. The bid ask spread, measuring the difference between the price at which you can buy and sell the asset at the same point in time is the illiquidity measure.
- We can regress the bid-ask spread (as a percent of the price) 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. 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.

Estimating the illiquidity discount for the restaurant

Approach used	Estimated discount	Value of restaurant
Bludgeon (Fixed discount)	25%	$0.521 (1- .25) = $0.391 million
Refined Bludgeon (Fixed discount with adjustment for revenue size/ profitability)	28.75% (Silber adjustment for small revenues and positive profits to a base discount of 25%)	$0.521 (1-.2875) = $0.371 million
Bid-ask spread regression	= 0.145 – 0.0022 ln (1.2) -0.015 (1) – 0.016 (.05) – 0.11 (0)= 12.88%	$0.521 (1-.1288) = $0.454 million

II. Private company sold to publicly traded company

- The key difference between this scenario and the previous scenario is that the seller of the business is not diversified but the buyer is (or at least the investors in the buyer are). Consequently, they can look at the same firm and see very different amounts of risk in the business with the seller seeing more risk than the buyer.
- The cash flows may also be affected by the fact that the tax rates for publicly traded companies can diverge from those of private owners.
- Finally, there should be no illiquidity discount to a public buyer, since investors in the buyer can sell their holdings in a market.

Revisiting the cost of equity and capital: Restaurant Valuation

	Private	Public
Unlevred beta	2.36	1.18
Debt to equity ratio	14.33%	14.33%
Tax rate	40%	40%
Pre-tax cost of debt	7.50%	7.50%
Levered beta	2.56	1.28
Riskfree rate	4.25%	4.25%
Equity risk premium	4%	4%
Cost of equity	14.5%	9.38%
After-tax cost of debt	4.50%	4.50%
Cost of capital	13.25%	8.76%

Revaluing the restaurant to a "public" buyer

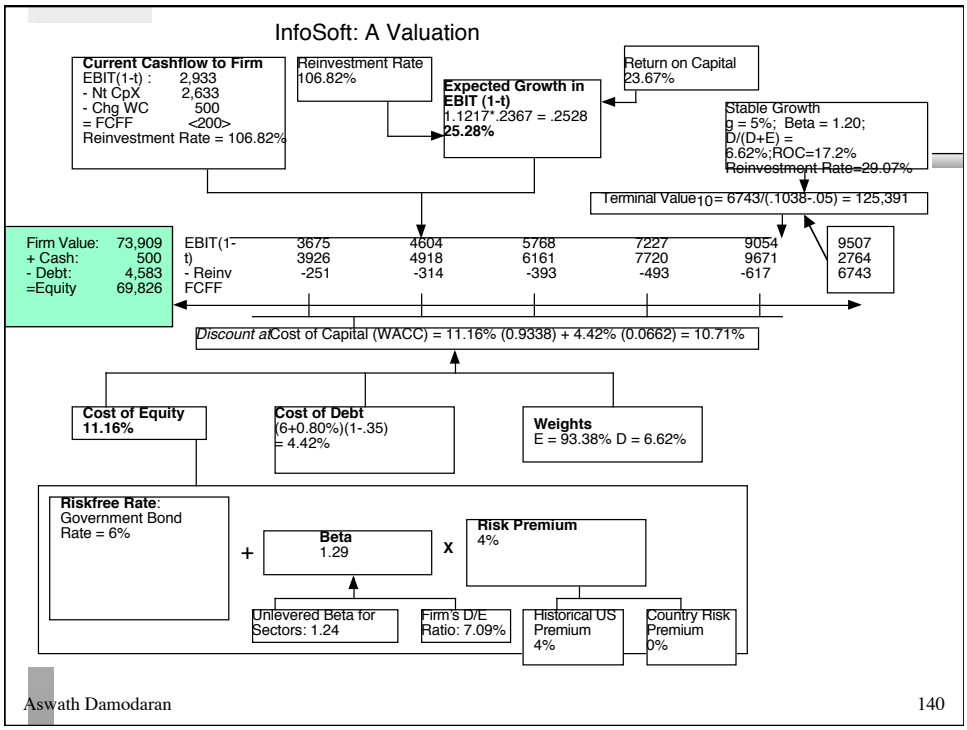
	Private	Public
Adjusted EBIT =	370	370
Key person discount =	20%	20%
EBIT =	296	296
Expected growth rate =	2%	2%
Return on capital =	20%	20%
Reinvestment rate =	10.00%	10.00%
FCFF next year =	$163.04	$163.04
Cost of capital =	13.25%	8.76%
Value of business=	$1,449.22	$2,411.79
- Debt	$928.23	$928.23
Value of equity =	$520.99	$1,483.56
- Illiquidity discount	12.88%	0.00%
Value of equity	$453.88	$1,483.56

