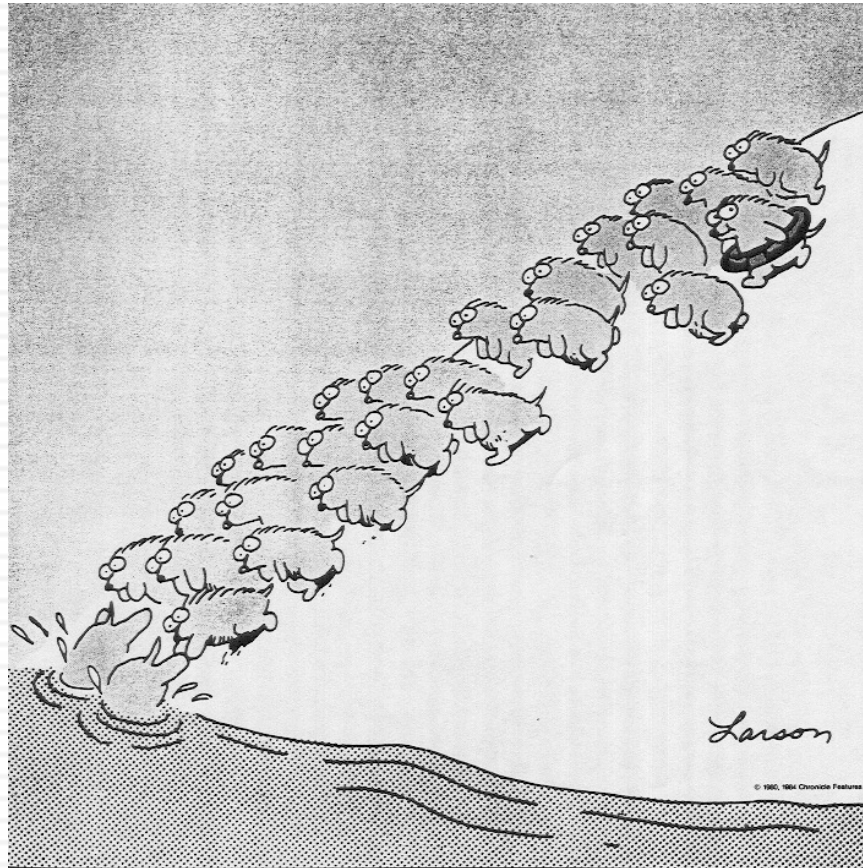# ADVANCED VALUATION

Aswath Damodaran
www.damodaran.com

Some Initial Thoughts

" One hundred thousand lemmings cannot be wrong"

Graffiti

Misconceptions about Valuation

- Myth 1: A valuation is an objective search for "true" value
  - Truth 1.1: All valuations are biased. The only questions are how much and in which direction.
  - Truth 1.2: The direction and magnitude of the bias in your valuation is directly proportional to who pays you and how much you are paid.
- Myth 2.: A good valuation provides a precise estimate of value
  - Truth 2.1: There are no precise valuations
  - Truth 2.2: The payoff to valuation is greatest when valuation is least precise.
- Myth 3: . The more quantitative a model, the better the valuation
  - Truth 3.1: One's understanding of a valuation model is inversely proportional to the number of inputs required for the model.
  - Truth 3.2: Simpler valuation models do much better than complex ones.

Approaches to Valuation

- **Intrinsic valuation**, relates the value of an asset to the present value of expected future cashflows on that asset. In its most common form, this takes the form of a discounted cash flow valuation.

- **Relative valuation**, estimates the value of an asset by looking at the pricing of 'comparable' assets relative to a common variable like earnings, cashflows, book value or sales.

- **Contingent claim valuation**, uses option pricing models to measure the value of assets that share option characteristics.

Discounted Cash Flow Valuation

- *What is it*: In discounted cash flow valuation, the value of an asset is the present value of the expected cash flows on the asset.
- *Philosophical Basis*: Every asset has an intrinsic value that can be estimated, based upon its characteristics in terms of cash flows, growth and risk.
- *Information Needed*: To use discounted cash flow valuation, you need
  - to estimate the life of the asset
  - to estimate the cash flows during the life of the asset
  - to estimate the discount rate to apply to these cash flows to get present value
- *Market Inefficiency*: Markets are assumed to make mistakes in pricing assets across time, and are assumed to correct themselves over time, as new information comes out about assets.

Approaches to Valuation

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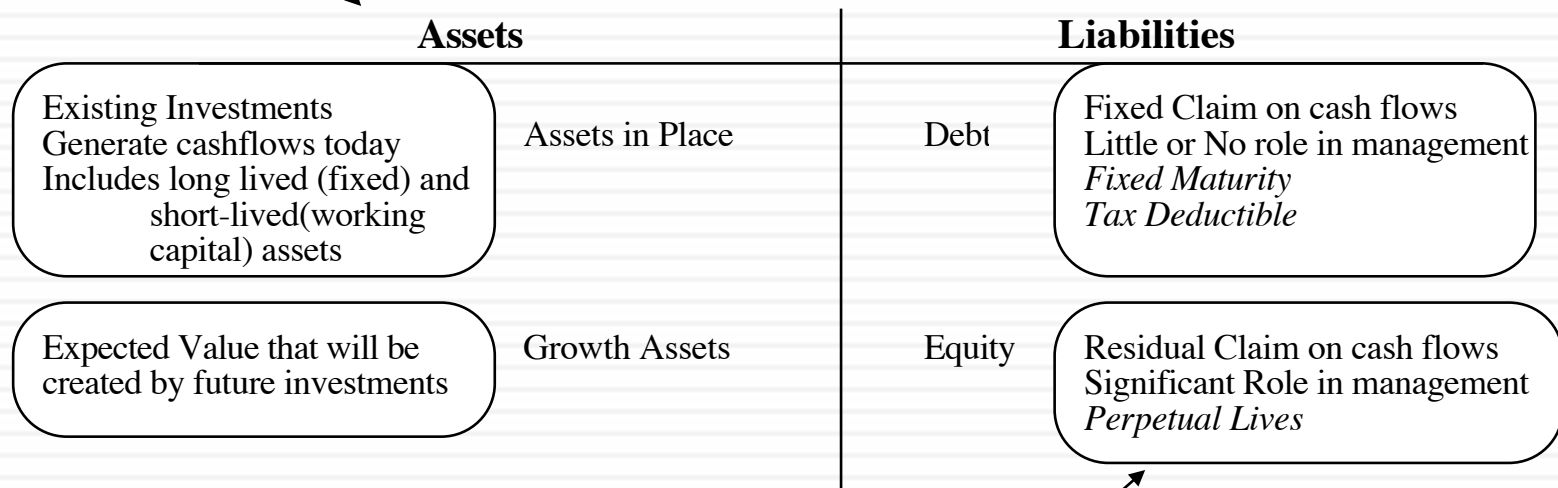
Risk Adjusted Value: Three Basic Propositions

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

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

- Proposition 1: If "it" does not affect the cash flows or alter risk (thus changing discount rates), "it" cannot affect value.
- Proposition 2: For an asset to have value, the expected cash flows have to be positive some time over the life of the asset.
- Proposition 3: Assets that generate cash flows early in their life will be worth more than assets that generate cash flows later; the latter may however have greater growth and higher cash flows to compensate.

DCF Choices: Equity Valuation versus Firm Valuation

Firm Valuation: Value the entire business

Assets		**Liabilities**	
Existing Investments Generate cashflows today Includes long lived (fixed) and short-lived(working capital) assets	Assets in Place	Debt	Fixed Claim on cash flows Little or No role in management *Fixed Maturity* *Tax Deductible*
Expected Value that will be created by future investments	Growth Assets	Equity	Residual Claim on cash flows Significant Role in management *Perpetual Lives*

Equity valuation: Value just the equity claim in the business

The Drivers of Value…

Growth from new investments
Growth created by making new investments; function of amount and quality of investments

Efficiency Growth
Growth generated by using existing assets better

Terminal Value of firm (equity)

Current Cashflows
These are the cash flows from existing investment,s, net of any reinvestment needed to sustain future growth. They can be computed before debt cashflows (to the firm) or after debt cashflows (to equity investors).

Expected Growth during high growth period

Stable growth firm, with no or very limited excess returns

Length of the high growth period
Since value creating growth requires excess returns, this is a function of
- Magnitude of competitive advantages
- Sustainability of competitive advantages

Cost of financing (debt or capital) to apply to discounting cashflows
Determined by
- Operating risk of the company
- Default risk of the company
- Mix of debt and equity used in financing

DISCOUNTED CASHFLOW VALUATION

Cashflow to Firm
EBIT (1-t)
- (Cap Ex - Depr)
- Change in WC
= FCFF

Expected Growth
Reinvestment Rate
* Return on Capital

Firm is in stable growth:
Grows at constant rate
forever

Terminal Value= $FCFF_{n+1}/(r-g_n)$

Value of Operating Assets
+ Cash & Non-op Assets
= Value of Firm
- Value of Debt
= Value of Equity

$FCFF_1$ $FCFF_2$ $FCFF_3$ $FCFF_4$ $FCFF_5$ $FCFF_n$ ....

Forever

Discount at WACC= Cost of Equity (Equity/(Debt + Equity)) + Cost of Debt (Debt/(Debt+ Equity))

Cost of Equity

Cost of Debt
(Riskfree Rate
+ Default Spread) (1-t)

Weights
Based on Market Value

Riskfree Rate :
- No default risk
- No reinvestment risk
- In same currency and
in same terms (real or
nominal as cash flows

+

Beta
- Measures market risk

X

Risk Premium
- Premium for average
risk investment

Type of
Business

Operating
Leverage

Financial
Leverage

Base Equity
Premium

Country Risk
Premium

Amgen: Status Quo

Cap Ex = Acc net Cap Ex(255) + Acquisitions (3975) + R&D (2216)

Current Cashflow to Firm
EBIT(1-t)= :7336(1-**.28**)=   6058
- Nt CpX=   6443
- Chg WC   37
= FCFF   - 423
Reinvestment Rate = 6480/6058
                   =106.98%
Return on capital = 16.71%

Reinvestment Rate
60%

Expected Growth in EBIT (1-t)
.60*.16=.096
9.6%

Return on Capital
16%

Stable Growth
g = 4%; Beta = 1.10;
Debt Ratio= 20%; Tax rate=35%
Cost of capital = 8.08%
ROC= 10.00%;
Reinvestment Rate=4/10=40%

Growth decreases gradually to 4%

First 5 years

Terminal Value$_{10}$= 7300/(.0808-.04) = 179,099

Op. Assets   94214
+ Cash: 1283
- Debt   8272
=Equity   87226
-Options   479
Value/Share $ 74.33

Year	1	2	3	4	5	6	7	8	9	10	Term Yr
EBIT	$9,221	$10,106	$11,076	$12,140	$13,305	$14,433	$15,496	$16,463	$17,306	$17,998	18718
EBIT (1-t)	$6,639	$7,276	$7,975	$8,741	$9,580	$10,392	$11,157	$11,853	$12,460	$12,958	12167
- Reinvestment	$3,983	$4,366	$4,785	$5,244	$5,748	$5,820	$5,802	$5,690	$5,482	$5,183	4867
= FCFF	$2,656	$2,911	$3,190	$3,496	$3,832	$4,573	$5,355	$6,164	$6,978	$7,775	7300

Cost of Capital (WACC) = 11.7% (0.90) + 3.66% (0.10) = 10.90%

Debt ratio increases to 20%
Beta decreases to 1.10

On May 1,2007, Amgen was trading at $ 55/share

Cost of Equity
11.70%

Cost of Debt
(4.78%+..85%)(1-.35)
= 3.66%

Weights
E = 90% D = 10%

Riskfree Rate:
Riskfree rate = 4.78%

+

Beta
1.73

X

Risk Premium
4%

Unlevered Beta for Sectors: 1.59

D/E=11.06%

Tata Motors: April 2010

Current Cashflow to Firm
EBIT(1-t) :   Rs 20,116
- Nt CpX   Rs 31,590
- Chg WC   Rs   2,732
= FCFF   - Rs 14,205
Reinv Rate = (31590+2732)/20116 =
170.61%; Tax rate = 21.00%
Return on capital = 17.16%

Average reinvestment rate
from 2005-09: 179.59%;
without acquisitions: 70%

Reinvestment Rate
70%

**Expected Growth
from new inv.**
.70*.1716=0.1201

Return on Capital
17.16%

Stable Growth
g = 5%; Beta = 1.00
Country Premium= 3%
Cost of capital = 10.39%
Tax rate = 33.99%
ROC= 10.39%;
Reinvestment Rate=g/ROC
=5/ 10.39= 48.11%

Terminal Value$_5$= 23493/(.1039-.05) = Rs 435,686

Rs Cashflows

Op. Assets Rs210,813
+ Cash: 11418
+ Other NO   140576
- Debt   109198
=Equity   253,628

Value/Share Rs 614

Year	1	2	3	4	5	6	7	8	9	10
EBIT (1-t)	22533	25240	28272	31668	35472	39236	42848	46192	49150	51607
- Reinvestment	15773	17668	19790	22168	24830	25242	25138	24482	23264	21503
FCFF	6760	7572	8482	9500	10642	13994	17711	21710	25886	30104

45278
21785
23493

Discount at Cost of Capital (WACC) = 14.00% (.747) + 8.09% (0.253) = 12.50%

*Growth declines to 5%
and cost of capital
moves to stable period
level.*

**Cost of Equity
14.00%**

Cost of Debt
(5%+ 4.25%+3)(1-.3399)
= 8.09%

Weights
E = 74.7% D = 25.3%

On April 1, 2010
Tata Motors price = Rs 781

Riskfree Rate:
Rs Riskfree Rate= 5%

+

Beta
1.20

X

**Mature market
premium**
4.5%

+

Lambda
0.80

X

Country Equity Risk
Premium
4.50%

Unlevered Beta for
Sectors: 1.04

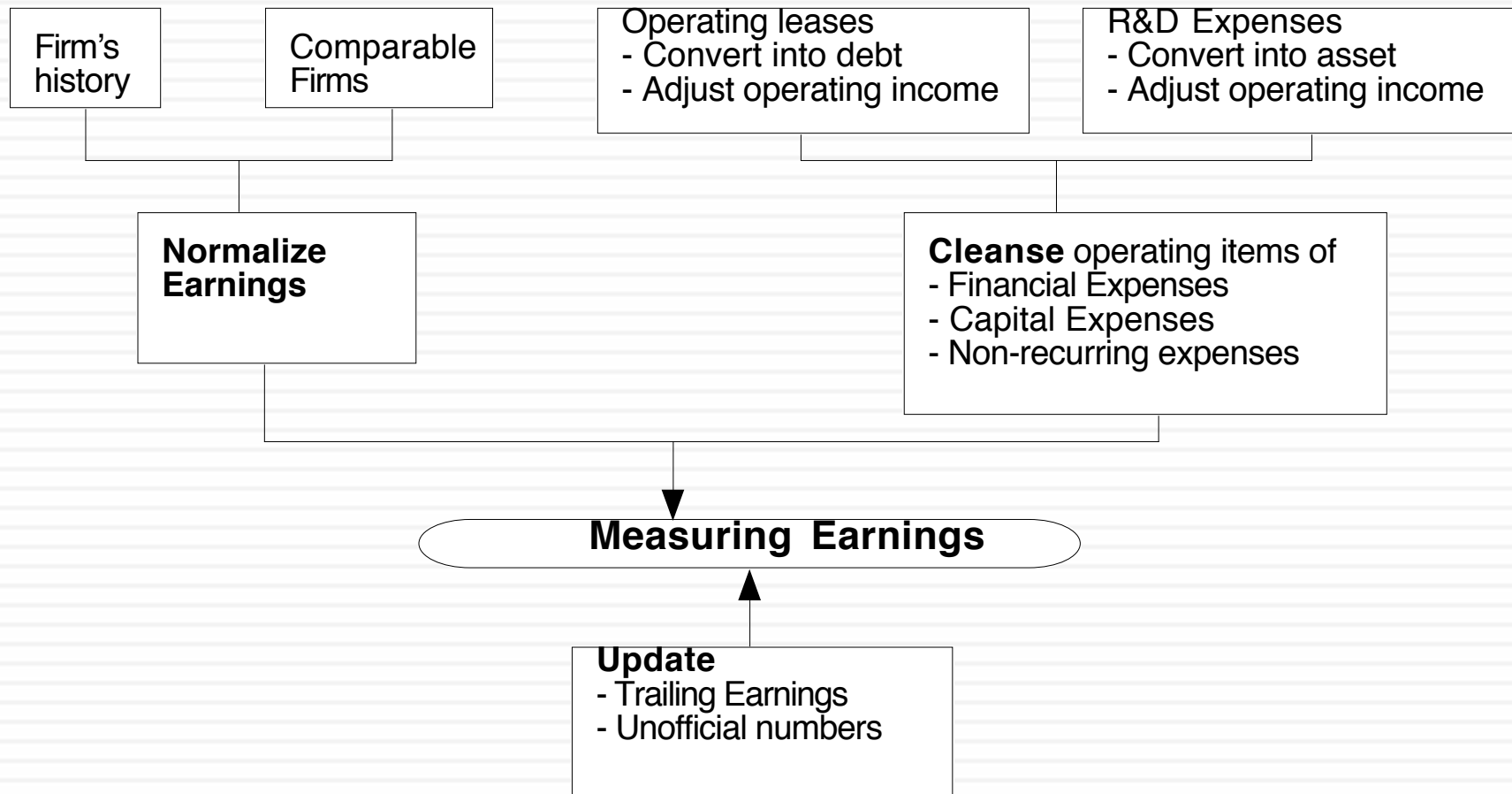Firm's D/E
Ratio: 33%

Country Default
Spread
3%

X

Rel Equity
Mkt Vol
1.50

DCF INPUTS

"Garbage in, garbage out"

I. Measure earnings right..

Firm's history

Comparable Firms

Operating leases
- Convert into debt
- Adjust operating income

R&D Expenses
- Convert into asset
- Adjust operating income

Normalize Earnings

Cleanse operating items of
- Financial Expenses
- Capital Expenses
- Non-recurring expenses

Measuring Earnings

Update
- Trailing Earnings
- Unofficial numbers

Operating Leases at Amgen in 2007

□   Amgen has lease commitments and its cost of debt (based on it's A rating) is 5.63%.

Year	Commitment	Present Value
1	$96.00	$90.88
2	$95.00	$85.14
3	$102.00	$86.54
4	$98.00	$78.72
5	$87.00	$66.16
6-12	$107.43	$462.10 ($752 million prorated)

□   Debt Value of leases = $869.55

□   Debt outstanding at Amgen = $7,402 + $ 870 = $8,272 million

□   Adjusted Operating Income = Stated OI + Lease expense this year – Depreciation

         = 5,071 m + 69 m - 870/12 = $5,068 million (12 year life for assets)

□   Approximate Operating income= stated OI + PV of Lease commitment * Pre-tax cost of debt

= $5,071 m + 870 m (.0563) = $ 5,120 million

Capitalizing R&D Expenses: Amgen

- R & D was assumed to have a 10-year life.

Year	R&D Expense	Unamortized portion		Amortization this year
Current	3366.00	1.00	3366.00	
-1	2314.00	0.90	2082.60	$231.40
-2	2028.00	0.80	1622.40	$202.80
-3	1655.00	0.70	1158.50	$165.50
-4	1117.00	0.60	670.20	$111.70
-5	865.00	0.50	432.50	$86.50
-6	845.00	0.40	338.00	$84.50
-7	823.00	0.30	246.90	$82.30
-8	663.00	0.20	132.60	$66.30
-9	631.00	0.10	63.10	$63.10
-10	558.00		0.00	$55.80
Value of Research Asset =			$10,112.80	$1,149.90

- Adjusted Operating Income = $5,120 + 3,366 - 1,150 = $7,336 million

II. Get the big picture (not the accounting one) when it comes to cap ex and working capital

- Capital expenditures should include
  - Research and development expenses, once they have been re-categorized as capital expenses.
  - Acquisitions of other firms, whether paid for with cash or stock.
- Working capital should be defined not as the difference between current assets and current liabilities but as the difference between non-cash current assets and non-debt current liabilities.
- On both items, start with what the company did in the most recent year but do look at the company's history and at industry averages.

Amgen's Net Capital Expenditures

- The accounting net cap ex at Amgen is small:
  - Accounting Capital Expenditures = $1,218 million
  - - Accounting Depreciation = $ 963 million
  - Accounting Net Cap Ex = $ 255 million
- We define capital expenditures broadly to include R&D and acquisitions:
  - Accounting Net Cap Ex = $ 255 million
  - Net R&D Cap Ex = (3366-1150) = $2,216 million
  - Acquisitions in 2006 = $3,975 million
  - Total Net Capital Expenditures = $ 6,443 million
- Acquisitions have been a volatile item. Amgen was quiet on the acquisition front in 2004 and 2005 and had a significant acquisition in 2003.

III. Betas do not come from regressions... and are noisy...
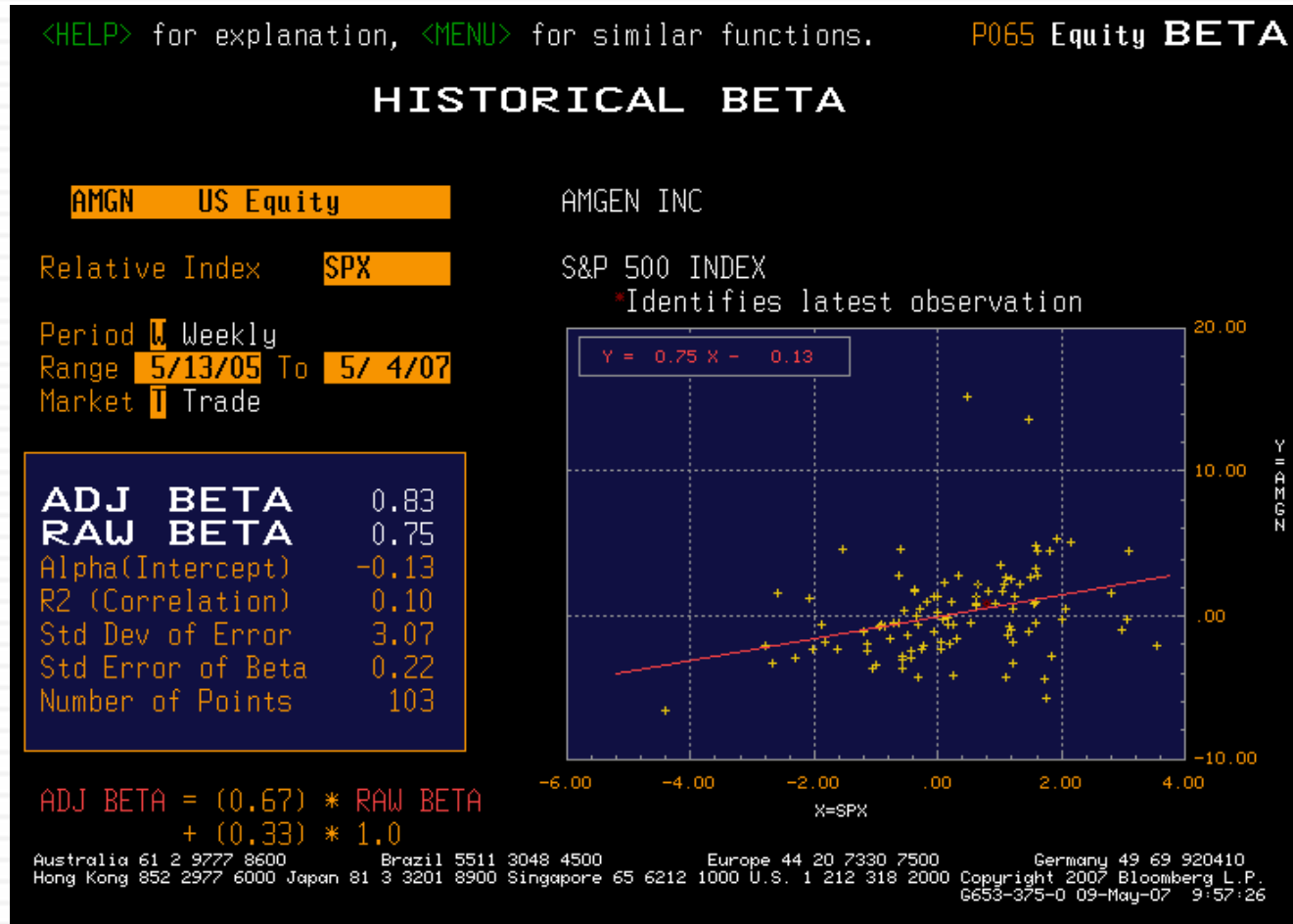
Look better for some companies, but looks can be deceptive…

Determinants of Betas

Beta of Equity

Beta of Firm

Nature of product or service offered by company:
Other things remaining equal, the more discretionary the product or service, the higher the beta.

Operating Leverage (Fixed Costs as percent of total costs):
Other things remaining equal the greater the proportion of the costs that are fixed, the higher the beta of the company.

Financial Leverage:
Other things remaining equal, the greater the proportion of capital that a firm raises from debt,the higher its equity beta will be

Implciations
Highly levered firms should have highe betas than firms with less debt.

Implications
1. Cyclical companies should have higher betas than non-cyclical companies.
2. Luxury goods firms should have higher betas than basic goods.
3. High priced goods/service firms should have higher betas than low prices goods/services firms.
4. Growth firms should have higher betas.

Implications
1. Firms with high infrastructure needs and rigid cost structures shoudl have higher betas than firms with flexible cost structures.
2. Smaller firms should have higher betas than larger firms.
3. Young firms should have

Bottom-up Betas

Step 1: Find the business or businesses that your firm operates in.

Possible Refinements

Step 2: Find publicly traded firms in each of these businesses and obtain their regression betas. Compute the simple average across these regression betas to arrive at an average beta for these publicly traded firms. Unlever this average beta using the average debt to equity ratio across the publicly traded firms in the sample.
Unlevered beta for business = Average beta across publicly traded firms/ (1 + (1- t) (Average D/E ratio across firms))

If you can, adjust this beta for differences between your firm and the comparable firms on operating leverage and product characteristics.

Step 3: Estimate how much value your firm derives from each of the different businesses it is in.

While revenues or operating income are often used as weights, it is better to try to estimate the value of each business.

Step 4: Compute a weighted average of the unlevered betas of the different businesses (from step 2) using the weights from step 3.
Bottom-up Unlevered beta for your firm = Weighted average of the unlevered betas of the individual business

If you expect the business mix of your firm to change over time, you can change the weights on a year-to-year basis.

Step 5: Compute a levered beta (equity beta) for your firm, using the market debt to equity ratio for your firm.
Levered bottom-up beta = Unlevered beta (1+ (1-t) (Debt/Equity))

If you expect your debt to equity ratio to change over time, the levered beta will change over time.

22

Two examples…

- Amgen
  - The unlevered beta for pharmaceutical firms is 1.59. Using Amgen's debt to equity ratio of 11%, the bottom up beta for Amgen is
  - Bottom-up Beta = 1.59 (1+ (1-.35)(.11)) = 1.73
- Tata Motors
  - The unlevered beta for automobile firms is 0.98. Using Tata Motor's debt to equity ratio of 33.87%, the bottom up beta for Tata Motors is
  - Bottom-up Beta = 0.98 (1+ (1-.3399)(.3387)) = 1.20
- A Question to ponder: Tata Motors recently made two big investments.
  - Tata Nano: Promoted as the cheapest car in the world, Tata Motors hopes that volume (especially in Asia) will make up for tight margins.
  - Jaguar/Land Rover: Tata acquired both firms, catering to luxury markets.
  - What effect will these investments have on Tata Motor's beta?

IV. And the past is not always a good indicator of the future

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

	Arithmetic Average		Geometric Average	
	Stocks - T. Bills	Stocks - T. Bonds	Stocks - T. Bills	Stocks - T. Bonds
1928-2012	7.65%	5.88%	5.74%	4.20%
	2.20%	2.33%		
1962-2012	5.93%	3.91%	4.60%	2.93%
	2.38%	2.66%		
2002-2012	7.06%	3.08%	5.38%	1.71%
	5.82%	8.11%		

In 2012, the actual cash returned to stockholders was 72.25. Using the average total yield for the last decade yields 69.46

Analysts expect earnings to grow 7.67% in 2013, 7.28% in 2014, scaling down to 1.76% in 2017, resulting in a compounded annual growth rate of 5.27% over the next 5 years. We will assume that dividends & buybacks will tgrow 5.27% a year for the next 5 years.

