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December 19, 2023

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Understanding and Using Implied Volatility to Implement Strategies

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As with all investments, your capital is at risk

Using Implied Volatility to Implement Strategies

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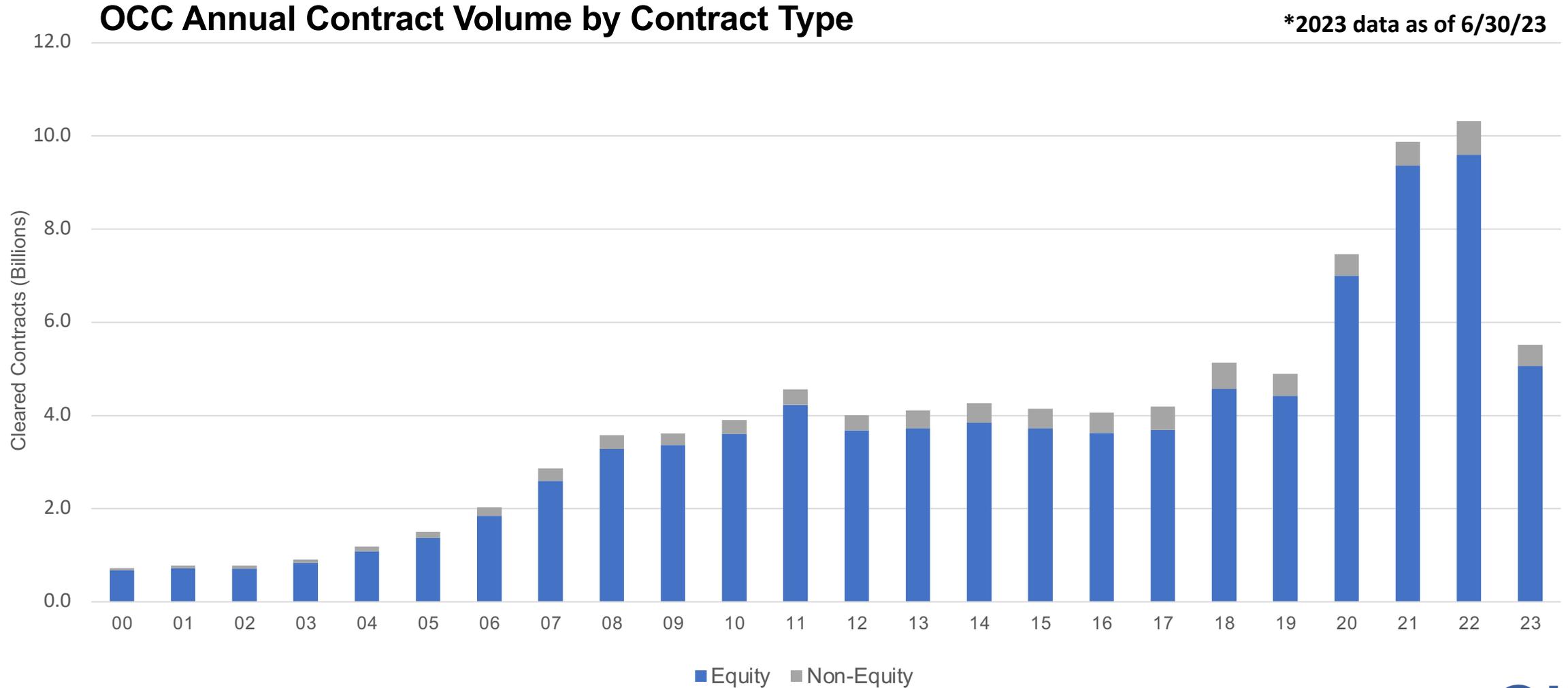


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Annual Options Volume 2000-2023*



Presentation Outline

- Historical Volatility
- Implied Volatility (IV)
- Vega
- Historical Implied Volatility
- Strategies



Volatility: What is It?

- Volatility reflects fluctuations in underlying stock price
 - Moves to the upside/moves to the downside
 - Over days, weeks, months, or longer
 - Does not imply a price trend

