



OPM vs. PWERM

WHY THE PWERM IS OFTEN THE BETTER CHOICE

Annika Reinemann
Brittan Park Valuation

Cost of Capital

VC rates

- Includes consideration for illiquidity
- Needs adjustments to work for allocation
- Assumes that you are using all success outcomes

CAPM with Specific Company Risk

- If you want a liquid rate, OK to make adjustments for DLOM after allocation
- Assumes that you are using all success outcomes
- Should be the equivalent of an DLOM adjusted VD rate

CAPM without Specific Company Risk

- aka Industry Rate
- When you have included failure scenarios
- Reflects industry risks but no company specific risks
- There may be a case for adding some company Specific Risk or your comps are at a different stage of development (however, this is only true if you have not accounted for these differences in the outcome scenarios)

OPM vs. PWERM

- Many of the assumptions and a majority of the modeling is the same for an OPM and a PWERM
 - Determine inflection points when the company will be a viable M&A target or IPO candidate
 - Determine likely liquidity events
 - Determine likely liquidity timing
 - Determine probability of failure
 - Identify public comparables and industry M&A transactions
 - Develop a discount rate
 - Project cash flows and future funding needs

- OPM
 - Present value each enterprise or equity indication
 - Allocate through the OPM
 - No ability to vary rates of return by class of security
 - Difficult to account for future rounds, especially if event or time driven
 - How to treat fully participating securities when an IPO is one of the probable exits
 - Unrealistic outcome distribution

- PWERM
 - Allocate at the liquidity event
 - Present value each indication
 - Each outcome can have a different capitalization table based on funding needed to reach each outcome
 - Each security class can have a different rate of return

Comparative Matrix

Analytical Work	OPM	PWERM
Identify comps & industry M&A transactions	YES	YES
Develop a discount rate	YES	YES
Determine likely exit events and related timing	YES	YES
Determine probability of failure	MAYBE	MAYBE
Project cash flow	YES	YES
Determine future funding needs	NO	YES
Allocation	In the present	At each exit event
Features	OPM	PWERM
Ability to vary rate of return for each security class	No	YES
Ability to reflect path specific funding needs/capitalization tables	NO*	YES
Flexible	NO	YES

*) Unless you run several OPMs

Case Study

Company Overview

- A round company in software driven research and analytics space. Forefront of its industry. Potential for IP sale if venture does not work.
- Recent Series A Round
 - 1x liq. pref. and no participation