After year 5, we will assume that earnings on the index will grow at 1.76%, the same rate as the entire economy (= riskfree rate).

| 73.12 | 76.97 | 81.03 | 85.30 | 89.80 |

Data Sources:
Dividends and Buybacks last year: S&P
Expected growth rate: S&P, Media reports, Factset, Thomson-Reuters

January 1, 2013
S&P 500 is at 1426.19
Adjusted Dividends & Buybacks
for base year = 69.46

$$1426.19 = \frac{73.12}{(1+r)} + \frac{76.97}{(1+r)^2} + \frac{81.03}{(1+r)^3} + \frac{85.30}{(1+r)^4} + \frac{89.80}{(1+r)^5} + \frac{89.80(1.0176)}{(r-.0176)(1+r)^5}$$

Expected Return on Stocks (1/1/13) = 7.54%
T.Bond rate on 1/1/13 = 1.76%
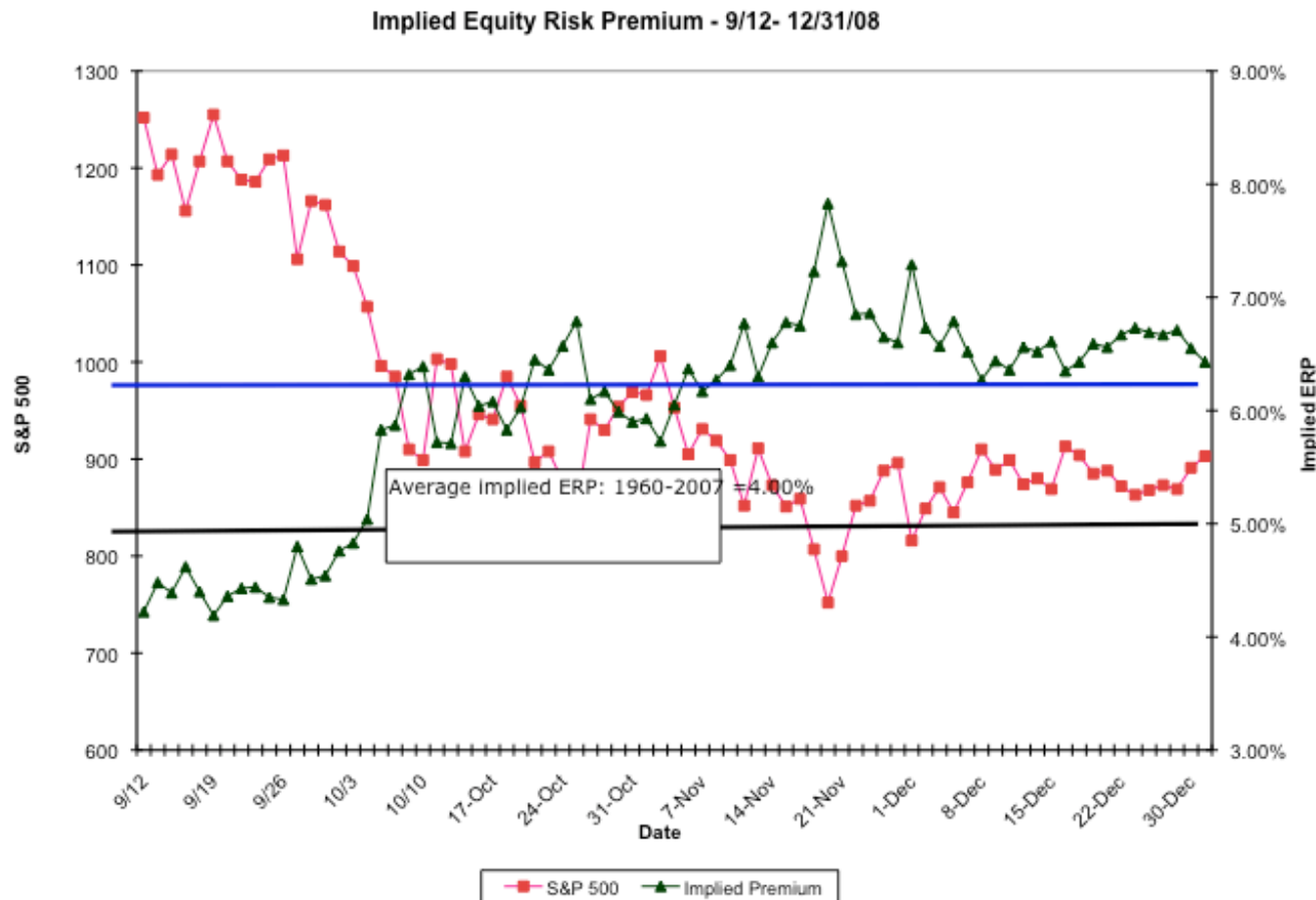Equity Risk Premium = 7.54% - 1.76% = 5.78%

Implied Premiums in the US: 1960-2012

Implied Premium for US Equity Market
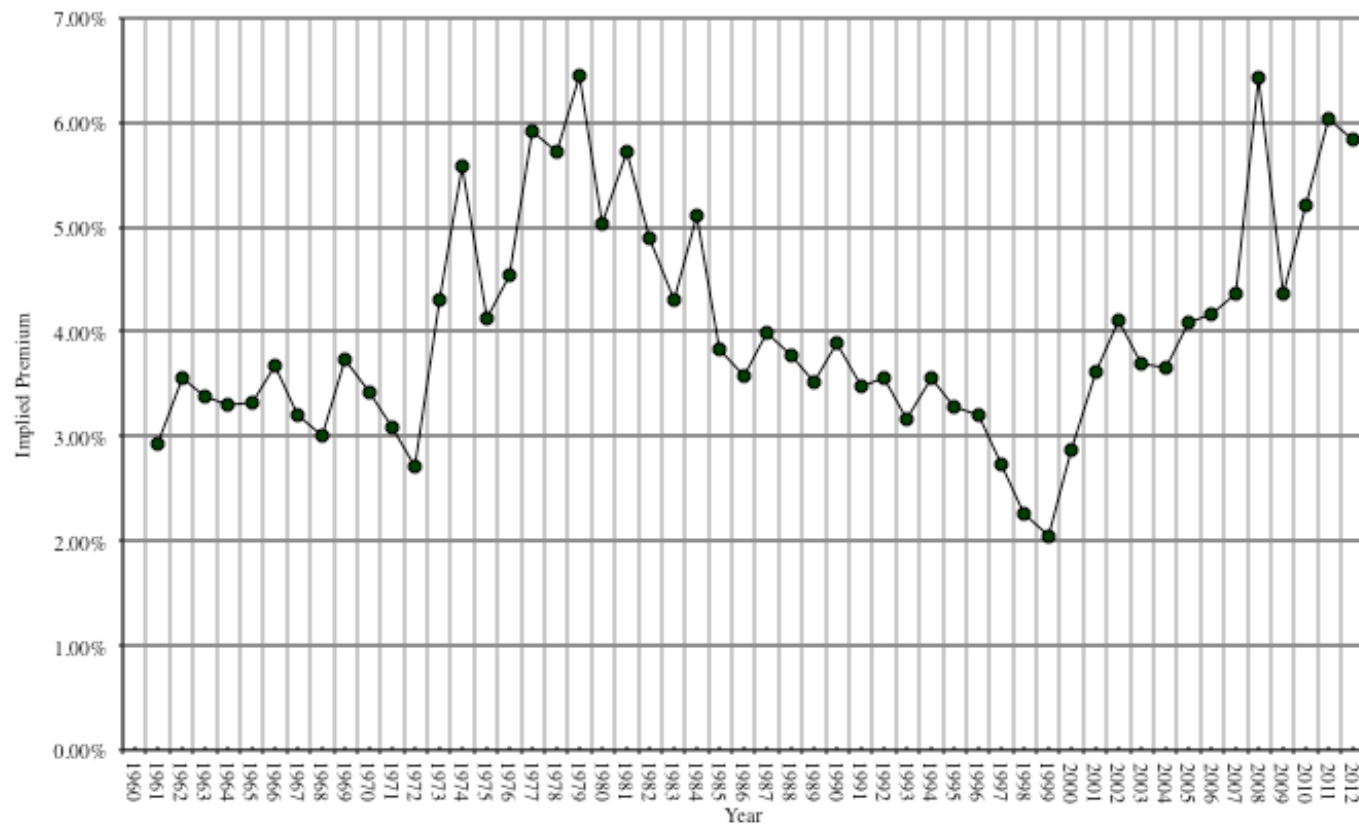
The Anatomy of a Crisis: Implied ERP from September 12, 2008 to January 1, 2009

Implied Premium for India using the Sensex: April 2010

- Level of the Index = 17559

- FCFE on the Index = 3.5% (Estimated FCFE for companies in index as % of market value of equity)

- Other parameters
  - Riskfree Rate = 5% (Rupee)
  - Expected Growth (in Rupee)
    - Next 5 years = 20% (Used expected growth rate in Earnings)
    - After year 5 = 5%

- Solving for the expected return:
  - Expected return on Equity = 11.72%
  - Implied Equity premium for India =11.72% - 5% = 6.72%

V. There is a downside to globalization...

- Emerging markets offer growth opportunities but they are also riskier. If we want to count the growth, we have to also consider the risk.
- Two ways of estimating the country risk premium:
  - Default spread on Country Bond: In this approach, the country equity risk premium is set equal to the default spread of the bond issued by the country.
    - Equity Risk Premium for mature market = 4.5%
    - Equity Risk Premium for India = 4.5% + 3% = 7.5%
  - Adjusted for equity risk: The country equity risk premium is based upon the volatility of the equity market relative to the government bond rate.
    - Country risk premium= Default Spread* σCountry Equity / σCountry Bond
    - Standard Deviation in Sensex = 21%
    - Standard Deviation in Indian government bond= 14%
    - Default spread on Indian Bond= 2%
    - Additional country risk premium for India = 2% (21/14) = 3%
    - Total equity risk premium = US equity risk premium + CRP for India = 6% + 3% = 9%

Country Risk Premium January 2013

Canada	0.00%	5.80%
USA	0.00%	5.80%
N. America	**0.00%**	**5.80%**

Argentina	9.00%	14.80%
Belize	15.00%	20.80%
Bolivia	4.88%	10.68%
Brazil	2.63%	8.43%
Chile	1.05%	6.85%
Colombia	3.00%	8.80%
Costa Rica	3.00%	8.80%
Ecuador	10.50%	16.30%
El Salvador	4.88%	10.68%
Guatemala	3.60%	9.40%
Honduras	7.50%	13.30%
Mexico	2.25%	8.05%
Nicaragua	9.00%	14.80%
Panama	2.63%	8.43%
Paraguay	6.00%	11.80%
Peru	2.63%	8.43%
Uruguay	3.00%	8.80%
Venezuela	6.00%	11.80%
Latin America	**3.38%**	**9.18%**

Belgium	1.05%	6.85%
Germany	0.00%	5.80%
Portugal	4.88%	10.68%
Italy	2.63%	8.43%
Luxembourg	0.00%	5.80%
Austria	0.00%	5.80%
Denmark	0.00%	5.80%
France	0.38%	6.18%
Finland	0.00%	5.80%
Greece	10.50%	16.30%
Iceland	3.00%	8.80%
Ireland	3.60%	9.40%
Netherlands	0.00%	5.80%
Norway	0.00%	5.80%
Slovenia	2.63%	8.43%
Spain	3.00%	8.80%
Sweden	0.00%	5.80%
Switzerland	0.00%	5.80%
Turkey	3.60%	9.40%
UK	0.00%	5.80%
W.Europe	**1.05%**	**6.85%**

Angola	4.88%	10.68%
Botswana	1.50%	7.30%
Egypt	7.50%	13.30%
Kenya	6.00%	11.80%
Mauritius	2.25%	8.05%
Morocco	3.60%	9.40%
Namibia	3.00%	8.80%
Nigeria	4.88%	10.68%
Senegal	6.00%	11.80%
South Africa	2.25%	8.05%
Tunisia	3.00%	8.80%
Zambia	6.00%	11.80%
Africa	**4.29%**	**10.09%**

Albania	6.00%	11.80%
Armenia	4.13%	9.93%
Azerbaijan	3.00%	8.80%
Belarus	9.00%	14.80%
Bosnia & Herzegovina	9.00%	14.80%
Bulgaria	2.63%	8.43%
Croatia	3.00%	8.80%
Czech Republic	1.28%	7.08%
Estonia	1.28%	7.08%
Georgia	4.88%	10.68%
Hungary	3.60%	9.40%
Kazakhstan	2.63%	8.43%
Latvia	3.00%	8.80%
Lithuania	2.25%	8.05%
Moldova	9.00%	14.80%
Montenegro	4.88%	10.68%
Poland	1.50%	7.30%
Romania	3.00%	8.80%
Russia	2.25%	8.05%
Slovakia	1.50%	7.30%
Ukraine	9.00%	14.80%
E. Europe & Russia	**2.68%**	**8.48%**

Bahrain	2.25%	8.05%
Israel	1.28%	7.08%
Jordan	4.13%	9.93%
Kuwait	0.75%	6.55%
Lebanon	6.00%	11.80%
Oman	1.28%	7.08%
Qatar	0.75%	6.55%
Saudi Arabia	1.05%	6.85%
United Arab Emirates	0.75%	6.55%
Middle East	**1.16%**	**6.96%**

Bangladesh	4.88%	10.68%
Cambodia	7.50%	13.30%
China	1.05%	6.85%
Fiji Islands	6.00%	11.80%
Hong Kong	0.38%	6.18%
India	3.00%	8.80%
Indonesia	3.00%	8.80%
Japan	1.05%	6.85%
Korea	1.05%	6.85%
Macao	1.05%	6.85%
Malaysia	1.73%	7.53%
Mongolia	6.00%	11.80%
Pakistan	10.50%	16.30%
Papua New Guinea	6.00%	11.80%
Philippines	3.60%	9.40%
Singapore	0.00%	5.80%
Sri Lanka	6.00%	11.80%
Taiwan	1.05%	6.85%
Thailand	2.25%	8.05%
Vietnam	7.50%	13.30%
Asia	**1.55%**	7.35%

Australia	0.00%	5.80%
New Zealand	0.00%	5.80%
Australia & NZ	**0.00%**	5.80%

Black #: Total ERP
Red #: Country risk premium
AVG: GDP weighted average

VI. And it is not just emerging market companies that are exposed to this risk..

□ The "default" approach in valuation has been to assign country risk based upon your country of incorporation. Thus, if you are incorporated in a developed market, the assumption has been that you are not exposed to emerging market risks. If you are incorporated in an emerging market, you are saddled with the entire country risk.

□ As companies globalize and look for revenues in foreign markets, this practice will under estimate the costs of equity of developed market companies with significant emerging market risk exposure and over estimate the costs of equity of emerging market companies with significant developed market risk exposure.

Operation based ERP: Single versus Multiple Emerging Markets

☐ Single emerging market: Embraer, in 2004, reported that it derived 3% of its revenues in Brazil and the balance from mature markets. The mature market ERP in 2004 was 5% and Brazil's CRP was 7.89%.

	Revenues	Total ERP	CRP
US and other mature markets	97%	5.00%	0.00%
Brazil	3%	12.89%	8%
Embraer		**5.24%**	**0.24%**

☐ Multiple emerging markets: Ambev, the Brazilian-based beverage company, reported revenues from the following countries during 2011.

	Revenues	%	Total ERP	CRP
Argentina	19	9.31%	15.00%	9.00%
Bolivia	4	1.96%	10.88%	4.88%
Brazil	130	63.73%	8.63%	2.63%
Canada	23	11.27%	6.00%	0.00%
Chile	7	3.43%	7.05%	1.05%
Ecuador	6	2.94%	12.75%	6.75%
Paraguay	3	1.47%	12.00%	6.00%
Peru	12	5.88%	9.00%	3.00%
Ambev	**204**		**9.11%**	**3.11%**

Estimating Lambda(s)

- The easiest and most accessible data is on revenues. Most companies break their revenues down by region. One simplistic solution would be to do the following:

$$\lambda = \% \text{ of revenues domestically }_{firm} / \% \text{ of revenues domestically }_{average\ firm}$$

- In 2008-09, Tata Motors got about 91.37% of its revenues in India and TCS got 7.62%. The average Indian firm gets about 80% of its revenues in India:
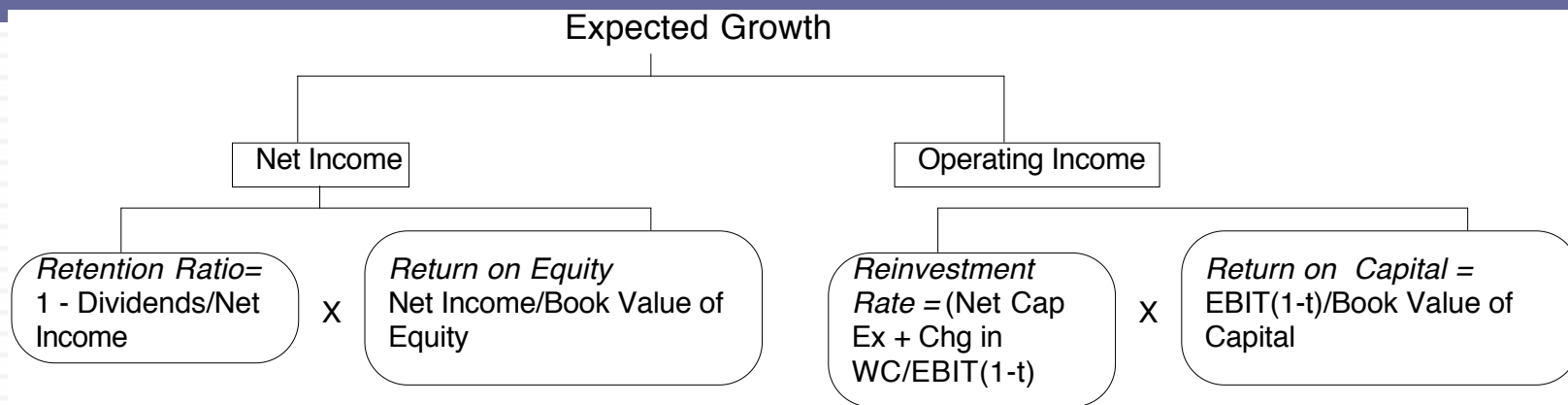
  - $\lambda_{Tata\ Motors} = 91\%/80\% = 1.14$
  - $\lambda_{TCS} = 7.62\%/80\% = 0.09$

	Tata Motors	*TCS*
% of production/operations in India	High	High
% of revenues in India	91.37% (in 2009) Estimated 70% (in 2010)	7.62%
Lambda	0.80	0.20
Flexibility in moving operations	Low. Significant physical assets.	High. Human capital is mobile.

Aswath Damodaran

VII. Discount rates can (and often should) change over time...

- The inputs into the cost of capital - the cost of equity (beta), the cost of debt (default risk) and the debt ratio - can change over time. For younger firms, they should change over time.

- At the minimum, they should change when you get to your terminal year to inputs that better reflect a mature firm.

VIII. Growth has to be earned (not endowed or estimated)

Expected Growth

Net Income   Operating Income

Retention Ratio=
1 - Dividends/Net Income   X   *Return on Equity*
Net Income/Book Value of Equity

Reinvestment Rate = (Net Cap Ex + Chg in WC/EBIT(1-t))   X   *Return on Capital =* EBIT(1-t)/Book Value of Capital

Adjust EBIT for
a. Extraordinary or one-time expenses or income
b. Operating leases and R&D
c. Cyclicality in earnings (Normalize)
d. Acquisition Debris (Goodwill amortization etc.)

Use a marginal tax rate to be safe. A high ROC created by paying low effective taxes is not sustainable

$$\text{ROC} = \frac{\text{EBIT (1- tax rate)}}{\text{Book Value of Equity + Book value of debt - Cash}}$$

Adjust book equity for
1. Capitalized R&D
2. Acquisition Debris (Goodwill)

Adjust book value of debt for
a. Capitalized operating leases

Use end of prior year numbers or average over the year but be consistent in your application

IX. All good things come to an end..And the terminal value is not an ATM…

This tax rate locks in forever. Does it make sense to use an effective tax rate?

Are you reinvesting enough to sustain your stable growth rate? Check
Reinv Rate = g/ ROC

$$\text{Terminal Value}_n = \frac{\text{EBIT}_{n+1}\ (1 - \text{tax rate})\ (1 - \text{Reinvestment Rate})}{\text{Cost of capital} - \text{Expected growth rate}}$$

This is a mature company. It's cost of capital should reflect that.

This growth rate should be less than the nominlnal growth rate of the economy

Terminal Value and Growth

Stable growth rate	Amgen	Tata Motors
0%	$150,652	435,686Rs
1%	$154,479	435,686Rs
2%	$160,194	435,686Rs
3%	$167,784	435,686Rs
4%	$179,099	435,686Rs
ROIC	10%	10.39%
Cost of capital	8.08%	10.39%

THE LOOSE ENDS IN VALUATION...

The loose ends matter…

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

1. The Value of Cash
An Exercise in Cash Valuation

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

- ☐ In which of these companies is cash most likely to trade at face value, at a discount and at a premium?

Cash: Discount or Premium?

Market Value of $ 1 in cash:
Estimates obtained by regressing Enterprise Value against Cash Balances
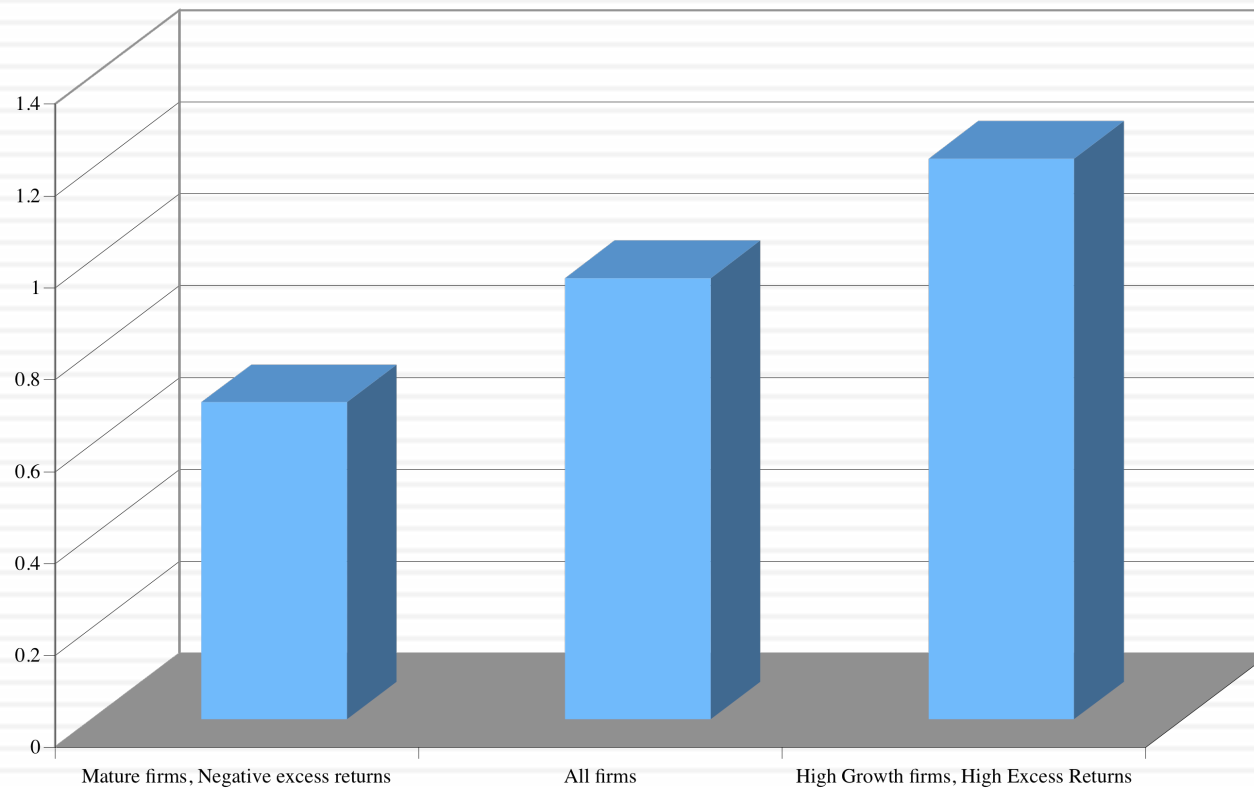
2. Dealing with Holdings in Other firms

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

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

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

Two compromise solutions...

- <u>The market value solution</u>: When the subsidiaries are publicly traded, you could use their traded market capitalizations to estimate the values of the cross holdings. You do risk carrying into your valuation any mistakes that the market may be making in valuation.

- <u>The relative value solution</u>: When there are too many cross holdings to value separately or when there is insufficient information provided on cross holdings, you can convert the book values of holdings that you have on the balance sheet (for both minority holdings and minority interests in majority holdings) by using the average price to book value ratio of the sector in which the subsidiaries operate.

Tata Motor's Cross Holdings

Value of Cross holdings: Tata Motors

- Tata Steel
- Tata Chemicals
- Non-listed Tata companies
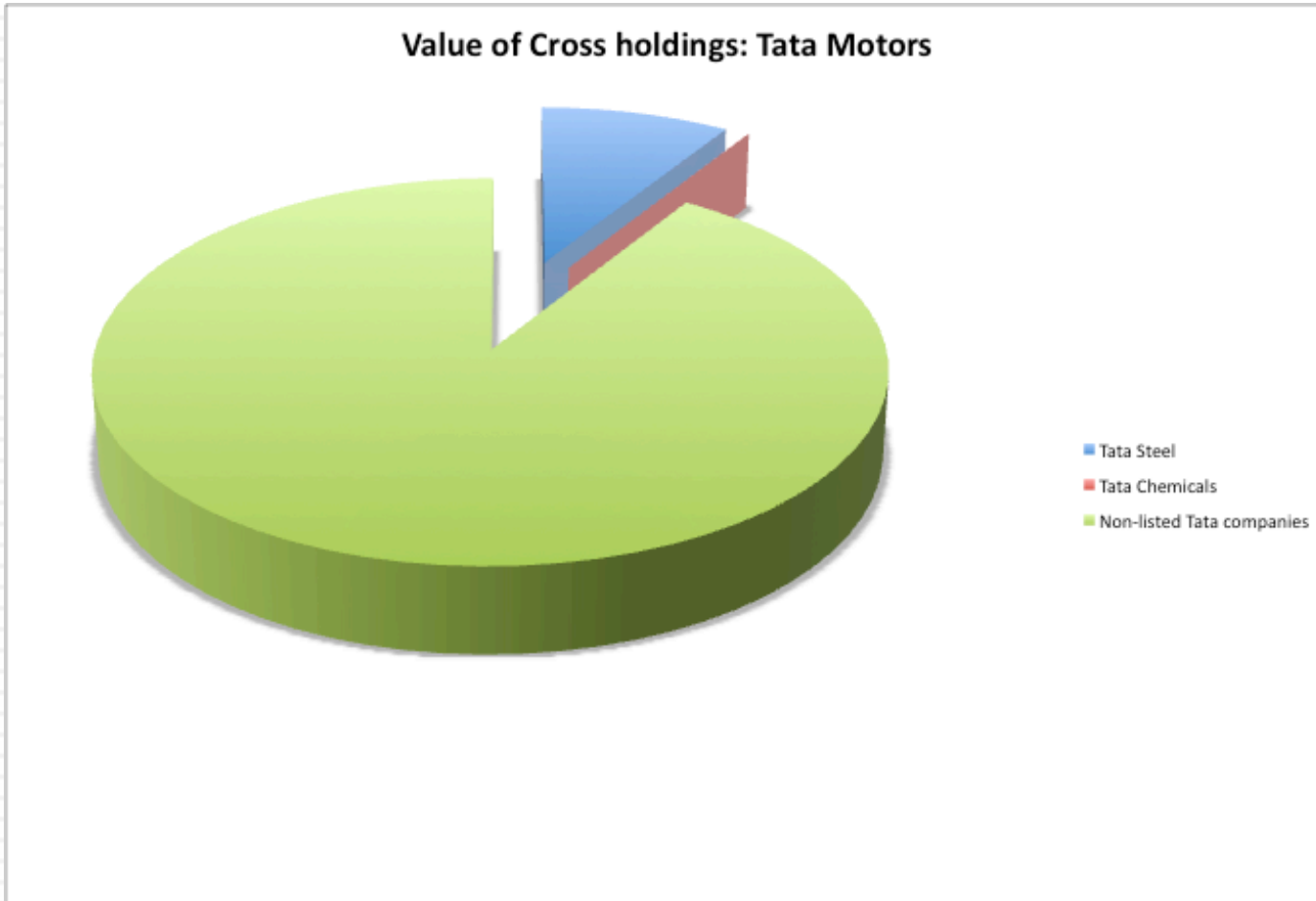
3. Other Assets that have not been counted yet..

- <u>Unutilized assets</u>: 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.

- <u>Overfunded pension plans</u>: If you have a defined benefit plan and your assets exceed your expected liabilities, you could consider the over funding with two caveats:
  - Collective bargaining agreements may prevent you from laying claim to these excess assets.
  - There are tax consequences. Often, withdrawals from pension plans get taxed at much higher rates.
  - Do not double count an asset. If you count the income from an asset in your cashflows, you cannot count the market value of the asset in your value.

4. A Discount for Complexity: An Experiment

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

- Which firm would you value more highly?

Measuring Complexity: Volume of Data in Financial Statements

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

Measuring Complexity: A Complexity Score

Item	Factors	Follow-up Question	Answer	Weighting factor	Gerdau Score	GE Score
Operating Income	1. Multiple Businesses	Number of businesses (with more than 10% of revenues) =	1	2.00	2	30
	2. One-time income and expenses	Percent of operating income =	10%	10.00	1	0.8
	3. Income from unspecified sources	Percent of operating income =	0%	10.00	0	1.2
	4. Items in income statement that are volatile	Percent of operating income =	15%	5.00	0.75	1
Tax Rate	1. Income from multiple locales	Percent of revenues from non-domestic locales =	70%	3.00	2.1	1.8
	2. Different tax and reporting books	Yes or No	No	Yes=3	0	3
	3. Headquarters in tax havens	Yes or No	No	Yes=3	0	0
	4. Volatile effective tax rate	Yes or No	Yes	Yes=2	2	0
Capital Expenditures	1. Volatile capital expenditures	Yes or No	Yes	Yes=2	2	2
	2. Frequent and large acquisitions	Yes or No	Yes	Yes=4	4	4
	3. Stock payment for acquisitions and investments	Yes or No	No	Yes=4	0	4
Working capital	1. Unspecified current assets and current liabilities	Yes or No	No	Yes=3	0	0
	2. Volatile working capital items	Yes or No	Yes	Yes=2	2	2
Expected Growth rate	1. Off-balance sheet assets and liabilities (operating leases and R&D)	Yes or No	No	Yes=3	0	3
	2. Substantial stock buybacks	Yes or No	No	Yes=3	0	3
	3. Changing return on capital over time	Is your return on capital volatile?	Yes	Yes=5	5	5
	4. Unsustainably high return	Is your firm's ROC much higher than industry average?	No	Yes=5	0	0
Cost of capital	1. Multiple businesses	Number of businesses (more than 10% of revenues) =	1	1.00	1	20
	2. Operations in emerging markets	Percent of revenues=	50%	5.00	2.5	2.5
	3. Is the debt market traded?	Yes or No	No	No=2	2	0
	4. Does the company have a rating?	Yes or No	Yes	No=2	0	0
	5. Does the company have off-balance sheet debt?	Yes or No	No	Yes=5	0	5
No-operating assets	Minority holdings as percent of book assets	Minority holdings as percent of book assets	0%	20.00	0	0.8
Firm to Equity value	Consolidation of subsidiaries	Minority interest as percent of book value of equity	63%	20.00	12.6	1.2
Per share value	Shares with different voting rights	Does the firm have shares with different voting rights?	Yes	Yes = 10	10	0
	Equity options outstanding	Options outstanding as percent of shares	0%	10.00	0	0.2
		Complexity Score =			48.95	90.55

Dealing with Complexity
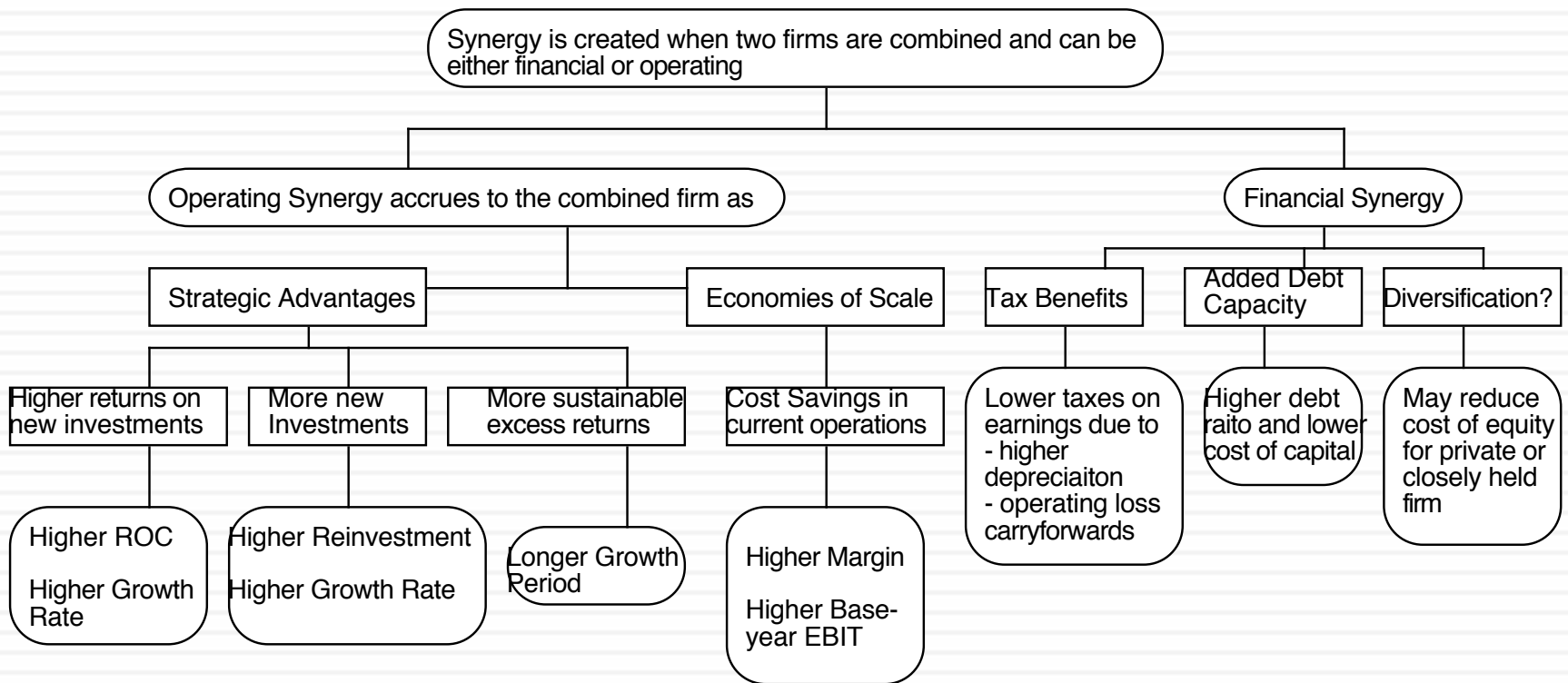
- In Discounted Cashflow Valuation
  - The Aggressive Analyst: Trust the firm to tell the truth and value the firm based upon the firm's statements about their value.
  - The Conservative Analyst: Don't value what you cannot see.
  - The Compromise: Adjust the value for complexity
    - Adjust cash flows for complexity
    - Adjust the discount rate for complexity
    - Adjust the expected growth rate/ length of growth period
    - Value the firm and then discount value for complexity
- In relative valuation
  - In a relative valuation, you may be able to assess the price that the market is charging for complexity:
  - With the hundred largest market cap firms, for instance:

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

5. The Value of Synergy

Synergy is created when two firms are combined and can be either financial or operating

Operating Synergy accrues to the combined firm as

Financial Synergy

Strategic Advantages

Economies of Scale

Tax Benefits

Added Debt Capacity

Diversification?