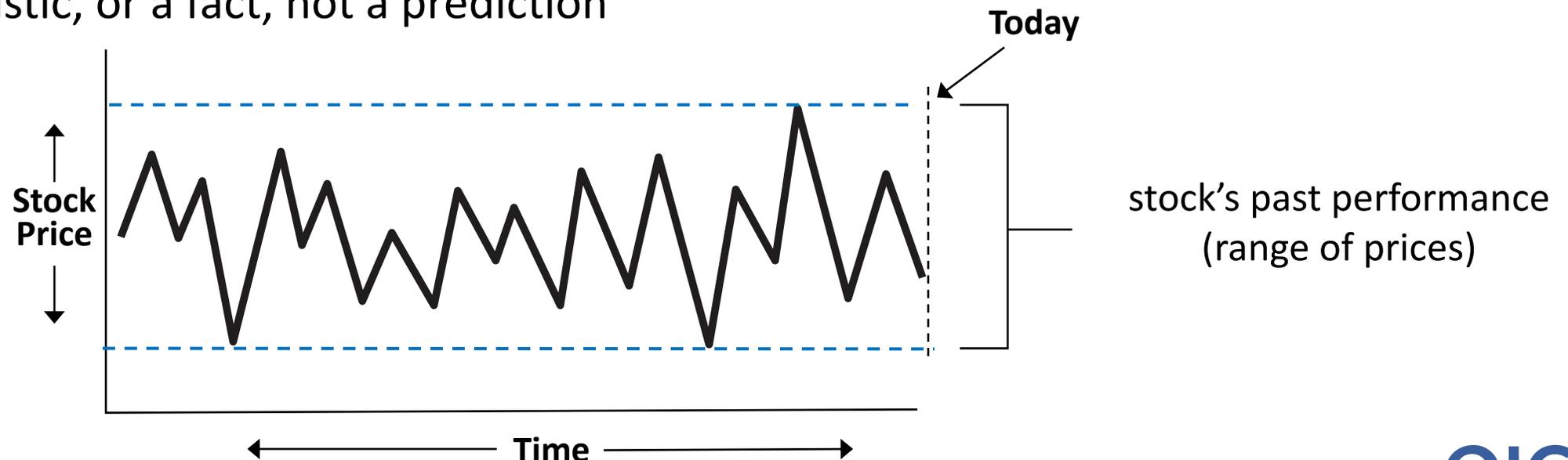


Historical Volatility



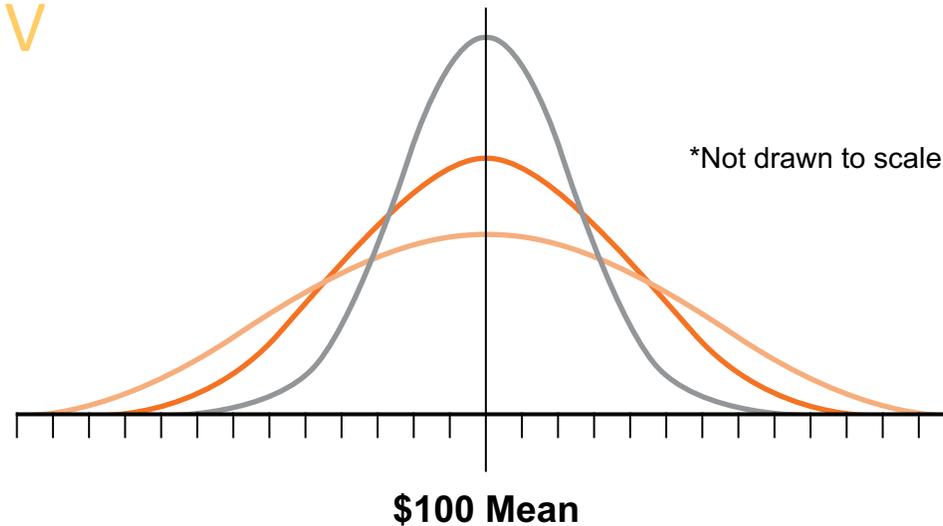
Historical Volatility (HV)

- A stock's volatility in the past
 - Can be observed and quantified
 - This is “historical” volatility
 - A statistic, or a fact, not a prediction



Comparing Distributions

- Compare distributions of three stocks – each with different volatility
 - Stock A = 15% HV
 - Stock B = 25% HV
 - Stock C = 35% HV



Implied Volatility



Implied Volatility (IV): Definition

- Option implied volatility
 - volatility assumption at which option is currently priced in market
 - can be determined via option pricing model
 - volatility input resulting in value same as current market price
- Reflects underlying stock's volatility expected by marketplace
 - consensus of all market participants
- Who ultimately determines option market prices?
 - everybody who makes a bid/ask price and trades an option
 - professionals and individual investors alike

