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Understanding and Using Implied Volatility to Implement Strategies

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Using Implied Volatility to Implement Strategies

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- **FREE** unbiased and professional options education
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Annual Options Volume 2000-2023*

OCC Annual Contract Volume by Contract Type

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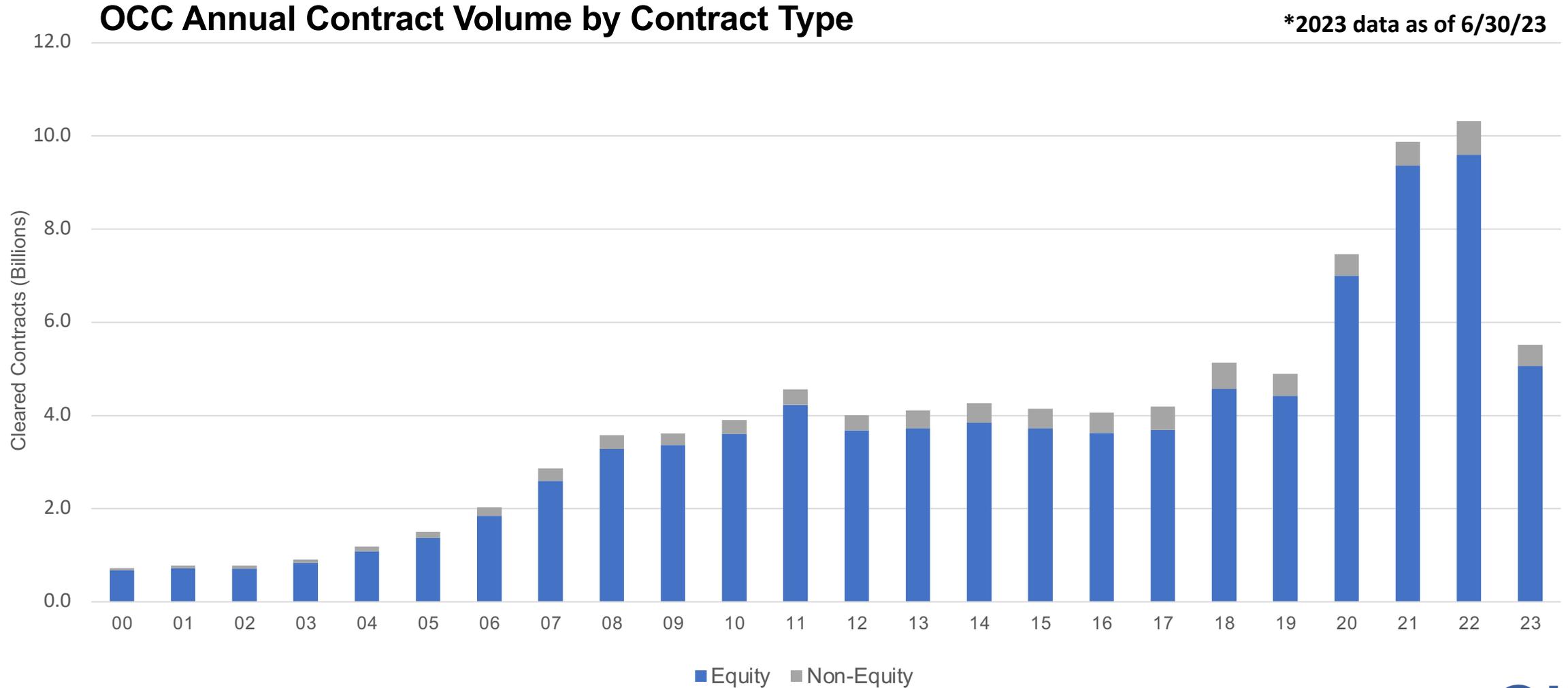
Presentation Outline

- Historical Volatility

- Implied Volatility (IV)

- Vega

- Historical Implied Volatility

- Strategies

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Volatility: What is It?