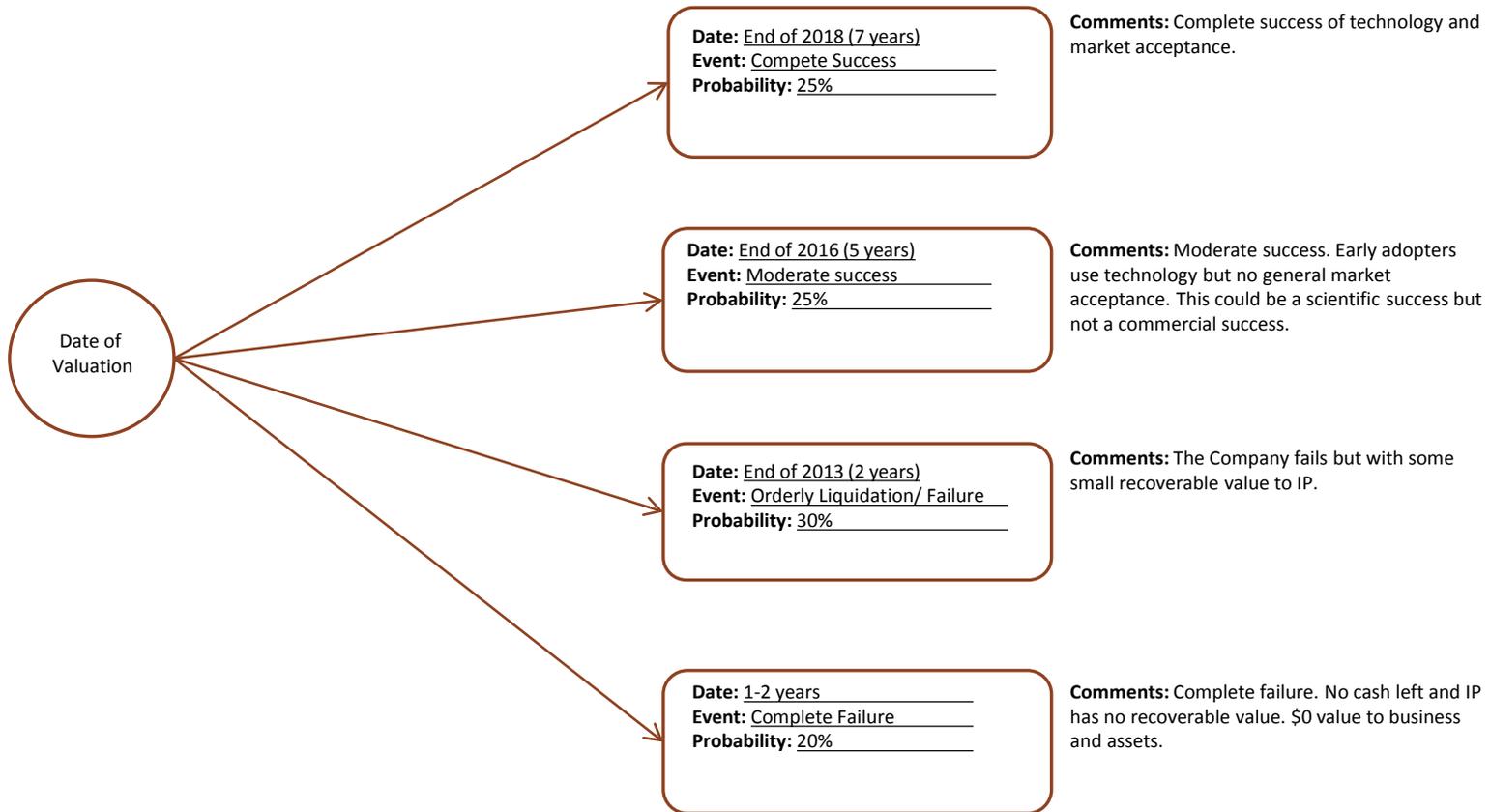
Traditional OPM back-solve resulted in \$0.31/CS (NMM)

- 47% of Pref. A price
- Recued DLOM due to use of A round price (still a controversial issue)

PWERM resulted in \$0.11/CS (NMM)

- Model supports Series A round price (“PWERM back-solve”)
- Analysis included one complete failure scenario and one asset sale scenario (both plausible at this stage of development)
- Model includes future B Round in success outcomes
- Differentiated rates of return, weighted average discount rate equals industry rate.
- Full DLOM on common (no controversy)

PWERM Chart for Client



Survivorship Analysis

and implications for:
Entity-Level Cost of Capital, and
Implied Failure Date

FAIR VALUE SUMMIT : SAN FRANCISCO : NOVEMBER 2013

Knaup & Piazza Data¹

1998 cohort (2Q birth date)