Intrinsic Value vs. Extrinsic (Time) Value

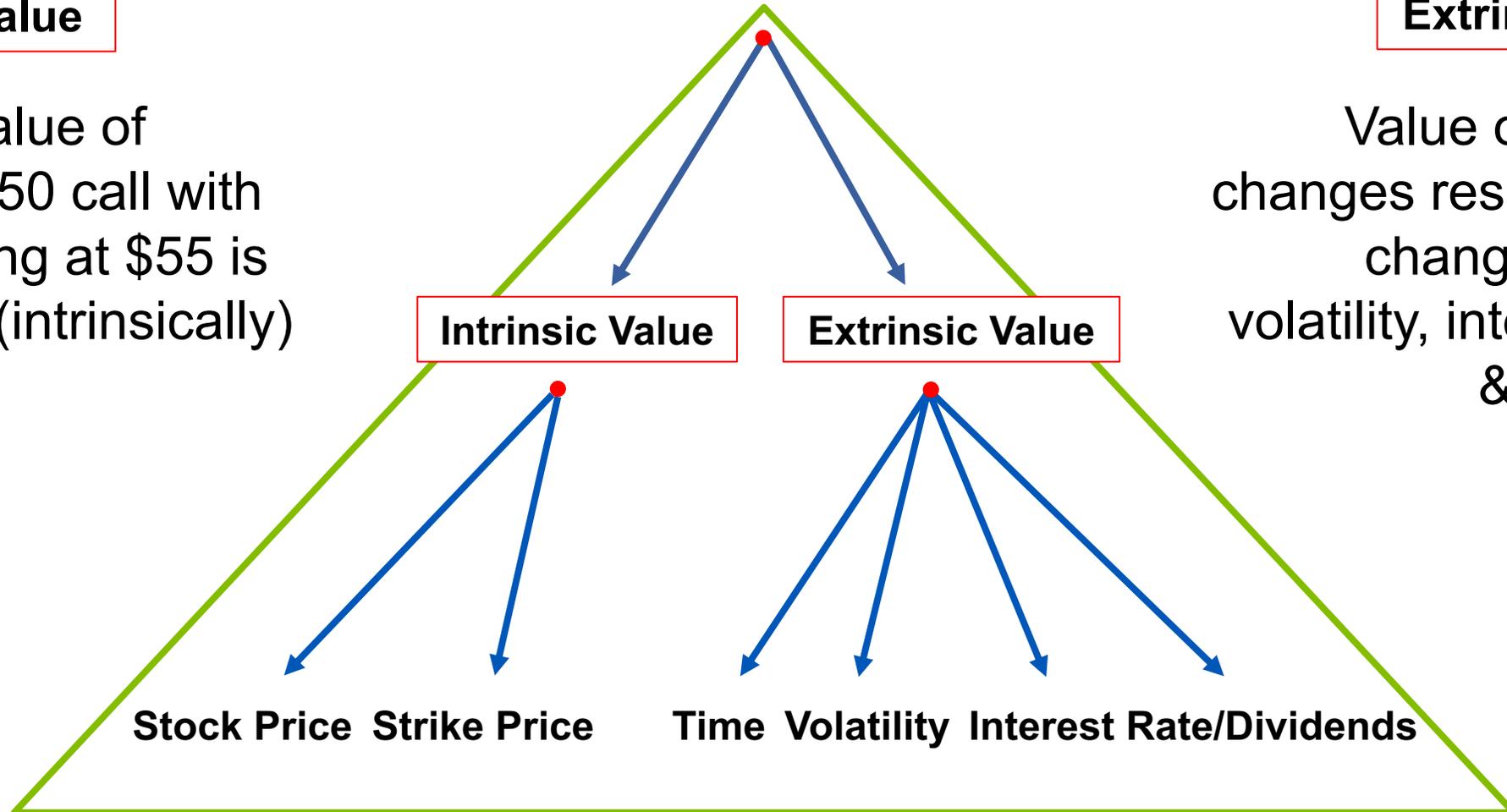
Option's Premium

Intrinsic Value

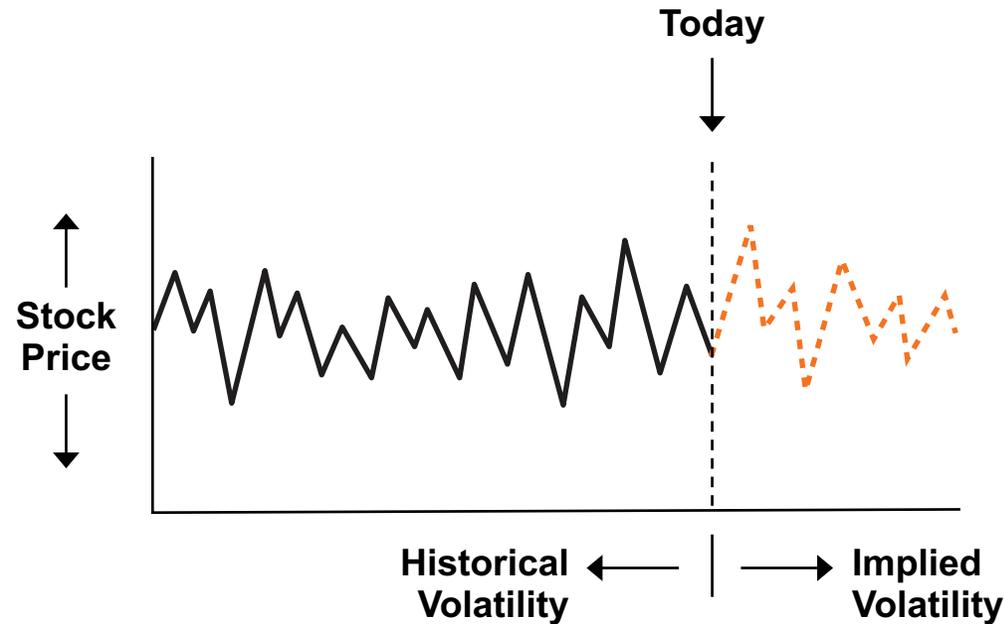
Inherent value of option: A \$50 call with stock trading at \$55 is inherently (intrinsically) worth \$5

