

# 2024 ASA SPRING FAIR VALUE CONFERENCE

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## Valuation of Equity Compensation

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Equity Methods

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Josh Schaeffer is a managing director and practice leader for Equity Methods' valuation practice. Josh brings deep academic and practical experience in economics, finance, and statistics to a range of challenges including valuation and compensation.

Josh works closely with finance executives across a broad range of public and private firms. He leads teams in valuing instruments and designing models for a wide array of derivative securities pertaining to compensation agreements, private companies, partnerships, earnouts, and guarantees. He also helps companies assess their median employee compensation for purposes of their CEO pay ratio calculation and assists companies with assessing pay equity among other compensation issues.



James Milne is a manager for Equity Methods' valuation practice. He brings a wide variety of practical business experience to the valuation and equity compensation space.

James has worked closely with finance executives across a broad range of public and private firms. He manages teams in valuing a wide variety of derivative instruments pertaining to compensation agreements, private companies, partnerships, earn-outs, and guarantees. He has also valued the equity, debt and intangible assets of privately held firms spanning a large number of industries including financial services, real estate, entertainment, and consumer products.

## Polling Question #1

Rate your familiarity with equity compensation and Monte Carlo simulation

- None, I still thought ASC 718 was guidance on accounting for Porsches.
- Some, I've valued options and went to a casino once.
- Lots, one time I even ran a simulation to pick my fantasy football team.
- Tons, I use Monte Carlo simulation to choose where to go to dinner.

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## Introduction to ASC 718

## Introduction to Stock Based Compensation and ASC 718

- Equity vs. Liability Classification
  - Most “traditional” equity compensation plans are equity-classified
  - Awards are liability-classified if they are cash-settled (most common reason), or if they trigger certain other criteria
  - Equity-classified awards are valued once—on the grant date—and not remeasured during the expense amortization period
  - Liability-classified awards are re-valued each reporting period until settlement
- Grant Date (ASC 718-10-25-5)
  - When measurement (i.e. valuation) occurs for an equity-classified grant
  - Criteria: mutual understanding, contingent obligation, affected by stock price, all approvals obtained, [employed by company]
  - Semi-exception to mutual understanding requirement:
    - The award is a unilateral grant and, therefore, the recipient does not have the ability to negotiate the key terms and conditions of the award with the employer
    - The key terms and conditions of the award are expected to be communicated to an individual recipient within a relatively short time period from the date of approval

## Introduction to Stock Based Compensation and ASC 718

- Vest Date/Requisite Service Period End Date (ASC 718-10-55-69 through 55-79)
  - Vest date is when the employee is first able to exercise an option or when a restricted share is released to the employee
  - Vesting can be either cliff (all at once) or ratable/graded (multiple tranches)
  - Requisite Service Period (RSP) is the period for which service is required in order to receive the award
  - This is the period over which that expense is recognized
  - Requisite service period might differ from vest date in cases such as retirement eligibility or termination
- Grant Date Fair Value (ASC 718-10-30-2)
  - The value that is used to measure the cost of services received from employees in exchange for awards of share-based compensation
  - Valuation techniques vary for different award types (as discussed later)
- Contractual Term
  - Length of time from grant date an employee has to exercise their options
- Strike Price/Grant Price
  - The amount paid by an employee to exercise an option
  - Employee options are almost always granted at-the-money

## Introduction to Stock Based Compensation and ASC 718

- **Forfeiture**
  - This is a cancellation that occurs prior to a legal vesting date. Shares are forfeited by the employee and added back to the pool.
  - On the income statement, the result is a reversal for any expense booked to date for the forfeited shares
- **Expiration**
  - A cancellation that occurs post-vest. This does not result in any expense reversal.
  - May occur at the contractual end of an option's life (often 7 or 10 years), or sooner if there is a termination.
- **Exercise/Release**
  - A transaction where the ownership of the shares is transferred to the employee.
  - This event is typically referred to as an exercise for options. In these cases, employees pay a strike price.
  - For restricted stock where no upfront payment is required by the employee, this event is typically referred to as a release.
- **Acceleration**
  - Where an award is expensed faster than the original amortization schedule, for reasons such as termination, modification, etc.
- **Retirement Eligibility**
  - Where an employee is entitled to receive all (or part) of their award if they terminate due to retirement prior to the vesting date

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## Award Types & Characteristics



## Summary of Award Types

### Options

*(The right, but not the obligation, to buy shares at a predetermined price)*

1. Non Qualified Stock Option (NQ): employee elects to purchase shares based on the award's strike price.
2. Stock Appreciation Right (SAR): employee receives the appreciation on exercise date in relation to stock price on grant date. No upfront payment required by an employee.
3. Incentive Stock Options (ISO): tax preferential award that enables an employee to (1) defer taxation until the sale date and (2) pay taxes all at capital gains rates

### Restricted Stock

*(Stock that has forfeiture and transferability restrictions until certain conditions are met)*

1. Restricted Stock Award: employees receive shares upon grant, but not transferrable until release
2. Restricted Stock Unit: employees do not receive shares until the restrictions lapse
3. Deferred Stock Unit: allows employees to defer income to a future date through phantom stock units

### Performance & Market Awards

*(Awards where vesting/exercisability is contingent on perf. or market conditions)*

Performance and/or Market awards can take the form of an Option (SAR or NQ) or a Restricted Stock. Awards can be settled in cash or equity. There are valuation and accounting implications that a company needs to be aware of when granting awards under this umbrella.

### Liability Awards

*(Awards that may pay out in cash)*

ASC 718-10-25-6 through 25-19 classify a grant as a liability if any of the following apply:

1. The underlying shares are classified as liabilities.
2. The entity can be required under any circumstances to settle the option or similar instrument by transferring cash or other assets.
3. An award indexed to a factor in addition to a market, performance, or service condition

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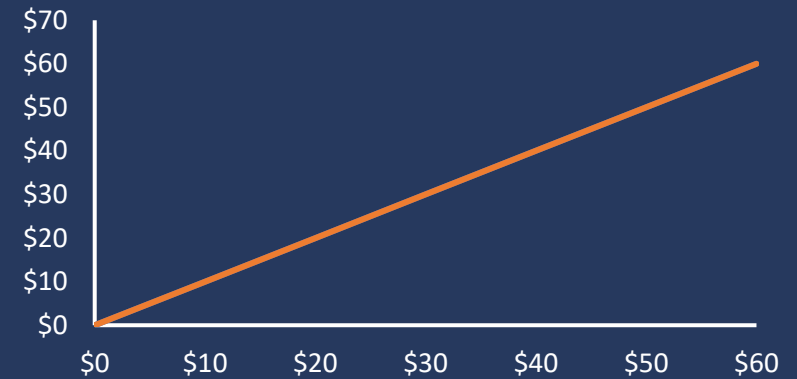
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## Restricted Stock

## Valuing Restricted Stock

*ASC 718-10-30-17: A nonvested equity share or nonvested equity share unit awarded to an employee shall be measured at its fair value as if it were vested and issued on the grant date.*



Investors would undoubtedly pay less for a stock with restrictions, however, for expense, we incorporate the full value of the share. In the event the share is not earned, the expense is removed.

