The Dark Side of Valuation:
Bias, Uncertainty and Complexity

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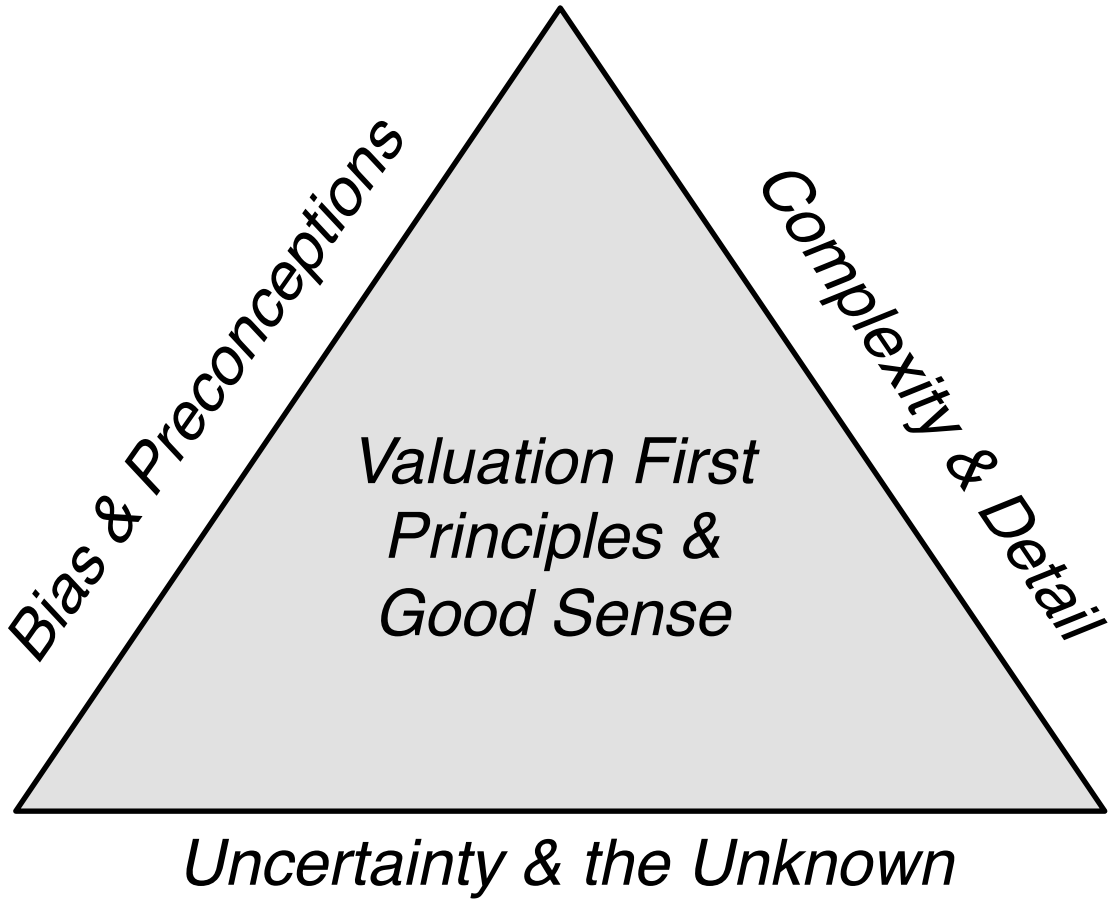
The Bermuda Triangle of Valuation



I. Valuation Bias

- Preconceptions and priors: When you start on the valuation of a company, you almost never start with a blank slate. Instead, your valuation is shaped by your prior views of the company in question.
  - Corollary 1: The more you know about a company, the more likely it is that you will be biased, when valuing the company.
  - Corollary 2: The "closer" you get to the management/owners of a company, the more biased your valuation of the company will become.
- Value first, valuation to follow: In principle, you should do your valuation first before you decide how much to pay for an asset. In practice, people often decide what to pay and do the valuation afterwards.

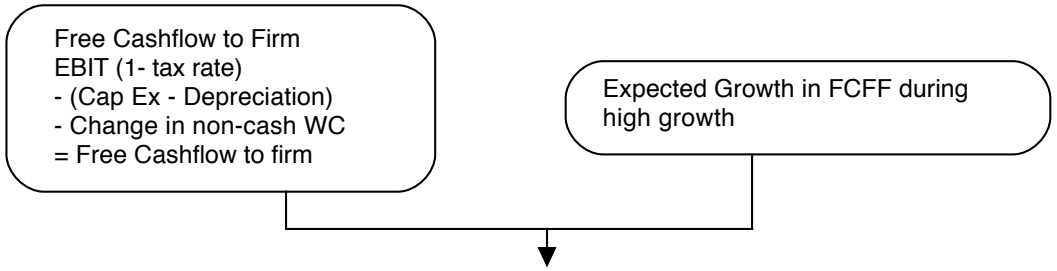
Sources of bias

- The power of the subconscious: We are human, after all, and as a consequence are susceptible to
  - Herd behavior: For instance, there is the "market price" magnet in valuation, where estimates of intrinsic value move towards the market price with each iteration.
  - Hindsight bias: If you know the outcome of a sequence of events, it will affect your valuation. (That is why teaching valuation with cases is an exercise in futility)
- The power of suggestion: Hearing what others think a company is worth will color your thinking, and if you view those others as more informed/smarter than you are, you will be influenced even more.
- The power of money: If you have an economic stake in the outcome of a valuation, bias will almost always follow.
  - Corollary 1: Your bias in a valuation will be directly proportional to who pays you to do the valuation and how much you get paid.
  - Corollary 2: You will be more biased when valuing a company where you already have a position (long or short) in the company.

Biasing a DCF valuation: A template of "tricks"

If you want higher (lower) value, you can
1. Augment (haircut) earnings
2. Reduce(increase) effective tax rate
3. Ignore (Count in) unconventional cap ex
4. Narrow (Broaden) definition of working capital

If you want to increase (decrease) value, you can
1. Use higher (lower) growth rates
2. Assume less (more) reinvestment with the same growth rate, thus raising (lowering) the quality and value of growth.



If you want to increase (decrease) value, you can
1. Assume a longer (shorter) growth period
2. Assume more (less) excess returns over the growth period

Length of high growth period: PV of FCFF during high

Value of Operating Assets today
+ Cash & non-operating assets
- Debt
Value of equity

If you want to increase (decrease) value, you can add (subtract) premiums (discounts) for things you like (dislike) about the company.
Premiums: Control, Synergy, liquidity
Discounts: Illiquidity, private company

Stable Growth
When operating income and FCFF grow at constant rate forever.

If you want to increase value, you can
1. Use stable growth rates that are economically impossible (higher than the growth rate of the economy)
2. Allow this growth to be accompanied by high positive excess returns (low reinvestment)
If you want to decrease value, you can
1. Use lower growth rates in perpetuity
2. Accompany this growth with high negative excess returns

Cost of Capital
Weighted average of cost of equity & cost of debt

If you want to increase (decrease) value, you can
1. Assume a higher (lower) debt ratio, with the same costs of debt & equity. You may be able to accomplish this by using book (market) value debt ratios.
2. Use a lower (higher) equity risk premium for equity and a lower (higher) default spread for debt.
3. Find a "lower" ("higher") beta for your stock.
4. Don't add (add) other premiums to the cost of equity (small cap?)