Higher returns on new investments

More new Investments

More sustainable excess returns

Cost Savings in current operations

Lower taxes on earnings due to
- higher depreciaiton
- operating loss carryforwards

Higher debt raito and lower cost of capital

May reduce cost of equity for private or closely held firm

Higher ROC

Higher Growth Rate

Higher Reinvestment

Higher Growth Rate

Longer Growth Period

Higher Margin

Higher Base-year EBIT

Valuing Synergy

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

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

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

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

Valuing Synergy: P&G + Gillette

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

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

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

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

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

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

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

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

8. 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

Increase Cash Flows

Reduce the cost of capital

More efficient operations and cost cuttting: Higher Margins

Divest assets that have negative EBIT

Reduce tax rate
- moving income to lower tax locales
- transfer pricing
- risk management

Revenues

* Operating Margin

= EBIT

- Tax Rate * EBIT

EBIT (1-t)

+ Depreciation
- Capital Expenditures
- Chg in Working Capital
= FCFF

Live off past over-investment

Better inventory management and tighter credit policies

Make your product/service less discretionary

Reduce Operating leverage

Reduce beta

Cost of Equity * (Equity/Capital) + Pre-tax Cost of Debt (1- tax rate) * (Debt/Capital)

Match your financing to your assets: Reduce your default risk and cost of debt

Shift interest expenses to higher tax locales

Change financing mix to reduce cost of capital

Firm Value

Increase Expected Growth
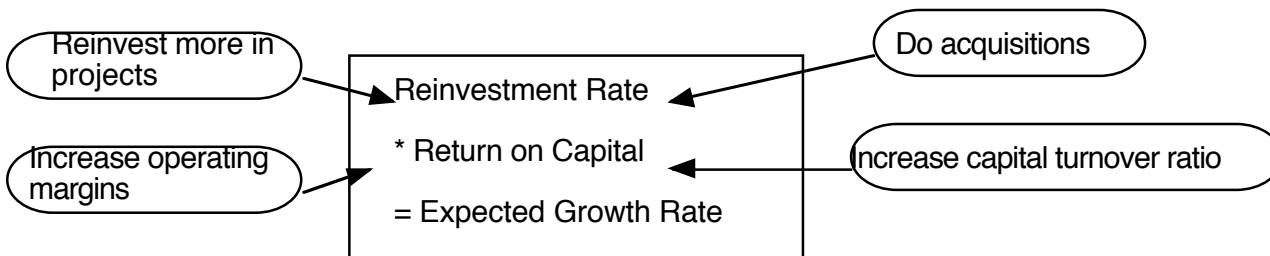
Increase length of growth period

Reinvest more in projects

Increase operating margins

Do acquisitions

Reinvestment Rate

* Return on Capital

= Expected Growth Rate

ncrease capital turnover ratio

Build on existing competitive advantages

Create new competitive advantages
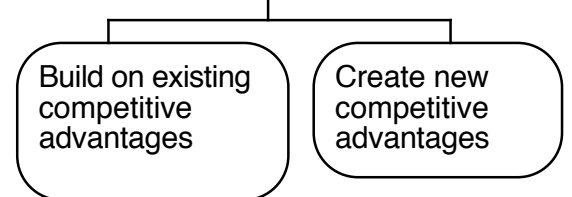
Adris Grupa (Status Quo): 4/2010

Current Cashflow to Firm
EBIT(1-t) :   436 HRK
- Nt CpX   3 HRK
- Chg WC   -118 HRK
= FCFF   551 HRK
Reinv Rate = (3-118)/436= -26.35%;
Tax rate = 17.35%
Return on capital = 8.72%

Average from 2004-09
70.83%

Reinvestment Rate
70.83%

Expected Growth from new inv.
.7083*.0969 =0.0686 or 6.86%

Average from 2004-09
9.69%

Return on Capital
9.69%

Stable Growth
g = 4%; Beta = 0.80
Country Premium= 2%
Cost of capital = 9.92%
Tax rate = 20.00%
ROC=9.92%;
Reinvestment Rate=g/ROC
=4/9.92= 40.32%

Terminal Value$_5$= 365/(.0992-.04) =6170 HRK

HKR Cashflows

Op. Assets   4312
+ Cash: 1787
- Debt   141
- Minority int   465
=Equity   5,484
(Common + Preferred shares)
Value non-voting share
335 HRK/share

Year	1	2	3	4	5	
EBIT (1-t)	HRK 466	HRK 498	HRK 532	HRK 569	HRK 608	612
- Reinvestment	HRK 330	HRK 353	HRK 377	HRK 403	HRK 431	246
FCFF	HRK 136	HRK 145	HRK 155	HRK 166	HRK 177	365

Discount at $ Cost of Capital (WACC) = 10.7% (.974) + 5.40% (0.026) = 10.55%

**Cost of Equity
10.70%**

Cost of Debt
(4.25%+ 0.5%+2%)(1-.20)
= 5.40 %

Weights
E = 97.4% D = 2.6%

On May 1, 2010
AG Pfd price = 279 HRK
AG Common = 345 HRK

Riskfree Rate:
HRK Riskfree Rate=
4.25%

+

**Beta
0.70**

X

**Mature market premium
4.5%**

+

Lambda
0.68

X

CRP for Croatia
(3%)

Lambda
0.42

X

CRP for Central Europe
(3%)

Unlevered Beta for
Sectors: 0.68

Firm's D/E
Ratio: 2.70%

Country Default
Spread
2%

X

Rel Equity
Mkt Vol
1.50
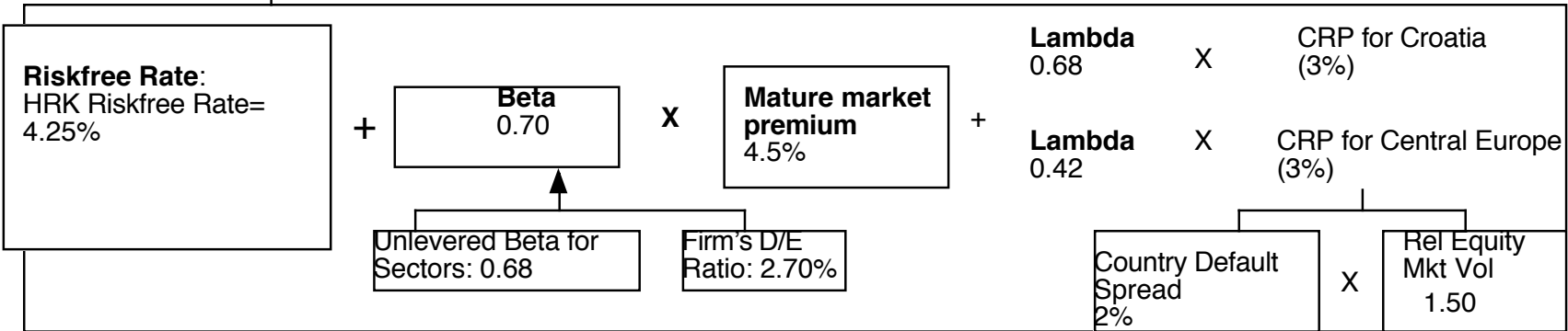
Adris Grupa: 4/2010 (Restructured)

Increased ROIC to cost of capital

Current Cashflow to Firm
EBIT(1-t) :   436 HRK
- Nt CpX   3 HRK
- Chg WC   -118 HRK
= FCFF   551 HRK
Reinv Rate = (3-118)/436= -26.35%;
Tax rate = 17.35%
Return on capital = 8.72%

Average from 2004-09
70.83%

Reinvestment Rate
70.83%

Expected Growth from new inv.
.7083*.01054=0.
or 6.86%

Return on Capital
10.54%

Stable Growth
g = 4%; Beta = 0.80
Country Premium= 2%
Cost of capital = 9.65%
Tax rate = 20.00%
ROC=9.94%;
Reinvestment Rate=g/ROC
=4/9.65= 41/47%

Terminal Value$_5$= 367/(.0965-.04) =6508 HRK

HKR Cashflows

Op. Assets	4545	Year	1	2	3	4	5
+ Cash:	1787	EBIT (1-t)	HRK 469	HRK 503	HRK 541	HRK 581	HRK 623
- Debt	141	- Reinvestment	HRK 332	HRK 356	HRK 383	HRK 411	HRK 442
- Minority int	465	FCFF	HRK 137	HRK 147	HRK 158	HRK 169	HRK 182
=Equity	5,735						

628
246
367

Value/non-voting   334
Value/voting   362

Discount at $ Cost of Capital (WACC) = 11.12% (.90) + 8.20% (0.10) = 10.55%

Changed mix of debt and equity tooptimal

On May 1, 2010
AG Pfd price = 279 HRK
AG Common = 345 HRK

Cost of Equity
11.12%

Cost of Debt
(4.25%+ 4%+2%)(1-.20)
= 8.20%

Weights
E = 90 % D = 10 %

Riskfree Rate:
HRK Riskfree Rate=
4.25%

+

Beta
0.75

X

Mature market premium
4.5%

+

Lambda
0.68
X
CRP for Croatia
(3%)

Lambda
0.42
X
CRP for Central Europe
(3%)

Unlevered Beta for
Sectors: 0.68

Firm's D/E
Ratio: 11.1%

Country Default
Spread
2%

X

Rel Equity
Mkt Vol
1.50

Value of Control and the Value of Voting Rights

- The value of control at Adris Grupa can be computed as the difference between the status quo value (5484) and the optimal value (5735).
- The value of a voting share derives entirely from the capacity you have to change the way the firm is run. In this case, we have two values for Adris Grupa's Equity.

    Status Quo Value of Equity = 5,484 million HKR

    All shareholders, common and preferred, get an equal share of the status quo value.

- Value for a non-voting share = 5484/(9.616+6.748) = 334 HKR/share
- Optimal value of Equity = 5,735 million HKR
- Value of control at Adris Grupa = 5,735 – 5484 = 249 million HKR
- Only voting shares get a share of this value of control

    Value per voting share =334 HKR + 249/9.616 = 362 HKR

THE DARK SIDE OF VALUATION: VALUING DIFFICULT-TO-VALUE COMPANIES

The fundamental determinants of value...

What is the **value added** by growth assets?
Equity: Growth in equity earnings/ cashflows
Firm: Growth in operating earnings/ cashflows

What are the **cashflows from existing assets**?
- Equity: Cashflows after debt payments
- Firm: Cashflows before debt payments

How **risky are the cash flows** from both existing assets and growth assets?
Equity: Risk in equity in the company
Firm: Risk in the firm's operations

When will the firm become a **mature fiirm**, and what are the potential roadblocks?

The Dark Side of Valuation…

- Valuing stable, money making companies with consistent and clear accounting statements, a long and stable history and lots of comparable firms is easy to do.

- The true test of your valuation skills is when you have to value "difficult" companies. In particular, the challenges are greatest when valuing:
  - Young companies, early in the life cycle, in young businesses
  - Companies that don't fit the accounting mold
  - Companies that face substantial truncation risk (default or nationalization risk)

Difficult to value companies…

- Across the life cycle:
  - Young, growth firms: Limited history, small revenues in conjunction with big operating losses and a propensity for failure make these companies tough to value.
  - Mature companies in transition: When mature companies change or are forced to change, history may have to be abandoned and parameters have to be reestimated.
  - Declining and Distressed firms: A long but irrelevant history, declining markets, high debt loads and the likelihood of distress make them troublesome.
- Across sectors
  - Financial service firms: Opacity of financial statements and difficulties in estimating basic inputs leave us trusting managers to tell us what's going on.
  - Commodity and cyclical firms: Dependence of the underlying commodity prices or overall economic growth make these valuations susceptible to macro factors.
  - Firms with intangible assets: Accounting principles are left to the wayside on these firms.
- Across the ownership cycle
  - Privately owned businesses: Exposure to firm specific risk and illiquidity bedevil valuations.
  - VC and private equity: Different equity investors, with different perceptions of risk.
  - Closely held public firms: Part private and part public, sharing the troubles of both.

I. The challenge with young companies…

Making judgments on revenues/ profits difficult becaue you cannot draw on history. If you have no product/ service, it is difficult to gauge market potential or profitability. The company;s entire value lies in future growth but you have little to base your estimate on.
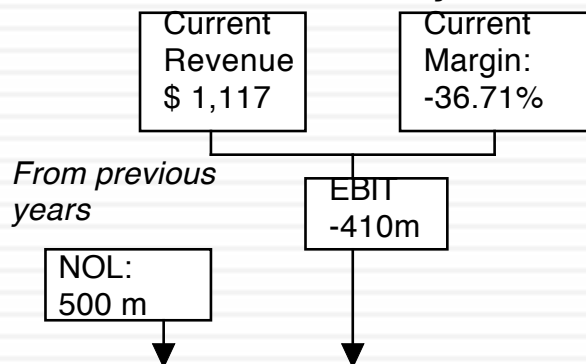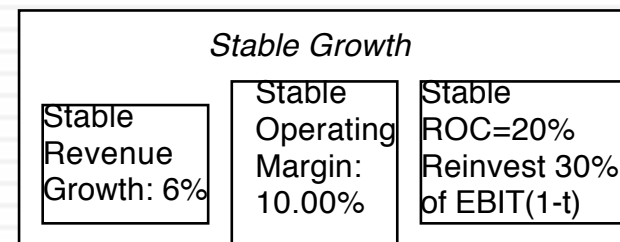
Cash flows from existing assets non-existent or negative.

What is the value added by growth assets?

What are the cashflows from existing assets?

When will the firm become a mature fiirm, and what are the potential roadblocks?

Different claims on cash flows can affect value of equity at each stage.

How risky are the cash flows from both existing assets and growth assets?

Limited historical data on earnings, and no market prices for securities makes it difficult to assess risk.

What is the value of equity in the firm?

Will the firm will make it through the gauntlet of market demand and competition. Even if it does, assessing when it will become mature is difficult because there is so little to go on.

Upping the ante.. Young companies in young businesses...

- When valuing a business, we generally draw on three sources of information
  - The firm's current financial statement
    - How much did the firm sell?
    - How much did it earn?
  - The firm's financial history, usually summarized in its financial statements.
    - How fast have the firm's revenues and earnings grown over time?
    - What can we learn about cost structure and profitability from these trends?
    - Susceptibility to macro-economic factors (recessions and cyclical firms)
  - The industry and comparable firm data
    - What happens to firms as they mature? (Margins.. Revenue growth... Reinvestment needs... Risk)
- It is when valuing these companies that you find yourself tempted by the dark side, where
  - "Paradigm shifts" happen...
  - New metrics are invented ...
  - The story dominates and the numbers lag...

9a. Amazon in January 2000

Current Revenue $ 1,117

Current Margin: -36.71%

From previous years

EBIT -410m

NOL: 500 m

Sales to capital ratio and expected margin are retail industry average numbers

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)
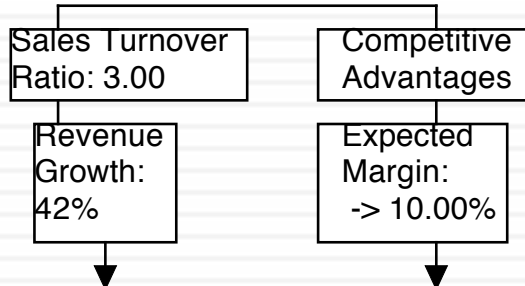
Terminal Value= 1881/(.0961-.06) =52,148

Value of Op Assets $ 15,170
+ Cash $ 26
= Value of Firm $14,936
- Value of Debt $ 349
= Value of Equity $14,847
- Equity Options $ 2,892
Value per share $ 35.08

All existing options valued as options, using current stock price of $84.

	1	2	3	4	5	6	7	8	9	10	Term. Year
Revenue Growth	150.00%	100.00%	75.00%	50.00%	30.00%	25.20%	20.40%	15.60%	10.80%	6.00%	6%
Revenues	$ 2,793	$ 5,585	$ 9,774	$ 14,661	$ 19,059	$ 23,862	$ 28,729	$ 33,211	$ 36,798	$ 39,006	$ 41,346
Operating Margin	-13.35%	-1.68%	4.16%	7.08%	8.54%	9.27%	9.64%	9.82%	9.91%	9.95%	10.00%
EBIT	-$373	-$94	$407	$1,038	$1,628	$2,212	$2,768	$3,261	$3,646	$3,883	$4,135
EBIT(1-t)	-$373	-$94	$407	$871	$1,058	$1,438	$1,799	$2,119	$2,370	$2,524	$2,688
- Reinvestment	$600	$967	$1,420	$1,663	$1,543	$1,688	$1,721	$1,619	$1,363	$961	$155
FCFF	-$931	-$1,024	-$989	-$758	-$408	-$163	$177	$625	$1,174	$1,788	$1,881

	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%	11.94%	11.46%	10.98%	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%	
After-tax 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%	11.62%	11.08%	10.49%	9.61%	

Cost of Equity 12.90%

Used average interest coverage ratio over next 5 years to get BBB rating.

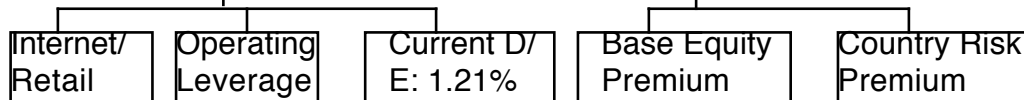**Cost of Debt** 6.5%+1.5%=8.0% Tax rate = 0% -> 35%

Weights Debt= 1.2% -> 15%

Amazon was trading at $84 in January 2000.

Pushed debt ratio to retail industry average of 15%.

Dot.com retailers for firrst 5 years Convetional retailers after year 5

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

Lesson 1: Don't trust regression betas....
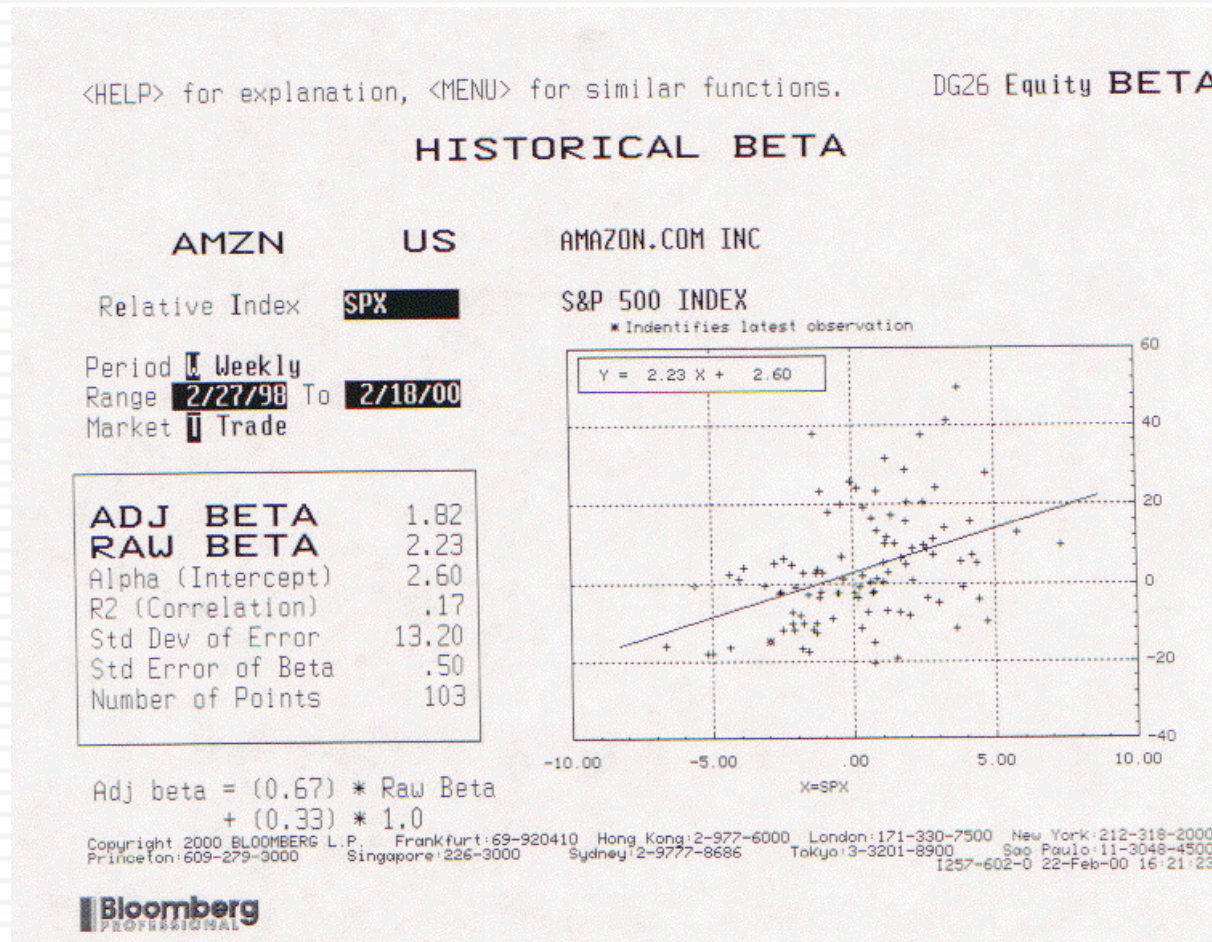
Lesson 2: Work backwards and keep it simple…

Year	Revenue Growth	Sales	Operating Margin	EBIT	EBIT (1-t)
Tr 12 mths		$1,117	-36.71%	-$410	-$410
1	150.00%	$2,793	-13.35%	-$373	-$373
2	100.00%	$5,585	-1.68%	-$94	-$94
3	75.00%	$9,774	4.16%	$407	$407
4	50.00%	$14,661	7.08%	$1,038	$871
5	30.00%	$19,059	8.54%	$1,628	$1,058
6	25.20%	$23,862	9.27%	$2,212	$1,438
7	20.40%	$28,729	9.64%	$2,768	$1,799
8	15.60%	$33,211	9.82%	$3,261	$2,119
9	10.80%	$36,798	9.91%	$3,646	$2,370
10	6.00%	$39,006	9.95%	$3,883	$2,524
TY	6.00%	$41,346	10.00%	$4,135	$2,688

Lesson 3: Scaling up is hard to do…

Typically, the revenue growth rate of a newly public company outpaces its industry average for only about five years.

Post-I.P.O. growth

Median of new issues from 1965 to 2005

Margin by which revenue growth rate exceeds industry average

Number of years after coming to market
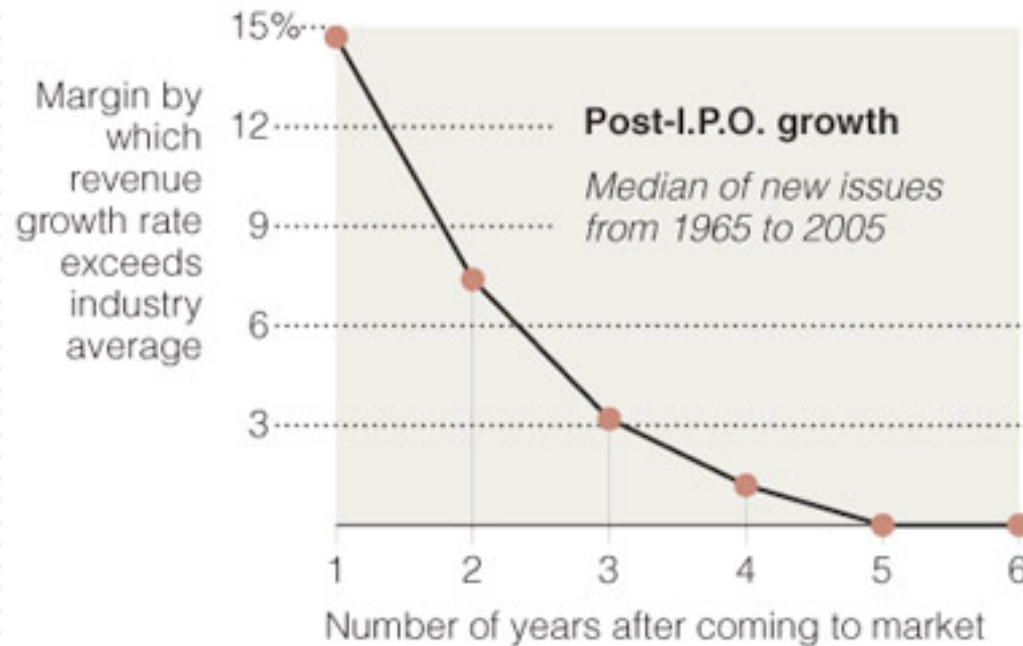
Source: Andrew Metrick

The New York Times

Lesson 4: Don't forget to pay for growth…

Year	Revenues	Δ Revenue	Sales/Cap	Δ Investment	Invested Capital	EBIT (1-t)	Imputed ROC
Tr 12 mths	$1,117				$ 487	-$410	
1	$2,793	$1,676	3.00	$559	$ 1,045	-$373	-76.62%
2	$5,585	$2,793	3.00	$931	$ 1,976	-$94	-8.96%
3	$9,774	$4,189	3.00	$1,396	$ 3,372	$407	20.59%
4	$14,661	$4,887	3.00	$1,629	$ 5,001	$871	25.82%
5	$19,059	$4,398	3.00	$1,466	$ 6,467	$1,058	21.16%
6	$23,862	$4,803	3.00	$1,601	$ 8,068	$1,438	22.23%
7	$28,729	$4,868	3.00	$1,623	$ 9,691	$1,799	22.30%
8	$33,211	$4,482	3.00	$1,494	$ 11,185	$2,119	21.87%
9	$36,798	$3,587	3.00	$1,196	$ 12,380	$2,370	21.19%
10	$39,006	$2,208	3.00	$736	$ 13,116	$2,524	20.39%
TY	$41,346	$2,340	NA		Assumed to be =		20.00%

Lesson 5: There are always scenarios where the market price can be justified…

	6%	8%	10%	12%	14%
30%	$ (1.94)	$ 2.95	$ 7.84	$ 12.71	$ 17.57
35%	$ 1.41	$ 8.37	$ 15.33	$ 22.27	$ 29.21
40%	$ 6.10	$ 15.93	$ 25.74	$ 35.54	$ 45.34
45%	$ 12.59	$ 26.34	$ 40.05	$ 53.77	$ 67.48
50%	$ 21.47	$ 40.50	$ 59.52	$ 78.53	$ 97.54
55%	$ 33.47	$ 59.60	$ 85.72	$ 111.84	$ 137.95
60%	$ 49.53	$ 85.10	$ 120.66	$ 156.22	$ 191.77

Lesson 6: Don't forget to mop up...

☐ Watch out for "other" equity claims: If you buy equity in a young, growth company, watch out for other (often hidden) claims on the equity that don't take the form of common shares. In particular, watch for options granted to managers, employees, venture capitalists and others (you will be surprised...).

  ☐ Value these options as options (not at exercise value)

  ☐ Take into consideration expectations of future option grants when computing expected future earnings/cash flows.

☐ Not all shares are equal: If there are differences in cash flow claims (dividends or liquidation) or voting rights across shares, value these differences.

  ☐ Voting rights matter even at well run companies

Lesson 7: You will be wrong 100% of the time... and it really is not (always) your fault...

- No matter how careful you are in getting your inputs and how well structured your model is, your estimate of value will change both as new information comes out about the company, the business and the economy.

- As information comes out, you will have to adjust and adapt your model to reflect the information. Rather than be defensive about the resulting changes in value, recognize that this is the essence of risk.

- A test: If your valuations are unbiased, you should find yourself increasing estimated values as often as you are decreasing values. In other words, there should be equal doses of good and bad news affecting valuations (at least over time).