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## Options

## What is an Option? (For employee options, we use calls only)

- The right, but not the obligation, to buy stock at a set price over a preset future term
- End term payout resembles a “Hockey Stick”



## Valuation: Underlying Financial Theory

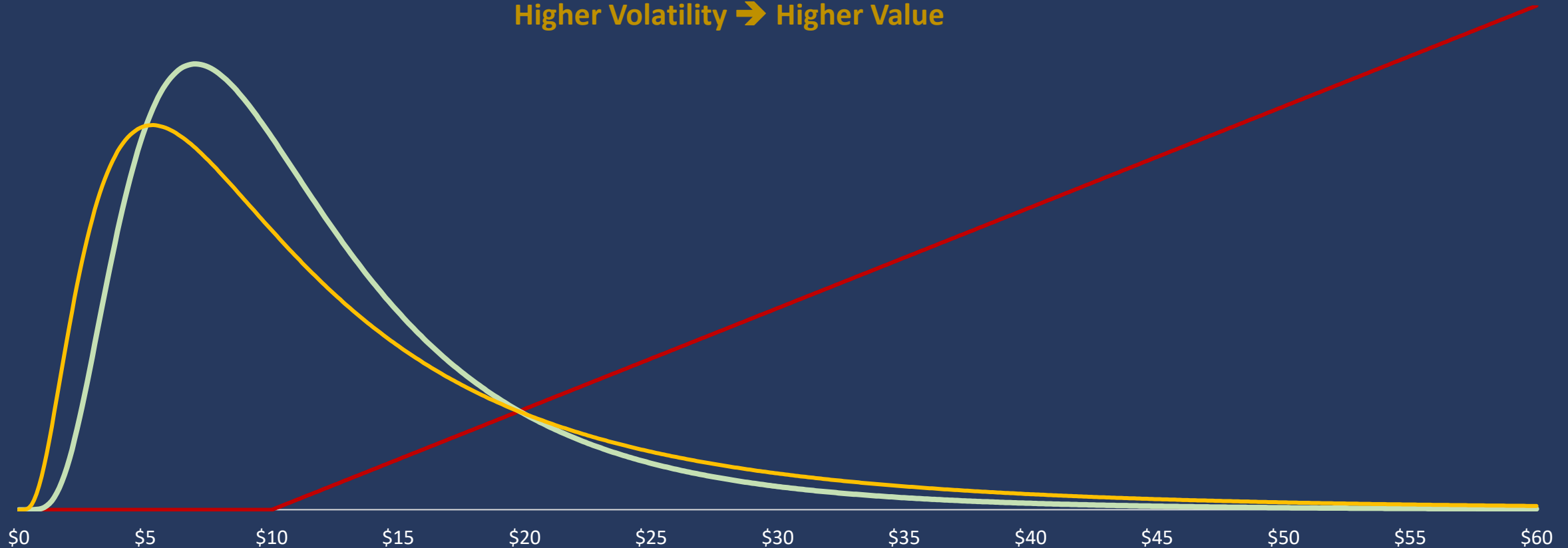
- Modeling stock prices is extremely complex
- Models such as the Black-Scholes-Merton formula use “simplifying” assumptions including:
  - **Efficient Market.** Today’s stock price is the best forecast of future prices
  - **Risk-neutral framework.** Under this construct, all prices are assumed to increase at the risk-free rate
  - **Geometric Brownian Motion.** Prices follow a random walk with normal returns / lognormal prices
  - **Constant input assumptions.** Volatility, risk-free rate, dividend yield do not change over time

## The Framework

Stock Price – Lognormal Distribution (Bell Curve)



Strike Price – Max Linear Function (Hockey Stick)

Higher Volatility → Higher Value



## Different Valuation Techniques – Same Concept

- Three categories of option-pricing models are permitted under ASC 718:

$C = S * N(d_1) - Xe^{-rt} * N(d_2)$ <p>1. Black-Scholes Formula</p>	 <p>2. Lattice Model</p>	 <p>3. Monte Carlo Simulation</p>
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- At a minimum, six inputs are needed:

Key Input	Impact on Fair Value Upon Increase
Price of the underlying share	▲
Exercise price of the option	▼
Risk-free interest rate	▲
Expected dividend yield	▼
Expected volatility of the stock	▲
Expected term of the option*	▲

A forfeiture rate is not applied to the option-pricing model, but is applied in the amortization model; it is usually computed at the same time as the expected term

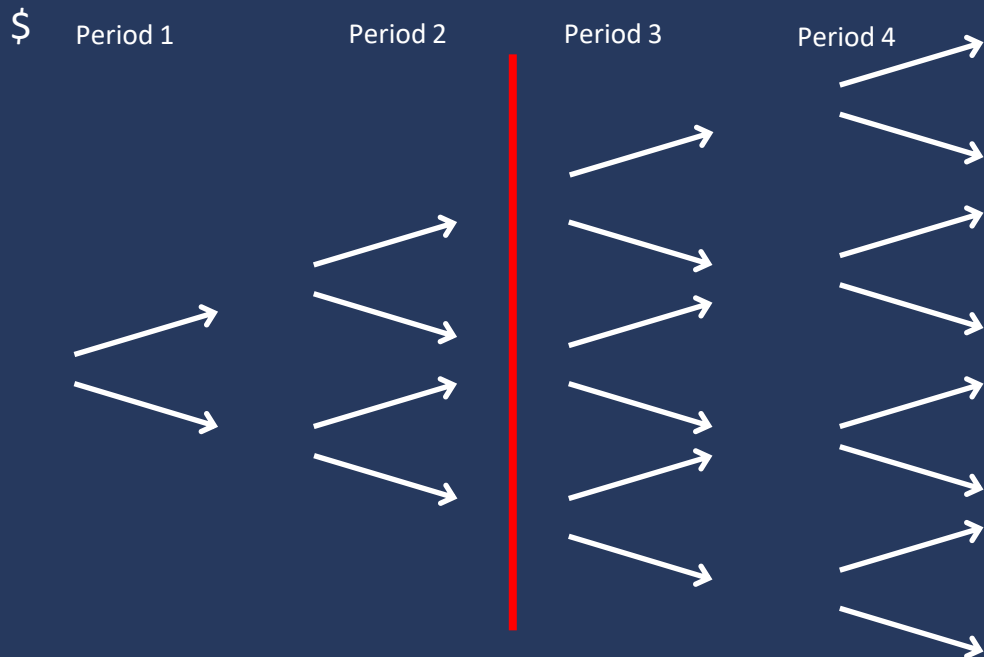
\* Expected term is an input to the Black-Scholes formula, but is an output of a Lattice / Monte Carlo model.



