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# Valuing Investments in Start-Ups

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# Topics to Cover

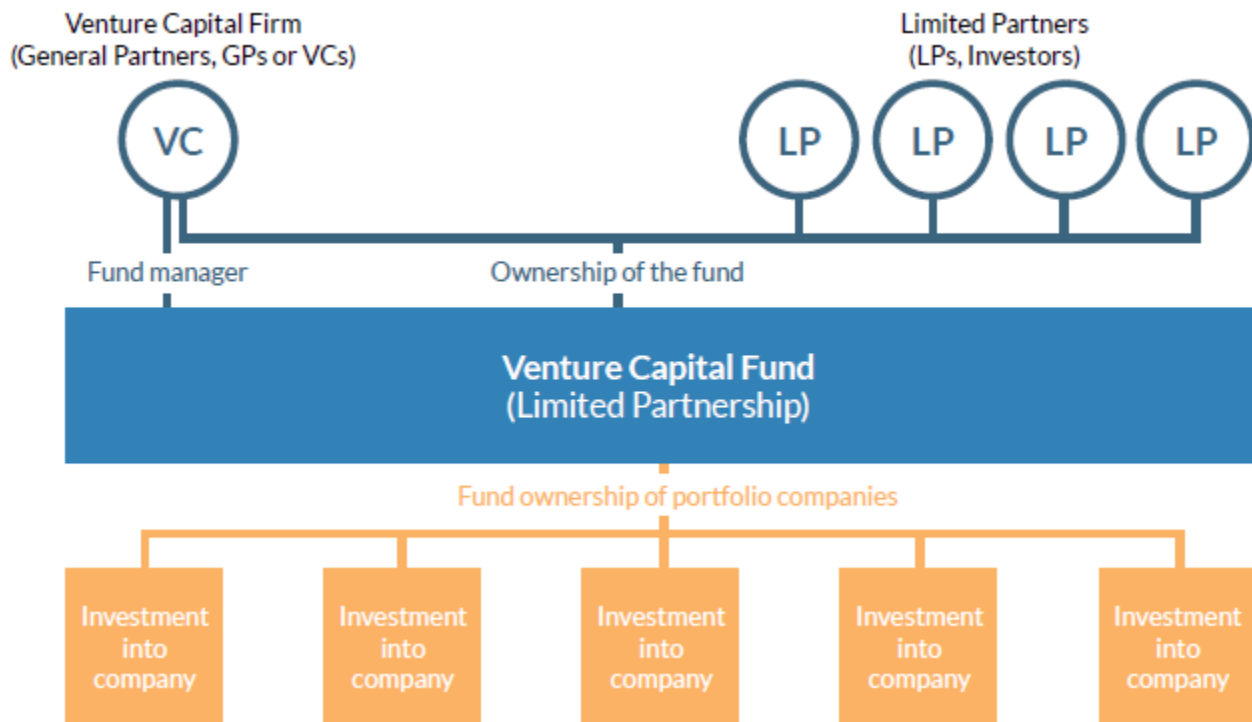
- VC Market Overview
- Valuing the Enterprise
  - Calibration
  - Measuring Current Value
- Valuing the Interest in the Enterprise
  - PWERM
  - OPM



# VC Market Overview

## SECTION 1

# Basic VC Architecture



Source: NVCA 2017 Yearbook

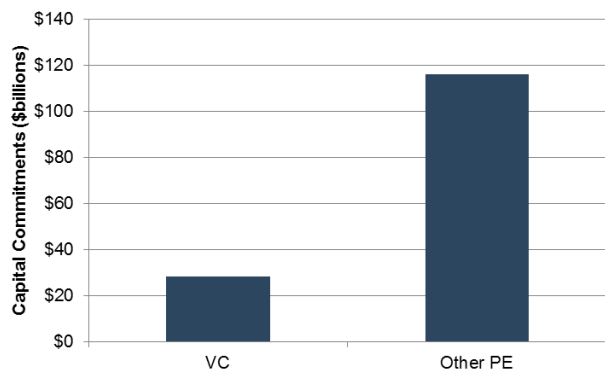
Investors commit capital to fund => GP identifies early-stage companies to invest in => investment returns are shared by GP (fees & carry) and LPs

## Relation to Private Equity

|                       | Venture Capital                                              | Other Private Equity                                          |
|-----------------------|--------------------------------------------------------------|---------------------------------------------------------------|
| Life Cycle Stage      | Early / Development                                          | Mature                                                        |
| Transaction Type      | Primary                                                      | Secondary                                                     |
| Financial Leverage    | Not used                                                     | Significant source of returns                                 |
| Managerial Assistance | More likely                                                  | Less likely                                                   |
| Holding Periods       | Depends on strategy – on balance, potentially longer than PE | Depends on strategy – on balance, potentially shorter than PE |

Strictly speaking, VC is a subset of private equity. There are, however, some primary characteristics that separate VC from the rest of the PE universe

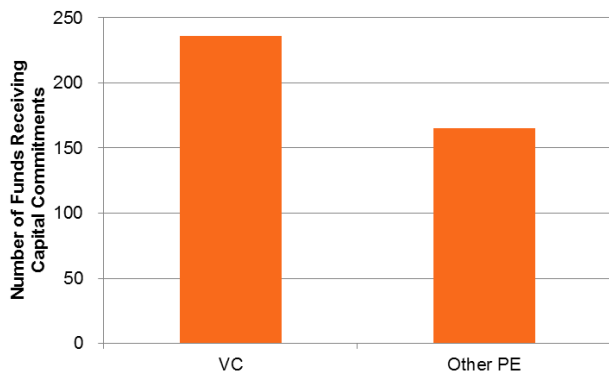
# Comparison to Traditional PE



During 2015, capital commitments to VC funds accounted for approximately 20% of total private equity commitments

The number of VC funds receiving commitments actually exceeded traditional LBO and mezzanine funds

Because VC funds typically make smaller investments, the fund sizes tend to be much smaller. VC funds received average capital commitments of \$120 million during 2015, compared to \$705 million for non-venture private equity funds



Source: NVCA 2016 Yearbook

# Development Company Life Cycle

## AICPA Practice Aid Life Cycle Stage Framework

|                     | Stage 1           | Stage 2         | Stage 3         | Stage 4           | Stage 5                | Stage 6             |
|---------------------|-------------------|-----------------|-----------------|-------------------|------------------------|---------------------|
| Product Revenue     | None              | None            | None            | Some              | Growing                | Established History |
| Expense History     | Limited           | Substantive     | Substantive     | Substantive       | Established History    | Established History |
| Profitability       | Losses            | Losses          | Losses          | Losses            | Breakeven / Profitable | Established History |
| Management Team     | Incomplete        | Expanding       | Complete        | Complete          | Complete               | Complete            |
| Product Development | Limited           | Underway        | Beta Testing    | Shipping Orders   | Shipping Orders        | Ongoing             |
| Financing Sources   | Angels / Early VC | Venture Capital | VC / Strategics | Mezz / Strategics | Strategic / IPO        | Self-Funding        |

Paragraph 2.02: An enterprise typically builds value throughout the various stages of development but generally not in a linear fashion. In valuing the securities within an enterprise, it is important to recognize the enterprise's stage of development and its achievement of developmental milestones. The stage of development will influence the perceived risk of investing in the enterprise, which, in turn, will influence the valuation.

Source: AICPA Practice Aid – Valuation of Privately-Held-Company Equity Securities Issued as Compensation

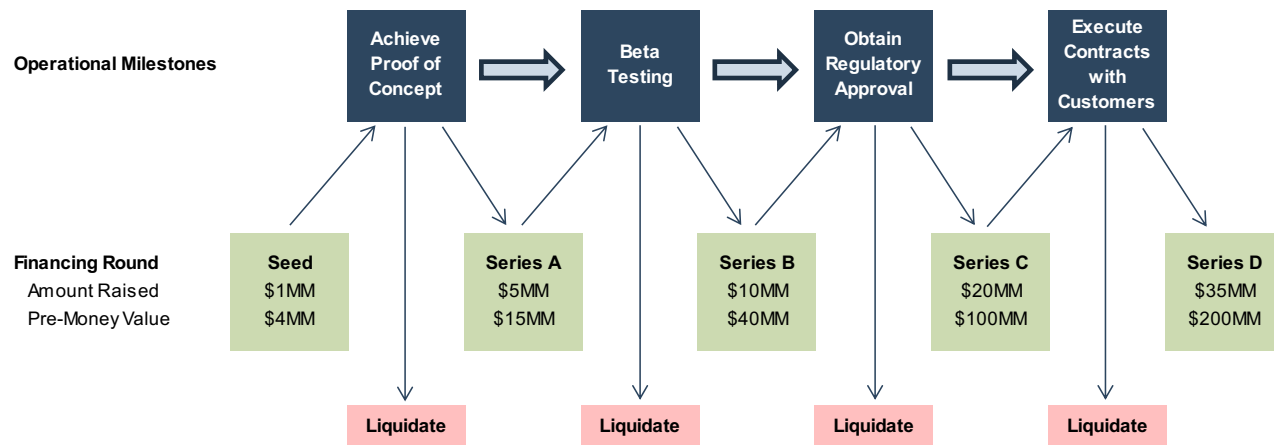
# Development Milestones

- Finalize original business plan
- Obtain initial outside financing
- Achieve proof of concept
- Beta test product or service
- Successfully assemble management team
- Establish relationship with strategic partners
- Obtain key customer(s)
- Obtain regulatory approval
- Develop manufacturing plan
- Secure key raw materials, equipment, or work force
- Execute customer contracts
- Deliver product or service
- Achieve positive cash flows / breakeven
- Achieve profitability

Examples from AICPA  
Practice Aid

Source: AICPA Practice Aid – Valuation of Privately-Held-Company Equity Securities Issued as Compensation

# Staged Investment Model



Paragraph 3.02: Many early-stage enterprises have a well-developed business plan that sets forth the business strategy, the product, the market, the competition, and a projected financing and operating schedule. Few investors are willing to commit funds in advance sufficient to carry the firm from concept to public offering. Rather, they want to see that the enterprise's management has a sound plan, is executing its plan, and is meeting its commitments. As a result, several financing rounds usually are necessary, with each round contingent on the enterprise having met its prior commitments. Those commitments often are set forth in the original business plan as a series of milestones.

