TEN MYTHS ABOUT DISCOUNTED CASH FLOW VALUATION! WHY D+ CF≠ DCF!

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The essence of intrinsic value

- In intrinsic valuation, you value an asset based upon its fundamentals (or intrinsic characteristics).
- For cash flow generating assets, the intrinsic value will be a function of the magnitude of the expected cash flows on the asset over its lifetime and the uncertainty about receiving those cash flows.
- Discounted cash flow valuation is a tool for estimating intrinsic value, where the expected value of an asset is written as the present value of the expected cash flows on the asset, with either the cash flows or the discount rate adjusted to reflect the risk.

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The two faces of discounted cash flow valuation

- The value of a risky asset can be estimated by discounting the expected cash flows on the asset over its life at a risk-adjusted discount rate:

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

where the asset has an n-year life, $E(CF_t)$ is the expected cash flow in period t and r is a discount rate that reflects the risk of the cash flows.

- Alternatively, we can replace the expected cash flows with the guaranteed cash flows we would have accepted as an alternative (certainty equivalents) and discount these at the riskfree rate:

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

where CE(CFt) is the certainty equivalent of $E(CF_t)$ and r_f is the riskfree rate.

Ten DCF Myths

1. D + CF = DCF
2. A DCF is an exercise in modeling & number crunching.
3. You cannot do a DCF when there is too much uncertainty.
4. The most critical input in a DCF is the discount rate and you have to believe in beta, to use that discount rate.
5. The biggest number in a DCF is the terminal value.
6. A DCF requires too many assumptions and can be manipulated to yield any value you want.
7. A DCF cannot value brand name or other intangibles
8. A DCF yields a conservative estimate of value. It is better to under estimate value than over estimate it.
9. A DCF is static. It is pointless in a dynamic world.
10. A DCF is an academic exercise.

The DCF Myths

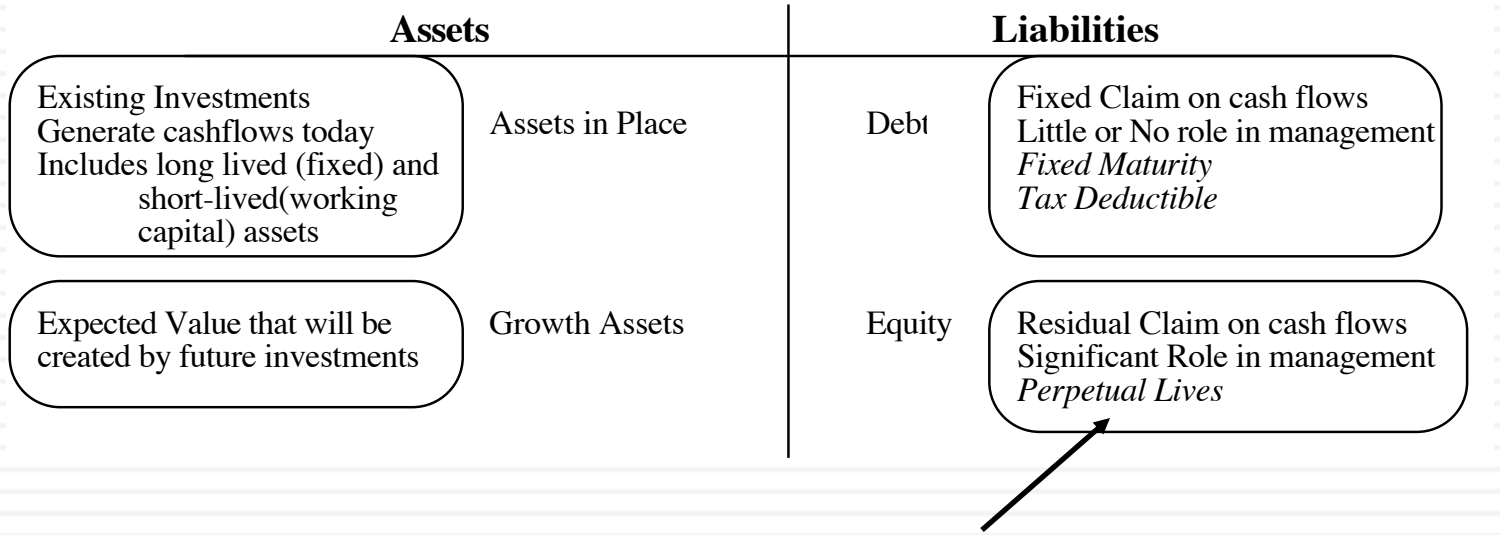
Dispelling Delusions

Myth 1: D + CF = DCF

- It is true that every good discounted cash flow valuation has expected cash flows that are discounted at a “risk-adjusted” discount rate.
- It does not follow, however, that just because you have expected cash flows and are discounting them at a “risk-adjusted” discount rate that you have a good discounted cash flow valuation.
- For a D+CF = DCF, you have to be consistent
  - In matching claimholder cash flows to claim discount rates
  - In matching the currency of your cash flows to the currency of your discount rate
  - In your assumptions about risk, growth and reinvestment.

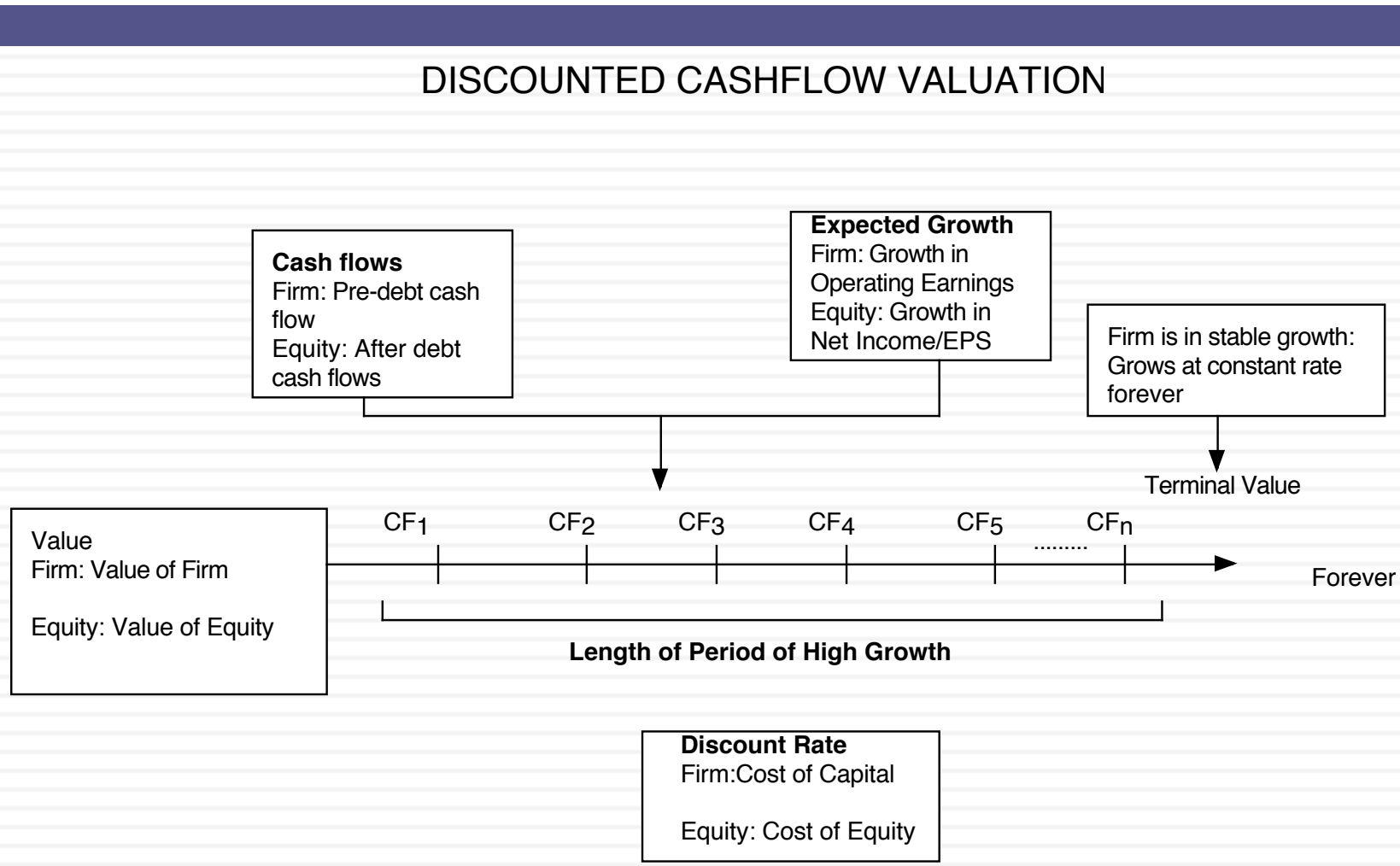
1a. Claimholder Consistency

Firm Valuation: Value the entire business



Equity valuation: Value just the equity claim in the business

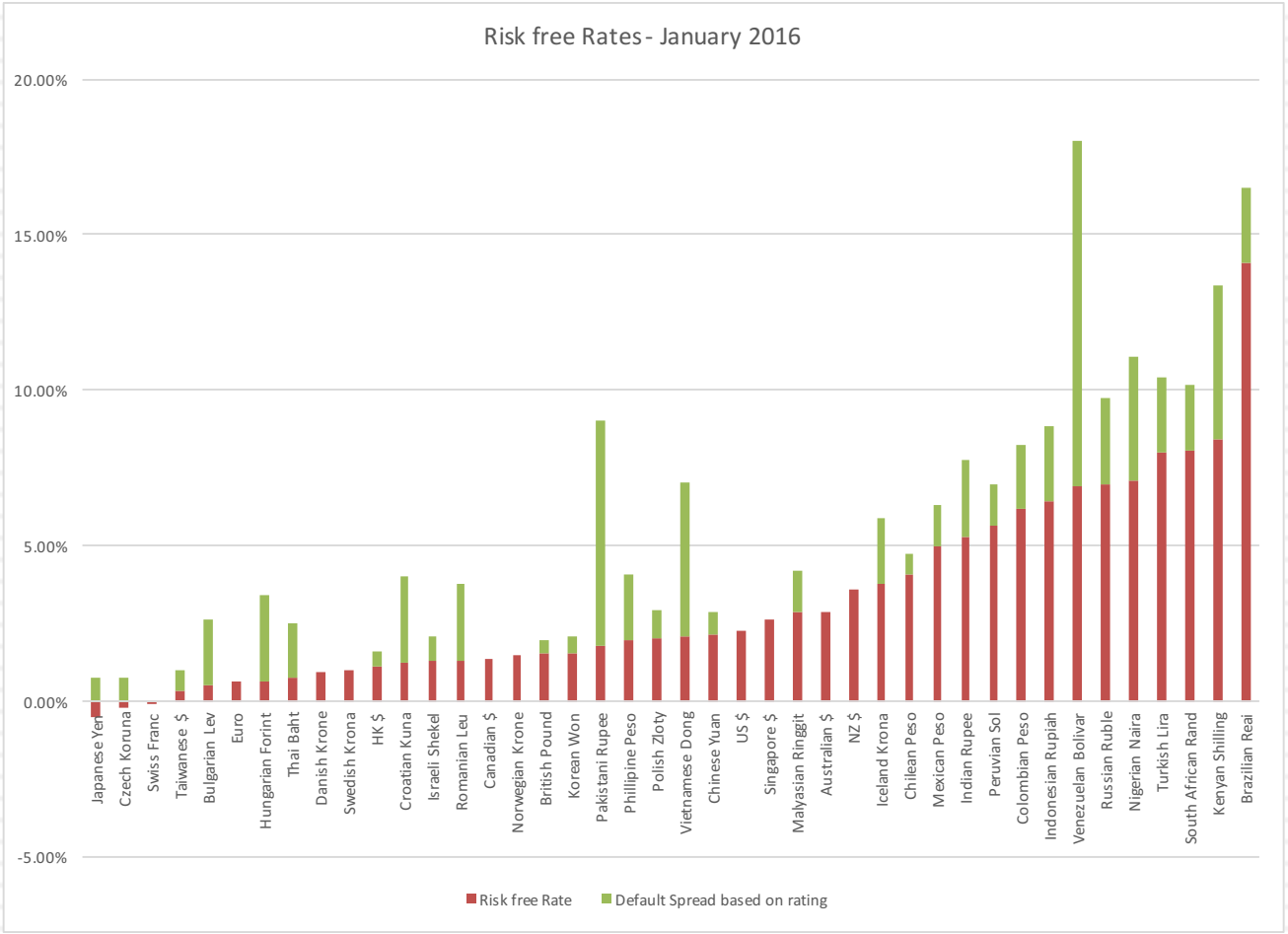
Generic DCF Valuation Model



Same ingredients, different approaches…

Input	Dividend Discount Model	FCFE (Potential dividend) discount model	FCFF (firm) valuation model
Cash flow	Dividend	Potential dividends = FCFE = Cash flows after taxes, reinvestment needs and debt cash flows	FCFF = Cash flows before debt payments but after reinvestment needs and taxes.
Expected growth	In equity income and dividends	In equity income and FCFE	In operating income and FCFF
Discount rate	Cost of equity	Cost of equity	Cost of capital
Steady state	When dividends grow at constant rate forever	When FCFE grow at constant rate forever	When FCFF grow at constant rate forever

1b. Currency Consistency



Valuing Tata Motors in 2010

	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)

1c. Internal Consistency

Tesla: Summary 15-year DCF Analysis (DCF valuation as of mid-year 2013)