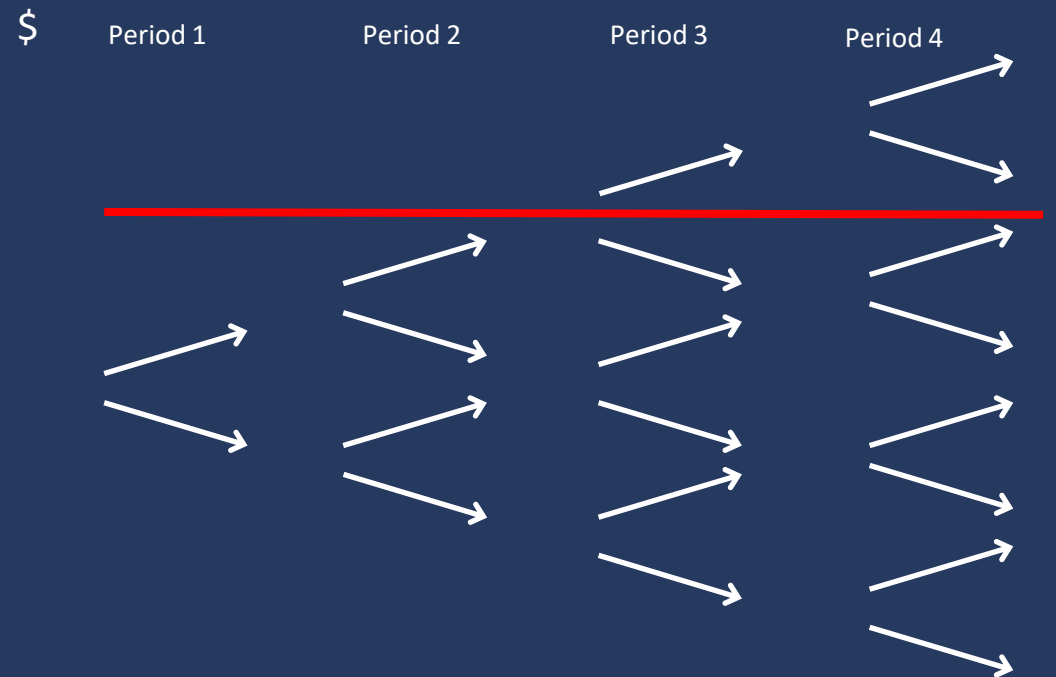
## Black-Scholes vs Lattice

- Employees exercise options early. Models can capture that in different ways:
  - The BSM formula assumes future exercise behavior will happen after a certain amount of *time*
  - A lattice model forecasts future exercise behavior in the context of expected employee *payoff*

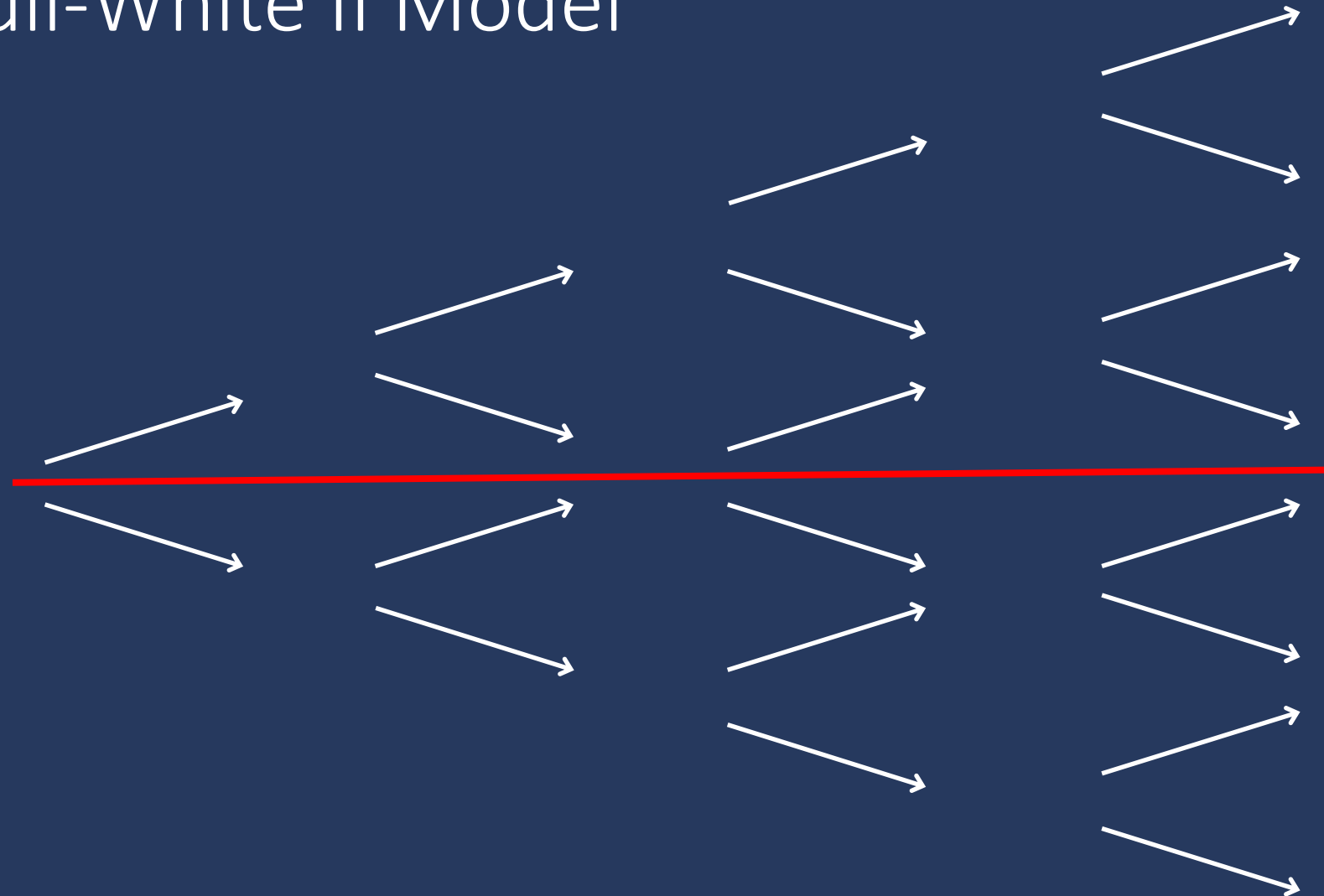
**Black-Scholes-Merton Formula  
(Time-Based)**



**Simple Lattice Model  
(Payoff-Based)**



## Hull-White II Model



In the money: Regression Based Probability (Moneyness, Remaining Time, Recently Vested, Termination Rate, etc.)

