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Volatility Concepts for Options Investors

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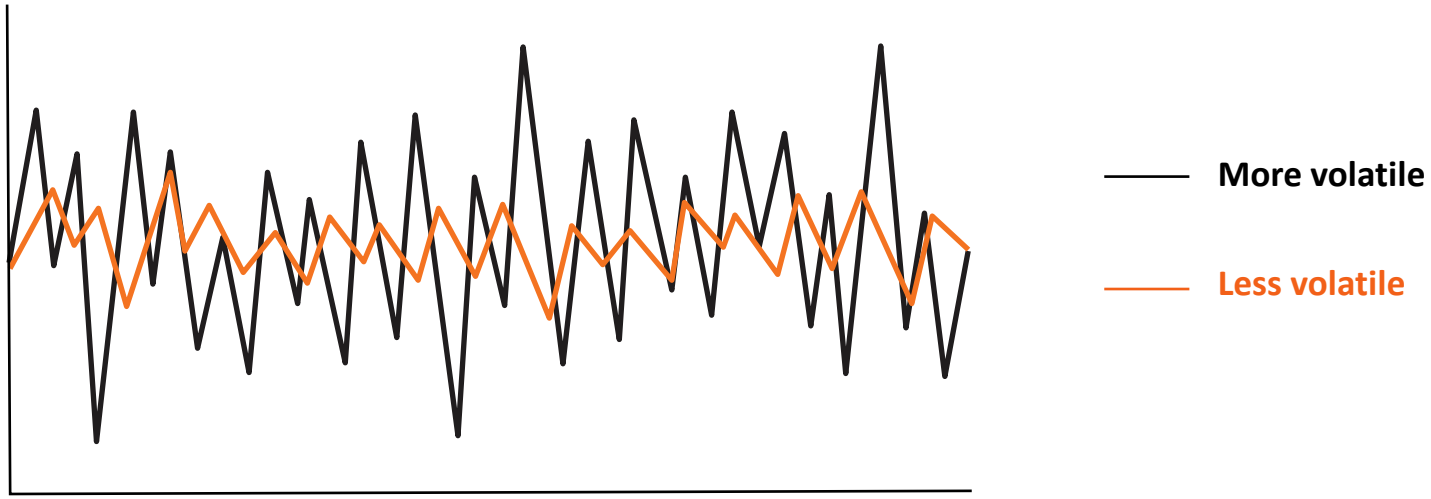
Presentation Outline

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

Volatility: What is It?

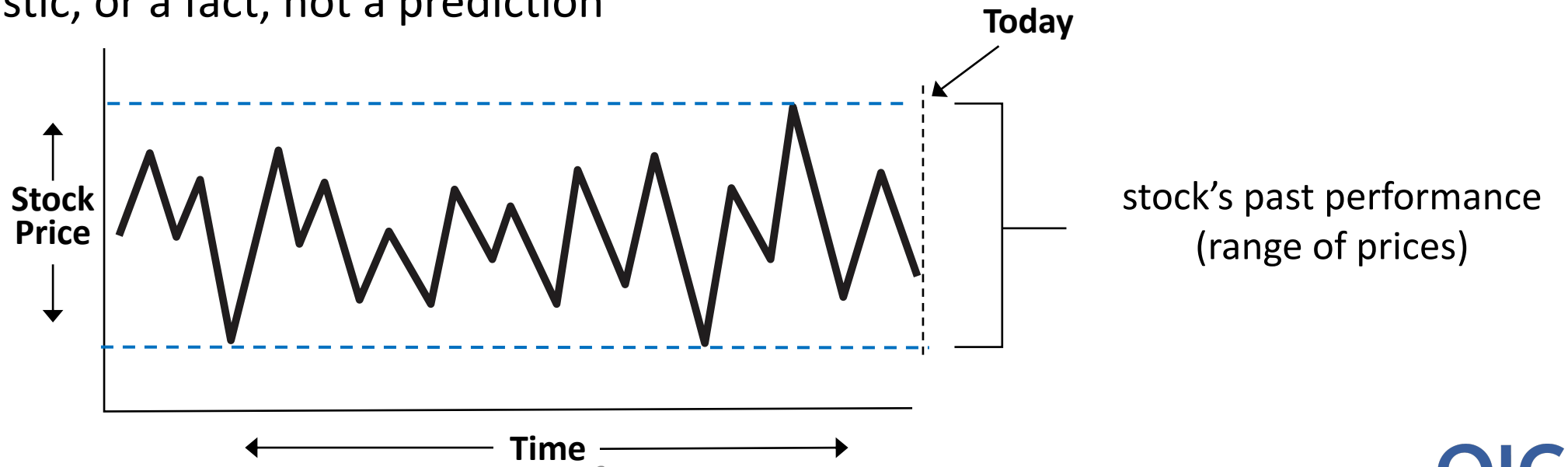
- Volatility reflects fluctuations in underlying stock price
  - Moves to the upside/moves to the downside
  - Over days, weeks, months, or longer
  - Does not imply a price trend