VC investing  
illustrates “real  
options” framework

# Evolving Capital Structures

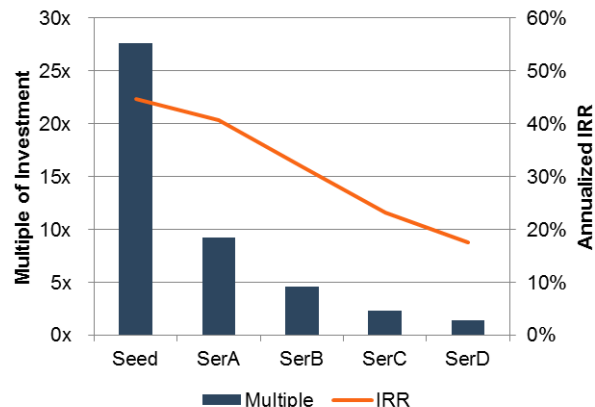
|                                | Jun-16        |             | Dec-18         |             | Dec-19         |             | Jun-21         |             | Jun-23         |             |
|--------------------------------|---------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|
| Common & Options               | 1,000         | 80%         | 1,000          | 60%         | 1,000          | 48%         | 1,000          | 40%         | 1,000          | 34%         |
| Seed Preferred                 | 250           | 20%         | 250            | 15%         | 250            | 12%         | 250            | 10%         | 250            | 9%          |
| Series A Preferred             |               | 0%          | 417            | 25%         | 417            | 20%         | 417            | 17%         | 417            | 14%         |
| Series B Preferred             |               | 0%          |                | 0%          | 417            | 20%         | 417            | 17%         | 417            | 14%         |
| Series C Preferred             |               | 0%          |                | 0%          |                | 0%          | 417            | 17%         | 417            | 14%         |
| Series D Preferred             |               | 0%          |                | 0%          |                | 0%          |                | 0%          | 438            | 15%         |
| <b>Total</b>                   | <b>1,250</b>  | <b>100%</b> | <b>1,667</b>   | <b>100%</b> | <b>2,083</b>   | <b>100%</b> | <b>2,500</b>   | <b>100%</b> | <b>2,938</b>   | <b>100%</b> |
| Proceeds from Round (\$000s)   | \$1,000       |             | \$5,000        |             | \$10,000       |             | \$20,000       |             | \$35,000       |             |
| <i>Per Fully-Diluted Share</i> | <i>\$4.00</i> |             | <i>\$12.00</i> |             | <i>\$24.00</i> |             | <i>\$48.00</i> |             | <i>\$80.00</i> |             |
| Pre-Money Value                | \$4,000       |             | \$15,000       |             | \$40,000       |             | \$100,000      |             | \$200,000      |             |
| Post-Money Value               | \$5,000       |             | \$20,000       |             | \$50,000       |             | \$120,000      |             | \$235,000      |             |
| Cumulative Financing           | \$1,000       |             | \$6,000        |             | \$16,000       |             | \$36,000       |             | \$71,000       |             |

As the Company raises additional rounds of financing, the capital structure evolves; enterprise value increases as developmental milestones are achieved

# Risk and Return

|                    | Exit // Jun-25 |                |          |     |
|--------------------|----------------|----------------|----------|-----|
|                    | Shares         | Holding Period | Multiple | IRR |
| Common & Options   | 1,000          |                |          |     |
| Seed Preferred     | 250            | 9.0            | 27.7x    | 45% |
| Series A Preferred | 417            | 6.5            | 9.2x     | 41% |
| Series B Preferred | 417            | 5.5            | 4.6x     | 32% |
| Series C Preferred | 417            | 4.0            | 2.3x     | 23% |
| Series D Preferred | 438            | 2.0            | 1.4x     | 18% |
| <b>Total</b>       | <b>2,938</b>   |                |          |     |

Transaction Proceeds (\$000s) \$325,000  
 Per Fully-Diluted Share \$110.64



Paragraph 3.04: In general, as each milestone is met, the value of the enterprise and the securities within the enterprise are enhanced. As the number of remaining milestones and the related time frame for achieving the business plan are reduced, uncertainty about achieving the original business plan declines. As uncertainty is reduced, investors perceive that there is less risk, which, in turn, reduces their *required rate of return*, which increases the value of the enterprise and its securities.

Potential returns decrease in later rounds as risk is mitigated

# Other Enterprise Value Considerations

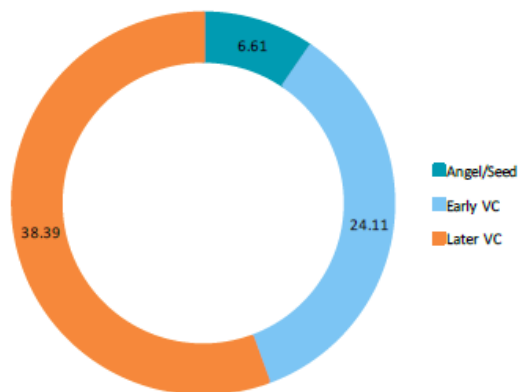
- State of industry and economy
- Management & BoD
- Marketplace and major competitors
- Barriers to entry
- Competitive forces
- Existence of proprietary technology, product, or service
- Workforce / human capital
- Customer and vendor characteristics
- Strategic relationships with major suppliers or customers
- Major investors
- Cost structure and financial condition
- Attractiveness of industry segment

Source: AICPA Practice Aid – [Valuation of Privately-Held-Company Equity Securities Issued as Compensation](#)

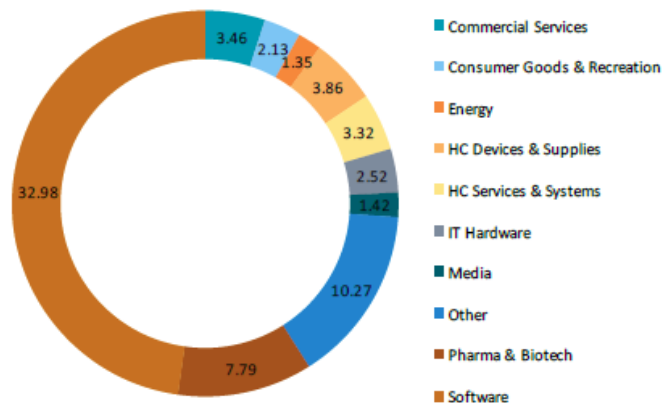
Factors from AICPA  
Practice Aid

# Financing Diversity

2016 U.S. VC Deals by Stage (\$B)



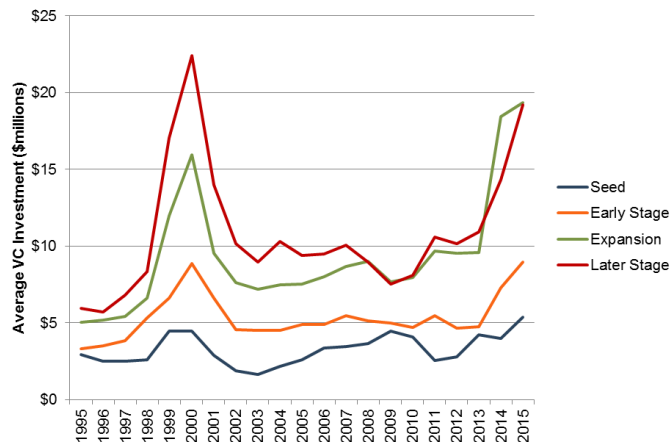
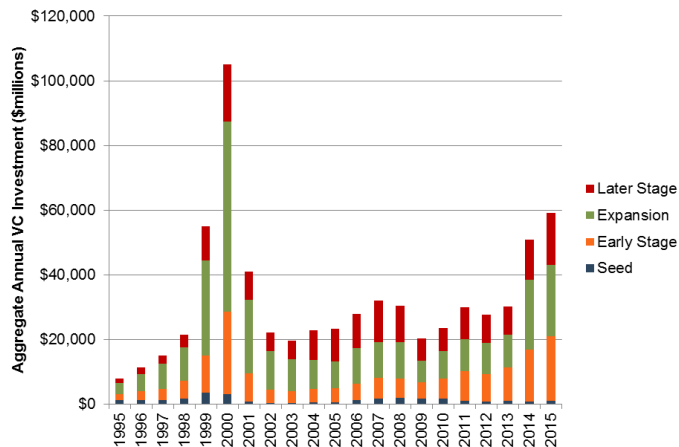
16 US VC Deals by Sector (\$B)



2016 VC investing activity by stage and industry sector

Source: NVCA 2017 Yearbook

# Financing Trends Over Time



Source: NVCA 2016 Yearbook

VC investing is cyclical and generally sensitive to overall economic conditions

# Economic Rights – Preferred Shares

Table 6-1

**Economic Rights**

| <i>Nature of right</i>                    | <i>Is the right meaningful and substantive?</i> | <i>Purpose of right</i>                                               | <i>When, if ever, is the right generally meaningful and substantive before initial public offering (IPO)?</i> | <i>Is the value of the right readily and objectively measurable?</i> | <i>Do valuation methods typically consider the right?</i> |
|-------------------------------------------|-------------------------------------------------|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------|
| Preferred dividends (noncumulative)       | No                                              | Preference to receive dividends if declared                           | N/A <sup>1</sup>                                                                                              | N/A                                                                  | N/A                                                       |
| Preferred dividends (cumulative)          | Yes                                             | Aims to provide a minimum fixed return in all situations except IPO   | Entire life of instrument                                                                                     | Yes                                                                  | Yes                                                       |
| Liquidation preference (nonparticipating) | Yes                                             | Ensures higher return up until break-even point <sup>2</sup>          | Up until break-even point <sup>3</sup>                                                                        | Yes                                                                  | Yes                                                       |
| Liquidation preference (participating)    | Yes                                             | Ensures disproportionately higher return in all situations except IPO | Entire life of instrument                                                                                     | Yes                                                                  | Yes                                                       |
| Mandatory redemption                      | Yes <sup>4</sup>                                | Right to return of capital; aims to provide liquidity                 | Entire life of instrument                                                                                     | No                                                                   | No                                                        |
| Conversion (fixed or variable ratio)      | Yes                                             | Produces better economic results in certain circumstances             | Entire life of instrument                                                                                     | Yes                                                                  | Yes                                                       |
| Participation (fixed or variable ratio)   | Yes                                             | Ensures disproportionately higher return in all situations except IPO | Entire life of instrument                                                                                     | Yes                                                                  | Yes                                                       |
| Antidilution                              | Yes                                             | Aims to protect value of investment                                   | Entire life of instrument                                                                                     | Maybe <sup>5</sup>                                                   | No                                                        |
| Registration                              | No <sup>6</sup>                                 | Aims to provide liquidity                                             | N/A                                                                                                           | N/A                                                                  | N/A                                                       |

