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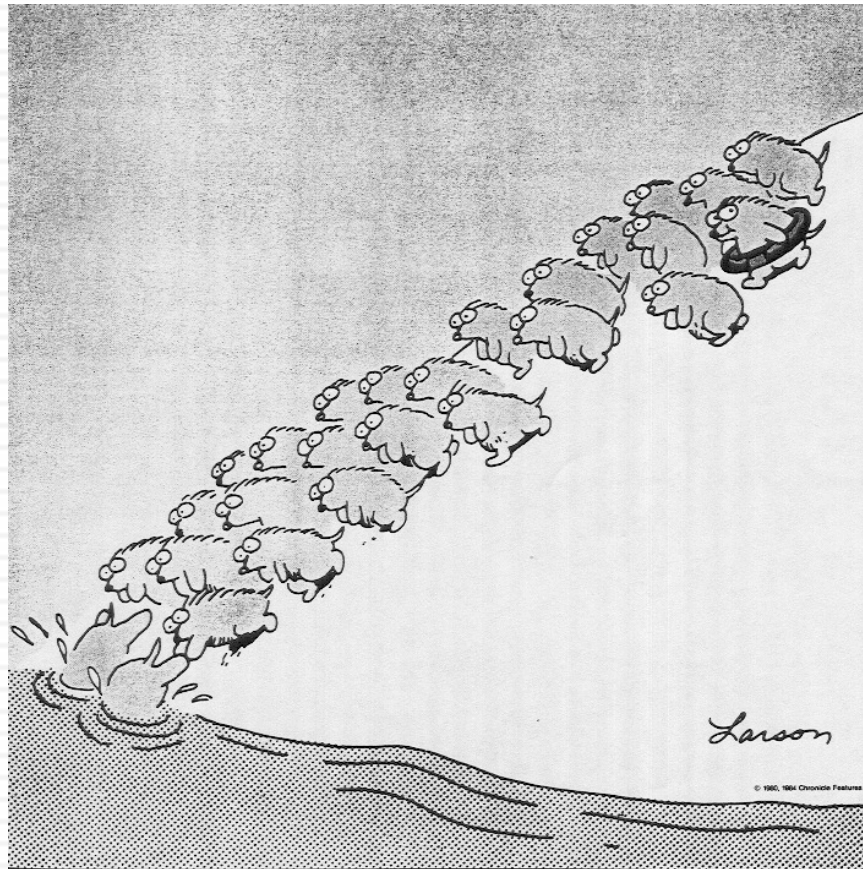
VALUATION: ART, SCIENCE, CRAFT OR MAGIC?

Aswath Damodaran
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Some Initial Thoughts

" One hundred thousand lemmings cannot be wrong"

Graffiti

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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.

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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.

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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.

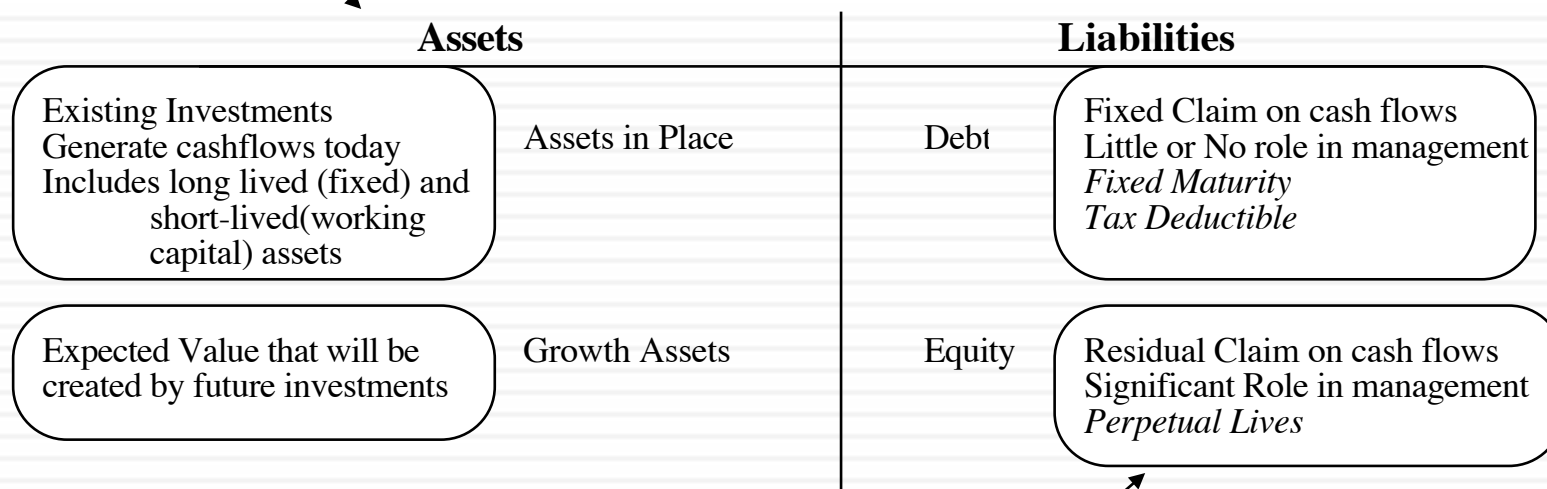*Aswath Damodaran*

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Intrinsic 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:

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

1. *The IT Proposition*: If "it" does not affect the cash flows or alter risk (thus changing discount rates), "it" cannot affect value.

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

3. *The DON'T FREAK OUT Proposition*: 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.

4. *The VALUE IS NOT PRICE Proposition*: The value of an asset may be very different from its price.

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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

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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

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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

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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%

Return on Capital
16%

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

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%

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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%

Return on Capital 17.16%

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

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

Year	1	2	3	4	5	6	7	8	9	10	
EBIT (1-t)	22533	25240	28272	31668	35472	39236	42848	46192	49150	51607	45278
- Reinvestment	15773	17668	19790	22168	24830	25242	25138	24482	23264	21503	21785
FCFF	6760	7572	8482	9500	10642	13994	17711	21710	25886	30104	23493

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

Value/Share Rs 614

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%

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Unlevered Beta for Sectors: 1.04

Firm's D/E Ratio: 33%

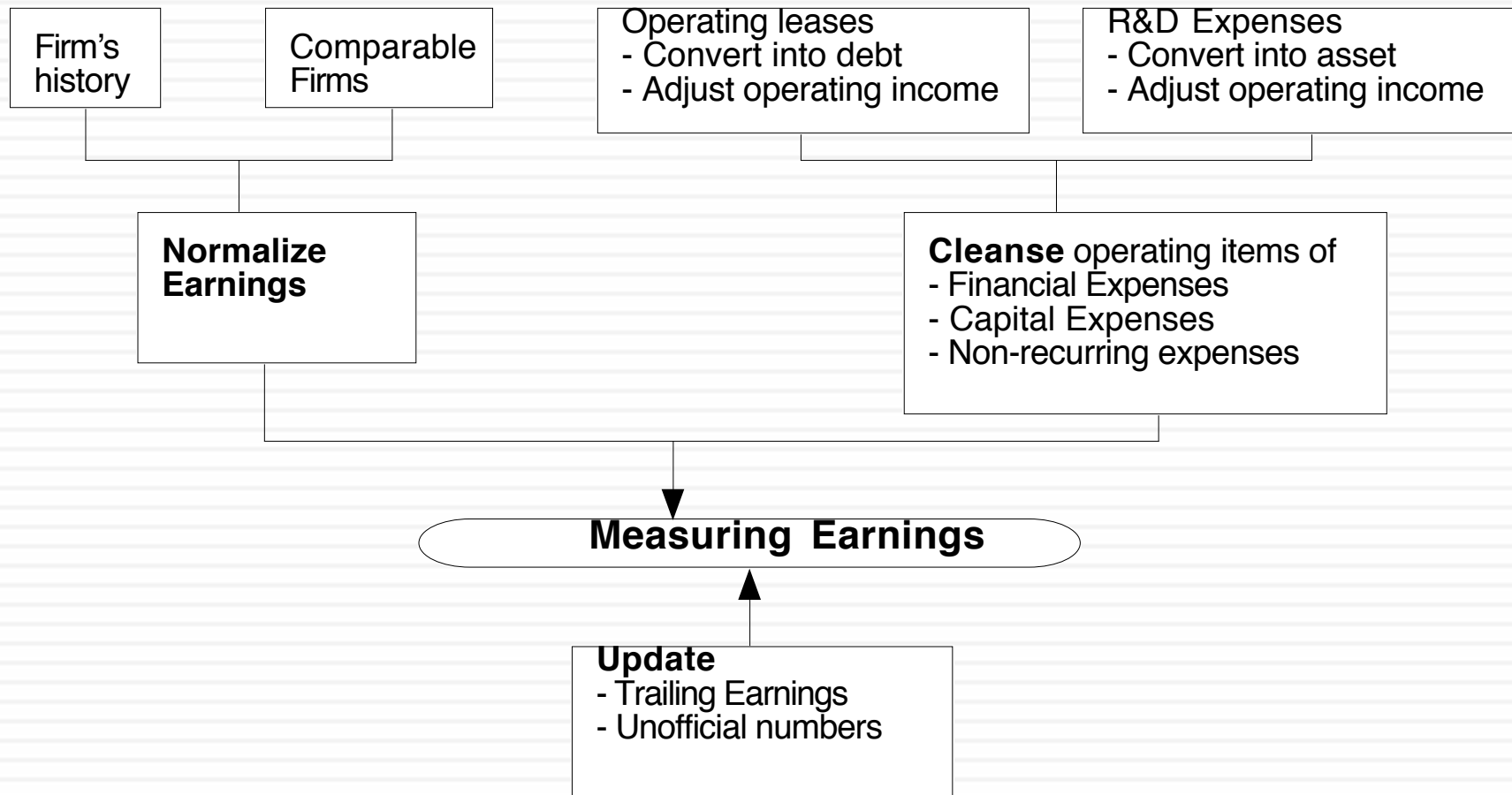Country Default Spread 3%

X

Rel Equity Mkt Vol 1.50

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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

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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

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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

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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.

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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.

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III. The government bond rate is not always the risk free rate

- When valuing Amgen in US dollars, the US$ ten-year bond rate of 4.78% was used as the risk free rate. We assumed that the US treasury was default free.

- When valuing Tata Motors in Indian rupees in 2010, the Indian government bond rate of 7% was not default free. Using the Indian government's local currency rating of Ba2 yielded a default spread of 3% for India and a riskfree rate of 4% in Indian rupees.

  Risk free rate in Indian Rupees = 7% - 3% = 4%

- Since LATAM's numbers are reported in US $, we will be valuing the company in dollars. The risk free rate that we will be using is the US ten-year T.Bond rate.

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Risk free rates will vary across currencies

Risk free Rates by Currency: January 2013
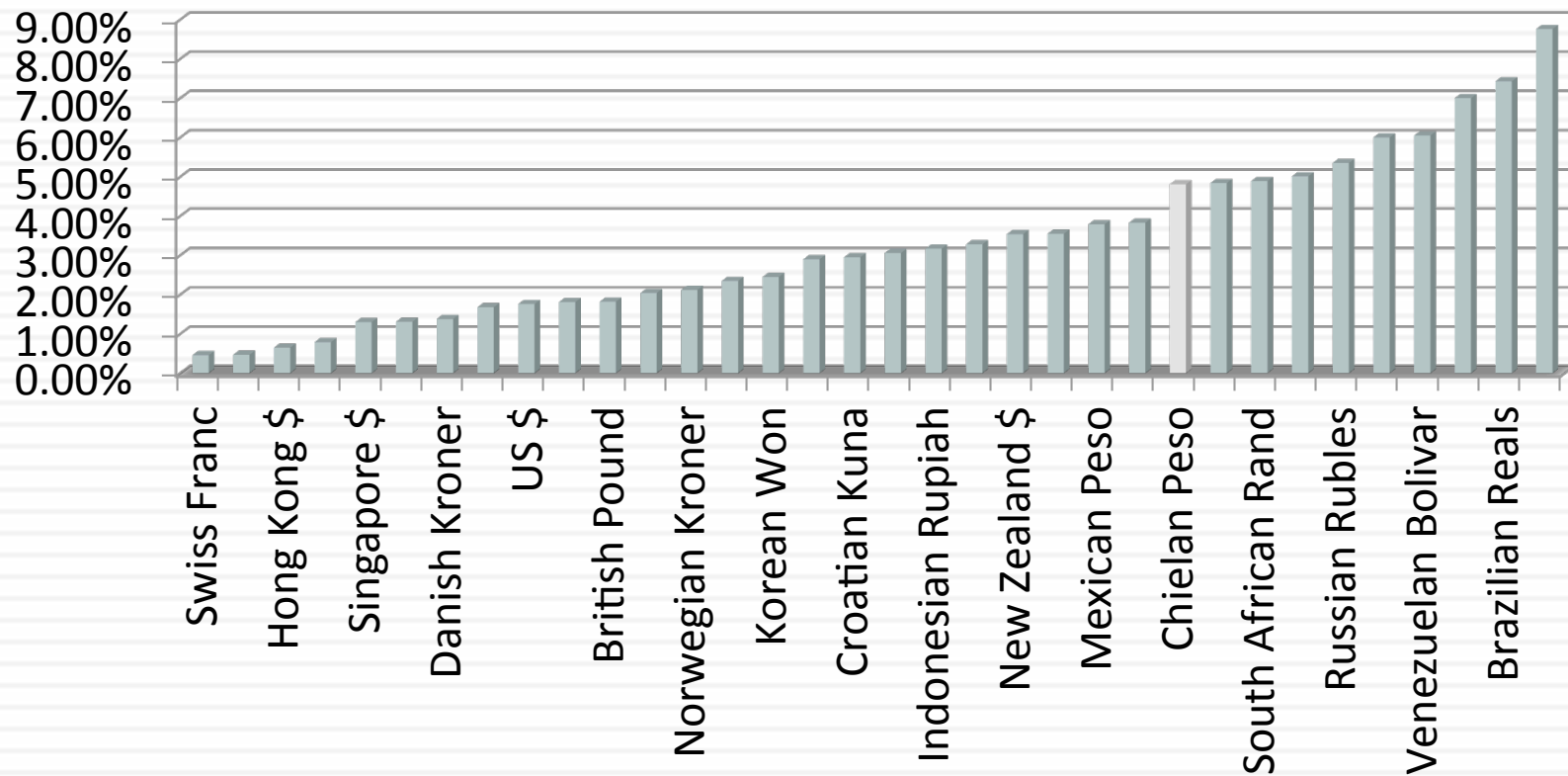
But valuations should not

	In Indian Rupees	In US $
Risk free Rate	5.00%	2.00%
Expected inflation rate	4.00%	1.00%
Cost of capital - High Growth - Stable Growth	 12.50% 10.39%	 9.25% 7.21%
Expected growth rate - High Growth - Stable Growth	 12.01% 5.00%	 8.78% 2.00%
Return on Capital - High Growth - Stable Growth	 17.16% 10.39%	 13.78% 7.21%
Value per share	Rs 614	$12.79/share (roughly Rs 614 at current exchange rate)