Out of the Money: Employee Termination Rate Only

## Polling Question #2

### Equity Compensation

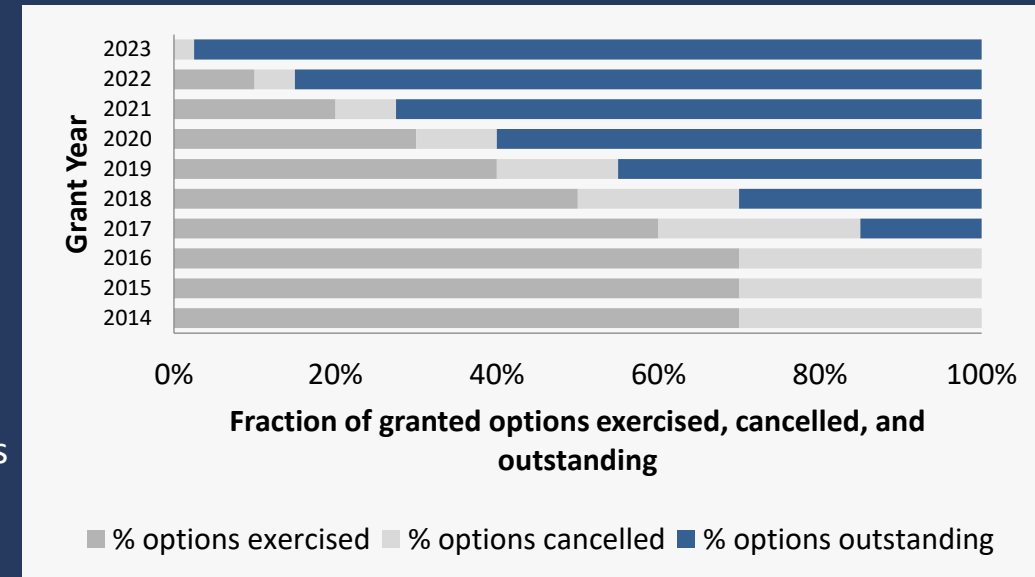
- a) Is a way to align incentives for stakeholders and management.
- b) Is frequently used by large companies.
- c) Provides assurances that men and women are paid comparably for similar work.
- d) Is a valuable retention tool.
- e) a, c, and d.

## Historical Data Analysis

Three main areas to consider in analyzing data

- Grouping
  - Employee bands (e.g., C-Suite, Management, All Other)
  - Different award structures
- Data Exclusions, such as
  - Acquired options
  - Large RIFs
  - Modifications
  - Unusual stock price performance
- Treatment of unexercised options
  - Vested unexercised options could have exercised but have not
  - Ignoring these biases terms and exercise rates upward, lowering option values

Vest Schedule	Average Time to Vest	Average Holding Period	Expected Term Impact
One-year cliff	1.00 year	4.00 years	<b>Lower</b>
Four-year vesting	2.50 years	6.50 years	<b>Higher</b>



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# Market Awards and Monte Carlo Simulation

## Performance & Market Awards – The Basics

### Market Awards

- Compares stock performance only (e.g. stock price – absolute TSR award, or relative to an index – relative TSR award)
- Amortization value is fixed based on Monte Carlo fair value
- Small award details can impact valuation
- Better for relative targets

*Fair value is complicated (Monte Carlo)*

*Valuation technique takes into account probability of multiple outcomes*

*Common Market Award:*

*Pay out a variable number of shares based on the relative ranking of returns among a basket of peer companies (RTSR)*

### Performance Awards

- A performance condition ties the vesting or payout to a firm's internal operations (typically an accounting metric)
- Amortization value is dependent on the payout expected/delivered to the employee
- Results in volatility to P&L due to expense adjustments as 'probable' outcomes are adjusted (variable accruals)

*Fair value is trivial (Grant date stock price)*

*Probability incorporated via adjustment based on actual outcomes*

*Common Performance Award:*

*Pay out a variable number of shares based on level of EPS vs. pre-specified targets*

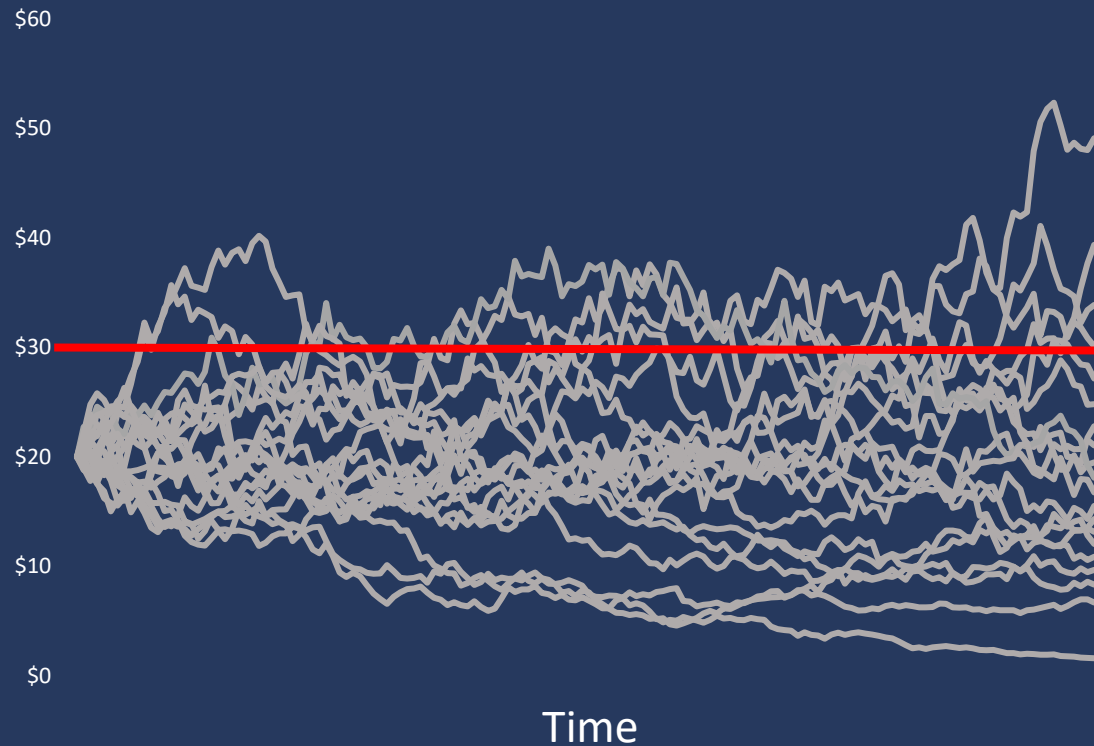
For purposes of this valuation discussion, we'll focus on market awards.