VCs invest in preferred shares, which generally provide enhanced economic rights relative to common shares

Source: AICPA Practice Aid – Valuation of Privately-Held-Company Equity Securities Issued as Compensation

# Control Rights – Preferred Shares

Table 6-2

**Control Rights**

| <i>Nature of right</i>                | <i>Is the right meaningful and substantive?</i> | <i>Purpose of right</i>                                           | <i>When, if ever, is the right generally meaningful and substantive before initial public offering (IPO)?</i> | <i>Is the value of the right readily and objectively measurable?</i> | <i>Do valuation methods typically consider the right?</i> |
|---------------------------------------|-------------------------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------|
| Voting                                | Yes                                             | Ability to control or influence                                   | Entire life of instrument                                                                                     | No                                                                   | No                                                        |
| Protective provisions and veto rights | Yes                                             | Ability to control disproportionate to ownership                  | Entire life of instrument                                                                                     | No                                                                   | No                                                        |
| Board composition                     | Yes                                             | Ability to control disproportionate to ownership                  | Entire life of instrument                                                                                     | No                                                                   | No                                                        |
| Drag along                            | Yes                                             | Ability to control disproportionate to ownership                  | Entire life of instrument                                                                                     | No                                                                   | No                                                        |
| Right to participate in future rounds | Yes                                             | Ability to maintain ownership percentage                          | Entire life of instrument                                                                                     | No                                                                   | No                                                        |
| First refusal                         | Yes                                             | Restricted ability to sell common stock                           | Entire life of instrument                                                                                     | No                                                                   | No                                                        |
| Tag along                             | Yes                                             | Restricted ability to sell common stock                           | Entire life of instrument                                                                                     | No                                                                   | No                                                        |
| Management                            | Yes                                             | Access to inside information not available to common stockholders | Entire life of instrument                                                                                     | No                                                                   | No                                                        |
| Information                           | Yes                                             | Access to inside information not available to common stockholders | Entire life of instrument                                                                                     | No                                                                   | No                                                        |

Source: AICPA Practice Aid – Valuation of Privately-Held-Company Equity Securities Issued as Compensation

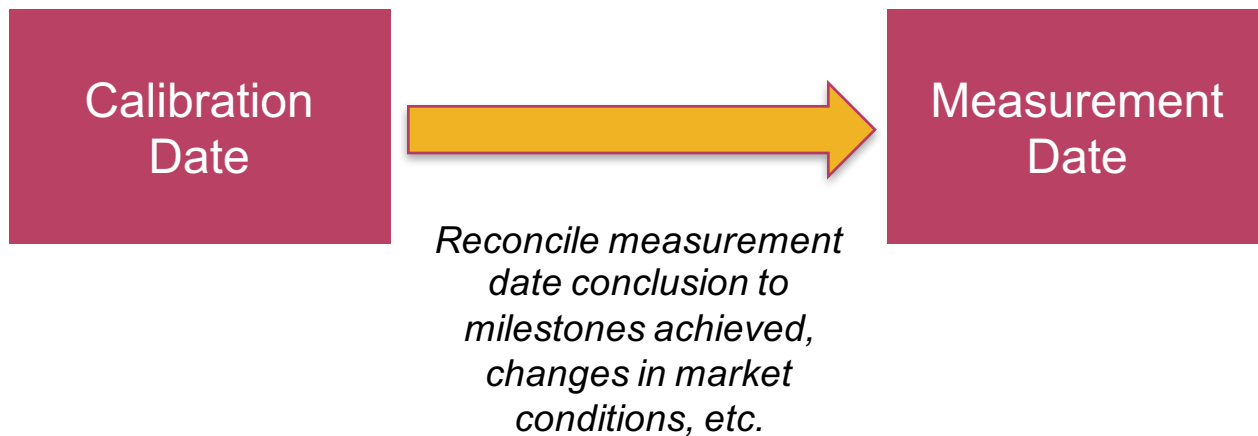
VCs invest in preferred shares, which generally provide enhanced control rights relative to common shares



# Valuing the Enterprise

## SECTION 2

# Role of Calibration



# Calibration :: What Was the Last Valuation?

## Developing a Calibration Date Enterprise Value

### Last External Round

| Issue              | Date      | Price    | Shares    | Proceeds     |
|--------------------|-----------|----------|-----------|--------------|
| Series E Preferred | 4/15/2015 | \$7.1405 | 4,971,641 | \$35,500,003 |

### As-If Converted Basis

|                                          |                      |
|------------------------------------------|----------------------|
| Fully-Diluted Share Count                | 77,494,506           |
| times: Series E Issue Price              | \$7.1405             |
| <b>Implied Equity Value (Post-Money)</b> | <b>\$553,349,520</b> |
| Weight Assigned to Indication            | 50.0%                |

Overstates value because it treats every share as if it were the most senior class

### Option Pricing Model Backsolve

|                                     | Shares            | Per Share | Total                |
|-------------------------------------|-------------------|-----------|----------------------|
| Series A Preferred                  | 3,666,666         | \$1.9749  | \$7,241,480          |
| Series B Preferred                  | 9,400,764         | \$2.0362  | \$19,142,277         |
| Series C Preferred / Warrants       | 8,409,088         | \$2.1958  | \$18,464,963         |
| Series C-1 Preferred                | 1,198,019         | \$3.6190  | \$4,335,618          |
| Series D Preferred                  | 12,256,960        | \$3.4919  | \$42,799,698         |
| Series E Preferred                  | 4,971,641         | \$7.1405  | \$35,500,052         |
| Options: 2007 Stock Plan / Warrants | 14,680,052        | \$1.7894  | \$26,268,052         |
| Common Stock                        | 22,911,316        | \$1.9236  | \$44,072,577         |
| <b>Total</b>                        | <b>77,494,506</b> |           | <b>\$197,824,718</b> |
| Weight Assigned to Indication       |                   |           | 50.0%                |

Understates value because it tends to ascribe too much value to seniority preferences

|                                                         |                      |
|---------------------------------------------------------|----------------------|
| <b>Indicated Equity Value - Last External Round</b>     | <b>\$376,000,000</b> |
| less: Cash                                              | (\$61,416,003)       |
| plus: Interest-Bearing Debt                             | \$20,823,000         |
| <b>Indicated Enterprise Value - Last External Round</b> | <b>\$335,406,997</b> |

# Enterprise Valuation Methods

- Asset-based approaches
- Discounted cash flow analysis
- Market multiples
- PWERM => Probability-Weighted Expected Return Method

# Enterprise Valuation Methods

- Asset-based approaches
- Discounted cash flow analysis
- Market multiples
- **PWERM => Probability-Weighted Expected Return Method**

# PWERM & VC Perspectives

## The PWERM

**6.23** Under a PWERM, the value of the various equity securities are estimated based upon an analysis of future values for the enterprise, assuming various future outcomes. Share value is based upon the probability-weighted present value of expected future investment returns, considering each of the possible future outcomes available to the enterprise, as well as the rights of each share class. Although the future outcomes considered in any given valuation model will vary based upon the enterprise's facts and circumstances, common future outcomes modeled might include an IPO, a merger or sale, a dissolution, or continued operation as a private enterprise until a later exit date.<sup>5</sup>

**6.24** This method involves a forward-looking analysis of the potential future outcomes available to the enterprise, the estimation of ranges of future and present value under each outcome, and the application of a probability factor to each outcome as of the valuation date. The following list is a simple

*Source: AICPA Practice Aid – Valuation of Privately-Held-Company Equity Securities Issued as Compensation*

### PWERM Calculation Steps:

- 1 – Determine the possible future outcomes available to the enterprise
- 2 – Estimate the future equity value under each outcome, either as a point estimate or range
- 3 – Allocate the estimated future equity value to each share class under each possible outcome
- 4 – Weight each possible outcome by its respective probability to estimate the expected future probability-weighted cash flows to each share class
- 5 – Discount the expected equity value allocated to each share class to present value using a risk-adjusted discount rate
- 6 – Divide the present value allocated to each share class by the respective number of shares outstanding to calculate the value per share for each class.
- 7 – Consider additional adjustments (i.e., DLOM)

The PWERM mirrors the perspective and assumptions of VCs

# PWERM Scenarios

## Scenario Definitions

### Scenario #1: IPO

|                                   |                |               |
|-----------------------------------|----------------|---------------|
| Expected Time Until Event (Years) | 4.0            |               |
|                                   | <b>Revenue</b> | <b>EBITDA</b> |
| Forward Performance Measures      | € 840.1        | € 42.0        |
| times: Selected Multiples         | <b>0.9x</b>    | <b>15.0x</b>  |
| Estimated IPO Values              | € 756.1        | € 630.1       |
| <i>Weights Applied</i>            | <b>50.0%</b>   | <b>50.0%</b>  |
| <b>Estimated IPO Exit</b>         | <b>€ 693.1</b> |               |