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

— **More volatile**

— **Less volatile**

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Historical Volatility

Historical Volatility (HV)

- A stock's volatility in the past

  - Can be observed and quantified

  - This is "<u>historical</u>" volatility

  - A statistic, or a fact, not a prediction

stock's past performance
(range of prices)

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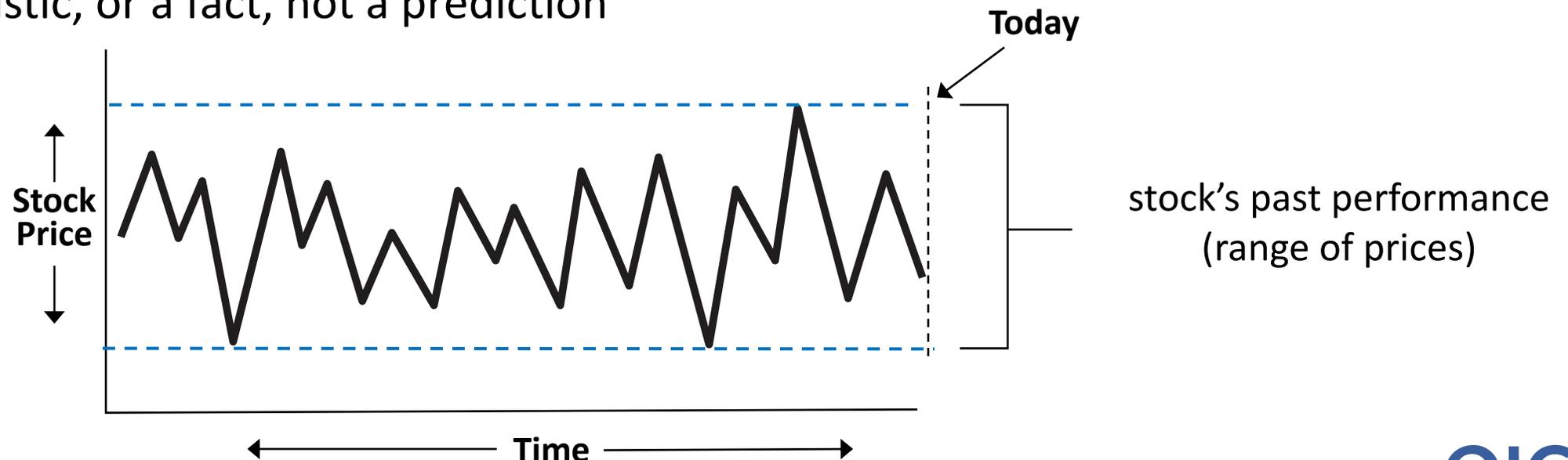
Comparing Distributions

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

*Not drawn to scale

$100 Mean

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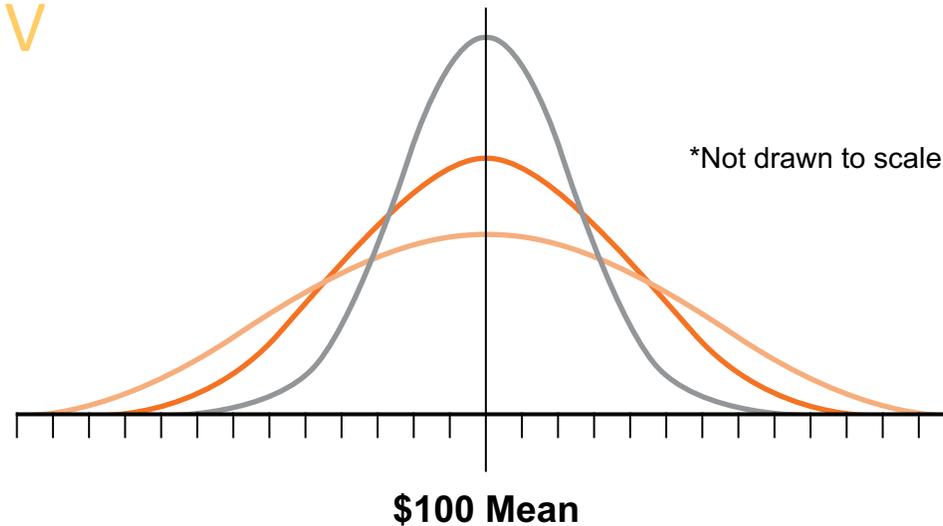
Implied Volatility

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 <u>underlying stock's</u> volatility expected by marketplace

  - consensus of all market participants

- Who ultimately determines option market prices?