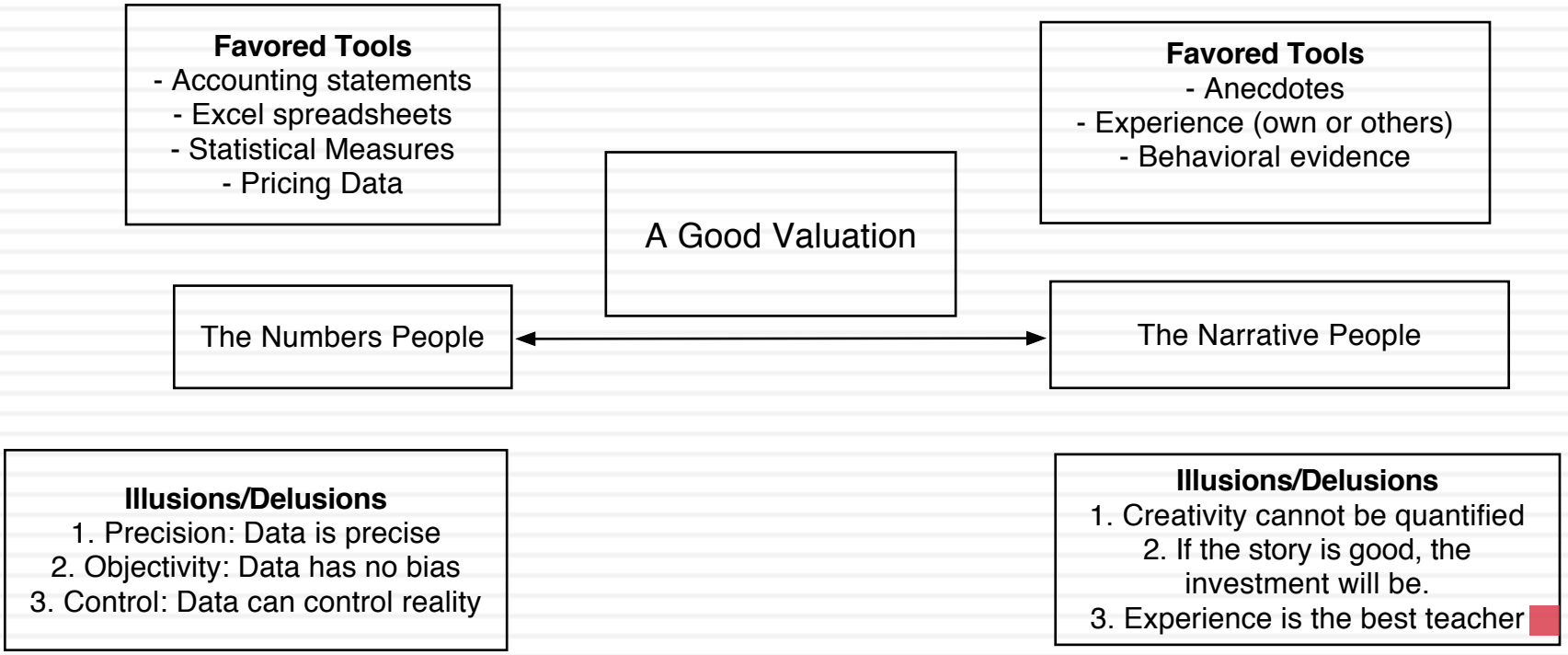
	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028
Unit Volume	24,298	36,883	64,684	86,713	149,869	214,841	291,861	384,747	466,559	550,398	643,850	726,655	820,645	922,481	1,034,215	1,137,780
% Growth		*52%*	*75%*	*34%*	*73%*	*43%*	*36%*	*32%*	*21%*	*18%*	*17%*	*13%*	*13%*	*12%*	*12%*	*10%*
Automotive Revenue Per Unit ($)	93,403	85,342	83,432	78,932	65,465	58,258	56,407	55,553	55,991	56,586	56,969	57,540	58,138	58,603	59,002	59,554
% Growth		*-9%*	*-2%*	*-5%*	*-17%*	*-11%*	*-3%*	*-2%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*
Automotive Sales	2,462	3,321	5,613	7,051	10,025	12,720	16,685	21,595	26,347	31,357	36,897	42,022	47,949	54,283	61,221	67,980
Development Service Sales	16	40	42	44	46	49	51	54	56	59	62	65	68	72	75	79
Total Sales	**2,478**	**3,361**	**5,655**	**7,095**	**10,072**	**12,768**	**16,736**	**21,648**	**26,403**	**31,416**	**36,959**	**42,087**	**48,017**	**54,355**	**61,296**	**68,059**
% Growth		*36%*	*68%*	*25%*	*42%*	*27%*	*31%*	*29%*	*22%*	*19%*	*18%*	*14%*	*14%*	*13%*	*13%*	*11%*
EBITDA	**148**	**417**	**920**	**1,042**	**1,586**	**2,150**	**3,138**	**4,066**	**4,857**	**5,723**	**6,328**	**7,182**	**8,144**	**9,688**	**10,874**	**12,099**
% Margin	*6.0%*	*12.4%*	*16.3%*	*14.7%*	*15.7%*	*16.8%*	*18.7%*	*18.8%*	*18.4%*	*18.2%*	*17.1%*	*17.1%*	*17.0%*	*17.8%*	*17.7%*	*17.8%*
D&A	103	158	172	203	301	353	389	537	606	696	811	938	1,088	1,260	1,451	1,661
% of Capex	*41%*	*79%*	*55%*	*65%*	*62%*	*69%*	*78%*	*86%*	*79%*	*77%*	*75%*	*76%*	*76%*	*76%*	*76%*	*77%*
EBIT	**45**	**259**	**748**	**839**	**1,285**	**1,796**	**2,749**	**3,529**	**4,252**	**5,027**	**5,517**	**6,244**	**7,056**	**8,429**	**9,423**	**10,439**
% Margin	*1.8%*	*7.7%*	*13.2%*	*11.8%*	*12.8%*	*14.1%*	*16.4%*	*16.3%*	*16.1%*	*16.0%*	*14.9%*	*14.8%*	*14.7%*	*15.5%*	*15.4%*	*15.3%*
Net Interest Income (Expense)	(27)	(1)	9	33	47	90	108	155	199	278	358	445	542	651	784	934
Other Income	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pretax Income	**46**	**258**	**758**	**872**	**1,332**	**1,886**	**2,857**	**3,684**	**4,451**	**5,305**	**5,875**	**6,688**	**7,598**	**9,080**	**10,207**	**11,373**
Income Taxes	3	2	14	34	86	262	462	641	807	1,003	1,134	1,317	1,470	1,761	2,028	2,323
% Effective Rate	*6%*	*1%*	*2%*	*4%*	*6%*	*14%*	*16%*	*17%*	*18%*	*19%*	*19%*	*20%*	*19%*	*19%*	*20%*	*20%*
Net Income	**44**	**256**	**744**	**839**	**1,246**	**1,624**	**2,395**	**3,043**	**3,644**	**4,303**	**4,741**	**5,372**	**6,128**	**7,319**	**8,179**	**9,050**
Plus																
After-tax Interest Expense (Income)	27	1	(9)	(33)	(47)	(90)	(108)	(154)	(199)	(278)	(357)	(444)	(541)	(650)	(782)	(932)
Depreciation of PP&E	103	158	172	203	301	353	389	537	606	696	811	938	1,088	1,260	1,451	1,661
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Less																
Change in Working Capital	(155)	(14)	(157)	(167)	(172)	(325)	(163)	(81)	(28)	(299)	(356)	(328)	(219)	(329)	(365)	(376)
% of Change in Sales		*-2%*	*-7%*	*-12%*	*-6%*	*-12%*	*-4%*	*-2%*	*-1%*	*-6%*	*-6%*	*-6%*	*-4%*	*-5%*	*-5%*	*-6%*
Capital Expenditures	250	200	312	312	486	510	497	623	765	906	1,078	1,236	1,437	1,660	1,898	2,149
% of Sales	*10%*	*6%*	*6%*	*4%*	*5%*	*4%*	*3%*	*3%*	*3%*	*3%*	*3%*	*3%*	*3%*	*3%*	*3%*	*3%*
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unlevered Free Cash Flow	**78**	**229**	**750**	**863**	**1,186**	**1,702**	**2,343**	**2,884**	**3,314**	**4,113**	**4,472**	**4,959**	**5,456**	**6,597**	**7,315**	**8,005**

EBITDA	12,099
Sales	68,059
Net Debt (Cash)	(260)
Tesla Diluted Shares	142

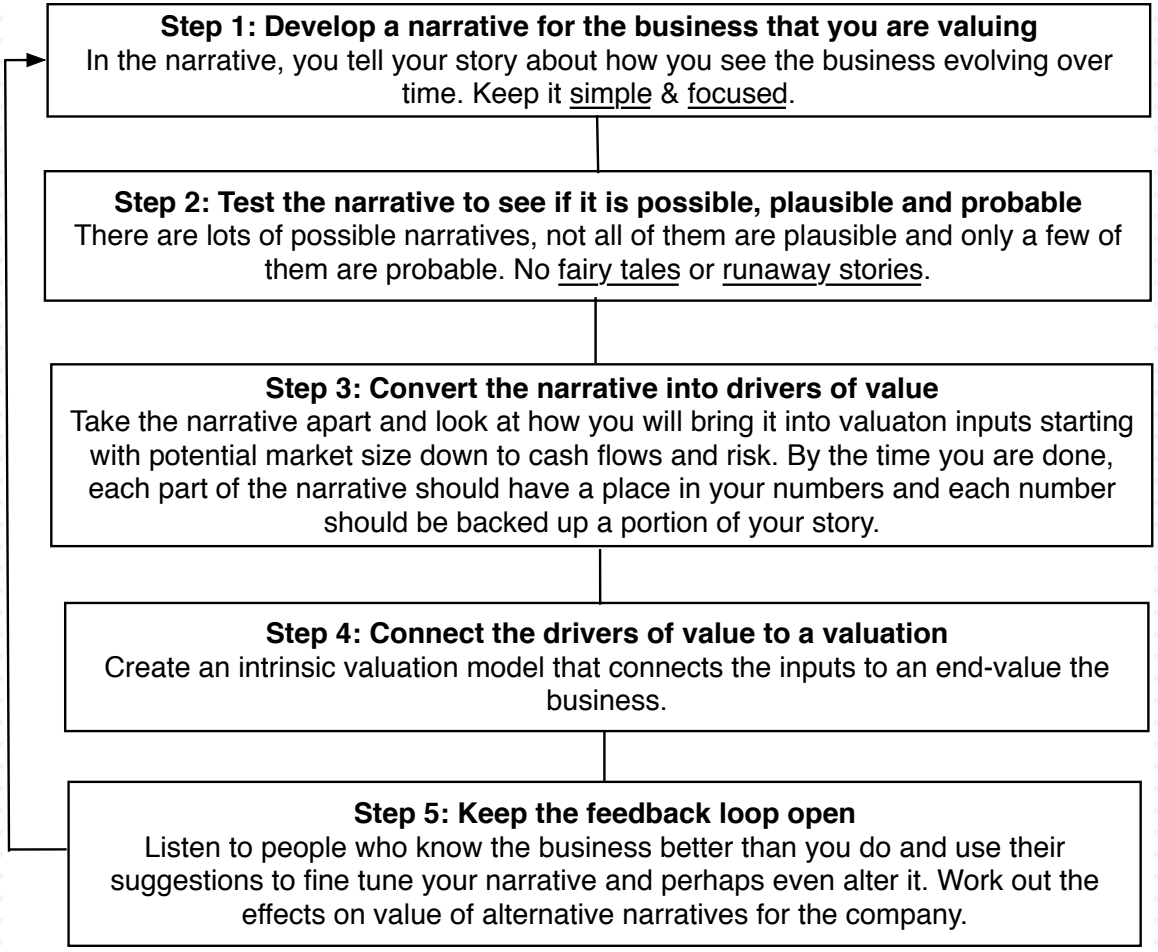
Exit EBITDA High	12.0 x	Exit PPG High	5.0%	Exit P/Sales High	180%
Exit EBITDA Low	8.0 x	Exit PPG Low	3.0%	Exit P/Sales Low	130%

Discount Rate High	13.0%	FY Month of Valuation	1.0 (Beginning of this Month)
Discount Rage Low	9.0%	Month of FY End	12.0 (End of this Month)

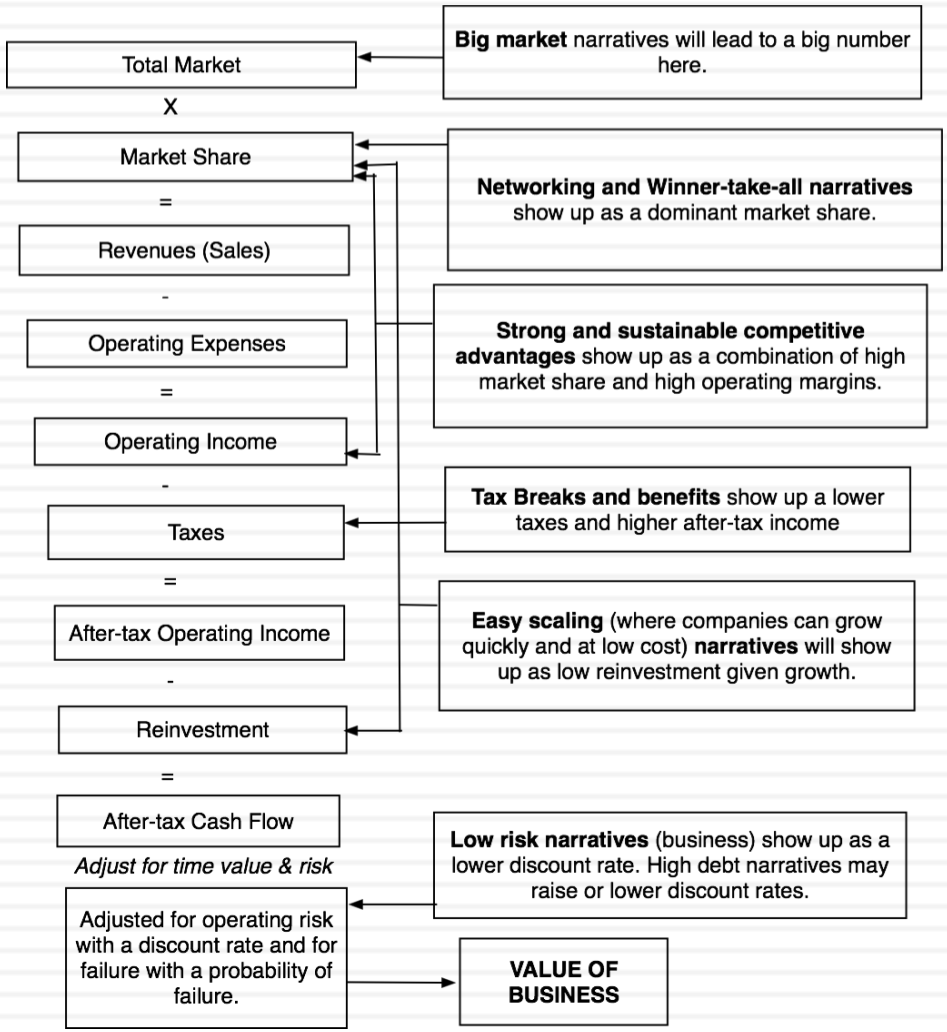
Myth 2: DCF is all about Modeling



From story to numbers and beyond..



Every story has a number!



Uber, the Urban Car Service Company

The Story

Uber is an urban car service company, drawing in new users into car service. It will enjoy local networking benefits while preserving its current revenue sharing (80/20) and capital intensity (don't own cars or hire drivers) model.

The Assumptions

	Base year	Years 1-5	Years 6-10	After year 10	Story link
Total Market	100 billion	Grow 6% a year		Grow 2.5%	Urban Car Service + New users
Gross Market Share	1.50%	1.50%>10%		10%	Local Networking benefits
Revenue Share	20.00%	Stays at 20%		20.00%	Preserve revenue share
Operating Margin	3.33%	3.33% - 40%		40.00%	Strong competitive position
Reinvestment	NA	Sales to capital ratio of 5.00		Reinvestment rate = 10%	Low capital intensity model
Cost of capital	NA	12.00%	12%->8%	8%	90th percentile of US firms
Risk of failure	10% chance of failure (with equity worth zero)				Young company

The Cash Flows

	Total Market	Market Share	Revenues	EBIT (1-t)	Reinvestment	FCFF
1	$106,000	3.63%	$769	$37	$94	$(57)
2	$112,360	5.22%	$1,173	$85	$81	$4
3	$119,102	6.41%	$1,528	$147	$71	$76
4	$126,248	7.31%	$1,846	$219	$64	$156
5	$133,823	7.98%	$2,137	$301	$58	$243
6	$141,852	8.49%	$2,408	$390	$54	$336
7	$150,363	8.87%	$2,666	$487	$52	$435
8	$159,385	9.15%	$2,916	$591	$50	$541
9	$168,948	9.36%	$3,163	$701	$49	$652
10	$179,085	10.00%	$3,582	$860	$84	$776
Terminal year	$183,562	10.00%	$3,671	$881	$88	$793

The Value

Terminal value	$14,418	
PV(Terminal value)	$5,175	
PV (CF over next 10 years)	$1,375	
Value of operating assets =	$6,550	
Probability of failure	10%	
Value in case of failure	$-	
Adjusted Value for operating assets	$5,895	VCs priced Uber at $17 billion at the time.

Ferrari, The Exclusive Club

The Story

Ferrari will remain an exclusive club, selling relatively few cars at very high prices and with no advertising, to the super rich, who are unaffected by economic ups and downs.