9b. Amazon in January 2001

Current Revenue $ 2,465

Current Margin: -34.60%

EBIT -853m

NOL: 1,289 m

Reinvestment:
Cap ex includes acquisitions
Working capital is 3% of revenues

Sales Turnover Ratio: 3.02

Revenue Growth: 25.41%

Competitive Advantage

Expected Margin: -> 9.32%

Stable Growth

Stable Revenue Growth: 5%

Stable Operating Margin: 9.32%

Stable ROC=16.94% Reinvest 29.5% of EBIT(1-t)

Terminal Value= 1064/(.0876-.05) =$ 28,310

	1	2	3	4	5	6	7	8	9	10	Term. Year
Revenues	$4,314	$6,471	$9,059	$11,777	$14,132	$16,534	$18,849	$20,922	$22,596	$23,726	$24,912
EBIT	-$545	-$107	$347	$774	$1,123	$1,428	$1,692	$1,914	$2,087	$2,201	$2,302
EBIT(1-t)	-$545	-$107	$347	$774	$1,017	$928	$1,100	$1,244	$1,356	$1,431	$1,509
- Reinvestment	$612	$714	$857	$900	$780	$796	$766	$687	$554	$374	$ 445
FCFF	-$1,157	-$822	-$510	-$126	$237	$132	$333	$558	$802	$1,057	$1,064

Value of Op Assets	$ 8,789
+ Cash & Non-op	$ 1,263
= Value of Firm	$10,052
- Value of Debt	$ 1,879
= Value of Equity	$ 8,173
- Equity Options	$ 845
Value per share	$ 20.83

	1	2	3	4	5	6	7	8	9	10	
Debt Ratio	27.27%	27.27%	27.27%	27.27%	27.27%	24.81%	24.20%	23.18%	21.13%	15.00%	Forever
Beta	2.18	2.18	2.18	2.18	2.18	1.96	1.75	1.53	1.32	1.10	
Cost of Equity	13.81%	13.81%	13.81%	13.81%	13.81%	12.95%	12.09%	11.22%	10.36%	9.50%	
AT cost of debt	10.00%	10.00%	10.00%	10.00%	9.06%	6.11%	6.01%	5.85%	5.53%	4.55%	
Cost of Capital	12.77%	12.77%	12.77%	12.77%	12.52%	11.25%	10.62%	9.98%	9.34%	8.76%	

Cost of Equity 13.81%

Cost of Debt
6.5%+3.5%=10.0%
Tax rate = 0% -> 35%

Weights
Debt= 27.3% -> 15%
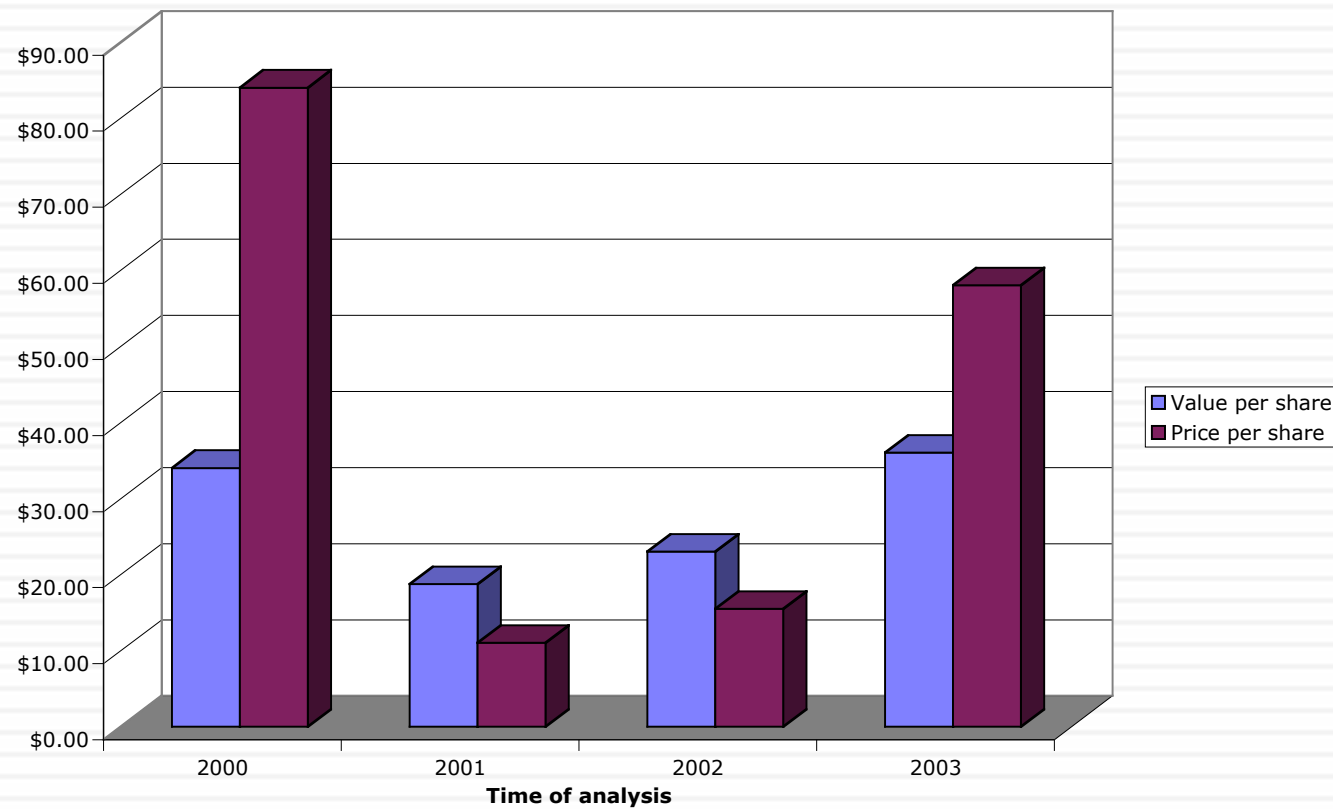
Riskfree Rate: T. Bond rate = 5.1%

+

Beta 2.18-> 1.10

X

Risk Premium 4%

Internet/ Retail

Operating Leverage

Current D/E: 37.5%

Base Equity Premium

Country Risk Premium
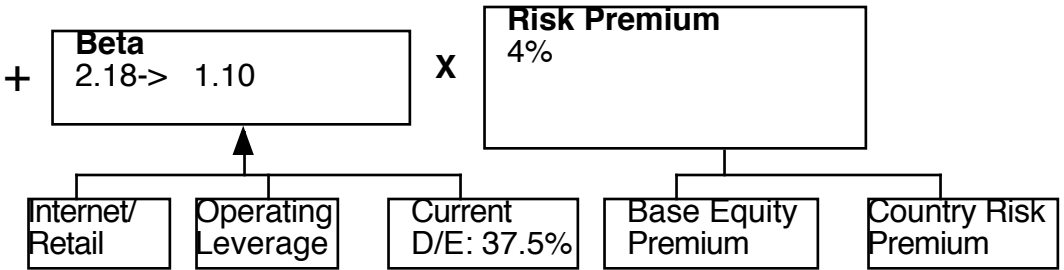
Amazon.com January 2001 Stock price = $14
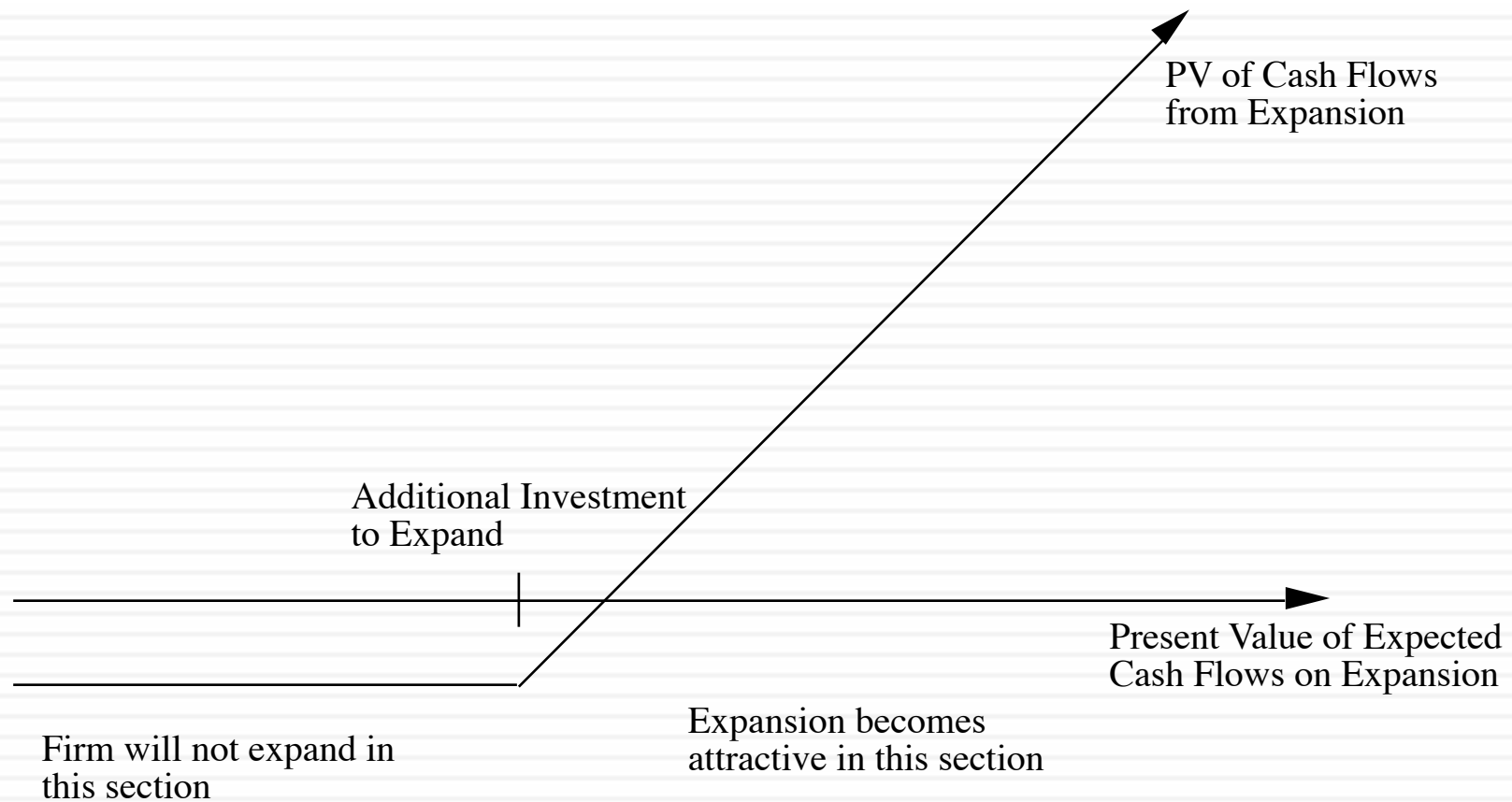
And the market is often "more wrong"….

Amazon: Value and Price

An "option premium": The option to add a product or enter a market

PV of Cash Flows
from Expansion

Additional Investment
to Expand

Present Value of Expected
Cash Flows on Expansion

Firm will not expand in
this section

Expansion becomes
attractive in this section

An Example of an Expansion Option

- You have complete a DCF valuation of a small anti-virus software company, Secure Mail, and estimated a value of $115 million.

- Assume that there is the possibility that the company could use the customer base that it develops for the anti-virus software and the technology on which the software is based to create a database software program sometime in the next 5 years.
  - It will cost Secure Mail about $500 million to develop a new database program, if they decided to do it today.
  - Based upon the information you have now on the potential for a database program, the company can expect to generate about $ 40 million a year in after-tax cashflows for ten years. The cost of capital for private companies that provide database software is 12%.
  - The annualized standard deviation in firm value at publicly traded database companies is 50%.
  - The five-year treasury bond rate is 3%.

Valuing the Expansion Option

S   = Value of entering the database software market
      = PV of $40 million for 10 years @12%   = $226 million
K   = Cost of entering the database software market = $ 500 mil
t   = Period over which you have the right to enter the market
      = 5 years
σ = Standard deviation of stock prices of database firms = 50%
r   = Riskless rate = 3%

                     Call Value= $ 56 Million

DCF valuation of the firm   = $ 115 million
Value of Option to Expand to Database market   = $ 56 million
Value of the company with option to expand   = $ 171 million

A note of caution: Opportunities are not options...

Is the first investment necessary for the second investment?

Not necessary   Pre-Requisit

A Zero competitive
advantage on Second Investment

An Exclusive Right to
Second Investment

No option value   **100% of option value**

Option has no value   **Option has high value**

Second Investment has
zero excess returns

Second investment
has large sustainable
excess return

| First-Mover | Technological Edge | Brand Name | Telecom Licenses | Pharmaceutical patents |

Increasing competitive advantage/ barriers to entry

II. Mature Companies in transition..

- Mature companies are generally the easiest group to value. They have long, established histories that can be mined for inputs. They have investment policies that are set and capital structures that are stable, thus making valuation more grounded in past data.

- However, this stability in the numbers can mask real problems at the company. The company may be set in a process, where it invests more or less than it should and does not have the right financing mix. In effect, the policies are consistent, stable and bad.

- If you expect these companies to change or as is more often the case to have change thrust upon them,

The perils of valuing mature companies…

Figure 7.1: Estimation Issues - Mature Companies

Lots of historical data on earnings and cashflows. Key questions remain if these numbers are volatile over time or if the existing assets are not being efficiently utilized.

Growth is usually not very high, but firms may still be generating healthy returns on investments, relative to cost of funding. Questions include how long they can generate these excess returns and with what growth rate in operations. Restructuring can change both inputs dramatically and some firms maintain high growth through acquisitions.

What is the value added by growth assets?

What are the cashflows from existing assets?

When will the firm become a mature fiirm, and what are the potential roadblocks?

How risky are the cash flows from both existing assets and growth assets?

Equity claims can vary in voting rights and dividends.

Operating risk should be stable, but the firm can change its financial leverage This can affect both the cost of equtiy and capital.

Maintaining excess returns or high growth for any length of time is difficult to do for a mature firm.

What is the value of equity in the firm?

83

Hormel Foods: The Value of Control Changing

Hormel Foods sells packaged meat and other food products and has been in existence as a publicly traded company for almost 80 years. In 2008, the firm reported after-tax operating income of $315 million, reflecting a compounded growth of 5% over the previous 5 years.

The Status Quo

Run by existing management, with conservative reinvestment policies (reinvestment rate = 14.34% and debt ratio = 10.4%.

Anemic growth rate and short growth period, due to reinvestment policy

Low debt ratio affects cost of capital

Year	Operating income after taxes	Expected growth rate	ROC	Reinvestment Rate	Reinvestment	FCFF	Cost of capital	Present Value
Trailing 12 months	$315							
1	$324	2.75%	14.34%	19.14%	$62	$262	6.79%	$245
2	$333	2.75%	14.34%	19.14%	$64	$269	6.79%	$236
3	$342	2.75%	14.34%	19.14%	$65	$276	6.79%	$227
Beyond	$350	2.35%	7.23%	32.52%	$114	$4,840	7.23%	$3,974
Value of operating assets								$4,682
(Add) Cash								$155
(Subtract) Debt								$491
(Subtract) Management Options								$53
Value of equity in common stock								$4,293
Value per share								$31.91

New and better management

More aggressive reinvestment which increases the reinvestment rate (to 40%) and tlength of growth (to 5 years), and higher debt ratio (20%).

Operating Restructuring (1)
Expected growth rate = ROC * Reinvestment Rate
Expected growth rae (status quo) = 14.34% * 19.14% = 2.75%
Expected growth rate (optimal) = 14.00% * 40% = 5.60%
ROC drops, reinvestment rises and growth goes up.

Financial restructuring (2)
Cost of capital = Cost of equity (1-Debt ratio) + Cost of debt (Debt ratio)
Status quo = 7.33% (1-.104) + 3.60% (1-.40) (.104) = 6.79%
Optimal = 7.75% (1-.20) + 3.60% (1-.40) (.20) = 6.63%
Cost of equity rises but cost of capital drops.

Year	Operating income after taxes	Expected growth rate	ROC	Reinvestment Rate	Reinvestment	FCFF	Cost of capital	Present Value
Trailing 12 months	$315							
1	$333	5.60%	14.00%	40.00%	$133	$200	6.63%	$187
2	$351	5.60%	14.00%	40.00%	$141	$211	6.63%	$185
3	$371	5.60%	14.00%	40.00%	$148	$223	6.63%	$184
4	$392	5.60%	14.00%	40.00%	$260	$235	6.63%	$182
5	$414	5.60%	14.00%	40.00%	$223	$248	6.63%	$180
Beyond	$423	2.35%	6.74%	34.87%	$148	$6,282	6.74%	$4,557
Value of operating assets								$5,475
(Add) Cash								$155
(Subtract) Debt								$491
(Subtract) Management Options								$53
Value of equity in common stock								$5,085
Value per share								$37.80

Probability of management change = 10%
Expected value =$31.91 (.90) + $37.80 (.10) = $32.50 (3)
(4)

Lesson 1: Cost cutting and increased efficiency are easier accomplished on paper than in practice...

Cost-synergy estimation is better, but there are patterns emerging in the errors

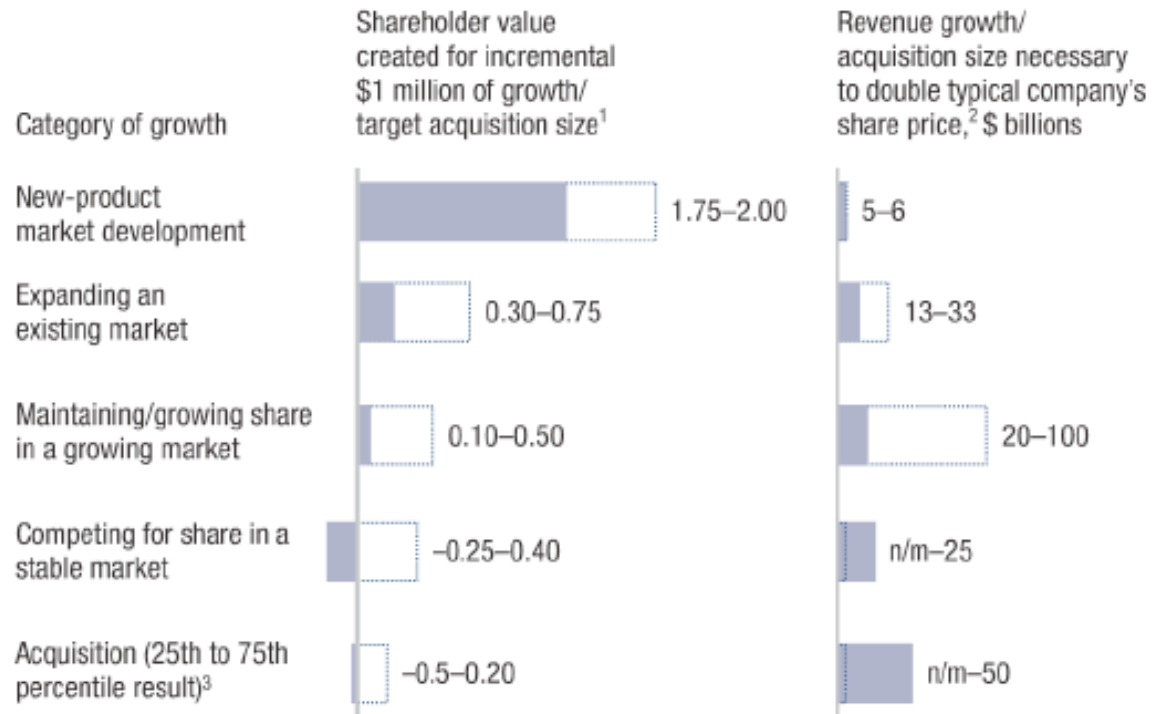Mergers achieving stated percentage of expected cost savings, percent *N* = 92

<30%	30–50%	51–60%	61–70%	71–80%	81–90%	91–100%	>100%
3	5	1	4	12	13	25	36
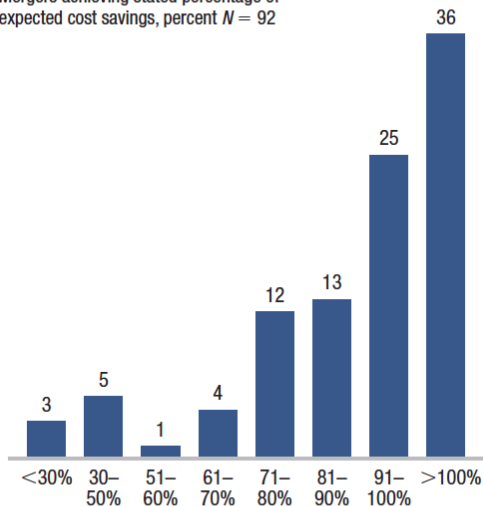
Typical sources of estimation error

- Underestimating one-time costs
- Using benchmarks from noncomparable situations
- Not sanity-checking management estimates against precedent transactions
- Failing to ground estimates in bottom-up analysis (e.g., location-by-location review of overlaps

Source: McKinsey (2002) Postmerger Management Practice client survey; client case studies

Lesson 2: Increasing growth is not always an option (or at least not a good option)

Modes of organic growth vary in value creation intensity—consumer goods industry

Category of growth	Shareholder value created for incremental $1 million of growth/ target acquisition size[1]	Revenue growth/ acquisition size necessary to double typical company's share price,[2] $ billions
New-product market development	1.75–2.00	5–6
Expanding an existing market	0.30–0.75	13–33
Maintaining/growing share in a growing market	0.10–0.50	20–100
Competing for share in a stable market	−0.25–0.40	n/m–25
Acquisition (25th to 75th percentile result)[3]	−0.5–0.20	n/m–50

Lesson 3: Financial leverage is a double-edged sword..

Exhibit 7.1: Optimal Financing Mix: Hormel Foods in January 2009

As debt ratio increases, equity becomes riskier.(higher beta) and cost of equity goes up. ①

As firm borrows more money, its ratings drop and cost of debt rises ②

Current Cost of Capital

Debt Ratio	Beta	Cost of Equity	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)	WACC	Firm Value (G)
0%	0.78	7.00%	AAA	3.60%	40.00%	2.16%	7.00%	$4,523
10%	0.83	7.31%	AAA	3.60%	40.00%	2.16%	6.80%	$4,665
10.39%	**0.83**	**7.33%**	**AAA**	**3.60%**	**40.00%**	**2.16%**	**6.79%**	**$4,680**
20%	0.89	7.70%	AAA	3.60%	40.00%	2.16%	6.59%	$4,815
30%	0.97	8.20%	A+	4.60%	40.00%	2.76%	6.57%	$4,834
40%	1.09	8.86%	A-	5.35%	40.00%	3.21%	6.60%	$4,808
50%	1.24	9.79%	B+	8.35%	40.00%	5.01%	7.40%	$4,271
60%	1.47	11.19%	B-	10.85%	40.00%	6.51%	8.38%	$3,757
70%	1.86	13.52%	CCC	12.35%	40.00%	7.41%	9.24%	$3,398
80%	2.70	18.53%	CC	14.35%	38.07%	8.89%	10.81%	$2,892
90%	5.39	34.70%	CC	14.35%	33.84%	9.49%	12.01%	$2,597

Optimal: Cost of capital lowest between 20 and 30%.

Debt ratio is percent of overall market value of firm that comes from debt financing.

At debt ratios > 80%, firm does not have enough operating income to cover interest expenses. Tax rate goes down to reflect lost tax benefits. ③

As cost of capital drops, firm value rises (as operating cash flows remain unchanged)

III. Dealing with decline and distress…

Historial data often reflects flat or declining revenues and falling margins. Investments often earn less than the cost of capital.

Growth can be negative, as firm sheds assets and shrinks. As less profitable assets are shed, the firm's remaining assets may improve in quality.

What is the value added by growth assets?

What are the cashflows from existing assets?

When will the firm become a mature fiirm, and what are the potential roadblocks?

Underfunded pension obligations and litigation claims can lower value of equity. Liquidation preferences can affect value of equity

How risky are the cash flows from both existing assets and growth assets?

What is the value of equity in the firm?

Depending upon the risk of the assets being divested and the use of the proceeds from the divestuture (to pay dividends or retire debt), the risk in both the firm and its equity can change.

There is a real chance, especially with high financial leverage, that the firm will not make it. If it is expected to survive as a going concern, it will be as a much smaller entity.

a. Dealing with Decline

- In decline, firms often see declining revenues and lower margins, translating in negative expected growth over time.

- If these firms are run by good managers, they will not fight decline. Instead, they will adapt to it and shut down or sell investments that do not generate the cost of capital. This can translate into negative net capital expenditures (depreciation exceeds cap ex), declining working capital and an overall negative reinvestment rate. The best case scenario is that the firm can shed its bad assets, make itself a much smaller and healthier firm and then settle into long-term stable growth.

- As an investor, your worst case scenario is that these firms are run by managers in denial who continue to expand the firm by making bad investments (that generate lower returns than the cost of capital). These firms may be able to grow revenues and operating income but will destroy value along the way.

11. Sears Holdings: Status Quo

Current Cashflow to Firm
EBIT(1-t) :   1,183
- Nt CpX   -18
- Chg WC   - 67
= FCFF   1,268
Reinvestment Rate = -75/1183
                    =-7.19%
Return on capital = 4.99%

Reinvestment Rate
-30.00%

Expected Growth in EBIT (1-t)
-.30*..05=-0.015
-1.5%

Return on Capital
5%

Stable Growth
g = 2%; Beta = 1.00;
Country Premium= 0%
Cost of capital = 7.13%
ROC= 7.13%; Tax rate=38%
Reinvestment Rate=28.05%

Terminal Value$_4$= 868/(.0713-.02) = 16,921

Op. Assets   17,634
+ Cash: 1,622
- Debt   7,726
=Equity   11,528
-Options   5
Value/Share $87.29

	1	2	3	4	Term Yr
EBIT (1-t)	$1,165	$1,147	$1,130	$1,113	$1,206
- Reinvestment	($349)	($344)	($339)	($334)	$ 339
FCFF	$1,514	$1,492	$1,469	$1,447	$ 868

Discount at Cost of Capital (WACC) = 9.58% (.566) + 4.80% (0.434) = 7.50%

On July 23, 2008, Sears was trading at $76.25 a share.

Cost of Equity
9.58%

Cost of Debt
(4.09%+3,65%)(1-.38)
= 4.80%

Weights
E = 56.6% D = 43.4%

Riskfree Rate
Riskfree rate = 4.09%

+

Beta
1.22

X

Risk Premium
4.00%

Unlevered Beta for Sectors: 0.77

Firm's D/E Ratio: 93.1%

Mature risk premium 4%

Country Equity Prem 0%
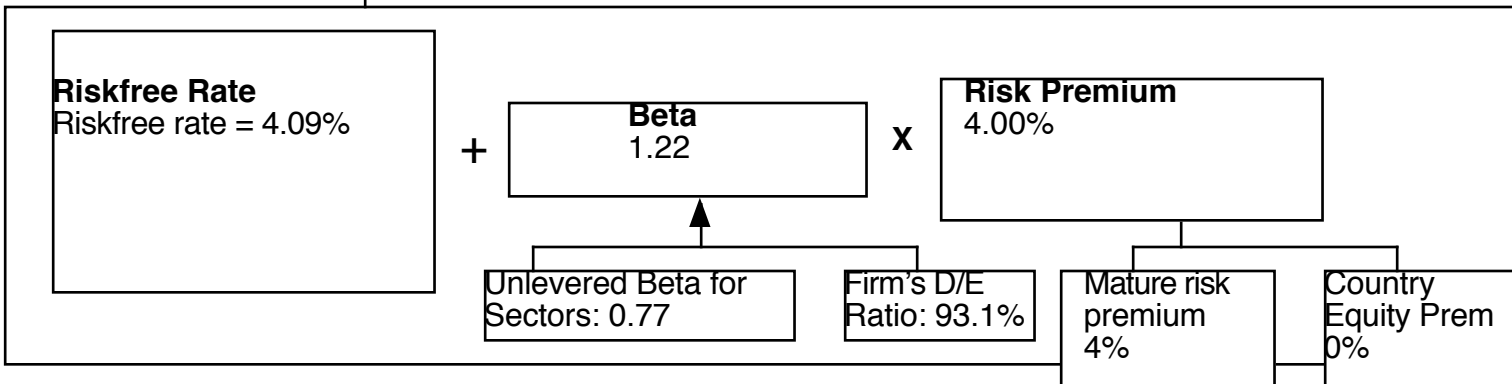
b. Dealing with the "downside" of Distress

- A DCF valuation values a firm as a going concern. If there is a significant likelihood of the firm failing before it reaches stable growth and if the assets will then be sold for a value less than the present value of the expected cashflows (a distress sale value), DCF valuations will understate the value of the firm.

- Value of Equity= DCF value of equity (1 - Probability of distress) + Distress sale value of equity (Probability of distress)

- There are three ways in which we can estimate the probability of distress:
  - Use the bond rating to estimate the cumulative probability of distress over 10 years
  - Estimate the probability of distress with a probit
  - Estimate the probability of distress by looking at market value of bonds..

- The distress sale value of equity is usually best estimated as a percent of book value (and this value will be lower if the economy is doing badly and there are other firms in the same business also in distress).

Current Revenue $ 4,390

Current Margin: 4.76%

EBIT $ 209m

Reinvestment: Capital expenditures include cost of new casinos and working capital

Extended reinvestment break, due ot investment in past

Industry average

Expected Margin: -> 17%

Stable Growth

Stable Revenue Growth: 3%

Stable Operating Margin: 17%

Stable ROC=10% Reinvest 30% of EBIT(1-t)

Terminal Value= 758(.0743-.03) =$ 17,129

Term. Year

	1	2	3	4	5	6	7	8	9	10	Term. Year
Revenues	$4,434	$4,523	$5,427	$6,513	$7,815	$8,206	$8,616	$9,047	$9,499	$9,974	$10,273
Oper margin	5.81%	6.86%	7.90%	8.95%	10%	11.40%	12.80%	14.20%	15.60%	17%	17%
EBIT	$258	$310	$429	$583	$782	$935	$1,103	$1,285	$1,482	$1,696	$ 1,746
Tax rate	26.0%	26.0%	26.0%	26.0%	26.0%	28.4%	30.8%	33.2%	35.6%	38.00%	38%
EBIT * (1 - t)	$191	$229	$317	$431	$578	$670	$763	$858	$954	$1,051	$1,083
- Reinvestment	-$19	-$11	$0	$22	$58	$67	$153	$215	$286	$350	$ 325
FCFF	$210	$241	$317	$410	$520	$603	$611	$644	$668	$701	$758

Forever

	1	2	3	4	5	6	7	8	9	10
Beta	3.14	3.14	3.14	3.14	3.14	2.75	2.36	1.97	1.59	1.20
Cost of equity	21.82%	21.82%	21.82%	21.82%	21.82%	19.50%	17.17%	14.85%	12.52%	10.20%
Cost of debt	9%	9%	9%	9%	9%	8.70%	8.40%	8.10%	7.80%	7.50%
Debtl ratio	73.50%	73.50%	73.50%	73.50%	73.50%	68.80%	64.10%	59.40%	54.70%	50.00%
Cost of capital	9.88%	9.88%	9.88%	9.88%	9.88%	9.79%	9.50%	9.01%	8.32%	7.43%

Value of Op Assets	$ 9,793
+ Cash & Non-op	$ 3,040
= Value of Firm	$12,833
- Value of Debt	$ 7,565
= Value of Equity	$ 5,268
Value per share	$ 8.12

Cost of Equity 21.82%

Cost of Debt
3%+6%= 9%
9% (1-.38)=5.58%

Weights
Debt= 73.5% ->50%

Riskfree Rate:
T. Bond rate = 3%

+

Beta
3.14-> 1.20

X

Risk Premium
6%

Casino 1.15

Current D/E: 277%

Base Equity Premium

Country Risk Premium

Las Vegas Sands Feburary 2009 Trading @ $4.25

Adjusting the value of LVS for distress..