So, what price should you ask for?

- Assume that you represent the chef/owner of the restaurant and that you were asking for a "reasonable" price for the restaurant. What would you ask for?
  - $ 454,000
  - $ 1.484 million
  - Some number in the middle
- If it is "some number in the middle", what will determine what you will ultimately get for your business?
- How would you alter the analysis, if your best potential bidder is a private equity or VC fund rather than a publicly traded firm?

III. Private company for initial public offering

- In an initial public offering, the private business is opened up to investors who clearly are diversified (or at least have the option to be diversified).
- There are control implications as well. When a private firm goes public, it opens itself up to monitoring by investors, analysts and market.
- The reporting and information disclosure requirements shift to reflect a publicly traded firm.



The twists in an initial public offering

- Valuation issues:
  - Use of the proceeds from the offering: The proceeds from the offering can be held as cash by the firm to cover future investment needs, paid to existing equity investors who want to cash out or used to pay down debt.
  - Warrants/ Special deals with prior equity investors: If venture capitalists and other equity investors from earlier iterations of fund raising have rights to buy or sell their equity at pre-specified prices, it can affect the value per share offered to the public.
- Pricing issues:
  - Institutional set-up: Most IPOs are backed by investment banking guarantees on the price, which can affect how they are priced.
  - Follow-up offerings: The proportion of equity being offered at initial offering and subsequent offering plans can affect pricing.

A. Use of the Proceeds

- The proceeds from an initial public offering can be
  - Taken out of the firm by the existing owners
  - Used to pay down debt and other obligations
  - Held as cash by the company to cover future reinvestment needs
- How you deal with the issuance will depend upon how the proceeds are used.
  - If taken out of the firm -> Ignore in valuation
  - If used to pay down debt -> Change the debt ratio, which may change the cost of capital and the value of the firm
  - If held as cash to cover future reinvestment needs -> Add the cash proceeds from the IPO to the DCF valuation of the company.

The Infosoft example

- We valued the equity in the DCF model at approximately $70 million. Assume that 20% of the equity in Infosoft will be offered to the public and that $ 10 million of the proceeds will be held by the firm to cover future investment needs and the rest will be withdrawn by existing equity investors. If the plan is to have 10 million shares outstanding in the firm, estimate the value per share.

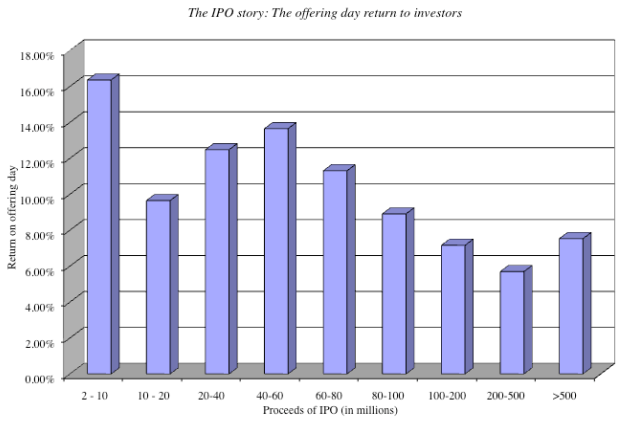
B. Claims from prior equity investors

- When a private firm goes public, there are already equity investors in the firm, including the founder(s), venture capitalists and other equity investors. In some cases, these equity investors can have warrants, options or other special claims on the equity of the firm.
- If existing equity investors have special claims on the equity, the value of equity per share has to be affected by these claims. Specifically, these options need to be valued at the time of the offering and the value of equity reduced by the option value before determining the value per share.