NAICS supersector	Surviving Establishments, by sector and year since birth, 1998-2005							
	Active Births	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Natural resources & mining	3,198	2,633	2,224	1,900	1,585	1,389	1,278	1,173
Construction	27,536	22,219	18,099	14,748	11,728	10,176	9,187	8,251
Manufacturing	7,326	6,168	5,031	4,174	3,473	2,995	2,713	2,484
Trade, transportation & utilities	41,797	34,518	27,928	22,863	18,674	15,969	14,262	12,964
Information	3,793	3,063	2,384	1,877	1,430	1,185	1,073	940
Financial activities	14,853	12,490	10,333	8,698	7,314	6,525	5,991	5,481
Professional and business services	40,992	33,743	27,389	22,599	18,152	15,623	14,127	12,739
Education and Health Services	11,594	9,923	8,444	7,389	6,420	5,807	5,388	5,068
Leisure & Hospitality	16,834	13,661	10,941	9,024	7,367	6,415	5,814	5,286
Other Services	39,783	32,113	25,783	21,214	17,458	14,738	12,863	11,446
Unidentified	4,476	1,848	987	708	515	431	378	334
National Total	212,182	172,379	139,543	115,194	94,116	81,253	73,074	66,166

This census contains information on more than **8.9 million U.S. businesses** in both **public & private** sectors. Using a seven-year database from 1998 to 2005, the authors concluded that only 44% of all businesses that were founded in 1998 survived at least 4 years and only 31% made it through all seven years.

Survivorship includes "successor relationships," that is, survival within the M&A or IPO context.

Survival Rates of Previous Year's Survivors, by sector and year since birth, 1998-2005							
Births	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
100.0%	82.3%	84.5%	85.4%	83.4%	87.6%	92.0%	91.8%
100.0%	80.7%	81.5%	81.5%	79.5%	86.8%	90.3%	89.8%
100.0%	84.2%	81.6%	83.0%	83.2%	86.2%	90.6%	91.6%
100.0%	82.6%	80.9%	81.9%	81.7%	85.5%	89.3%	90.9%
100.0%	80.8%	77.8%	78.7%	76.2%	82.9%	90.5%	87.6%
100.0%	84.1%	82.7%	84.2%	84.1%	89.2%	91.8%	91.5%
100.0%	82.3%	81.2%	82.5%	80.3%	86.1%	90.4%	90.2%
100.0%	85.6%	85.1%	87.5%	86.9%	90.5%	92.8%	94.1%
100.0%	81.2%	80.1%	82.5%	81.6%	87.1%	90.6%	90.9%
100.0%	80.7%	80.3%	82.3%	82.3%	84.4%	87.3%	89.0%
<u>100.0%</u>	<u>41.3%</u>	<u>53.4%</u>	<u>71.7%</u>	<u>72.7%</u>	<u>83.7%</u>	<u>87.7%</u>	<u>88.4%</u>
100.0%	81.2%	81.0%	82.6%	81.7%	86.3%	89.9%	90.5%

Source: Knaup, Amy E. and Piazza, Merissa C., September 2007, "Business Employment Dynamics data: survival and longevity, II," Monthly Labor Review, pp. 3-10.

Surviving Establishments since birth, 1992-2002 (Shane)											Interpolated				SBA
Active Births	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
100	75	64	56	50	45	40	37	34	31	29	28.2	27.4	26.6	25.8	25