## Monte Carlo Simulation

- Geometric Brownian Motion (GBM) is used to model stock price returns, which assumes a constant drift (growth at the Risk-Free Rate) is accompanied by random variation (based on the volatility of the stock)
- Stock price returns using GBM are normally distributed, while stock prices are lognormally distributed
- The GBM Formula uses the following inputs to simulate future stock prices:
  - The initial stock price ( $S_0$ )
  - Time step to simulate ( $T$ )
  - Volatility ( $v$ )
  - Risk-Free Rate ( $r_{fr}$ )
  - Dividend Yield ( $q$ )
- A Monte Carlo Simulation uses the GBM Formula to simulate the value of a Market Award in a risk-neutral setting, using the same underlying principle of the Black-Scholes Formula

## Absolute TSR Award

Payout based on company stock price achieving certain TSR levels, either during or at the end of the performance period



### Examples:

- 100 shares vest if the stock price at the end of the period exceeds \$30.
- 100 shares vest if the 30-day average stock price at the end of the period exceeds \$30.
- 50 shares vest if the IRR over a 3 year period is 8%. An additional 50 shares vest if the IRR is above 12%. In between, the amounts are linearly interpolated.



## Modeling an Absolute TSR Award

	A	B	C	D
1				
2			<b>Company A</b>	
3		Initial Stock Price	\$10.00	
4		Volatility	50.00%	
5		Risk-Free Rate	4.00%	
6		Dividend Yield	0.00%	
7		Term (Years)	3	
8				
9		Absolute TSR	Payout	
10		0%	0%	
11		20%	100%	
12		50%	200%	
13				
14				
15		Path 3,000 of 100,000	<b>Company A</b>	
16		Simulated Random Factor (Normal Distribution)	1.22	
17		Simulated Stock Price	\$22.32	
18		Absolute TSR	123.19%	
19		Payout	200%	
20		Discount Factor	88.69%	
21		Value	\$39.59	
22				

Future stock price using Geometric Brownian Motion: Normal distribution of returns (this is the same as BSM assumption)

Return over the period

Payout from table

Discount Factor

Payout percentage \* Stock price \* Discount factor



High prices are associated with higher vesting rates

Therefore, need to consider the vesting and value from each stock path

## Absolute TSR Award Sample Paths

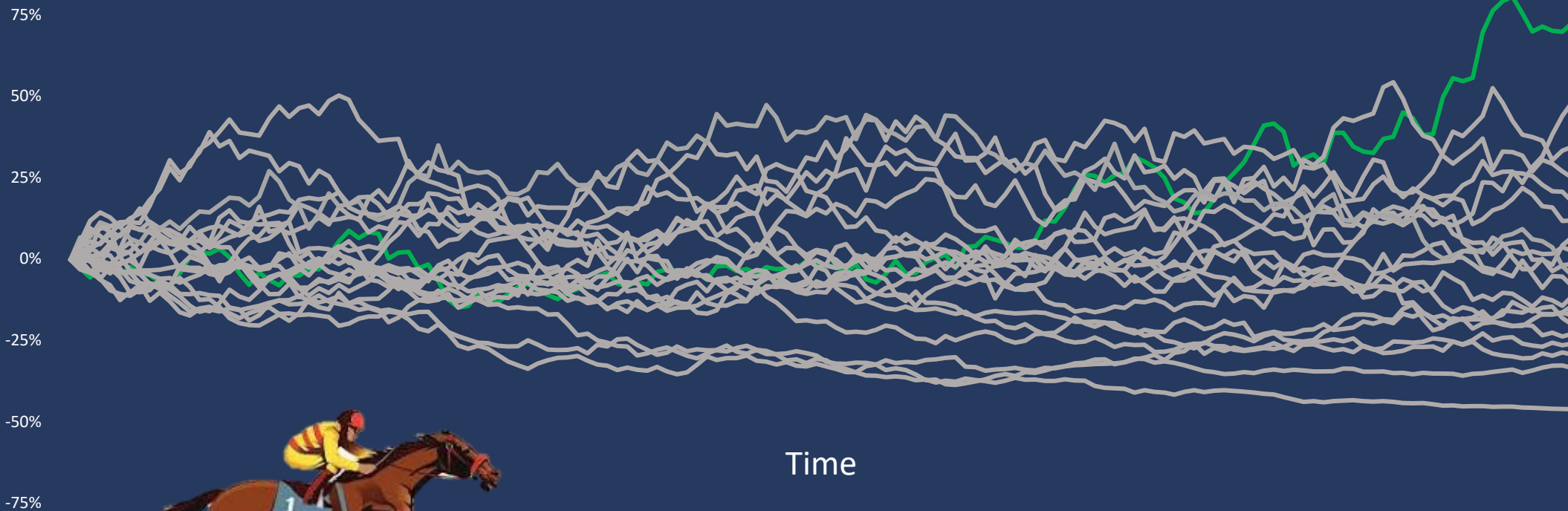
	A	B	C	D
1				
2			<b>Company A</b>	
3		Initial Stock Price	\$10.00	
4		Volatility	50.00%	
5		Risk-Free Rate	4.00%	
6		Dividend Yield	0.00%	
7		Term (Years)	3	
8				
9		Absolute TSR	Payout	
10		0%	0%	
11		20%	100%	
12		50%	200%	
13				
14		Low Path		
15		Path 153 of 100,000	<b>Company A</b>	
16		Simulated Random Factor (Normal Distribution)	-0.30	
17		Simulated Stock Price	\$5.95	
18		Absolute TSR	-40.47%	
19		Payout	0%	
20		Discount Factor	88.69%	
21		Value	\$0.00	
22				

	A	B	C	D
1				
2			<b>Company A</b>	
3		Initial Stock Price	\$10.00	
4		Volatility	50.00%	
5		Risk-Free Rate	4.00%	
6		Dividend Yield	0.00%	
7		Term (Years)	3	
8				
9		Absolute TSR	Payout	
10		0%	0%	
11		20%	100%	
12		50%	200%	
13				
14		Mid Path		
15		Path 73,839 of 100,000	<b>Company A</b>	
16		Simulated Random Factor (Normal Distribution)	0.43	
17		Simulated Stock Price	\$11.25	
18		Absolute TSR	12.47%	
19		Payout	62%	
20		Discount Factor	88.69%	
21		Value	\$6.22	
22				

