



Trading Strategy Desk – Options Intermediate Week 4

# What you need to know about volatility

BROKERAGE: **OPTIONS**



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# Intermediate Options Trading Webinar Series

## Options Pricing

Understand how options are priced and learn how you can help get better returns.

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## What You Need To Know About Volatility

Understanding the different volatility types and how to formulate and manage an outlook on implied volatility.

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## One Leg or Two

Evaluate the pros and cons to more complex options trading strategies (e.g. spreads).

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## Generating Options Trade Ideas

Get to know the Fidelity suite of resources for options trade idea generation.



# What is on our agenda today?

## What is Volatility?

Overview and comparison of Historic vs Implied Volatility (HV/IV)

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## How does IV affect option pricing?

A deep dive on meaning and interpretation of IV

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## Using volatility data to make trade decisions

Determining the relative expensiveness of a potential trade

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## Fidelity resources for volatility analysis

Live demonstration of the Option Chain, Option Statistics and more



# What is Volatility?

# What is volatility?

Volatility measures the price movement and fluctuation of an underlying security

## Measures uncertainty (risk)

- Low volatility → Less movement → Less Risk
- High volatility → More movement → More Risk

## No bias for direction

## Measured in percentage terms

- 10% volatility on \$50 stock = **1 year expected move is + or (-) \$5**

## Different types of volatility

- Historical vs. Implied Volatility

# Historical Volatility vs. Implied Volatility

## Historical Volatility (HV)

- Realized, statistical, or *actual* volatility
- Calculated using past price movement of the security
- HV % tells you the expected range a security should price within over 1 year based on historical movement
  - Considers 1 standard deviation and therefore is expected to capture 68% of price points
- Many technical indicators are based on historical volatility
  - Bollinger Bands, Average True Range (ATR), etc.

VOLATILITY			
IV30 62.35	IV60 65.63	IV90 65.48	
HV10 28.05	<b>HV20 30.24</b>	HV30 45.02	HV60 47.97

**Current stock price + or (-) 30.24%**

Based on the last 20 trading days, there is a 68% likelihood (or simply 2/3 of the time) that the stock will be within this price range.

*Image shows volatility data from the Option Statistics tool in Active Trader Pro*

# Historical Volatility vs. Implied Volatility

## Implied Volatility (IV)

- Measures what the market expects volatility of the security to be in the future, based on premiums on option contracts for that security
- Annualized percentage for future expected move
- Dynamic - will change with option prices based on supply and demand for contracts

VOLATILITY							
IV30	62.35	IV60	65.63	IV90	65.48		
HV10	28.05	HV20	30.24	HV30	45.02	HV60	47.97

62.35% annualized expected move based on hypothetical 30-day option contracts

*Image shows volatility data from the Option Statistics tool in Active Trader Pro*

# Historical Volatility vs. Implied Volatility

## Historical Volatility (HV)

- Uses **actual** pricing data over the specified period
- Measure of **realized** volatility
- Based on trading days

## Implied Volatility (IV)

- Derived from the option contract prices on the given security
- Measure of **expected** movement
- Based on calendar days for a theoretical option



How does IV affect  
option pricing?

# Implied Volatility: Standard Deviations

IV is expressed as a percentage move of the stock price representing a one standard deviation move over the next year

- ***What is a standard deviation??***

From a statistical standpoint, at the end of 1 year there is a:

- 68% likelihood the stock will end the period within 1 standard deviation
- 95% likelihood the stock will end the period within 2 standard deviations
- 99% likelihood the stock will end the period within 3 standard deviations