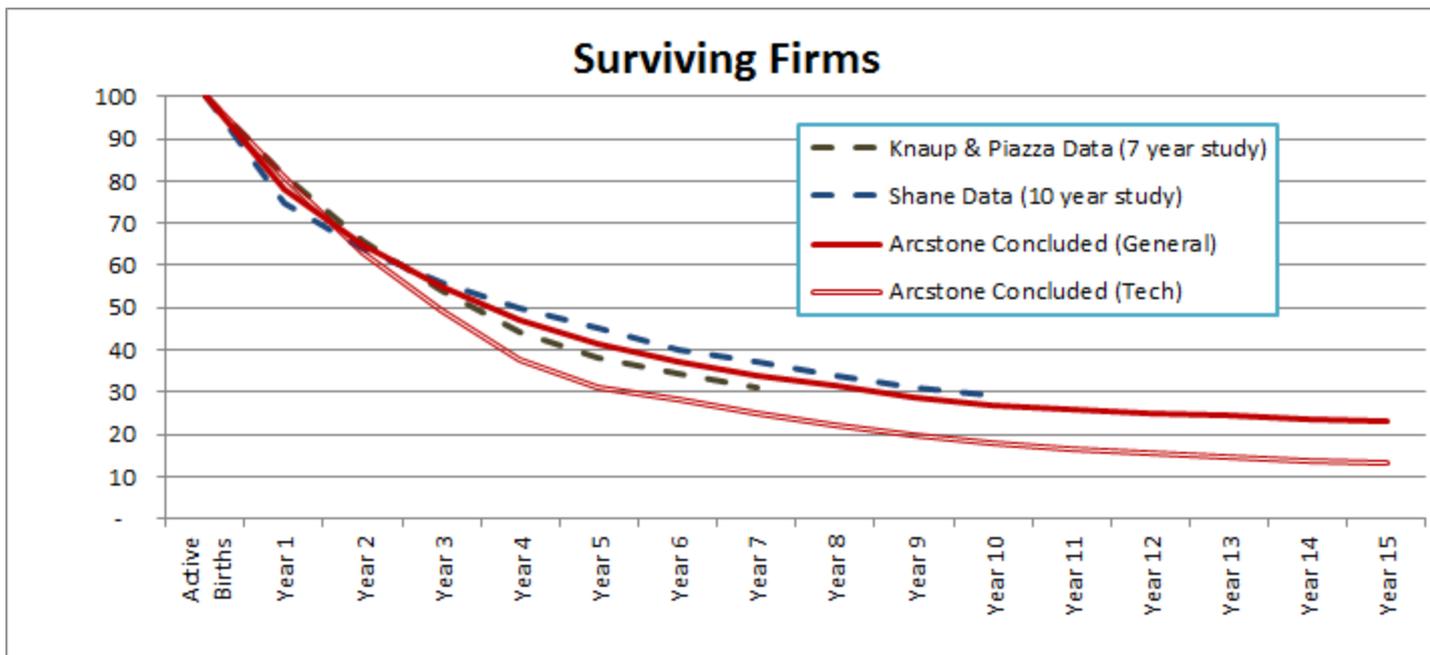
Survival Rates of Previous Year's Survivors since birth															
Births	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
100.0%	75.0%	85.3%	87.5%	89.3%	90.0%	88.9%	92.5%	91.9%	91.2%	93.5%	97.2%	97.2%	97.1%	97.0%	96.9%

Seven out of ten new employer firms survive at least 2 years, half at least 5 years, a third at least 10 years, and a quarter stay in business 15 years or more. Census data report that 69 percent of new employer establishments born to new firms in 2000 survived at least 2 years, and 51 percent survived 5 or more years. **Survival rates were similar across states and major industries.** Bureau of Labor Statistics data on establishment age show that 49 percent of establishments survive 5 years or more; 34 percent survive 10 years or more; and **26 percent survive 15 years or more.**

Source: Shane, Scott, January 2008, The Illusions of Entrepreneurship: The Costly Myths That Entrepreneurs, Investors, and Policy Makers Live By, p.99, Figure 6.2. (<http://smallbiztrends.com/2008/04/startup-failure-rates.html>); and U.S Dept. of Commerce, Census Bureau, Business Dynamics Statistics; U.S. Dept of Labour, Bureau of Labor Statistics, BED (<http://smallbiztrends.com/2008/04/startup-failure-rates.html>)