  - <u>everybody</u> who makes a bid/ask price and trades an option

  - professionals and individual investors alike

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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

Intrinsic Value

Extrinsic Value

Stock Price Strike Price

Time Volatility Interest Rate/Dividends

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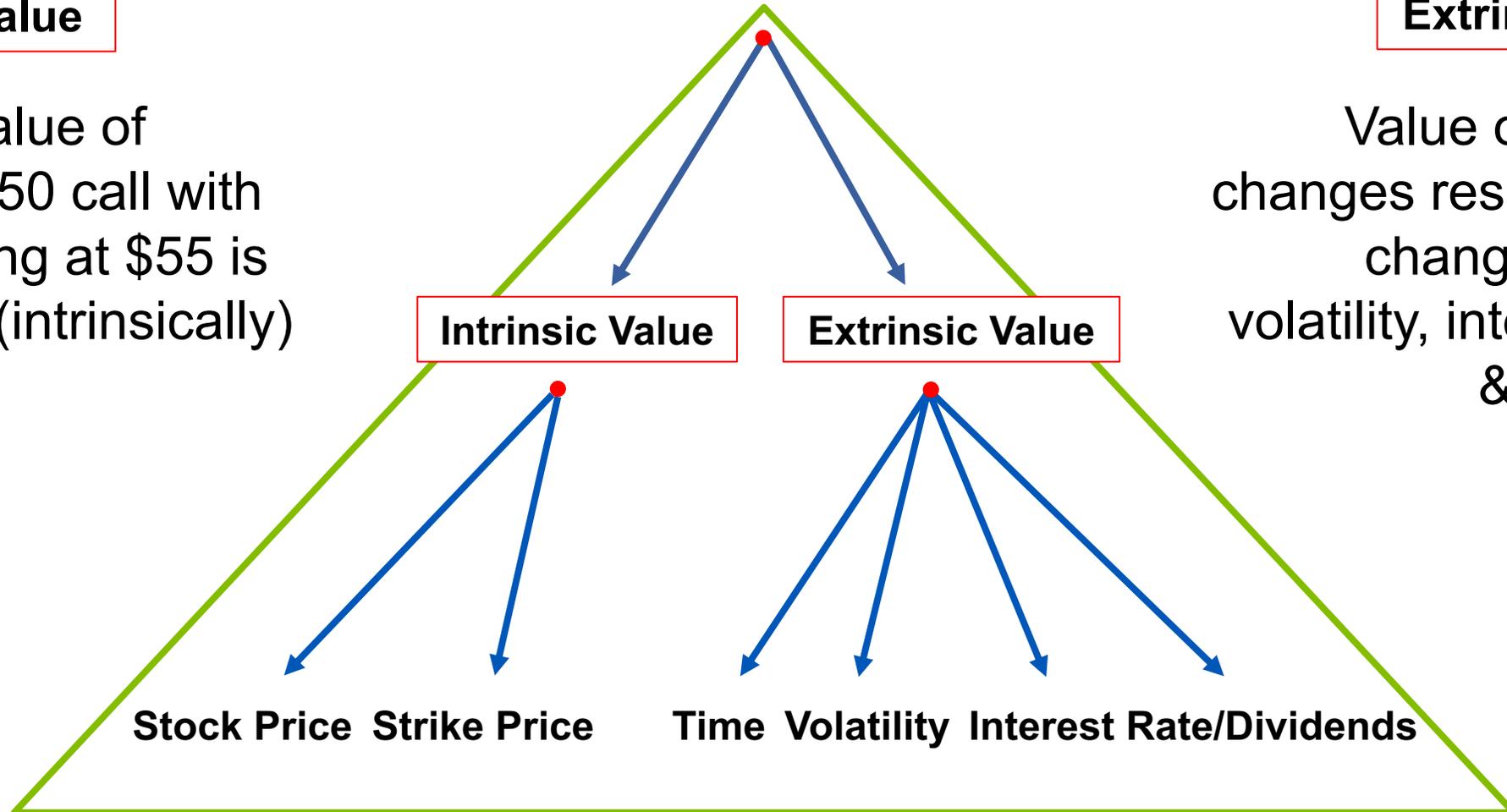
Implied Volatility Represents the Future
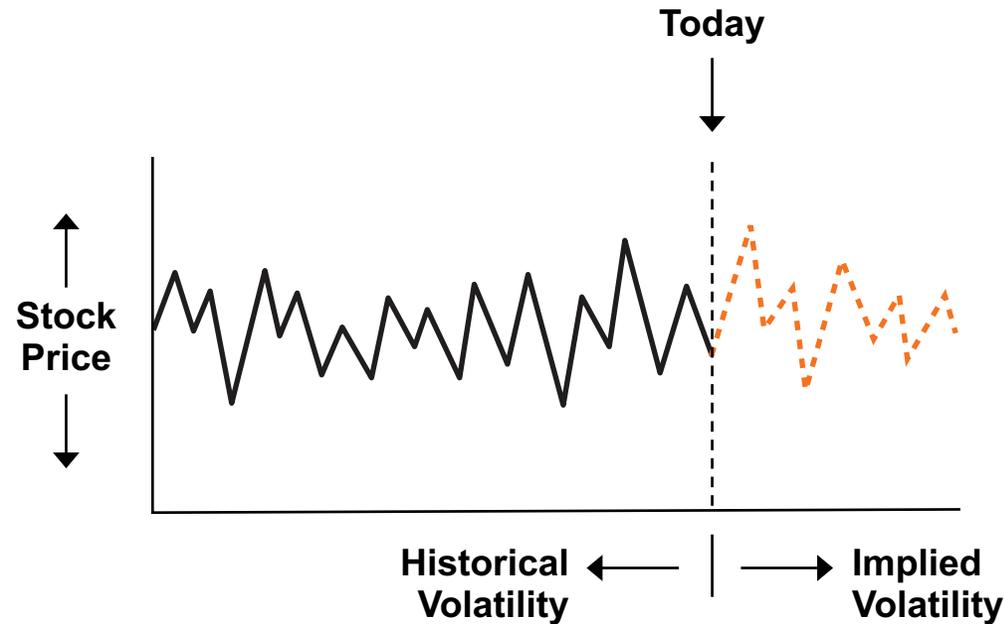
- <u>Option implied</u> volatility reflects current expectations of <u>future stock</u> volatility