☐ In February 2009, LVS was rated B+ by S&P. Historically, 28.25% of B+ rated bonds default within 10 years. LVS has a 6.375% bond, maturing in February 2015 (7 years), trading at $529. If we discount the expected cash flows on the bond at the riskfree rate, we can back out the probability of distress from the bond price:

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

☐ Solving for the probability of bankruptcy, we get:

☐ $\pi_{Distress}$ = Annual probability of default = 13.54%
  ▪ Cumulative probability of surviving 10 years = (1 - .1354)10 = 23.34%
  ▪ Cumulative probability of distress over 10 years = 1 - .2334 = .7666 or 76.66%

☐ If LVS is becomes distressed:
  ▪ Expected distress sale proceeds = $2,769 million < Face value of debt
  ▪ Expected equity value/share = $0.00

☐ Expected value per share = $8.12 (1 - .7666) + $0.00 (.7666) = $1.92

The "sunny" side of distress: Equity as a call option to liquidate the firm

Net Payoff
on Equity

Face Value
of Debt
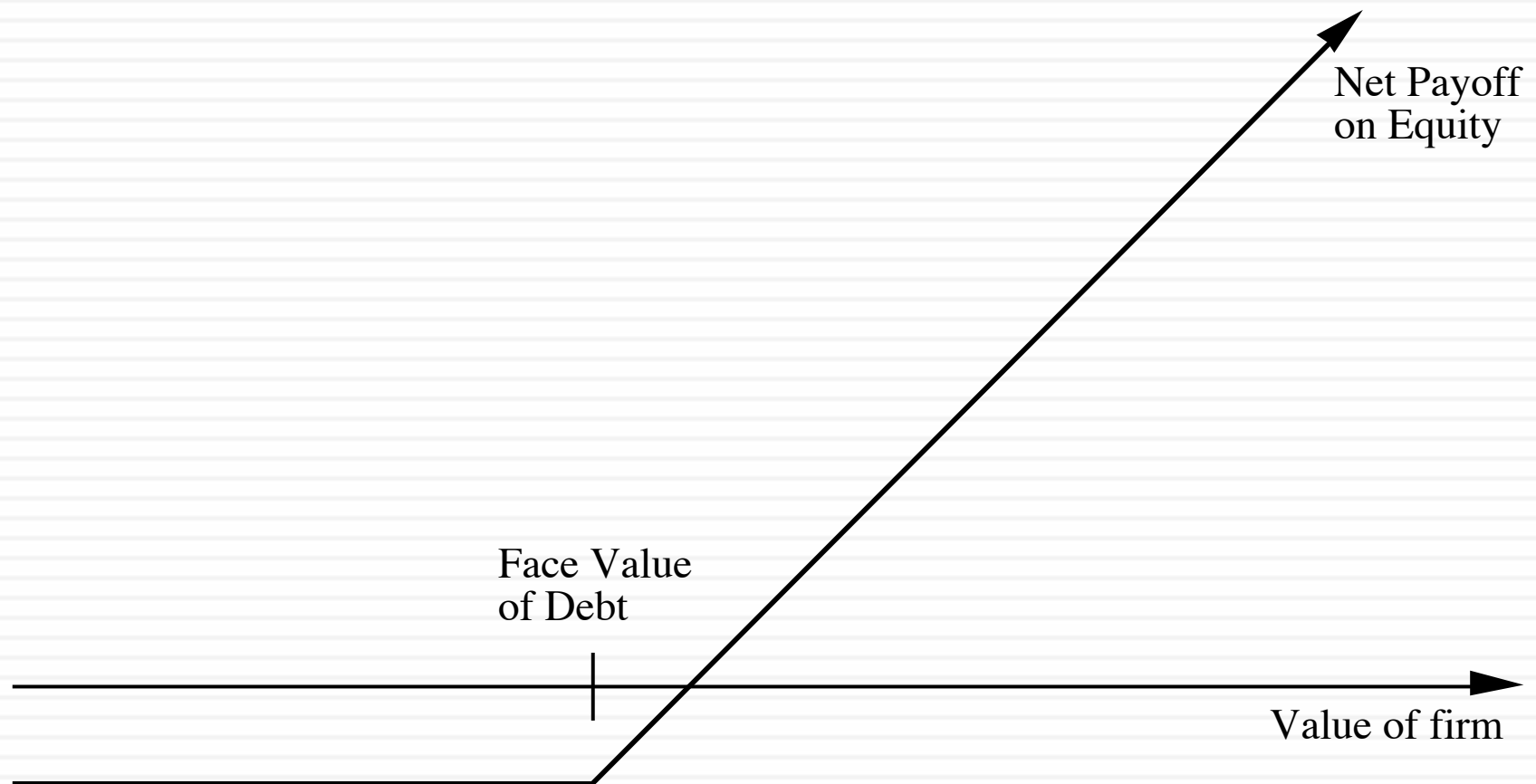
Value of firm

Application to valuation: A simple example

- Assume that you have a firm whose assets are currently valued at $100 million and that the standard deviation in this asset value is 40%.

- Further, assume that the face value of debt is $80 million (It is zero coupon debt with 10 years left to maturity).

- If the ten-year treasury bond rate is 10%,

  - how much is the equity worth?
  - What should the interest rate on debt be?

Model Parameters & Valuation

- The inputs
  - Value of the underlying asset = S = Value of the firm = $ 100 million
  - Exercise price = K = Face Value of outstanding debt = $ 80 million
  - Life of the option = t = Life of zero-coupon debt = 10 years
  - Variance in the value of the underlying asset = σ^2 = Variance in firm value = 0.16
  - Riskless rate = r = Treasury bond rate corresponding to option life = 10%
- The output
  - The Black-Scholes model provides the following value for the call:
    - d1 = 1.5994   N(d1) = 0.9451
    - d2 = 0.3345   N(d2) = 0.6310
  - Value of the call = 100 (0.9451) - 80 exp$^{(-0.10)(10)}$ (0.6310) = $75.94 million
  - Value of the outstanding debt = $100 - $75.94 = $24.06 million
  - Interest rate on debt = ($ 80 / $24.06)1/10 -1 = 12.77%

Firm value drops..

- Assume now that a catastrophe wipes out half the value of this firm (the value drops to $ 50 million), while the face value of the debt remains at $ 80 million.

- The inputs
  - Value of the underlying asset = S = Value of the firm = $ 50 million
  - All the other inputs remain unchanged

- The output
  - Based upon these inputs, the Black-Scholes model provides the following value for the call:
    - d1 = 1.0515   N(d1) = 0.8534
    - d2 = -0.2135   N(d2) = 0.4155
  - Value of the call = 50 (0.8534) - 80 exp$^{(-0.10)(10)}$ (0.4155) = $30.44 million
  - Value of the bond= $50 - $30.44 = $19.56 million

Equity value persists .. As firm value declines..

Value of Equity as Firm Value Changes

98
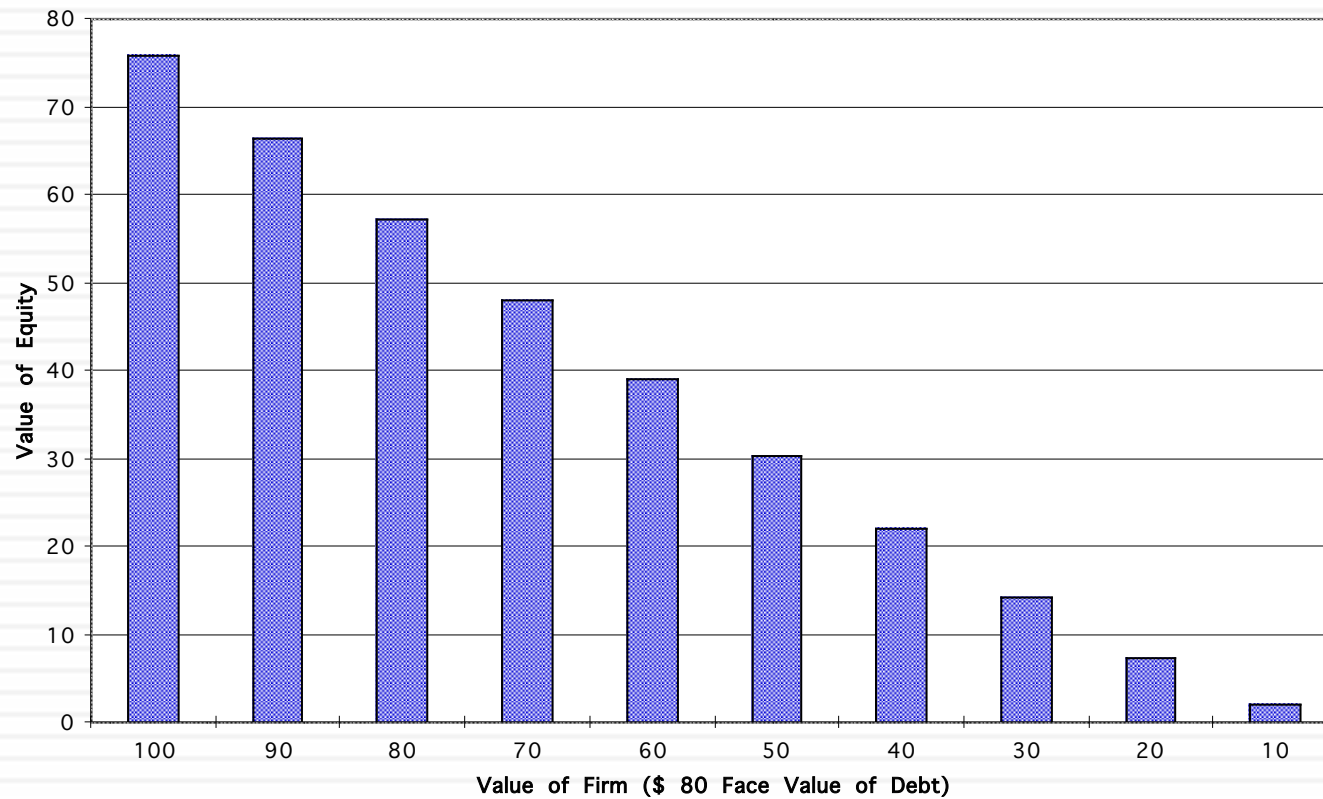
Real World Approaches to Valuing Equity in Troubled Firms: Getting Inputs

Input	Estimation Process
Value of the Firm	• Cumulate market values of equity and debt (or) • Value the <u>assets in place</u> using FCFF and WACC (or) • Use cumulated market value of assets, if traded.
Variance in Firm Value	• If stocks and bonds are traded, $\sigma^2_{firm} = w_e^2\ \sigma_e^2 + w_d^2\ \sigma_d^2 + 2\ w_e\ w_d\ \rho_{ed}\ \sigma_e\ \sigma_d$ where σ_e^2 = variance in the stock price w_e = MV weight of Equity σ_d^2 = the variance in the bond price $\quad$ w_d = MV weight of debt • If not traded, use variances of similarly rated bonds. • Use average firm value variance from the industry in which company operates.
Value of the Debt	• If the debt is short term, you can use only the face or book value of the debt. • If the debt is long term and coupon bearing, add the cumulated nominal value of these coupons to the face value of the debt.
Maturity of the Debt	• Face value weighted duration of bonds outstanding (or) • If not available, use weighted maturity

Valuing Equity as an option - Eurotunnel in early 1998

- Eurotunnel has been a financial disaster since its opening
  - In 1997, Eurotunnel had earnings before interest and taxes of -£56 million and net income of -£685 million
  - At the end of 1997, its book value of equity was -£117 million
- It had £8,865 million in face value of debt outstanding
  - The weighted average duration of this debt was 10.93 years

Debt Type	Face Value	Duration
Short term	935	0.50
10 year	2435	6.7
20 year	3555	12.6
Longer	1940	18.2
Total	£8,865 mil	10.93 years

The Basic DCF Valuation

□ The value of the firm estimated using projected cashflows to the firm, discounted at the weighted average cost of capital was £2,312 million.

□ This was based upon the following assumptions –

- ◻ Revenues will grow 5% a year in perpetuity.
- ◻ The COGS which is currently 85% of revenues will drop to 65% of revenues in yr 5 and stay at that level.
- ◻ Capital spending and depreciation will grow 5% a year in perpetuity.
- ◻ There are no working capital requirements.
- ◻ The debt ratio, which is currently 95.35%, will drop to 70% after year 5. The cost of debt is 10% in high growth period and 8% after that.
- ◻ The beta for the stock will be 1.10 for the next five years, and drop to 0.8 after the next 5 years.
- ◻ The long term bond rate is 6%.

Other Inputs

- The stock has been traded on the London Exchange, and the annualized std deviation based upon ln (prices) is 41%.

- There are Eurotunnel bonds, that have been traded; the annualized std deviation in ln(price) for the bonds is 17%.

  - The correlation between stock price and bond price changes has been 0.5. The proportion of debt in the capital structure during the period (1992-1996) was 85%.

  - Annualized variance in firm value

  - $= (0.15)^2 (0.41)^2 + (0.85)^2 (0.17)^2 + 2 (0.15) (0.85)(0.5)(0.41)(0.17) = 0.0335$

- The 15-year bond rate is 6%. (I used a bond with a duration of roughly 11 years to match the life of my option)

Valuing Eurotunnel Equity and Debt

- Inputs to Model
  - Value of the underlying asset = S = Value of the firm = £2,312 million
  - Exercise price = K = Face Value of outstanding debt = £8,865 million
  - Life of the option = t = Weighted average duration of debt = 10.93 years
  - Variance in the value of the underlying asset = σ^2 = Variance in firm value = 0.0335
  - Riskless rate = r = Treasury bond rate corresponding to option life = 6%
- Based upon these inputs, the Black-Scholes model provides the following value for the call:
  - d1 = -0.8337   N(d1) = 0.2023
  - d2 = -1.4392   N(d2) = 0.0751
- Value of the call = 2312 (0.2023) - 8,865 exp$^{(-0.06)(10.93)}$ (0.0751) = £122 million
- Appropriate interest rate on debt = $(8865/2190)^{1/10.93}$-1= 13.65%

IV. Valuing Financial Service Companies

Existing assets are usually financial assets or loans, often marked to market. Earnings do not provide much information on underlying risk.

Defining capital expenditures and working capital is a challenge.Growth can be strongly influenced by regulatory limits and constraints. Both the amount of new investments and the returns on these investments can change with regulatory changes.

What is the value added by growth assets?

What are the cashflows from existing assets?

When will the firm become a mature fiirm, and what are the potential roadblocks?

How risky are the cash flows from both existing assets and growth assets?

Preferred stock is a significant source of capital.

What is the value of equity in the firm?

For financial service firms, debt is raw material rather than a source of capital. It is not only tough to define but if defined broadly can result in high financial leverage, magnifying the impact of small operating risk changes on equity risk.

In addition to all the normal constraints, financial service firms also have to worry about maintaining capital ratios that are acceptable ot regulators. If they do not, they can be taken over and shut down.

2b. Goldman Sachs: August 2008

Rationale for model
Why dividends? Because FCFE cannot be estimated
Why 3-stage? Because the firm is behaving (reinvesting, growing) like a firm with potential.

Left return on equity at 2008 levels. well below 16% in 2007 and 20% in 2004-2006.

ROE = 13.19%

Retention Ratio = 91.65%

Dividends
EPS = $16.77 *
Payout Ratio 8.35%
DPS =$1.40
(Updated numbers for 2008 financial year ending 11/08)

Expected Growth in first 5 years =
91.65%*13.19% = 12.09%

g =4%: ROE = 10%(>Cost of equity)
Beta = 1.20
Payout = (1- 4/10) = .60 or 60%

Terminal Value= EPS_{10}*Payout/(r-g)
= (42.03*1.04*.6)/(.095-.04) = 476.86

Year	1	2	3	4	5	6	7	8	9	10
EPS	$18.80	$21.07	$23.62	$26.47	$29.67	$32.78	$35.68	$38.26	$40.41	$42.03
Payout ratio	8.35%	8.35%	8.35%	8.35%	8.35%	18.68%	29.01%	39.34%	49.67%	60.00%
DPS	$1.57	$1.76	$1.97	$2.21	$2.48	$6.12	$10.35	$15.05	$20.07	$25.22

Forever

Value of Equity per share = PV of Dividends & Terminal value = $222.49

Discount at Cost of Equity

Between years 6-10, as growth drops to 4%, payout ratio increases and cost of equity decreases.

In August 2008, Goldman was trading at $ 169/share.

Cost of Equity
4.10% + 1.40 (4.5%) = 10.4%

Riskfree Rate:
Treasury bond rate
4.10%

+ **Beta** 1.40

X

Risk Premium
4.5%
Impled Equity Risk premium in 8/08

Average beta for inveestment banks= 1.40

Mature Market
4.5%

Country Risk
0%

Lesson 1: Financial service companies are opaque…

- With financial service firms, we enter into a Faustian bargain. They tell us very little about the quality of their assets (loans, for a bank, for instance are not broken down by default risk status) but we accept that in return for assets being marked to market (by accountants who presumably have access to the information that we don't have).

- In addition, estimating cash flows for a financial service firm is difficult to do. So, we trust financial service firms to pay out their cash flows as dividends. Hence, the use of the dividend discount model.

Lesson 2: For financial service companies, book value matters...

- The book value of assets and equity is mostly irrelevant when valuing non-financial service companies. After all, the book value of equity is a historical figure and can be nonsensical. (The book value of equity can be negative and is so for more than a 1000 publicly traded US companies)

- With financial service firms, book value of equity is relevant for two reasons:
  - Since financial service firms mark to market, the book value is more likely to reflect what the firms own right now (rather than a historical value)
  - The regulatory capital ratios are based on book equity. Thus, a bank with negative or even low book equity will be shut down by the regulators.

- From a valuation perspective, it therefore makes sense to pay heed to book value. In fact, you can argue that reinvestment for a bank is the amount that it needs to add to book equity to sustain its growth ambitions and safety requirements:
  - FCFE = Net Income – Reinvestment in regulatory capital (book equity)

2d. Deutsche Bank: March 2009

Last 2 years

	2007	2008
Net Income	3,954 m	-3,855m
Dividends	2,146 m	285 m
Risk adjusted assets =		312,882m
Book Equity =		31,914 m
Regulatory Capital =		

Normalized Net Income for base year 3,000 m
Normalized ROE = 9.4%

Expected growth in asset base 4%

Target capital ratio 10%

Target ROE 10.2%

Stable Growth
g = 3%; Beta = 1.00
Cost of equity = 10.20%
Retunr on equity = 10.20%;
Reinvestment Rate=g/ROE
=3/10.20% = 29.41%

Cashflows

Terminal Value$_5$= 2,823/(.102-.03) = 39,209 m

	1	2	3	4	5	
Asset Base	325,398 €	338,414 €	351,950 €	366,028 €	380,669 €	
Capital ratio	10.16%	10.12%	10.08%	10.04%	10.00%	
Regulatory Capital	33,060 €	34,247 €	35,477 €	36,749 €	38,067 €	
Change in capital	1,146 €	1,187 €	1,229 €	1,273 €	1,318 €	
ROE	9.56%	9.72%	9.88%	10.04%	10.20%	
Net Income	3,161 €	3,329 €	3,505 €	3,690 €	3,883 €	3,999
-Reinvestment	1,146 €	1,187 €	1,229 €	1,273 €	1,318 €	1,176
FCFE	2,014 €	2,142 €	2,276 €	2,417 €	2,565 €	2,823

PV of CF = 31,383 m
/ # shares   581.85
Value/Share   53.94 €

*Discount at Cost of equity = 3.60% + 1.162 * 6% + -0.60% = 11.172%*

In March 2009 Deutsche Bank price = 48 Euros/share (down from 89 Euros in early 2008)

Riskfree Rate:
Euro Riskfree Rate= 3.6%

+

Beta
1.162

X

Mature market premium
6%

+

Beta for commercial & Investment banking

Region	Lambda	CRP
Western Europe	0.68	0.00%
United States	0.42	0.00%
Latin America	0.01	4.50%
Africa & Middle East	0.01	7.00%
Asia	0.11	3.50%
Eastern Europe	0.04	3.00%
Deutshce Bank		0.60%

V. Valuing Companies with "intangible" assets

If capital expenditures are miscategorized as operating expenses, it becomes very difficult to assess how much a firm is reinvesting for future growth and how well its investments are doing.

What is the value added by growth assets?

What are the cashflows from existing assets?

When will the firm become a mature fiirm, and what are the potential roadblocks?

How risky are the cash flows from both existing assets and growth assets?

The capital expenditures associated with acquiring intangible assets (technology, himan capital) are mis-categorized as operating expenses, leading to inccorect accounting earnings and measures of capital invested.

It ican be more difficult to borrow against intangible assets than it is against tangible assets. The risk in operations can change depending upon how stable the intangbiel asset is.

Intangbile assets such as brand name and customer loyalty can last for very long periods or dissipate overnight.

Lesson 1: Accounting rules are cluttered with inconsistencies…

- If we start with accounting first principles, capital expenditures are expenditures designed to create benefits over many periods. They should not be used to reduce operating income in the period that they are made, but should be depreciated/amortized over their life. They should show up as assets on the balance sheet.

- Accounting is consistent in its treatment of cap ex with manufacturing firms, but is inconsistent with firms that do not fit the mold.
  - With pharmaceutical and technology firms, R&D is the ultimate cap ex but is treated as an operating expense.
  - With consulting firms and other firms dependent on human capital, recruiting and training expenses are your long term investments that are treated as operating expenses.
  - With brand name consumer product companies, a portion of the advertising expense is to build up brand name and is the real capital expenditure. It is treated as an operating expense.

Exhibit 11.1: Converting R&D expenses to R&D assets - Amgen

Step 1: Ddetermining an amortizable life for R & D expenses. ①
How long will it take, on an expected basis, for research to pay off at Amgen? Given the length of the approval process for new drugs by the Food and Drugs Administration, we will assume that this amortizable life is 10 years.

Step 2: Capitalize historical R&D exoense

Year	R&D Expense	Unamortized portion ②	Amortization this year ③
Current	3030.00	1.00	3030.00	
-1	3266.00	0.90	2939.40	$326.60
-2	3366.00	0.80	2692.80	$336.60
-3	2314.00	0.70	1619.80	$231.40
-4	2028.00	0.60	1216.80	$202.80
-5	1655.00	0.50	827.50	$165.50
-6	1117.00	0.40	446.80	$111.70
-7	864.00	0.30	259.20	$86.40
-8	845.00	0.20	169.00	$84.50
-9	823.00	0.10	82.30	$82.30
-10	663.00	0.00	0.00	$66.30
			$13283.60	$1,694.10

④
Current year's R&D expense = Cap ex = $3,030 million
R&D amortization = Depreciation = $ 1,694 million
Unamortized R&D = Capital invested (R&D) = $13,284 million

Step 3: Restate earnings, book value and return numbers

⑤

	Unadjusted	Adjusted for R&D	Comments
Net Income	$4,196	$4,196 + 3030 – 1694 = $ 5,532$	Add current year's R&D and subtract R&D amortization
Book value of equity	$17,869	$17,869 + 13,284 = $ 31,153$	Add unamortized R&D from prior years
Return on Equity	$\frac{4196}{17869} = 23.48\%$	$\frac{5532}{31153} = 17.75\%$	Return on equity drops when book equity is augmented by R&D, even though net income rises.
Pre-tax Operating Income	$5,594	$5,594 + 3030 – 1694 = $ 6.930$	Add current year's R&D and subtract R&D amortization
Book value of invested capital	$21,985	$21,985+$13,284 = $35,269$	Add unamortized R&D from prior years
Pre-tax Return on Capital	$\frac{5594}{21985} = 25.44\%$	$\frac{6930}{35269} = 19.65\%$	Return on capital drops when capital is augmented by R&D, even though operating income rises.

Lesson 2: And fixing those inconsistencies can alter your view of a company and affect value

	No R&D adjustment	R&D adjustment
EBIT	$5,071	$7,336
Invested Capital	$25,277	$33,173
ROIC	14.58%	18.26%
Reinvestment Rate	115.68%	106.98%
Value of firm	$58,617	$95,497
Value of equity	$50,346	$87,226
Value/share	$42.73	$74.33

VI. Valuing cyclical and commodity companies

Company growth often comes from movements in the economic cycle, for cyclical firms, or commodity prices, for commodity companies.

What is the value added by growth assets?

What are the cashflows from existing assets?

When will the firm become a mature fiirm, and what are the potential roadblocks?

Historial revenue and earnings data are volatile, as the economic cycle and commodity prices change.

How risky are the cash flows from both existing assets and growth assets?

Primary risk is from the economy for cyclical firms and from commodity price movements for commodity companies. These risks can stay dormant for long periods of apparent prosperity.

For commodity companies, the fact that there are only finite amounts of the commodity may put a limit on growth forever. For cyclical firms, there is the peril that the next recession may put an end to the firm.

Valuing a Cyclical Company - Toyota in Early 2009

In early 2009, Toyota Motors had the highest market share in the sector. However, the global economic recession in 2008-09 had pulled earnings down.

Year	Revenues	Operating Income	EBITDA	Operating Margin
FY1 1992	¥10,163,380	¥218,511	¥218,511	2.15%
FY1 1993	¥10,210,750	¥181,897	¥181,897	1.78%
FY1 1994	¥9,362,732	¥136,226	¥136,226	1.45%
FY1 1995	¥8,120,975	¥255,719	¥255,719	3.15%
FY1 1996	¥10,718,740	¥348,069	¥348,069	3.25%
FY1 1997	¥12,243,830	¥665,110	¥665,110	5.43%
FY1 1998	¥11,678,400	¥779,800	¥1,382,950	6.68%
FY1 1999	¥12,749,010	¥774,947	¥1,415,997	6.08%
FY1 2000	¥12,879,560	¥775,982	¥1,430,982	6.02%
FY1 2001	¥13,424,420	¥870,131	¥1,542,631	6.48%
FY1 2002	¥15,106,300	¥1,123,475	¥1,822,975	7.44%
FY1 2003	¥16,054,290	¥1,363,680	¥2,101,780	8.49%
FY1 2004	¥17,294,760	¥1,666,894	¥2,454,994	9.64%
FY1 2005	¥18,551,530	¥1,672,187	¥2,447,987	9.01%
FY1 2006	¥21,036,910	¥1,878,342	¥2,769,742	8.93%
FY1 2007	¥23,948,090	¥2,238,683	¥3,185,683	9.35%
FY1 2008	¥26,289,240	¥2,270,375	¥3,312,775	8.64%
FY 2009 (Estim	¥22,661,325	¥267,904	¥1,310,304	1.18%
		¥1,306,867		7.33%

Normalized Return on capital and Reinvestment ②
Once earnings bounce back to normal, we assume that Toyota will be able to earn a return on capital equal to its cost of capital (5.09%). This is a sector, where earning excess returns has proved to be difficult even for the best of firms.
To sustain a 1.5% growth rate, the reinvestment rate has to be:
Reinvestment rate = 1.5%/5.09%
= 29.46%

Normalized Earnings ①
As a cyclical company, Toyota's earnings have been volatile and 2009 earnings reflect the troubled global economy. We will assume that when economic growth returns, the operating margin for Toyota will revert back to the historical average.
Normalized Operating Income = Revenues in 2009 * Average Operating Margin (98--09)
= 22661 * .0733 =1660.7 billion yen

Operating Assets	19,640
+ Cash	2,288
+ Non-operating assets	6,845
- Debt	11,862
- Minority Interests	583
Value of Equity	
/ No of shares	/3,448
Value per share	¥4735

$$\text{Value of operating assets} = \frac{1660.7\,(1.015)\,(1-.407)\,(1-.2946)}{(.0509 - .015)} = 19{,}640 \text{ billion}$$

Normalized Cost of capital ③
The cost of capital is computed using the average beta of automobile companies (1.10), and Toyota's cost of debt (3.25%) and debt ratio (52.9% debt ratio. We use the Japanese marginal tax rate of 40.7% for computing both the after-tax cost of debt and the after-tax operating income
Cost of capital = 8.65% (.471) + 3.25% (1-.407) (.529) = 5.09%

Stable Growth ④
Once earnings are normalized, we assume that Toyota, as the largest market-share company, will be able to maintain only stable growth (1.5% in Yen terms)

Valuing a commodity company - Exxon in Early 2009

Historical data: Exxon Operating Income vs Oil Price
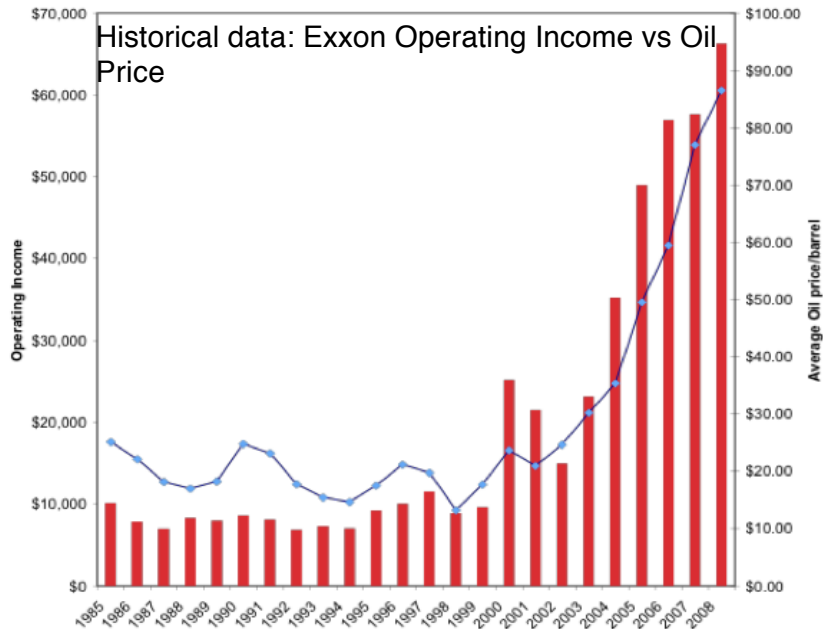
Regressing Exxon's operating income against the oil price per barrel from 1985-2008:

Operating Income = -6,395 + 911.32 (Average Oil Price) R^2 = 90.2%
                        (2.95)   (14.59)

Exxon Mobil's operating income increases about $9.11 billion for every $ 10 increase in the price per barrel of oil and 90% of the variation in Exxon's earnings over time comes from movements in oil prices.

