

# **Valuation of Early- Stage Entities**

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**Bocconi University**

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**Mark L. Zyla CPA/ABV, CFA, ASA**

**Zyla Valuation Advisors LLC**  
**Atlanta, Georgia**

# Agenda

- Overview of Characteristics of Early-Stage Entities ( “ESE’s”)
- Challenges in the valuation of ESE’s.
- Traditional Valuation Methodologies Applied to ESE’s.
- Other Valuation Methodologies.
- Case Study in Allocation of Value to Various Equity Classes Using the Option Pricing Method.

# Characteristics of Early Stage Entities

- High growth potential
- Early operating losses and negative cash flow.
- High level of expenses compared to revenue.
- Comprised primarily of intangible assets.
  - Technology
  - Software
  - Management Team
- Complex capital structure
  - Preferred Rounds
  - Common Stock
  - Options and Warrants
- High Risk /High return potential

*Puca, Antonella Early Stage Valuation ( Wiley Finance: 2020)*

# ESE's Growth Funded in Stages

- Stage 1: Seed funding/ Angel investors
  - Friends and family investors
  - Little or no revenue
  - Rounds are typically smaller investments
- Stage 2 Early Venture Capital investors
  - Formal management team
  - Commercial Operations and R&D
- Stage 3: Additional Venture Capital investments
  - High revenue growth
  - Funding for operations and marketing
- Stage 4: Private Equity
  - Later stage rounds of financing
  - Complex capital structures.
- Stage 5: Exit either through IPO or acquisition

# Traditional Valuation Approaches As Applied to ESE's

- Income Approach
  - Typically used valuation of later stage investments.
  - Scenario analysis may be useful.
  - Discount rate selection is key to account for risk.
- Market Approach
  - Subsequent rounds can be calibrated to initial transactions.
  - Guideline companies can provide data on volatility for option pricing models
- Asset Approach
  - Asset Accumulation Method
  - Techniques to measure the value of intangible assets.

# Other Valuation Methodologies

- Current Value Method
  - Allocates value to each class of security without regard to the potential future growth in company value.
- Option Pricing Method (OPM)
  - Allocates value to each class of security by treating securities as contingent claims (options) on the company's future value.
- Probability Weighted Expected Return Method (PWERM)
  - Allocates value to each class of security by running future values through the company's "waterfall" at the time of each expected outcome and discounting to present value.
- Hybrid Method
  - Allocates value to each class of security through a combination of the OPM and the PWERM.

*AICPA Accounting and Valuation Guide: Valuation of Portfolio Company Investments of Venture Capital and Private Equity Funds and Other Investment Companies (2019)*

# **Case Study – Allocation of Enterprise Value of an Early-Stage Company in a Complex Capital Structure Using the Option Pricing Method.**

# Option Characteristics - A Brief Refresher

Stock options have the following features that impact their valuation:

- Contractual features: exercise price, maximum term, and possibly a market or performance condition
- Market features: stock price (if publicly traded), risk-free interest rate
- Estimated features: stock price (if closely-held), dividends, volatility, expected term



# OPM – Steps in Application

The following steps are applied in the Option Pricing Method:

1. Select a method for calculating the enterprise value
2. Analyze equity rights for each class to establish breakpoints
3. Select the appropriate option-pricing model
4. Select the key valuation inputs
5. Allocate the value to the various classes of stock

# OPM Example – Facts

- The FinPay Enterprise is a software design firm which produces mobile pay app for the financial services industry.
- The company was founded in late 2019 and now has more than 70 banking customers served out of a Milan-based location.
- The enterprise is experiencing declining operating losses and was near break-even.
- No long-term business plan forecast had been prepared.
- However, a three-year budget is available.
- FinPay is seeking additional investment but has not had any discussions with investment bankers or private equity investors regarding potential exit valuations.
- Management expects to have an exit event ( preferably an IPO) within five years.