- Only <u>options</u> have <u>implied</u> volatility

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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

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Implied Volatility: Effect on Option Prices

- A change in underlying stock <u>historical</u> 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 <u>implied</u> volatility <u>increases</u> ⬆

  - both call and put prices <u>will increase</u> ⬆

- As <u>implied</u> volatility <u>decreases</u> ⬇

  - both call and put prices <u>will decrease</u> ⬇

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Reading an Implied Volatility Chart
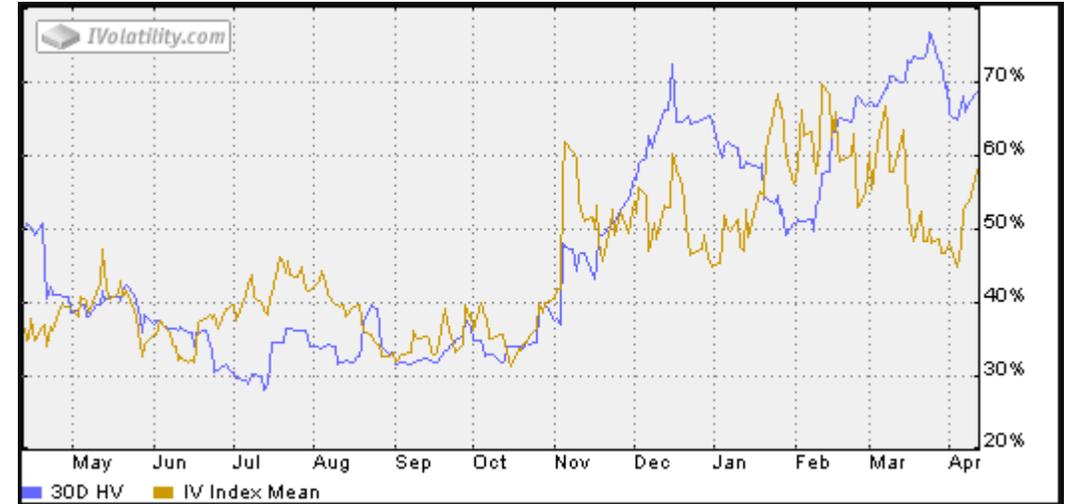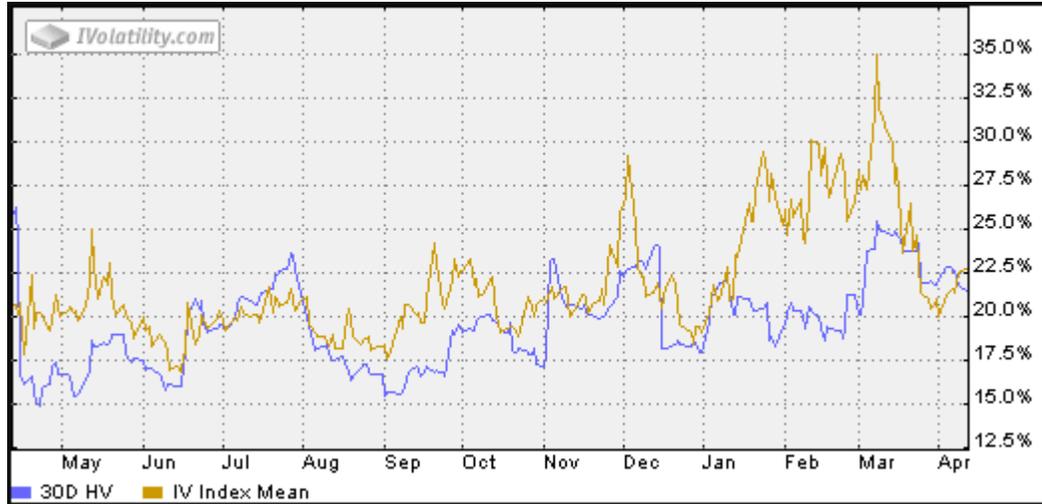
- Stock A lower volatility / 52-week range 16.91 – 34.99
- Stock B higher volatility / 52-week range 31.37 – 69.79

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Look into the Future: 1 Year

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

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%