The Assumptions

	Base year	Years 1-5	Years 6-10	After year 10	Link to story
Revenues (a)	€ 2,763	CAGR = 4%	4%->0.7%	CAGR = 0.7%	Low growth to stay exclusive
Operating margin (b)	18.20%	18.20%		18.20%	High prices + No advertising costs = Current
Tax rate	33.54%	33.54%		33.54%	Stays unchanged
Reinvestment (c)	1.42	Sales to capital ratio of 1.42		Reinvestment rate = 4.81%	With little growth, little reinvestment
Cost of capital (d)		8.00%	8%->7.5%	7.50%	Lightly affected by macroeconomic forces

The Cash Flows

	Revenues	Operating Margin	EBIT (1-t)	Reinvestment	FCFF
1	€ 2,876	18.20%	€ 348	€ 78	€ 270
2	€ 2,988	18.20%	€ 361	€ 81	€ 281
3	€ 3,108	18.20%	€ 376	€ 84	€ 292
4	€ 3,232	18.20%	€ 391	€ 87	€ 303
5	€ 3,362	18.20%	€ 407	€ 91	€ 316
6	€ 3,474	18.20%	€ 420	€ 79	€ 341
7	€ 3,567	18.20%	€ 431	€ 66	€ 366
8	€ 3,639	18.20%	€ 440	€ 51	€ 389
9	€ 3,689	18.20%	€ 446	€ 35	€ 411
10	€ 3,715	18.20%	€ 449	€ 18	€ 431
Terminal year	€ 3,740	18.20%	€ 452	€ 22	€ 431

The Value

Terminal value	€ 6,835
PV(Terminal value)	€ 3,485
PV (CF over next 10 years)	€ 2,321
Value of operating assets =	€ 5,806
- Debt	€ 623
- Minority Interests	€ 13
+ Cash	€ 1,141
Value of equity	€ 6,311

The Impossible, The Implausible and the Improbable

The Impossible

Bigger than the economy
Assuming Growth rate for company in perpetuity> Growth rate for economy

Bigger than the total market
Allowing a company's revenues to grow so much that it has more than a 100% market share of whatever business it is in.

Profit margin > 100%
Assuming earnings growth will exceeds revenue growth for a long enough period, and pushing margins above 100%

Depreciation without cap ex
Assuming that depreciation will exceed cap ex in perpetuity.

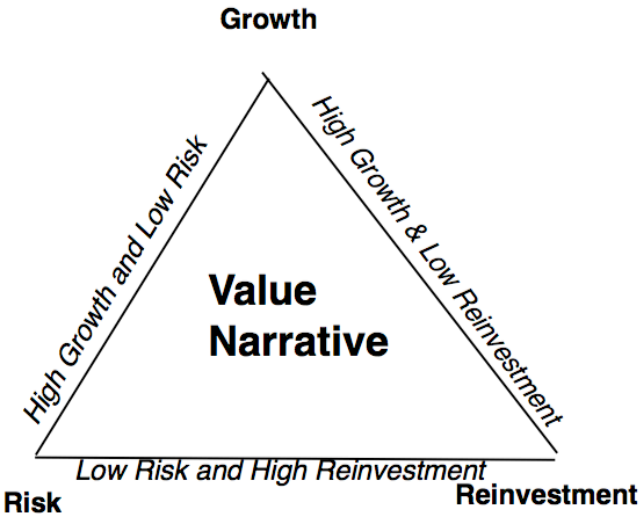
The Implausible

Growth without reinvestment
Assuming growth forever without reinvestment.

Profits without competition
Assuming that your company will grow and earn higher profits, with no competition.

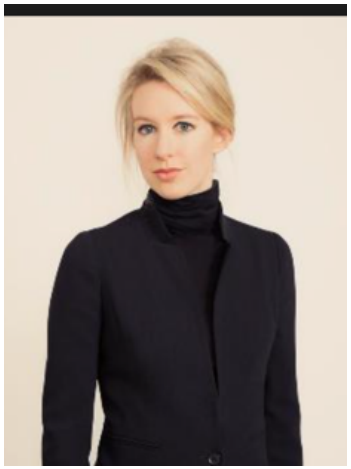
Returns without risk
Assuming that you can generate high returns in a business with no risk.

The Improbable



The Runaway Story: A story so good, you want it to be true!

The Story



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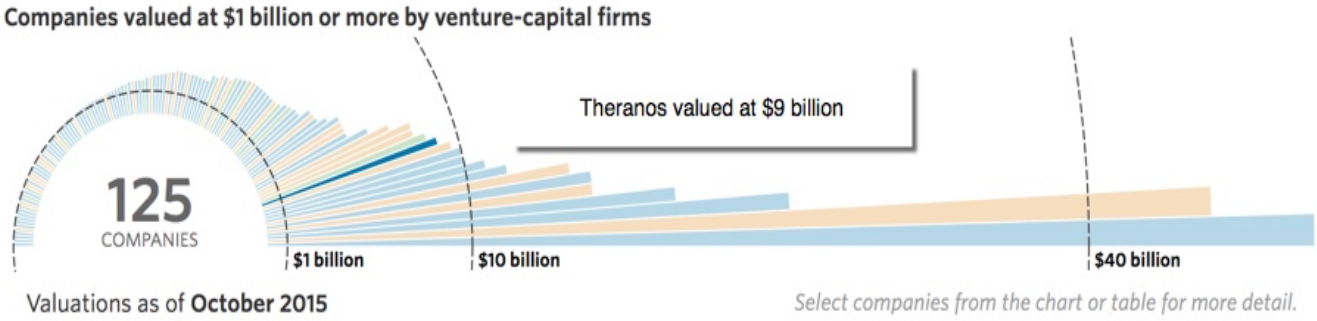
The Checks (?)

Board Member	Designation	Age
Henry Kissinger	Former Secretary of State	92
Bill Perry	Former Secretary of Defense	88
George Schultz	Former Secretary of State	94
Bill Frist	Former Senate Majority Leader	63
Sam Nunn	Former Senator	77
Gary Roughead	Former Navy Admiral	64
James Mattis	Former Marine Corps General	65
Dick Kovocovich	Former CEO of Wells Fargo	72
Riley Bechtel	Former CEO of Bechtel	63
William Foege	Epidemologist	79
Elizabeth Holmes	Founder & CEO, Theranos	31
Sunny Balwani	President & COO, Theranos	NA

+ Money



The Feedback Loop: Keep it open!

- When you tell a story about a company (either explicitly or implicitly), it is natural to feel attached to that story and to defend it against all attacks. Nothing can destroy an investor more than hubris.
- Being open to other views about a company is not easy, but here are some suggestions that may help:
  - Face up to the uncertainty in your own estimates of value.
  - Present the valuation to people who don't think like you do.
  - Create a process where people who disagree with you the most have a say.
  - Provide a structure where the criticisms can be specific and pointed, rather than general.

The Uber Feedback Loop: Bill Gurley

1. Not just car service company.: Uber is a car company, not just a car service company, and there may be a day when consumers will subscribe to a Uber service, rather than own their own cars. It could also expand into logistics, i.e., moving and transportation businesses.
2. Not just urban: Uber can create new demands for car service in parts of the country where taxis are not used (suburbia, small towns).
3. Global networking benefits: By linking with technology and credit card companies, Uber can have global networking benefits.

Valuing Bill Gurley's Uber narrative

	Uber (Gurley)	*Uber (Gurley Mod)*	*Uber (Damodaran)*
Narrative	Uber will expand the car service market substantially, bringing in mass transit users & non-users from the suburbs into the market, and use its networking advantage to gain a dominant market share, while maintaining its revenue slice at 20%.	Uber will expand the car service market substantially, bringing in mass transit users & non-users from the suburbs into the market, and use its networking advantage to gain a dominant market share, while cutting prices and margins (to 10%).	Uber will expand the car service market moderately, primarily in urban environments, and use its competitive advantages to get a significant but not dominant market share and maintain its revenue slice at 20%.
Total Market	$300 billion, growing at 3% a year	$300 billion, growing at 3% a year	$100 billion, growing at 6% a year
Market Share	40%	40%	10%
Uber's revenue slice	20%	10%	20%
Value for Uber	$53.4 billion + Option value of entering car ownership market ($10 billion+)	$28.7 billion + Option value of entering car ownership market ($6 billion+)	$5.9 billion + Option value of entering car ownership market ($2-3 billion)

Figure 9.4: Ferrari, Rev-it-up

The Story

Ferrari will go for higher growth with a lower-cost model aimed at the rich, backing up this strategy with more marketing , but becoming more exposed to macroeconomic forces.

The Assumptions

	Base year	Years 1-5	Years 6-10	After year 10	Link to story
Revenues (a)	€ 2,763	CAGR = 12%	12%->0.7%	CAGR = 0.7%	Higher growth with low-cost model
Operating margin(b)	18.20%	18.2% -> 14.32%		14.32%	75th percentile of auto company margins
Tax rate	33.54%	33.54%		33.54%	Stays unchanged
Reinvestment (c)	1.42	Sales to capital ratio of 1.42		Reinvestment rate = 4.81%	More cars to be produced
Cost of capital (d)		8.00%	8%->7.5%	7.50%	More sensitive to economic conditions

The Cash Flows

	Revenue	Operating Margin	EBIT (1-t)	Reinvestment	FCFF
1	€ 3,095	17.81%	€ 366	€ 233	€ 133
2	€ 3,466	17.42%	€ 401	€ 261	€ 140
3	€ 3,881	17.04%	€ 439	€ 293	€ 147
4	€ 4,348	16.65%	€ 481	€ 323	€ 153
5	€ 4,869	16.26%	€ 526	€ 367	€ 159
6	€ 5,344	15.87%	€ 564	€ 334	€ 230
7	€ 5,743	15.48%	€ 591	€ 281	€ 310
8	€ 6,043	15.10%	€ 606	€ 211	€ 395
9	€ 6,222	14.71%	€ 608	€ 126	€ 482
10	€ 6,266	14.32%	€ 596	€ 31	€ 566
Terminal year	€ 6,309	14.32%	€ 600	€ 35	€ 565

The Value

Terminal value	€ 8,315
PV(Terminal value)	€ 3,906
PV (CF over next 10 years)	€ 1,631
Value of operating assets =	€ 5,537
- Debt	€ 623
- Minority Interests	€ 13
+ Cash	€ 1,141
Value of equity	€ 6,041

Myth 3: A DCF does not work when there is too much uncertainty

- In which of these two cities would you find it easier to forecast the weather?

Weather changeability for Honolulu, Hawaii

Temperature	Last Month	Last Year
Average change in high temperature day-to-day	1.7°	1.2°
Average change in low temperature day-to-day	1.5°	2.0°

Precipitation	Last Month	Last Year
Chance of dry day after a precip day	67%	81%
Chance of precip day after a dry day	7%	13%

Weather changeability for Epping, North Dakota

Temperature	Last Month	Last Year
Average change in high temperature day-to-day	8.5°	7.7°
Average change in low temperature day-to-day	7.1°	8.6°

Precipitation	Last Month	Last Year
Chance of dry day after a precip day	50%	65%
Chance of precip day after a dry day	38%	20%

But the payoff is greatest where there is the most uncertainty…

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Weather changeability for Honolulu, Hawaii

Temperature	Last Month	Last Year
Average change in high temperature day-to-day	1.7°	1.2°
Average change in low temperature day-to-day	1.5°	2.0°

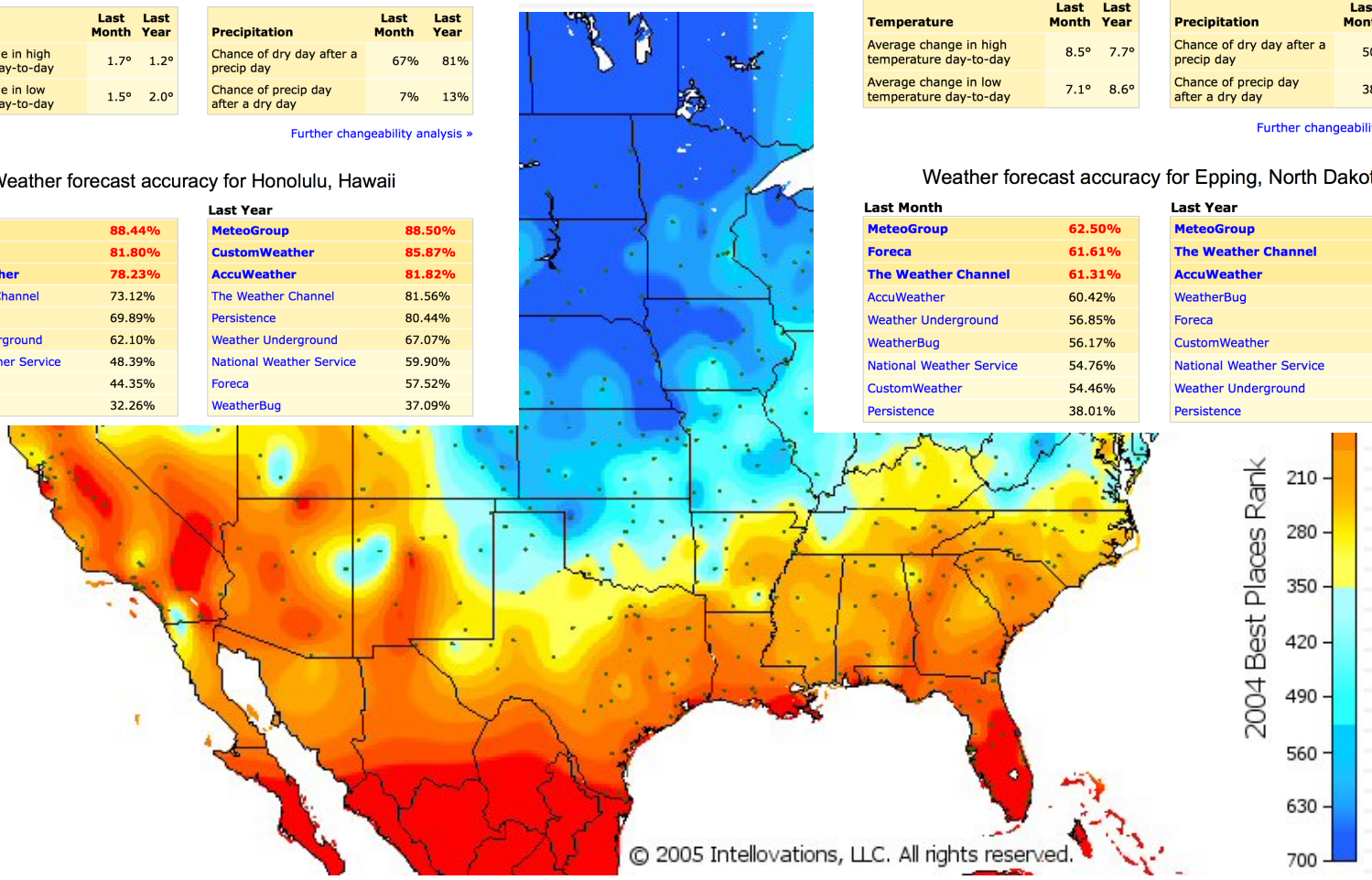
Precipitation	Last Month	Last Year
Chance of dry day after a precip day	67%	81%
Chance of precip day after a dry day	7%	13%

Further changeability analysis »

Weather forecast accuracy for Honolulu, Hawaii

Last Month	
MeteoGroup	**88.44%**
Persistence	**81.80%**
CustomWeather	**78.23%**
The Weather Channel	73.12%
AccuWeather	69.89%
Weather Underground	62.10%
National Weather Service	48.39%
Foreca	44.35%
WeatherBug	32.26%

Last Year	
MeteoGroup	**88.50%**
CustomWeather	**85.87%**
AccuWeather	**81.82%**
The Weather Channel	81.56%
Persistence	80.44%
Weather Underground	67.07%
National Weather Service	59.90%
Foreca	57.52%
WeatherBug	37.09%



Weather changeability for Epping, North Dakota

Temperature	Last Month	Last Year
Average change in high temperature day-to-day	8.5°	7.7°
Average change in low temperature day-to-day	7.1°	8.6°

Precipitation	Last Month	Last Year
Chance of dry day after a precip day	50%	65%
Chance of precip day after a dry day	38%	20%