Facebook IPO: May 17, 2012

	This year	*Last year*
Revenues	$ 3,711.00	$ 1,974.00
Operating inco	$1,695.00	$ 1,032.00
Invested Capi	$ 4,216.11	$ 694.00
Tax rate	40.00%	
Operating ma	45.68%	
Return on cap	146.54%	
Sales/Capital	88.02%	

Revenue growth of 40% a year for 5 years, tapering down to 2% in year 10

Pre-tax operating margin declines to 35% in year 10

Sales to capital ratio of 1.50 for incremental sales

Stable Growth
g = 2%; Beta = 1.00;
Cost of capital = 8%
ROC= 12%;
Reinvestment Rate=2%/12% = 16.67%

Terminal Value$_{10}$= 7,713/(.08-.02) = 128,546

Year	1	2	3	4	5	6	7	8	9	10
Revenues	$5,195	$7,274	$10,183	$14,256	$19,959	$26,425	$32,979	$38,651	$42,362	$43,209
Operating margin	44.61%	43.54%	42.47%	41.41%	40.34%	39.27%	38.20%	37.14%	36.07%	35.00%
EBIT	$2,318	$3,167	$ 4,325	$ 5,903	$ 8,051	$10,377	$12,599	$14,353	$15,279	$15,123
EBIT (1-t)	$1,391	$1,900	$ 2,595	$ 3,542	$ 4,830	$ 6,226	$ 7,559	$ 8,612	$ 9,167	$ 9,074
- Reinvestment	$ 990	$1,385	$ 1,940	$ 2,715	$ 3,802	$ 4,311	$ 4,369	$ 3,782	$ 2,474	$ 565
FCFF	$ 401	$ 515	$ 655	$ 826	$ 1,029	$ 1,915	$ 3,190	$ 4,830	$ 6,694	$ 8,509

Term yr	
EBIT (1-t)	9255
- Reinv	1543
FCFF	7713

Operating assets	62,053
+ Cash	1,512
- Debt	1,219
Value of equity	62,350
- Options	3,088
Value in stock	59,262
Value/share	$25.39

Cost of capital = 11.19% (.988) + 1.59% (.012) = 11.07%

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

Cost of Equity
11.19%

Cost of Debt
(2%+0.65%)(1-.40)
= 1.59%

Weights
E = 98.8% D = 1.2%

At 4.00 pm, May 17, the offering was priced at $38/share

Riskfree Rate:
Riskfree rate = 2%

+

Beta
1.53

x

Risk Premium
6%

Unlevered Beta for Sectors: 1.52

D/E=1.21%

Bias Up: Facebook IPO: May 17, 2012

	This year	*Last year*
Revenues	$ 3,711.00	$ 1,974.00
Operating inco	$1,695.00	$ 1,032.00
Invested Capi	$ 4,216.11	$ 694.00
Tax rate	40.00%	
Operating mar	45.68%	
Return on cap	146.54%	
Sales/Capital	88.02%	

Revenue growth of 40% a year for 5 years, tapering down to 2% in year 10

Pre-tax operating margin stays at **45.68%**

Sales to capital ratio of **3.00** for incremental sales

Stable Growth
g = 2%; Beta = 1.00;
Cost of capital = 8%
ROC= **20**%;
Reinvestment Rate=2%/20% = 10%

Terminal Value$_{10}$= 10,870/(.08-.02) = 181,173

Year	1	2	3	4	5	6	7	8	9	10
Revenues	$5,195	$7,274	$10,183	$14,256	$19,959	$26,425	$32,979	$38,651	$42,362	$43,209
Operating margin	45.68%	45.68%	45.68%	45.68%	45.68%	45.68%	45.68%	45.68%	45.68%	45.68%
EBIT	$2,373	$3,322	$ 4,651	$ 6,512	$ 9,116	$12,070	$15,063	$17,654	$19,349	$19,736
EBIT (1-t)	$1,424	$1,993	$ 2,791	$ 3,907	$ 5,470	$ 7,242	$ 9,038	$10,592	$11,609	$11,841
- Reinvestment	$ 495	$ 693	$ 970	$ 1,358	$ 1,901	$ 2,156	$ 2,184	$ 1,891	$ 1,237	$ 282
FCFF	$ 929	$1,301	$ 1,821	$ 2,549	$ 3,569	$ 5,086	$ 6,853	$ 8,702	$10,372	$11,559

Term yr	
EBIT (1-t)	12078
- Reinv	1208
FCFF	10870

Operating assets	94,564
+ Cash	1,512
- Debt	1,219
Value of equity	94,861
- Options	3,088
Value in stock	91,772
Value/share	$39.32

Cost of capital = 11.19% (.988) + 1.59% (.012) = 11.07%

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

Cost of Equity
11.19%

Cost of Debt
(2%+0.65%)(1-.40)
= 1.59%

Weights
E = 98.8% D = 1.2%

At 4.00 pm, May 17, the offering was priced at $38/share

Riskfree Rate:
Riskfree rate = 2%

+

Beta
1.53

x

Risk Premium
6%

Unlevered Beta for Sectors: 1.52

D/E=1.21%

Bias Down: Facebook IPO: May 17, 2012

	This year	*Last year*
Revenues	$ 3,711.00	$ 1,974.00
Operating inco	$1,695.00	$ 1,032.00
Invested Capi	$ 4,216.11	$ 694.00
Tax rate	40.00%	
Operating mar	45.68%	
Return on cap	146.54%	
Sales/Capital	88.02%	

Revenue growth of 40% a year for 5 years, tapering down to 2% in year 10

Pre-tax operating margin **drops to 31%** over the next 10 years

Sales to capital ratio **stays at 0.75**

Stable Growth
g = 2%; Beta = 1.00;
Cost of capital = 8%
ROC= **8**%;
Reinvestment Rate=2%/20% = 10%

Terminal Value$_{10}$= 6,148/(.08-.02) = 102,469

Year	1	2	3	4	5	6	7	8	9	10
Revenues	$5,195	$7,274	$10,183	$14,256	$19,959	$26,425	$32,979	$38,651	$42,362	$43,209
Operating margin	44.21%	42.74%	41.27%	39.81%	38.34%	36.87%	35.40%	33.94%	32.47%	31.00%
EBIT	$2,297	$3,109	$ 4,203	$ 5,675	$ 7,652	$ 9,743	$11,675	$13,116	$13,754	$13,395
EBIT (1-t)	$1,378	$1,865	$ 2,522	$ 3,405	$ 4,591	$ 5,846	$ 7,005	$ 7,870	$ 8,252	$ 8,037
- Reinvestment	$1,979	$2,771	$ 3,879	$ 5,431	$ 7,603	$ 8,622	$ 8,738	$ 7,563	$ 4,947	$ 1,130
FCFF	$ (601)	$ (906)	$ (1,358)	$ (2,026)	$ (3,012)	$ (2,776)	$ (1,733)	$ 307	$ 3,305	$ 6,907

Term yr	
EBIT (1-t)	8198
- Reinv	2049
FCFF	6148

Operating assets	35,408
+ Cash	1,512
- Debt	1,219
Value of equity	35,705
- Options	3,088
Value in stock	32,616
Value/share	$13.97