	A	B	C	D
1				
2			<b>Company A</b>	
3		Initial Stock Price	\$10.00	
4		Volatility	50.00%	
5		Risk-Free Rate	4.00%	
6		Dividend Yield	0.00%	
7		Term (Years)	3	
8				
9		Absolute TSR	Payout	
10		0%	0%	
11		20%	100%	
12		50%	200%	
13				
14		High Path		
15		Path 6,834 of 100,000	<b>Company A</b>	
16		Simulated Random Factor (Normal Distribution)	0.83	
17		Simulated Stock Price	\$15.94	
18		Absolute TSR	59.36%	
19		Payout	200%	
20		Discount Factor	88.69%	
21		Value	\$28.27	
22				

## Relative TSR Award

- Relative TSR Awards payout based on company's TSR relative to a peer group, most often using the percentile ranking of the company among peers at the end of the period



## Modeling a Relative TSR Award

	A	B	C	D	E	F	G	H	I
1									
2			<b>Company A</b>	<b>Peer 1</b>	<b>Peer 2</b>	<b>Peer 3</b>	<b>Peer 4</b>	<b>Peer 5</b>	
3		Initial Stock Price	\$10.00	\$5.00	\$15.00	\$10.00	\$25.00	\$15.00	
4		Volatility	50.00%	20%	30%	50%	100%	30%	
5		Risk-Free Rate	4.00%						
6		Dividend Yield	0.00%						
7		Term (Years)	3						
8									
9		Percentile Rank	Payout						
10		0%	0%						
11		40%	100%						
12		80%	200%						
13									
14		Correlation Matrix	Company A	Peer 1	Peer 2	Peer 3	Peer 4	Peer 5	
15		Company A	1	0.49	0.34	0.35	0.33	0.44	
16		Peer 1	0.49	1	0.27	0.33	0.18	0.35	
17		Peer 2	0.34	0.27	1	0.23	0.29	0.36	
18		Peer 3	0.35	0.33	0.23	1	0.25	0.28	
19		Peer 4	0.33	0.18	0.29	0.25	1	0.51	
20		Peer 5	0.44	0.35	0.36	0.28	0.51	1	
21									
22									
23		Path 26,423 of 100,000	Company A	Peer 1	Peer 2	Peer 3	Peer 4	Peer 5	
24		Simulated Random Factor (Correlated Normal Distribution)	-0.23	-0.94	-0.20	-0.35	0.28	-2.11	
25		Simulated Stock Price	\$6.37	\$3.84	\$13.29	\$5.71	\$10.30	\$4.93	
26		Absolute TSR	-36.31%	-23.26%	-11.40%	-42.92%	-58.81%	-67.14%	
27		Percentile Ranking	60.00%						
28		Payout	150%						
29		Discount Factor	88.69%						
30		Value	\$8.47						
31									

- The correlations between each pair of companies in the peer group are incorporated into the model as a matrix

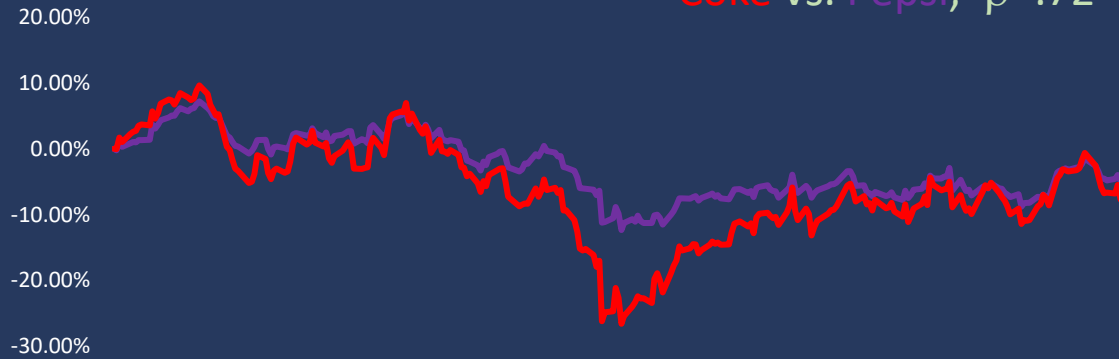
### Percentile Ranking:

Note that not all percentiles are defined equally, pay careful attention to the definition

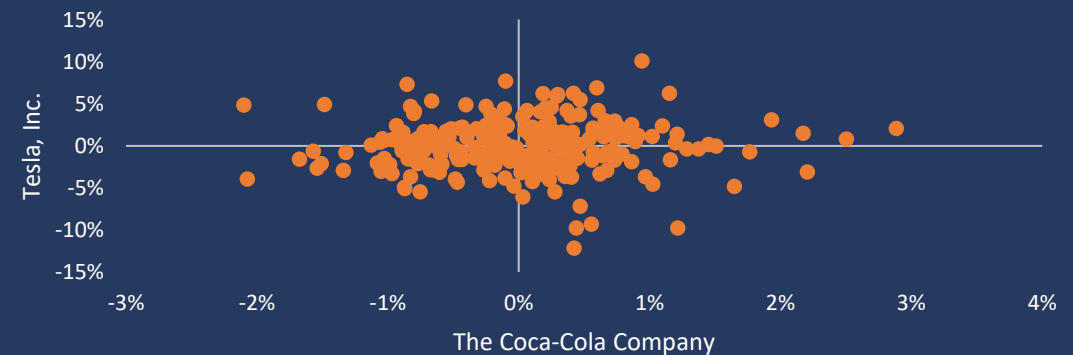
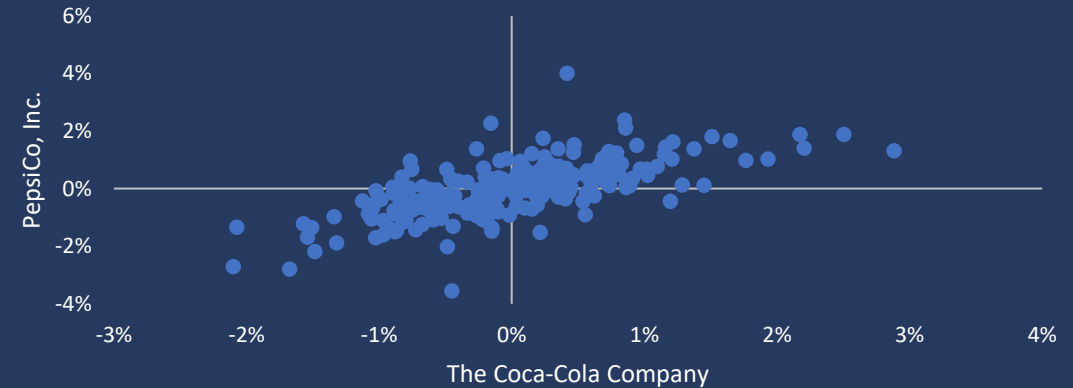
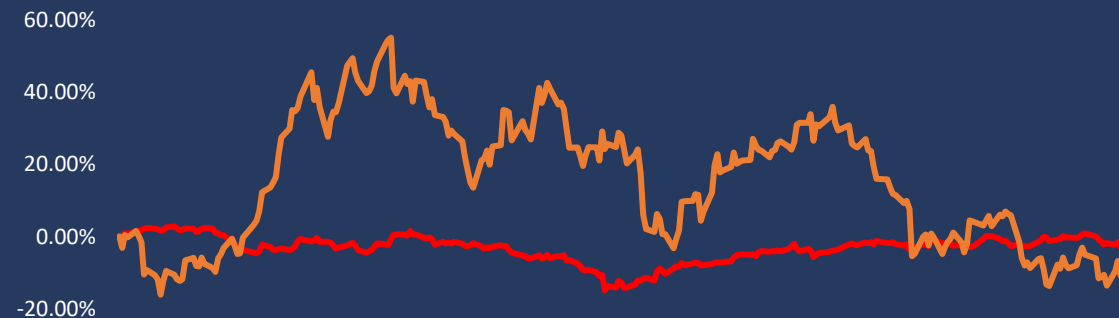
## Correlation