Extrinsic Value

Value of potential changes resulting from changes in time, volatility, interest rates & dividends



Implied Volatility Represents the Future



- Option implied volatility reflects current expectations of future stock volatility
- Only options have implied volatility

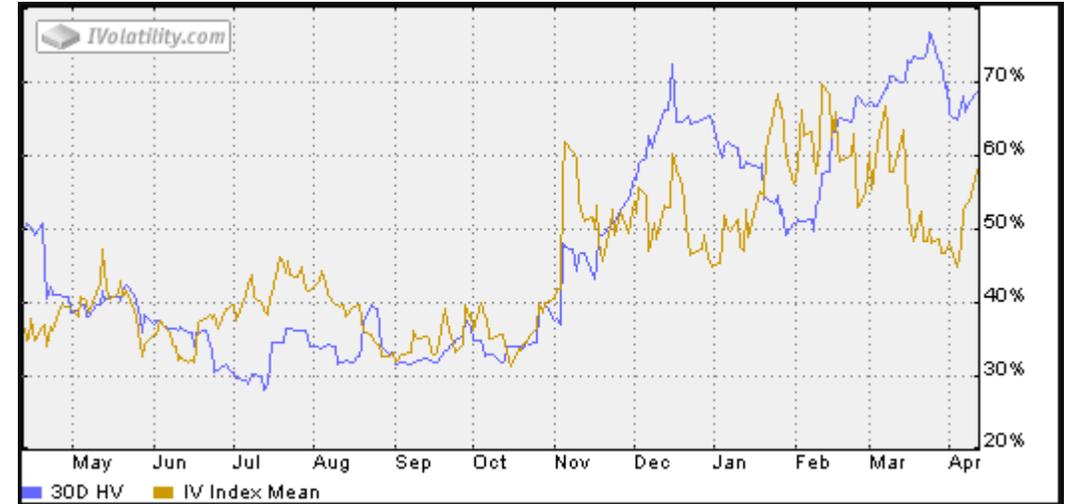
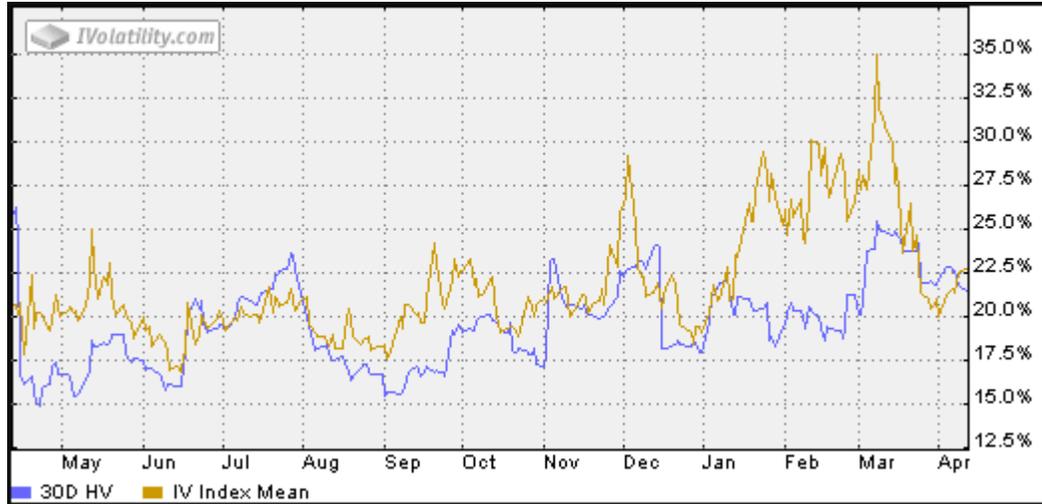
Implied vs. Historical Volatility

- Will an option's implied volatility return to its underlying stock's historical volatility level?
 - Not necessarily
 - Not safe to assume it will
- Why be concerned about implied volatility?
 - Directly affects market value of your options (time value)
 - Not predictable
 - Can explain option price movement you might not expect or understand