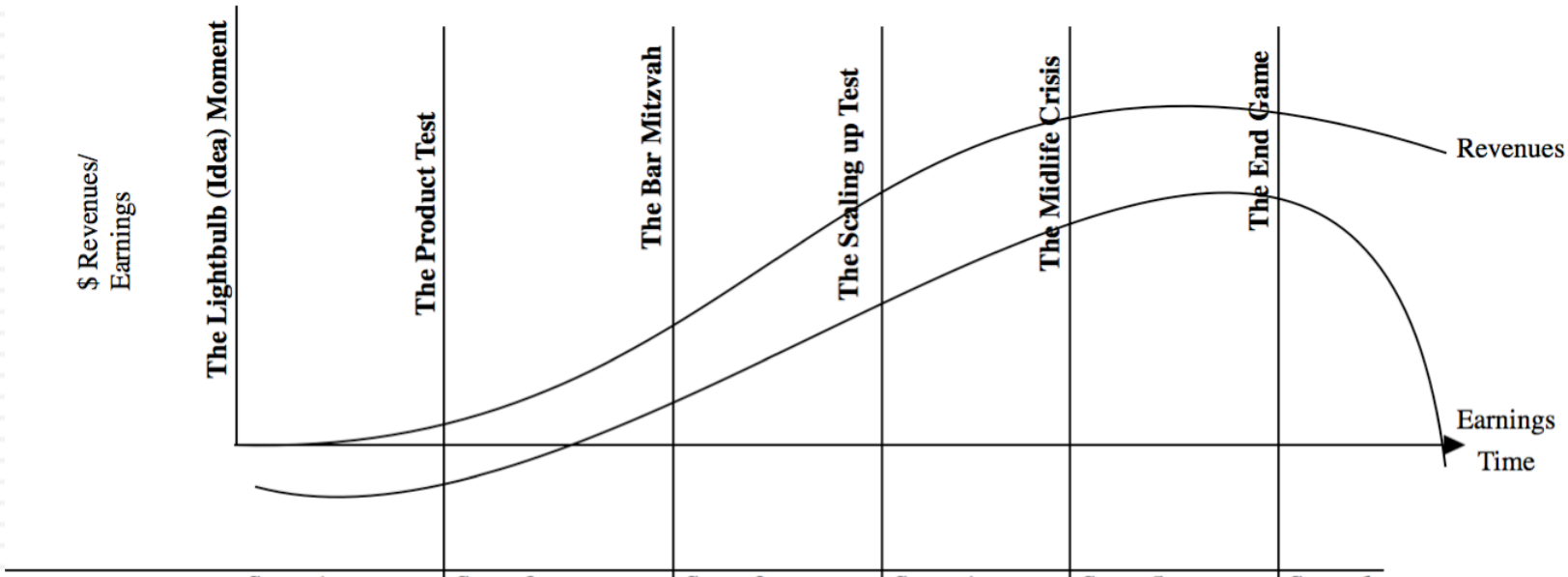
Further changeability analysis »

Weather forecast accuracy for Epping, North Dakota

Last Month	
MeteoGroup	**62.50%**
Foreca	**61.61%**
The Weather Channel	**61.31%**
AccuWeather	60.42%
Weather Underground	56.85%
WeatherBug	56.17%
National Weather Service	54.76%
CustomWeather	54.46%
Persistence	38.01%

Last Year	
MeteoGroup	**66.97%**
The Weather Channel	**66.73%**
AccuWeather	**64.86%**
WeatherBug	64.80%
Foreca	62.75%
CustomWeather	62.70%
National Weather Service	62.64%
Weather Underground	61.38%
Persistence	44.09%

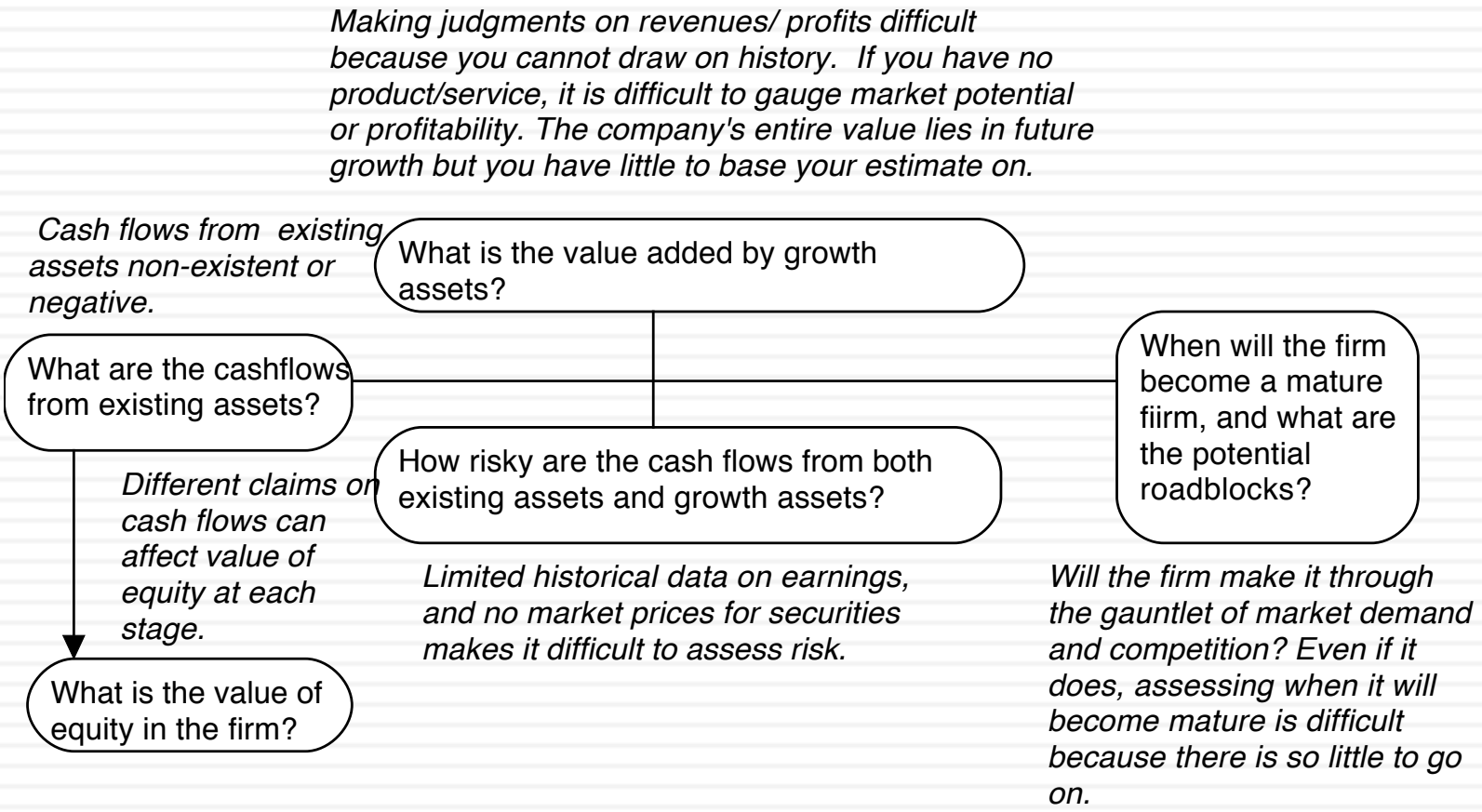
Introducing the corporate life cycle



Growth stage	Stage 1 Start-up	Stage 2 Young Growth	Stage 3: High Growth	Stage 4 Mature Growth	Stage 5 Mature Stable	Stage 6 Decline
Description	Have an idea for a business that meets an unmet need in the market.	Create a business model that converts ideas into potential revenues & earnings	Build the business, converting potential into revenues.	Grow your business, shifting from losses to profits	Defend your business from new competitors & find new markets	Scale down your business as market shrinks.

Valuing a start up is hard to do..

Figure 3: Estimation Issues - Young and Start-up Companies



And the dark side will beckon..

- With young start up companies, you will be told that it is "too difficult" or even "impossible" to value these companies, because there is so little history and so much uncertainty in the future.
- Instead, you will be asked to come over to the "dark side", where
  - You will see value metrics that you have never seen before
  - You will hear "macro" stories, justifying value
  - You will be asked to play the momentum game
- While all of this behavior is understandable, none of it makes the uncertainty go away. You have a choice. You can either hide from uncertainty or face up to it.

Twitter: Setting the table in October 2013

	Last 10K	Trailing 12 month
Revenues	$316.93	$534.46
Operating Income	($77.06)	($134.91)
Adjusted Operating Income		$7.66
Invested Capital		$955.00
Adjusted Operating Margin		1.44%
Sales/ Invested Capital		$0.56

Twitter: Priming the Pump for Valuation

1. Make small revenues into big revenues

	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 online advertising market will be close to $200 billion and Twitter will have about 5.7% ($11.5 billion)

2. Make losses into profits

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

3. Reinvest for growth

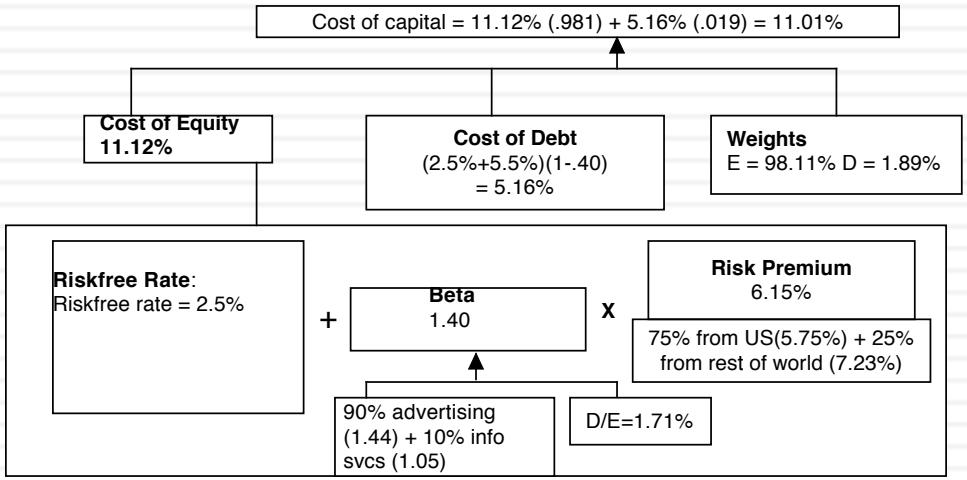
	Sales/ Invested Capital
Twitter (2013)	1.10
Advertising Companies	1.40
Social Media Companies	1.05

My estimate for Twitter: Sales/Capital will be 1.50 for next 10 years

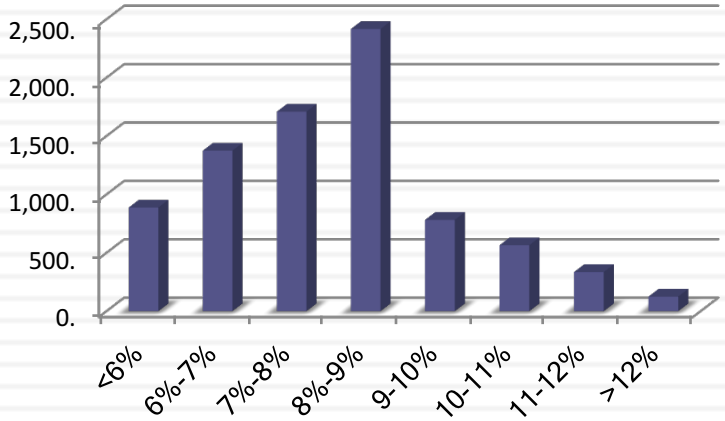
The Cost of Capital for Twitter

Risk in the discount rate

My estimate for Twitter



Cost of Capital: US - Nov '13



0% *Survival Risk* 100%

Probability that the firm will not make it as a going concern

Certain to make it as going concern → *Certain to fail*

My assumption for Twitter

Twitter Pre-IPO Valuation: October 27, 2013

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

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

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

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

Terminal year (11)

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

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

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

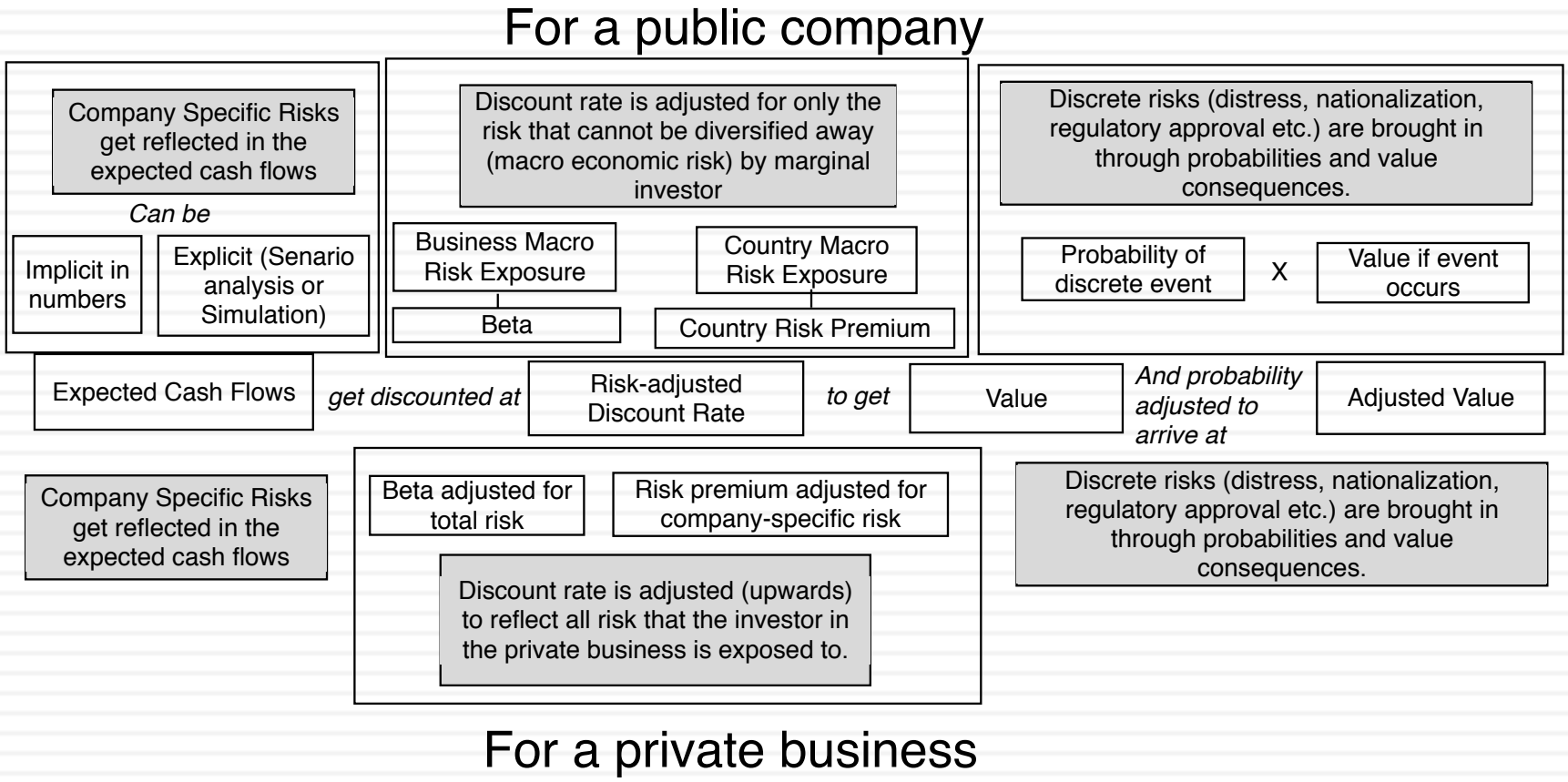
D/E=1.71%

x

Risk Premium
6.15%

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

Myth 4: It is all about the discount rate (and betas)



The Cost of Equity: A Big Picture Perspective

Expectation of cash flows across all scenarios, good and bad. Incorporates all risks that affect the asset / business.

$$\frac{\text{Expected Cash Flows}}{\text{Risk Adjusted Discount Rate}}$$

Discount rate should reflect the risk perceived by the marginal investor in the company

Risk Adjusted Cost of equity	=	Risk free rate in the currency of analysis	+	Relative risk of company/equity in questiion	X	Equity Risk Premium required for average risk equity

Not all risk is created equal…

- 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 models 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.