# OPM – Critical Assumptions

- Enterprise value is €11.8M, assumes no debt
- Risk-free rate is 2.69% - Five year Italian Gov't Bond.
- Volatility (estimated at 40% based on guideline companies for our example)
- 5-year term reflects expected timing of liquidity event and incorporates:
  - Investor expectations and profile
  - Market industry observations
  - Product development milestones
  - Funding requirements
  - Revenue run rates

# OPM Example – Facts

The FinPay is currently capitalized as follows:

	<u>Shares</u>	<u>% of Total</u>
Series A Preferred Stock	7,000,000	70%
Common	3,000,000	30%
Total	<u>10,000,000</u>	<u>100%</u>

# Enterprise Value

- Enterprise value can be estimated based on **traditional cost, market, and income approaches**.
- The latest round of financing can represent a market approach indication of value.
- The pre-money value from the **term sheet** plus the current round **can be useful** as enterprise value.
- However, there is an enterprise value that supports the **latest preferred round price**.

# OPM Example – Facts

- The preferred stock was issued in January 2021 at €1.50 per share and has the following allocation characteristics:
  - Conversion – each share of preferred is convertible into one share of common.
  - Automatic Conversion – upon **IPO** of at least €5.00 per share.
  - Liquidation preference – upon a merger/sale/IPO, first to preferred shareholders up to €1.50 per share. Preferred and common **participate** in remaining proceeds on a fully diluted basis.
  - Dividends – preferred shareholders have priority in dividends, but **do not accumulate**.

# Selecting the Appropriate Model

- The modified Black-Scholes-Merton model, which estimates the value of options features using a closed-form equation.
- The lattice (binomial, trinomial, etc.) and Monte Carlo approaches, which estimate the value of employee stock options using a variety of numerical methods.

# Selecting the Inputs

- Key questions and misconceptions focus on the following topics:
  - Choice of model
  - Estimation of model parameters (assumptions, inputs)
  - Verification of model and parameters, ex post
  - General misconceptions and errors



