Valuing Equity Options issued by firms... The Dilution Problem

- Option pricing models can be used to value employee options with four caveats –
 - Employee options are long term, making the assumptions about constant variance and constant dividend yields much shakier,
 - Employee options result in stock dilution, and
 - Employee options are often exercised before expiration, making it dangerous to use European option pricing models.
 - Employee options cannot be exercised until the employee is vested.
- These problems can be partially alleviated by using an option pricing model, allowing for shifts in variance and early exercise, and factoring in the dilution effect. The resulting value can be adjusted for the probability that the employee will not be vested.

245

Valuing Employee Options

246

- To value employee options, you need the following inputs into the option valuation model:
 - Stock Price = \$ 10, Adjusted for dilution = \$9.58
 - Strike Price = \$ 10
 - Maturity = 10 years (Can reduce to reflect early exercise)
 - Standard deviation in stock price = 40%
 - Riskless Rate = 4%
- Using a dilution-adjusted Black Scholes model, we arrive at the following inputs:
 - N (d1) = 0.8199
 - N (d2) = 0.3624
 - Value per call = \$ 9.58 (0.8199) \$10 e -(0.04) (10) (0.3624) = \$5.42

Value of Equity to Value of Equity per share

Using the value per call of \$5.42, we can now estimate the value of equity per share after the option grant:

Value of firm = 100 / (.0803)	= 2000
Debt	= 1000
= Equity	= 1000
Value of options granted	= \$ 54.2
= Value of Equity in stock	= \$945.8
/ Number of shares outstanding	/ 100
= Value per share	= \$ 9,46

 Note that this approach yields a higher value than the diluted share count approach (which ignores exercise proceeds) and a lower value than the treasury stock approach (which ignores the time premium on the options)

Option grants in the future...

- Assume now that this firm intends to continue granting options each year to its top management as part of compensation. These expected option grants will also affect value.
- The simplest mechanism for bringing in future option grants into the analysis is to do the following:
 - Estimate the value of options granted each year over the last few years as a percent of revenues.
 - Forecast out the value of option grants as a percent of revenues into future years, allowing for the fact that as revenues get larger, option grants as a percent of revenues will become smaller.
 - Consider this line item as part of operating expenses each year.
 This will reduce the operating margin and cashflow each year.

NARRATIVE AND NUMBERS: VALUATION AS A BRIDGE

Tell me a story..

Valuation as a bridge

Number Crunchers

Story Tellers



Step 1: Survey the landscape

- Every valuation starts with a narrative, a story that you see unfolding for your company in the future.
- In developing this narrative, you will be making assessments of
 - Your company (its products, its management and its history.
 - The market or markets that you see it growing in.
 - The competition it faces and will face.
 - The macro environment in which it operates.



Step 2: Create a narrative for the future

- Every valuation starts with a narrative, a story that you see unfolding for your company in the future.
- In developing this narrative, you will be making assessments of your company (its products, its management), the market or markets that you see it growing in, the competition it faces and will face and the macro environment in which it operates.
 - **Rule 1: Keep it simple.**
 - Rule 2: Keep it focused.
 - Rule 3: Stay grounded in reality.

The Uber Narrative

In June 2014, my initial narrative for Uber was that it would be

- 1. <u>An urban car service business</u>: I saw Uber primarily as a force in urban areas and only in the car service business.
- 2. Which <u>would expand the business moderately (about 40%</u> over ten years) by bringing in new users.
- 3. <u>With local networking benefits</u>: If Uber becomes large enough in any city, it will quickly become larger, but that will be of little help when it enters a new city.
- 4. Maintain its revenue sharing (20%) system due to strong <u>competitive advantages</u> (from being a first mover).
- 5. And its existing low-capital business model, with drivers as contractors and very little investment in infrastructure.

Step 3: Check the narrative against history, economic first principles & common sense



The Impossible, The Implausible and the Improbable



Uber: Possible, Plausible and Probable



The Runaway Story: When you want a story to be true...

- With a runaway business story, you usually have three ingredients:
 - 1. <u>Charismatic, likeable Narrator</u>: The narrator of the business story is someone that you want to see succeed, either because you like the narrator or because he/she will be a good role model.
 - <u>Telling a story about disrupting a much business, where you</u> <u>dislike the status quo</u>: The status quo in the business that the story is disrupting is dissatisfying (to everyone involved)>
 - 3. <u>With a societal benefit as bonus</u>: And if the story holds, society and humanity will benefit.
- Since you want this story to work out, you stop asking questions, because the answers may put the story at risk.

The Impossible: The Runaway Story



When runaway stories melt down..