Cost of capital = 11.19% (.988) + 1.59% (.012) = 11.07%

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

Cost of Equity
11.19%

Cost of Debt
(2%+0.65%)(1-.40)
= 1.59%

Weights
E = 98.8% D = 1.2%

At 4.00 pm, May 17, the offering was priced at $38/share

Riskfree Rate:
Riskfree rate = 2%

+

Beta
1.53

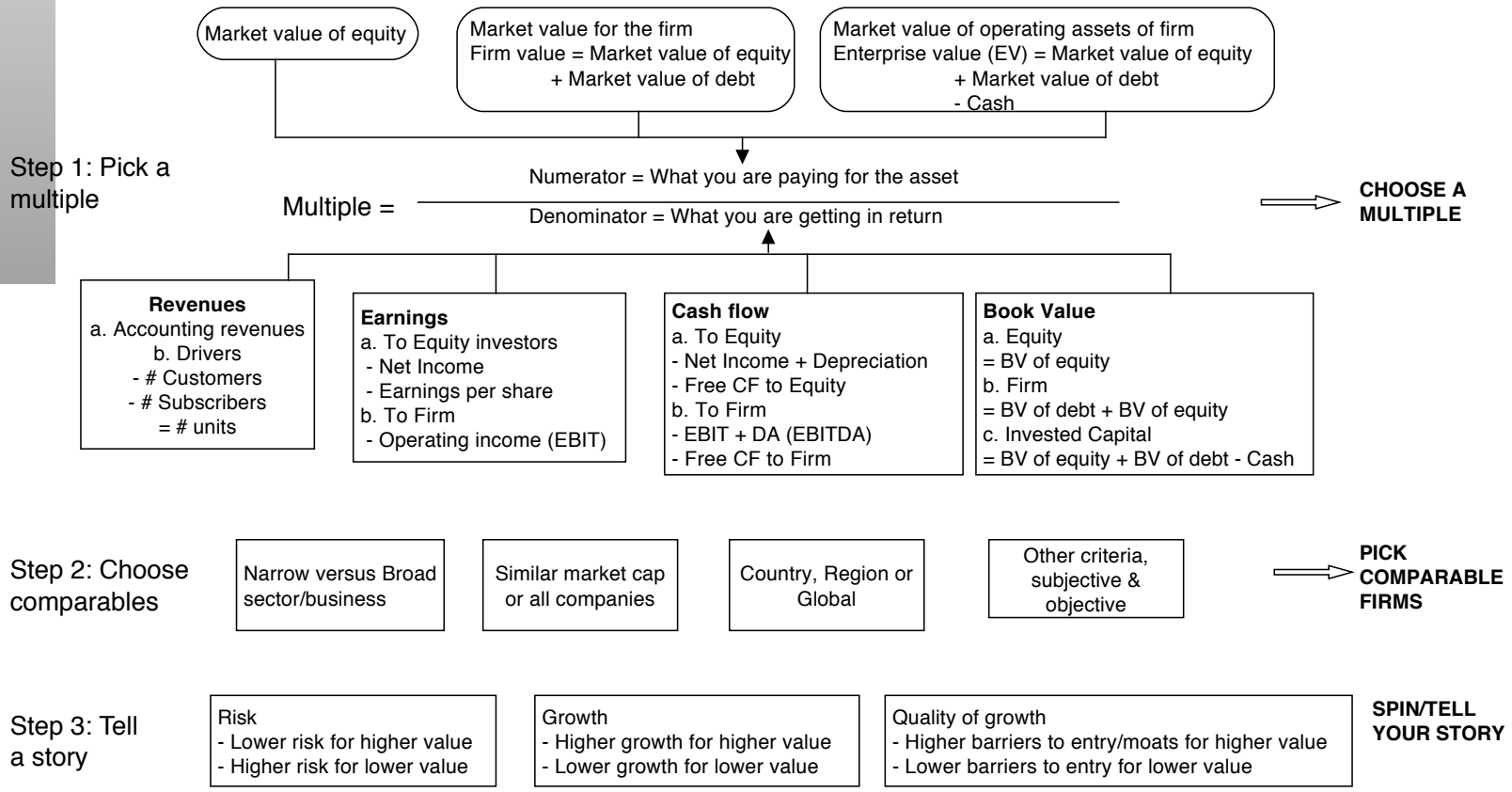
x

Risk Premium
6%

Unlevered Beta for Sectors: 1.52

D/E=1.21%

Manifestations of Bias: Relative Valuation



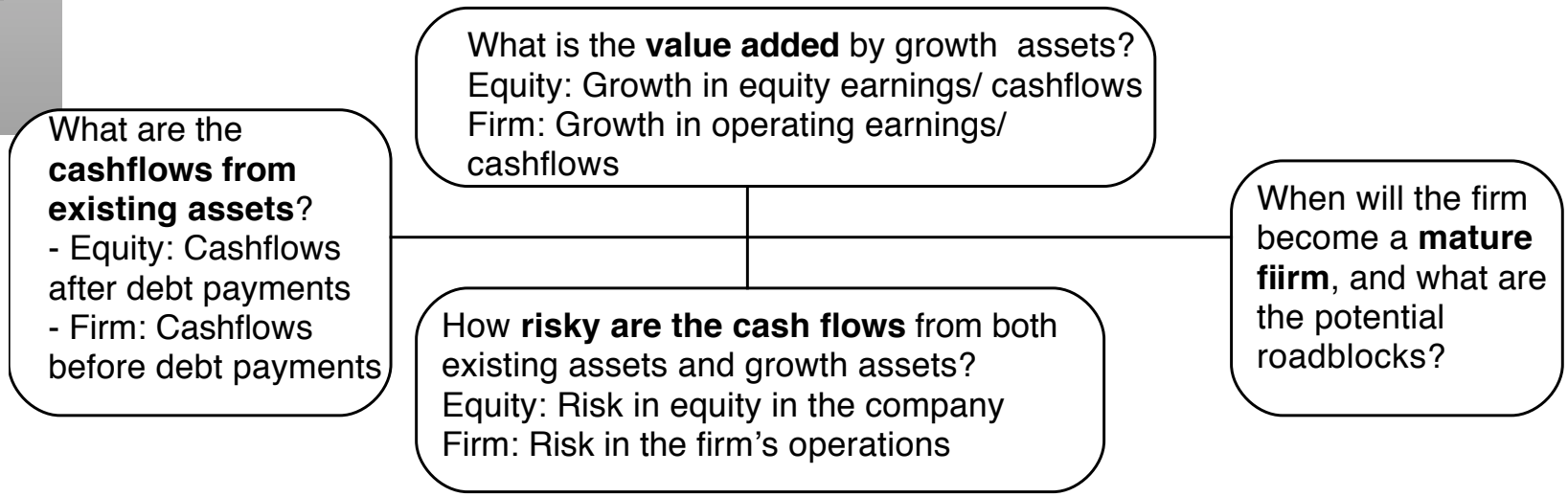
Dealing with bias: The "bad" ways

- I use only numbers: The easiest defense is to argue that you are only using numbers and that bias requires subjective judgments.
- I am a "professional": Valuation professionals point to the requirements of their professional groups (CPA, CFA, CVA etc.) that they be unbiased.
- It is a "FAIR" value (with my lawyer/accountant's imprimatur): The most common response to bias is to add legal or accounting cover.
  - Legal fair value: In most countries, investment bankers have to sign a legal document that their value is a "fair" value.
  - Accounting fair value: Accountants have jumped into the mix and have set up standards for fair value.