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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 = $.30 / \sqrt{252}$ X $80.00 = +/- $1.50

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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)

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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

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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

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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?

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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

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Volatility Strategies

Long Straddle

- Buy 1 87.50 Call $2.15
- Buy 1 87.50 Put $1.85

  Net Debit $4.00

Unlimited upside potential

Current share price of $87.50

Max. Loss $4.00

B/E: $83.50

B/E: $91.50

80   85   90   95

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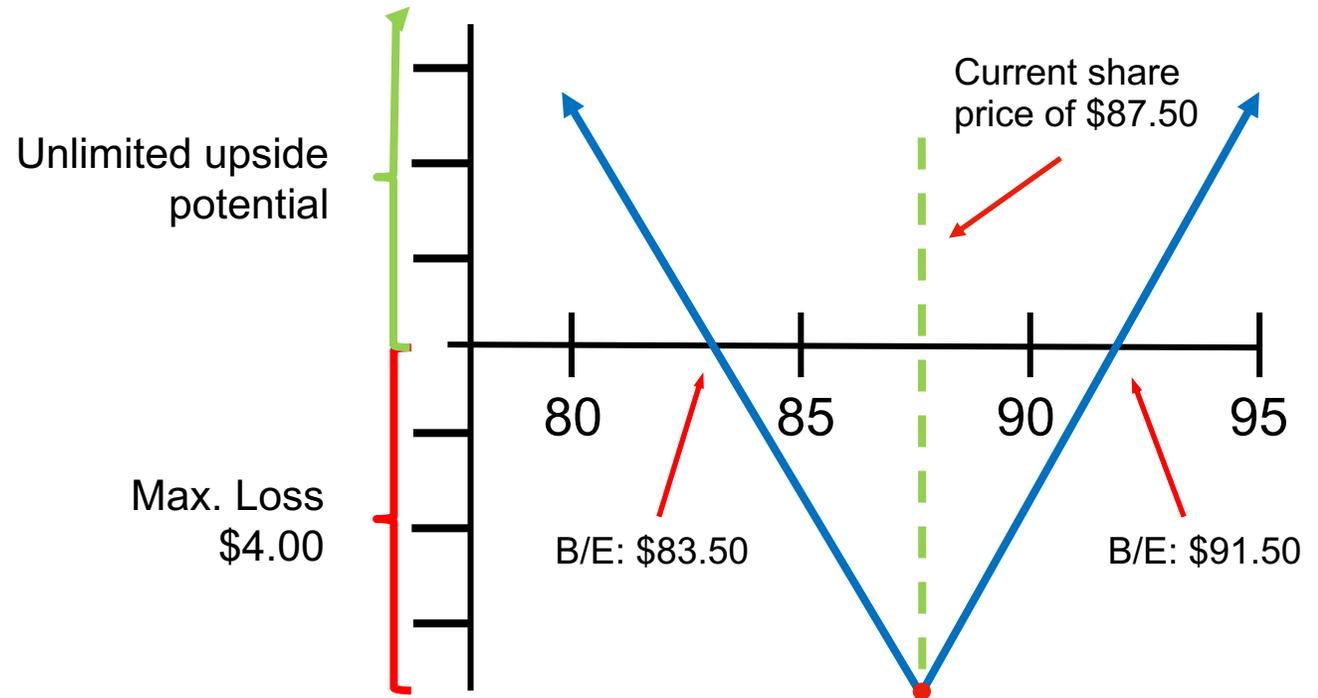
Long Strangle