Implied Volatility: Effect on Option Prices

- A change in underlying stock historical volatility may or may not affect an option's market price. However...
- **Other pricing factors remaining constant, a change in implied volatility will affect option prices:**
- As implied volatility increases ↑
 - both call and put prices will increase ↑
- As implied volatility decreases ↓
 - both call and put prices will decrease ↓

Reading an Implied Volatility Chart



- Stock A lower volatility / 52-week range 16.91 – 34.99
- Stock B higher volatility / 52-week range 31.37 – 69.79

Look into the Future: 1 Year

- Let's assume:
 - XYZ is currently trading at \$80.00
 - XYZ options are trading at annualized 30% implied volatility
 - 1 SD of 30% represents $\$80.00 \times 30\% = \24.00
- Statistically, you can expect the following results for XYZ over the next year:

Variance	Standard Deviation Amount	Trading Range	Probability Within Range	Probability Outside Range
± 1 SD	\$24.00	\$56.00 ↔ \$104.00	≈ 68%	≈ 32%
± 2 SD	\$48.00	\$32.00 ↔ \$128.00	≈ 95%	≈ 5%
± 3 SD	\$72.00	\$8.00 ↔ \$152.00	≈ 99%	≈ 1%

Rule of 16

- To take an annualized volatility and calculate standard deviation amounts for periods of less than 1 year, use the following formula:

$$\frac{\text{Annualized Volatility \%}}{\sqrt{\text{Time Period}}} \times \text{Stock Price}$$

- XYZ is currently trading at \$80.00
- XYZ options are trading at annualized 30% implied volatility
- 1 day expected move = $.30 / \sqrt{252} \times \$80.00 = +/- \$1.50$

Calculating different time periods

- To take an annualized volatility and calculate standard deviation amounts for periods of less than 1 year, use the following formula:

$$\frac{\text{Annualized Volatility \%}}{\sqrt{\text{Time Period}}} \times \text{Stock Price}$$

- “Time periods” you might use in the formula
- 1 quarter = 4 (quarters in a year)
- 1 month = 12 (months in a year)
- 1 week = 52 (weeks in a year)
- 1 day = 252 (approximate trading days in a year)

Vega: The Volatility Greek

K Vega: Option value's sensitivity to volatility

- Expected change in option value
 - With a 1%-point change in implied volatility (IV)
 - Expressed in decimal form (.080)
 - Represents cash amount per option
 - All other pricing factors constant
 - Vega is greatest ATM and long term
- Calls and puts both have positive Vega amounts
 - IV  option value  by Vega amount
 - IV  option value  by Vega amount

K
Vega

Vega in Action

Pre-Earnings

- Stock: \$100
- DTE: 13
- IV: 60%

	105 Call
Value	\$2.55
Delta	.35
Gamma	.03
Theta	.16
Vega	.07
Rho	.01

Post-Earnings

- Stock: \$105
- DTE: 6
- IV: 30%

	105 Call
Value	\$1.60
Delta	.50
Gamma	.10
Theta	.13
Vega	.05
Rho	.01

Even with a \$5 increase in share price, these calls lost value due to time decay and decreasing IV

Historical Implied Volatility

- By tracking IV over time, an investor can map out Historic levels of Implied Volatility
- Historical IV can help an investor make sense of current IV levels and how they relate to both historic volatility and recent IV
- If the current level of IV is higher or lower than historic levels, will it revert to the mean?



Implied Volatility Analytics

IV Rank

- Compares current IV to an IV range over a defined time frame
- Given an observed IV range of 20% – 60%, a current IV of 40% would yield an IV Rank of 50%.
- If the time frame chosen is 1 year, an IV Rank of 0% means the current level is the lowest of the year, while 100% means the current level is the highest of the year