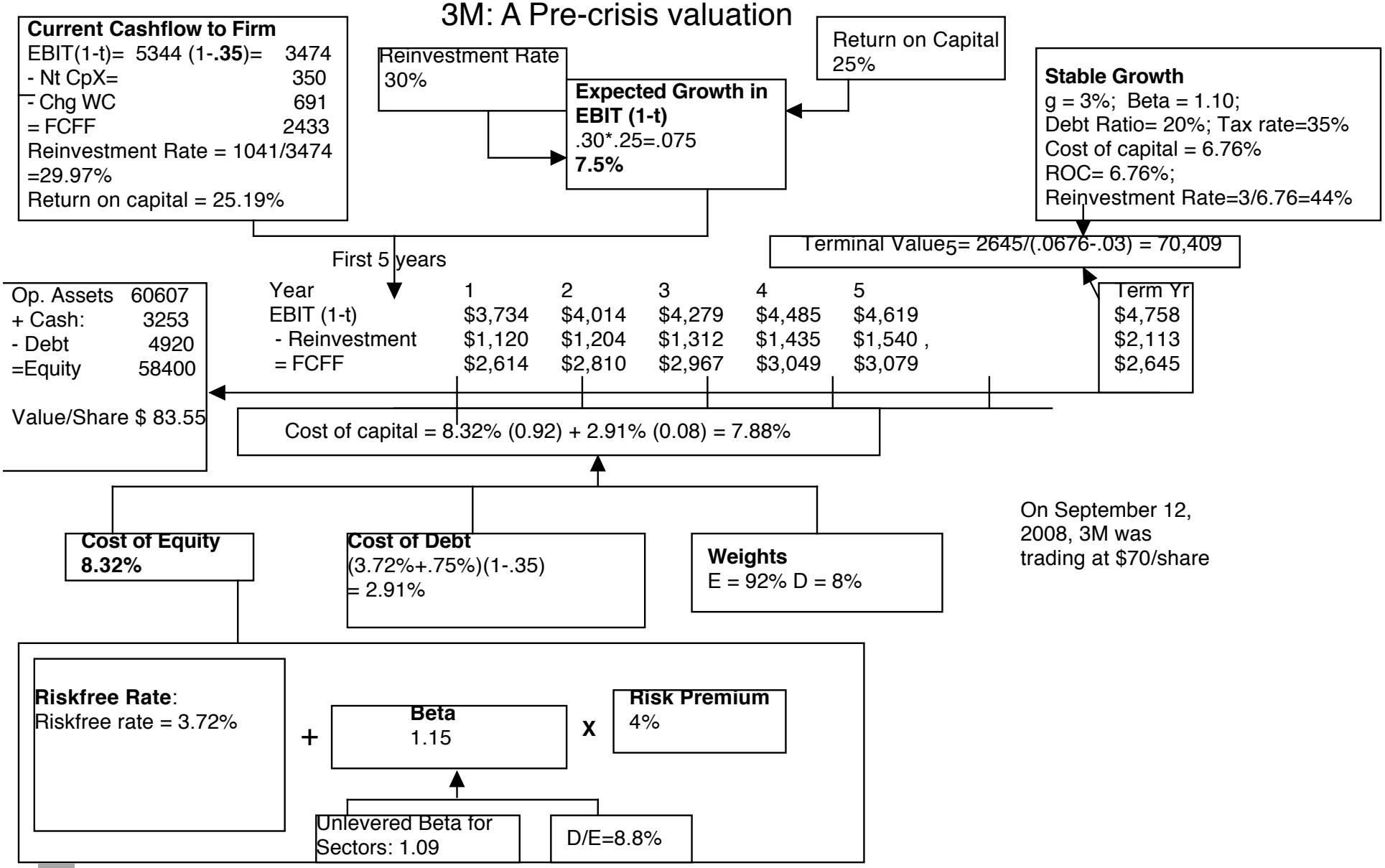
Healthy responses to bias

- Build processes that minimize bias, not maximize it: To the degree that a significant portion of bias comes from reward/punishment mechanisms, we need to build processes that disassociate the valuation outcome from compensation.
- Be honest (at least with yourself): Even if you may not want to reveal your biases to your clients, you should at least be honest with yourself.
- Bayesian valuation: It may be a good idea to require anyone valuing a company to state what they believe that they will find in the valuation, before they actually do the valuation. Anyone using the valuation should then have access to both the analyst's priors and the valuation.
- Transparency about motives: All valuations should be accompanied with full details of who is paying for the valuation and how much, as well as any other stakes in the outcome of the valuation.

II. Valuation Uncertainty



3M: A Pre-crisis valuation



On September 12, 2008, 3M was trading at $70/share

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 Value5= 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
- 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

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%

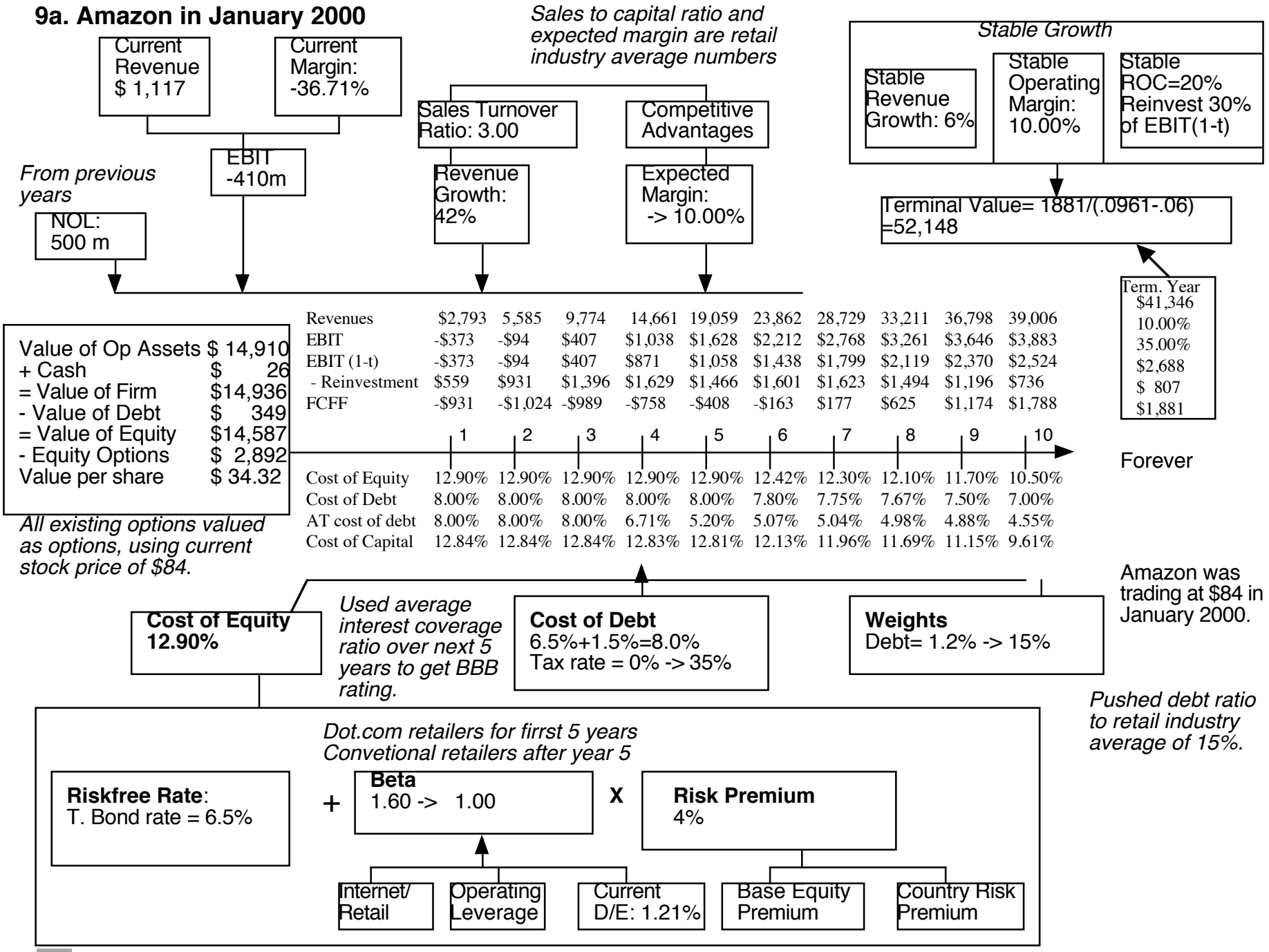
+ **Beta** 1.20 X **Mature market premium** 4.5% + **Lambda** 0.80 X Country Equity Risk Premium 4.50%

Unlevered Beta for Sectors: 1.04

Firm's D/E Ratio: 33%

Country Default Spread 3% X Rel Equity Mkt Vol 1.50

9a. Amazon in January 2000



The sources of uncertainty

- Estimation versus Economic uncertainty
  - Estimation uncertainty reflects the possibility that you could have the "wrong model" or estimated inputs incorrectly within this model.
  - Economic uncertainty comes the fact that markets and economies can change over time and that even the best medals will fail to capture these unexpected changes.
- Micro uncertainty versus Macro uncertainty
  - Micro uncertainty refers to uncertainty about the potential market for a firm's products, the competition it will face and the quality of its management team.
  - Macro uncertainty reflects the reality that your firm's fortunes can be affected by changes in the macro economic environment.
- Discrete versus continuous uncertainty
  - Discrete risk: Risks that lie dormant for periods but show up at points in time. (Examples: A drug working its way through the FDA pipeline may fail at some stage of the approval process or a company in Venezuela may be nationalized)
  - Continuous risk: Risks changes in interest rates or economic growth occur continuously and affect value as they happen.

Assessing uncertainty…

- Rank the four firms in terms of uncertainty (least to most) in your estimate:
  - 3M in 2007
  - Tata Motors in 2010
  - Amazon in 2000
  - Facebook in 2012
- With each company, specify the type of uncertainty that you face:

Company	Estimation or Economic	Micro or Macro	Discrete or Continuous
3M (2007)			
Tata Motors (2010)			
Amazon (2000)			
Facebook (2012)			

Unhealthy ways of dealing with uncertainty

- Paralysis & Denial: When faced with uncertainty, some of us get paralyzed. Accompanying the paralysis is the hope that if you close your eyes to it, the uncertainty will go away
- Mental short cuts (rules of thumb): Behavioral economists note that investors faced with uncertainty adopt mental short cuts that have no basis in reality. And here is the clincher. More intelligent people are more likely to be prone to this.
- Herding: When in doubt, it is safest to go with the crowd.. The herding instinct is deeply engrained and very difficult to fight.
- Outsourcing: Assuming that there are experts out there who have the answers does take a weight off your shoulders, even if those experts have no idea of what they are talking about.