Buy 1 45-day **90.00** Call $ 1.20
Buy 1 45-day **85.00** Put $ 1.30

Net Debit $2.50

Unlimited upside
potential

Current share
price of $87.50

Max. Loss
$2.50

B/E: $82.50

B/E: $92.50

80   85   90   95

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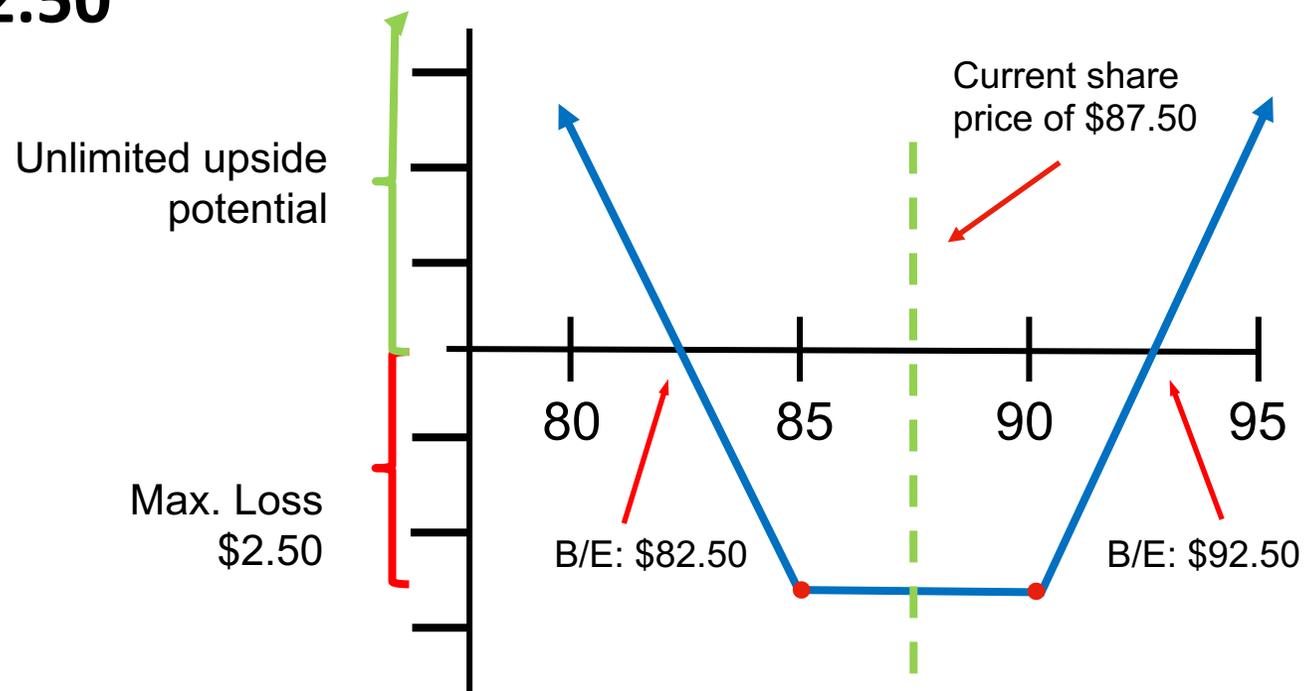
Bear Call Spread