IV Percentile

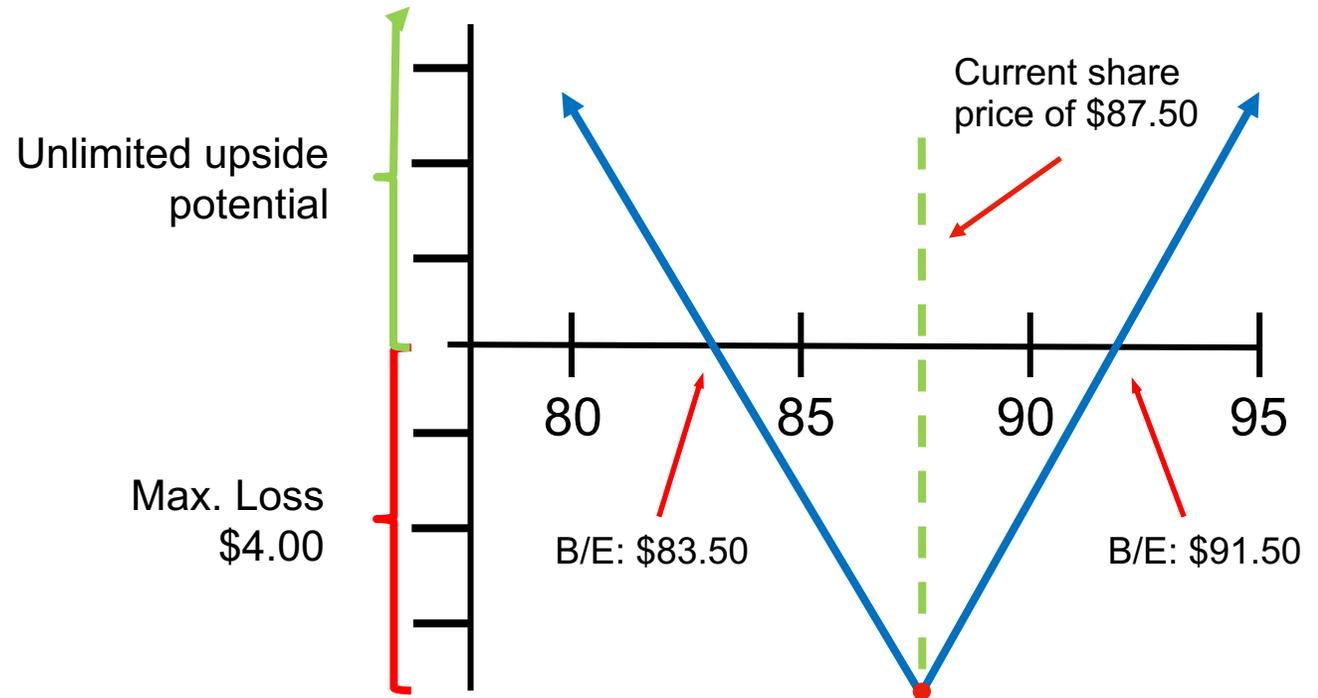
- The percentage of days that IV has been lower than current IV
- IV Percentile of 60% = Previous levels of IV have been below current level 60% of the time