Healthy responses to uncertainty

1. Less is more (the rule on detail….) (Revenue & margin forecasts)
2. Build in internal checks on reasonableness… (reinvestment and ROC)
3. Use the offsetting principle (risk free rates & inflation at Tata Motors)
4. Draw on economic first principles (Terminal value at all the companies)
5. Use the "market" as a crutch (equity risk premiums, country risk premiums)
6. Use the law of large numbers (Beta for all companies
7. Don't let the discount rate become the receptacle for all uncertainties.
8. Confront uncertainty, if you can
9. Don't look for precision

1. Less is more
Revenues & Margins for Amazon in 2000

Put intermediate numbers on autopilot

Year	Growth rate	Revenues	Operating Margin	EBIT
Tr12m	*200%*	*$1,117*	*-36.71%*	*-$410*
1	150%	$2,793	-13.35%	-$373
2	100%	$5,585	-1.68%	-$94
3	75%	$9,774	4.16%	$407
4	50%	$14,661	7.08%	$1,038
5	30%	$19,059	8.54%	$1,628
6	25.2%	$23,862	9.27%	$2,212
7	20.4%	$28,729	9.64%	$2,768
8	15.6%	$33,211	9.82%	$3,261
9	10.8%	$36,798	9.91%	$3,646
10	6.0%	$39,006	9.95%	$3,883
TY(11)	6.0%	$41,346	10.00%	$4,135

Be parsimonious: Estimate the big numbers (revenues and margin in year 1(

2. Build in "internal" checks for reasonableness… Reinvestment and Return on Capital

Year	Revenues	After-tax Op Inc	Sales/Capital	Reinvestment	nvested Capita	eturn on Capita
Base year	$ 1,117	-$410			$ 487	
1	$ 2,793	-$373	3.00	$559	$ 1,045	-76.62%
2	$ 5,585	-$94	3.00	$931	$ 1,976	-8.96%
3	$ 9,774	$407	3.00	$1,396	$ 3,372	20.59%
4	$ 14,661	$871	3.00	$1,629	$ 5,001	25.82%
5	$ 19,059	$1,058	3.00	$1,466	$ 6,467	21.16%
6	$ 23,862	$1,438	3.00	$1,601	$ 8,068	22.23%
7	$ 28,729	$1,799	3.00	$1,623	$ 9,691	22.30%
8	$ 33,211	$2,119	3.00	$1,494	$ 11,185	21.87%
9	$ 36,798	$2,370	3.00	$1,196	$ 12,380	21.19%
10	$ 39,006	$2,524	3.00	$736	$ 13,116	20.39%
Terminal year	$ 41,346	$2,688				20.00%

Comfortable with $41.3 billion in revenues
- *Check against total market (and market share)*
- *Check against largest companies in the market*

Comfortable with ROC = 20.39% in year 10?
- *Check against cost of capital*
- *Check against industry average*

3. Use consistency tests…
Tata Motors: In Rupees and US dollars

(1.125)(1.01/1.04)-1 = .0925*

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

Equity versus Firm: If cash flows are post-debt and to equity, you should discount at the cost of equity. Pre-debt cash flows should be discounted at the cost of capital.

Currency: The currency in which the cash flows are estimated should also be the currency in which the discount rate is estimated.

4. Draw on economic first principles and mathematical limits… The terminal value limits

Stable Growth rate	3M	Tata Motors	Amazon	Facebook
0%	$70,409	INR 435,686	$26,390	$113,423
1%	$70,409	INR 435,686	$28,263	$120,012
2%	$70,409	INR 435,686	$30,595	$128,546
3%	$70,409	INR 435,686	$33,594	
4%		INR 435,686	$37,618	
5%		INR 435,686	$43,334	
6%			$52,148	
Riskfree rate	3.72%	5.00%	6.50%	2.00%
ROC (stable growth)	6.76%	10.39%	20.00%	8.00%
Cost of capital (stable growth)	6.76%	10.39%	9.61%	12.00%

5. Use the market as a crutch… Equity Risk Premiums

	Arithmetic Average		Geometric Average	
	Stocks - T. Bills	Stocks - T. Bonds	Stocks - T. Bills	Stocks - T. Bonds
1928-2011	7.55%	5.79%	5.62%	4.10%
	2.22%	2.36%		
1962-2011	5.38%	3.36%	4.02%	2.35%
	2.39%	2.68%		
2002-2011	3.12%	-1.92%	1.08%	-3.61%
	6.46%	8.94%		

← *Historical premium*

In the trailing 12 months, the cash returned to stockholders was 74.17. Using the average cash yield of 4.71% for 2002-2011 the cash returned would have been 59.29.

Analysts expect earnings to grow 9.6% in 2012, 11.9% in 2013, 8.2% in 2014, 4.5% in 2015 and 2% therafter, resulting in a compounded annual growth rate of 7.18% over the next 5 years. We will assume that dividends & buybacks will grow 7.18% a year for the next 5 years.

After year 5, we will assume that earnings on the index will grow at 1.87%, the same rate as the entire economy (= riskfree rate).

63.54 68.11 73.00 78.24 83.86

$$1257.60 = \frac{63.54}{(1+r)} + \frac{68.11}{(1+r)^2} + \frac{73.00}{(1+r)^3} + \frac{78.24}{(1+r)^4} + \frac{83.86}{(1+r)^5} + \frac{83.86(1.0187)}{(r-.0187)(1+r)^5}$$

January 1, 2012
S&P 500 is at 1257.60
Adjusted Dividends & Buybacks for 2011 = 59.29

Expected Return on Stocks (1/1/12) = 7.91%
T.Bond rate on 1/1/12 = 1.87%
Equity Risk Premium = 8.03% - 3.29% = 6.04%

Data Sources:
Dividends and Buybacks last year: S&P
Expected growth rate: News stories, Yahoo! Finance, Bloomberg

Country Risk Premiums
June 2012

Canada	6.00%	0.00%
United States	6.00%	0.00%
NORTH AM	6.00%	0.00%

Argentina	15.00%	9.00%
Belize	9.00%	3.00%
Bolivia	10.88%	4.88%
Brazil	8.63%	2.63%
Chile	7.05%	1.05%
Colombia	9.00%	3.00%
Costa Rica	9.00%	3.00%
Ecuador	18.75%	12.75%
El Salvador	10.13%	4.13%
Guatemala	9.60%	3.60%
Honduras	13.50%	7.50%
Mexico	8.25%	2.25%
Nicaragua	15.00%	9.00%
Panama	9.00%	3.00%
Paraguay	12.00%	6.00%
Peru	9.00%	3.00%
Uruguay	9.60%	3.60%
Venezuela	12.00%	6.00%
LAT AM	9.42%	3.42%

Spain	9.00%	3.00%
Austria	6.00%	0.00%
Belgium	7.05%	1.05%
Cyprus	10.88%	4.88%
Denmark	6.00%	0.00%
Finland	6.00%	0.00%
France	6.00%	0.00%
Germany	6.00%	0.00%
Greece	16.50%	10.50%
Iceland	9.00%	3.00%
Ireland	9.60%	3.60%
Italy	7.73%	1.73%
Malta	7.73%	1.73%
Netherlands	6.00%	0.00%
Norway	6.00%	0.00%
Portugal	10.88%	4.88%
Sweden	6.00%	0.00%
Switzerland	6.00%	0.00%
Turkey	9.60%	3.60%
United Kingdom	6.00%	0.00%
W. EUROPE	6.80%	0.80%

Angola	10.88%	4.88%
Botswana	7.50%	1.50%
Egypt	13.50%	7.50%
Mauritius	8.25%	2.25%
Morocco	9.60%	3.60%
Namibia	9.00%	3.00%
South Africa	7.73%	1.73%
Tunisia	9.00%	3.00%
AFRICA	9.82%	3.82%

Albania	12.00%	6.00%
Armenia	10.13%	4.13%
Azerbaijan	9.00%	3.00%
Belarus	15.00%	9.00%
Bosnia	15.00%	9.00%
Bulgaria	8.63%	2.63%
Croatia	9.00%	3.00%
Czech Republic	7.28%	1.28%
Estonia	7.28%	1.28%
Georgia	10.88%	4.88%
Hungary	9.60%	3.60%
Kazakhstan	8.63%	2.63%
Latvia	9.00%	3.00%
Lithuania	8.25%	2.25%
Moldova	15.00%	9.00%
Montenegro	10.88%	4.88%
Poland	7.50%	1.50%
Romania	9.00%	3.00%
Russia	8.25%	2.25%
Slovakia	7.50%	1.50%
Slovenia [1]	7.50%	1.50%
Ukraine	13.50%	7.50%
E. EUROPE	8.60%	2.60%