Historical Volatility

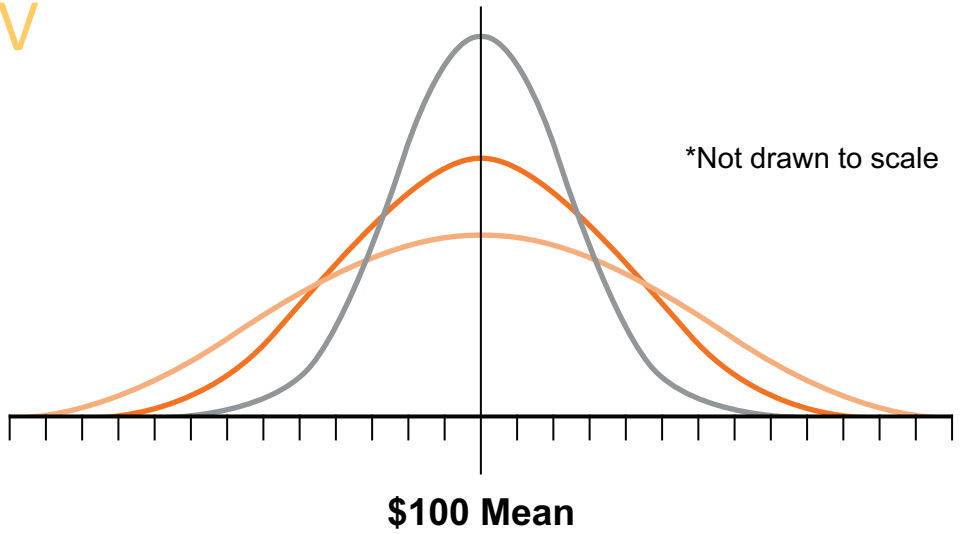
Historical Volatility (HV)