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

B/E: $51

Max. Profit $1.00

Max. Loss $1.50

47.50   50   52.50   55   57.50

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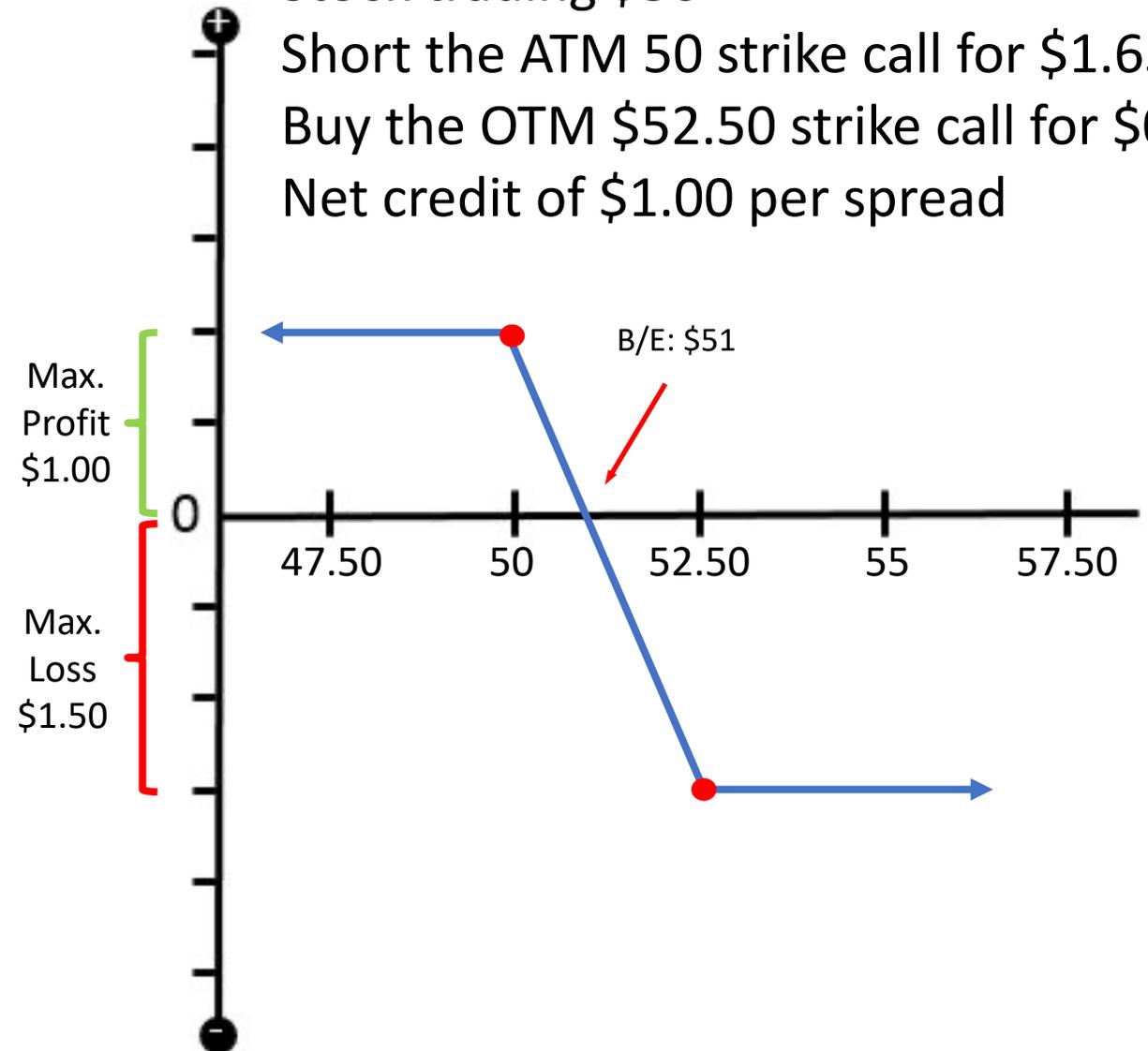
Bull Put Spread