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IV. Betas do not come from regressions… and are noisy…

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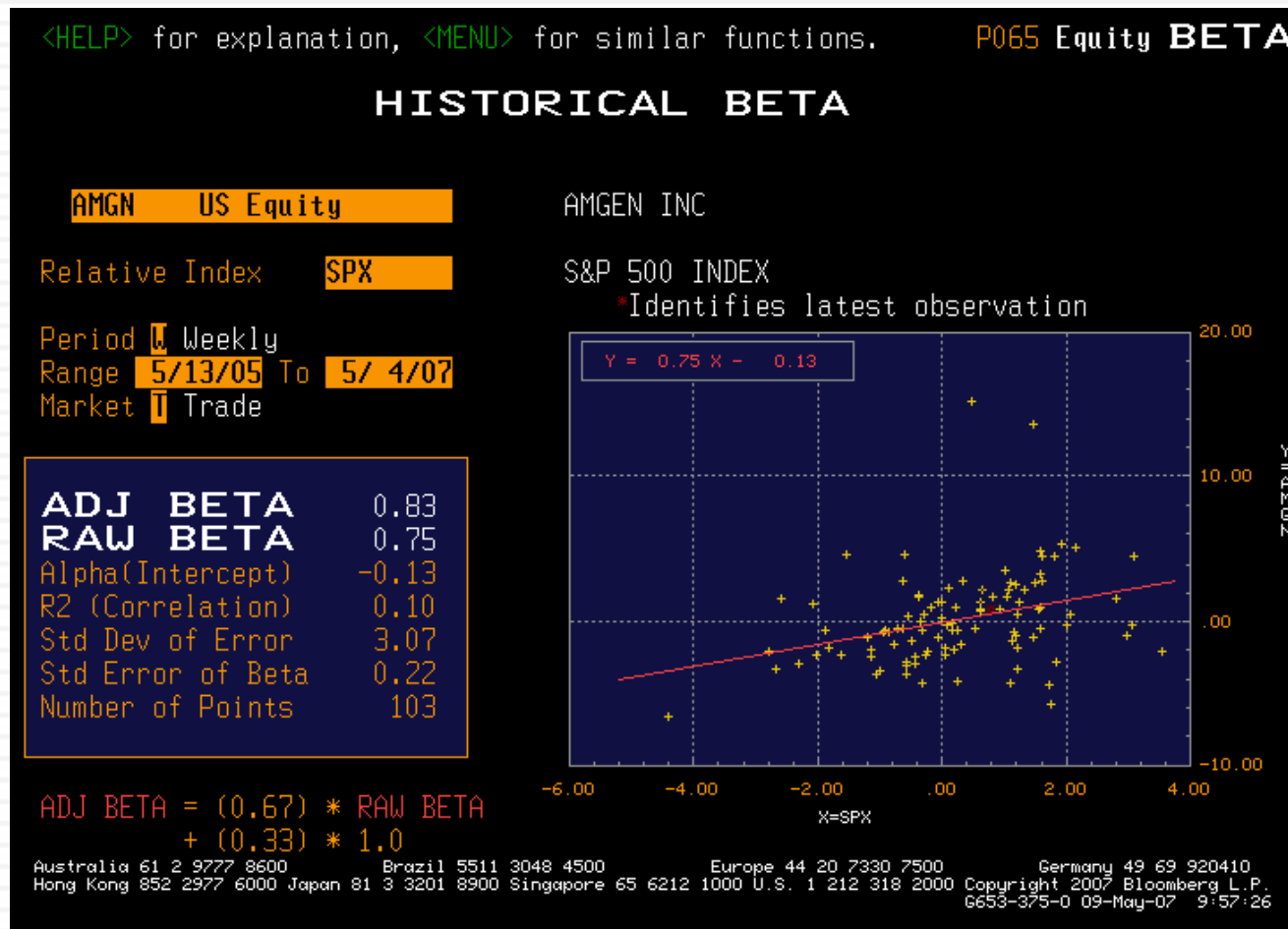
Look better for some companies, but only because they are run against narrow indices

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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

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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.

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Working through with our companies

- 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

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V. 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%
Std error	2.20%	2.33%		
1962-2012	5.93%	3.91%	4.60%	2.93%
Std error	2.38%	2.66%		
2002-2012	7.06%	3.08%	5.38%	1.71%
Std error	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%

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Implied Premiums in the US: 1960-2012

Implied Premium for US Equity Market

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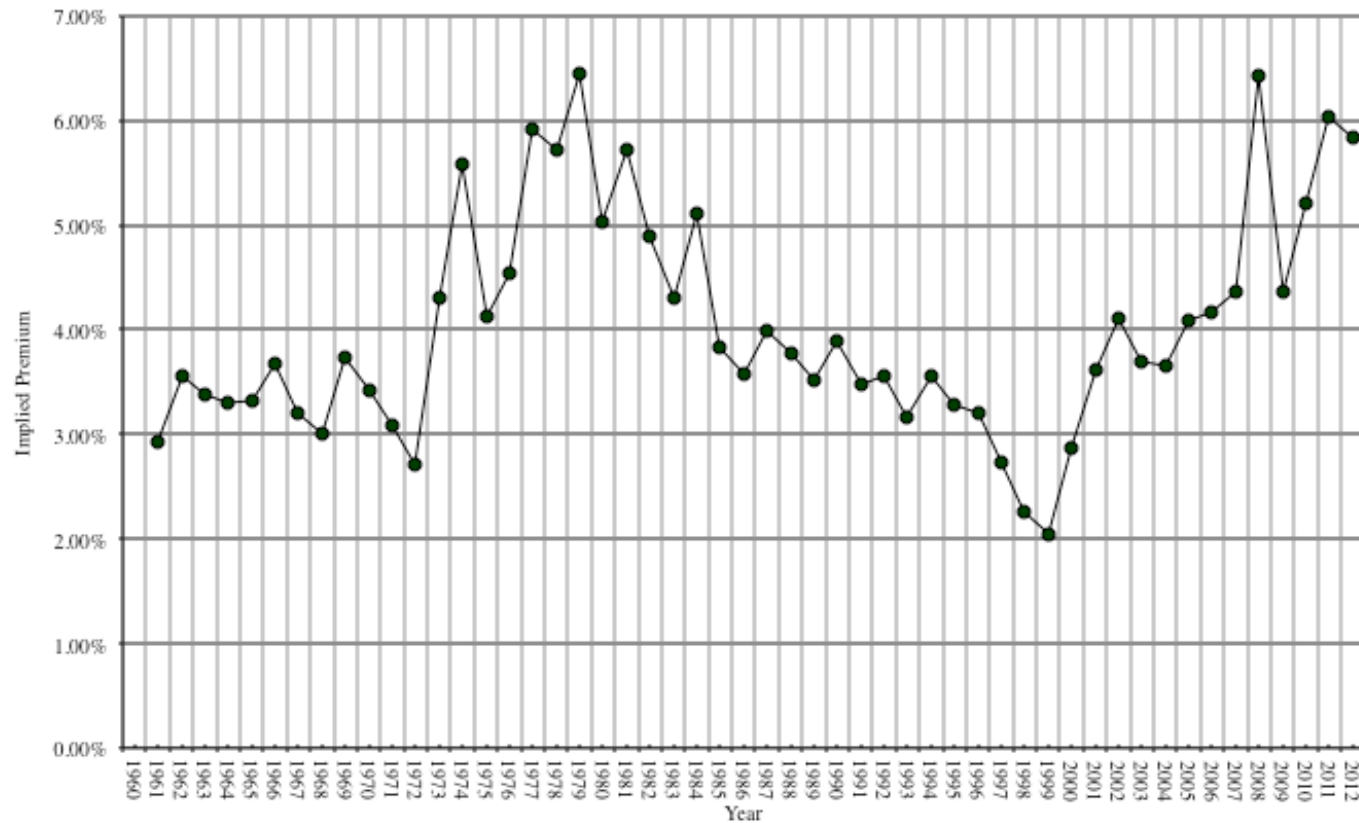
The Anatomy of a Crisis: Implied ERP from September 12, 2008 to January 1, 2009

Implied Equity Risk Premium - 9/12- 12/31/08

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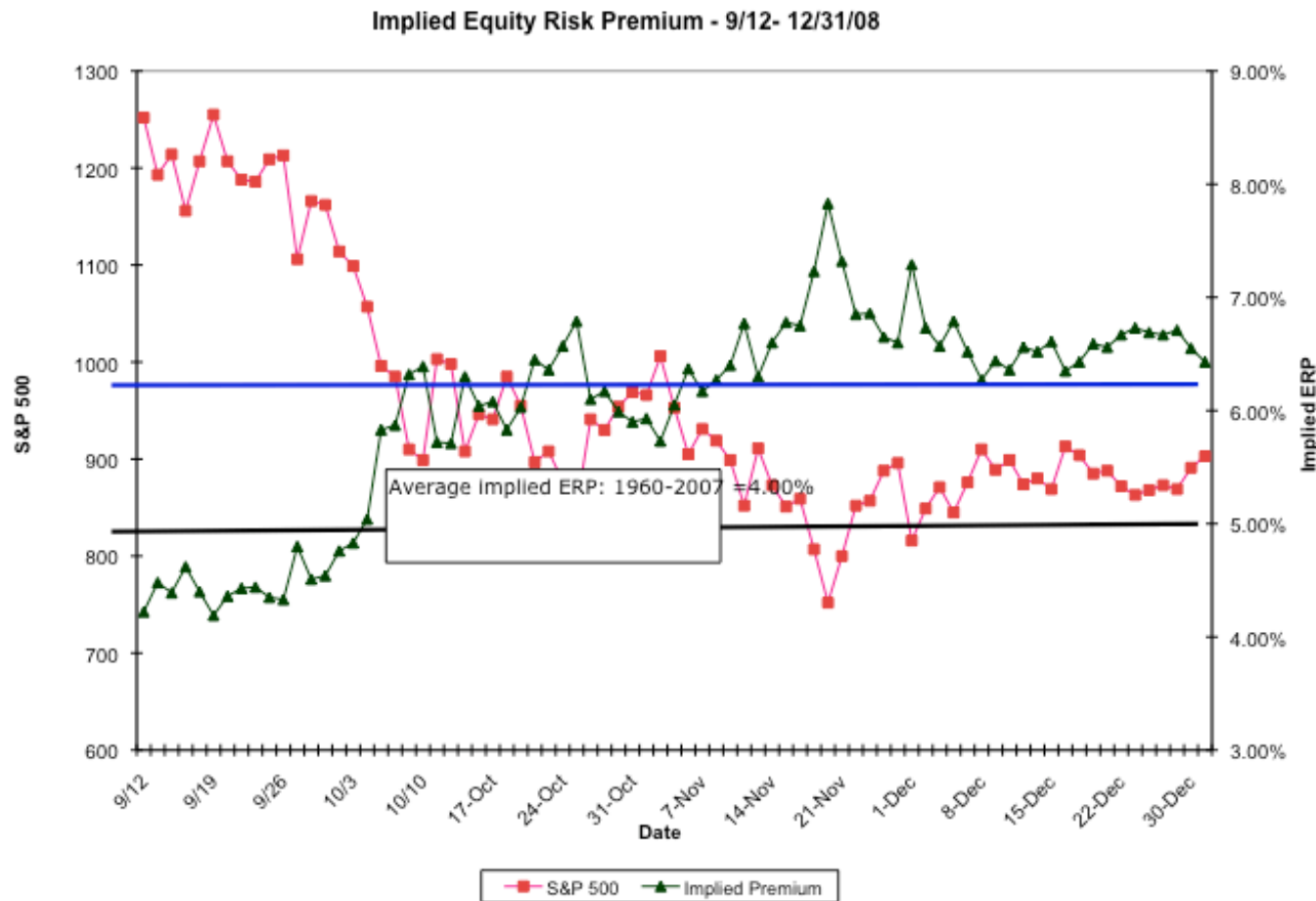
Implied Premium for India using the Sensex: April 2010

- 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%

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VI. 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:
  - Sovereign Default Spread: 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 = 4.50%
    - Default Spread for India = 3.00% (based on rating)
    - Equity Risk Premium for India = 4.50% + 3.00%
  - 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* $\text{Std Deviation}_{\text{Country Equity}}$ / $\text{Std Deviation}_{\text{Country Bond}}$
    - 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%

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Country Risk Premiums
July 2013

Andorra	1.95%	7.70%
Austria	0.00%	5.75%
Belgium	1.20%	6.95%
Cyprus	16.50%	22.25%
Denmark	0.00%	5.75%
Finland	0.00%	5.75%
France	0.45%	6.20%
Germany	0.00%	5.75%
Greece	10.13%	15.88%
Iceland	3.38%	9.13%
Ireland	4.13%	9.88%
Isle of Man	0.00%	5.75%
Italy	3.00%	8.75%
Liechtenstein	0.00%	5.75%
Luxembourg	0.00%	5.75%
Malta	1.95%	7.70%
Netherlands	0.00%	5.75%
Norway	0.00%	5.75%
Portugal	5.40%	11.15%
Spain	3.38%	9.13%
Sweden	0.00%	5.75%
Switzerland	0.00%	5.75%
Turkey	3.38%	9.13%
UK	0.45%	6.20%
W. Europe	**1,.22%**	**6.97%**

Canada	0.00%	5.75%
United States	0.00%	5.75%
North America	**0.00%**	**5.75%**

Argentina	10.13%	15.88%
Belize	14.25%	20.00%
Bolivia	5.40%	11.15%
Brazil	3.00%	8.75%
Chile	1.20%	6.95%
Colombia	3.38%	9.13%
Costa Rica	3.38%	9.13%
Ecuador	12.00%	17.75%
El Salvador	5.40%	11.15%
Guatemala	4.13%	9.88%
Honduras	8.25%	14.00%
Mexico	2.55%	8.30%
Nicaragua	10.13%	15.88%
Panama	3.00%	8.75%
Paraguay	5.40%	11.15%
Peru	3.00%	8.75%
Suriname	5.40%	11.15%
Uruguay	3.38%	9.13%
Venezuela	6.75%	12.50%
Latin America	3.94%	9.69%

Angola	5.40%	11.15%
Benin	8.25%	14.00%
Botswana	1.65%	7.40%
Burkina Faso	8.25%	14.00%
Cameroon	8.25%	14.00%
Cape Verde	6.75%	12.50%
Egypt	12.00%	17.75%
Gabon	5.40%	11.15%
Ghana	6.75%	12.50%
Kenya	6.75%	12.50%
Morocco	4.13%	9.88%
Mozambique	6.75%	12.50%
Namibia	3.38%	9.13%
Nigeria	5.40%	11.15%
Rwanda	8.25%	14.00%
Senegal	6.75%	12.50%
South Africa	2.55%	8.30%
Tunisia	4.73%	10.48%
Zambia	6.75%	12.50%
Africa	**5.90%**	**11.65%**