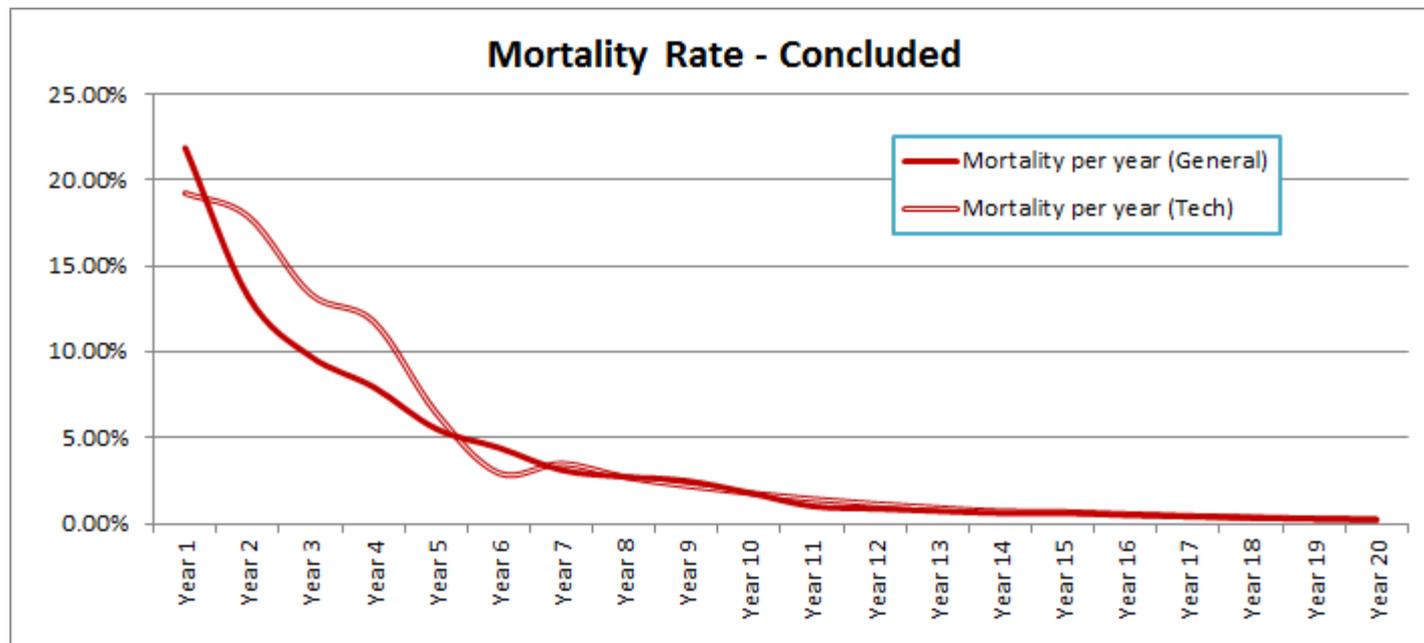
Concluded Survivorship Rates

	Surviving Establishments since birth, concluded															
	Active Births	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Knaup & Piazza Data (7 year study)	100	81	66	54	44	38	34	31								
Shane Data (10 year study)	100	75	64	56	50	45	40	37	34	31	29					
Arcstone Concluded (General)	100	78	65	55	47	42	37	34	31	29	27	26	25	24	24	23
Arcstone Concluded (Tech)	100	81	63	49	38	31	28	25	22	20	18	17	15	15	14	13



The data across industries and time periods are consistent, with the exception of IT firms having a measurably lower survivorship in the Knaup & Piazza data. The weakness in the data is in the shortness of the studies: ten years is not enough.

Source: Arcstone Partners



Flipping the equation from survivorship rates to **mortality rates**, we arrive at a similar conclusion – one that follows popular conception: **survive the first five years and you're bankable.**

Source: Arcstone Partners

Current Apparent Age of Company (years)

2

Expected Failure Rate, from today

68%

Arcstone

If the company fails, it will likely fail in X years, from today:

4.1

Arcstone

Calculated WACC

Discount Rate

18.7%

Arcstone

Portfolio years to maturity

5.00

Arcstone

Indicated Required Return (Entity Level)

48.6%

Pellegrino⁴

Hurdle Rate Studies

40% - 60%

Plumber, Bygrave & Scherlis, et al⁵

Selected Discount Rate

50%

From this data we can conclude two key inputs to our valuation models:

- (1) the Entity-level Cost of Capital, and
- (2) the most likely date of failure, measured in years from today.