Introducing peers into the simulation adds complexity, as the model needs to incorporate the way stock prices of different companies move in relation to one another

Coke vs. Pepsi,  $\rho=.72$



Coke vs. Tesla  $\rho=.50$





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## Pay versus Performance

## New Requirements – The Highlights

#	Requirement	Complexity Drivers / Considerations
1	Produce a new proxy table containing a new measure of compensation, <i>compensation actually paid</i> (CAP), alongside four measures of financial performance: own TSR, peer group TSR, net income, and a company-selected measure (CSM)	<ul style="list-style-type: none"> <li>Introduction of an entirely new measure of compensation (CAP), which is a <u>combined</u> realizable and realized pay measure predicated on fair value</li> <li>6 distinct use cases for determining CAP across situations (timing of grant, vesting, and forfeiture)</li> <li>Additional complexity for pensions and non-qualified deferred compensation (NQDC)</li> <li>CSM must be from the unranked list and be the “most important measure”</li> </ul>
2	Provide clear descriptions of the relationships between CAP and TSR, net income, and the CSM for the PEO and average of the non-PEO NEOs	<ul style="list-style-type: none"> <li>Description should cover the covered fiscal years; may take narrative and/or graphical form</li> <li>Initial disclosure looks back three fiscal years; builds to five fiscal years</li> <li>Produce separate columns for each PEO if there were multiple PEOs in a year</li> <li>Average CAP data for Non-PEO NEOs and disclose the NEOs being included for each year</li> </ul>
3	Provide a clear description of the relationship between own TSR and peer group TSR	<ul style="list-style-type: none"> <li>Specific calculation conventions apply to calculation of TSR (weighting, dividends, etc.)</li> <li>Changes in peer groups require disclosure of the reason and the TSR from the old group</li> </ul>
4	Provide unranked list of most important performance measures used to link CAP to the NEOs during the last fiscal year	<ul style="list-style-type: none"> <li>Minimum of three and maximum of seven measures</li> <li>At least three must be financial measures and after three non-financial measures may be used</li> <li>The measures that most fully explain payouts (vs pay decisions) in the current year</li> </ul>
5	Broad XBRL tagging	<ul style="list-style-type: none"> <li>XBRL tagging required on each table value and disclosure block text, all to be in Inline XBRL</li> </ul>



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## The Core Table and New Compensation Measure: Compensation Actually Paid

Year	Summary Compensation Table Total for PEO	Compensation Actually Paid to PEO	Average Summary Compensation Table Total for Non-PEO NEOs	Average Compensation Actually Paid to Non-PEO NEOs	Value of Initial Fixed \$100 Investment Based On:			[Company-Selected Measure]
					Total Shareholder Return	Peer Group Total Shareholder Return	Net Income	
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
Y1								
Y2								
Y3								
Y4								
Y5								

2022  
2021  
2020



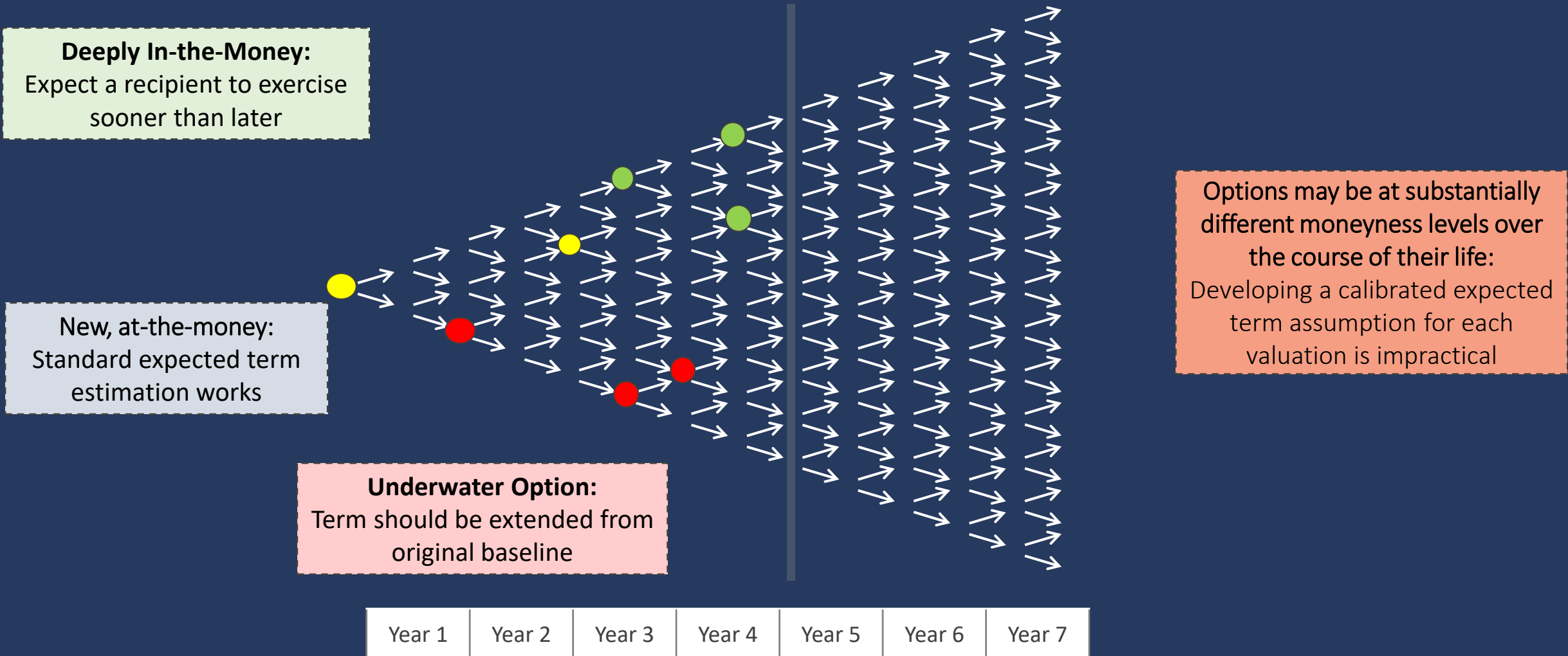
One additional year in each of the subsequent fiscal years to arrive at 5