Albania	6.75%	12.50%
Armenia	4.73%	10.48%
Azerbaijan	3.38%	9.13%
Belarus	10.13%	15.88%
Bosnia	10.13%	15.88%
Bulgaria	3.00%	8.75%
Croatia	4.13%	9.88%
Czech Republic	1.43%	7.18%
Estonia	1.43%	7.18%
Georgia	5.40%	11.15%
Hungary	4.13%	9.88%
Kazakhstan	3.00%	8.75%
Latvia	3.00%	8.75%
Lithuania	2.55%	8.30%
Macedonia	5.40%	11.15%
Moldova	10.13%	15.88%
Montenegro	5.40%	11.15%
Poland	1.65%	7.40%
Romania	3.38%	9.13%
Russia	2.55%	8.30%
Serbia	5.40%	11.15%
Slovakia	1.65%	7.40%
Slovenia	4.13%	9.88%
Uganda	6.75%	12.50%
Ukraine	10.13%	15.88%
E. Europe/Russia	**3.13%**	**8.88%**

Bahrain	2.55%	8.30%
Israel	1.43%	7.18%
Jordan	6.75%	12.50%
Kuwait	0.90%	6.65%
Lebanon	6.75%	12.50%
Oman	1.43%	7.18%
Qatar	0.90%	6.65%
Saudi Arabia	1.20%	6.95%
UAE	0.90%	6.65%
Middle East	**1.38%**	**7.13%**

Bangladesh	5.40%	11.15%
Cambodia	8.25%	14.00%
China	1.20%	6.95%
Fiji	6.75%	12.50%
Hong Kong	0.45%	6.20%
India	3.38%	9.13%
Indonesia	3.38%	9.13%
Japan	1.20%	6.95%
Korea	1.20%	6.95%
Macao	1.20%	6.95%
Malaysia	1.95%	7.70%
Mauritius	2.55%	8.30%
Mongolia	6.75%	12.50%
Pakistan	12.00%	17.75%
Papua NG	6.75%	12.50%
Philippines	4.13%	9.88%
Singapore	0.00%	5.75%
Sri Lanka	6.75%	12.50%
Taiwan	1.20%	6.95%
Thailand	2.55%	8.30%
Vietnam	8.25%	14.00%
Asia	**1.77%**	**7.52%**

Australia	0.00%	5.75%
Cook Islands	6.75%	12.50%
New Zealand	0.00%	5.75%
Australia & NZ	**0.00%**	**5.75%**

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

VII. 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.

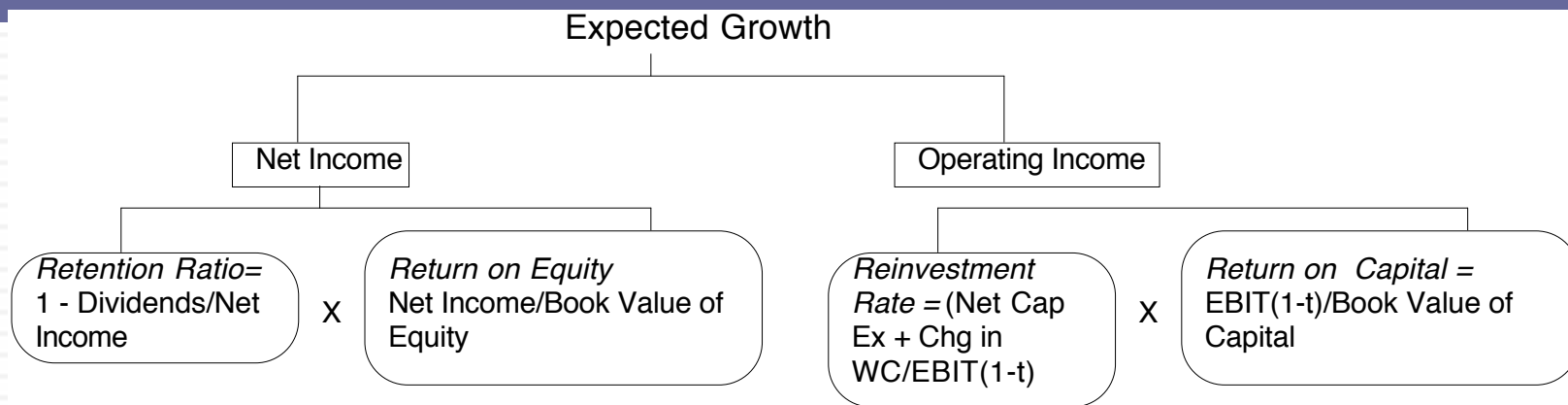*Aswath Damodaran*

Globalization's flip side: Operation-based ERP

- Developed market companies are not immune from emerging market risk:

Region	Revenues	Total ERP	CRP
Western Europe	19%	6.67%	0.67%
Eastern Europe & Russia	5%	8.60%	2.60%
Asia	15%	7.63%	1.63%
Latin America	15%	9.42%	3.42%
Australia	4%	6.00%	0.00%
Africa	4%	9.82%	3.82%
North America	40%	6.00%	0.00%
Coca Cola	100%	7.14%	1.14%

- And emerging market companies are not all made equal.

	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.

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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

$$ROC = \frac{EBIT\ (\ 1-\ tax\ rate)}{Book\ Value\ of\ Equity + Book\ value\ of\ debt\ -\ Cash}$$
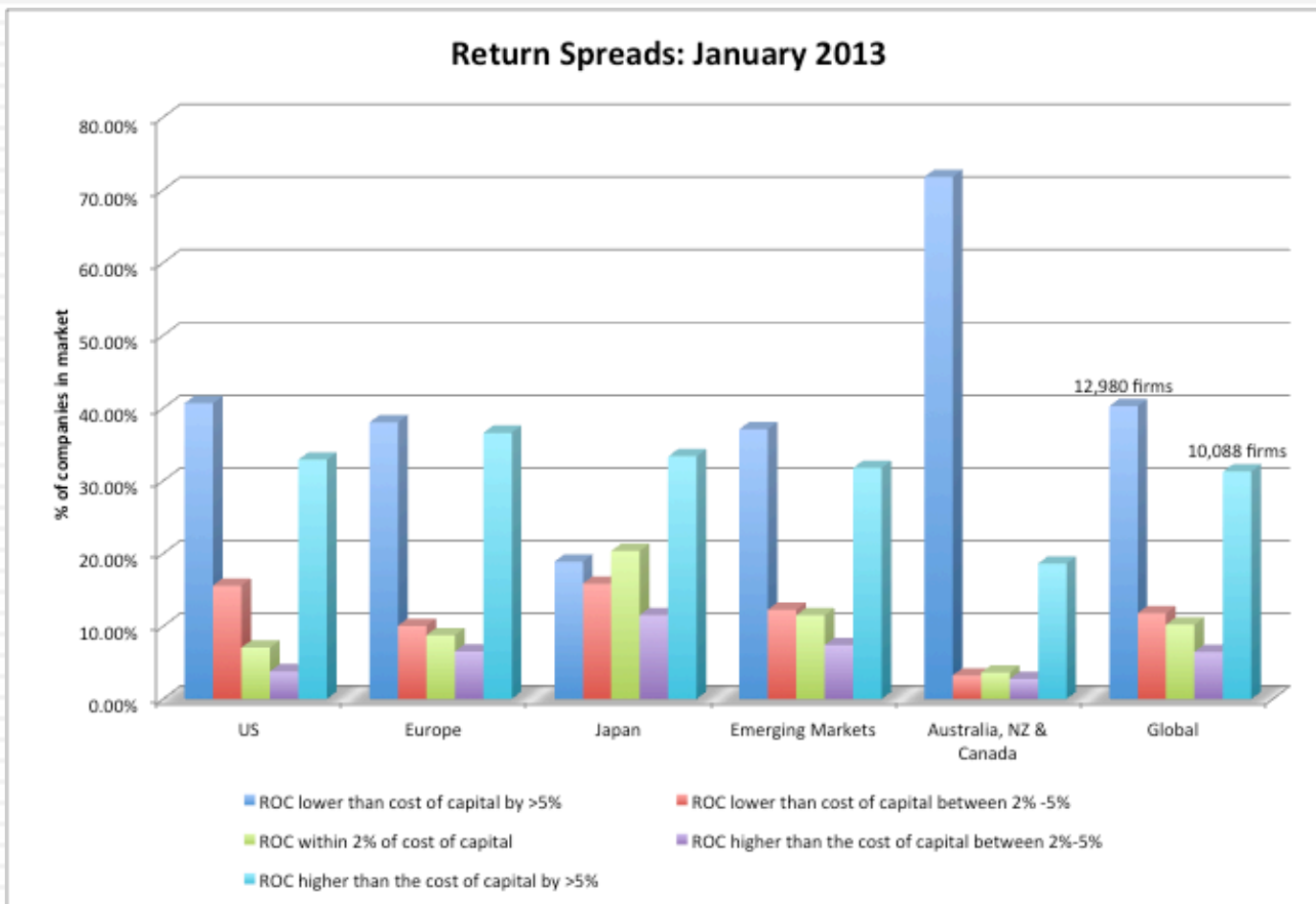
Adjust book equity for
1. Capitalized R&D
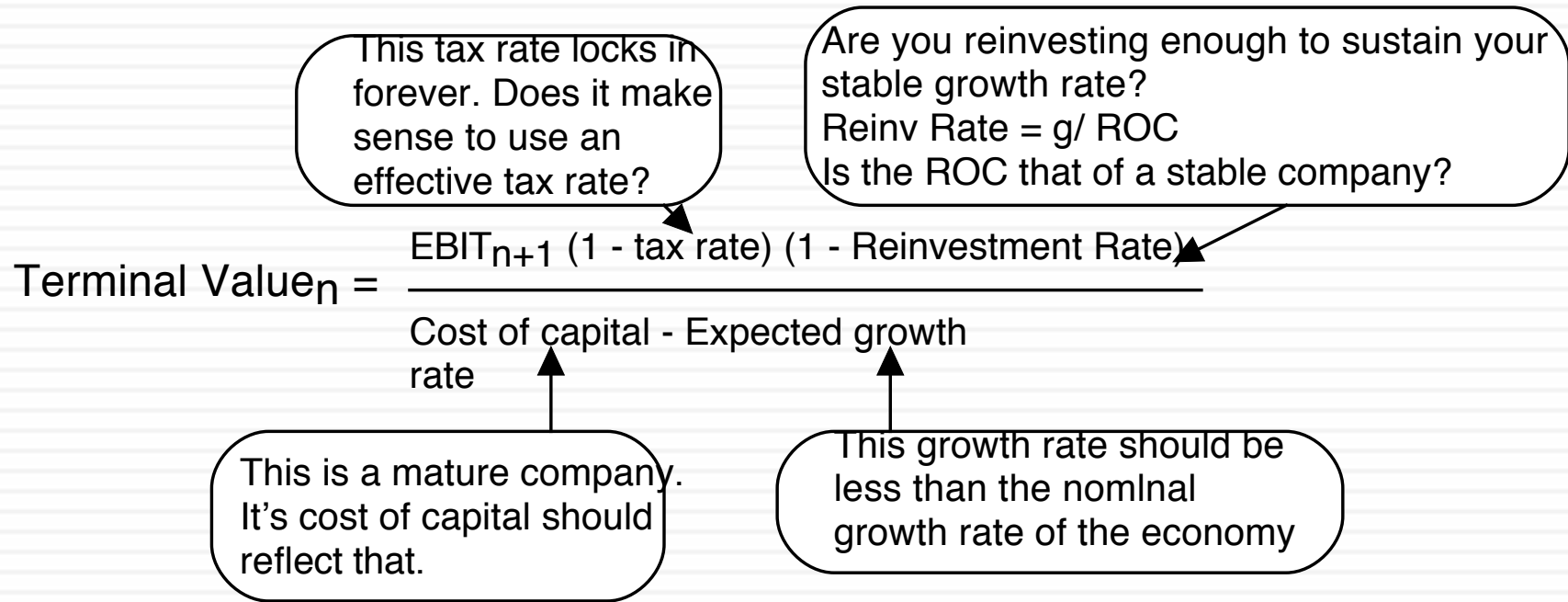2. Acquisition Debris (Goodwill)

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

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The Quality of Growth

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?
Reinv Rate = g/ ROC
Is the ROC that of a stable company?

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

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

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

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Terminal Value and Growth

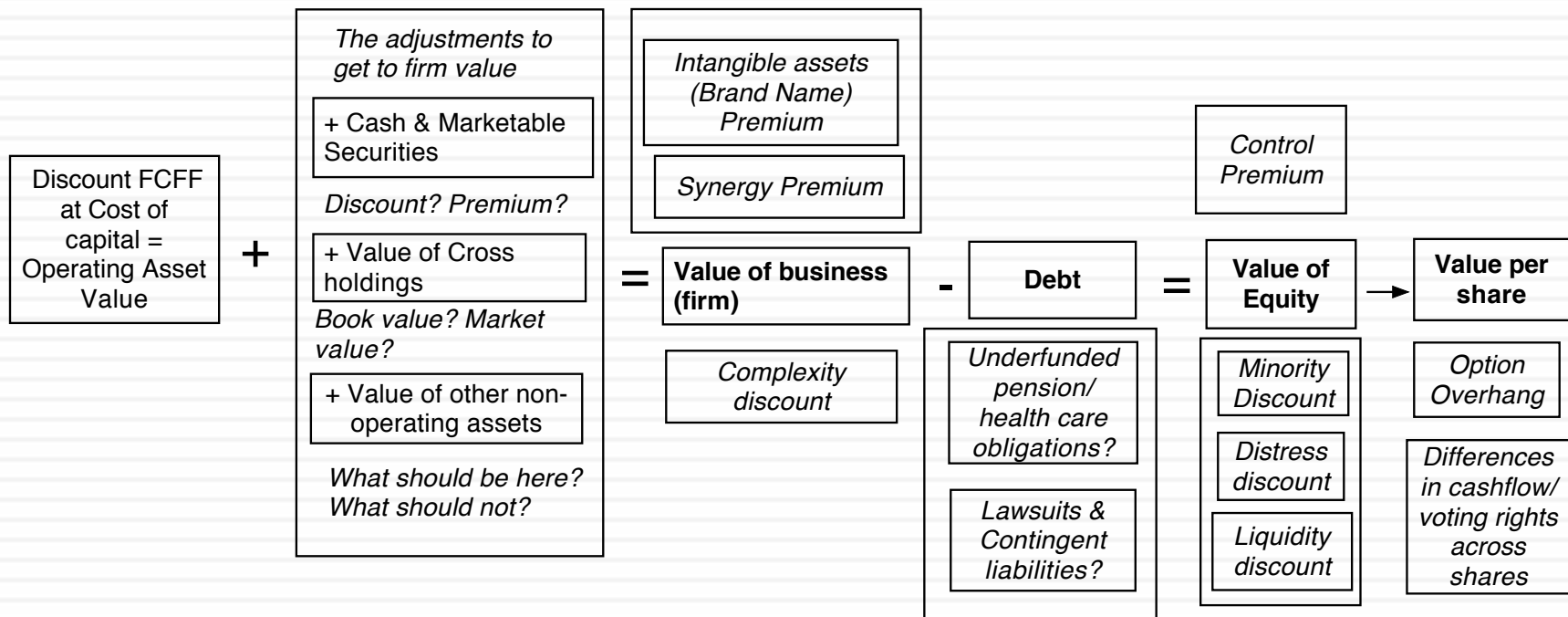| Stable growth rate	Amgen	Tata Motors
0%	$150,652	435,686₹
1%	$154,479	435,686₹
2%	$160,194	435,686₹
3%	$167,784	435,686₹
4%	$179,099	435,686₹
5%		435,686₹
Riskfree rate	4.78%	5%
ROIC	10%	10.39%
Cost of capital	8.08%	10.39%

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THE LOOSE ENDS IN VALUATION…

Aswath Damodaran

Getting from DCF to value per share: The Loose Ends

The adjustments to get to firm value

+ Cash & Marketable Securities

Discount? Premium?