### Scenario #2: Strategic Sale

|                                      |                |               |
|--------------------------------------|----------------|---------------|
| Expected Time Until Event (Years)    | 4.0            |               |
|                                      | <b>Revenue</b> | <b>EBITDA</b> |
| Forward Performance Measures         | € 840.1        | € 42.0        |
| times: Selected Multiples            | <b>1.25x</b>   | <b>20.0x</b>  |
| Estimated Strategic Sale Value       | € 1,050.1      | € 840.1       |
| <i>Weights Applied</i>               | <b>50.0%</b>   | <b>50.0%</b>  |
| <b>Estimated Strategic Sale Exit</b> | <b>€ 945.1</b> |               |

### Scenario #3: Downside Case

|                                      |                |
|--------------------------------------|----------------|
| Expected Time Until Event (Years)    | 4.0            |
| Estimated Strategic Sale Value       | € 945.1        |
| times: Selected Multiple             | <b>50.0%</b>   |
| Estimated Value - Downside Case      | € 472.5        |
| <i>Weights Applied</i>               | <b>100.0%</b>  |
| <b>Estimated Downside Case Value</b> | <b>€ 472.5</b> |

### Scenario #4: Liquidation / Dissolution

|                                                  |               |
|--------------------------------------------------|---------------|
| Expected Time Until Event (Years)                | 2.0           |
| Cumulative Invested Capital                      | € 72.6        |
| times: Estimated Recovery Multiple               | <b>50.0%</b>  |
| <b>Estimated Liquidation / Dissolution Value</b> | <b>€ 36.3</b> |

PWERM assumptions made with reference to life cycle stage, business plan, financial projections, and market data

# PWERM Scenarios

Scenario weights and expected dilution estimated with reference to life cycle stage and business plan

|                                                             | Scen #1        | Scen #2        | Scen #3       | Scen #4                   |
|-------------------------------------------------------------|----------------|----------------|---------------|---------------------------|
| Scenario Description                                        | IPO            | Strategic Sale | Downside Case | Liquidation / Dissolution |
| Exit Enterprise Value                                       | € 693.1        | € 945.1        | € 472.5       | € 36.3                    |
| Assumed Exit Date                                           | 12/31/2019     | 12/31/2019     | 12/31/2019    | 12/31/2017                |
| Scenario Weights                                            | 25.0%          | 25.0%          | 25.0%         | 25.0%                     |
| <b>Implied Enterprise Value Analysis</b>                    |                |                |               |                           |
| Expected Dilution                                           | 0.0%           | 0.0%           | 0.0%          | 0.0%                      |
| Enterprise Value Attributable to Existing Capital Providers | € 693.1        | € 945.1        | € 472.5       | € 36.3                    |
| Discount Periods                                            | 4.0            | 4.0            | 4.0           | 2.0                       |
| Weighted Average Cost of Capital                            | 17.4%          | 17.4%          | 17.4%         | 17.4%                     |
| Present Value Factor                                        | 0.5262         | 0.5262         | 0.5262        | 0.7254                    |
| Present Value of Exit Enterprise Value                      | € 364.7        | € 497.3        | € 248.7       | € 26.3                    |
| <b>Indicated Enterprise Value</b>                           | <b>€ 284.3</b> |                |               |                           |
| Projected Enterprise Value                                  | € 693.1        | € 945.1        | € 472.5       | € 36.3                    |

# PWERM Inputs

- Discount rate
- Time to liquidity event
- Exit multiples
  - Consider IPO data
  - Consider public company data
- Downside case exit value
- Liquidation recovery multiple
- Scenario weights
- Expected dilution

# Discount Rate

## Weighted Average Cost of Capital

| Cost of Equity                                 |        | References and Comments |
|------------------------------------------------|--------|-------------------------|
| Risk-Free Rate                                 | 2.66%  | Note (1)                |
| Equity Risk Premium                            | 5.50%  | Note (2)                |
| Guideline Beta                                 | 2.00   | Note (3)                |
| Beta Adjusted Common Stock Premium             | 11.00% |                         |
| Size Premium                                   | 3.74%  | Note (4)                |
| Specific Company Risk Premium                  | 0.50%  | Note (5)                |
| Equity Discount Rate (Required Rate of Return) | 17.90% | Rounded to: 0.01%       |

| Cost of Debt                     |       |                   |
|----------------------------------|-------|-------------------|
| Base Cost of Debt                | 4.86% | Note (6)          |
| Applicable Spread Over Base Cost | 0.00% | Note (7)          |
| Total Pre-tax Cost of Debt       | 4.86% |                   |
| Estimated Tax Rate               | 38.0% | -1.85%            |
| After-Tax Cost of Debt Capital   | 3.01% | Rounded to: 0.01% |

| Weighted Average Cost of Capital (WACC) |        |                       |         |
|-----------------------------------------|--------|-----------------------|---------|
| Capital Component                       | Cost   | Weight <sup>(8)</sup> | Product |
| Equity                                  | 17.90% | 100.0%                | 17.90%  |
| Debt                                    | 3.01%  | 0.0%                  | 0.00%   |
| Weighted Average Cost of Capital (WACC) |        |                       | 17.90%  |

At the calibration date, the objective of the WACC analysis is to establish a baseline framework for the enterprise WACC. The enterprise WACC is distinguished from the conditional returns achieved on successful VC investments, and is instead representative of an investor's expected return on a portfolio of VC investments (likely 15-20%)

At the calibration date, the specific company risk premium is implied such that the resulting WACC corresponds to the IRR on the enterprise value

At subsequent fair value measurement dates, the specific company risk premium is reassessed relative to fundamental changes in the business.

# VC Returns

Fund returns, net of fees // Source: AICPA Practice Aid

| Type of Fund                  | 5-Year Return |      | 10-Year Return |       | 20-Year Return |       |
|-------------------------------|---------------|------|----------------|-------|----------------|-------|
|                               | 2002          | 2008 | 2002           | 2008  | 2002           | 2008  |
| Seed/Early Stage <sup>1</sup> | 51.4%         | 3.0% | 34.9%          | 25.5% | 20.4%          | 22.1% |
| Balanced <sup>2</sup>         | 20.9%         | 7.5% | 20.9%          | 12.0% | 14.3%          | 14.6% |
| Later Stage <sup>3</sup>      | 10.6%         | 8.1% | 21.6%          | 7.3%  | 15.3%          | 14.7% |
| All Ventures                  | 28.3%         | 5.7% | 26.3%          | 13.4% | 16.6%          | 17.2% |

<sup>1</sup> Venture Economics uses the term *seed stage* to refer to enterprises that have not yet fully established commercial operations and may involve continued research and development. Venture Economics uses the term *early stage* to refer to enterprises involved in product development and initial marketing, manufacturing, and sales activities.

<sup>2</sup> Venture Economics uses the term *balanced* to refer to enterprises at a variety of stages of development (seed stage, early stage, later stage).

<sup>3</sup> Venture Economics uses the term *later stage* to refer to enterprises that are producing, shipping, and increasing sales volume.

# VC Returns

Expected enterprise-level returns Source: AICPA Practice Aid

| Rates of Return                                   |                            |                                         |                                       |
|---------------------------------------------------|----------------------------|-----------------------------------------|---------------------------------------|
| <i>Stage of Development</i>                       | <i>Plummer<sup>1</sup></i> | <i>Scherlis and Sahlman<sup>2</sup></i> | <i>Sahlman and Others<sup>3</sup></i> |
| Start-up <sup>4</sup>                             | 50%–70%                    | 50%–70%                                 | 50%–100%                              |
| First stage or early development <sup>5</sup>     | 40%–60%                    | 40%–60%                                 | 40%–60%                               |
| Second stage or expansion <sup>6</sup>            | 35%–50%                    | 30%–50%                                 | 30%–40%                               |
| Bridge/initial public offering (IPO) <sup>7</sup> | 25%–35%                    | 20%–35%                                 | 20%–30%                               |

<sup>1</sup> James L. Plummer, *QED Report on Venture Capital Financial Analysis* (Palo Alto: QED Research, Inc., 1987).

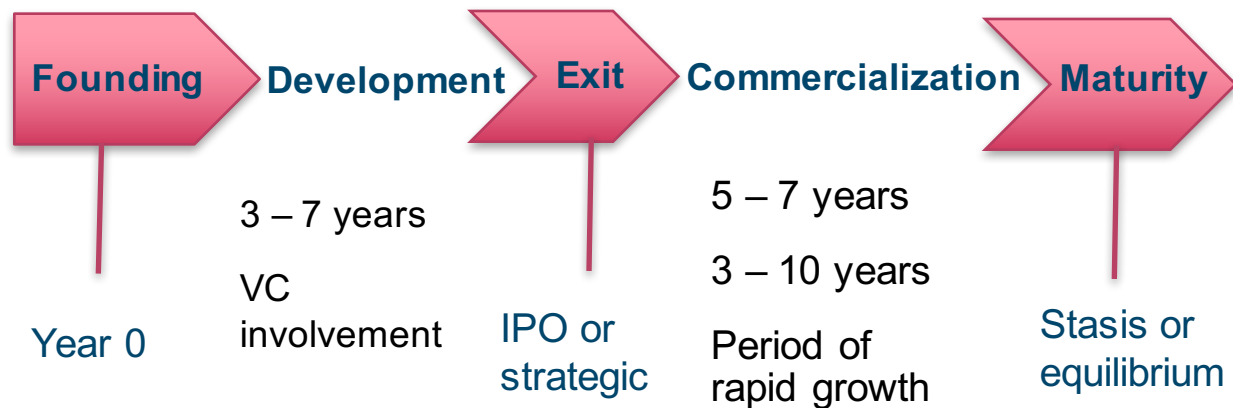
<sup>2</sup> Daniel R. Scherlis and William A. Sahlman, "A Method for Valuing High-Risk, Long Term, Investments: The 'Venture Capital Method,'" Harvard Business School Teaching Note 9-288-006 (Boston: Harvard Business School Publishing, 1989).