Source: Arcstone Partners; and Pellegrino, Michael, 2009, BVR's Guide to Intellectual Property Valuation, p10-11. The Cost of Capital is calculated as $((1 + \text{target rate})^{\text{holding period}} / \text{success rate})^{1/\text{holding period}} - 1$

Bo Brustkern - Founder

Mr. Brustkern has over fifteen years of valuation and financial advisory experience supporting transaction advisory, financial reporting, tax reporting, and litigation support. Prior to founding Arcstone, Mr. Brustkern was an investor at Rustic Canyon Partners, an \$850 million venture capital fund; and BACE Industries, a middle market private equity fund. Mr. Brustkern is a Charter Member and Executive Committee Member of the nationally regarded valuation think tank, the Fair Value Forum. He is a member of the American Society of Appraisers and the Appraisal Issues Task Force. Mr. Brustkern earned a BA from Dartmouth College and an MBA with distinction as a Deutschman Venture Fellow from The Anderson School at UCLA.

Jonathan Hartley, CFA - Director of Valuation

Mr. Hartley has provided transaction advisory services within a wide range of industries for capital investment, financial reporting, tax, litigation and transactional purposes. Prior to Arcstone, Mr. Hartley was a member in the Washington, DC office of Navigant Consulting, Inc., a specialty consulting firm. While at Navigant, Mr. Hartley performed business valuations, economic damages assessments and financial analyses in the context of complex economic disputes involved in US litigation and international arbitration. Mr. Hartley earned a BS in finance, magna cum laude, from Virginia Tech. Mr. Hartley is a Chartered Financial Analyst and a member of the CFA Institute.

Scott Carlson, CVA - Director of Valuation

Mr. Carlson has completed a wide variety of valuation engagements including analyses involving financial reporting, transaction advisory, tax and litigation support. Prior to Arcstone, Mr. Carlson worked as an Associate at Thomas Weisel Partners. Before working at TWP, he served as an analyst at Kirsh Real Estate Development, Inc. and served in the renowned management training program at Enterprise Rent-A-Car. Mr. Carlson earned a BS in finance from Indiana University, and an MBA with an emphasis in accounting and finance from the Kelley School of Business. Mr. Carlson is a member of the National Association of Certified Valuation Analysts, and holds the CVA designation. He is a member of the Fair Value Exchange.



Fair Value Forum



Financial Reporting and Tax Compliance

Purchase Price Allocations ASC 805
Goodwill Impairment Analyses ASC 350
Stock Option Valuations IRC 409A and ASC 718
Portfolio Valuations ASC 820

Litigation Support

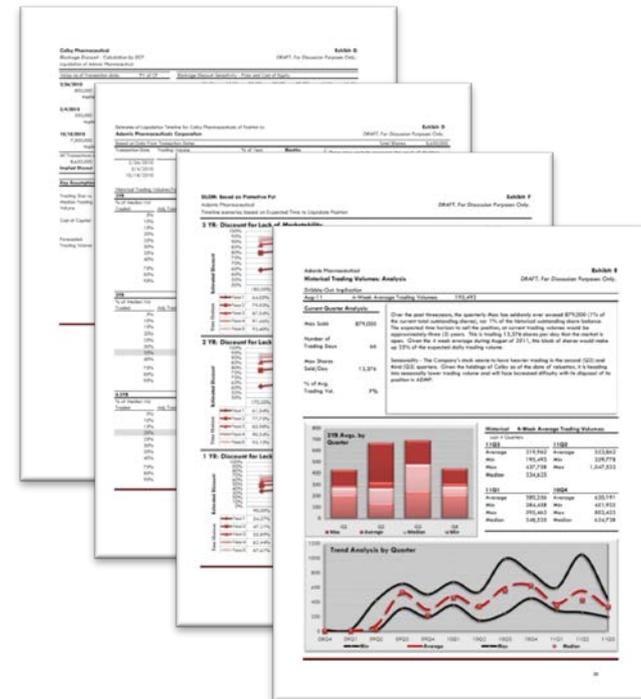
Litigation Consulting
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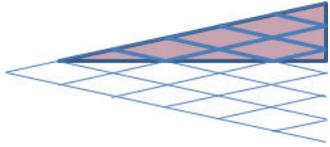
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Monte Carlo Alternative to OPM