+ Value of Cross holdings

Book value? Market value?

+ Value of other non-operating assets

What should be here? What should not?

Intangible assets (Brand Name) Premium

Synergy Premium

Discount FCFF at Cost of capital = Operating Asset Value

+

= Value of business (firm)

Complexity discount

- Debt

Underfunded pension/ health care obligations?

Lawsuits & Contingent liabilities?

Control Premium

= Value of Equity

Minority Discount

Distress discount

Liquidity discount

→ **Value per share**

Option Overhang

Differences in cashflow/ voting rights across shares

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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?

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Cash: Discount or Premium?

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

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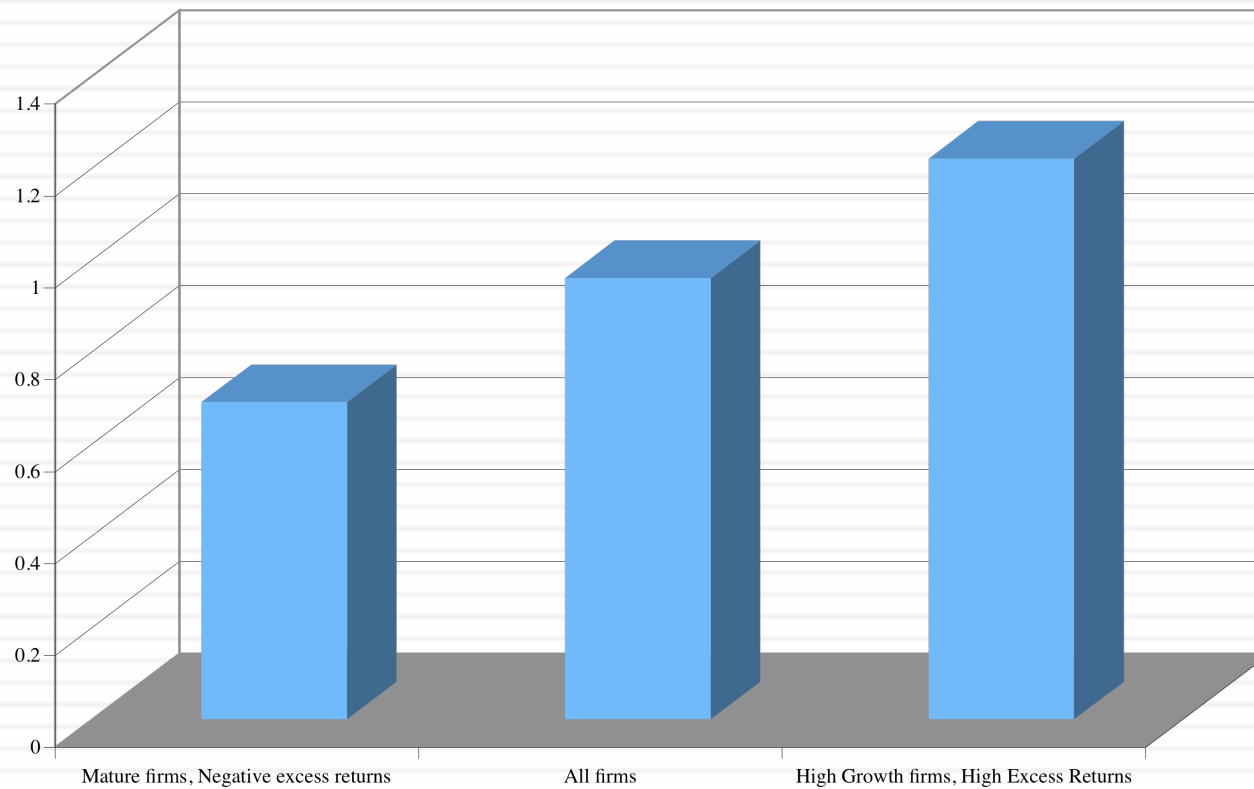
2. Dealing with Holdings in Other firms

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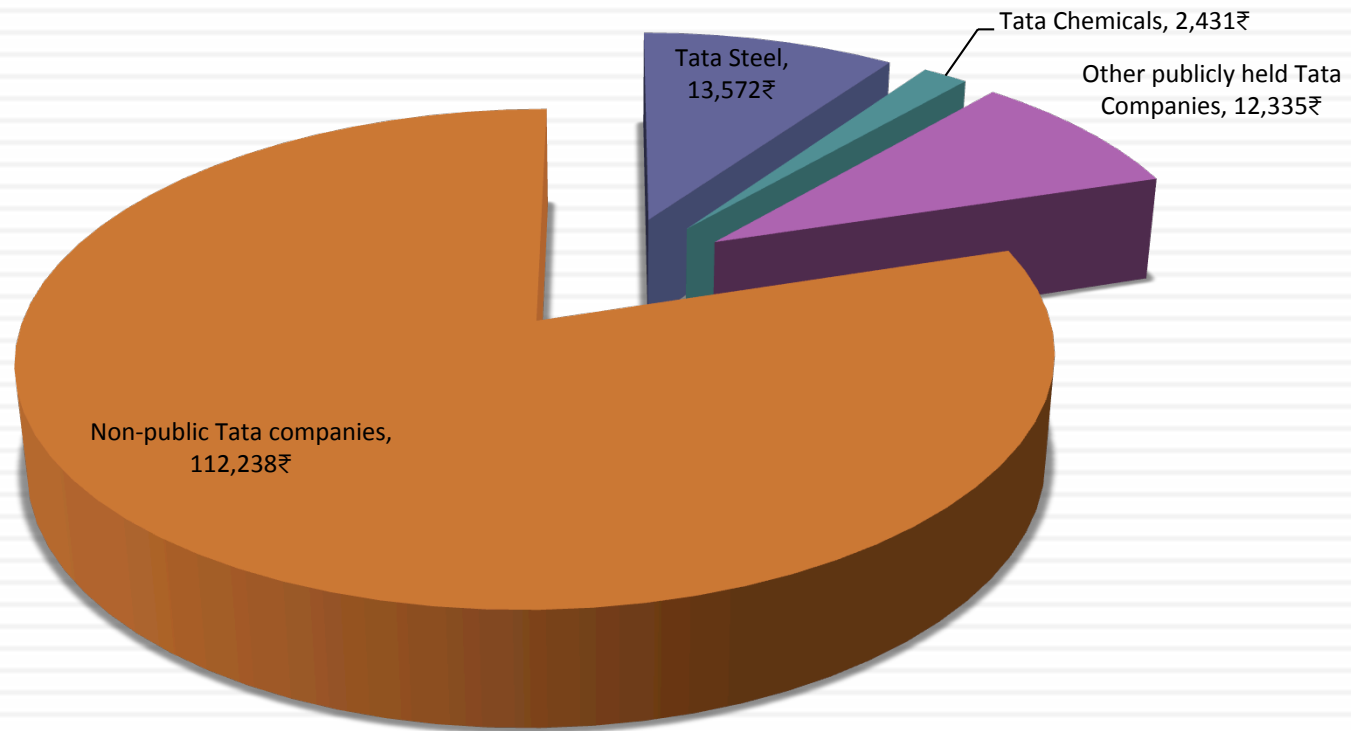
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How to value holdings in other firms.. In a perfect world..

□ 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 estimate cash flows and discount rates.

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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

Tata Chemicals, 2,431₹

Tata Steel, 13,572₹

Other publicly held Tata Companies, 12,335₹

Non-public Tata companies, 112,238₹

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

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

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4. Brand name, great management, superb product …Don't double count!

- There is often a temptation to add on premiums for intangibles. Here are a few examples.
    - 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.
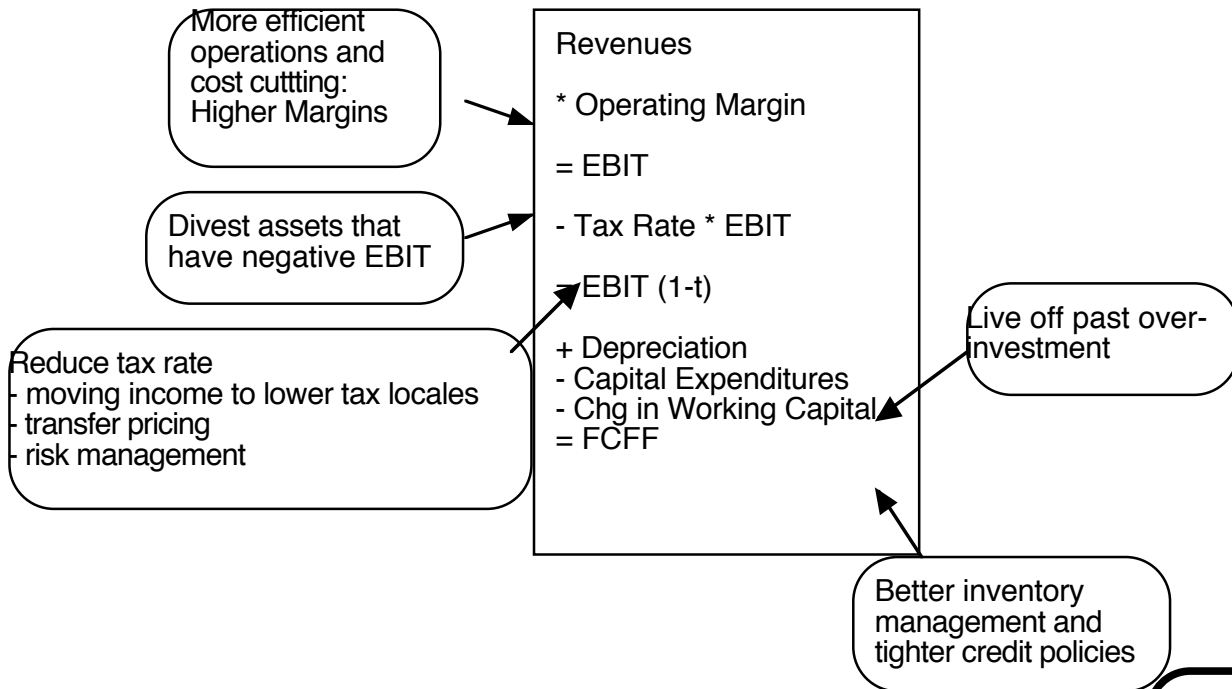
Valuing Brand Name

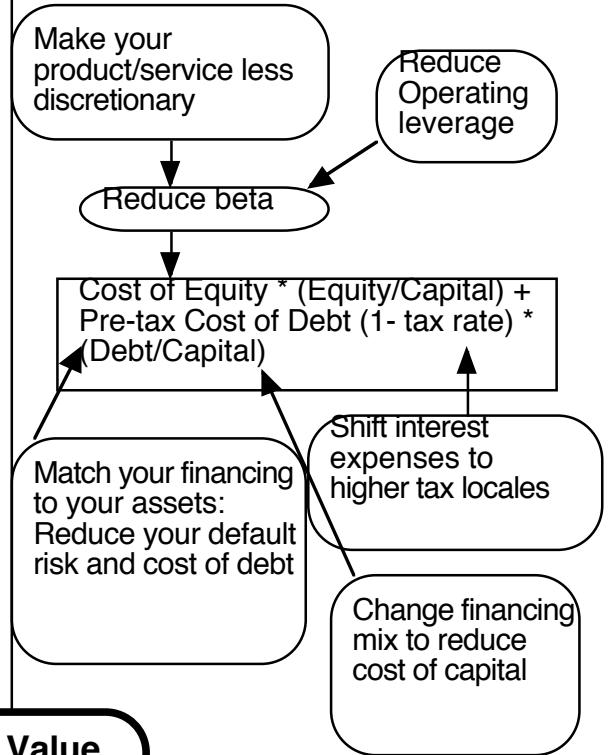|	Coca Cola	With Cott Margins
Current Revenues =	$21,962.00	$21,962.00
Length of high-growth period	10	10
Reinvestment Rate =	50%	50%
Operating Margin (after-tax)	15.57%	5.28%
Sales/Capital (Turnover ratio)	1.34	1.34
Return on capital (after-tax)	20.84%	7.06%
Growth rate during period (g) =	10.42%	3.53%
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

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5. The Value of Control: It's not always worth 20%!!