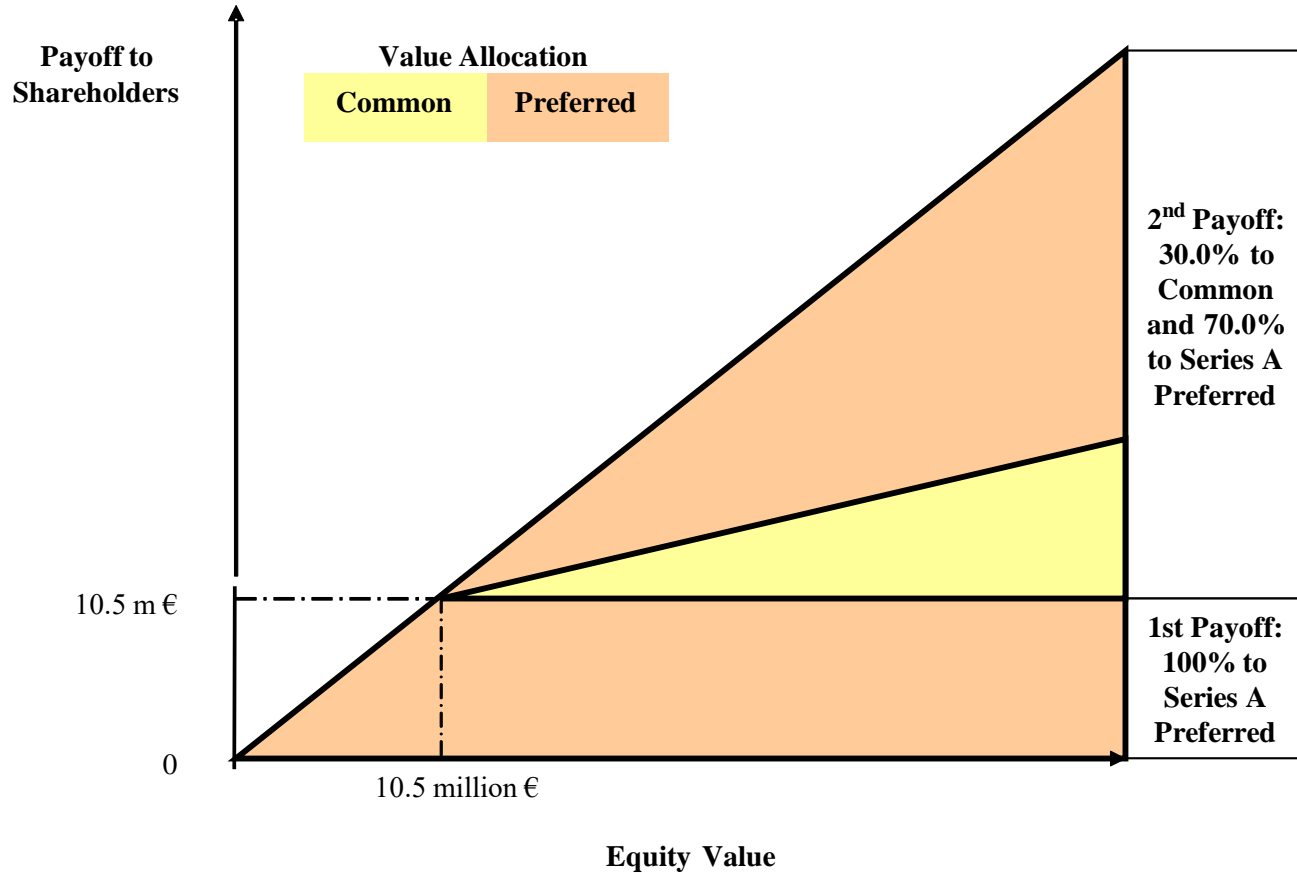
# Breakpoints

Breakpoints are used to separate the incremental returns to each class of equity. Breakpoints are used as exercise prices in the BSOPM and include:

- Liquidation preferences
- Return caps
- Conversion options
- Automatic conversion, IPO outcome ranges
- IRR hurdle thresholds

# Breakpoints Chart

Payoff to Common and Preferred Shareholders under a Sale/Merger Liquidity Event



# Breakpoints and Pay-offs

As shown in this example, there are three potential pay-offs which are shared by the common and preferred stockholders, as follows:

Breakpoint Type	Breakpoint		Allocation
Liquidation Pref.	€ 0	to € 10,500,000	All to Series A
Participation	€ 10,500,000	to € 50,000,000	Pro rata Series A and Common
Conversion	€ 50,000,000	to Infinity	As Converted to Common

# BSM - First Inflection

Business Enterprise Value (1)	
Less: PV of Dividends	-
Current Price	11,800,000 €
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Exercise Price	10,500,000 €
Years to Expiration	5.0027
Days to Expiration	1,826
Valuation Date	12/31/2021
Expiration Date (2)	12/31/2026
Volatility (3)	40.00%
Risk Free Rate (4)	2.69%
d1 (5)	0.7282
N(d1)	0.7668
N(-d1) or [1-N(d1)]	0.2332
d2 (5)	(0.1665)
N(d2)	0.4339
N(-d2) or [1-N(d2)]	0.5661
Quarterly Dividend Rate	0.00 €
Dividend Yield	0.00%
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Call Value (6)	5,065,466 €

# BSM - Second Inflection

Business Enterprise Value (1)	11,800,000 €
Less: PV of Dividends	-
Current Price	11,800,000 €

Exercise Price	50,000,000 €
Years to Expiration	5.0027
Days to Expiration	1,826
Valuation Date	12/31/2021
Expiration Date (2)	12/31/2026
Volatility (3)	40.00%
Risk Free Rate (4)	2.69%
d1 (5)	(1.0162)
N(d1)	0.1548
N(-d1) or [1-N(d1)]	0.8452
d2 (5)	(1.9108)
N(d2)	0.0280
N(-d2) or [1-N(d2)]	0.9720
Quarterly Dividend Rate	\$ -
Dividend Yield	0.00%