# Discount Rate Perspective

- Extension of CAPM to incorporate four factors:
  - Excess market returns
  - Size
  - Value
  - Liquidity
- Market, value, and liquidity factors appear significant in looking at data from c. 1981 to c. 2008
- Concluded estimate of VC cost of capital: 15%

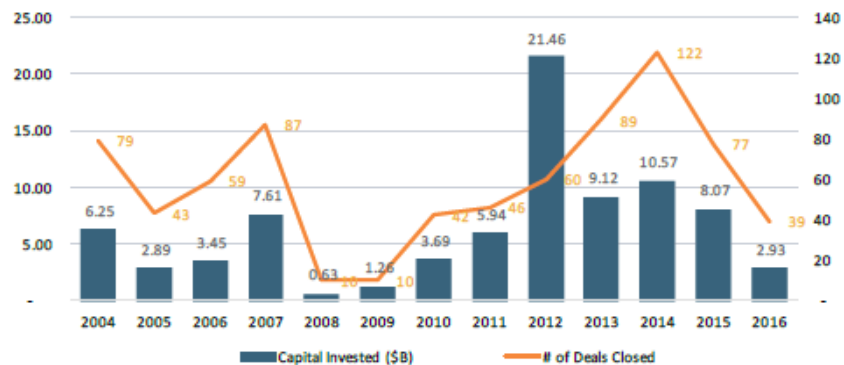
Source: Venture Capital & the Finance of Innovation, Metrick et al

# Lifecycle



# Exit Perspectives :: IPO

## U.S. VC-backed IPOs by Year



Source: NVCA 2017 Yearbook, Data Provided by PitchBook

## U.S. IPOs by Year

|      | # of All IPOs | # of VC Backed IPOs |
|------|---------------|---------------------|
| 2004 | 281           | 79                  |
| 2005 | 258           | 43                  |
| 2006 | 260           | 59                  |
| 2007 | 294           | 87                  |
| 2008 | 137           | 10                  |
| 2009 | 87            | 10                  |
| 2010 | 173           | 42                  |
| 2011 | 177           | 46                  |
| 2012 | 198           | 60                  |
| 2013 | 320           | 89                  |
| 2014 | 373           | 122                 |
| 2015 | 226           | 77                  |
| 2016 | 138           | 39                  |

Source: NVCA 2017 Yearbook, Data Provided by PitchBook

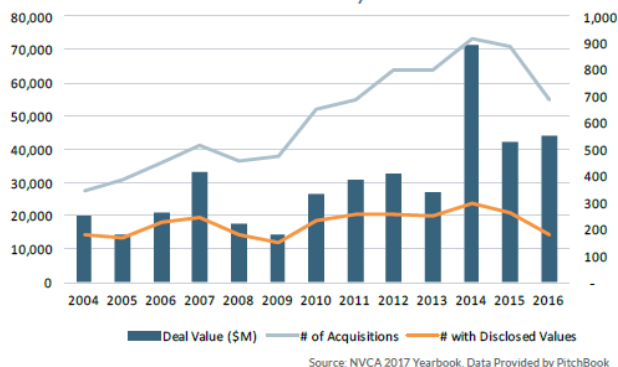
# Exit Perspectives :: IPO

## U.S. VC Backed IPO Value and Age Characteristics

|      | # of IPOs | Deal Value (\$M) | Median Deal Value (\$M) | Average Deal Value (\$M) | Post Value (\$M) | Median Post Value (\$M) | Average Post Value (\$M) | Median Time from 1st VC to Exit | Average Time from 1st VC to Exit |
|------|-----------|------------------|-------------------------|--------------------------|------------------|-------------------------|--------------------------|---------------------------------|----------------------------------|
| 2004 | 79        | 6,250.6          | 49.8                    | 84.5                     | 41,826.0         | 220.8                   | 580.9                    | 5.16                            | 5.20                             |
| 2005 | 43        | 2,892.0          | 53.8                    | 72.3                     | 8,628.8          | 199.3                   | 227.1                    | 4.77                            | 4.52                             |
| 2006 | 59        | 3,452.9          | 55.5                    | 63.9                     | 13,908.9         | 219.8                   | 252.9                    | 4.79                            | 5.09                             |
| 2007 | 87        | 7,611.2          | 75.0                    | 96.3                     | 33,492.2         | 333.8                   | 418.7                    | 5.17                            | 5.54                             |
| 2008 | 10        | 626.2            | 61.8                    | 69.6                     | 2,773.4          | 237.0                   | 396.2                    | 2.82                            | 4.61                             |
| 2009 | 10        | 1,255.0          | 86.6                    | 125.5                    | 4,824.2          | 342.1                   | 536.0                    | 7.32                            | 7.50                             |
| 2010 | 42        | 3,691.9          | 69.8                    | 87.9                     | 15,903.4         | 278.7                   | 378.7                    | 6.90                            | 7.38                             |
| 2011 | 46        | 5,938.9          | 87.7                    | 138.1                    | 45,877.3         | 423.6                   | 1,092.3                  | 5.88                            | 6.87                             |
| 2012 | 60        | 1,457.5          | 81.0                    | 390.1                    | 114,752.5        | 360.3                   | ,206.8                   | 7.14                            | 7.64                             |
| 2013 | 89        | 9,116.7          | 75.0                    | 107.3                    | 52,808.8         | 319.5                   | 628.7                    | 6.77                            | 7.30                             |
| 2014 | 122       | 10,565.5         | 65.6                    | 88.0                     | 52,081.5         | 249.4                   | 437.7                    | 6.85                            | 7.04                             |
| 2015 | 77        | 8,072.7          | 74.8                    | 104.8                    | 40,814.5         | 289.5                   | 551.5                    | 6.94                            | 6.75                             |
| 2016 | 39        | 2,928.5          | 70.5                    | 75.1                     | 16,079.3         | 250.6                   | 412.3                    | 8.27                            | 7.61                             |

# Exit Perspectives :: M&A

U.S. Venture-backed M&A Activity



U.S. VC Backed M&A Value and Age Characteristics

|      | # of Acquisitions | # with Disclosed Values | Deal Value (\$M) | Average Deal Value (\$M) | Median Deal Value (\$M) | Median Time from 1st VC to Exit | Average Time from 1st VC to Exit |
|------|-------------------|-------------------------|------------------|--------------------------|-------------------------|---------------------------------|----------------------------------|
| 2004 | 341               | 179                     | 19,745.0         | 110.3                    | 43.7                    | 3.90                            | 4.07                             |
| 2005 | 386               | 166                     | 14,086.9         | 84.9                     | 38.1                    | 4.74                            | 4.59                             |
| 2006 | 451               | 227                     | 20,666.5         | 91.0                     | 44.7                    | 4.70                            | 4.72                             |
| 2007 | 515               | 245                     | 33,180.1         | 135.4                    | 50.0                    | 4.57                            | 4.82                             |
| 2008 | 455               | 177                     | 17,523.4         | 99.0                     | 36.0                    | 4.75                            | 4.89                             |
| 2009 | 472               | 146                     | 14,437.0         | 98.9                     | 25.0                    | 4.34                            | 4.86                             |
| 2010 | 651               | 232                     | 26,583.8         | 114.6                    | 36.5                    | 4.36                            | 5.00                             |
| 2011 | 687               | 257                     | 30,956.5         | 120.5                    | 50.0                    | 4.21                            | 4.89                             |
| 2012 | 799               | 252                     | 32,478.5         | 128.9                    | 48.5                    | 4.51                            | 4.99                             |
| 2013 | 796               | 247                     | 27,124.0         | 109.8                    | 37.3                    | 4.08                            | 5.05                             |
| 2014 | 918               | 297                     | 71,176.4         | 239.7                    | 52.0                    | 4.44                            | 5.29                             |
| 2015 | 884               | 258                     | 42,299.5         | 164.0                    | 50.0                    | 4.31                            | 5.42                             |
| 2016 | 687               | 177                     | 43,894.6         | 248.0                    | 90.0                    | 4.67                            | 5.83                             |

Source: NVCA 2017 Yearbook, Data Provided by PitchBook

# Exit Perspectives

|                             | First<br>Investments | IPO | M&A   |
|-----------------------------|----------------------|-----|-------|
| 2004                        | 869                  | 79  | 341   |
| 2005                        | 1,045                | 43  | 386   |
| 2006                        | 1,279                | 59  | 451   |
| 2007                        | 1,678                | 87  | 515   |
| 2008                        | 1,762                | 10  | 455   |
| 2009                        | 1,674                | 10  | 472   |
| 2010                        | 2,089                | 42  | 651   |
| 2011                        | 2,830                | 46  | 687   |
| 2012                        | 3,340                | 60  | 799   |
| 2013                        | 3,586                | 89  | 796   |
| 2014                        | 3,739                | 122 | 918   |
| 2015                        | 3,333                | 77  | 884   |
| 2016                        | 2,340                | 39  | 687   |
|                             |                      |     |       |
| 2004 - 2011                 | 13,226               |     |       |
| 2009 - 2016                 |                      | 485 | 5,894 |
| <i>% of 1st Investments</i> |                      | 4%  | 45%   |

Source: NVCA 2017 Yearbook, Data Provided by Pitchbook

# Dilution

- Study of IPOs – implied retention
- First round investments            50%
- Second round investments        60%
- Third round investments          67%
- Fourth and later rounds          70%

Source: Venture  
Capital & the Finance  
of Innovation, Metrick  
et al

# PWERM Inputs

- Expected dilution – flip retention data based on additional rounds of investment necessary. These are baseline figures only and need to be adjusted for specific facts & circumstances
  - One round 5% to 10%
  - One to two rounds 10% to 20%
  - Two or more rounds 20% to 30%
  - Ser A (or Seed) 50% (or less)