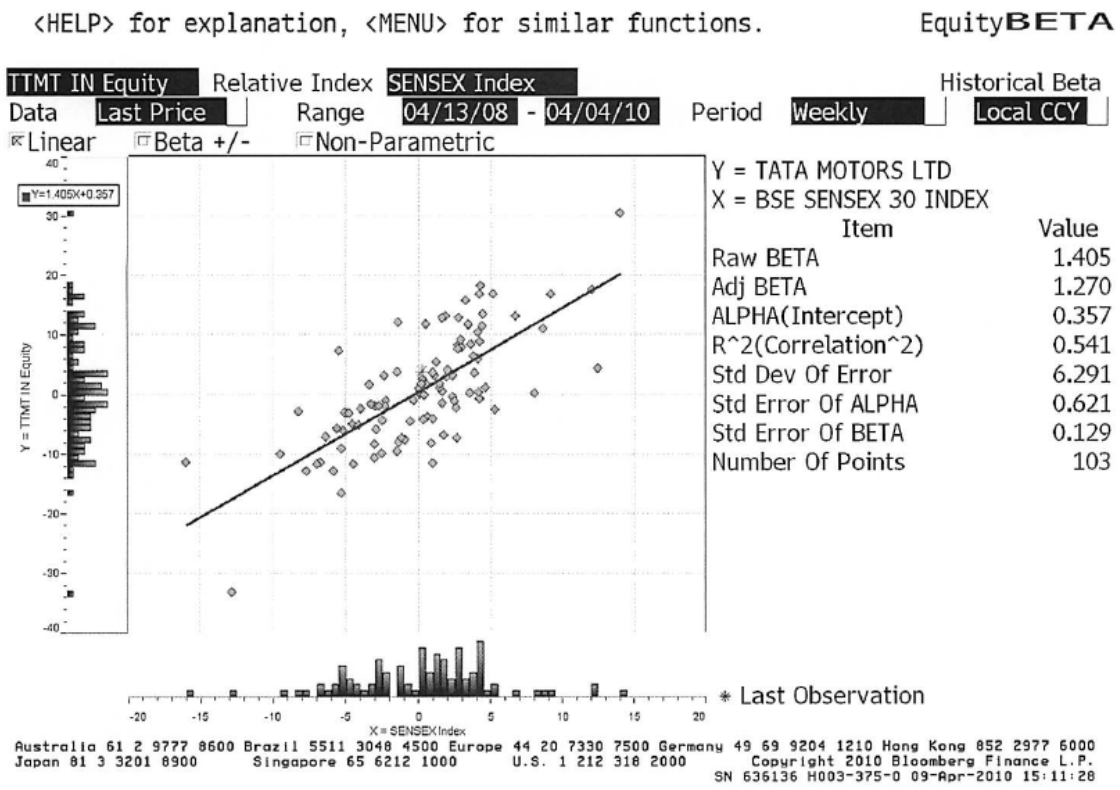
Bahrain	8.25%	2.25%
Israel	7.28%	1.28%
Jordan	10.13%	4.13%
Kuwait	6.75%	0.75%
Lebanon	12.00%	6.00%
Oman	7.28%	1.28%
Qatar	6.75%	0.75%
Saudi Arabia	7.05%	1.05%
UAE	6.75%	0.75%
MIDDLE EAST	7.16%	1.16%

Bangladesh	10.88%	4.88%
Cambodia	13.50%	7.50%
China	7.05%	1.05%
Fiji Islands	12.00%	6.00%
Hong Kong	6.38%	0.38%
India	9.00%	3.00%
Indonesia	9.00%	3.00%
Japan	7.05%	1.05%
Korea	7.28%	1.28%
Macao	7.05%	1.05%
Malaysia	7.73%	1.73%
Mongolia	12.00%	6.00%
Pakistan	15.00%	9.00%
New Guinea	12.00%	6.00%
Philippines	10.13%	4.13%
Singapore	6.00%	0.00%
Sri Lanka	12.00%	6.00%
Taiwan	7.05%	1.05%
Thailand	8.25%	2.25%
Vietnam	12.00%	6.00%
ASIA	7.63%	1,63%
WO JAPAN	7.77%	1.77%

Australia	6.00%	0.00%
New Zealand	6.00%	0.00%
AUS & NZ	6.00%	0.00%

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

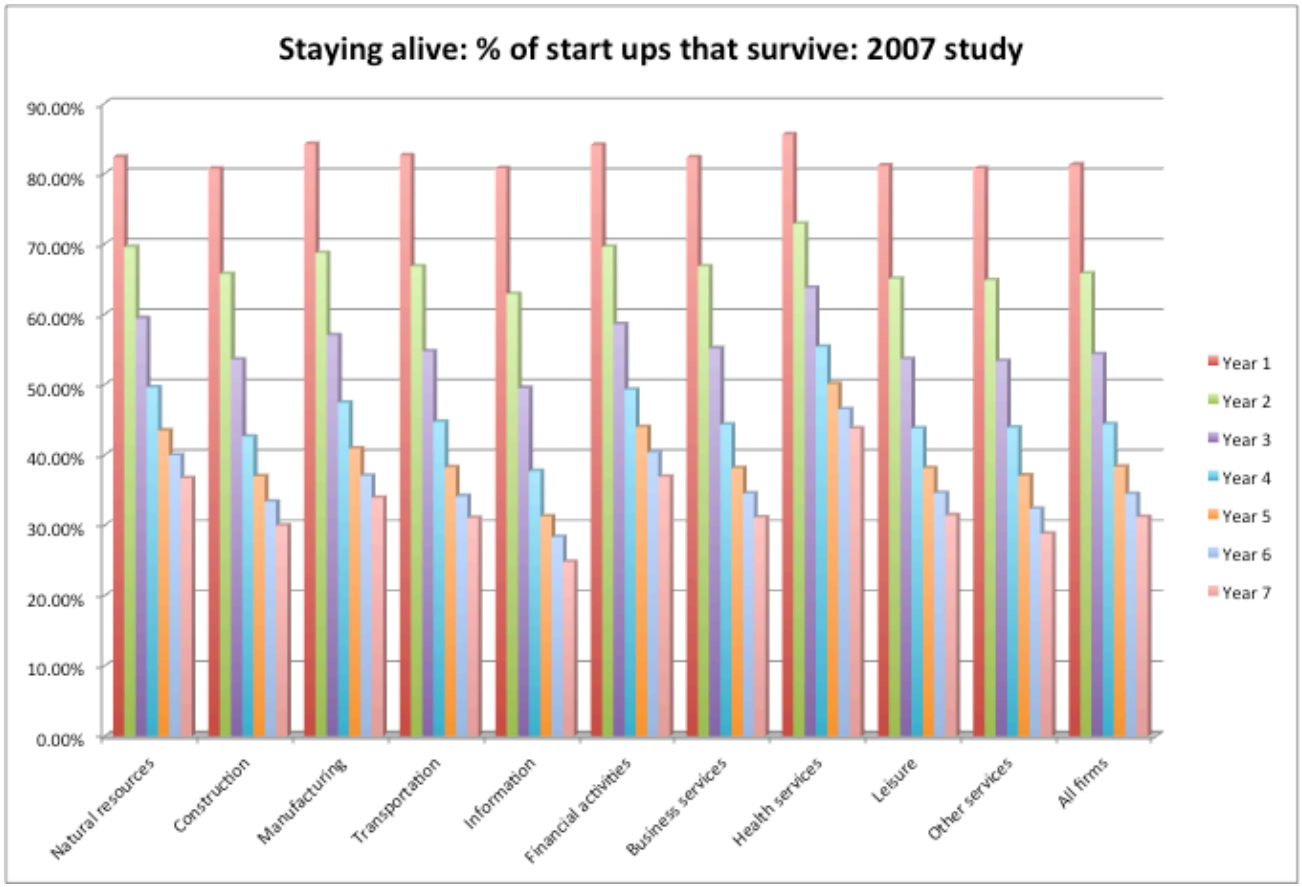
6. Draw on the law of large numbers… A single regression beta is noisy…



But an average beta across companies is not…

- There are 111 publicly traded companies, globally in the automobile business.
  - Average beta across companies = 1.22
  - Average D/E ratio across companies = 35%
  - Average tax rate across companies = 30%
  - Unlevered beta for automobile company = 1.22 / (1+ (1-.30)(.35)) = 0.98
  - Standard error on "average" beta = 0.26/Sq root of 111 = 0.025
- To estimate the beta for Tata Motors
  - Unlevered beta for automobile company = 0.98
  - D/E ratio for Tata Motors = 33.87%
  - Marginal tax rate in India = 33.99%
  - Levered beta = 0.98 (1+ (1-.3399)(.3387)) = 1.20

7. Don't let the discount rate become the receptacle for all uncertainty… For instance, most young firms don't make it…



And you can deal with it in one of two ways…

- The Venture Capital approach: In the venture capital approach, you hike the "discount rate" well above what would be appropriate for a going concern and then use this "target" rate to discount your "exit value" (which is estimated using a multiple and forward earnings).