Estiimate normalized income based on current oil price ①
At the time of the valuation, the oil price was $ 45 a barrel. Exxon's operating income based on thisi price is
Normalized Operating Income = -6,395   +   911.32 ($45) = $34,614

Estimate return on capital and reinvestment rate based on normalized income ②
This operating income translates into a return on capital of approximately 21% and a reinvestment rate of 9.52%, based upon a 2% growth rate.
Reinvestment Rate = g/ ROC = 2/21% = 9.52%

$$\text{Value of operating assets} = \frac{34,614(1-.38)(1-.0952)}{(.0818-.02)} = \$320,472 \text{ million}$$

Exxon's cost of capital ④
Exxon has been a predominantly equtiy funded company, and is explected to remain so, with a deb ratio of onlly 2.85%: It's cost of equity is 8.35% (based on a beta of 0.90) and its pre-tax cost of debt is 3.75% (given AAA rating). The marginal tax rate is 38%.
Cost of capital = 8.35% (.9715) + 3.75% (1-.38) (.0285) = 8.18%.

Expected growth in operating income ③
Since Exxon Mobile is the largest oil company in the world, we will assume an expected growth of only 2% in perpetuity.

Lesson 1: With "macro" companies, it is easy to get lost in "macro" assumptions...

- With cyclical and commodity companies, it is undeniable that the value you arrive at will be affected by your views on the economy or the price of the commodity.

- Consequently, you will feel the urge to take a stand on these macro variables and build them into your valuation. Doing so, though, will create valuations that are jointly impacted by your views on macro variables and your views on the company, and it is difficult to separate the two.

- The best (though not easiest) thing to do is to separate your macro views from your micro views. Use current market based numbers for your valuation, but then provide a separate assessment of what you think about those market numbers.

Lesson 2: Use probabilistic tools to assess value as a function of macro variables…

- If there is a key macro variable affecting the value of your company that you are uncertain about (and who is not), why not quantify the uncertainty in a distribution (rather than a single price) and use that distribution in your valuation.

- That is exactly what you do in a Monte Carlo simulation, where you allow one or more variables to be distributions and compute a distribution of values for the company.

- With a simulation, you get not only everything you would get in a standard valuation (an estimated value for your company) but you will get additional output (on the variation in that value and the likelihood that your firm is under or over valued)

Exxon Mobil Valuation: Simulation
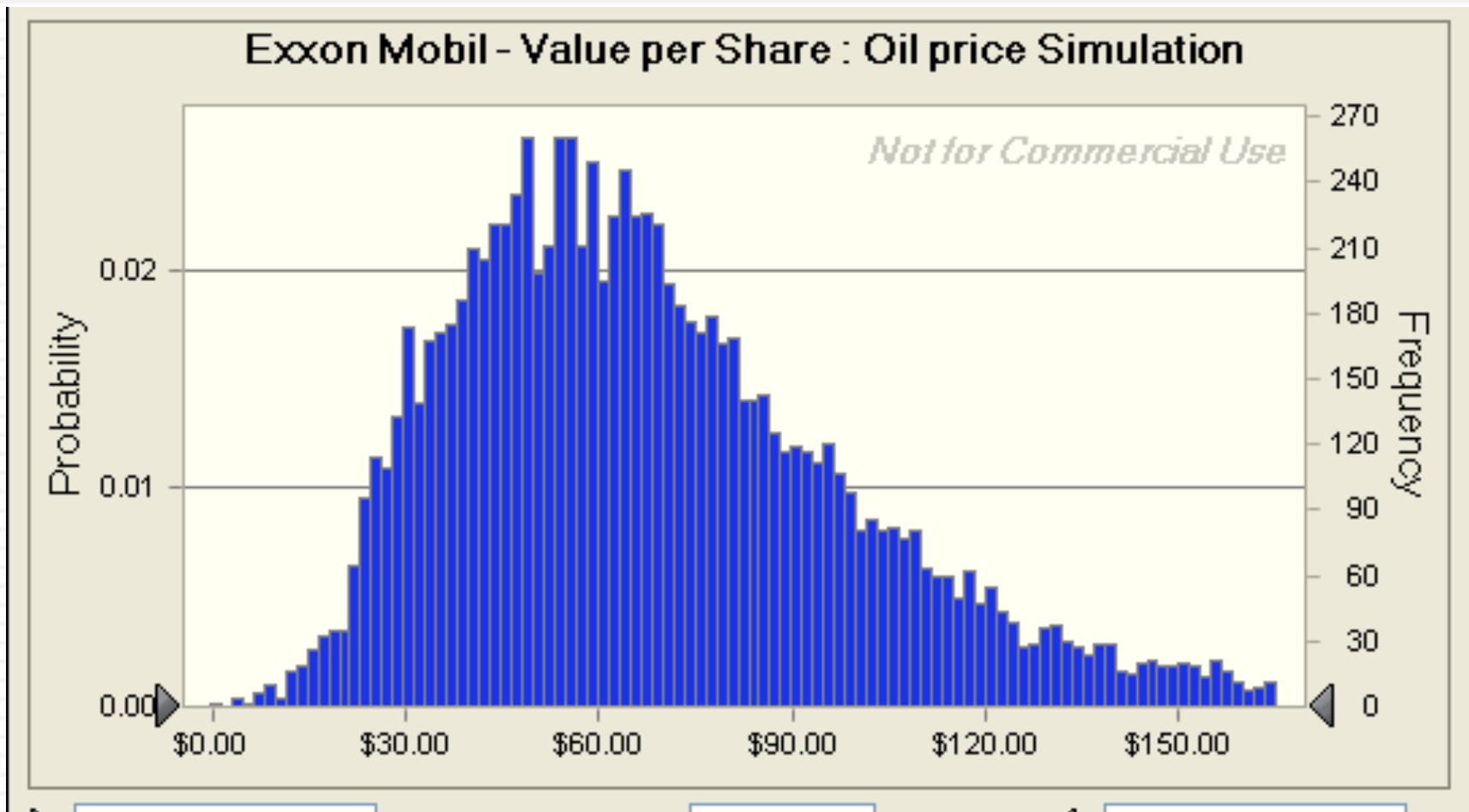
The optionality in commodities: Undeveloped reserves as an option

Net Payoff on Extraction

Cost of Developing Reserve

Value of estimated reserve of natural resource
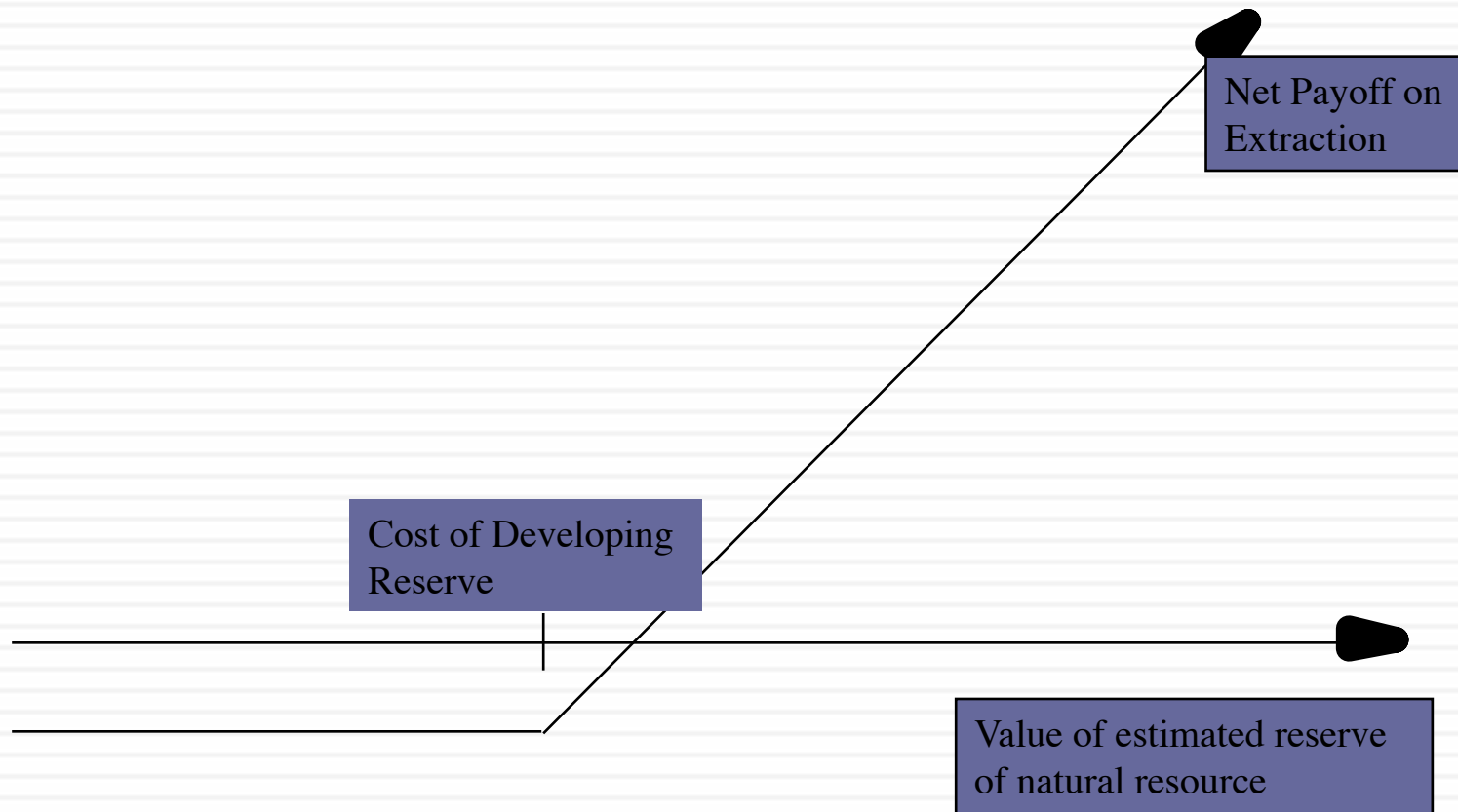
Valuing Gulf Oil

☐ Gulf Oil was the target of a takeover in early 1984 at $70 per share (It had 165.30 million shares outstanding, and total debt of $9.9 billion).

- ◻ It had estimated reserves of 3038 million barrels of oil and the average cost of developing these reserves was estimated to be $10 a barrel in present value dollars (The development lag is approximately two years).
- ◻ The average relinquishment life of the reserves is 12 years.
- ◻ The price of oil was $22.38 per barrel, and the production cost, taxes and royalties were estimated at $7 per barrel.
- ◻ The bond rate at the time of the analysis was 9.00%.
- ◻ Gulf was expected to have net production revenues each year of approximately 5% of the value of the developed reserves. The variance in oil prices is 0.03.

Valuing Undeveloped Reserves

- Inputs for valuing undeveloped reserves
  - Value of underlying asset = Value of estimated reserves discounted back for period of development lag= 3038 * ($ 22.38 - $7) / 1.05^2 = $42,380.44
  - Exercise price = Estimated development cost of reserves = 3038 * $10 = $30,380 million
  - Time to expiration = Average length of relinquishment option = 12 years
  - Variance in value of asset = Variance in oil prices = 0.03
  - Riskless interest rate = 9%
  - Dividend yield = Net production revenue/ Value of developed reserves = 5%
- Based upon these inputs, the Black-Scholes model provides the following value for the call:
  - d1 = 1.6548   N(d1) = 0.9510
  - d2 = 1.0548   N(d2) = 0.8542
- Call Value= 42,380.44 $\exp^{(-0.05)(12)}$ (0.9510) -30,380 ($\exp^{(-0.09)(12)}$ (0.8542) = $ 13,306 million

The composite value…

- In addition, Gulf Oil had free cashflows to the firm from its oil and gas production of $915 million from already developed reserves and these cashflows are likely to continue for ten years (the remaining lifetime of developed reserves).

- The present value of these developed reserves, discounted at the weighted average cost of capital of 12.5%, yields:
  - Value of already developed reserves = 915 (1 - 1.125^{-10})/.125 = $5065.83

- Adding the value of the developed and undeveloped reserves
  - Value of undeveloped reserves = $ 13,306 million
  - Value of production in place = $ 5,066 million
  - Total value of firm = $ 18,372 million
  - Less Outstanding Debt = $ 9,900 million
  - Value of Equity = $ 8,472 million
  - Value per share = $ 8,472/165.3 = $51.25

VII. Valuing Companies across the ownership cycle

Reported income and balance sheet are heavily affected by tax considerations rather than information disclosure requirements. The line between the personal and business expenses is a fine one.

What is the **value added** by growth assets?
Equity: Growth in equity earnings/ cashflows
Firm: Growth in operating earnings/ cashflows

What are the **cashflows from existing assets**?
- Equity: Cashflows after debt payments
- Firm: Cashflows before debt payments

When will the firm become a **mature fiirm**, and what are the potential roadblocks?

How **risky are the cash flows** from both existing assets and growth assets?
Equity: Risk in equity in the company
Firm: Risk in the firm's operations

Reversing investment mistakes is difficult to do. The need for and the cost of illiquidity has to be incorporated into current

Different buyers can perceive risk differently in the same private business, largely because what they see as risk will be a function of how diversified they are. The fall back positions of using market prices to extract risk measures does not

Many private businesses are finite life enterprises, not expected to last into perpetuity

123

Kristin's Kandy: Valuation in March 2006

Current Cashflow to Firm
EBIT(1-t) :   300
- Nt CpX   100
- Chg WC   40
= FCFF   160
Reinvestment Rate = 46.67%

Reinvestment Rate
46.67%

Expected Growth in EBIT (1-t)
.4667*.1364= .0636
6.36%

Return on Capital
13.64%

Stable Growth
g = 4%; Beta =3.00;
ROC= 12.54%
Reinvestment Rate=31.90%

Terminal Value$_5$= 289/(.1254-.04) = 3,403

Year	1	2	3	4	5	Term Yr
EBIT (1-t)	$319	$339	$361	$384	$408	425
- Reinvestment	$149	$158	$168	$179	$191	136
=FCFF	$170	$181	$193	$205	$218	289

Firm Value: 2,571
+ Cash   125
- Debt: 900
=Equity   1,796
- Illiq Discount 12.5%
Adj Value   1,571

Discount at Cost of Capital (WACC) = 16.26% (.70) + 3.30% (.30) = 12.37%

**Cost of Equity
16.26%**

Cost of Debt
(4.5%+1.00)(1-.40)
= 3.30%
Synthetic rating = A-

Weights
E =70% D = 30%

Riskfree Rate:
Riskfree rate = 4.50%
(10-year T.Bond rate)

+

1/3 of risk is
market risk

Total Beta
2.94
Adjusted for owrner
non-diversification

X

Risk Premium
4.00%

Market Beta: 0.98

Unlevered Beta for
Sectors: 0.78

Firm's D/E
Ratio: 30/70

Mature risk
premium
4%

Country Risk
Premium
0%

Lesson 1: In private businesses, risk in the eyes of the "beholder" (buyer)

Private business owner with entire wealth invested in the business	Venture capitalist, with multiple holdings in the sector.	Public company investor with diversified portfolio
Exposed to all risk in the company. Total beta measures exposure to total risk. Total Beta = Market Beta/ Correlation of firm with market	Partially diversified. Diversify away some firm specific risk but not all. Beta will fall berbetween total and market beta.	Firm-specific risk is diversified away. Market or macro risk exposure captured in a market beta or betas.

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

Total Beta measures all risk = Market Beta/ (Portion of the total risk that is market risk)

Is exposed to all the risk in the firm

Private owner of business with 100% of your weatlth invested in the business

Demands a cost of equity that reflects this risk

80 units of firm specific risk

Market Beta measures just market risk

Eliminates firm-specific risk in portfolio

20 units of market risk

Publicly traded company with investors who are diversified

Demands a cost of equity that reflects only market risk

Total Risk versus Market Risk

☐ Adjust the beta to reflect total risk rather than market risk. This adjustment is a relatively simple one, since the R squared of the regression measures the proportion of the risk that is market risk.

   ◻ Total Beta = Market Beta / Correlation of the sector with the market

☐ To estimate the beta for Kristin Kandy, we begin with the bottom-up unlevered beta of food processing companies:

   ◻ Unlevered beta for publicly traded food processing companies = 0.78
   ◻ Average correlation of food processing companies with market = 0.333
   ◻ Unlevered total beta for Kristin Kandy = 0.78/0.333 = 2.34
   ◻ Debt to equity ratio for Kristin Kandy = 0.3/0.7 (assumed industry average)
   ◻ Total Beta = 2.34 (1- (1-.40)(30/70)) = 2.94
   ◻ Total Cost of Equity = 4.50% + 2.94 (4%) = 16.26%

Three assessment tools when the buyer falls in the middle...

- Build up: Start with cost of equity for a "diversified" investor and add premiums (based upon historical data) for other variables that capture the additional risk borne by "typical" buyer of a private business.
  - Strength: Numbers seem strong because they are backed up by data
  - Weakness: (1) Premiums are all from public markets (2) Double counting
- Total Beta plus: Look at potential buyer (what else the buyer has in his or her portfolio), assess the correlation of that portfolio with the market and estimate a "customized" total beta.
  - Strength: Ties the cost of equity to the buyer, as it should.
  - Weaknesses: (1) Buyers are under no obligation to give you this information (2) Treats private markets as extensions of public ones
- Survey: Find out what buyers of private businesses are demanding as a rate of return when they value private businesses.
  - Strength: Agnostic on risk and return models
  - Weakness: (1) Wide differences in what "required" means across survey respondents (2) Circular logic (3) Works if private capital markets are separate and unconnected to public markets.

Lesson 2: With financials, trust but verify..

- 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.

- The Key person issue: In some private businesses, with a personal component, the cashflows may be intertwined with the owner being part of the business.

Lesson 3: Illiquidity is a clear and present danger..

- 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" approaches to estimating illiquidity discounts…

- 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 Restricted stock = Stock price – Price on restricted stock offering
  - DiscountIPO = IPO offering price – Price on pre-IPO transaction

The "alternative" approaches

- Bid-ask spreads: 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. I few can extrapolate what we know about bid ask spreads with public companies into the private company space, we could have a more dynamic, complete measure of illiquidity.
  - Spread = 0.145 – 0.0022 ln (Annual Revenues) -0.015 (DERN) – 0.016 (Cash/Firm Value) – 0.11 ($ Monthly trading volume/ Firm Value)

- Option pricing: Liquidity can be viewed as a put option, where you get the right to sell at the prevailing market price. Illiquidity can therefore be viewed as the loss of this put option.

RELATIVE VALUATION

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.

The Reasons for the allure...

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

    Jerry Seinfeld talking about Kramer in a Seinfeld episode

- " 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)

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: 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...

PE Ratios for US companies: January 2013
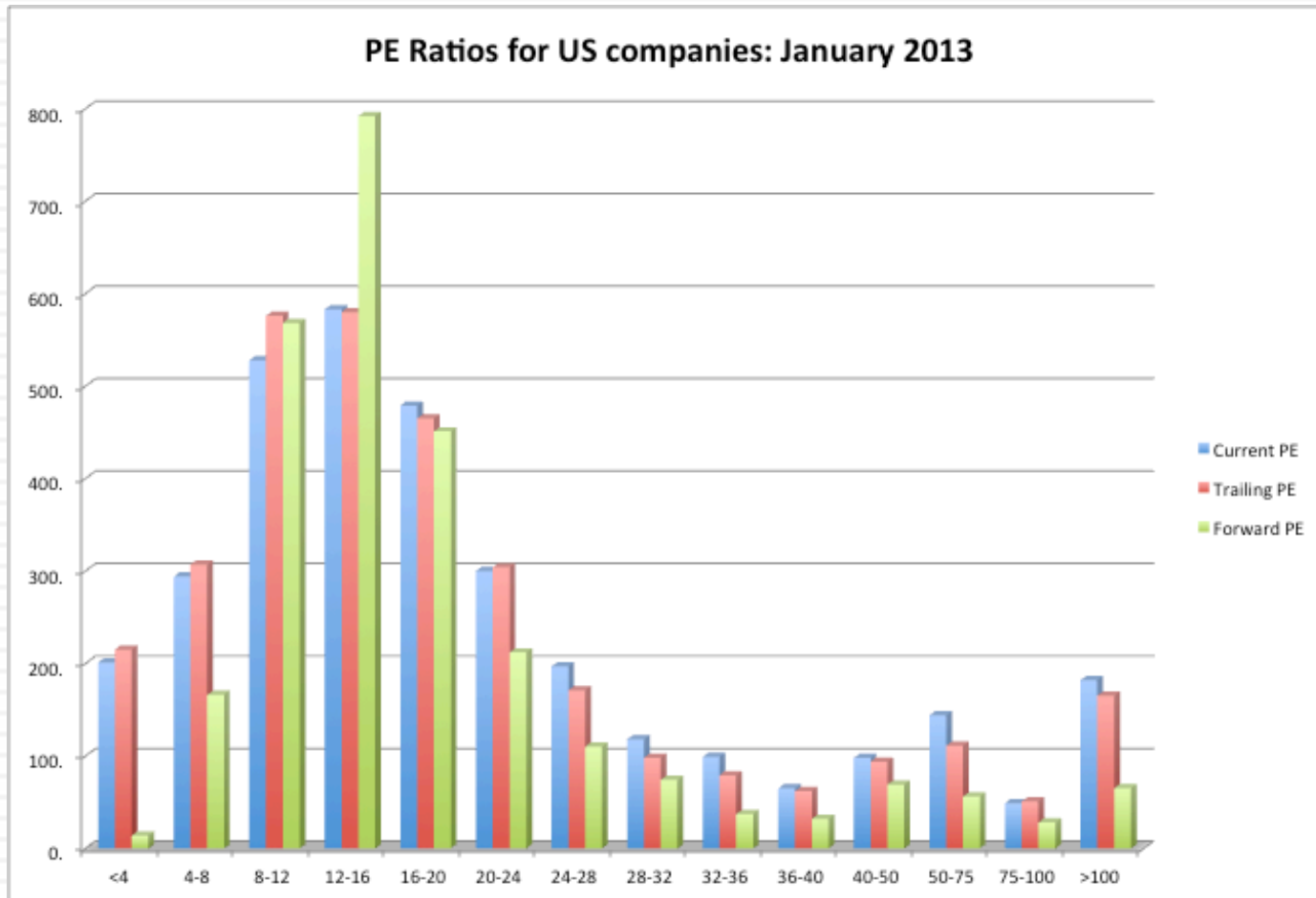
2. Making statistics "dicey"

	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: January 2013

PE Ratios: Global Comparison - 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

Legend:
- US
- Europe
- Japan
- Australia & NZ
- Emerging Markets
- Global

X-axis categories: <4, 4-8, 8-12, 12-16, 16-20, 20-24, 24-28, 28-32, 32-36, 36-40, 40-50, 50-75, 75-100, >100
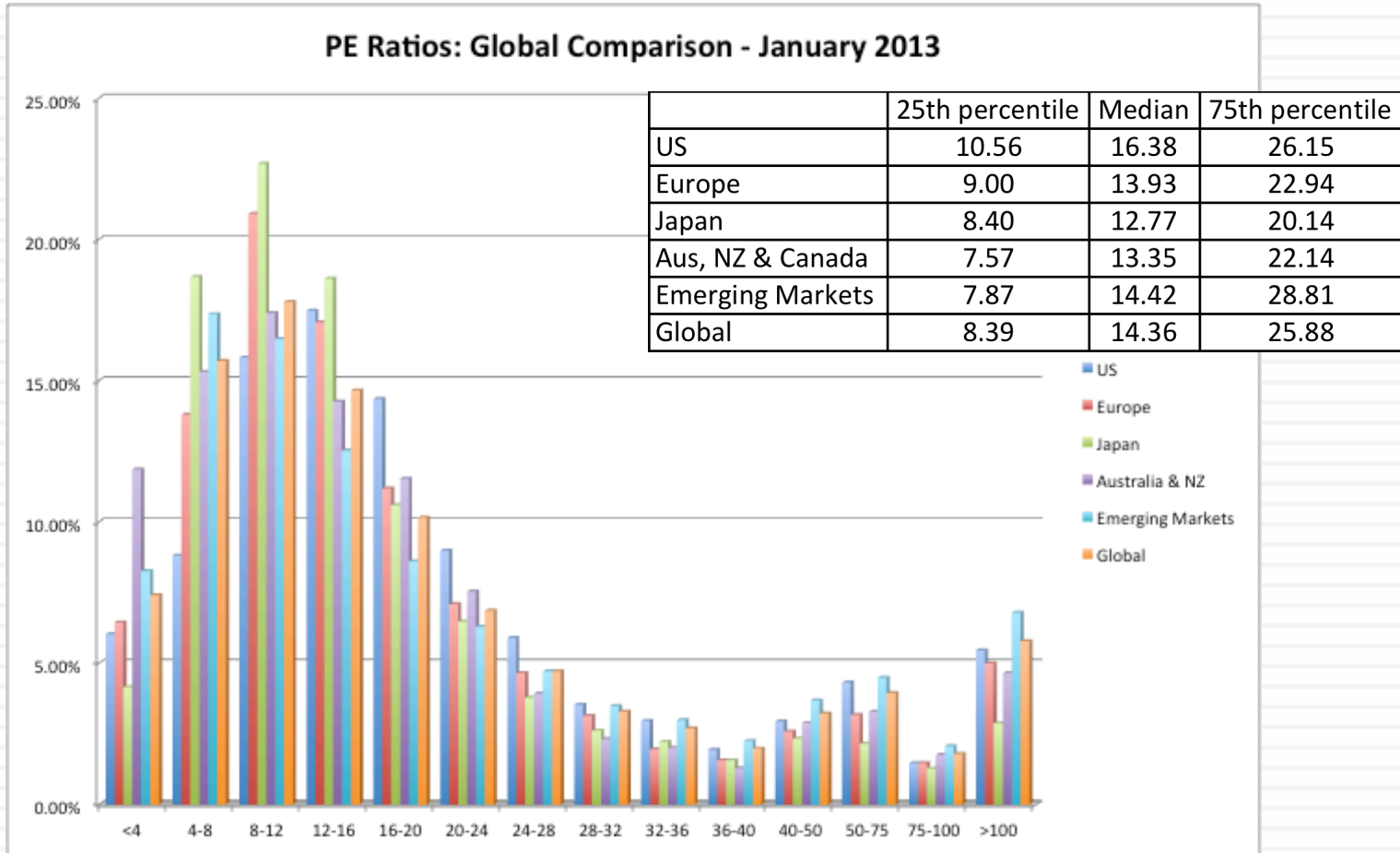
3a. And the differences are revealing...
Price to Book Ratios across globe – January 2013

Price to Book: Global - 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
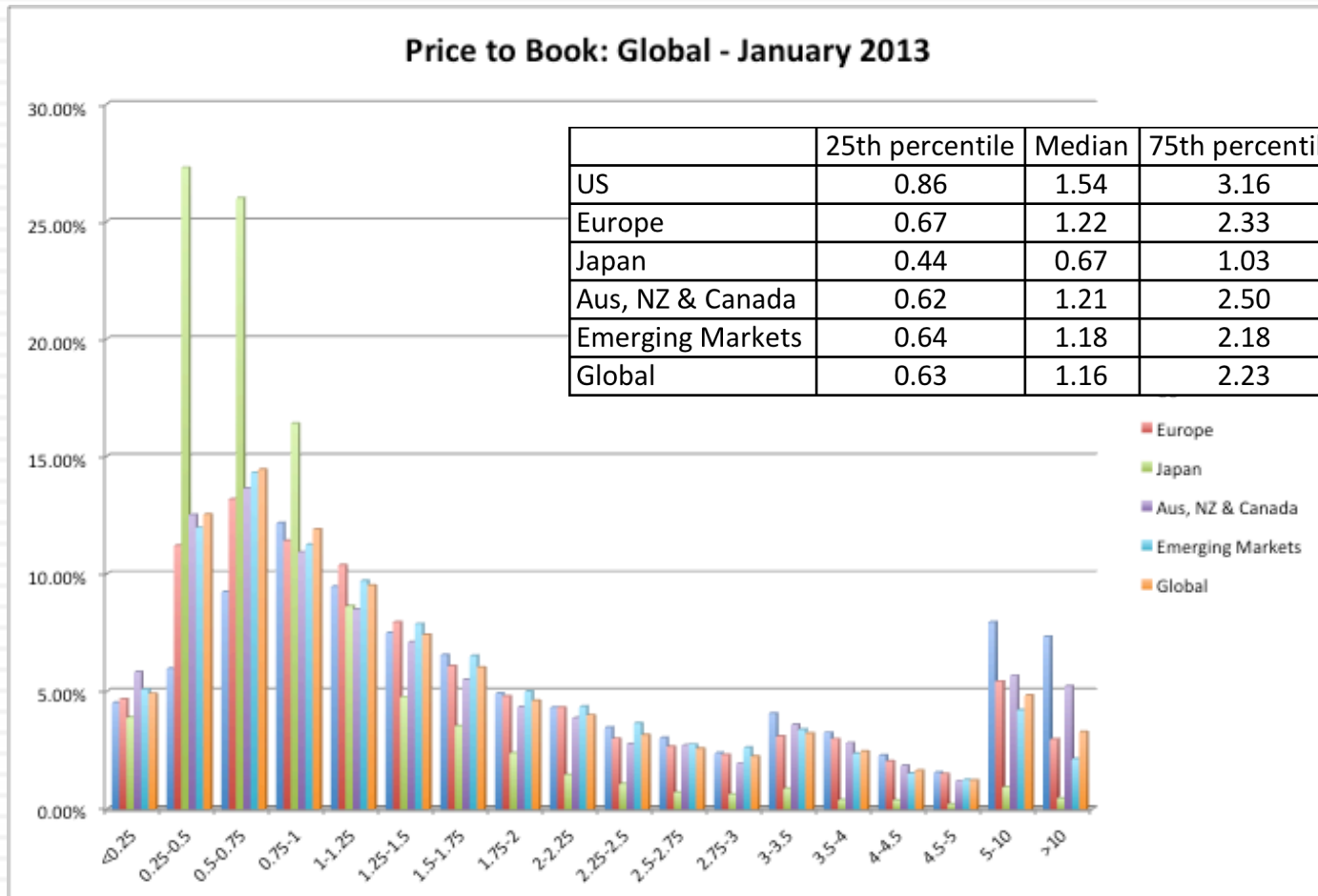
4. Simplistic rules almost always break down...6 times EBITDA was not cheap in 2010

EV Multiples: January 2010
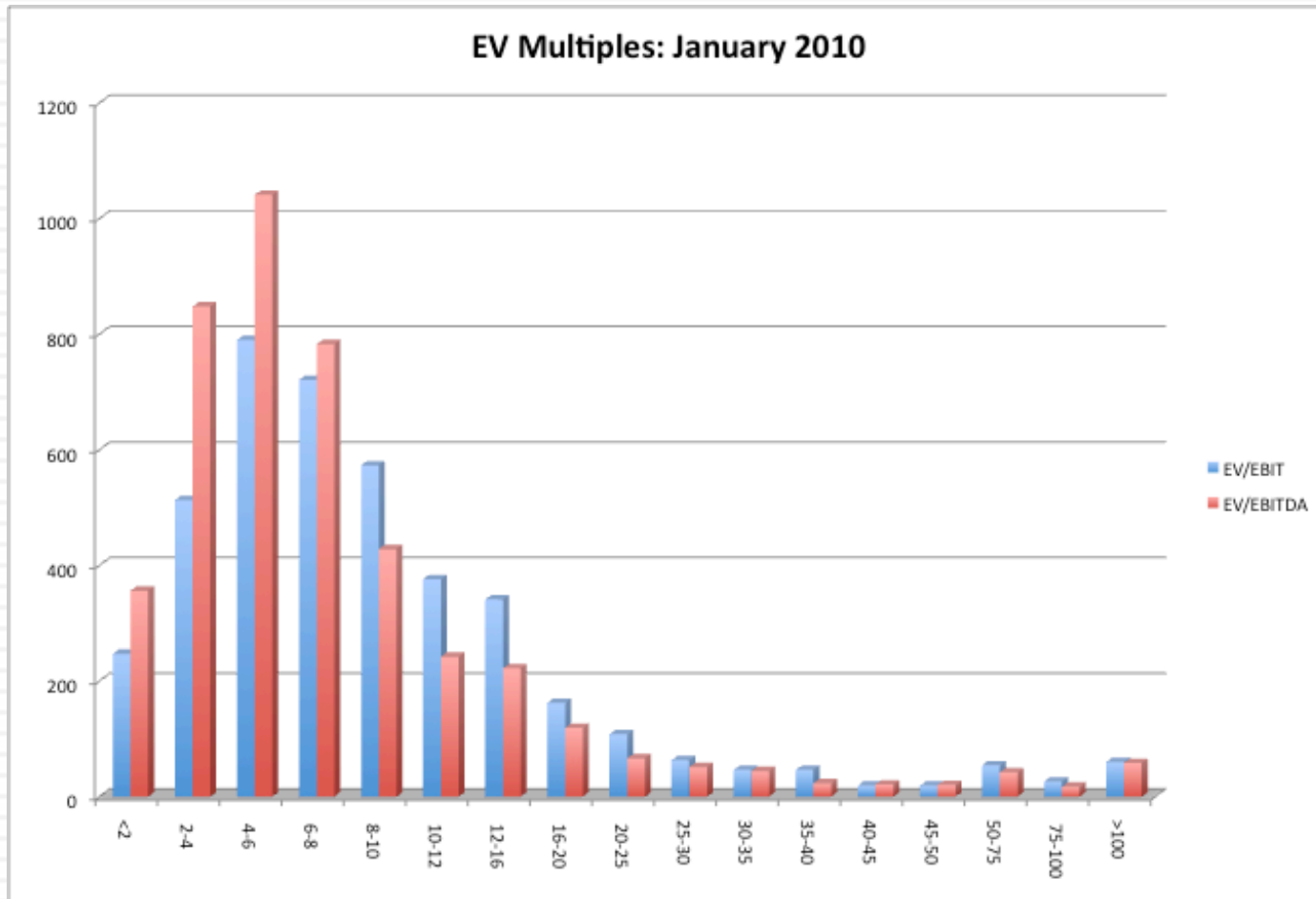
But it may work in 2013... in some markets...