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

B/E: $113.70

Max. Profit $1.30

Max. Loss $3.70

105   110   115   120   125

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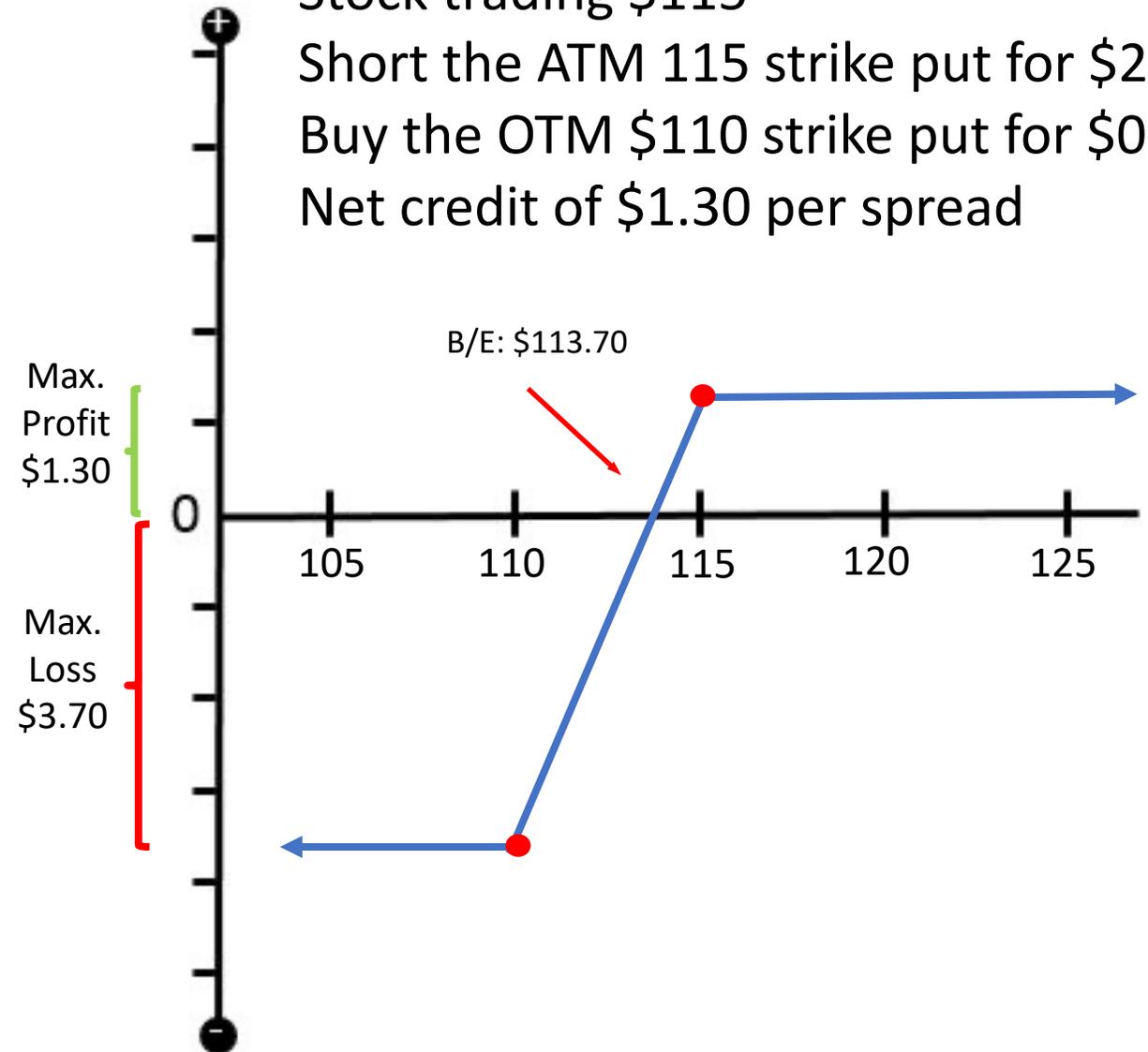
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