- 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
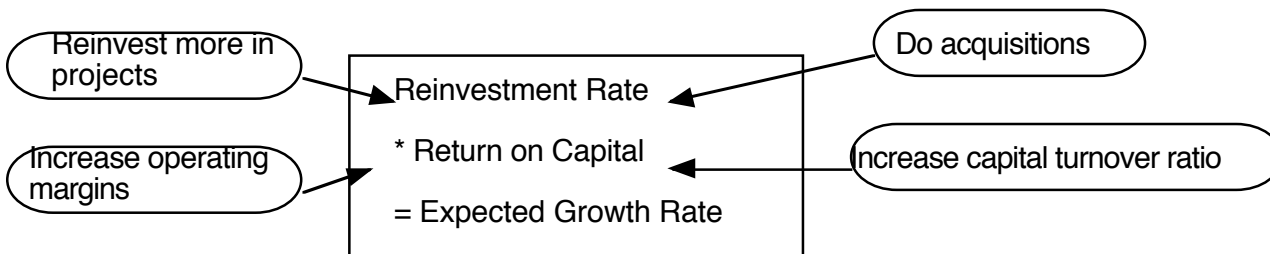
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More efficient operations and cost cuttting: Higher Margins

Make your product/service less discretionary

Reduce Operating leverage

Divest assets that have negative EBIT

Reduce beta

Revenues

* Operating Margin

= EBIT

- Tax Rate * EBIT

EBIT (1-t)

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

Live off past over-investment

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

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

Shift interest expenses to higher tax locales

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

Better inventory management and tighter credit policies

Change financing mix to reduce cost of capital

Firm Value

Reinvest more in projects

Do acquisitions

Reinvestment Rate

* Return on Capital

= Expected Growth Rate

Increase operating margins

Increase capital turnover ratio

Build on existing competitive advantages

Create new competitive advantages

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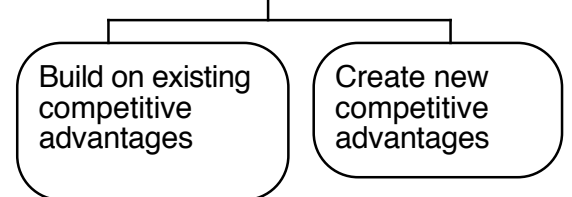
Adris Grupa (Status Quo): 4/2010

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%

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

Cost of Equity 10.70%

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

Weights
E = 97.4% D = 2.6%

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

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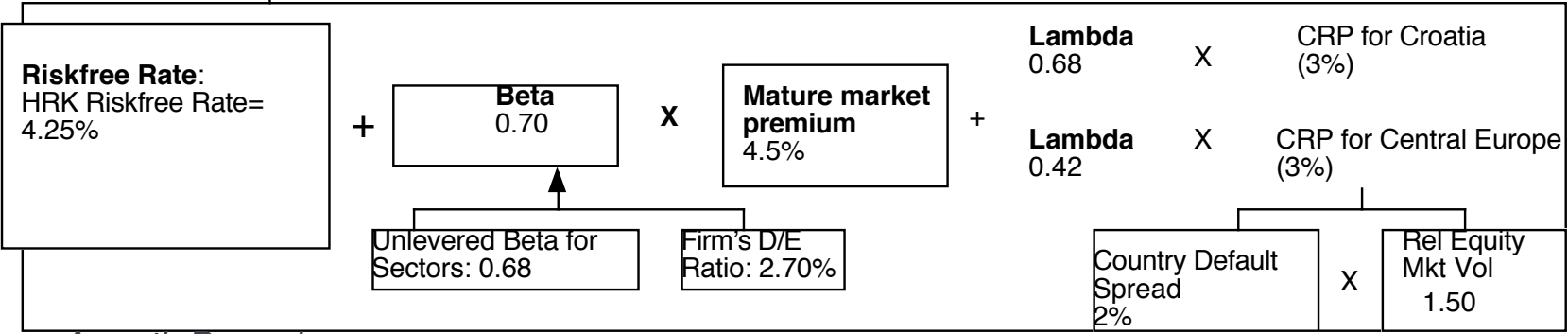
Adris Grupa: 4/2010 (Restructured)

Increased ROIC to cost of capital

Average from 2004-09
70.83%

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%

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

Year	1	2	3	4	5	
EBIT (1-t)	HRK 469	HRK 503	HRK 541	HRK 581	HRK 623	628
- Reinvestment	HRK 332	HRK 356	HRK 383	HRK 411	HRK 442	246
FCFF	HRK 137	HRK 147	HRK 158	HRK 169	HRK 182	367

Op. Assets	4545
+ Cash:	1787
- Debt	141
- Minority int	465
=Equity	5,735
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

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Value of Control and the Value of Voting Rights

- Adris Grupa has two classes of shares outstanding: 9.616 million voting shares and 6.748 million non-voting shares.

- To value a non-voting share, we assume that all non-voting shares essentially have to settle for status quo value. All shareholders, common and preferred, get an equal share of the status quo value.

    Status Quo Value of Equity = 5,484 million HKR

    Value for a non-voting share = 5484/(9.616+6.748) = 334 HKR/share

- To value a voting share, we first value control in Adris Grup as the difference between the optimal and the status quo value:

    Value of control at Adris Grupa = 5,735 – 5484 = 249 million HKR

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

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THE DARK SIDE OF VALUATION: VALUING DIFFICULT-TO-VALUE COMPANIES
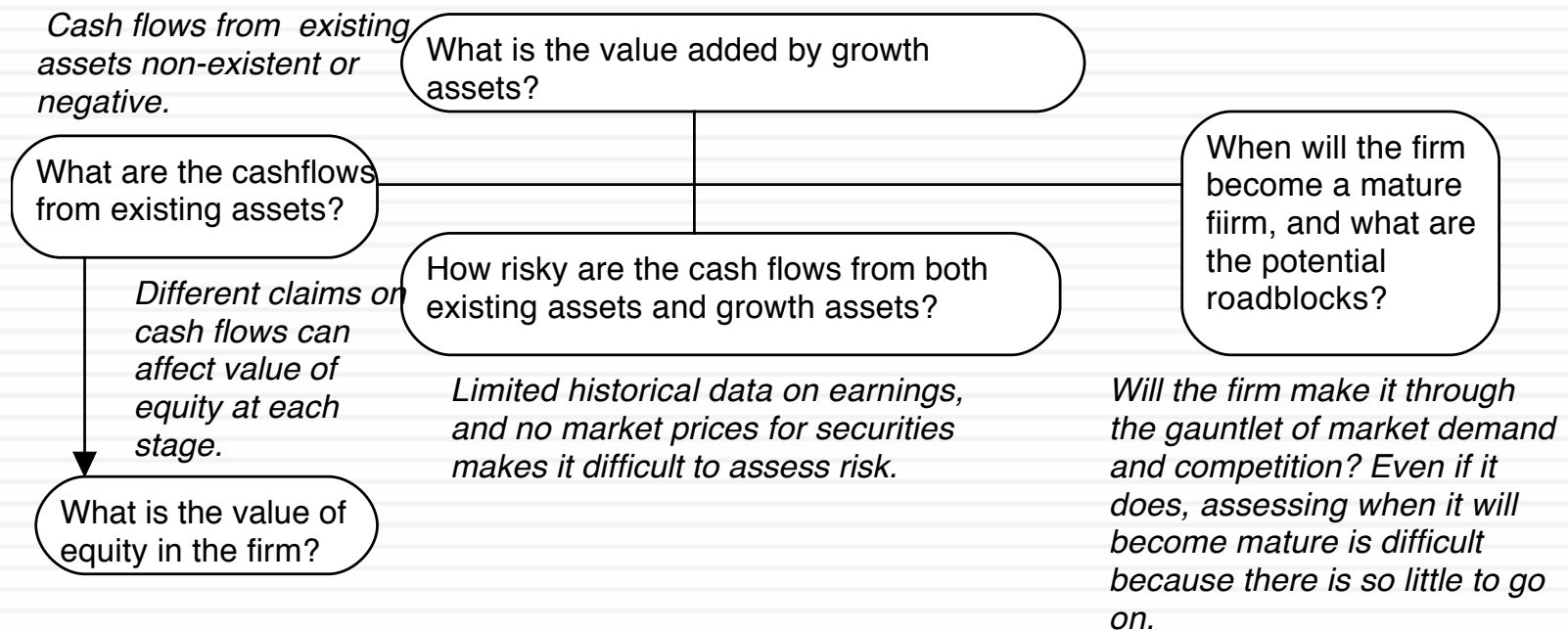
The Dark Side of Valuation…

- 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)

I. The challenge with young companies...

Figure 5.2: Estimation Issues - Young and Start-up 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.
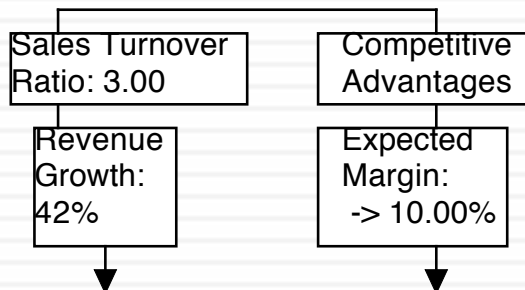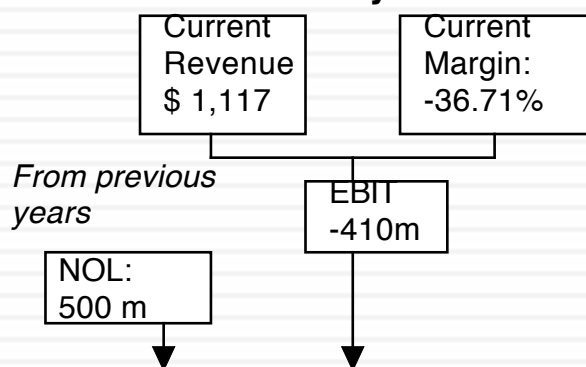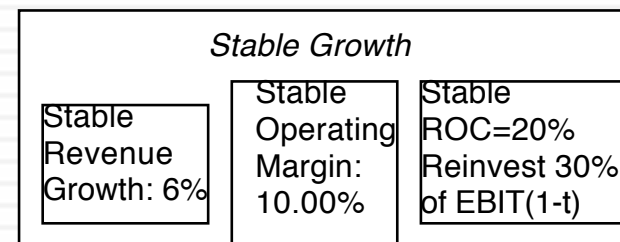
Cash flows from existing assets non-existent or negative.

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.

Will the firm 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.

What is the value of equity in the firm?

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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…

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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 $15,196
- 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.

Revenue Growth	150.00%	100.00%	75.00%	50.00%	30.00%	25.20%	20.40%	15.60%	10.80%	6.00%	Term. Year 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

	1	2	3	4	5	6	7	8	9	10
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%

Amazon was trading at $84 in January 2000.
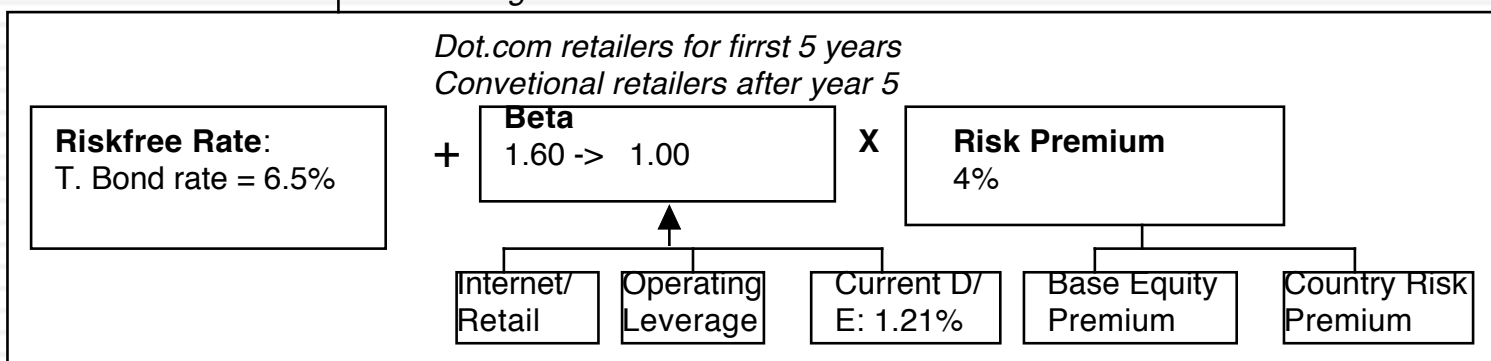
Cost of Equity 12.90%

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%

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

Starting numbers

	Last 10K	Trailing 12 month
Revenues	$316.93	$534.46
Operating income	-$77.06	-$134.91
Adjusted Operating Income		$7.67
Invested Capital		$955.00
Adjusted Operatng Margin		1.44%
Sales/ Invested Capital		0.56
Interest expenses	$2.49	$5.30

Revenue
Revenue growth of 51.5% a year for 5 years, tapering down to 2.5% in year 10

Pre-tax operating margin
Pre-tax operating margin increases to 25% over the next 10 years

Sales to capital ratio
Sales to capital ratio of **1.50** for incremental sales

Stable Growth
g = 2.5%; Beta = 1.00;
Cost of capital = 8%
ROC= **12**%;
Reinvestment Rate=2.5%/12% = 20.83%

Terminal Value$_{10}$= 1466/(.08-.025) = $26,657

	1	2	3	4	5	6	7	8	9	10
Revenues	$ 810	$1,227	$1,858	$2,816	$4,266	$6,044	$7,973	$9,734	$10,932	$11,205
Operating Income	$ 31	$ 75	$ 158	$ 306	$ 564	$ 941	$1,430	$1,975	$ 2,475	$ 2,801
Operating Income after tax	$ 31	$ 75	$ 158	$ 294	$ 395	$ 649	$ 969	$1,317	$ 1,624	$ 1,807
- Reinvestment	$ 183	$ 278	$ 421	$ 638	$ 967	$1,186	$1,285	$1,175	$ 798	$ 182
FCFF	$(153)	$ (203)	$ (263)	$ (344)	$ (572)	$ (537)	$ (316)	$ 143	$ 826	$ 1,625

Terminal year (11)
EBIT (1-t)	$ 1,852
- Reinvestment	$ 386
FCFF	$ 1,466

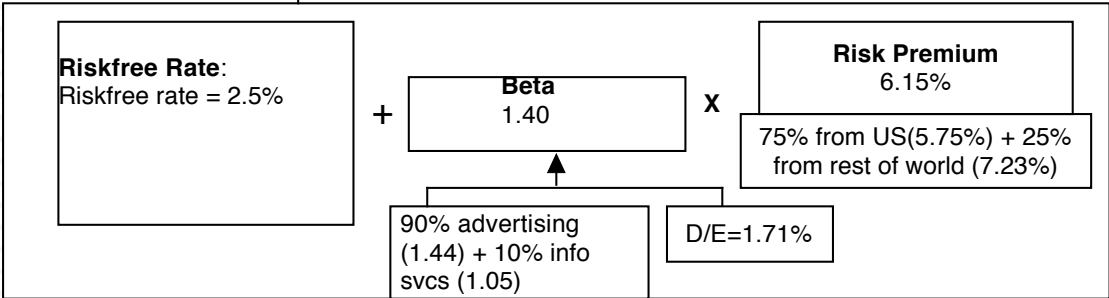| Operating assets	$9,705
+ Cash	321
+ IPO Proceeds	1295
- Debt	214
Value of equity	11,106
- Options	713
Value in stock	10,394
/ # of shares	582.46
Value/share	$17.84

Cost of capital = 11.12% (.981) + 5.16% (.019) = 11.01%

Cost of capital decreases to 8% from years 6-10

Cost of Equity
11.12%

Cost of Debt
(2.5%+5.5%)(1-.40)
= 5.16%

Weights
E = 98.1% D = 1.9%

Riskfree Rate:
Riskfree rate = 2.5%

+

Beta
1.40

X

Risk Premium
6.15%

75% from US(5.75%) + 25% from rest of world (7.23%)

90% advertising (1.44) + 10% info svcs (1.05)

D/E=1.71%

1. Less is more

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

Principle of parsimony: Estimate fewer inputs when faced with uncertainty.