The Meltdown Story

Bad Business Model The business model has a Story at war with numbers **Untrustworthy Storyteller** fundamental flaw that can The company's narrative A narrator, who through affect either future conflicts with its own his/her words or actions ++profitability or survival, but actions and/or with the has become the management is either in actual results/numbers untrustworthy. denial about the flaw or reported by the company. opaque in how it plans to deal with it.

Meltdown Story Investors, lenders and observers question story, unwilling to accept the company's spin on number, pushing pricing down.

=

Aswath Damodaran



The Implausible: The Big Market Delusion

				Breakeven	% from Online	Imputed Online Ad
Company	Market Cap	Enterprise Value	Current Revenues	Revenues (2025)	Advertising	Revenue (2025)
Google	\$441,572.00	\$386,954.00	\$69,611.00	\$224,923.20	89.50%	\$201,306.2
Facebook	\$245,662.00	\$234,696.00	\$14,640.00	\$129,375.54	92.20%	\$119,284.25
Yahoo!	\$30,614.00	\$23,836.10	\$4,871.00	\$25,413.13	100.00%	\$25,413.13
LinkedIn	\$23,265.00	\$20,904.00	\$2,561.00	\$22,371.44	80.30%	\$17,964.26
Twitter	\$16,927.90	\$14,912.90	\$1,779.00	\$23,128.68	89.50%	\$20,700.17
Pandora	\$3,643.00	\$3,271.00	\$1,024.00	\$2,915.67	79.50%	\$2,317.96
Yelp	\$1,765.00	\$0.00	\$465.00	\$1,144.26	93.60%	\$1,071.02
Zillow	\$4,496.00	\$4,101.00	\$480.00	\$4,156.21	18.00%	\$748.12
Zynga	\$2,241.00	\$1,142.00	\$752.00	\$757.86	22.10%	\$167.49
Total US	\$770,185.90	\$689,817.00	\$96,183.00	\$434,185.98		\$388,972.6
Alibaba	\$184,362.00	\$173,871.00	\$12,598.00	\$111,414.06	60.00%	\$66,848.43
Tencent	\$154,366.00	\$151,554.00	\$13,969.00	\$63,730.36	10.50%	\$6,691.69
Baidu	\$49,991.00	\$44,864.00	\$9,172.00	\$30,999.49	98.90%	\$30,658.50
Sohu.com	\$18,240.00	\$17,411.00	\$1,857.00	\$16,973.01	53.70%	\$9,114.5
Naver	\$13,699.00	\$12,686.00	\$2,755.00	\$12,139.34	76.60%	\$9,298.74
Yandex	\$3,454.00	\$3,449.00	\$972.00	\$2,082.52	98.80%	\$2,057.52
Yahoo! Japan	\$23,188.00	\$18,988.00	\$3,591.00	\$5,707.61	69.40%	\$3,961.08
Sina	\$2,113.00	\$746.00	\$808.00	\$505.09	48.90%	\$246.99
Netease	\$14,566.00	\$11,257.00	\$2,388.00	\$840.00	11.90%	\$3,013.71
Mail.ru	\$3,492.00	\$3,768.00	\$636.00	\$1,676.47	35.00%	\$586.76
Mixi	\$3,095.00	\$2,661.00	\$1,229.00	\$777.02	96.00%	\$745.94
Kakaku	\$3,565.00	\$3,358.00	\$404.00	\$1,650.49	11.60%	\$191.46
Total non-US	\$474,131.00	\$444,613.00	\$50,379.00	\$248,495.46		\$133,415.32
Global Total	\$1,244,316.90	\$1,134,430.00	\$146,562.00	\$682,681.44		\$522,387.98
			1			

The Improbable: Willy Wonkitis

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	24,200	52%	7586	34%	73%	214,041	201,001	32%	21%	18%	17%	120,000	1.9%	1286	1,004,210	1095
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%	7%	176
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%	656	14%	16%	17%	18%	19%	19%	20%	19%	1956	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 Sales Net Debt (Car Tesla Diluted	sh) Shares		12,099 68,059 (260) 142
Exit EBITDA High							12.0	x	Exit PPG Hig	h	5.0%		Exit P/Sales H	High	180%	
Exit EBITDA Low							8.0 1	x	Exit PPG Low	v	3.0%		Exit P/Sales I	ow	130%	
							Discount Rat Discount Rat	le High ge Low	13.0% FY Month of Valuation 1.0 (Beginning of 9.0% Month of FY End 12.0 (End of this /				Beginning of t End of this M	this Month) onth)		

Step 4: Connect your narrative to key drivers of value



The Uber narrative (June 2014)

Step 4: Value the company (Uber)





	Cost of capital for first 5 years =	٦ [Cost of conital declines from 10% to
Adust for probability of failure (10%) Expected value = \$6,595 (.9) = \$5,895	Top decile of US companies = 12%		8% from years 6 to 10.

Aswath Damodaran