EV/EBITDA: Global - January 2013

	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
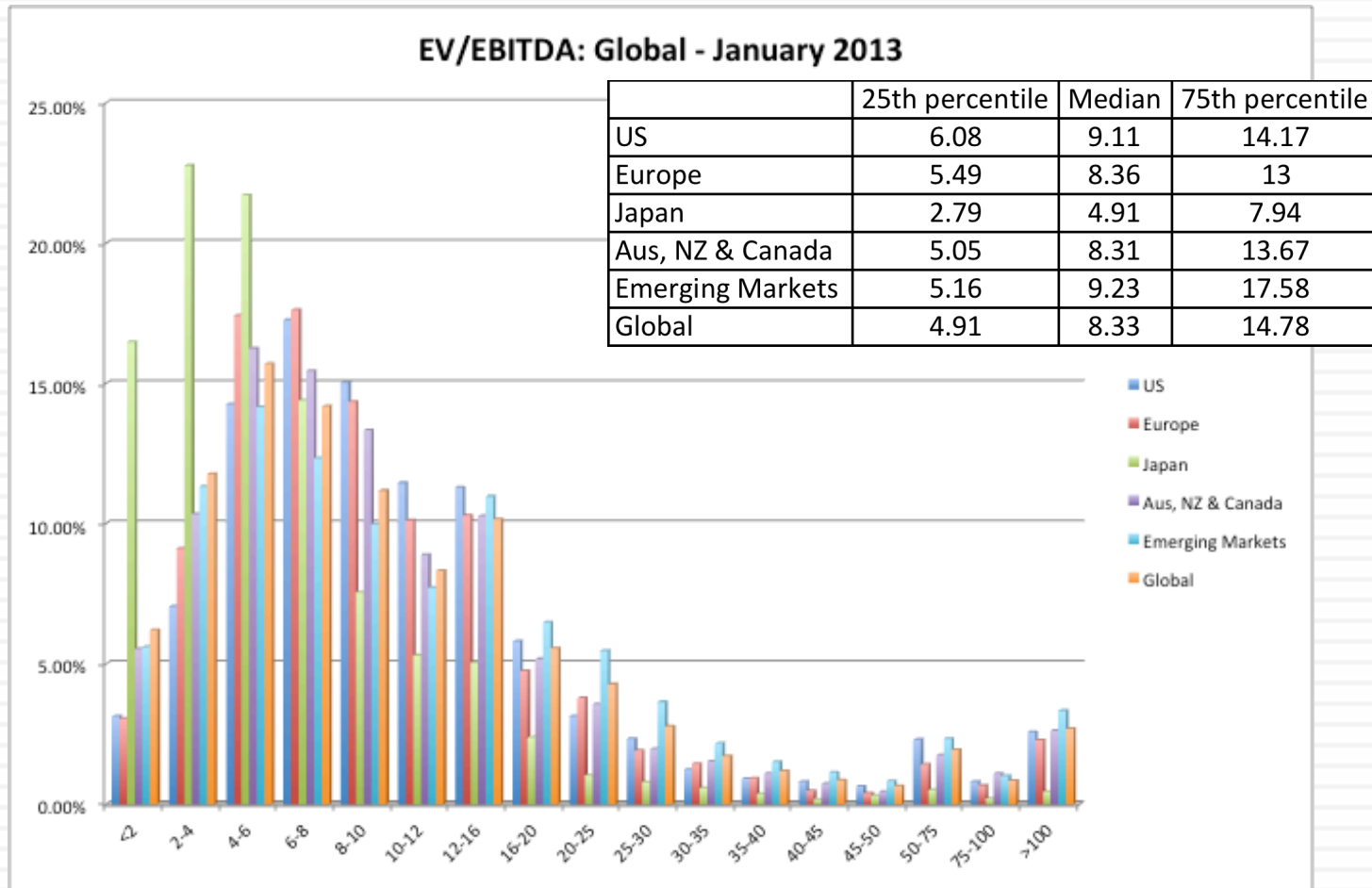
Analytical Tests

☐ 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.

□ In fact, using a simple discounted cash flow model and basic algebra should yield the fundamentals that drive a multiple

☐ How do changes in these fundamentals change the multiple?

□ The relationship between a fundamental (like growth) and a multiple (such as PE) is seldom linear. For example, if firm A has twice the growth rate of firm B, it will generally not trade at twice its PE ratio

□ Proposition 3: It is impossible to properly compare firms on a multiple, if we do not know the nature of the relationship between fundamentals and the multiple.

PE Ratio: Understanding the Fundamentals

- 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,

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

- 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

PE Ratios and Expected Growth: Interest Rate Scenarios
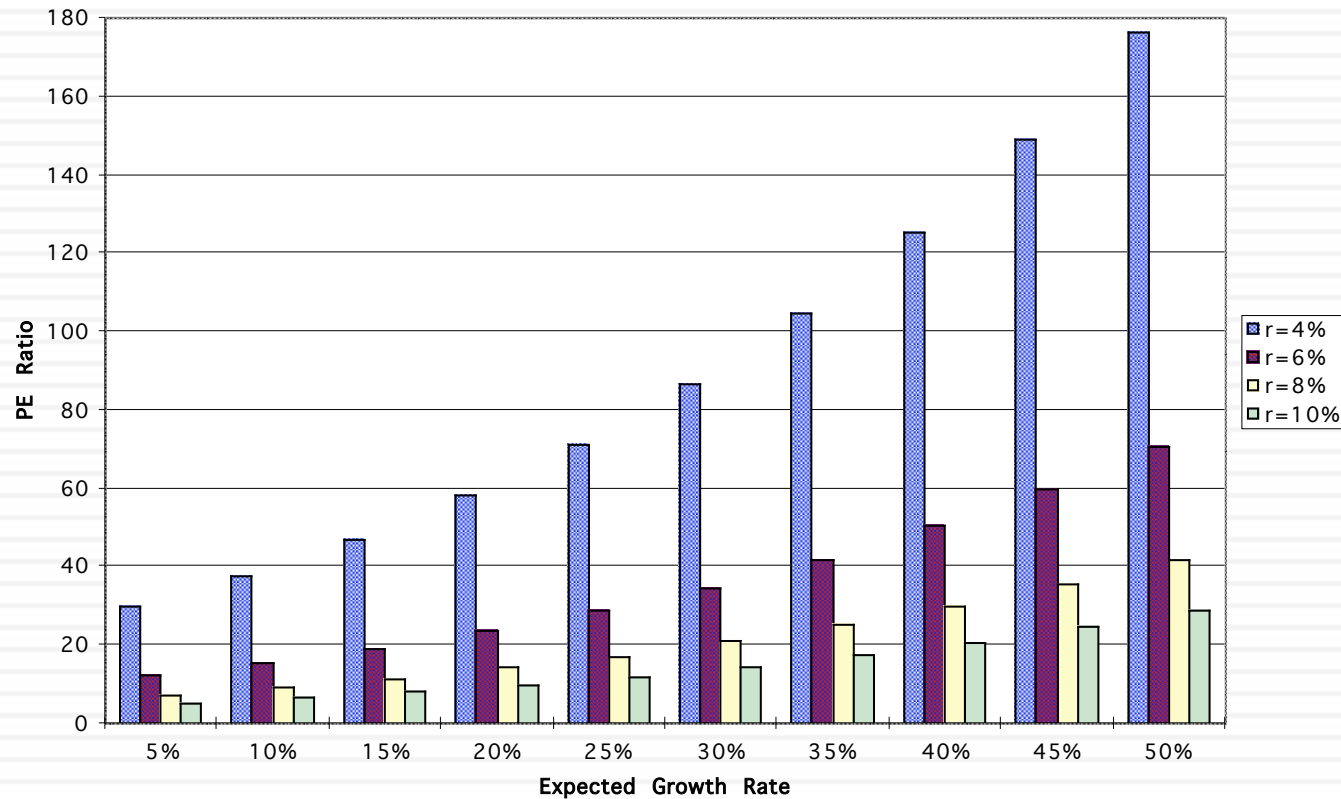
b. PE and Risk: A Follow up Example

PE Ratios and Beta: Growth Scenarios
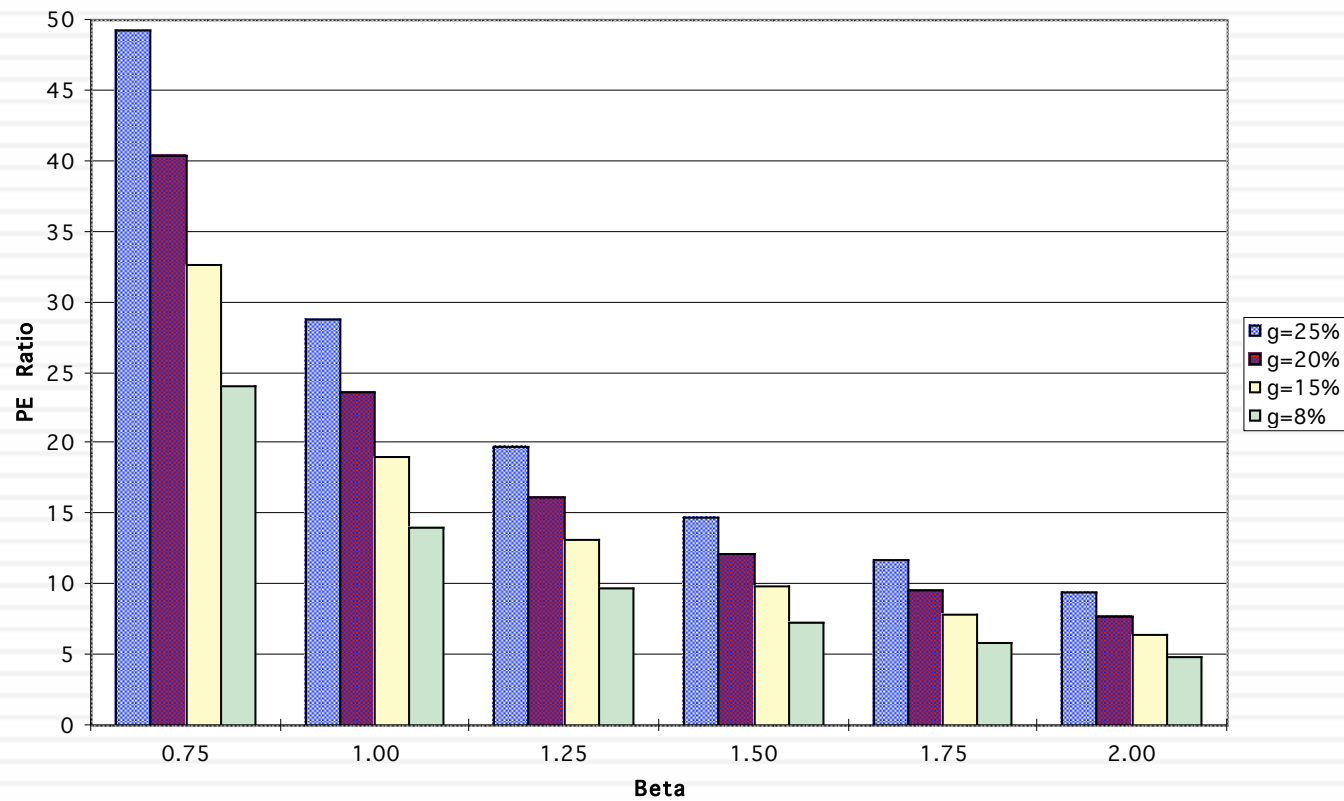
III. Comparisons of PE across time: PE Ratio for the S&P 500

PE Ratio for S&P 500: 1960-2012
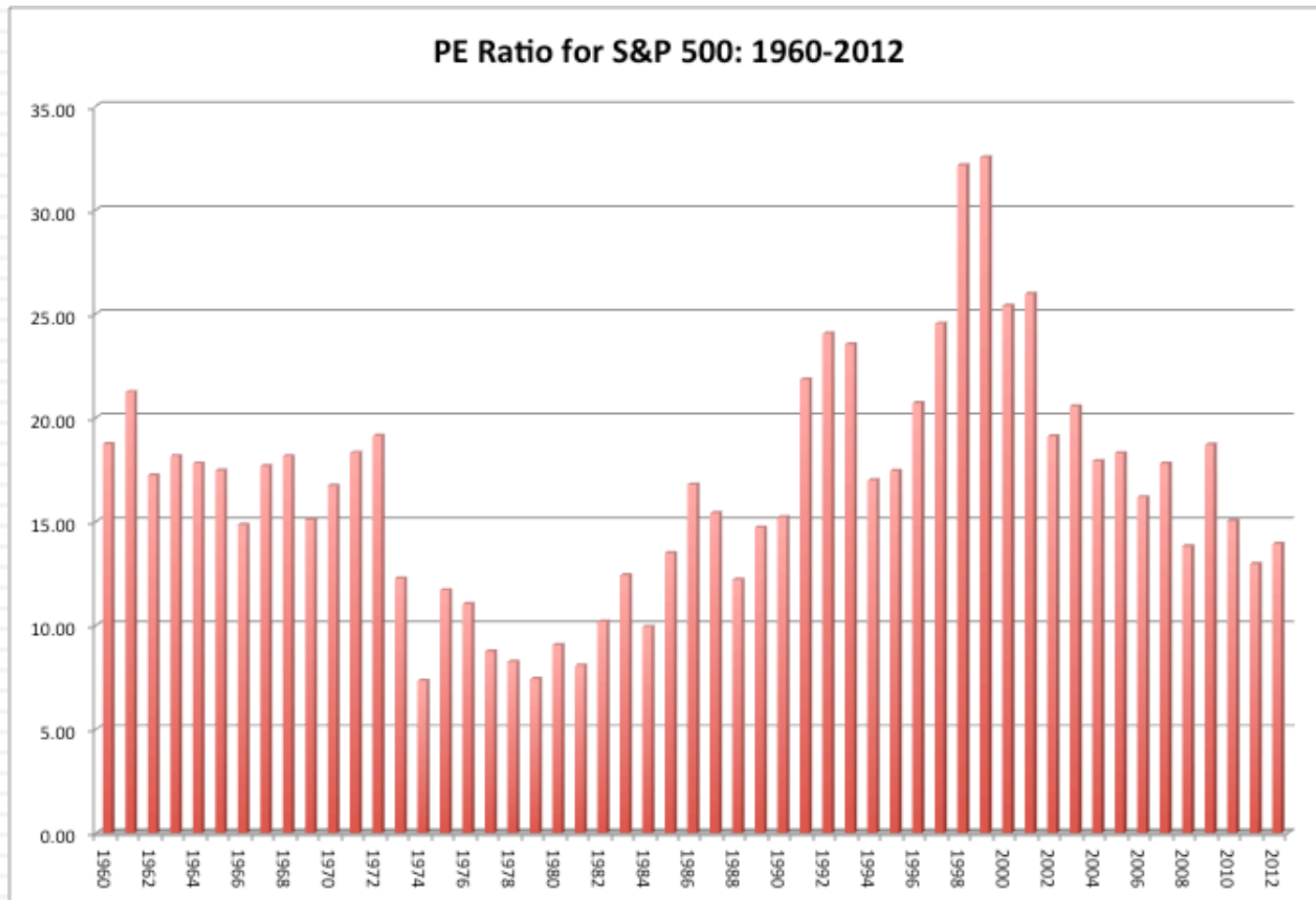
Is low (high) PE cheap (expensive)?

- A market strategist argues that stocks are expensive because the PE ratio today is high relative to the average PE ratio across time. Do you agree?
  - Yes
  - No

- If you do not agree, what factors might explain the higher PE ratio today?

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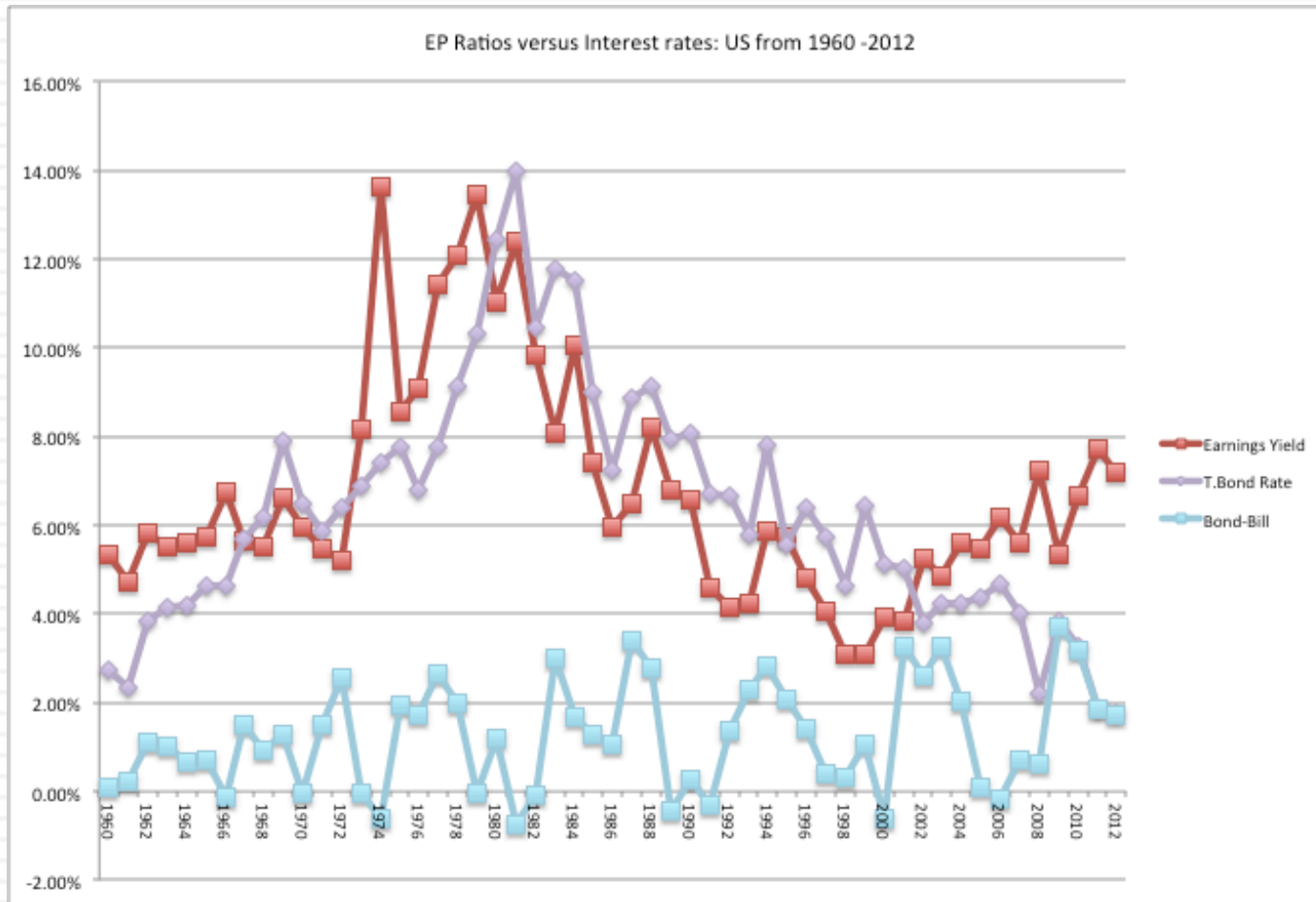
Regression Results

- 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?

The Determinants of Multiples...

$$\text{Value of Stock} = DPS_1/(k_e - g)$$

PE=Payout Ratio $(1+g)/(r-g)$	PEG=Payout ratio $(1+g)/g(r-g)$	PBV=ROE (Payout ratio) $(1+g)/(r-g)$	PS= Net Margin (Payout ratio) $(1+g)/(r-g)$
PE=f(g, payout, risk)	PEG=f(g, payout, risk)	PBV=f(ROE,payout, g, risk)	PS=f(Net Mgn, payout, g, risk)
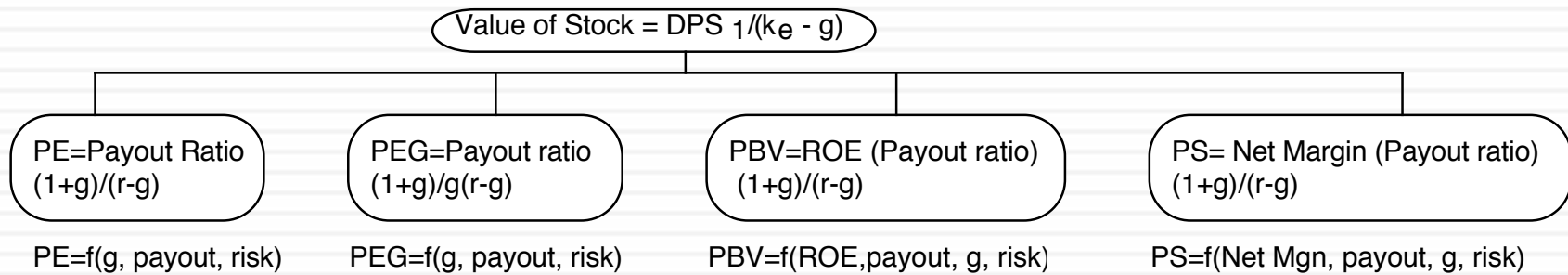
Equity Multiples

Firm Multiples

V/FCFF=f(g, WACC)   V/EBIT(1-t)=f(g, RIR, WACC   V/EBIT=f(g, RIR, WACC, t   VS=f(Oper Mgn, RIR, g, WACC)

Value/FCFF=$(1+g)/$ (WACC-g)	Value/EBIT(1-t) = $(1+g)$ (1- RIR)/(WACC-g)	Value/EBIT=$(1+g)(1-$ RiR)/(1-t)(WACC-g)	VS= Oper Margin (1- RIR) $(1+g)/$(WACC-g)

$$\text{Value of Firm} = FCFF_1/(WACC - g)$$

159
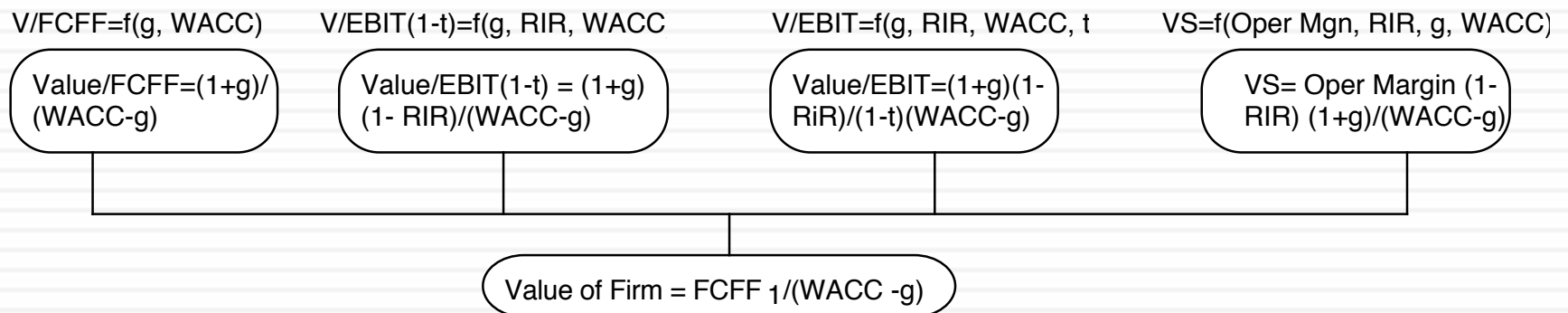
Application Tests

□ 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.