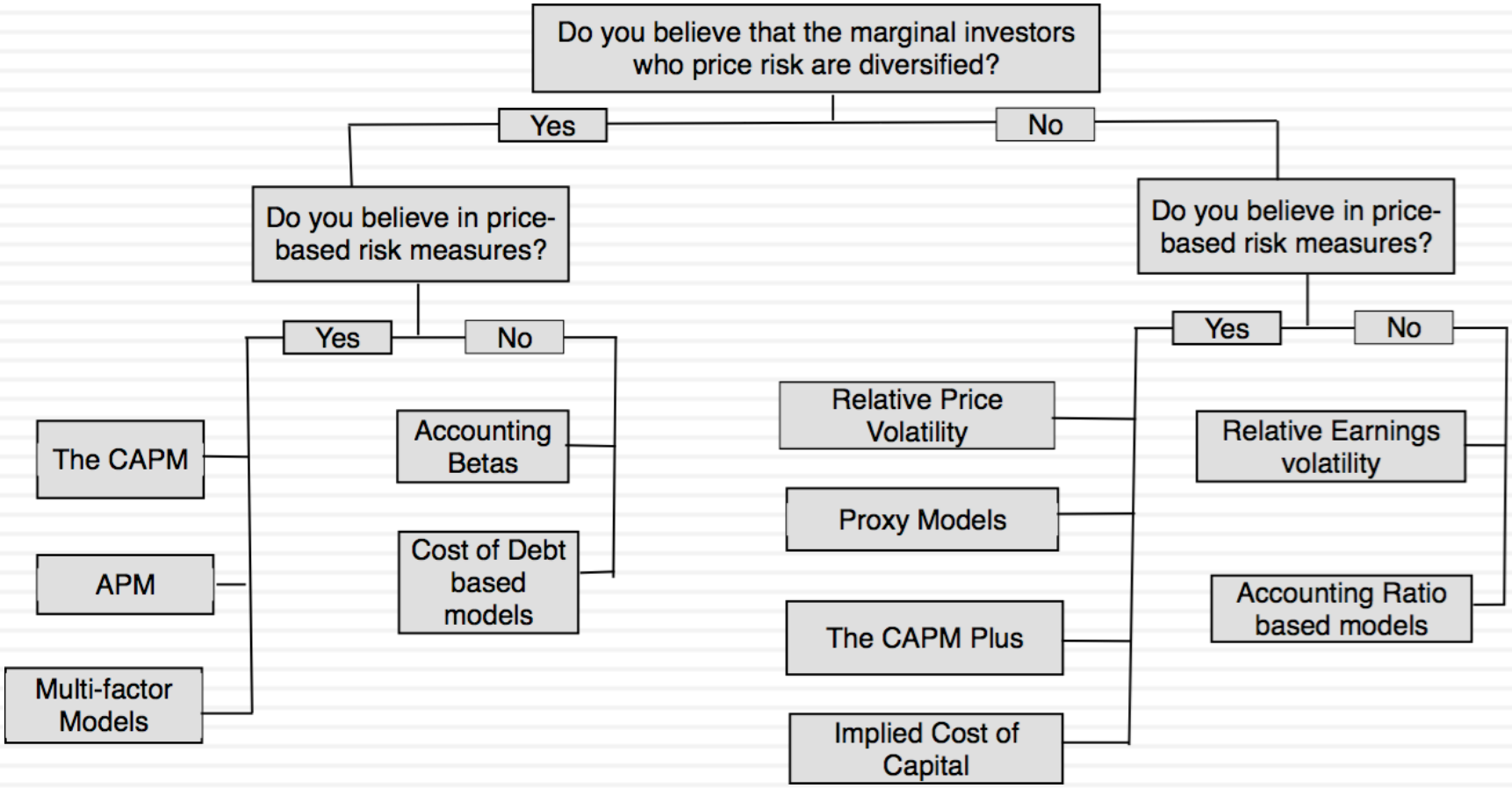
Risk and Cost of Equity: The role of the marginal investor

- Not all risk counts: While the notion that the cost of equity should be higher for riskier investments and lower for safer investments is intuitive, what risk should be built into the cost of equity is the question.
- Risk through whose eyes? While risk is usually defined in terms of the variance of actual returns around an expected return, risk and return models in finance assume that the risk that should be rewarded (and thus built into the discount rate) in valuation should be the risk perceived by the marginal investor in the investment
- The diversification effect: Most risk and return models in finance also assume that the marginal investor is well diversified, and that the only risk that he or she perceives in an investment is risk that cannot be diversified away (i.e, market or non-diversifiable risk). In effect, it is primarily economic, macro, continuous risk that should be incorporated into the cost of equity.

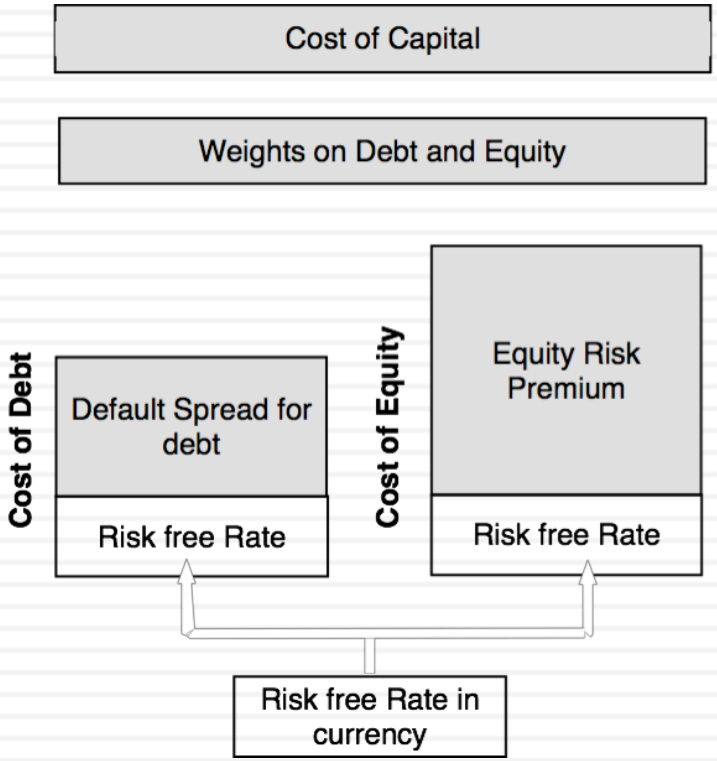
The Cost of Equity: Modern Finance Variations

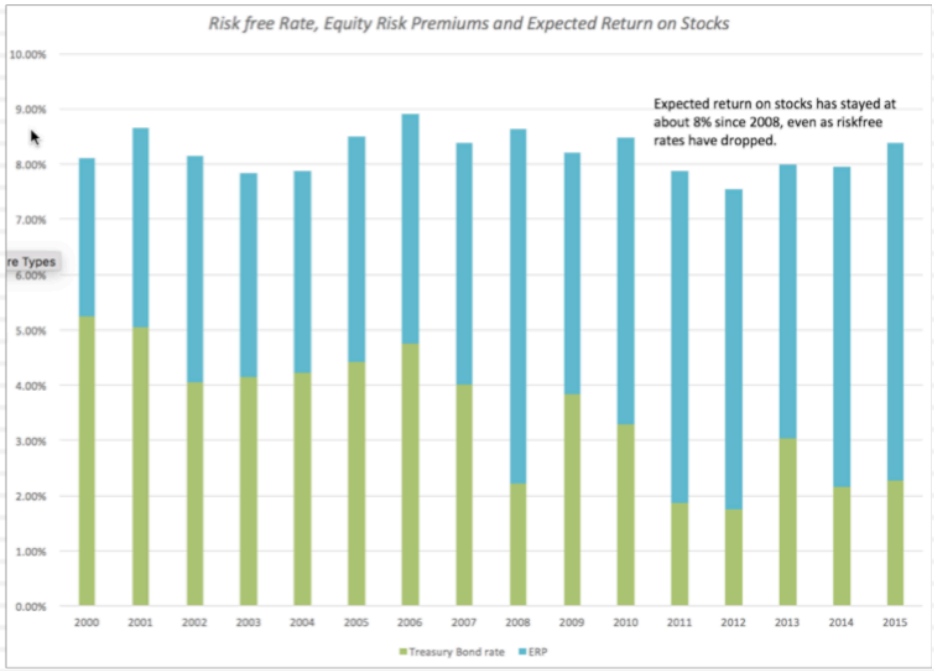
Model	Assumptions	Risk Measure
The CAPM	1. There are no transactions costs. 2. There is no private information.	The marginal investors will be fully diversified and hold a portfolio of every traded asset in the market. The risk of an individual asset will be captured by the risk added to this market portfolio, and measured with a single beta, measured against the market.
The APM	The market prices of stocks are the best indicators of market and firm-specific risks, with market risks affecting all or many stocks and firm-specific risks not.	Historical stock returns can be analyzed to identify the number of market risk factors and the exposure of each stock to that market risk. Since this is a statistical model, the factors will be unnamed. The risk in a stock will be captured with betas, measured against these unnamed factors.
The Multifactor Model	Market risk factors have to be macroeconomic, to affect many stocks at the same time. Looking at how a stock behaves, relative to different macroeconomic variables, should yield clues to its market risk exposure.	The risk in a stock will be captured with betas, measured against specified macroeconomic factors.

Measuring Relative Risk: You don't like betas or modern portfolio theory? No problem.



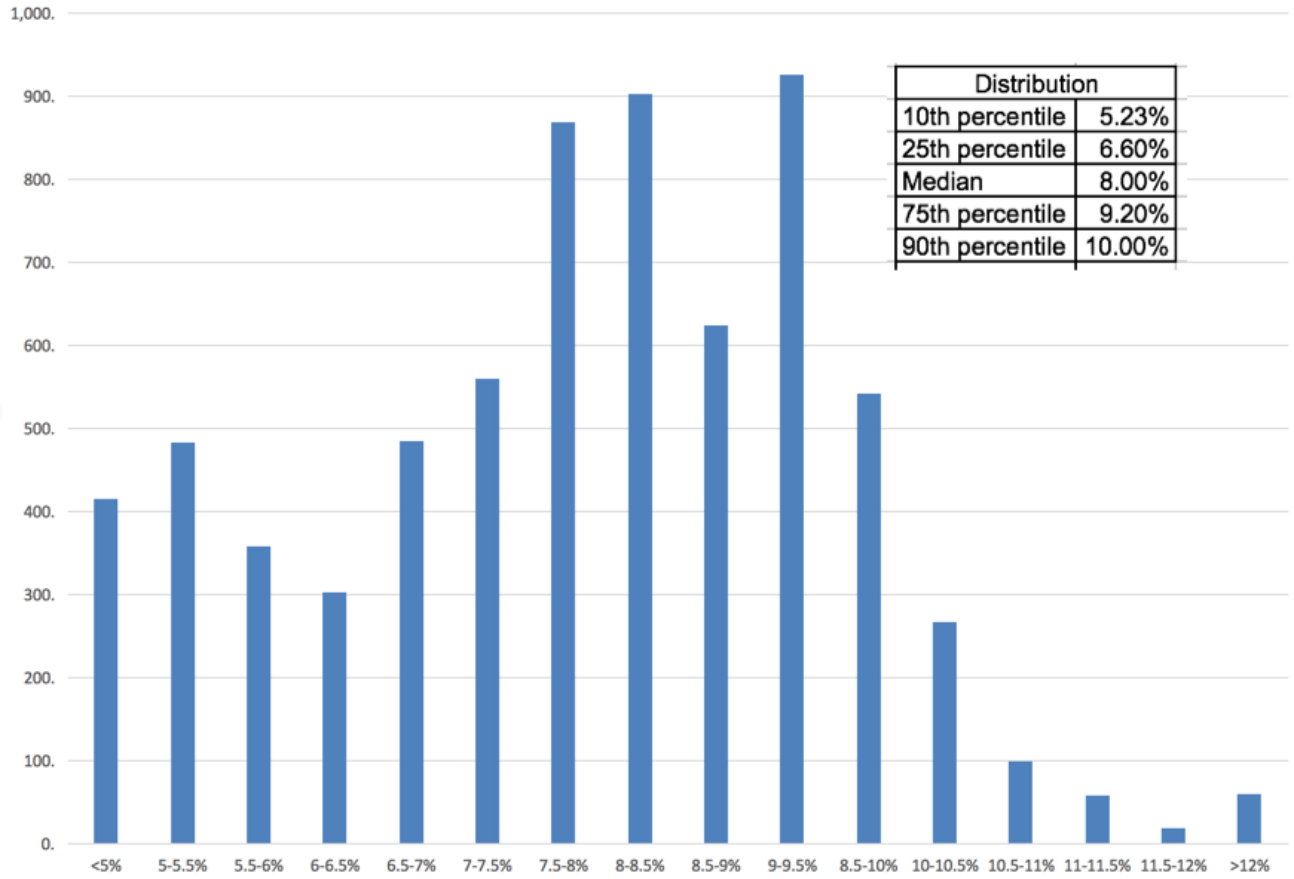
It’s interconnected





And it is not that important..

Figure 16: Cost of Capital for US Companies - January 2016



Distribution	
10th percentile	5.23%
25th percentile	6.60%
Median	8.00%
75th percentile	9.20%
90th percentile	10.00%

Myth 5: It's all in about your terminal value

- A publicly traded firm potentially has an infinite life. The value is therefore the present value of cash flows forever.

$$\text{Value} = \sum_{t=1}^{t=\infty} \frac{CF_t}{(1+r)^t}$$

- Since we cannot estimate cash flows forever, we estimate cash flows for a "growth period" and then estimate a terminal value, to capture the value at the end of the period:

$$\text{Value} = \sum_{t=1}^{t=N} \frac{CF_t}{(1+r)^t} + \frac{\text{Terminal Value}}{(1+r)^N}$$

Risk free Rates and Stable Growth Rates

- **Risk free Rate** = Expected Inflation + Expected Real Interest Rate
- The real interest rate is what borrowers agree to return to lenders in real goods/services.

- **Nominal GDP Growth** = Expected Inflation + Expected Real Growth
- The real growth rate in the economy measures the expected growth in the production of goods and services.

The argument for Risk free rate = Nominal GDP growth

1. In the long term, the real growth rate cannot be lower than the real interest rate, since you have the growth in goods/services has to be enough to cover the promised rate.
2. In the long term, the real growth rate can be higher than the real interest rate, to compensate risk taking. However, as economies mature, the difference should get smaller and since there will be growth companies in the economy, it is prudent to assume that the extra growth comes from these companies.

Period	*10-Year T.Bond Rate*	*Inflation Rate*	*Real GDP Growth*	*Nominal GDP growth rate*	*Nominal GDP - T.Bond Rate*
1954-2015	5.93%	3.61%	3.06%	6.67%	0.74%
1954-1980	5.83%	4.49%	3.50%	7.98%	2.15%
1981-2008	6.88%	3.26%	3.04%	6.30%	-0.58%
2009-2015	2.57%	1.66%	1.47%	3.14%	0.57%

A Practical Reason for using the Risk free Rate Cap – Preserve Consistency

- You are implicitly making assumptions about nominal growth in the economy, with your risk free rate. Thus, with a low risk free rate, you are assuming low nominal growth in the economy (with low inflation and low real growth) and with a high risk free rate, a high nominal growth rate in the economy.
- If you make an explicit assumption about nominal growth in cash flows that is at odds with your implicit growth assumption in the denominator, you are being inconsistent and bias your valuations:
  - If you assume high nominal growth in the economy, with a low risk free rate, you will over value businesses.
  - If you assume low nominal growth rate in the economy, with a high risk free rate, you will under value businesses.

Don't forget that growth has to be earned..