Use "auto pilot" approaches to estimate future years

A tougher task at Twitter

	2011		2012		2013	
	%	$	%	$	%	$
Google	32.09%	$27.74	31.46%	$32.73	33.24%	$38.83
Facebook	3.65%	$3.15	4.11%	$4.28	5.04%	$5.89
Yahoo!	3.95%	$3.41	3.37%	$3.51	3.10%	$3.62
Microsoft	1.27%	$1.10	1.63%	$1.70	1.78%	$2.08
IAC	1.15%	$0.99	1.39%	$1.45	1.47%	$1.72
AOL	1.17%	$1.01	1.02%	$1.06	0.95%	$1.11
Amazon	0.48%	$0.41	0.59%	$0.61	0.71%	$0.83
Pandora	0.28%	$0.24	0.36%	$0.37	0.50%	$0.58
Twitter	0.16%	$0.14	0.28%	$0.29	0.50%	$0.58
Linkedin	0.18%	$0.16	0.25%	$0.26	0.32%	$0.37
Millennial Media	0.05%	$0.04	0.07%	$0.07	0.10%	$0.12
Other	55.59%	$48.05	55.47%	$57.71	52.29%	$61.09
Total Market	100%	$86.43	100.00%	$104.04	100.00%	$116.82

		Annual growth rate in Global Advertising Spending				
		2.00%	2.50%	3.00%	3.50%	4.00%
Online advertising share of market	20%	$124.78	$131.03	$137.56	$144.39	$151.52
	25%	$155.97	$163.79	$171.95	$180.49	$189.40
	30%	$187.16	$196.54	$206.34	$216.58	$227.28
	35%	$218.36	$229.30	$240.74	$252.68	$265.16
	40%	$249.55	$262.06	$275.13	$288.78	$303.04

My estimate for 2023: Overall market will be close to $200 billion and Twitter will about 5.7% ($11.5 billion)

Aswath Damodaran

Company	Operating Margin
Google Inc. (NasdaqGS:GOOG)	22.82%
Facebook, Inc. (NasdaqGS:FB)	29.99%
Yahoo! Inc. (NasdaqGS:YHOO)	13.79%
Netlfix	3.16%
Groupon	2.53%
LinkedIn Corporation (NYSE:LNKD)	5.18%
Pandora Media, Inc. (NYSE:P)	-9.13%
Yelp, Inc. (NYSE:YELP)	-6.19%
OpenTable, Inc. (NasdaqGS:OPEN)	24.90%
RetailMeNot	45.40%
Travelzoo Inc. (NasdaqGS:TZOO)	15.66%
Zillow, Inc. (NasdaqGS:Z)	-66.60%
Trulia, Inc. (NYSE:TRLA)	-6.79%
Aggregate	20.40%

My estimate for Twitter: Operating margin of 25% in year 10

2. Build in "internal" checks for reasonableness…

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%

Check total revenues, relative to the market that it serves… Your market share obviously cannot exceed 100% but there may be tighter constraints.

Are the margins and imputed returns on capital 'reasonable' in the outer years?

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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.

15% — (data point near year 1)

Margin by which revenue growth rate exceeds industry average

Post-I.P.O. growth

Median of new issues from 1965 to 2005

Number of years after coming to market: 1, 2, 3, 4, 5, 6
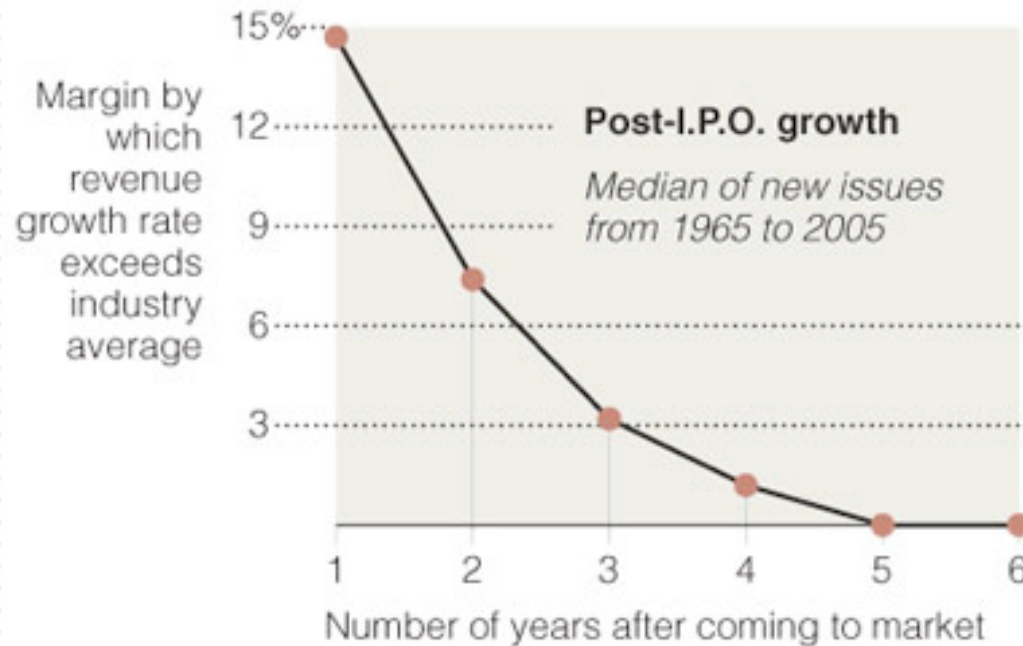
Source: Andrew Metrick   The New York Times

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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%
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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%

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

		Target pre-tax Operating Margin								
		6%		8%		10%		12%		14%
Compounded annual Revenue Growth rate	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

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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

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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).

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And the market is often "more wrong"....

Amazon: Value and Price

Aswath Damodaran
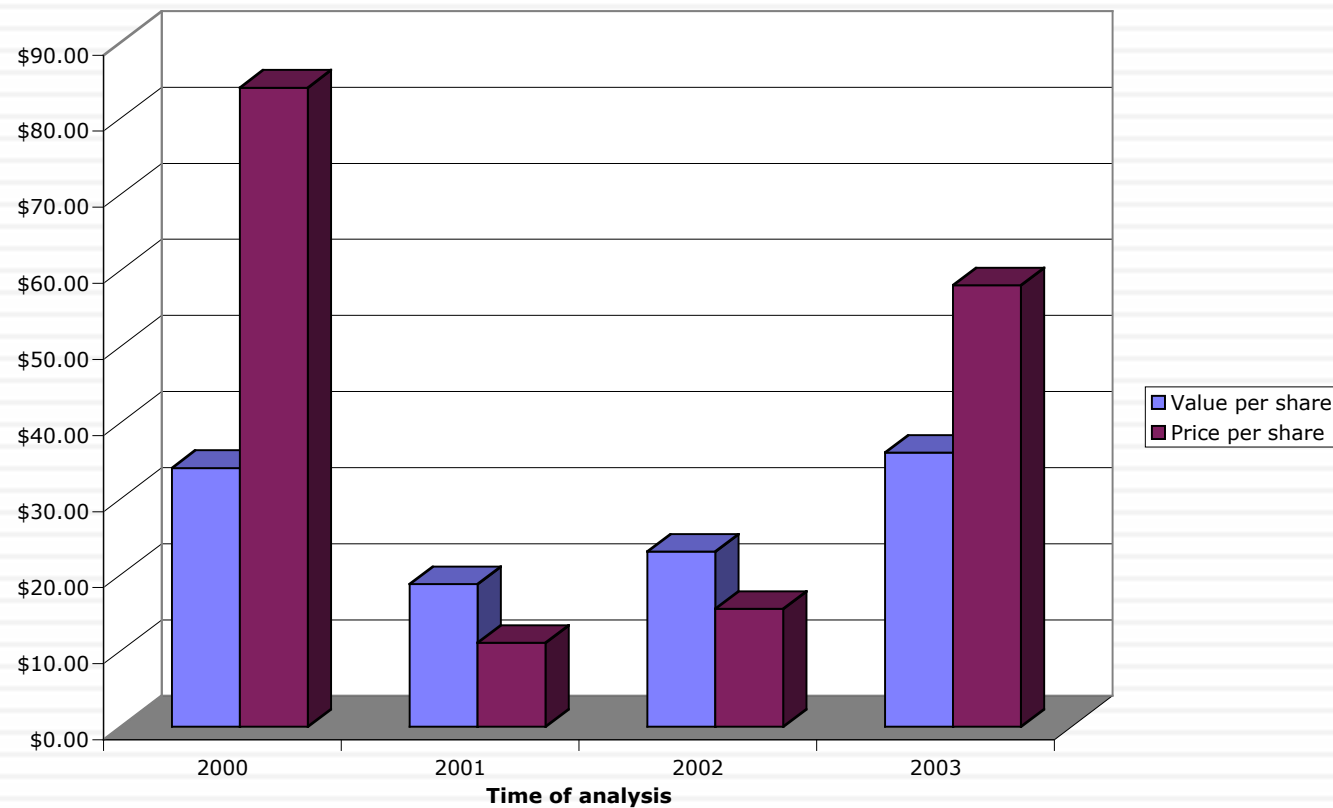
II. Dealing with decline and distress…

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.

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Current Revenue $ 4,390	Current Margin: 4.76%	Reinvestment: Capital expenditures include cost of new casinos and working capital		Stable Growth		

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

Stable Growth

- **Extended reinvestment break, due ot investment in past**
- **Industry average** → **Expected Margin: -> 17%**
- **Stable Revenue Growth: 3%**
- **Stable Operating Margin: 17%**
- **Stable ROC=10% Reinvest 30% of EBIT(1-t)**

EBIT $ 209m

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

	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

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

	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%

Forever

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%

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Casino 1.15	Current D/E: 277%	Base Equity Premium	Country Risk Premium

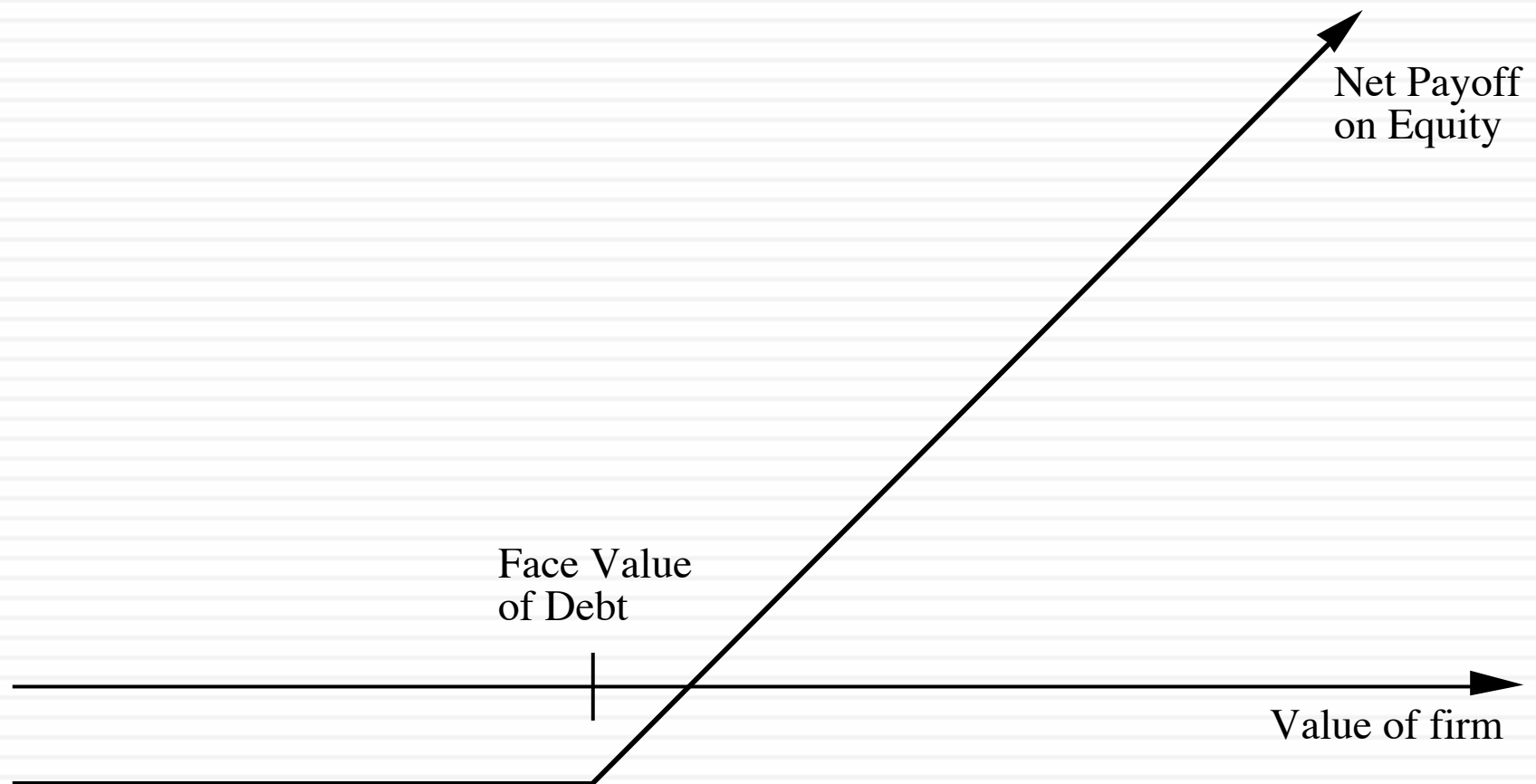**Las Vegas Sands Feburary 2009 Trading @ $4.25**

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

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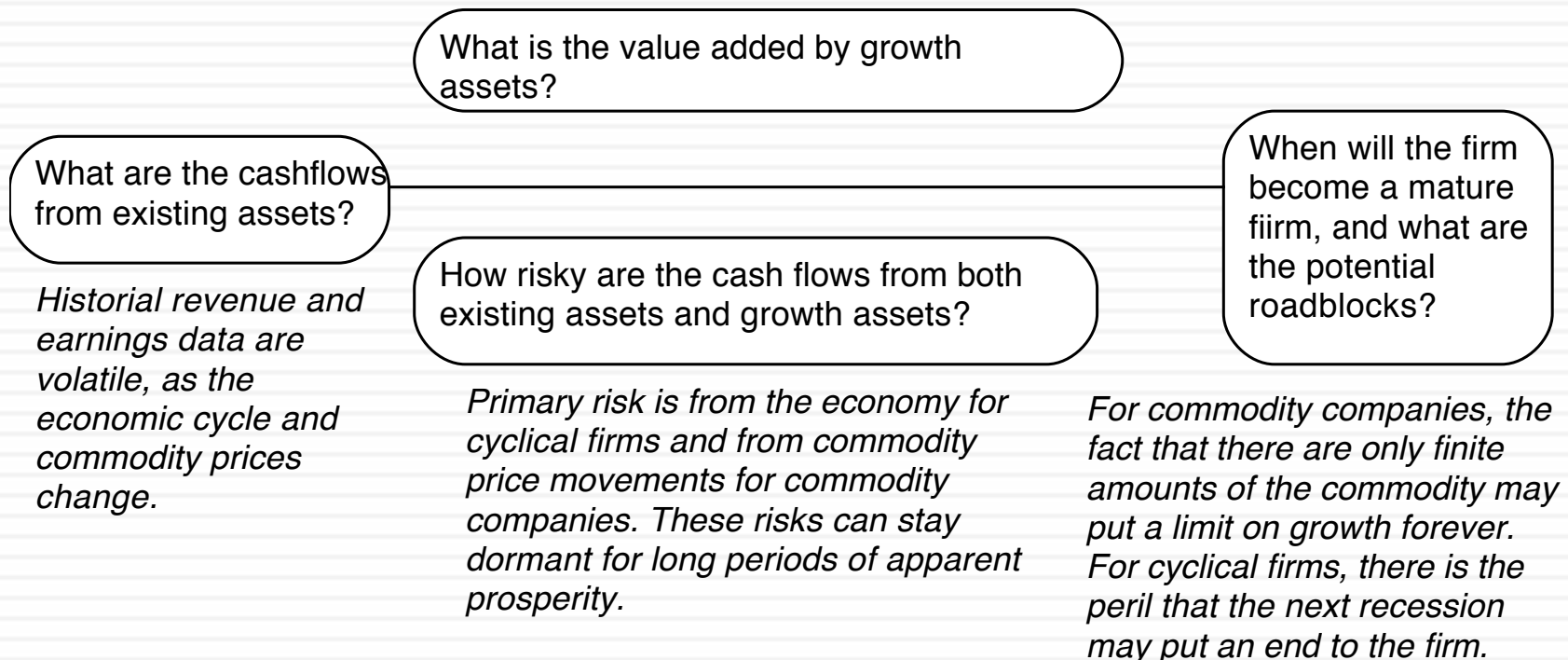# The "sunny" side of distress: Equity as a call option to liquidate the firm

Net Payoff
on Equity

Face Value
of Debt

Value of firm

Value Jet India as an Option

- The inputs
  - Value of the underlying asset = S = Value of the firm = Rs 6,164 crores (from a DCF valuation of the operating assets)
  - Exercise price = K = Face Value of outstanding debt = Rs 11430 crores (face value of the debt)
  - Life of the option = t = Life of zero-coupon debt = 4.5 year (average maturity of debt)
  - Variance in the value of the underlying asset = σ^2 = Variance in firm value = 0.2153 (average variance in firm value across airlines)
  - Riskless rate = r = Risk free rate over option live= 8% (Rupee risk free rate)
- The output
  - The Black-Scholes model provides the following value for the call:
    - d1 = 0.2308   N(d1) = 0.5913
    - d2 = -0.7535   N(d2) = 0.2256
  - Value of the call = Rs 1,846 1 crores
  - Probability of default = 1- 0.2256 = 77.44%

Aswath Damodaran

III. 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?

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

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

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

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 (Estin	¥22,661,325	¥267,904	¥1,310,304	1.18%
		¥1,306,867		7.33%

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.