Source: Venture Capital & the Finance of Innovation, Metrick et al

# Pulling It All Together

Scenario weights and expected dilution estimated with reference to life cycle stage and business plan

|                                                             | Scen #1        | Scen #2        | Scen #3       | Scen #4                   |
|-------------------------------------------------------------|----------------|----------------|---------------|---------------------------|
| Scenario Description                                        | IPO            | Strategic Sale | Downside Case | Liquidation / Dissolution |
| Exit Enterprise Value                                       | € 693.1        | € 945.1        | € 472.5       | € 36.3                    |
| Assumed Exit Date                                           | 12/31/2019     | 12/31/2019     | 12/31/2019    | 12/31/2017                |
| Scenario Weights                                            | 25.0%          | 25.0%          | 25.0%         | 25.0%                     |
| <b>Implied Enterprise Value Analysis</b>                    |                |                |               |                           |
| Expected Dilution                                           | 0.0%           | 0.0%           | 0.0%          | 0.0%                      |
| Enterprise Value Attributable to Existing Capital Providers | € 693.1        | € 945.1        | € 472.5       | € 36.3                    |
| Discount Periods                                            | 4.0            | 4.0            | 4.0           | 2.0                       |
| Weighted Average Cost of Capital                            | 17.4%          | 17.4%          | 17.4%         | 17.4%                     |
| Present Value Factor                                        | 0.5262         | 0.5262         | 0.5262        | 0.7254                    |
| Present Value of Exit Enterprise Value                      | € 364.7        | € 497.3        | € 248.7       | € 26.3                    |
| <b>Indicated Enterprise Value</b>                           | <b>€ 284.3</b> |                |               |                           |
| Projected Enterprise Value                                  | € 693.1        | € 945.1        | € 472.5       | € 36.3                    |

# PWERM Inputs

- Calibration and FV measurement
  - Total equity value approximates calibrated value and PWERM indicated exit value
- Calibration
  - Reconcile to share price from latest funding round

## Indicated Values

|                                     | Expected<br>Value | Units<br>Outstanding | Value /<br>Share |                                            |
|-------------------------------------|-------------------|----------------------|------------------|--------------------------------------------|
| Series A Preferred                  | \$17.3            | 3,666,666            | \$4.72           |                                            |
| Series B Preferred                  | \$44.9            | 9,400,764            | \$4.78           |                                            |
| Series C Preferred / Warrants       | \$40.8            | 8,409,088            | \$4.85           |                                            |
| Series C-1 Preferred                | \$6.1             | 1,198,019            | \$5.10           |                                            |
| Series D Preferred                  | \$62.4            | 12,256,960           | \$5.09           |                                            |
| <b>Series E Preferred</b>           | <b>\$33.8</b>     | <b>4,971,641</b>     | <b>\$6.81</b>    | <b>Offering Price = \$7.1405 per share</b> |
| Options: 2007 Stock Plan / Warrants | \$66.1            | 14,680,052           | \$4.50           |                                            |
| Common Stock                        | \$106.0           | 22,911,316           | \$4.63           |                                            |
| Total Present Value                 | \$377.4           |                      |                  |                                            |

## Reconciliation and Sanity Check



# Option Pricing Model

# SimpleCo Example

## Exhibit 1

### Payoff Table - SimpleCo

| Enterprise Value | Preferred Shareholders | Common Shareholders |
|------------------|------------------------|---------------------|
| \$0              | \$0                    | \$0                 |
| \$100            | \$100                  | \$0                 |
| \$200            | \$200                  | \$0                 |
| \$300            | \$300                  | \$0                 |
| \$400            | \$400                  | \$0                 |
| \$500            | \$500                  | \$0                 |
| \$600            | \$500                  | \$100               |
| \$700            | \$500                  | \$200               |
| \$800            | \$500                  | \$300               |
| \$900            | \$500                  | \$400               |
| \$1,000          | \$500                  | \$500               |

Two observations can be made from a brief study of Table 1.

1. **Financial engineering does not create value.** In every possible state of the world, the sum of the payoffs to the preferred and common shareholders is equal to the equity value. Creative pie-slicing does not make the pie any bigger.
2. **The payoffs to the common shareholders have the same basic shape as a call option.** The holder of a call option receives no payoff when the stock price is less than or equal to the strike price. However, the call option holder participates dollar-for-dollar in appreciation above the strike price.

The Basic Insight of the OPM

# SimpleCo Example

In light of these observations, we can express the value of the preferred and common share as shown in Exhibit 2.

## Exhibit 2

Component Securities - SimpleCo

| Enterprise Value | = | Preferred Value          | + | Common Value      |
|------------------|---|--------------------------|---|-------------------|
| <i>EV</i>        | = | <i>(EV - \$500 Call)</i> | + | <i>\$500 Call</i> |

By recasting the preferred and common equity classes into the component securities, the subjective judgment associated with selecting the appropriate yield on the preferred shares has been eliminated, as the value of the preferred shares is simply the excess of equity value over the value of a call option with a strike price of \$500.

The Basic Insight of the OPM

# What is a “Breakpoint”?

## Exhibit 3

### Capital Structure - ComplexCo

|                   | Liquidation<br>Preference | Liquidation<br>Priority | Conversion/<br>Exercise<br>Price | Fully-<br>Diluted<br>Shares | % of<br>Total |
|-------------------|---------------------------|-------------------------|----------------------------------|-----------------------------|---------------|
| Class A Preferred | \$1,000                   | <i>Pari Passu</i>       | \$2.00                           | 500                         | 19.6%         |
| Class B Preferred | 1,500                     | <i>Pari Passu</i>       | \$5.00                           | 300                         | 11.8%         |
| Common Shares     | 0                         | Residual                | na                               | 1,500                       | 58.8%         |
| Warrants          | 0                         | Residual                | \$10.00                          | 250                         | 9.8%          |
| <b>Total</b>      | <b>\$2,500</b>            |                         |                                  | <b>2,550</b>                | <b>100.0%</b> |

One could construct a payoff table similar to that in Exhibit 1. While certainly possible, doing so can become a bit cumbersome as the complexity of the capital structure increases. As a shortcut, valuation specialists identify the relevant “breakpoints” in the capital structure. In the OPM, a breakpoint is an equity value beyond which the marginal allocation of incremental value to the various equity classes changes. SimpleCo had a single breakpoint, while ComplexCo will prove to have four. We often see cases in which a dozen or more can be identified.

Breakpoints are identified starting with an equity value of \$0. For ComplexCo, the Class A and Class B preferred shares participate on a *pari passu* basis, so the first breakpoint is the aggregate liquidation preference, or \$2,500 (the total “Net Proceeds” in Exhibit 4). Additional elements of Exhibit 4 will be explained as we proceed through the example.

# Liquidation Preferences

## Exhibit 4

### Breakpoint #1 - Class A & Class B Liquidation Preference

|                        | Shares | Gross Proceeds | Exercise Price | Net Proceeds | % of Total | Marginal Proceeds | % of Total |
|------------------------|--------|----------------|----------------|--------------|------------|-------------------|------------|
| Preference Claims      |        |                |                |              |            |                   |            |
| Class A Preferred      |        | \$1,000        | na             | \$1,000      | 40.0%      | \$1,000           | 40.0%      |
| Class B Preferred      |        | 1,500          | na             | 1,500        | 60.0%      | 1,500             | 60.0%      |
| As-If Converted Shares | \$0.00 |                |                |              |            |                   |            |
| Class A Preferred      | 0      | 0              | na             | 0            | 0.0%       | 0                 | 0.0%       |
| Class B Preferred      | 0      | 0              | na             | 0            | 0.0%       | 0                 | 0.0%       |
| Common Shares          | 1,500  | 0              | na             | 0            | 0.0%       | 0                 | 0.0%       |
| Warrants               | 0      | 0              | 0              | 0            | 0.0%       | 0                 | 0.0%       |
| Total                  | 1,500  | \$2,500        | \$0            | \$2,500      | 100.0%     | \$2,500           | 100.0%     |

The definition of the first breakpoint will depend on whether the preferred classes share in liquidation proceeds on a pro rata basis or in order of seniority

# Conversion #1

## Exhibit 5

### Breakpoint #2 - Class A Converts to Common

|                        | Shares | Gross Proceeds | Exercise Price | Net Proceeds | % of Total | Marginal Proceeds | % of Total |
|------------------------|--------|----------------|----------------|--------------|------------|-------------------|------------|
| Preference Claims      |        |                |                |              |            |                   |            |
| Class A Preferred      |        | \$0            | na             | \$0          | 0.0%       | (\$1,000)         | -33.3%     |
| Class B Preferred      |        | 1,500          | na             | 1,500        | 27.3%      | 0                 | 0.0%       |
| As-If Converted Shares | \$2.00 |                |                |              |            |                   |            |
| Class A Preferred      | 500    | 1,000          | na             | 1,000        | 18.2%      | 1,000             | 33.3%      |
| Class B Preferred      | 0      | 0              | na             | 0            | 0.0%       | 0                 | 0.0%       |
| Common Shares          | 1,500  | 3,000          | na             | 3,000        | 54.5%      | 3,000             | 100.0%     |
| Warrants               | 0      | 0              | 0              | 0            | 0.0%       | 0                 | 0.0%       |
| Total                  | 2,000  | \$5,500        | \$0            | \$5,500      | 100.0%     | \$3,000           | 100.0%     |

## Exhibit 3

### Capital Structure - ComplexCo

|                   | Liquidation Preference | Liquidation Priority | Conversion/ Exercise Price | Fully-Diluted Shares | % of Total    |
|-------------------|------------------------|----------------------|----------------------------|----------------------|---------------|
| Class A Preferred | \$1,000                | <i>Pari Passu</i>    | \$2.00                     | 500                  | 19.6%         |
| Class B Preferred | 1,500                  | <i>Pari Passu</i>    | \$5.00                     | 300                  | 11.8%         |
| Common Shares     | 0                      | Residual             | na                         | 1,500                | 58.8%         |
| Warrants          | 0                      | Residual             | \$10.00                    | 250                  | 9.8%          |
| <b>Total</b>      | <b>\$2,500</b>         |                      |                            | <b>2,550</b>         | <b>100.0%</b> |

Once all liquidation preferences have been covered, the next step is to identify conversion / exercise by order of conversion price (not seniority), from lowest to highest