- In the section on expected growth, we laid out the fundamental equation for growth:

  Growth rate = Reinvestment Rate * Return on invested capital

  + Growth rate from improved efficiency

- In stable growth, you cannot count on efficiency delivering growth and you have to reinvest to deliver the growth rate that you have forecast.
- Consequently, your reinvestment rate in stable growth will be a function of your stable growth rate and what you believe the firm will earn as a return on capital in perpetuity:
  - Reinvestment Rate = Stable growth rate/ Stable period ROC = g/ ROC
- Your terminal value equation can then be rewritten as:

$$\text{Terminal Value in year n} = \frac{\text{EBIT}_{n+1}\ (1-t)(1-\frac{g}{ROC})}{(\text{Cost of Capital}-g)}$$

Making this implicit assumption your biggest one..

		Return on capital in perpetuity				
		6%	8%	10%	12%	14%
Growth rate forever	0.0%	$1,000	$1,000	$1,000	$1,000	$1,000
	0.5%	$965	$987	$1,000	$1,009	$1,015
	1.0%	$926	$972	$1,000	$1,019	$1,032
	1.5%	$882	$956	$1,000	$1,029	$1,050
	2.0%	$833	$938	$1,000	$1,042	$1,071
	2.5%	$778	$917	$1,000	$1,056	$1,095
	3.0%	$714	$893	$1,000	$1,071	$1,122

Terminal value for a firm with expected after-tax operating income of $100 million in year n+1 and a cost of capital of 10%.

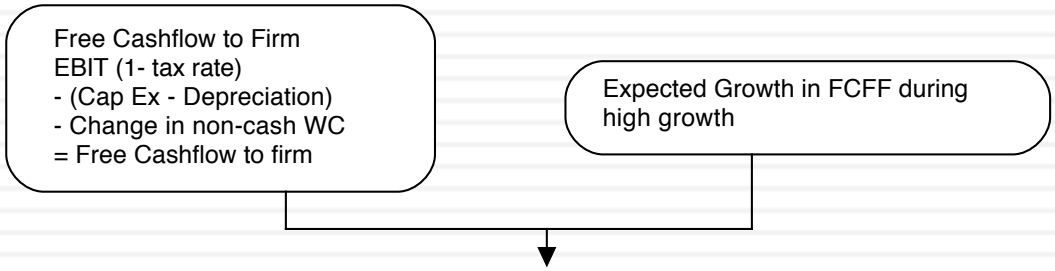
Myth 6: DCFs can be "manipulated"

- 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.

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

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?)

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

If you are the producer of the valuation, here is what you can do about bias..

- Try to minimize exposure to factors that may increase your bias
  - Don't depend on management for your earnings/cash flows
  - Don't tie your compensation to the outcome of the valuation
- Be honest with yourself about your biases.
  - Practice some "Bayesian Valuation", i.e., be aware of yoru priors
- If you are going to bias your valuation, at least have the good sense to try to hide your bias well.

The Myth of Fairness Opinions

	Tesla Valuation/ Pricing		*Solar City Valuation/ Pricing*		*Implied Exchange Ratio*	
	Evercore	*Lazard*	*Evercore*	*Lazard*	*Evercore*	*Lazard*
Cash flows used	**Instructed by Tesla Board** to use 1. Goldman Sachs Equity Research (GSER) forecasts for 2016-2020 2. IBES consensus forecasts		**Solar City supplied forecasts** of cash flows with 1. Unrestricted access to capital markets (LIQ) 2. Restricted access to capital markets (NOLIQ)		"Fair" ratio is 0.124-0.699 Tesla shares/ Solar City share, making the actual offer of 0.11 Tesla shares a good deal for Tesla shareholders	Using midpoints for Tesla value and SCTY (NOLIQ) value, the fair ratio is 0.0819 Tesla shares/ Solar City share, making the actual offer of 0.11 Tesla shares a good deal for Solar City shareholders
Discount Rate	10-12% (Cost of capital)	12-13% (Cost of capital)	12-15% (Cost of equity), on levered cash flows	9.5-10.5% (Cost of capital) on unlevered cash flows		
Terminal Value	6-8% growth rate in perpetuity	10-18 times EBITDA	3-5% growth rate in perpetuity	1.5-3% growth rate in perpetuity		
Value per share	*GSER:* $88.36-$302.21 *IBES:* $132.92-$451.02	*GSER:* $145-$270 *IBES:* Not done/reported	*LIQ:* $37.51-$61.53 *NOLIQ:* $24.76-$42.72	*LIQ:* $18.75-$37.75 *NOLIQ:* $10.75-$23.25		
Compensation Received	*Evercore*: $1.25 million as opinion fee + $5.75 million **contingent on deal happening** *Lazard*: $ 2 million + 0.4% of equity value of Solar City **contingent on deal happening**					

If you are the consumer of the valuation, here is your bias checklist..

A Fair Value Questionnaire

Question	*Green*	*Red*
1. Who is paying you to do this valuation and how much? Is any of the payment contingent on the deal happening?	Payment reflects reasonable payment for valuation services rendered and none of the payment is contingent on outcome	Payment **is disproportionately large**, relative to valuation services provided, and/or a **large portion of it is contingent on deal occurring**.
2. Where are you getting the cash flows that you are using in this valuation?	**Appraiser estimates** revenues, operating margins and cash flows, **with input from management** on investment and growth plans.	Cash flows **supplied by management/** board of company.
3. Are the cash flows internally consistent? 	1. Currency: Cash flows & discount rate are in **same currency**, with same inflation assumptions. 2. Claim holders: Cash flows are to **equity (firm)** and discount rate is cost **of equity (capital)**. 3. Operations: **Reinvestment, growth and risk assumptions** matched up.	**No internal consistency tests** run and/or **DCF littered with inconsistencies**, in currency and/or assumptions. - High growth + Low reinvestment - Low growth + High reinvestment - High inflation in cash flows + Low inflation in discount rate
4. What discount rate are you using in your valuation?	A cost of equity (capital) that **starts with a sector average** and is **within the bounds of what is reasonable** for the sector.	A cost of equity (capital) that falls **outside the normal range for a sector**, with no credible explanation for difference.
5. How are you applying closure in your valuation?	A terminal value that is estimated with a **perpetual growth rate < growth rate of the economy** and reinvestment & risk to match.	A terminal value based upon a **perpetual growth rate > economy** or a **multiple** (of earnings or revenues) that is **not consistent with a healthy, mature** firm.
6. What valuation garnishes have you applied?	**None.**	A **large dose of premiums** (control, synergy etc.) pushing up value or a **mess of discounts** (illiquidity, small size etc.) pushing down value.
7. What does your final judgment in value look like?	A **distribution of values**, with a base case value and statistics.	A **range of value so large** that any price can be justified.

Myth 7: You cannot value the “intangibles”

- 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

Valuing a Franchise: Star Wars

	Add-on $ per Box Office $
Streaming/Video	$1.20
Toys & Merchandise	$2.00
Books/eBooks	$0.20
Gaming	$0.50
Other	$0.50

Add on $ per box office $

Star Wars Franchise Valuation: December 2015

Main Movies
World Box office of $1.5 billion, adjusted for 2% inflation.

Spin Off Movies
World Box office is 50% of main movies.

	Main Star Wars Movies			*Star Wars Spin offs*		
	Star Wars VII	*Star Wars VIII*	*Star Wars IX*	*Rogue One*	*Hans Solo?*	*Boba Fett?*
Years from now	0.0	2.0	4.0	1.0	3.0	5.0
Movies - Revenues	$2,000	$2,081	$2,165	$1,020	$1,061	$1,104
Streaming/Video - Revenues	$2,400	$2,497	$2,598	$1,224	$1,273	$1,325
Toys & Merchandise - Revenues	$4,000	$4,162	$4,330	$2,040	$2,122	$2,208
Books/eBooks - Revenues	$400	$416	$433	$204	$212	$221
Gaming - Revenues	$1,000	$1,040	$1,082	$510	$531	$552
Other - Revenues	$1,000	$1,040	$1,082	$510	$531	$552
Total - Revenues	$10,800	$11,236	$11,690	$5,508	$5,731	$5,962
After-tax Operating Income (movies)	$ 282	$ 293	$ 305	$ 144	$ 150	$ 156
After-tax Operating Income (non-movies)	$ 924	$ 961	$ 1,000	$ 471	$ 490	$ 510
Present Value	$ 1,206	$ 1,083	$ 973	$ 572	$ 514	$ 461

Operating Margin
20.14% for movies
15% for non-movies
30% tax rate

Discounted back @ 7.61% cost of capital of entertainment companies

Value of new Star Wars movies =	$4,809
Value of continuing income =	$5,163
Value of Star Wars =	$9,972

Assumes that revenues from add ons continue after 2020, growing at 2% a year, with 15% operating margin

Myth 8: DCFs should yield "conservative" estimates of value

- Many old time value investing books recommend that you be conservative in your estimate of value, essentially arguing that if you are going to make a mistake, you are better off under valuing a company than over valuing it.
- Mechanically, this translates in your DCF valuation into:
  - Using "lower" than expected cash flows, either by haircutting the cash flows or counting only the growth that you believe is certain. At the limit, this often takes the form of using only the cash flows that you see (dividends).
  - Use "higher" discount rates than you should, given the risk and market price for risk.
  - Making post-valuation adjustments to value for other concerns (illiquidity, corporate governance) that you have as an investor.

The cost to being conservative in your value estimates

		The Truth	
		Stock is under priced	*Stock is over priced*
Your Analysis	*Stock is under priced*	A Good Buy	Type 1 investment error: Buy the wrong stock or fail to sell the right stock.
	Stock is over priced	Type 2 investment error: Fail to buy the right stock or sell the wrong one.	A Good Sell

Reduce the likelihood of Type 1 errors

Increase the likelihood of Type 2 errors

Underestimate cashflows

Under estimate the value of the company

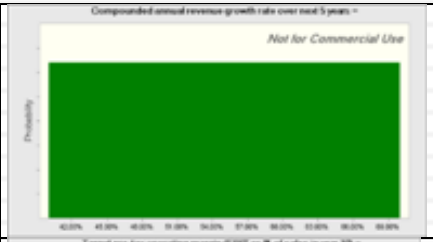
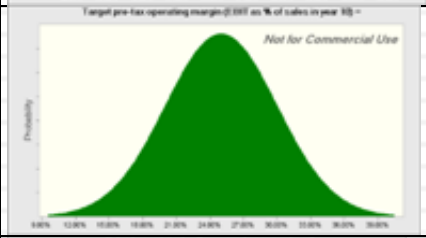
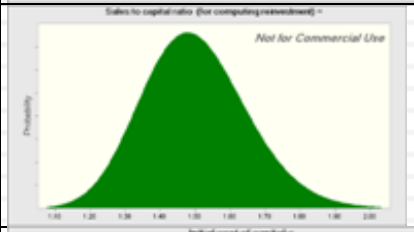
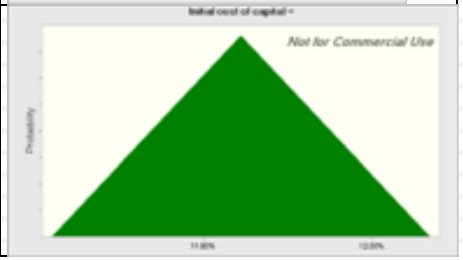
Overestimate discount rate

Does the trade off work in your favor?
1. Are you more invested in cash than you would like to be?
2. Are you a long only investor or can you sell short?
2. Do you earn a return on your portfolio (cash included) that is more than you would have made investing passively?

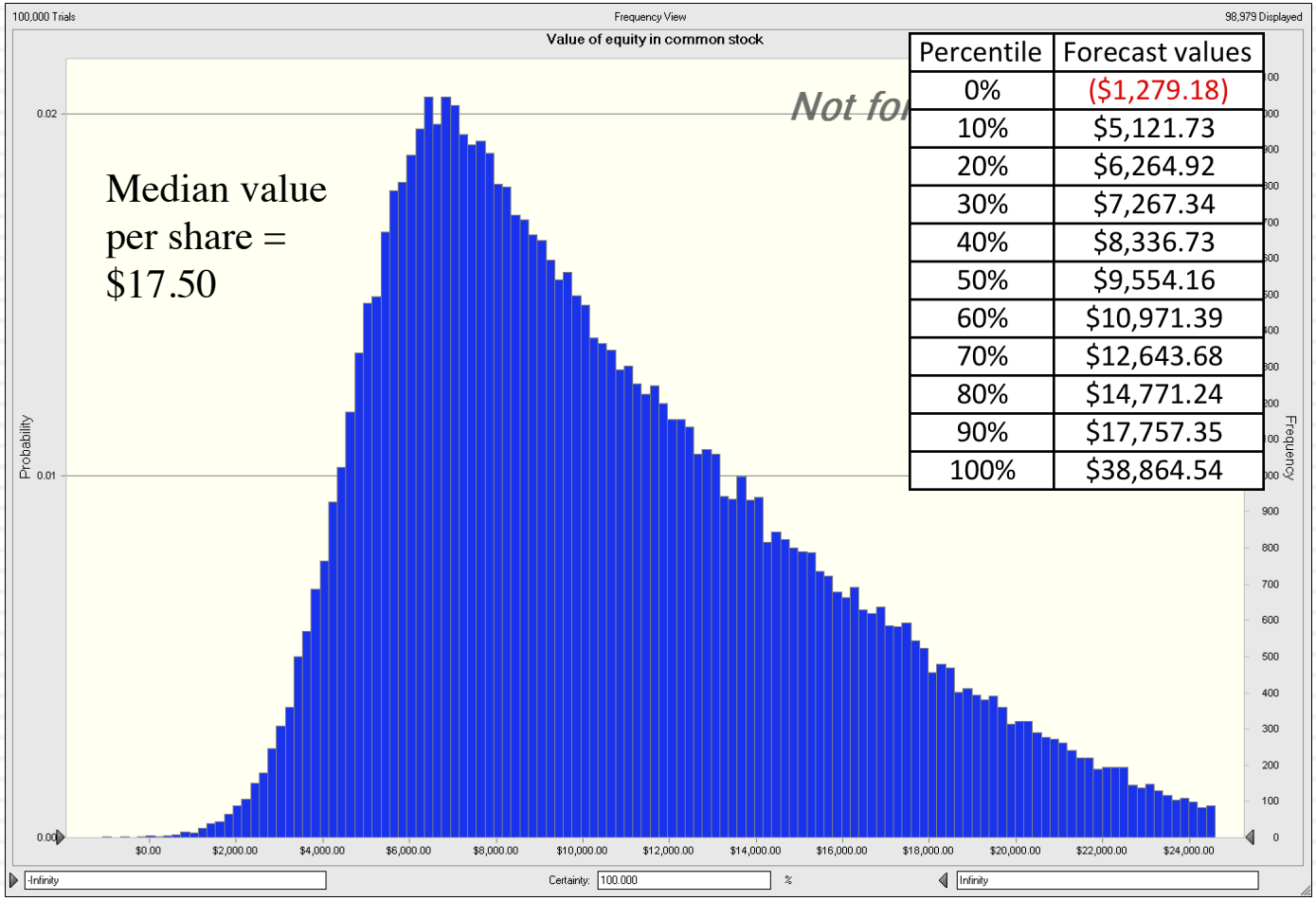
Myth 9: A DCF is static

- Uncertainty at a point in time: In standard valuation, you are forced to make point estimates for inputs where you are uncertain about values.
  - In statistical terms, you are being asked to compress a probability distribution about a variable into an expected value.
  - You then obtain a single estimate of value, based upon your base case or expected values.
- Uncertainty across time: That value will change over time, as new information comes out about the firm and macro economic conditions change.

a. Facing up to uncertainty at time of valuation: The Twitter Valuation

Revenue Growth Rate Distribution: Uniform Expected Value = 55% Minimum Value: 40% Maximum Value: 70%	
Target Operating Margin Distribution: Normal Expected Value = 25% Standard Deviation = 5%	
Sales to Capital Ratio Distribution: Lognormal Expected value: 1.50 Standard deviation: 0.15	
Cost of Capital Distribution: Triangular Expected value: 11.22% Minimum value: 10.02% Maximum value: 12.22%	

With the consequences for equity value… Twitter at the time of its IPO (2013)



Percentile	Forecast values
0%	($1,279.18)
10%	$5,121.73
20%	$6,264.92
30%	$7,267.34
40%	$8,336.73
50%	$9,554.16
60%	$10,971.39
70%	$12,643.68
80%	$14,771.24
90%	$17,757.35
100%	$38,864.54

b. Uncertainty across time: How narratives change

Narrative Break/End	Narrative Shift	Narrative Change (Expansion or Contraction)
Events, external (legal, political or economic) or internal (management, competitive, default), that can cause the narrative to break or end.	Improvement or deterioration in initial business model, changing market size, market share and/or profitability.	Unexpected entry/success in a new market or unexpected exit/failure in an existing market.
Your valuation estimates (cash flows, risk, growth & value) are no longer operative	Your valuation estimates will have to be modified to reflect the new data about the company.	Valuation estimates have to be redone with new overall market potential and characteristics.
Estimate a probability that it will occur & consequences	Monte Carlo simulations or scenario analysis	Real Options

a. A Story Break? Valeant, the Star…

Valeant continues on its path of acquisition-driven growth, with a compounded revenue growth of 12% a year for the next 10 years.