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
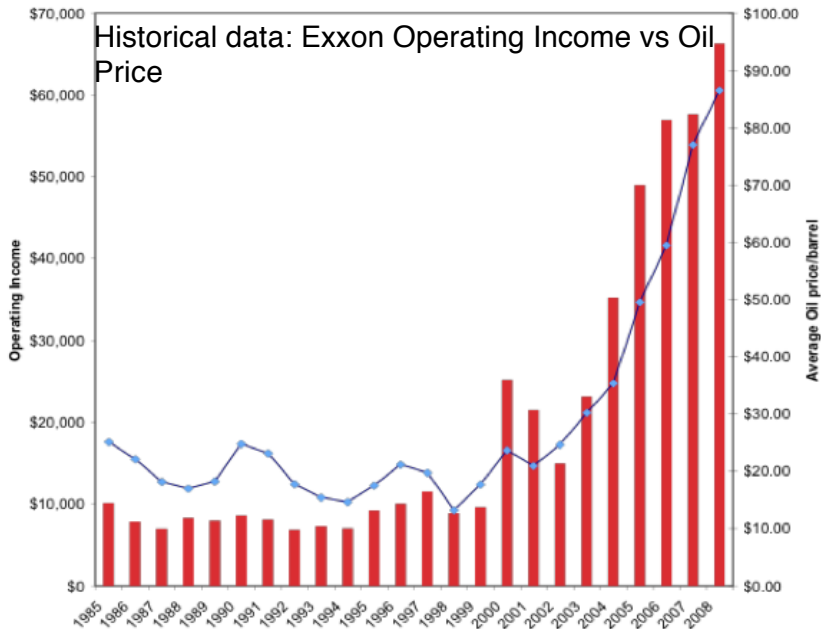
Regressing Exxon's operating income against the oil price per barrel from 1985-2008:

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% (.9745) + 3.75% (1-.38) (.0285) = 8.18%.

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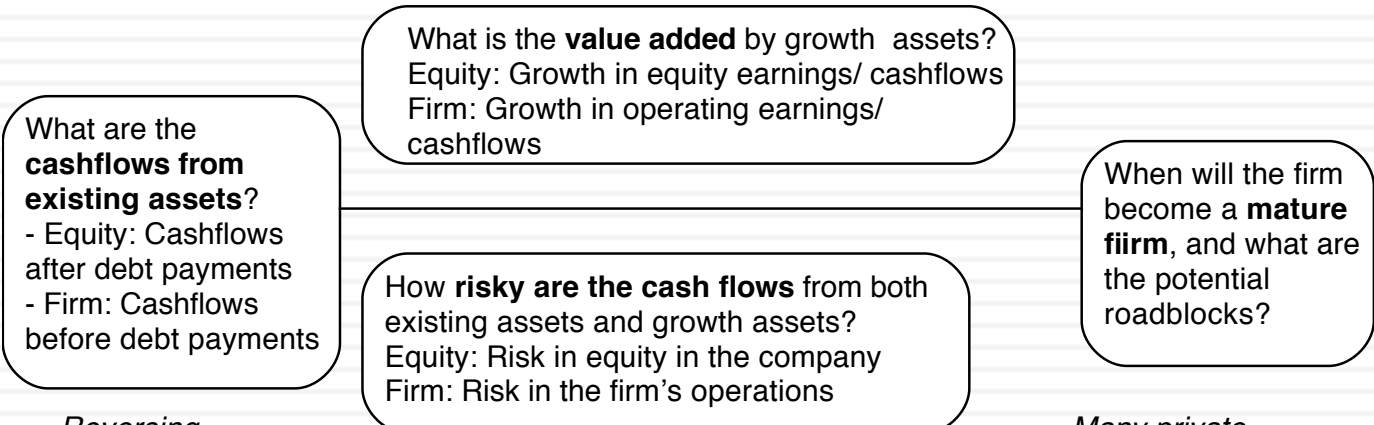

Expected growth in operating income (3)
Since Exxon Mobile is the largest oil company in the world, we will assume an expected growth of only 2% in perpetuity.

Exxon Mobil Valuation: Simulation

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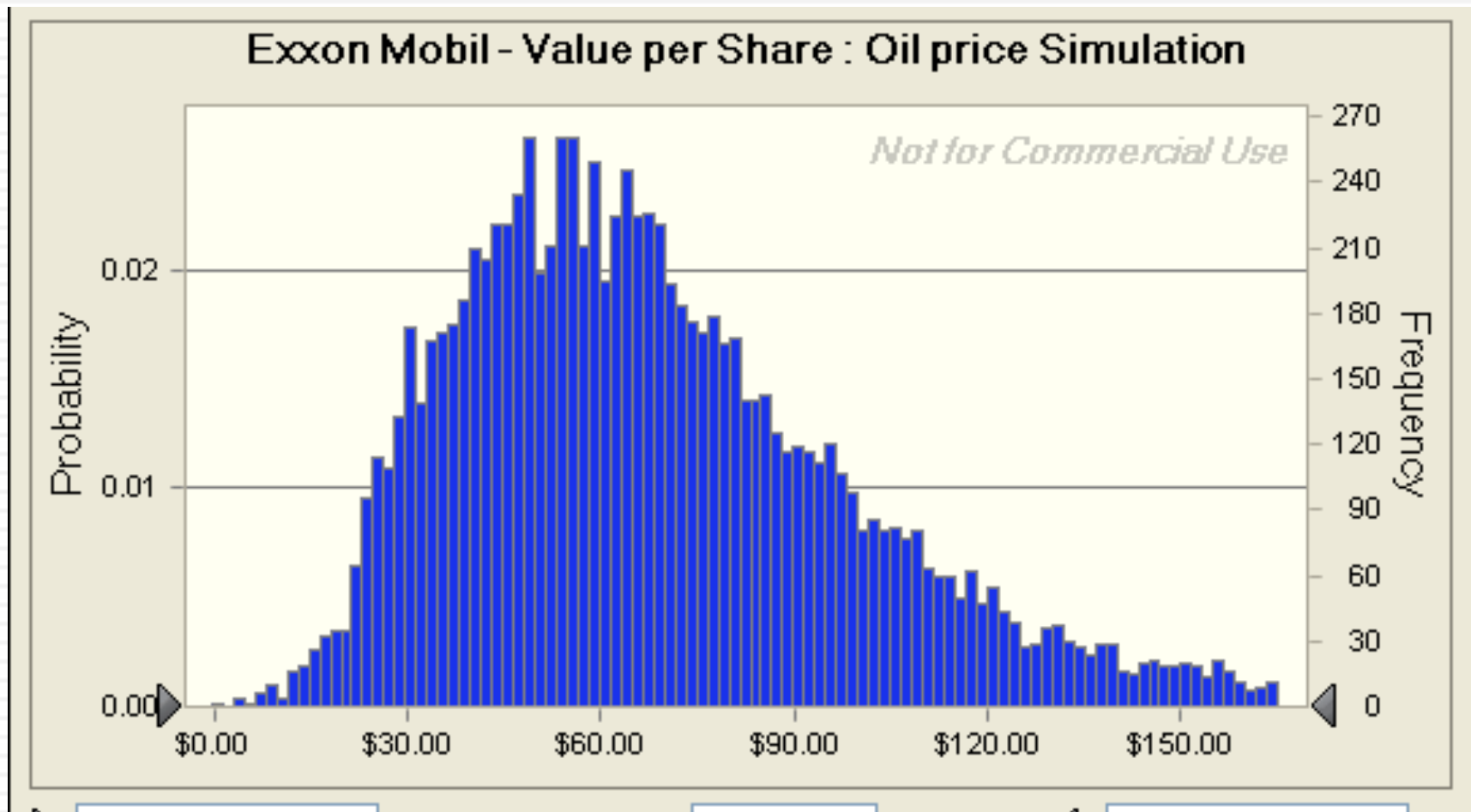
IV. Valuing Companies across the ownership cycle

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

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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%

Return on Capital
13.64%

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

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)

+

Total Beta
2.94

1/3 of risk is
market risk

Adjusted for owner
non-diversification

X

Risk Premium
4.00%

Market Beta: 0.98

Mature risk
premium
4%

Country Risk
Premium
0%

Aswath Damodaran Unlevered Beta for
Sectors: 0.78

Firm's D/E
Ratio: 30/70

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%

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RELATIVE VALUATION

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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.

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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

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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.

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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.

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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: EPS in most recent financial year

EPS in trailing 12 months (Trailing PE)

Forecasted EPSnnext year (Forward PE)

Forecasted EPS in future year

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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?

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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?

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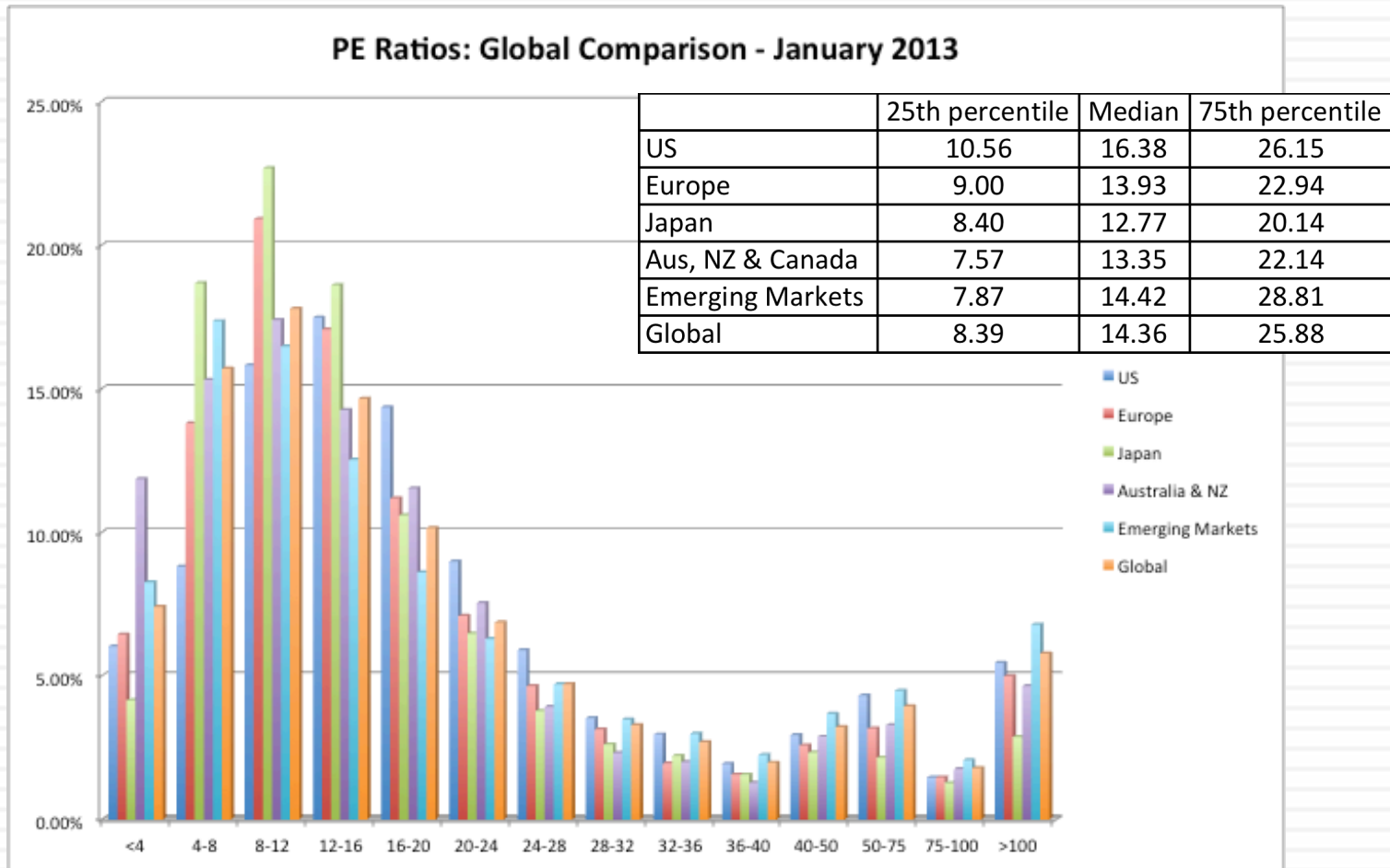
1. Multiples have skewed distributions...