# Conversion #2

## Exhibit 6

### Breakpoint #3 - Class B Converts to Common

|                        | Shares        | Gross Proceeds | Exercise Price | Net Proceeds    | % of Total | Marginal Proceeds | % of Total |
|------------------------|---------------|----------------|----------------|-----------------|------------|-------------------|------------|
| Preference Claims      |               |                |                |                 |            |                   |            |
| Class A Preferred      |               | \$0            | na             | \$0             | 0.0%       | \$0               | 0.0%       |
| Class B Preferred      |               | 0              | na             | 0               | 0.0%       | (1,500)           | -25.0%     |
| As-If Converted Shares | <b>\$5.00</b> |                |                |                 |            |                   |            |
| Class A Preferred      | 500           | 2,500          | na             | 2,500           | 21.7%      | 1,500             | 25.0%      |
| Class B Preferred      | 300           | 1,500          | na             | 1,500           | 13.0%      | 1,500             | 25.0%      |
| Common Shares          | 1,500         | 7,500          | na             | 7,500           | 65.2%      | 4,500             | 75.0%      |
| Warrants               | 0             | 0              | 0              | 0               | 0.0%       | 0                 | 0.0%       |
| Total                  | 2,300         | \$11,500       | \$0            | <b>\$11,500</b> | 100.0%     | \$6,000           | 100.0%     |

Once all liquidation preferences have been covered, the next step is to identify conversion / exercise by order of conversion price (not seniority), from lowest to highest

# Warrant Exercise

## Exhibit 7

### Breakpoint #4 - Warrants Exercise

|                        | Shares         | Gross<br>Proceeds | Exercise<br>Price | Net<br>Proceeds | % of<br>Total | Marginal<br>Proceeds | % of<br>Total |
|------------------------|----------------|-------------------|-------------------|-----------------|---------------|----------------------|---------------|
| Preference Claims      |                |                   |                   |                 |               |                      |               |
| Class A Preferred      |                | \$0               | na                | \$0             | 0.0%          | \$0                  | 0.0%          |
| Class B Preferred      |                | 0                 | na                | 0               | 0.0%          | 0                    | 0.0%          |
| As-If Converted Shares | <b>\$10.00</b> |                   |                   |                 |               |                      |               |
| Class A Preferred      | 500            | 5,000             | na                | 5,000           | 21.7%         | 2,500                | 21.7%         |
| Class B Preferred      | 300            | 3,000             | na                | 3,000           | 13.0%         | 1,500                | 13.0%         |
| Common Shares          | 1,500          | 15,000            | na                | 15,000          | 65.2%         | 7,500                | 65.2%         |
| Warrants               | 250            | 2,500             | (2,500)           | 0               | 0.0%          | 0                    | 0.0%          |
| Total                  | 2,550          | \$25,500          | (\$2,500)         | \$23,000        | 100.0%        | \$11,500             | 100.0%        |

Warrants and options are ranked along with convertible preferred to determine breakpoint order; however, unlike conversions, the breakpoint associated with warrant / option exercise needs to incorporate proceeds to corporation

# Illustrative Upside

## Exhibit 8

### Illustrative Upside

|                        | Shares         | Gross<br>Proceeds | Exercise<br>Price | Net<br>Proceeds | % of<br>Total | Marginal<br>Proceeds | % of<br>Total |
|------------------------|----------------|-------------------|-------------------|-----------------|---------------|----------------------|---------------|
| Preference Claims      |                |                   |                   |                 |               |                      |               |
| Class A Preferred      |                | \$0               | na                | \$0             | 0.0%          | \$0                  | 0.0%          |
| Class B Preferred      |                | 0                 | na                | 0               | 0.0%          | 0                    | 0.0%          |
| As-If Converted Shares | <b>\$15.00</b> |                   |                   |                 |               |                      |               |
| Class A Preferred      | 500            | 7,500             | na                | 7,500           | 21.0%         | 2,500                | 19.6%         |
| Class B Preferred      | 300            | 4,500             | na                | 4,500           | 12.6%         | 1,500                | 11.8%         |
| Common Shares          | 1,500          | 22,500            | na                | 22,500          | 62.9%         | 7,500                | 58.8%         |
| Warrants               | 250            | 3,750             | (2,500)           | 1,250           | 3.5%          | 1,250                | 9.8%          |
| Total                  | 2,550          | \$38,250          | (\$2,500)         | \$35,750        | 100.0%        | \$12,750             | 100.0%        |

The only purpose of the “illustrative upside” panel is to define the final set of marginal allocation percentages; the selected share price does not matter, so long as it is greater than that of the penultimate breakpoint

# Illustrative Upside

## Exhibit 8

### Illustrative Upside

|                        | Shares         | Gross<br>Proceeds | Exercise<br>Price | Net<br>Proceeds | % of<br>Total | Marginal<br>Proceeds | % of<br>Total |
|------------------------|----------------|-------------------|-------------------|-----------------|---------------|----------------------|---------------|
| Preference Claims      |                |                   |                   |                 |               |                      |               |
| Class A Preferred      |                | \$0               | na                | \$0             | 0.0%          | \$0                  | 0.0%          |
| Class B Preferred      |                | 0                 | na                | 0               | 0.0%          | 0                    | 0.0%          |
| As-If Converted Shares | <b>\$15.00</b> |                   |                   |                 |               |                      |               |
| Class A Preferred      | 500            | 7,500             | na                | 7,500           | 21.0%         | 2,500                | 19.6%         |
| Class B Preferred      | 300            | 4,500             | na                | 4,500           | 12.6%         | 1,500                | 11.8%         |
| Common Shares          | 1,500          | 22,500            | na                | 22,500          | 62.9%         | 7,500                | 58.8%         |
| Warrants               | 250            | 3,750             | (2,500)           | 1,250           | 3.5%          | 1,250                | 9.8%          |
| Total                  | 2,550          | \$38,250          | (\$2,500)         | \$35,750        | 100.0%        | \$12,750             | 100.0%        |

## Exhibit 3

### Capital Structure - ComplexCo

|                   | Liquidation<br>Preference | Liquidation<br>Priority | Conversion/<br>Exercise<br>Price | Fully-<br>Diluted<br>Shares | % of<br>Total |
|-------------------|---------------------------|-------------------------|----------------------------------|-----------------------------|---------------|
| Class A Preferred | \$1,000                   | <i>Pari Passu</i>       | \$2.00                           | 500                         | 19.6%         |
| Class B Preferred | 1,500                     | <i>Pari Passu</i>       | \$5.00                           | 300                         | 11.8%         |
| Common Shares     | 0                         | Residual                | na                               | 1,500                       | 58.8%         |
| Warrants          | 0                         | Residual                | \$10.00                          | 250                         | 9.8%          |
| <b>Total</b>      | <b>\$2,500</b>            |                         |                                  | <b>2,550</b>                | <b>100.0%</b> |

The only purpose of the “illustrative upside” panel is to define the final set of marginal allocation percentages; the selected share price does not matter, so long as it is greater than that of the penultimate breakpoint

# What is a “Tranche”?

## Exhibit 9

### Marginal Tranche Allocation Matrix

|                  | Tranche A | Tranche B | Tranche C | Tranche D | Tranche E |
|------------------|-----------|-----------|-----------|-----------|-----------|
| Upper Breakpoint | \$2,500   | \$5,500   | \$11,500  | \$23,000  | \$35,750  |
| Lower Breakpoint | \$0       | \$2,500   | \$5,500   | \$11,500  | \$23,000  |
| Tranche Width    | \$2,500   | \$3,000   | \$6,000   | \$11,500  | \$12,750  |

#### Marginal Allocations

|                   |       |        |       |       |       |
|-------------------|-------|--------|-------|-------|-------|
| Class A Preferred | 40.0% | 0.0%   | 25.0% | 21.7% | 19.6% |
| Class B Preferred | 60.0% | 0.0%   | 0.0%  | 13.0% | 11.8% |
| Common Shares     | 0.0%  | 100.0% | 75.0% | 65.2% | 58.8% |
| Warrants          | 0.0%  | 0.0%   | 0.0%  | 0.0%  | 9.8%  |

% of Marginal Proceeds from Breakpoint payoff tables

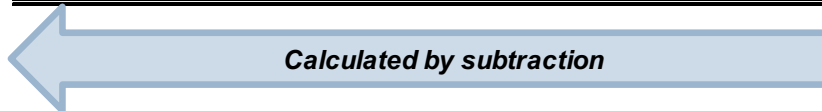
The next step in applying the OPM is to build a matrix that identifies the marginal allocation percentages between the various breakpoints. For purposes of the OPM, a “tranche” is the difference between two adjacent breakpoints. The marginal proceeds within a given tranche are allocated to the various equity classes in fixed proportions.

# Deriving Tranche Values

## Exhibit 10

### Derivation of Tranche Values

|                              | Tranche A       | Tranche B       | Tranche C       | Tranche D      | Tranche E      |
|------------------------------|-----------------|-----------------|-----------------|----------------|----------------|
| Stock price (S)              | \$17,500        | \$17,500        | \$17,500        | \$17,500       | \$17,500       |
| Exercise price (K)           | \$0             | \$2,500         | \$5,500         | \$11,500       | \$23,000       |
| Time to expiration (T)       | 4.0             | 4.0             | 4.0             | 4.0            | 4.0            |
| Volatility ( $\sigma$ )      | 35.0%           | 35.0%           | 35.0%           | 35.0%          | 35.0%          |
| Risk-free rate (r)           | 1.500%          | 1.500%          | 1.500%          | 1.500%         | 1.500%         |
| <b>Value of call options</b> | <b>\$17,500</b> | <b>\$15,148</b> | <b>\$12,426</b> | <b>\$8,033</b> | <b>\$3,514</b> |
| <b>Tranche Values</b>        | <b>\$2,352</b>  | <b>\$2,722</b>  | <b>\$4,393</b>  | <b>\$4,519</b> | <b>\$3,514</b> |



The BSOPM can be used to determine the value of the right to receive proceeds above a given breakpoint