Core calculations. Add columns for multiple PEOs; track changing NEOs and disclose

Four different measures of performance

- Only the two measures of TSR are scaled
- Changes in the TSR peer group require disclosure and recalculation

## Marking Options to Market – The Problem of Expected Term

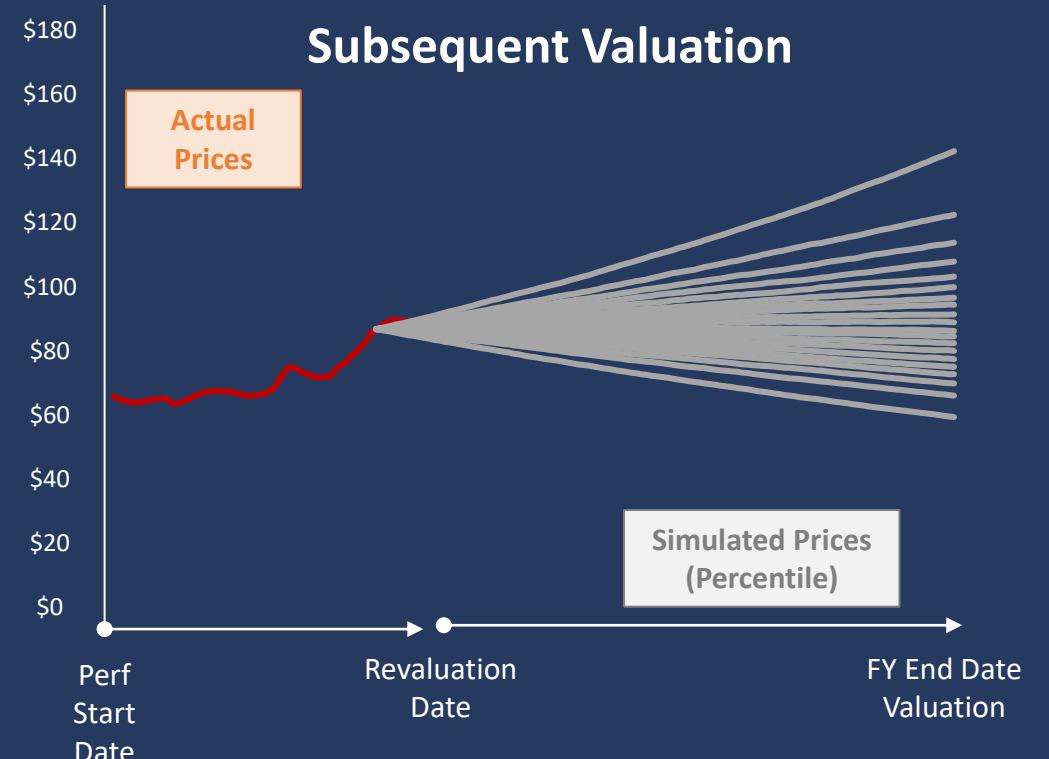
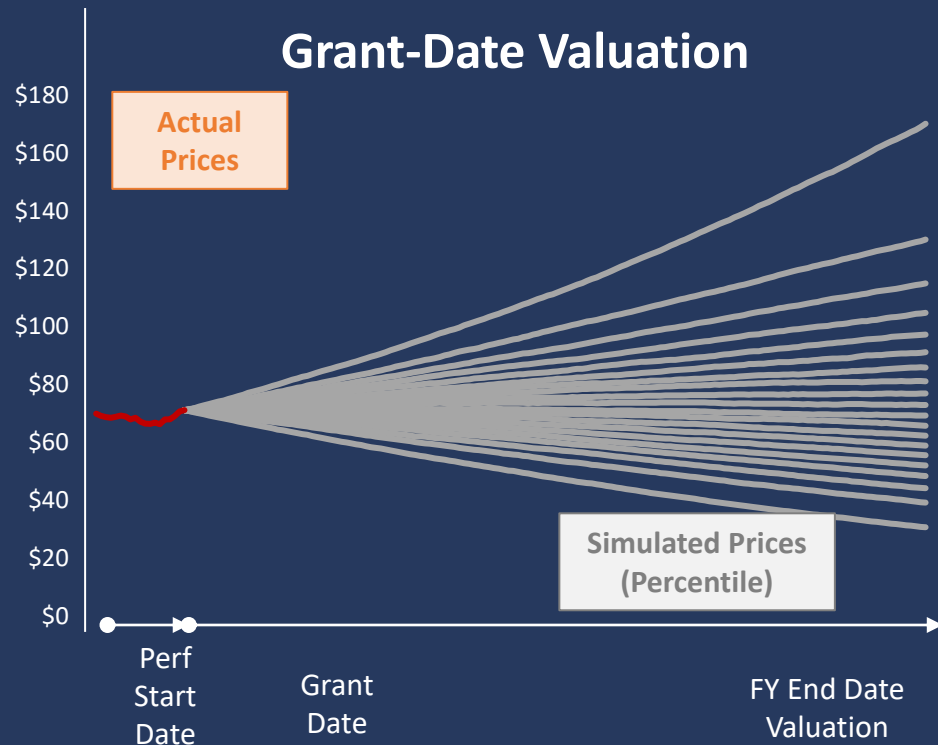


## Valuing Performance Awards with Market Conditions

### Stock Price Metrics:

- Relative TSR
- Absolute TSR
- Price-Hurdle
- Market Cap Level

Monte Carlo Simulation



## Polling Question #3

What do you want to do now?

- a) Hear Josh drone on more about Monte Carlo simulation?
- b) Hear James talk for a while about solving differential equations?
- c) Log off and wait for your CPE certificate?
- d) Go and chat over drinks!