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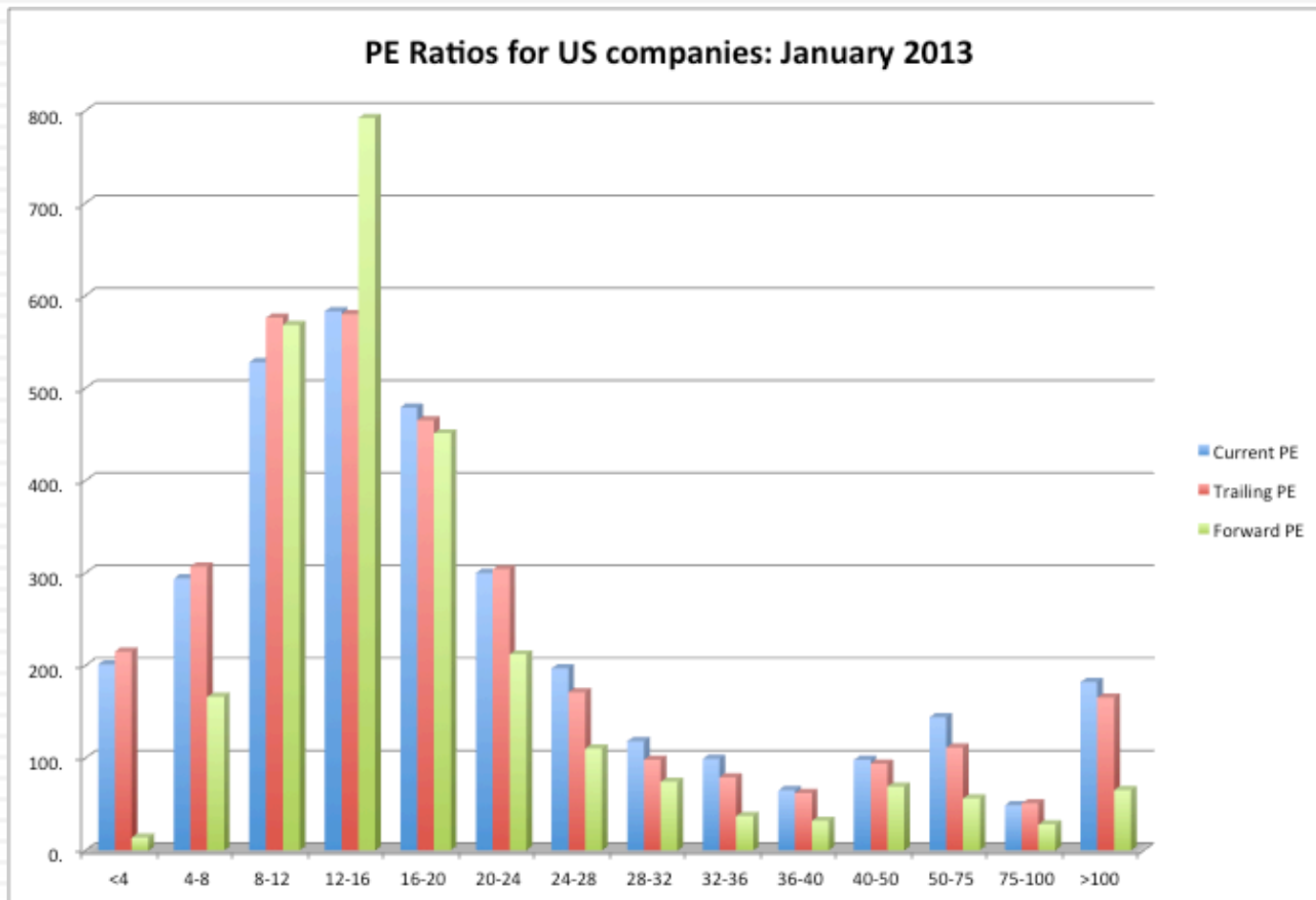
2. Making statistics "dicey"

	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

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3. Markets have a lot in common
PE Ratios: Global comparison – 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

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4. Simplistic rules almost always break down...6 times EBITDA may not be cheap...

EV Multiples: January 2010

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Or it may be…

EV/EBITDA Multiples: US companies in January 2013

25th percentile	6.08
Median	9.11
75th percentile	14.17

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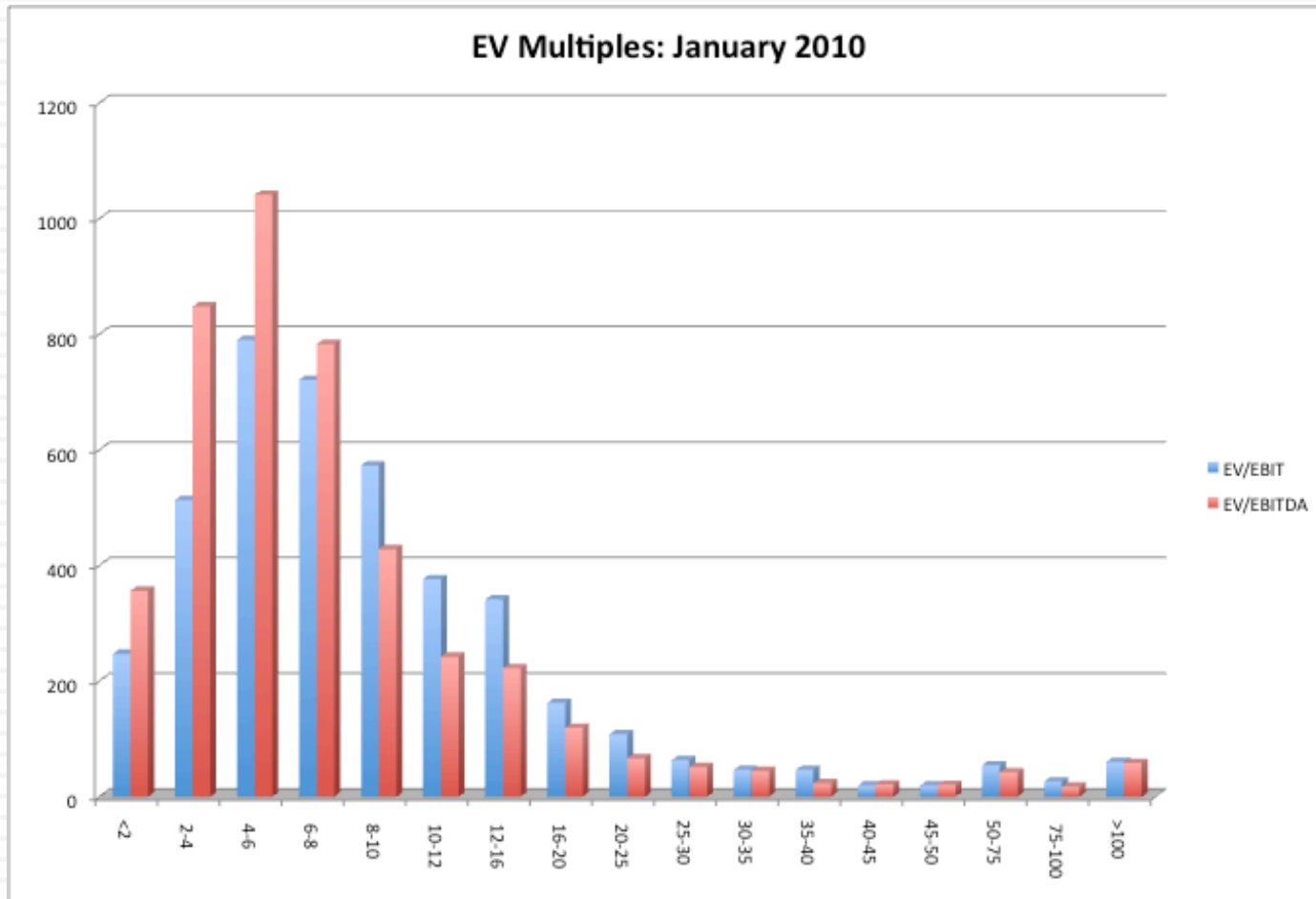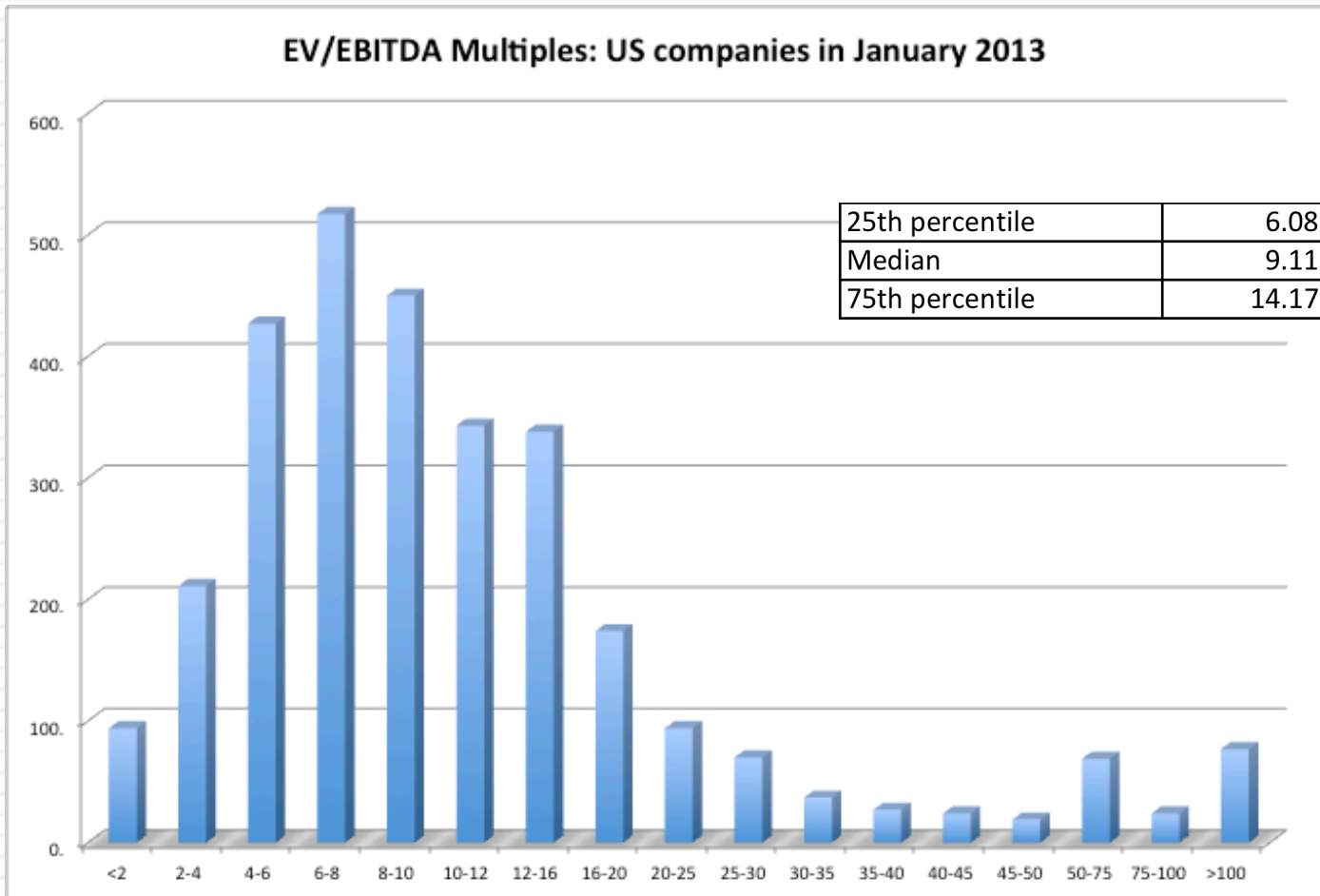
Analytical Tests

- □ 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,

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

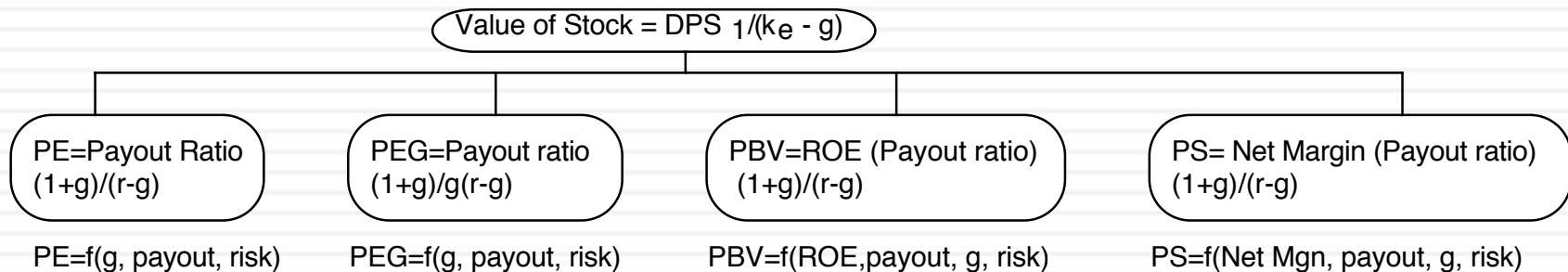- Dividing both sides by the current earnings per share,

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

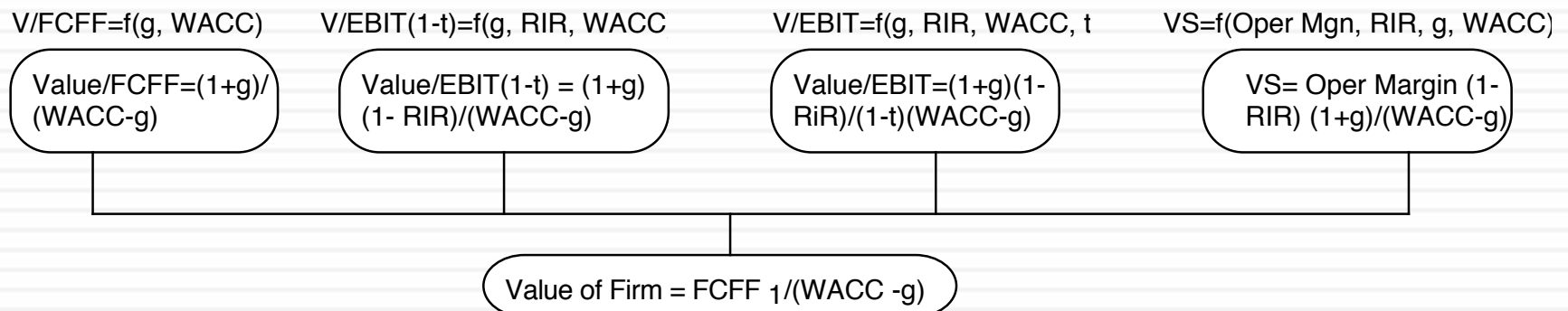- If this had been a FCFE Model,

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

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

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The Determinants of Multiples…

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) |

Value of Firm = $FCFF_1/(WACC - g)$

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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.

An Example: 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

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PE, Growth and Risk

☐ Dependent variable is: PE

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

Variable	Coefficient	SE	t-ratio	Probability
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		

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PE regressions across markets…

Region	Regression – January 2013	R squared
Europe	PE = 11.39 + 50.75 Expected Growth in EPS for next 5 years + 8.53 Payout – 2.77 Beta	31.9%
Japan	PE = 8.29 + 31.39 Expected Growth in EPS for next 5 years + 17.98 Payout	44.9%
Emerging Markets	PE = 15.22 + 43.52 Expected Growth in EPS for next 5 years + 2.01 Payout – 3.67 Beta	32.9%

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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

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A closing thought…