	0	1	2	3	4	5	6	7	8	9	10
Revenues	$ 9,990	$ 11,189	$ 12,532	$ 14,035	$ 15,720	$ 17,606	$ 19,719	$ 22,085	$ 24,735	$ 27,703	$ 31,028
Operating Margin	49.82%	49.82%	49.82%	49.82%	49.82%	49.82%	49.82%	49.82%	49.82%	49.82%	49.82%
Operating Income	$ 4,977	$ 5,574	$ 6,243	$ 6,992	$ 7,832	$ 8,771	$ 9,824	$ 11,003	$ 12,323	$ 13,802	$ 15,458
After-tax Operating Income		$ 4,654	$ 5,213	$ 5,838	$ 6,539	$ 7,323	$ 8,202	$ 9,186	$ 10,289	$ 11,523	$ 12,906
- Reinvestment	$ 2,506	$ 2,807	$ 3,144	$ 3,521	$ 3,944	$ 4,417	$ 4,947	$ 5,540	$ 6,205	$ 6,950	$ 3,344
FCFF	$ (2,506)	$ 1,847	$ 2,069	$ 2,317	$ 2,595	$ 2,906	$ 3,255	$ 3,646	$ 4,083	$ 4,573	$ 9,562
Terminal Value											$ 170,555
Value today @7.72%	$ 101,258										
+ Cash	$ 1,420										
- Debt	$ 30,883										
Value of Equity	$ 71,795										
Value per share	**208.16**										

Operating margin settles in at 49.82%, Valeant's operating margin (prior to acquisition expenses)

Effective tax rate stays at 16.51%.

Valeant maintains its current ROIC of 19.90% as its grows, with reinvestment rate =g/ 19.90%.

Valeant's continues its use of debt in funding acquisitions. This creates a tax benefit, without substantial default risk. Cost of capital for the firm is 7.72%.

To Valeant, the Dog!

Valeant settles for mature drug company growth, with a compounded revenue growth of 3% a year for the next 10 years. Accounting adjustments reduce base year revenues by 2%.

	0	1	2	3	4	5	6	7	8	9	10
Revenues	$ 10,346	$ 10,656	$ 10,976	$ 11,305	$ 11,645	$ 11,994	$ 12,354	$ 12,724	$ 13,106	$ 13,499	$ 13,904
Operating Margin	40.39%	40.39%	40.39%	40.39%	40.39%	40.39%	40.39%	40.39%	40.39%	40.39%	40.39%
Operating Income	$ 4,179	$ 4,304	$ 4,433	$ 4,566	$ 4,703	$ 4,844	$ 4,990	$ 5,139	$ 5,294	$ 5,452	$ 5,616
After-tax Operating Income		$ 3,443	$ 3,546	$ 3,653	$ 3,762	$ 3,875	$ 3,991	$ 4,111	$ 4,234	$ 4,362	$ 4,492
- Reinvestment	$ 627	$ 645	$ 665	$ 685	$ 705	$ 726	$ 748	$ 771	$ 794	$ 817	$ 976
FCFF	$ (627)	$ 2,798	$ 2,882	$ 2,968	$ 3,057	$ 3,149	$ 3,243	$ 3,341	$ 3,441	$ 3,544	$ 3,516
Terminal Value											$ 55,193
Value today @7.72%	$ 45,051										
Value adjusted for default	$ 44,488										
+ Cash	$ 1,420										
- Debt	$ 30,883										
Value of Equity	$ 15,024										
Value per share	**$ 43.56**										

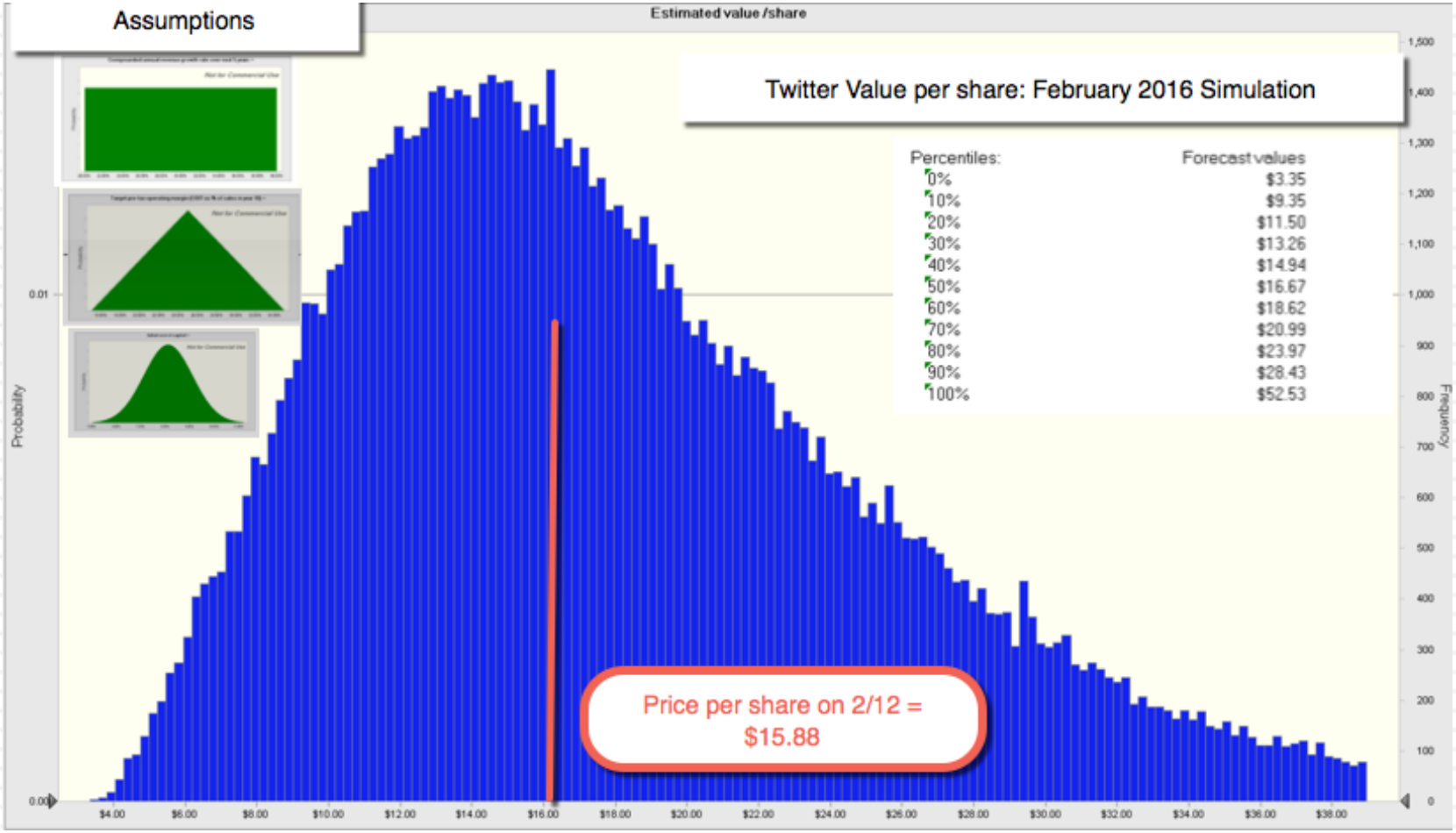
Operating margin drops to 40.39%, as half of acquisition expenses are moved back to operating expenses.

Effective tax rate rises to 20% as acquisition tax shields dissipate.

Valeant maintains its ROIC of 16.01% as its grows, with reinvestment rate =g/ 16.01%.

Valeant's debt is exposing the company to default risk, as rating drops to below investment grade. Cost of capital for the firm is 8.29%. There is also a 5% chance that the firm will default (and receive only 75% of fair value.)

b. A Stagnant Story? Twitter in February 2016



Facebook, the Google Wannabe

The Story

Facebook is a social media company that will use its giant user base to become an online advertising success story, almost as big as Google. Its growth path and profitability will resemble Google in its early years.

The Assumptions

	Base year	Years 1-5	Years 6-10	After year 10	Link to story
Revenues (a)	$3,711	CAGR = 40%	40%->2%	CAGR = 2%	Grow like Google
Operating margin (b)	45.68%	45.68%->35%		35.00%	Competive pressures
Tax rate	40.00%	40.00%		40.00%	Leave unchanged
Reinvestment (c)	NA	Sales to capital ratio of 1.50		Reinvestment rate = 10%	Industry average sales/capital
Cost of capital (d)		11.07%	11.07%-8%	8.00%	Online Advertising Business Risk

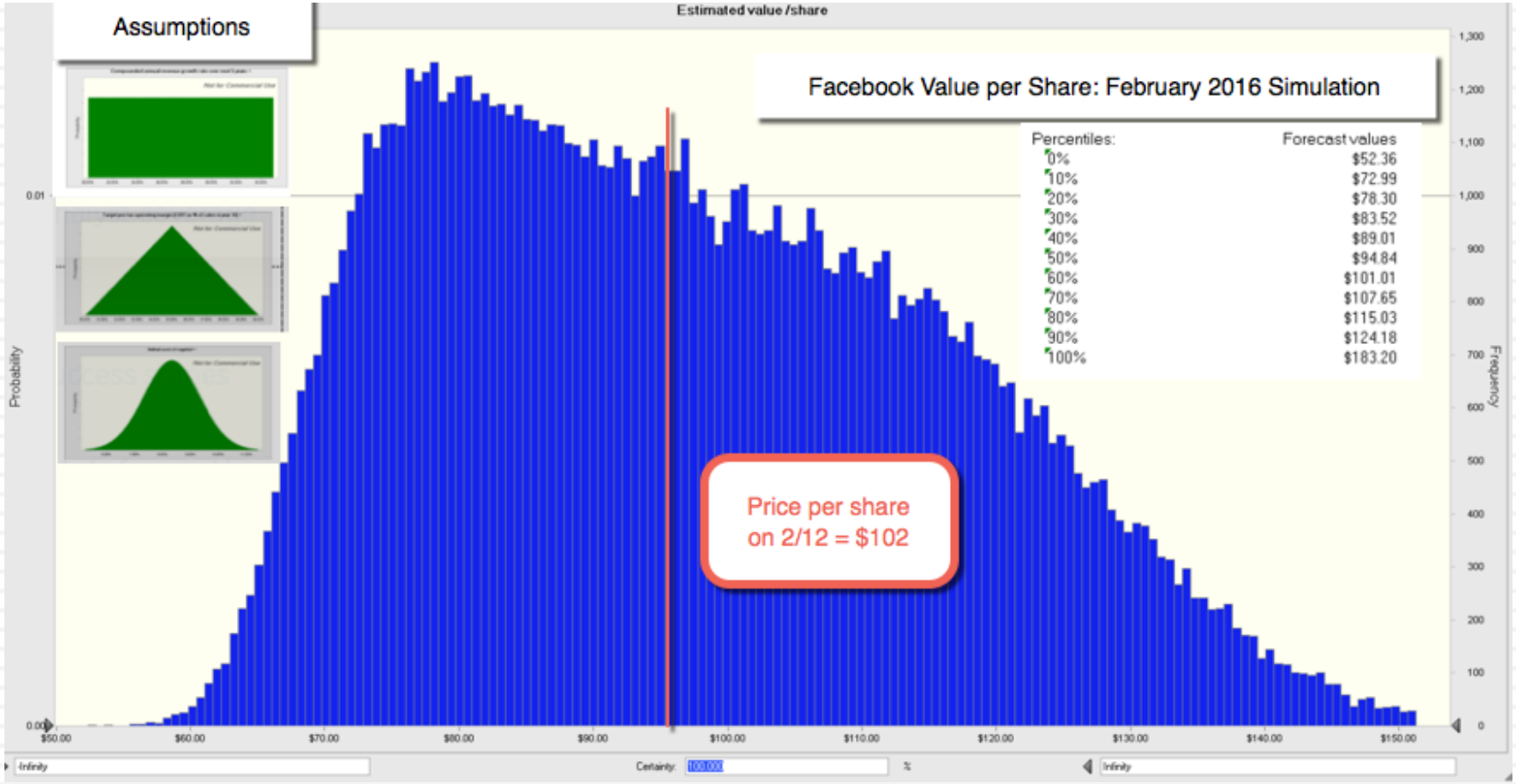
The Cash Flows

	Revenues	Operating Margin	EBIT (1-t)	Reinvestment	FCFF
1	$5,195	44.61%	$1,391	$990	$401
2	$7,274	43.54%	$1,900	$1,385	$515
3	$10,183	42.47%	$2,595	$1,940	$655
4	$14,256	41.41%	$3,542	$2,715	$826
5	$19,959	40.34%	$4,830	$3,802	$1,029
6	$26,425	39.27%	$6,226	$4,311	$1,915
7	$32,979	28.20%	$7,559	$4,369	$3,190
8	$38,651	37.14%	$8,612	$3,782	$4,830
9	$42,362	36.07%	$9,167	$2,474	$6,694
10	$43,209	35.00%	$9,074	$565	$9,509
Terminal year	$44,073	35.00%	$9,255	$926	$8,330

The Value

Terminal value	$138,830	
PV(Terminal value)	$52,832	
PV (CF over next 10 years)	$13,135	
Value of operating assets =	$65,967	
- Debt	$1,215	
+ Cash	$1,512	
Value of equity	$66,284	
- Value of options	$3,088	
Value of equity in common stock	$63,175	
Number of shares	2,330.90	
Estimated value /share	$27.07	The offering price was set at $28/share

c. A Story Shift? My Facebook Valuation in February 2016



Uber: The September 2015 Update

Input	*June 2014*	*September 2015*	*Rationale*
Total Market	$100 billion; Urban car service	$230 billion; Logistics	Market is broader, bigger & more global than I thought it would be. Uber's entry into delivery & moving businesses is now plausible, perhaps even probable.
Growth in market	Increase market size by 34%; CAGR of 6%.	Double market size; CAGR of 10.39%.	New customers being drawn to car sharing, with more diverse offerings.
Market Share	10% (Local Networking)	25% (Weak Global Networking)	Higher cost of entry will reduce competitors, but remaining competitors have access to capital & in Asia, the hometown advantage.
Slice of gross receipts	20% (Left at status quo)	15%	Increased competition will reduce car service company slice.
Operating margin	40% (Low cost model)	25% (Partial employee model)	Drivers will become partial employees, higher insurance and regulatory costs.
Cost of capital	12% (Ninth decile of US companies)	10% (75th percentile of US companies)	Business model in place and substantial revenues.
Probability of failure	10%	0%	Enough cash on hand to find off threats to survival.
Value of equity	**$5.9 billion**	**$23.4 billion**	**Value increased more than four fold.**

Myth 10: DCFs are academic

Tools for intrinsic analysis
- Discounted Cashflow Valuation (DCF)
- Intrinsic multiples
- Book value based approaches
- Excess Return Models

Tools for "the gap"
- Behavioral finance
- Price catalysts

Tools for pricing
- Multiples and comparables
- Charting and technical indicators
- Pseudo DCF

Value of cashflows, adjusted for time and risk

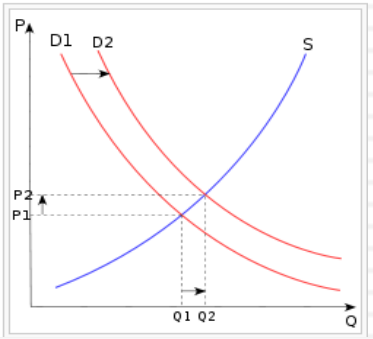
INTRINSIC VALUE

Value

THE GAP
Is there one?
Will it close?