C. The Investment Banking guarantee…

- Almost all IPOs are managed by investment banks and are backed by a pricing guarantee, where the investment banker guarantees the offering price to the issuer. If the price at which the issuance is made is lower than the guaranteed price, the investment banker will buy the shares at the guaranteed price and potentially bear the loss.
- Earlier, we estimated the value of equity per share in Infosoft at $8/ share. As the investment banker, would this also be your offering price? If not, why not?

The evidence on IPO pricing



An investment opportunity?

- Assume that investment banks try to under price initial public offerings by approximately 10-15%. As an investor, what strategy would you adopt to take advantage of this behavior?
- Why might it not work?

D. The offering quantity

- Assume now that you are the owner of Infosoft and were offering 100% of the shares in company in the offering to the public? Given the estimated equity value of $80 million, how much do you lose because of the under pricing (15%)?
- Assume that you were offering only 20% of the shares in the initial offering and plan to sell a large portion of your remaining stake over the following two years? Would your views of the under pricing and its effect on your wealth change as a consequence?

IV. An Intermediate Problem
Private to VC to Public offering…

- Assume that you have a private business operating in a sector, where publicly traded companies have an average beta of 1 and where the average correlation of firms with the market is 0.25. Consider the cost of equity at three stages (Riskfree rate = 4%; ERP = 5%):

Stage 1: The nascent business, with a private owner, who is fully invested in that business.

Perceived Beta = 1/ 0.25 = 4

Cost of Equity = 4% + 4 (5%) = 24%

Stage 2: Angel financing provided by specialized venture capitalist, who holds multiple investments, in high technology companies. (Correlation of portfolio with market is 0.5)

Perceived Beta = 1/0.5 = 2

Cost of Equity = 4% + 2 (5%) = 14%

Stage 3: Public offering, where investors are retail and institutional investors, with diversified portfolios:

Perceived Beta = 1

Cost of Equity = 4% + 1 (5%) = 9%

To value this company…

Assume that this company will be fully owned by its current owner for two years, will access the technology venture capitalist at the start of year 3 and that is expected to either go public or be sold to a publicly traded firm at the end of year 5.

Growth rate 2% forever after year 5

	1	2	3	4	5	Terminal year
E(Cash flow)	$100	$125	$150	$165	$170	$175
Market beta	1	1	1	1	1	1
Correlation	0.25	0.25	0.5	0.5	0.5	1
Beta used	4	4	2	2	2	1
Cost of equity	24.00%	24.00%	14.00%	14.00%	14.00%	9.00%
Terminal value					$2,500	
Cumulated COE	1.2400	1.5376	1.7529	1.9983	2.2780	2.4830
PV	$80.65	$81.30	$85.57	$82.57	$1,172.07	

175/ (.09-.02)

Value of firm	$1,502	(Correct value, using changing costs of equity)
Value of firm	$1,221	(using 24% as cost of equity forever. You will undervalue firm)
Value of firm	$2,165	(Using 9% as cost of equity forever. You will overvalue firm)

Private company valuation: Closing thoughts

- The value of a private business will depend on the potential buyer.
- If you are the seller of a private business, you will maximize value, if you can sell to
  - A long term investor
  - Who is well diversified (or whose investors are)
  - And does not think too highly of you (as a person)
- If you are valuing a private business for legal purposes (tax or divorce court), the assumptions you use and the value you arrive at will depend on which side of the legal divide you are on.
- As a final proposition, always keep in mind that the owner of a private business has the option of investing his wealth in publicly traded stocks. There has to be a relationship between what you can earn on those investments and what you demand as a return on your business.