- 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

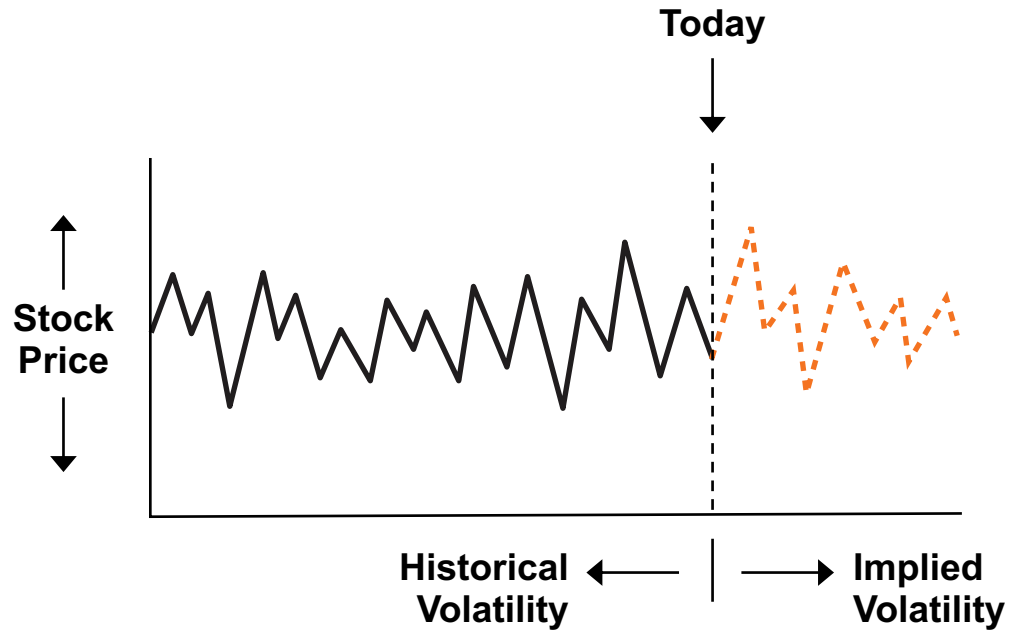


Implied Volatility

Implied Volatility: 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

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 ↓

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 x 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%

Vega: The Volatility Greek

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

Vega

Changing IV: Call Example

- You buy an XYZ Dec 50.00 call for $3.00
  - XYZ stock at $50.00
  - 60 days until expiration
- Next day XYZ stock fluctuates but levels off at $50.00
  - The Dec 50.00 call increases in price to $3.40
- What has happened?
  - Implied volatility level of Dec 50.00 call has increased
  - Implied level 35% when purchased → 40% the next day
  - You have an unrealized profit

IV Effect on Premium: Put Example

Current Stock price = $60

Put option with strike price = $59

30 days to expiration

Put premium with:

- IV at 20% = $1.00
- IV at 30% = $1.80
- IV at 50% = $3.30

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

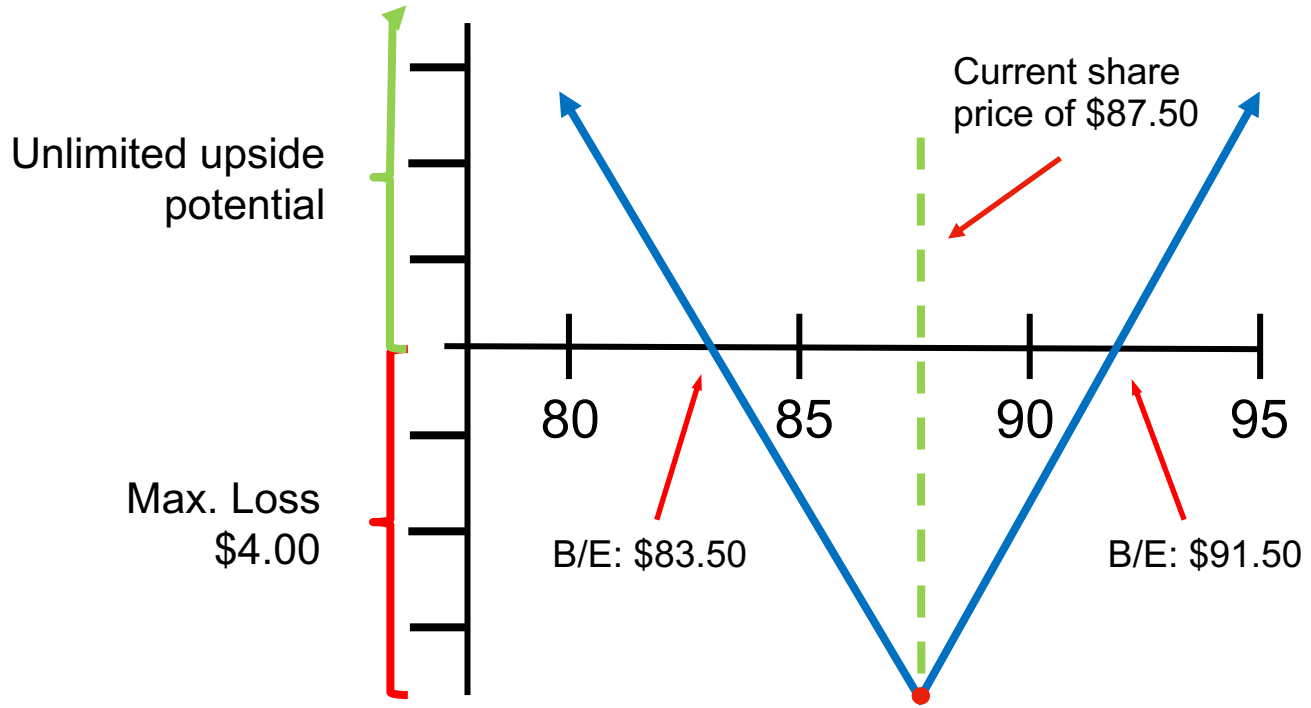
- The percentage of days that IV has been lower than current IV
- IV Percentile of 60% = Previous levels of IV have been below current level 60% of the time