Fair Value Summit, San Francisco, CA, November 2013

Particularly for Early Stage Companies We May Be Asking Too Much of the Black Scholes Model

▶ Volatility

- Model relies on smooth process price evolution versus actually of jump process price evolution
- Future financing impacts cannot be captured
 - Substantial down rounds
 - New round dilution
 - Anti-dilution provisions of existing preferred
 - Different expected probabilities of up vs. down financing rounds

▶ Time to a Liquidity Event

- Effectively just a subjective guess at an average expected term
- Inability to take into account impact of failure to raise additional financing
- Truncates ability to model future price changes in stay private scenarios
- Exit timing ignores valuation impact on COC or IPO timing

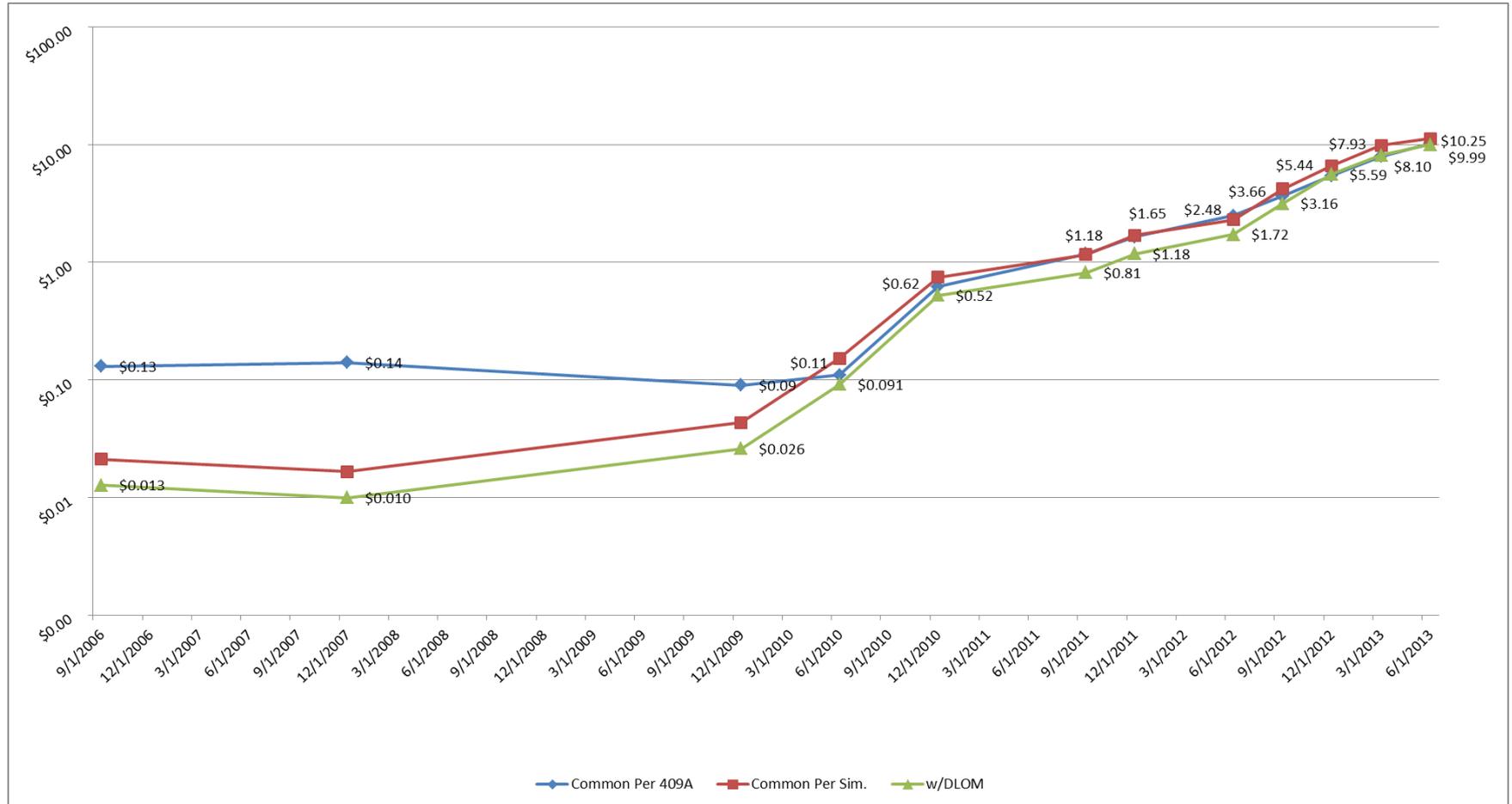
A Monte Carlo Alternative

- ▶ Provides the ability to explicit model key drivers of value and exit timing
 - IPO can be based on achieving a valuation target
 - COC can take into account likely control premium
 - Additional financing rounds can be incorporated and share issuances will be based on VC thinking, i.e. Required fully diluted ownership and pre-money valuation
 - Failure to obtain financing can be a company failure event within expected maximum cash runway
 - Life of stay private paths is not truncated
 - Management expectations of differential probabilities of an up round vs. down round can be taken into account