# Calculating Equity Class Values

## Exhibit 11

### Calculation of Equity Class Values

|                      | Tranche A        | Tranche B | Tranche C | Tranche D | Tranche E | Total           |
|----------------------|------------------|-----------|-----------|-----------|-----------|-----------------|
| Tranche Values       | <b>A</b> \$2,352 | \$2,722   | \$4,393   | \$4,519   | \$3,514   | \$17,500        |
| Marginal Allocations | <b>B</b>         |           |           |           |           |                 |
| Class A Preferred    | 40.0%            | 0.0%      | 25.0%     | 21.7%     | 19.6%     |                 |
| Class B Preferred    | 60.0%            | 0.0%      | 0.0%      | 13.0%     | 11.8%     |                 |
| Common Shares        | 0.0%             | 100.0%    | 75.0%     | 65.2%     | 58.8%     |                 |
| Warrants             | 0.0%             | 0.0%      | 0.0%      | 0.0%      | 9.8%      |                 |
| Marginal Values      | <b>A x B</b>     |           |           |           |           |                 |
| Class A Preferred    | 941              | 0         | 1,098     | 982       | 689       | 3,710           |
| Class B Preferred    | 1,411            | 0         | 0         | 589       | 413       | 2,414           |
| Common Shares        | 0                | 2,722     | 3,295     | 2,947     | 2,067     | 11,031          |
| Warrants             | 0                | 0         | 0         | 0         | 344       | 344             |
| Total                | \$2,352          | \$2,722   | \$4,393   | \$4,519   | \$3,514   | <b>\$17,500</b> |

Calculated by addition

The value of a given equity class is the “sumproduct” of the tranche values and the corresponding marginal allocation percentages

# Calculating Per Share Values

## Exhibit 12

### Calculation of Per Share Values

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|                   | Total Value | Fully-Diluted Shares | Value per Share |
|-------------------|-------------|----------------------|-----------------|
| Class A Preferred | \$3,710     | 500                  | \$7.42          |
| Class B Preferred | \$2,414     | 300                  | \$8.05          |
| Common Shares     | \$11,031    | 1,500                | \$7.35          |
| Warrants          | \$344       | 250                  | \$1.38          |

On a per share basis, the results conform to expectations regarding the relative value of the various classes. The higher liquidation preference of the Class B preferred shares causes those shares to be most valuable. The common shares, which do not have any liquidation preference, are worth less than either class of preferred shares. Finally, the strike price on the warrants reduces the value of those instruments relative to common shares.

The value per share is simply the quotient of the total value of the equity class and the number of shares outstanding

# Developing Inputs

The OPM inputs can be developed, and tested for reasonableness, in the same manner as in applications of the Black-Scholes model.

- **Stock Price.** The stock price in the OPM is the total equity value of the subject business. The total equity value is derived through application of the traditional valuation methods under the asset-based, income and market approaches. As will be discussed in a subsequent section of this post, a known value for a particular component of the capital structure can be used to find the implied total equity value (the “back-solve” method).
- **Exercise Price.** The exercise prices in the OPM correspond to the equity value breakpoints identified in the formal analysis of the capital structure.

- **Time to Expiration.** In applying the OPM, one must assume a single point estimate for when liquidity will be achieved, either through dissolution, strategic sale, or IPO. While the actual time to expiration cannot be known with certainty, reasonable estimates can generally be made by reference to the subject company’s life cycle stage, funding needs, and strategic outlook.
- **Volatility.** As with time to expiration, volatility cannot be directly observed. The most common starting point for volatility analysis is an examination of historical return volatility for a group of peer public companies. If reliable data is available, implied volatility from publicly traded options on the shares of such companies may also be consulted. Analysts adjust the observed peer volatility measures to take into account life cycle stage, remaining milestones, and other qualitative factors pertaining to the subject company.
- **Risk-free Rate.** The risk-free rate corresponds to the assumed time to expiration.

Five (generally)  
auditable inputs

# Sensitivity Analysis

## Exhibit 13

Sensitivity to OPM Inputs

|                                      | Volatility = 35%              |               |               | Time to Expiration = 4 yrs |               |               |
|--------------------------------------|-------------------------------|---------------|---------------|----------------------------|---------------|---------------|
|                                      | Changes in Time to Expiration |               |               | Changes in Volatility      |               |               |
|                                      | 2 yrs                         | 4 yrs         | 6 yrs         | 20%                        | 35%           | 50%           |
| <b>Total Value</b>                   |                               |               |               |                            |               |               |
| Class A Preferred                    | \$3,744                       | \$3,710       | \$3,696       | \$3,764                    | \$3,710       | \$3,698       |
| Class B Preferred                    | 2,345                         | 2,414         | 2,458         | 2,304                      | 2,414         | 2,526         |
| Common Shares                        | 11,221                        | 11,031        | 10,878        | 11,290                     | 11,031        | 10,729        |
| Warrants                             | 189                           | 344           | 467           | 142                        | 344           | 546           |
| Total                                | \$17,500                      | \$17,500      | \$17,500      | \$17,500                   | \$17,500      | \$17,500      |
| <b>Per Share Value</b>               |                               |               |               |                            |               |               |
| Class A Preferred                    | \$7.49                        | \$7.42        | \$7.39        | \$7.53                     | \$7.42        | \$7.40        |
| Class B Preferred                    | \$7.82                        | \$8.05        | \$8.19        | \$7.68                     | \$8.05        | \$8.42        |
| Common Shares                        | \$7.48                        | \$7.35        | \$7.25        | \$7.53                     | \$7.35        | \$7.15        |
| Warrants                             | \$0.76                        | \$1.38        | \$1.87        | \$0.57                     | \$1.38        | \$2.19        |
| <i>Diff b/t Class B &amp; Common</i> | <i>\$0.34</i>                 | <i>\$0.69</i> | <i>\$0.94</i> | <i>\$0.15</i>              | <i>\$0.69</i> | <i>\$1.27</i> |

Compared to enterprise valuation, sensitivity effects generally muted

**Exhibit 15****Comparison of OPM and PWERM**

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|                                   | <b>OPM</b>                                                                                                                                                                                                                                                                                                                                   | <b>PWERM</b>                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Required Assumptions</b>       | In addition to the breakpoints and tranche allocations dictated by the capital structure terms, requires only five inputs.                                                                                                                                                                                                                   | Requires more assumptions than the OPM. Analyst must specify amount, timing and probability of future liquidity events as well as dilution from future financing rounds and class-specific discount rates.                                                                                                                                                                              |
| <b>Sensitivity to Assumptions</b> | As shown in Exhibit 13, sensitivity for many classes is somewhat muted. Since the OPM is only an allocation method, the impact of changes in inputs on allocation is generally tame compared to that in typical valuation methods.                                                                                                           | Since the PWERM is both a valuation and allocation method, sensitivity to changes in inputs is potentially greater than with OPM.                                                                                                                                                                                                                                                       |
| <b>Flexibility / Adaptability</b> | Small number of required assumptions limits the flexibility and adaptability of the model. Cannot accommodate some common features of preferred shares such as mandatory conversion at IPO, IPO price guarantees and the like. The assumed lognormal distribution of outcomes may not be representative for many development-stage entities. | Can be readily adapted to unique features, such as price protection or ratchets. Offers the flexibility to consider a range of potential future outcomes that more closely represent the market participant perspective than a lognormal distribution. Allows the analyst to consider outcomes at different times, and to model dilution from future funding rounds (even down rounds). |
| <b>Transparency</b>               | Host of intermediate calculations and lack of familiarity with breakpoint analysis on the part of many report users contribute to perception that method is a "black box".                                                                                                                                                                   | Generally intuitive, allocation of proceeds for each discrete scenario is readily checked for conformity to governing documents.                                                                                                                                                                                                                                                        |
| <b>Auditability</b>               | While not necessarily intuitive for non-specialists, small number of assumptions and translation of governing documents to formal structure of model is highly auditable.                                                                                                                                                                    | While the required inputs correlate to assumptions that market participants actually make, convincing and documentable support for these estimates may prove elusive.                                                                                                                                                                                                                   |

# Backsolve Method

This procedure is reasonable and appropriate in many circumstances. In our experience, however, it is important to keep in mind how the limitations of the OPM (primarily the lognormal distribution of outcomes) can distort the results of the analysis. When reading “backwards” from the value of a single equity class to the value of all equity, the effect of such distortions can be magnified. In our experience, the potential magnitude of such distortion is greatest when the known value is for the most senior security in the capital structure. In many cases, the lognormal assumption causes total loss scenarios to be under-represented in the probability distribution of potential future outcomes relative to market participant expectations. When combined with the use of the risk-free rate in a risk neutral framework, the OPM may assign greater value to the liquidation preference than market participants do. This can cause the difference between the most senior preferred class and other components of the capital structure to be exaggerated, resulting in an understated total equity value.

**Exhibit 16**  
Backsolve Method Using the OPM

|                   | Total Value | Fully-Diluted Shares | Value per Share |
|-------------------|-------------|----------------------|-----------------|
| Class A Preferred | \$1,618     | 500                  | \$3.24          |
| Class B Preferred | \$1,500     | 300                  | \$5.00          |
| Common Shares     | \$4,089     | 1,500                | \$2.73          |
| Warrants          | \$35        | 250                  | \$0.14          |
| Total             | \$7,242     |                      |                 |

In our view, these distortions can be further aggravated when the equity class used to calibrate the total equity value accounts for only a small portion of the subject company's capital structure. In our practice, we temper the effect of this issue by also giving weight to the total equity value which is the product of the known per share price and the fully-diluted share count.

When a given share price is known, the OPM can be used to develop an implied enterprise value (the first step in calibration)



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# Questions?

# About the Speaker

Travis W. Harms, CFA, CPA/ABV, is Senior Vice President of Mercer Capital. He also leads the firm's Financial Reporting Valuation Group and Private Equity industry team.

Travis's practice focuses on providing public and private clients with fair value opinions and related assistance pertaining to goodwill and other intangible assets, stock-based compensation, and illiquid financial assets. Travis performs valuations used for tax compliance, ESOP compliance, and other purposes for clients in a wide range of industries.

Travis is also a frequent speaker on fair value accounting topics to audiences across the U.S. Travis is a member of The Appraisal Foundation's working group to address best practices for control premiums. He co-authored the book *Business Valuation: An Integrated Theory*, Second Edition, and is a regular contributor to Mercer Capital's *Financial Reporting Blog*.



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