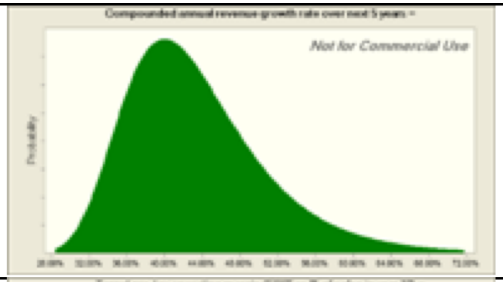
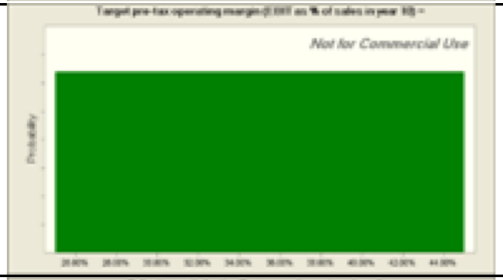
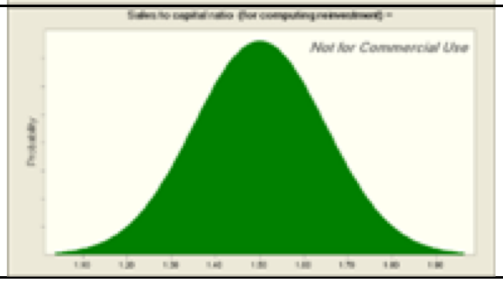
  Value = (Forward Earnings in year n * Exit multiple)/ (1+ target rate)^n

- The decision tree approach:

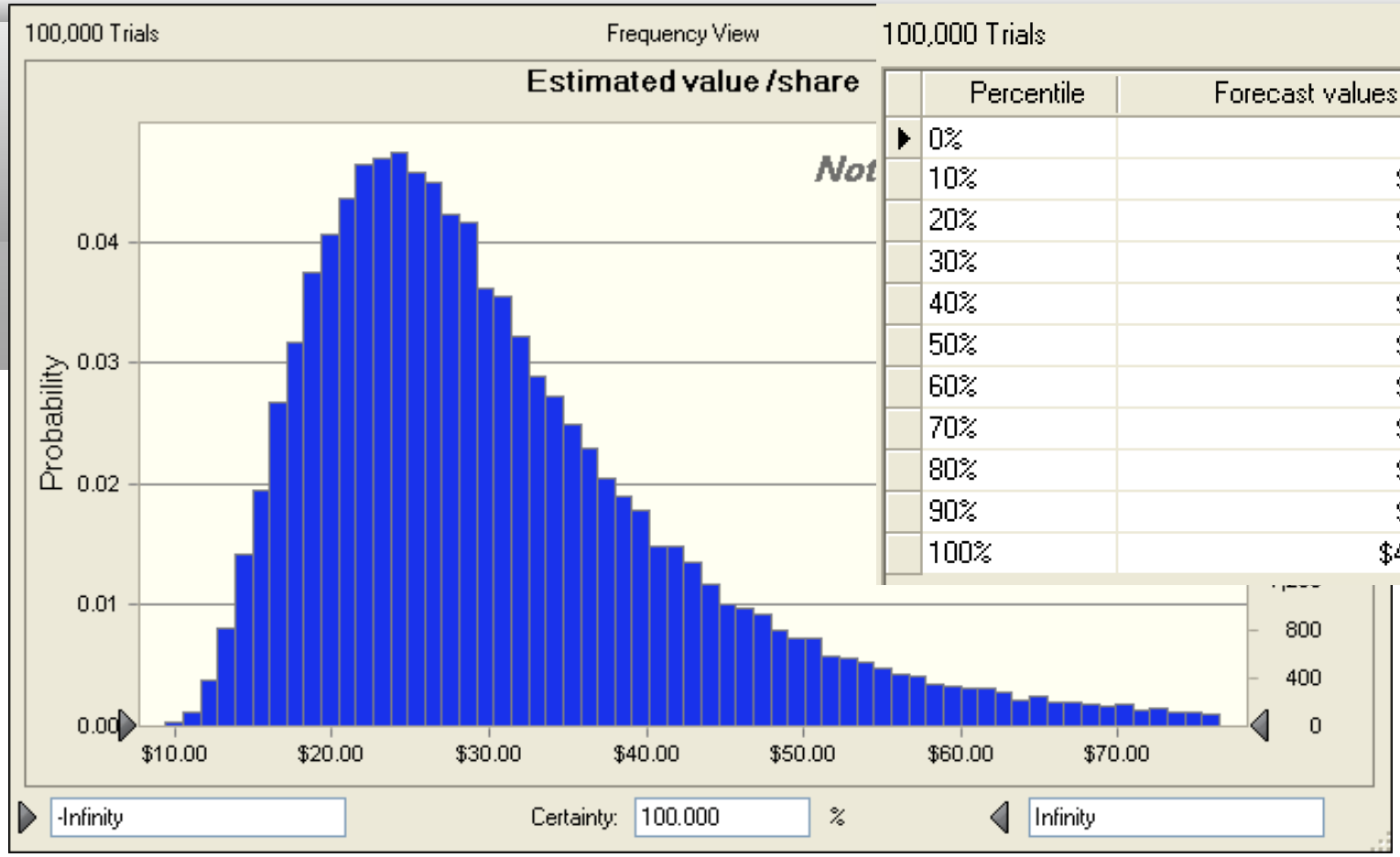
  1. Value the business as a "going concern", with a rate of return appropriate for a "going concern".
  2. Estimate the probability of survival (and failure) and the value of the business in the event of failure.

  Value = Going concern value (Probability of survival) + Liquidation value (Probability of failure)

8. Confront uncertainty, if you can… Revisiting the Facebook valuation…

Revenue Growth rate Expected growth rate = 40% Distribution: Lognormal Standard deviation = 6%	
Pre-tax Operating Margin Expected margin = 35% Distribution: Uniform Minimum = 25% Maximum = 45%	
Sales to Capital Ratio Distribution: Normal Expected value = 1.50 Standard deviation = 0.15	