Volatility Strategies



Long Straddle

- Buy 1 87.50 Call \$2.15
 - Buy 1 87.50 Put \$1.85
- Net Debit \$4.00**

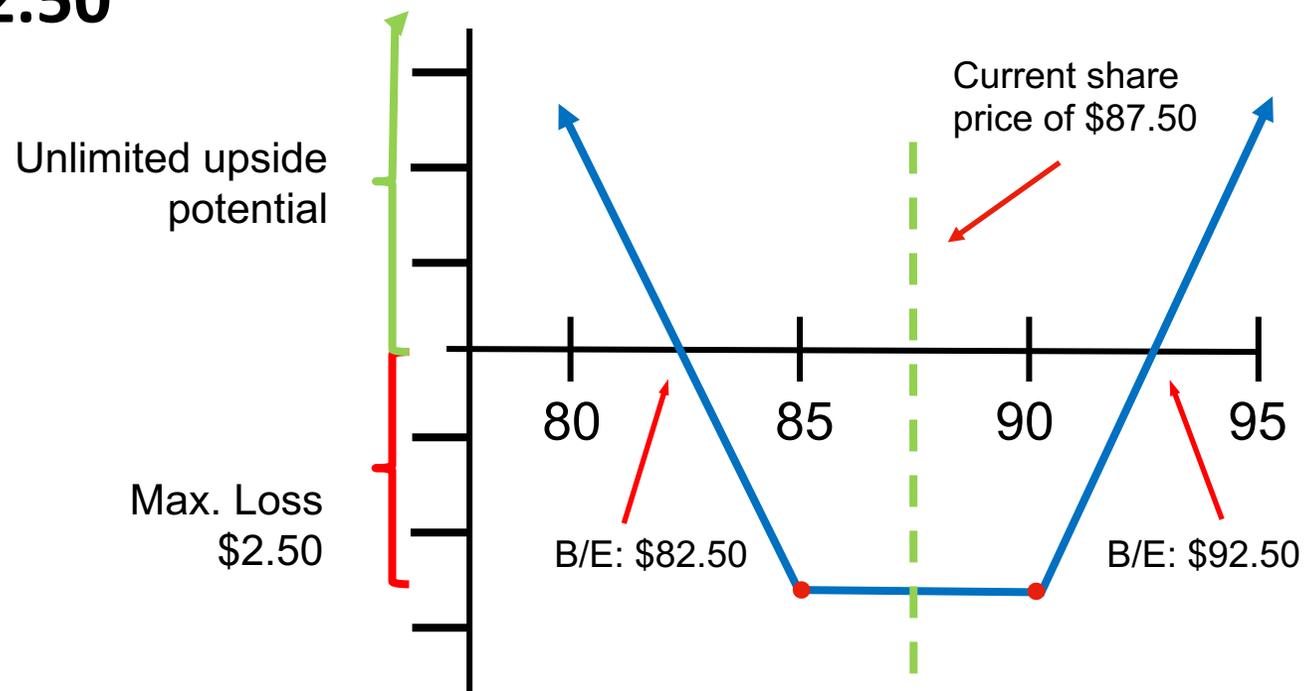


Long Strangle

Buy 1 45-day **90.00** Call \$ 1.20

Buy 1 45-day **85.00** Put \$ 1.30

Net Debit \$2.50



Bear Call Spread

If shares finish below \$50, both legs expire worthless and max profit achieved. No stock position

If shares finish between \$50 and \$52.50, short call is assigned and long call expires OTM. Short stock position results

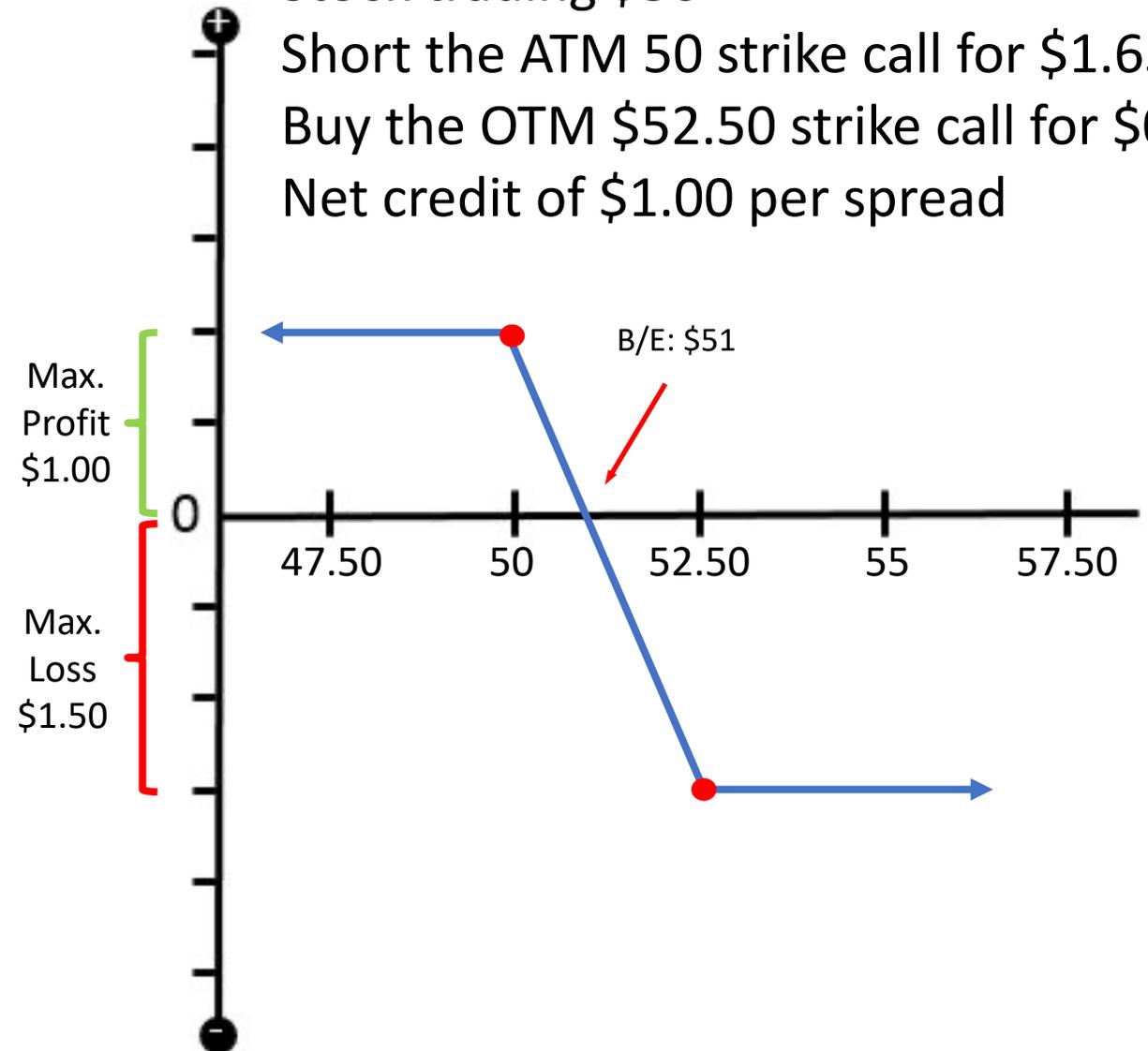
If shares finish above \$52.50, short call is assigned and long call exercised. Result is max loss and no stock position