 - Both debt and equity financing can be taken into account

An Actual Example

- ▶ The following graph is from an actual company where 409A valuations were performed from late 2006 to June 2013 and the company went public in Sept 2013
- ▶ The graph compares the actual 409A valuations with a Monte Carlo alternative, as of similar dates and using the same starting MVIC
- ▶ The Monte Carlo model was originally developed to value complex warrants issued by the company and subsequently expanded to include the entire capital structure

Results



Results

Date	Common Per 409A	Common Per Sim.	w/DLOM	DLOM	Liquidation Preference	MVIC
9/5/2006	\$ 0.13	\$ 0.021	\$ 0.013	40%	\$ 21,247,492	\$ 4,774,474
12/31/2007	\$ 0.14	\$ 0.017	\$ 0.010	40%	\$ 21,256,996	\$ 16,598,147
12/31/2009	\$ 0.09	\$ 0.043	\$ 0.026	40%	\$ 40,842,140	\$ 25,898,119
6/7/2010	\$ 0.11	\$ 0.15	\$ 0.091	40%	\$ 46,022,265	\$ 28,691,939
12/31/2010	\$ 0.62	\$ 0.75	\$ 0.52	30%	\$ 52,078,537	\$ 86,808,561
9/30/2011	\$ 1.18	\$ 1.16	\$ 0.81	30%	\$ 52,161,036	\$ 169,183,730
12/31/2011	\$ 1.65	\$ 1.69	\$ 1.18	30%	\$ 52,161,036	\$ 232,903,146
6/30/2012	\$ 2.48	\$ 2.30	\$ 1.72	25%	\$ 52,161,036	\$ 360,935,188
9/30/2012	\$ 3.66	\$ 4.21	\$ 3.16	25%	\$ 51,170,539	\$ 527,297,388
12/31/2012	\$ 5.44	\$ 6.58	\$ 5.59	15%	\$ 97,175,417	\$ 808,252,740
3/31/2013	\$ 7.93	\$ 9.88	\$ 8.10	18%	\$ 102,169,227	\$ 1,164,975,050
6/30/2013	\$ 10.25	\$ 11.23	\$ 9.99	11%	\$ 102,169,227	\$ 1,427,020,113

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