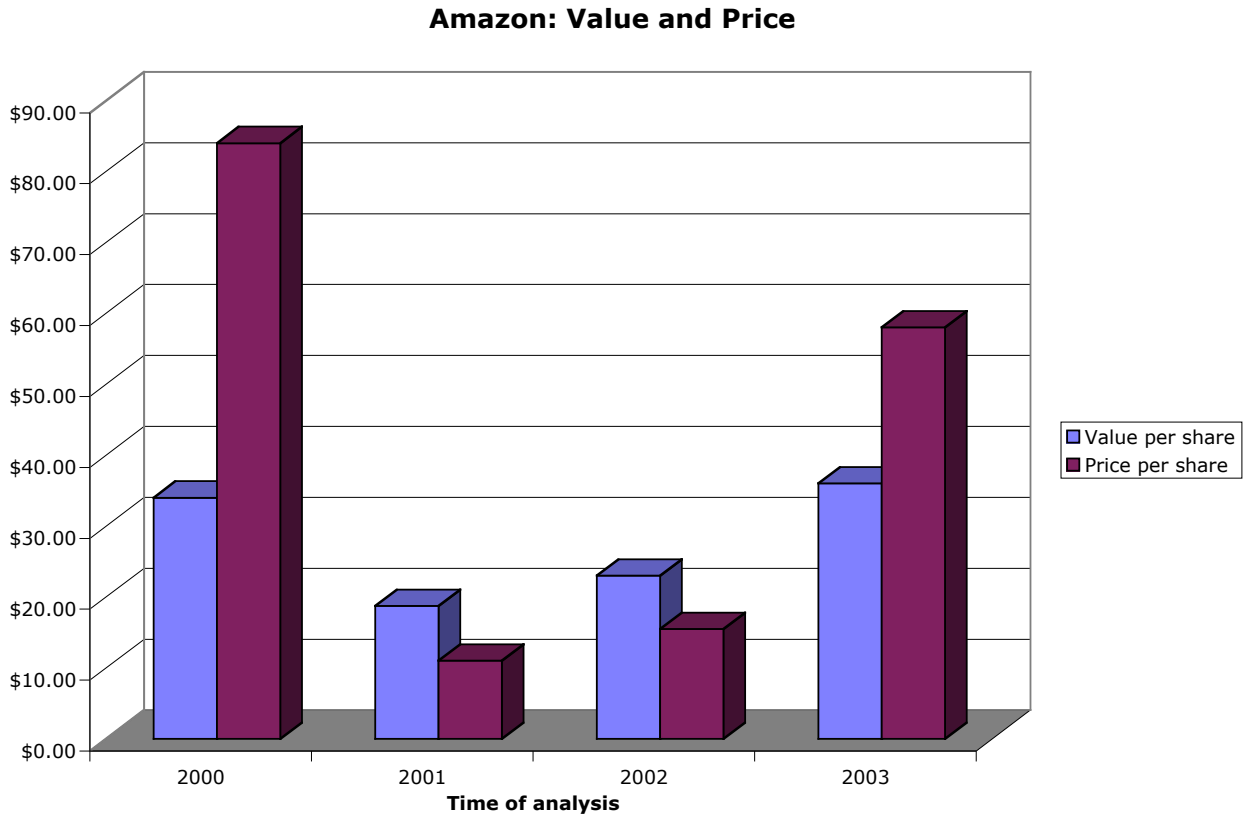
With the consequences…



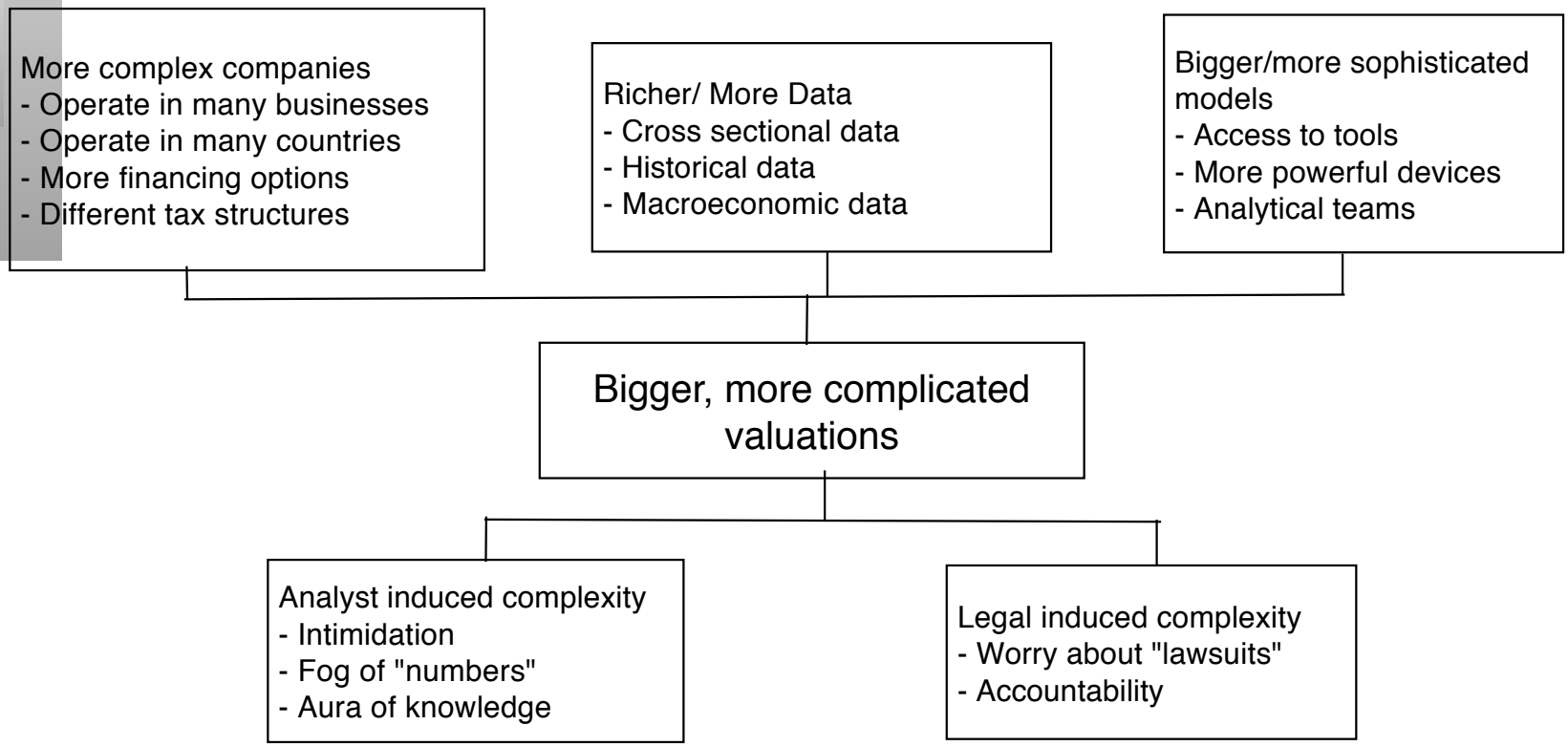
100,000 Trials

Percentile	Forecast values
0%	$8.95
10%	$17.92
20%	$20.73
30%	$23.13
40%	$25.52
50%	$28.04
60%	$30.99
70%	$34.61
80%	$39.80
90%	$49.26
100%	$473.24

9. Don't look for precision..
My valuations of Amazon over time…



III. Complexity in valuation



Sources of complexity

- Globalization: As companies globalize, valuations are getting more complex for a number of reasons:
  - Risk assessment has to factor in where a company operates and not where it is incorporated.
  - Currency choices proliferate, since a company can be valued in any of a half a dozen currencies (often to value different listings)
- Shifting and volatile macro economic risks have created changing risk premiums and strange interest rate/exchange rate environments.
- More complex accounting standards have created longer, more complicated, more difficult to read financial statements.
- More complicated holding structures (cross holdings, shares with different voting rights), motivated by tax and control reasons, make valuations more difficult.

Manifestations of complexity

- Mysterious terms/acronyms: A feature of complex valuation is line items or terms that sound "sophisticated" but you do not know or not sure what they mean or measure. (For an added layer of intimidation, make them Greek alphabets…)
- Longer, more detailed valuations: The level of detail that you see in valuations, with hundreds of line items and dozens of inputs, is staggering (and scary).
- What if and scenario analysis: While there is a place for asking what if questions and scenario analysis in valuation, the ease with which it can be done has opened the door to abuse, with the primary objective becoming cover, no matter what happens.

Unhealthy responses to complexity

- Input fatigue: Analysts who are called upon to estimate dozens and dozens of inputs, often with little information to do so, will give up at some point and input "numbers" just to get done. It is "garbage in, garbage out…
- Black box models: The models becomes so complicated that what happens inside the model becomes a mystery to those outside. Consequently, analysts essentially claim no ownership or responsibility for the output from the model. "The model did it" becomes the refrain.
- Suspension of common sense: The dependence on models becomes so complete that analysts lose sight of common sense and mangle the valuation of the simplest assets.

Healthy responses to complexity

- Parsimonious valuations: Never estimate more inputs than you absolutely have to. Less is more. When faced with the question of adding more detail/complexity, ask yourself whether it will make your valuation more precise (or just make it look more precise).
- Go back to first principles: The fundamentals of valuation don't change, just because you are faced with complexity. Always fall back on first principles.
- Focus on key levers: Even when there are dozens of inputs in a valuation, the valuation itself is a function of three or four key value drivers (which may be different for different companies). Keep your focus on those variables