Stock trading \$50

Short the ATM 50 strike call for \$1.65

Buy the OTM \$52.50 strike call for \$0.65

Net credit of \$1.00 per spread



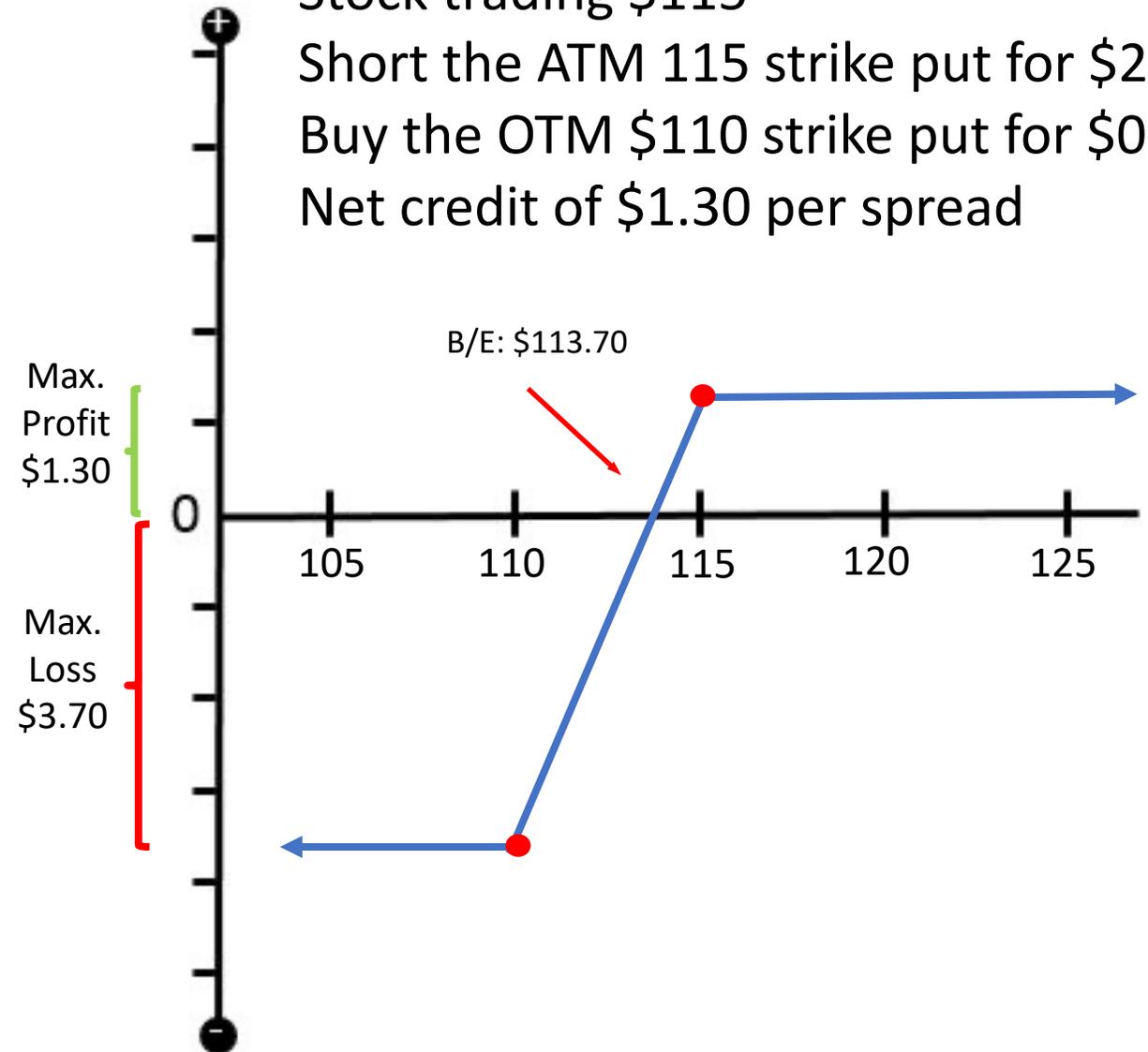
Bull Put Spread

If shares finish above \$115, both legs expire worthless and max profit achieved. No stock position

If shares finish between \$110 and \$115, short put is assigned and long put expires OTM. Long stock position results

If shares finish below \$110, short put is assigned and long put exercised. Result is max loss and no stock position

Stock trading \$115
Short the ATM 115 strike put for \$2.00
Buy the OTM \$110 strike put for \$0.70
Net credit of \$1.30 per spread



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