Call Value (6)	602,069 €
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# Inflection Footnotes

- (1) Based on income approach.
- (2) Assumes a five year time period to liquidity event.
- (3) Based on the average stock price volatility of the comparable companies
- (4) Based on the 5-year Italian Treasury Bond as of December 31, 2021,
- (5)  $N(d)$  = Cumulative density function (area under the normal curve) and  $d_1$  and  $d_2$  is as follows:

$$d_1 = \frac{\ln(\text{Market price}/\text{Exercise price}) + ((r + ((\text{Volatility}^2/2)) * \text{years to expiration})}{\text{Volatility} * (\text{years to expiration})^{1/2}}$$

$$d_2 = d_1 - ((\text{volatility}) * (\text{years to expiration})^{1/2})$$

- (6) Call Price = Market Price \*  $N(d_1)$  - [Exercise Price \*  $e^{-r(\text{time to expiration})}$  \*  $N(d_2)$ ]

## *Notes: Definitions*

e = Base of natural logarithms (2.71828).

r = Current interest rate on risk free investment or risk free rate.

# Option Values at Breakpoints

A BSOPM model is run for each breakpoint in order to establish the pay-off amounts with the following option values.

Breakpoint	Exercise Price	Option Value	Incremental Value
Liquidation Pref.	€ 0	€ 11,800,000	
Participation	€ 10,500,000	€ 5,065,466	€ 6,734,534
Conversion	€ 50,000,000	€ 602,069	€ 4,463,397

# BSM Pay-off Outputs

The incremental values of each option are used to develop pay-offs to each equity class.

	Pay-off 1	Pay-off 2	Pay-off 3	Total Value	Per Share
Series A	€ 6,734,534	€ 3,124,378	€421,448	€ 10,280,360	€ 1.47
Common	<u>          -</u>	<u>€ 1,339,019</u>	<u>€180,621</u>	<u>€ 1,519,640</u>	<u>€ 0.51</u>
Total	€6,734,534	€ 4,463,397	€602,069	€11,800,000	€ 1.18

*The common share price is equal to 35% of the preferred value, does this seem reasonable?*



# Points to Consider for OPM

- Are future equity values log-normally distributed? If not, why is option method being used?
- How is future funding considered?
- Is volatility appropriate? Public Co. may not match private common.
- Does implied value of recent preferred match actual?
- Stage of development
- Exit event timing, type, potential values
- Future dilution (future financing rounds, option grants)
- Recent financing round reference price
- Adjustments for lack of control and lack of marketability

## Mark L. Zyla CPA/ABV, CFA, ASA

- Mark Zyla is Managing Director of Zyla Valuation Advisors LLC, an Atlanta, Georgia based valuation and dispute analysis consultancy firm.
- Chairman, Standards Review Board, International Valuation Standards Council (“IVSC”)
- Former Member of the ASA’s Business Valuation Committee and formerly a member of the AICPA’s FVS Executive Committee.
- Author of *Fair Value Measurements: Practical Guidance and Implementation 3<sup>rd</sup> ed.* published by John Wiley & Sons (2020) and co-author with Ervin L. Black of *Accounting for Goodwill and Other Intangible Assets*, also published by Wiley ( 2018)
- Member of the working groups which developed the AICPA’s *Testing Goodwill for Impairment-Accounting and Valuation Guide* and The Appraisal Foundation’s *The Identification of Contributory Assets and Calculation of Economic Rents*.
- Co-author of four monographs on various aspects of fair value measurements published by BNA Bloomberg.
- Inducted into the AICPA’s BV Hall of Fame in 2013
- Member of the Master of Science in Finance Advisory Council at the University of Texas at Austin.