Volatility Strategies

Long Straddle

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

Net Debit $4.00

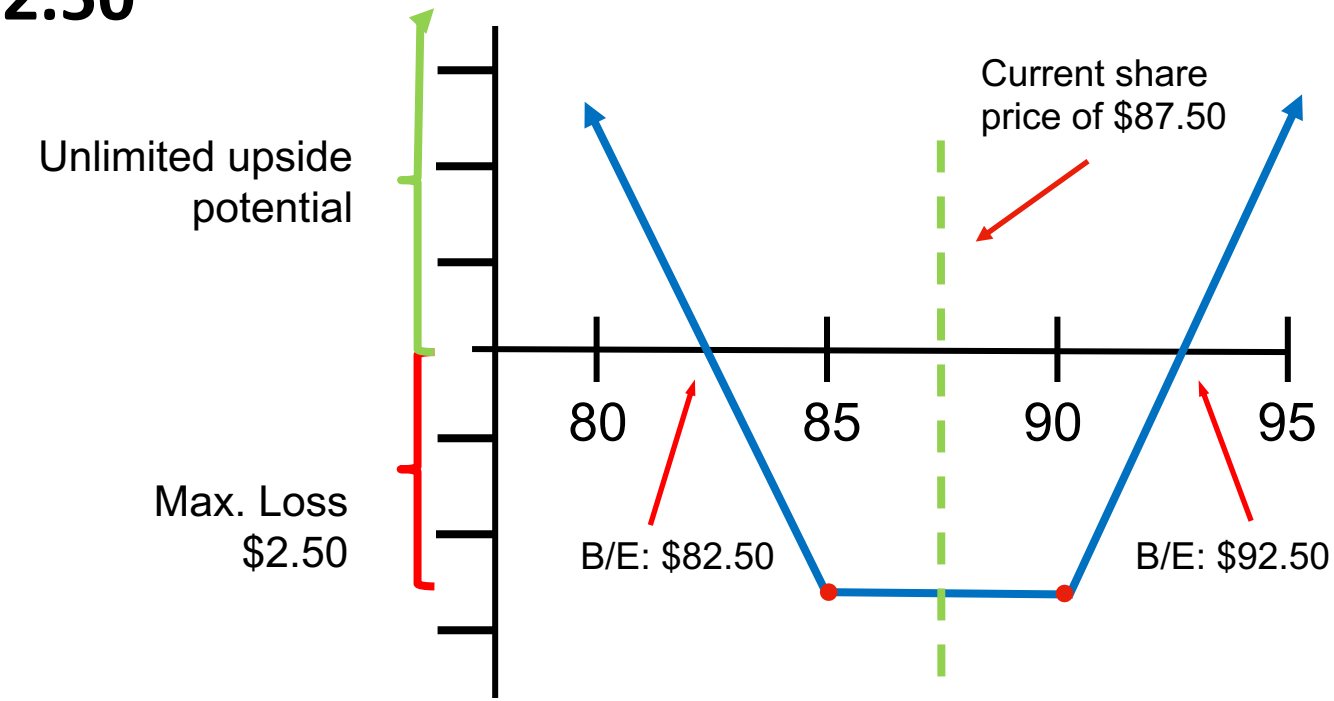


Excludes transaction costs

Long Strangle

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

Net Debit $2.50



Excludes transaction costs

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