I. 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.

II. Price to Book vs ROE: Largest Market Cap Firms in the United States: January 2010
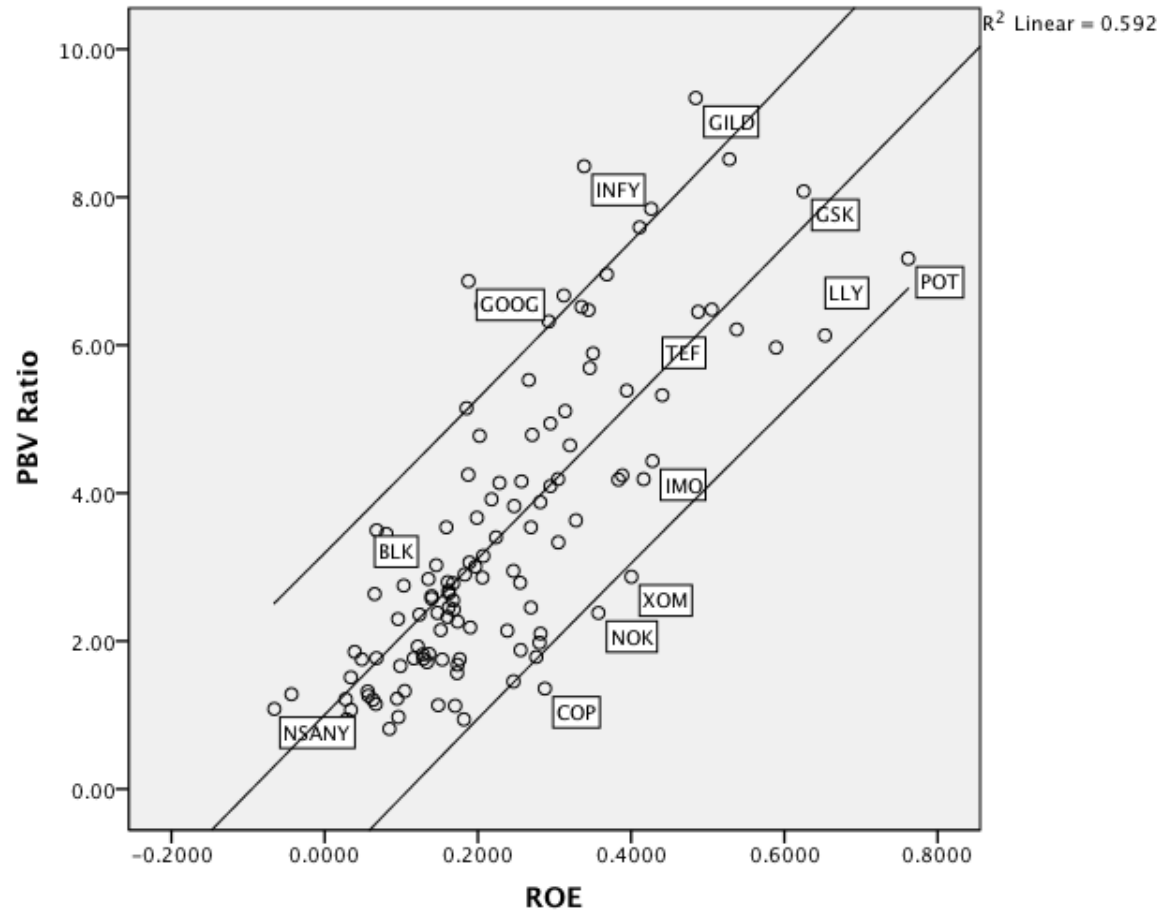
Missing growth?
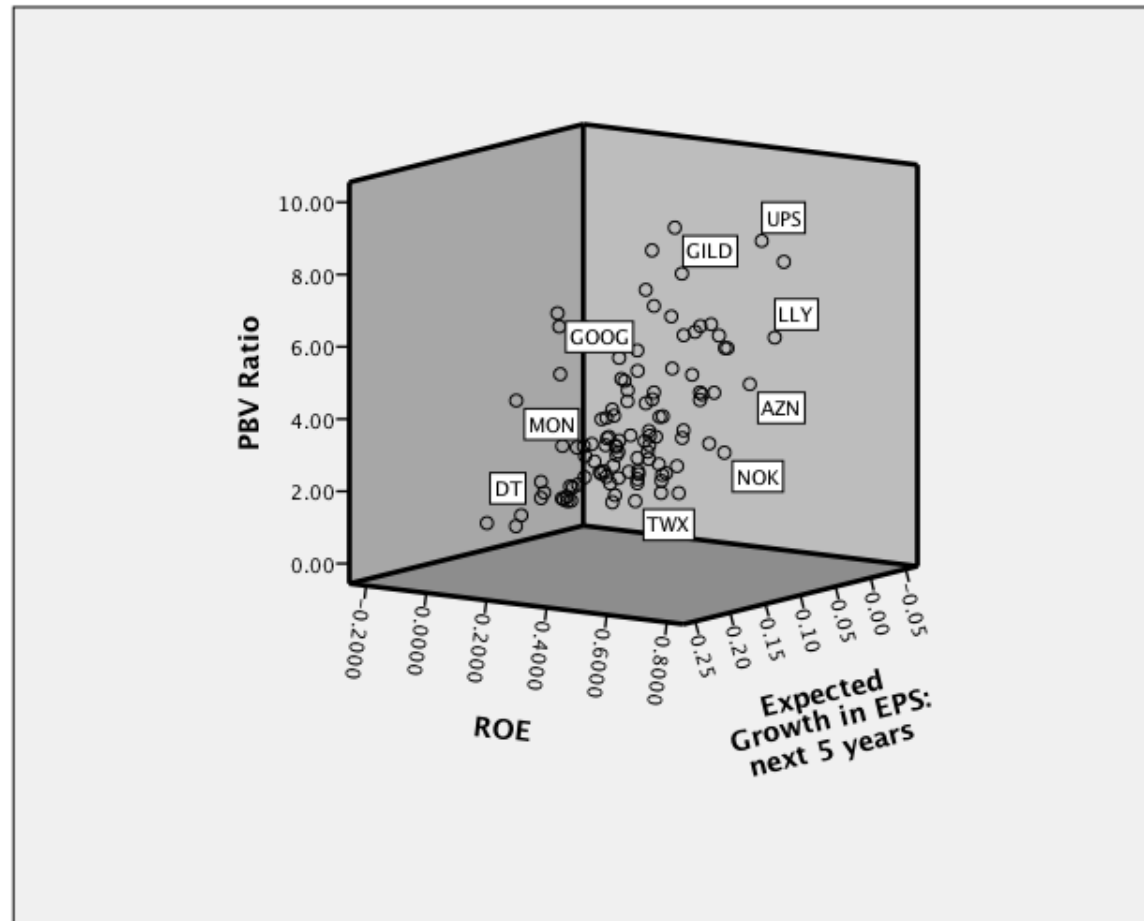
PBV, ROE and Risk: Large Cap US firms
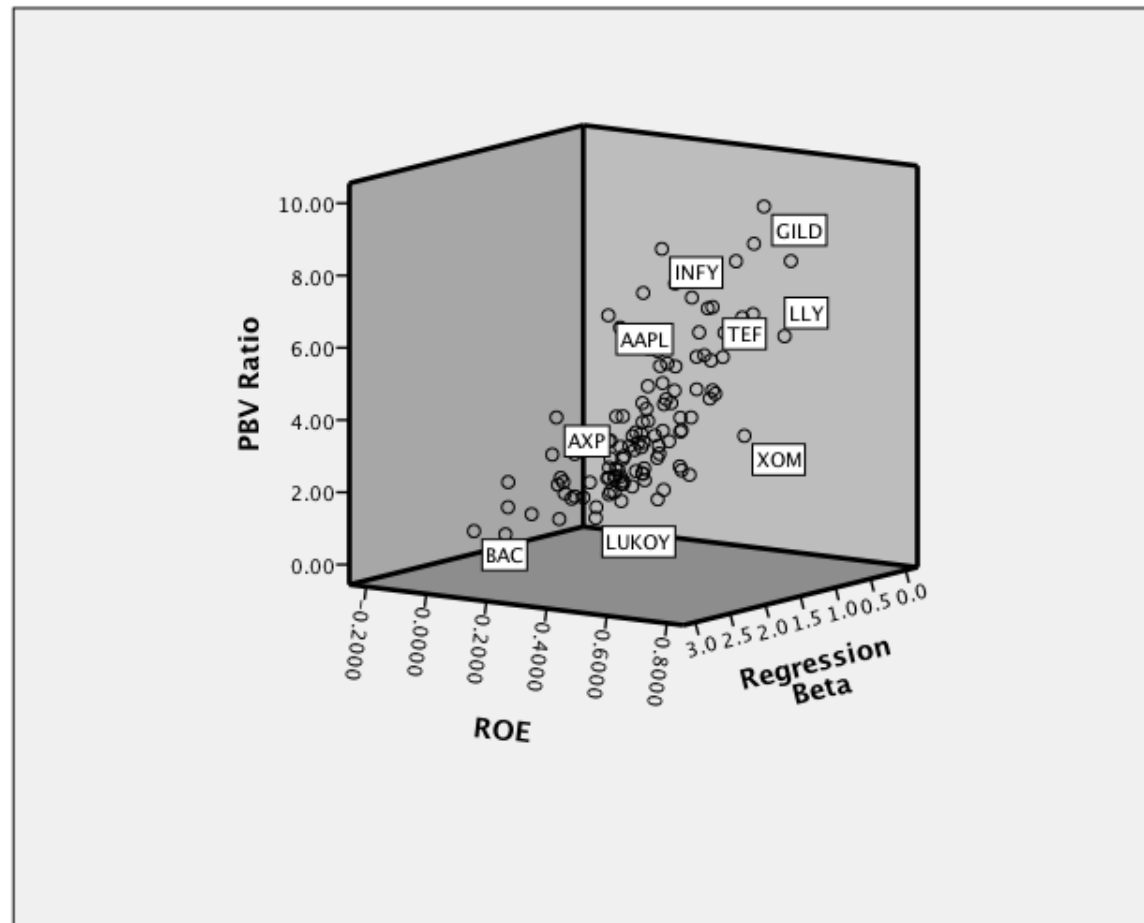
al

Bringing it all together... Largest US stocks

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
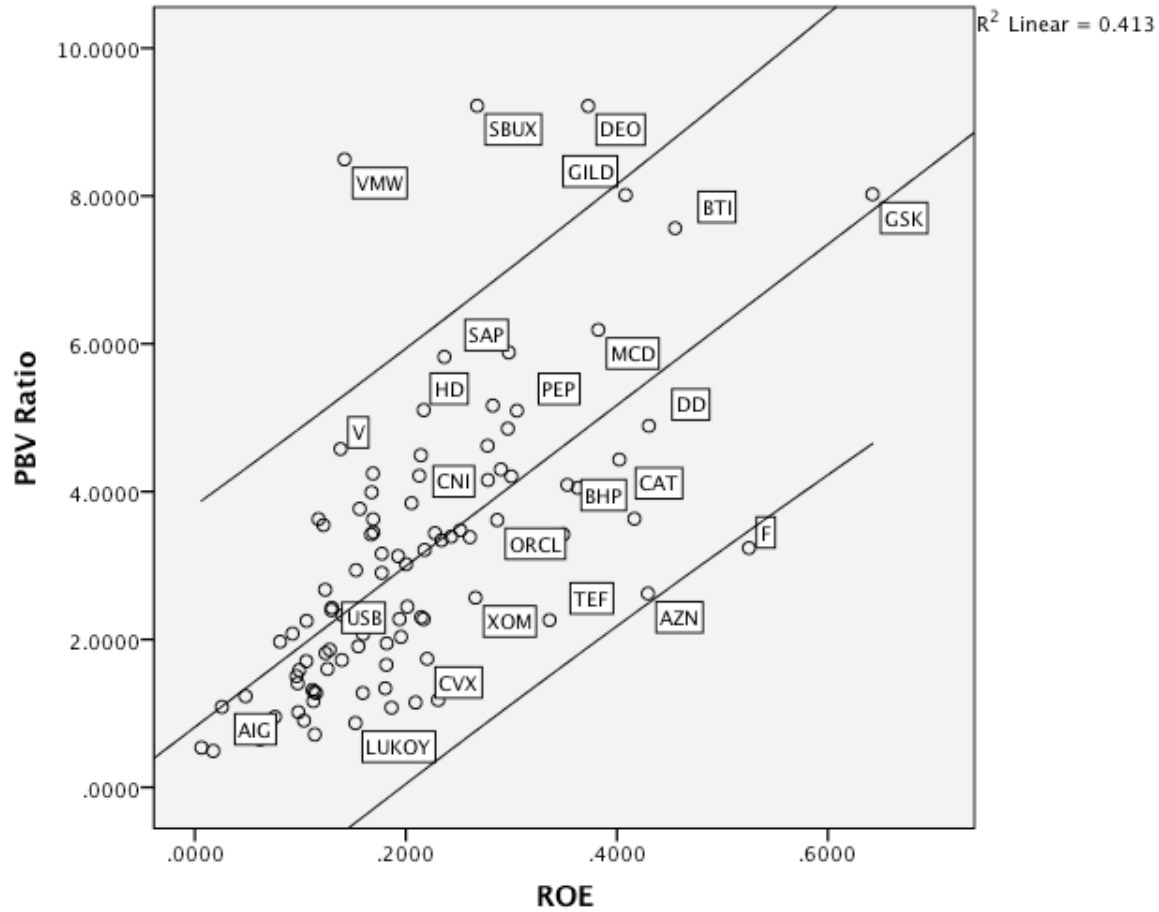
III. Value/EBITDA Multiple: Trucking Companies

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?
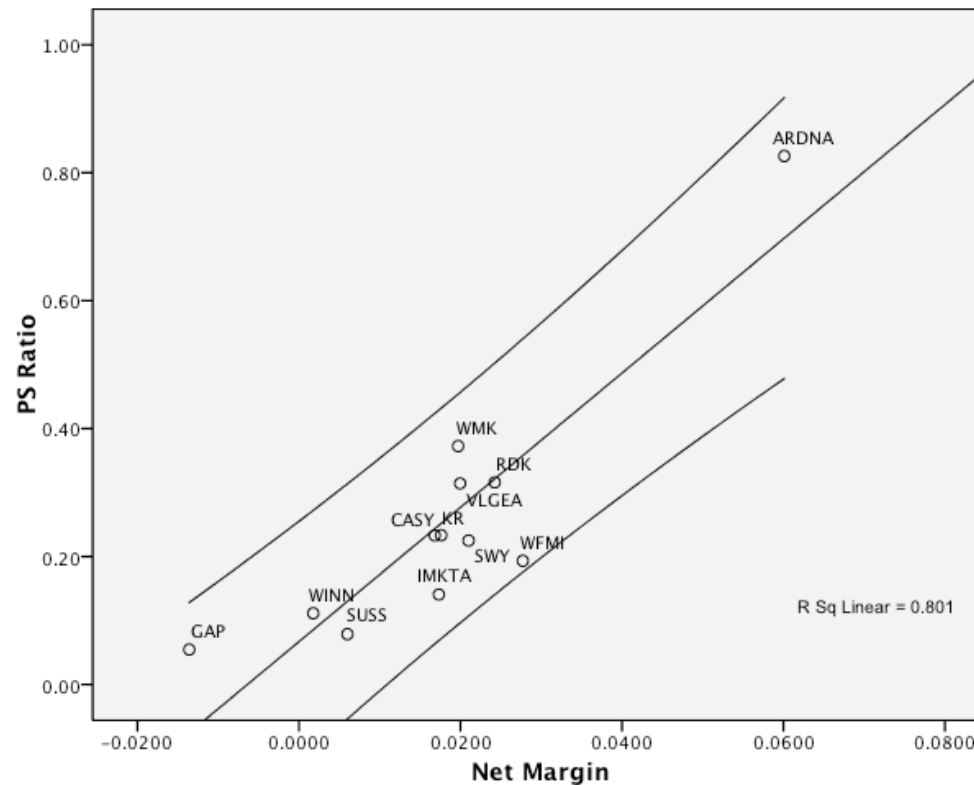
IV: Price to Sales Multiples: Grocery Stores - US in January 2007
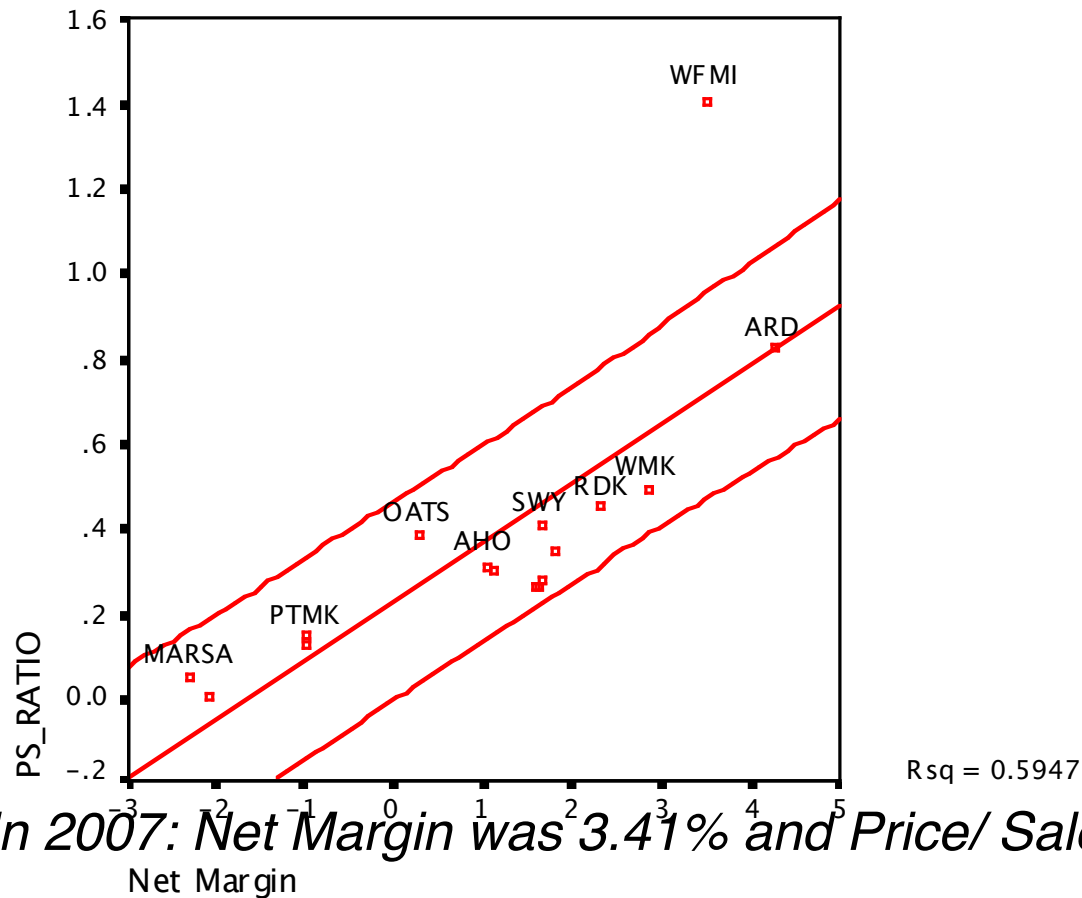
Whole Foods: In 2007: Net Margin was 3.41% and Price/ Sales ratio was 1.41

Predicted Price to Sales = 0.07 + 10.49 (0.0341) = 0.43

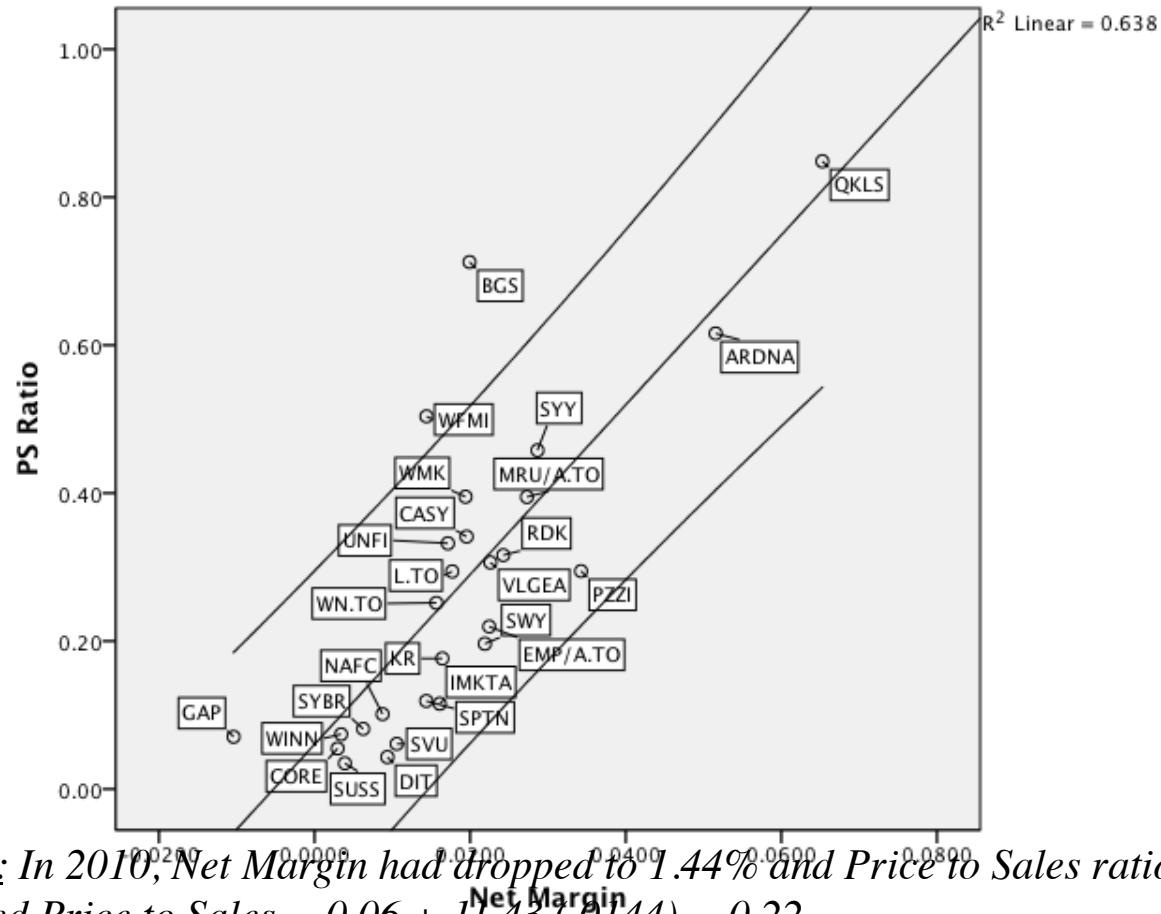# Reversion to normalcy: Grocery Stores - US in January 2009

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...
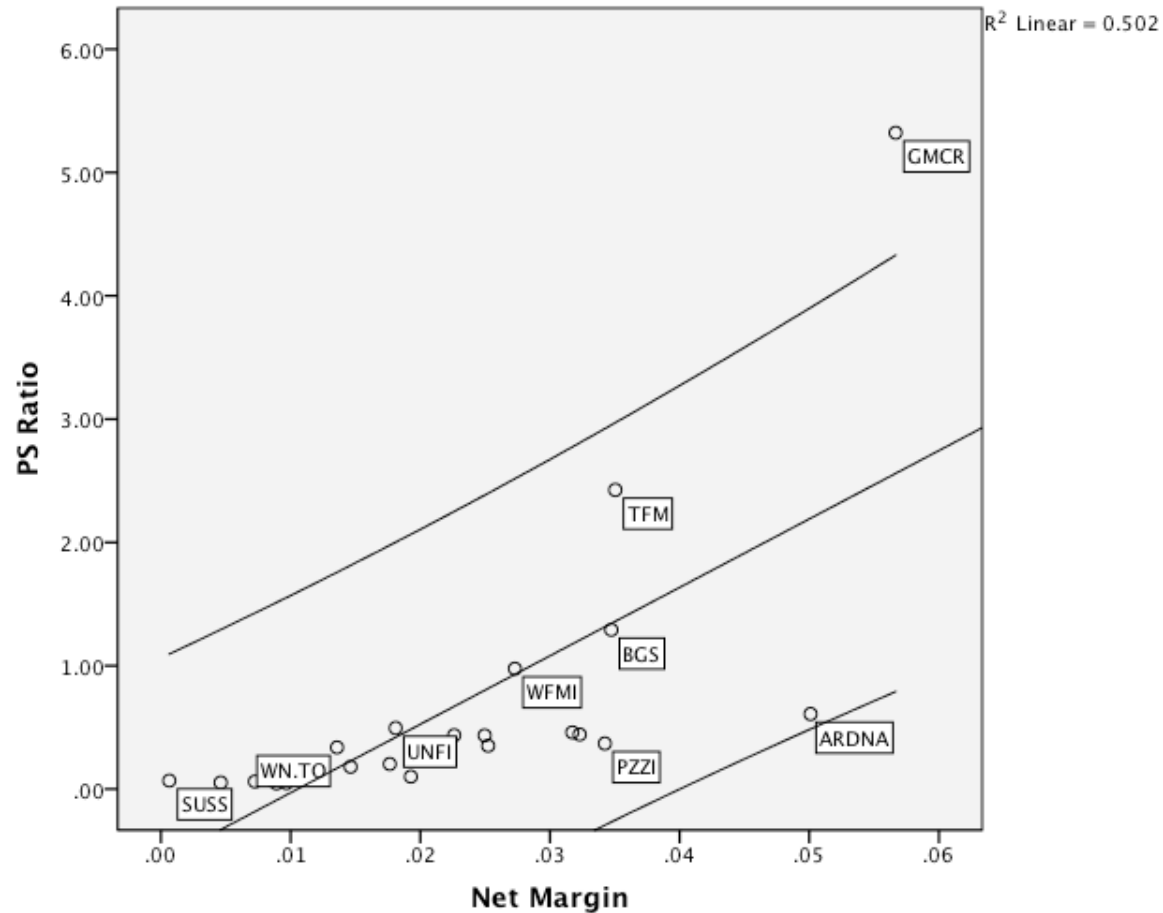
PS Ratio= - 0.585 + 55.50 (Net Margin) R^2= 48.2%
PS Ratio for WFMI = -0.585 + 55.50 (.0273) = 0.93
At a PS ratio of 0.98, WFMI is slightly over valued.

174

V. Nothing's working!!! Internet Stocks in early 2000
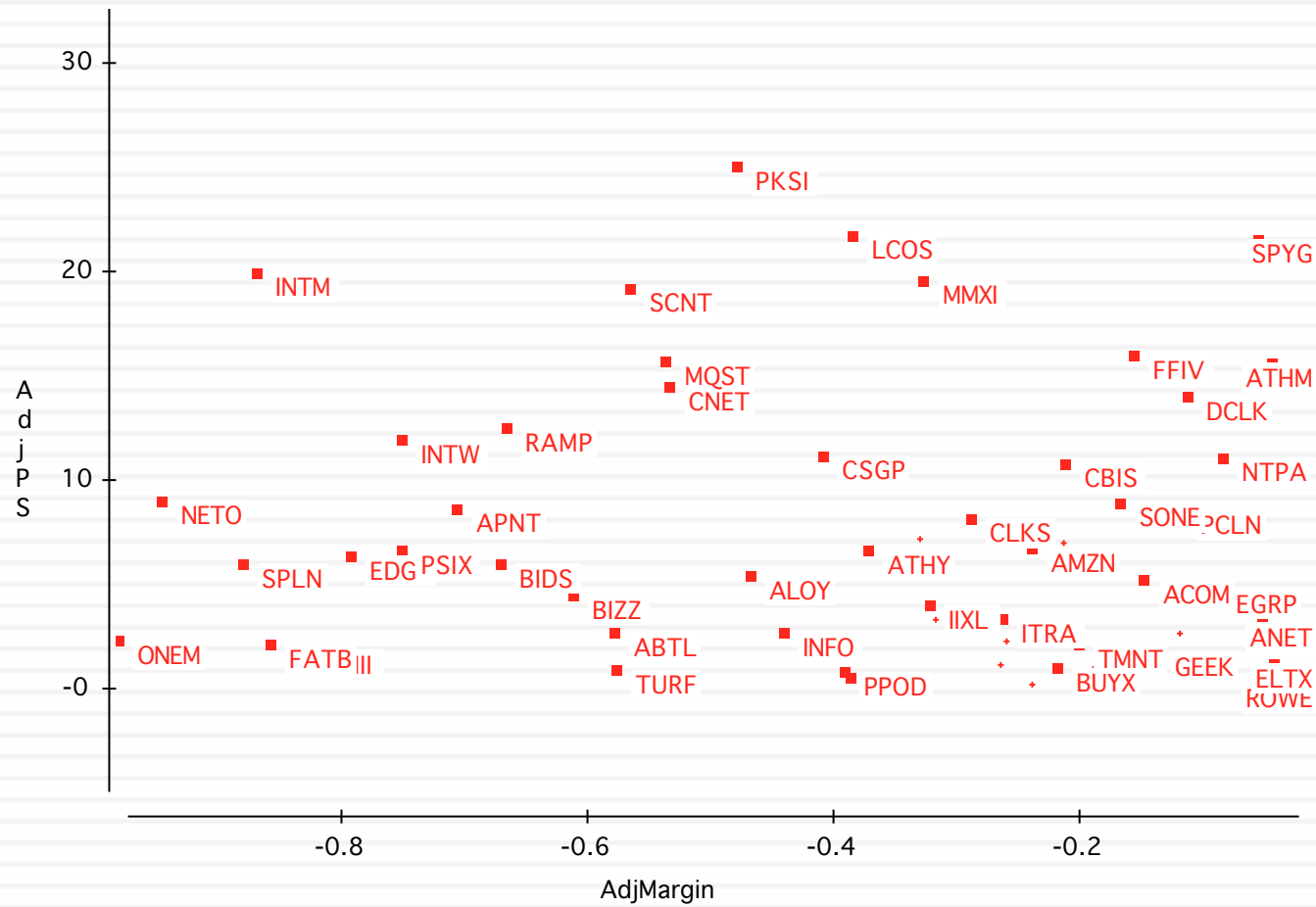
PS Ratios and Margins are not highly correlated

- 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)

$$\qquad\qquad\quad (0.66) \qquad\qquad (2.63) \qquad\qquad (3.49)$$

☐ 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/ 1.1385 = $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

Comparisons to 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.

PE versus Expected EPS Growth: January 2013
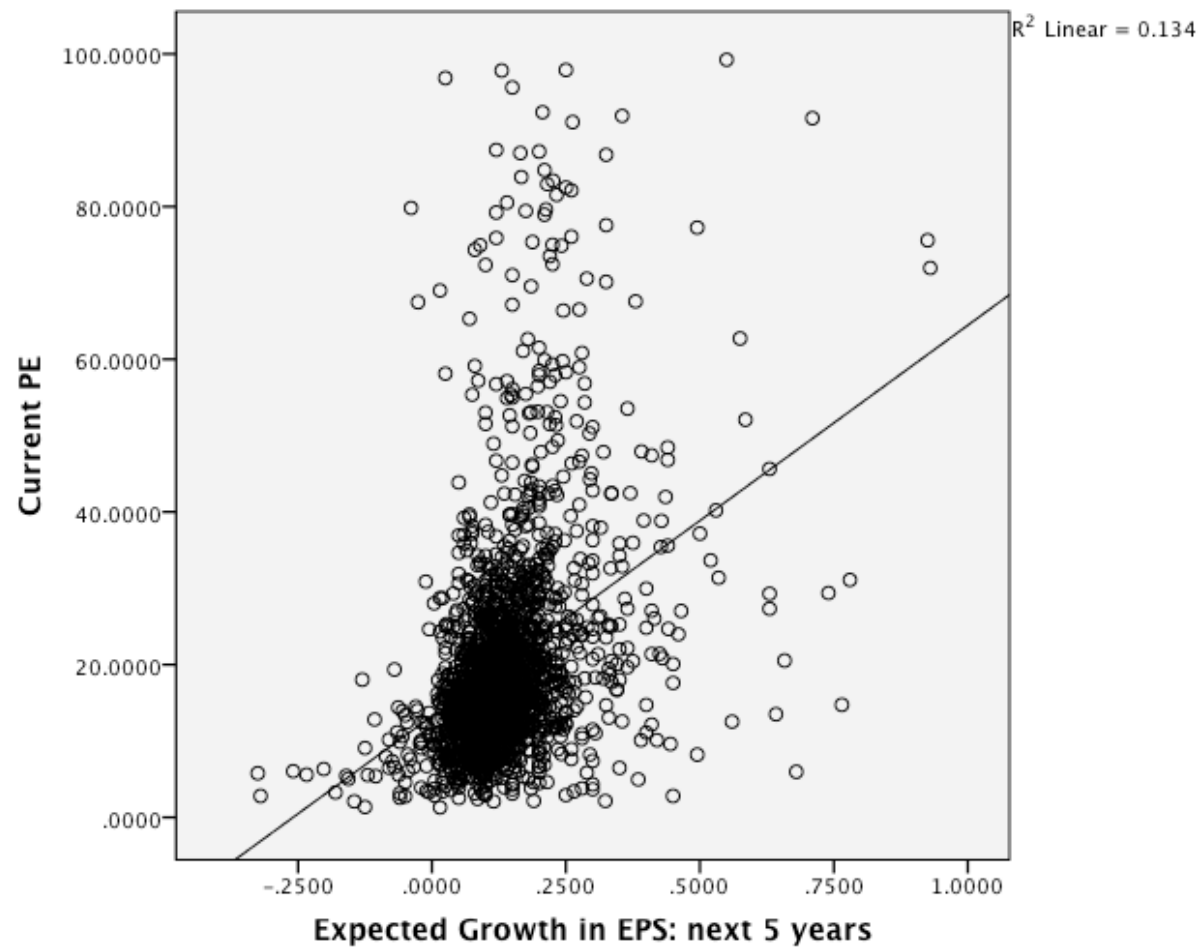
PE Ratio: Standard Regression for US stocks - January 2013

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

Aswath Damodaran

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%

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.

184

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	EV/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.

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

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 closing thought...