Price

PRICE



Drivers of intrinsic value
- Cashflows from existing assets
- Growth in cash flows
- Quality of Growth

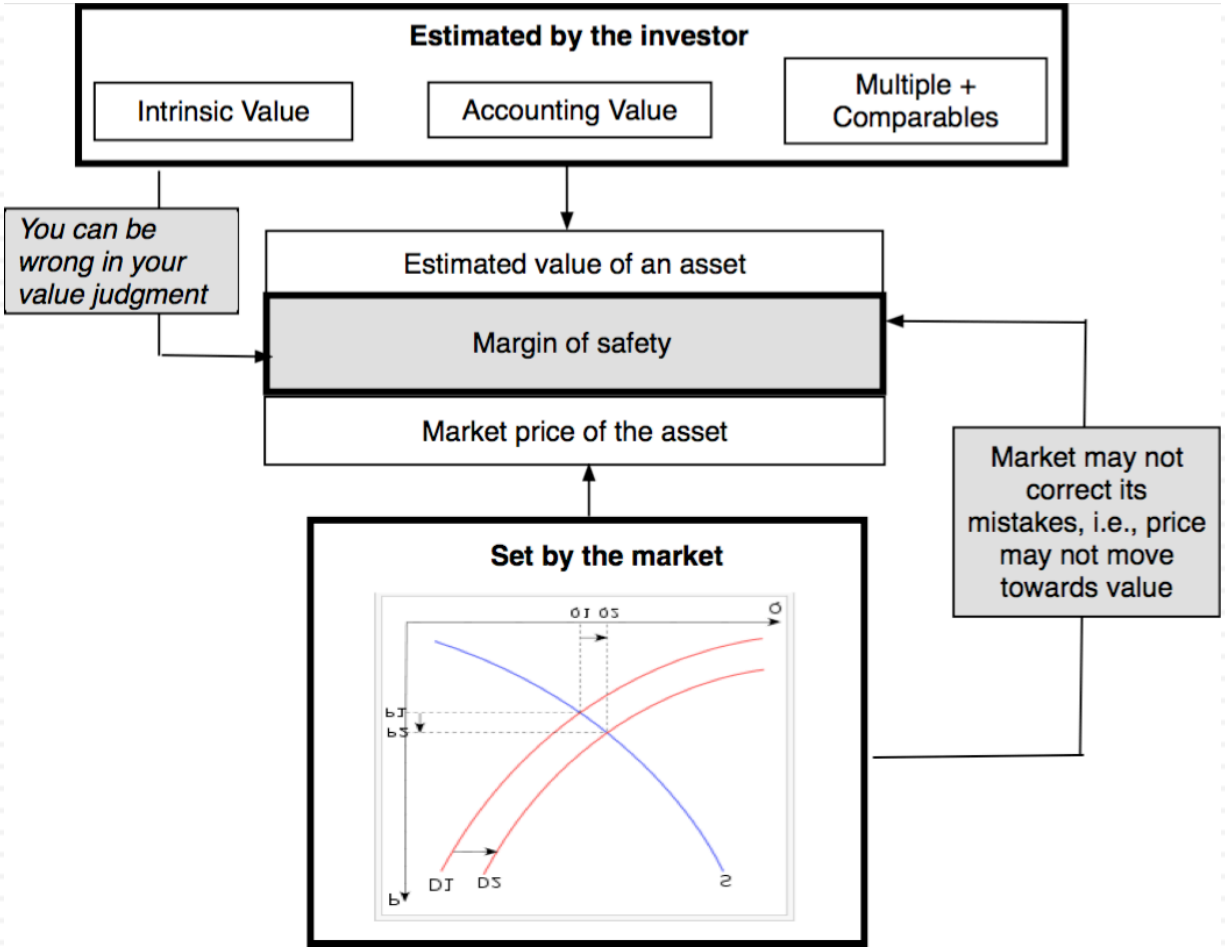
Drivers of "the gap"
- Information
- Liquidity
- Corporate governance

Drivers of price
- Market moods & momentum
- Surface stories about fundamentals

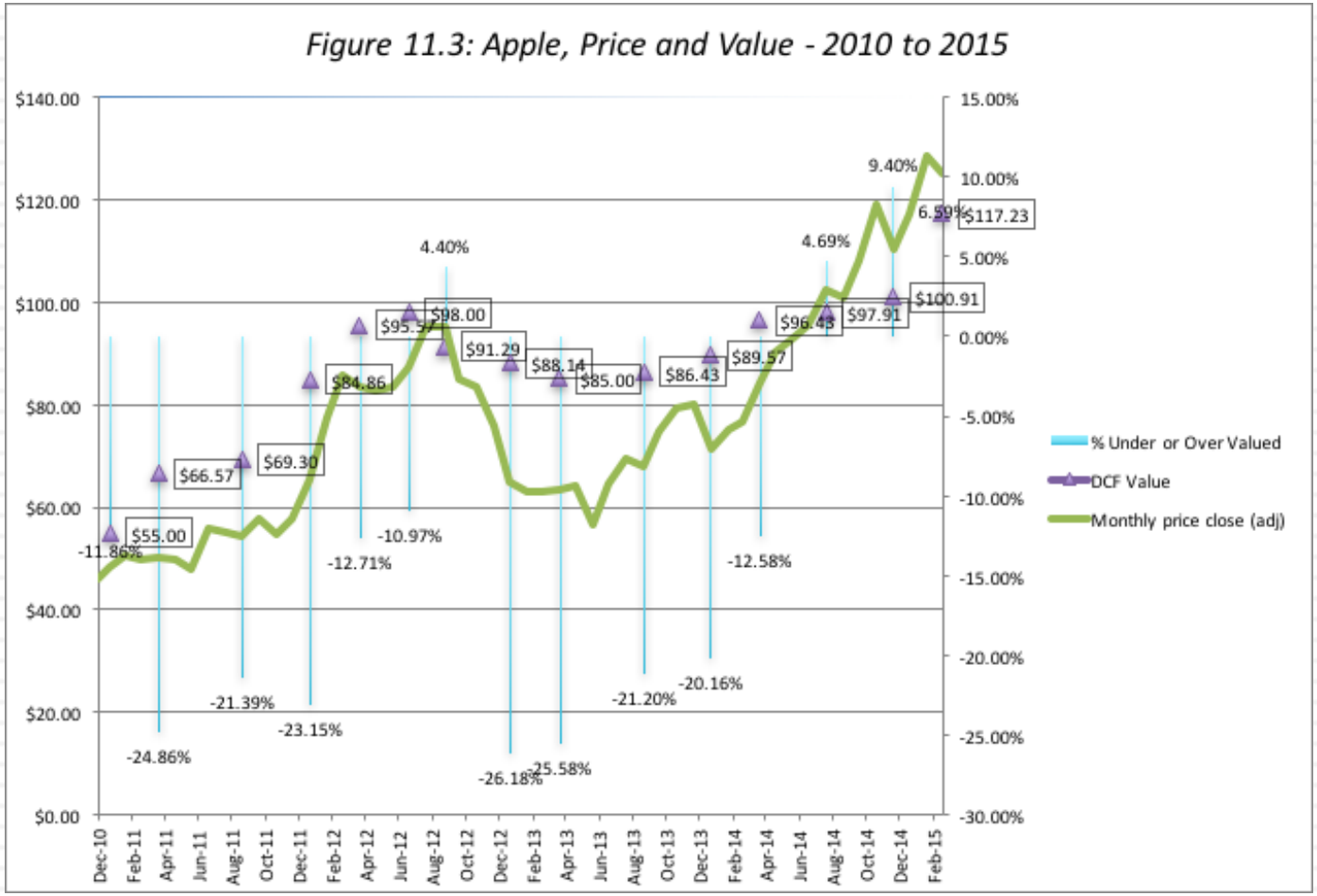
The Value dilemma and ways of dealing with it…

- Uncertainty about the magnitude of the gap:
  - Margin of safety: Many value investors swear by the notion of the "margin of safety" as protection against risk/uncertainty.
  - Collect more information: Collecting more information about the company is viewed as one way to make your investment less risky.
  - Ask what if questions: Doing scenario analysis or what if analysis gives you a sense of whether you should invest.
  - Confront uncertainty: Face up to the uncertainty, bring it into the analysis and deal with the consequences.
- Uncertainty about gap closing: This is tougher and you can reduce your exposure to it by
  - Lengthening your time horizon
  - Providing or looking for a catalyst that will cause the gap to close.

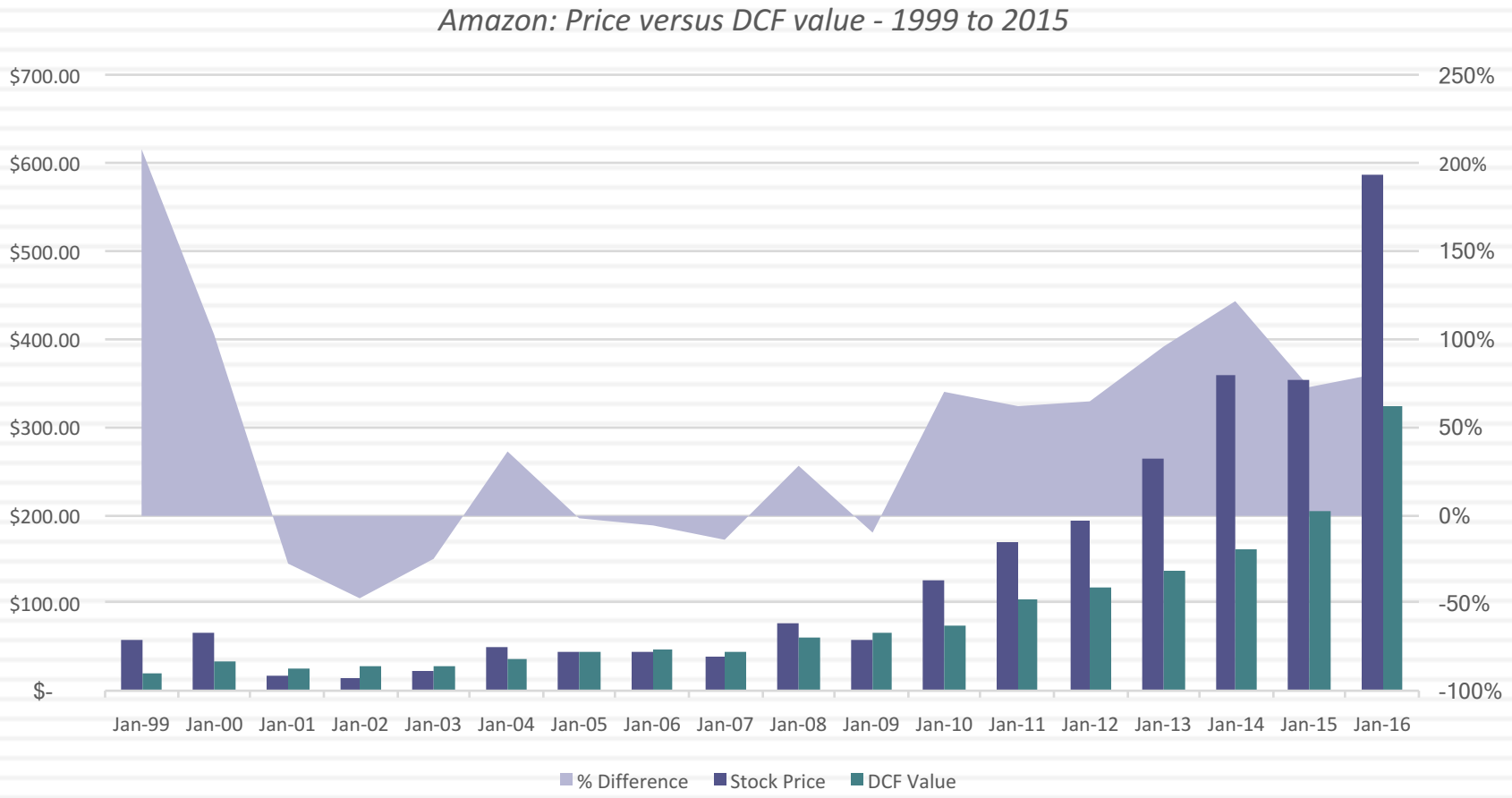
The Margin of Safety



Do you have faith?



Because you will be tested..



Dealing with Dysfunction

The DCF Hall of Shame

1. The Chimera DCF

- The **Chimera DCF** makes basic consistency mistakes.
- It mixes dollar cash flows with peso discount rates, nominal cash flows with real costs of capital and cash flows before debt payments with costs of equity.
- The end result is junk.

2. The Dreamstate DCF

- In a **Dreamstate DCF**, you build amazing companies on spreadsheets, making outlandish assumptions about growth and operating margins over time.
- Put differently, the only place this company can exist is in your dreams.

3. The Dissonant DCF

- In a **Dissonant DCF**, assumptions about growth, risk and cash flows are not consistent with each other, with little or no explanation given for the mismatch.
- Thus, you can have companies that grow without reinvestment and profit without risk forever.

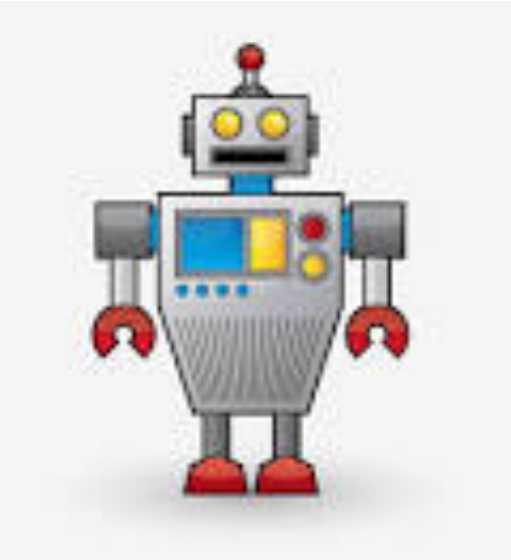
4. The Trojan Horse DCF

- In a **Trojan Horse DCF**, analysts use the Trojan Horse of cash flows to smuggle in a pricing (in the form of a terminal value, estimated by using a multiple).
- It provides the illusion of a DCF when what you are doing is a forward pricing.

5. The Kabuki DCF

- A **Kabuki DCF** is a work of art, where analyst goes through the motions of valuation, with the end value never in doubt.
- The intent is developing models that are legally or accounting-rule defensible rather than yielding reasonable values.

6. The Robo DCF



- In a **Robo DCF**, the valuation almost runs itself, with most or all of the inputs being outsourced (management, outside services, other analysts) and the model itself becoming mechanized.
- With data online and computer-built models, the future is here.
- If you want a Robo DCF, try **uValue**. It works on an iPhone or an iPad..

7. Mutant DCFs

- A **Mutant DCF** is a collection of numbers where items have familiar names (free cash flow, cost of capital) but are defined in strange ways.
- Using EBITDA as cash flow and a made-up number as your discount rate is one way to get there, but there are others…