# Implied Volatility: Standard Deviations

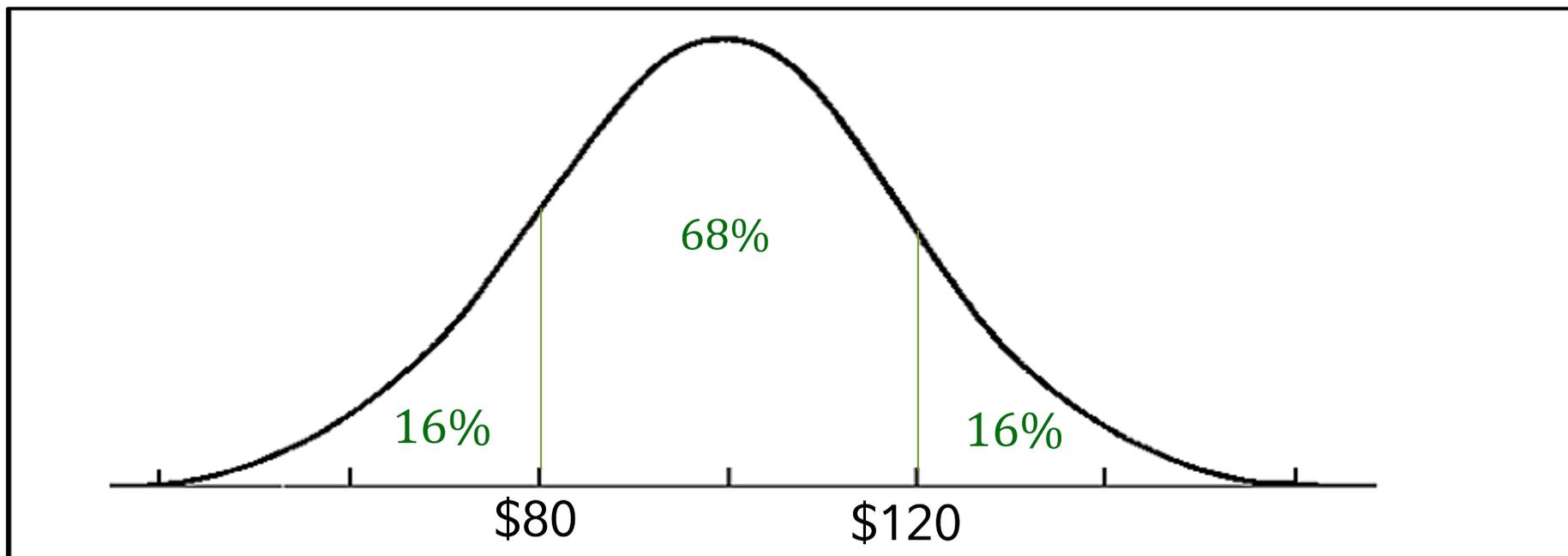
Example: A stock trading at \$100, with 20% IV has a 68% likelihood at being between \$80 and 120 at the end of one year.

Stock price = \$100

$$\$100 \times 20\% = \$20$$

IV = 20%

$$\$100 (+/-) \$20 = \$80/\$120$$



*The stock's annual expected range is between \$80 and \$120*

# Expected Move Calculation

Traders will convert the **annualized** expected move into **daily** expected move or expected move until expiration using the following formula:

$$\text{One standard deviation move} = \frac{\text{Stock Price} \times \text{Implied Volatility} \times \sqrt{\text{Days to expiry}}}{\sqrt{\text{Trading Days in a year}}}$$

## Trader's tip

It's helpful to remember that 16% IV results in a 1% daily expected move:  
 $(\$100 \times .16 \times 1) = +/- \$1$

Our previous example converted to a daily expected move...

- Stock price = \$100
- IV = 20%
- Sq. root of trading days in a year = approx. 16

$$\frac{\$100 \times .20 \times 1}{16} = + \text{ or } (-) \$1.25$$

# Implied Volatility is derived from option pricing

Option pricing components:

- ✓ *Stock price*
- ✓ *Strike price*
- ✓ *Expiration date*
- ✓ *Interest rate*
- ✓ *Dividends*
  
- ✓ ***Implied Volatility***

*Option pricing model*

**Option theoretical price**

IV can be derived by working backwards through the formula since the option price and all other components are known

Pricing models are used to price the initial IV

ATM contracts are generally used to calculate IV because they usually have highest volume and therefore prices are more determined by actual order flow (supply and demand)



Using volatility data to  
make trade decisions

# How the market affects IV levels

IV is considered a **measure of investor fear**. It changes due to market supply and demand.



# Impact of supply and demand on IV

## Consider an analogy:

Where would you expect sunglasses and snow cones to be more expensive: in Alaska or Florida?

## Why?

- Higher probability that the sun will be shining - sunglasses for protection, snow cones for relief
- In Alaska there may not even be snow cone shacks because of dismal demand
- More demand = Higher premiums

## Now let's apply it to SPX options:

- "Disaster" possibly looming => Investors purchase options to protect existing position(s) or to speculate on a downside move
- Demand increases when SPX falls due to continued downside concern
- SPX goes up => less concern about downside risk
- Selling premium to increase returns = more supply = IV decreases

# Volatility Skew

## Supply and demand are different for each option series:

When there is a bias resulting in higher implied volatilities for successively lower strike prices it is known as put skew. The opposite is call skew.

Trader's tip-  
Identify the vertical skew direction to see market's expectation for more volatile moves towards the skew.

## Horizontal skew:

When implied volatility levels are different across expiries, this is called horizontal skew.

- This is most prevalent around known upcoming events like earnings announcements where the options expiring soonest, but after the event will tend to have the highest IV levels

## But, beware!

IV Skew is not stagnant, it can and does change over time, sometimes rapidly.



Strike	Bid	Ask	IV Mid
▼ May 20 (73 days) CALLS			
185	1.83	1.86	29.54%
180	2.80	2.82	30.22%
175	4.15	4.20	31.12%
170	5.95	6.05	32.43%
165	8.25	8.35	33.79%
160	11.00	11.05	35.43%
155	14.10	14.20	37.07%
150	17.60	17.70	38.81%
145	21.35	21.50	40.62%
140	25.35	25.50	42.65%

Put Skew

Strike	Bid	Ask	IV Mid
▼ May 18 (71 days) CALLS			
42.5	3.20	3.30	126.51%
40	3.50	3.70	123.13%
37.5	3.90	4.10	120.51%
35	4.40	4.60	115.63%
32.5	5.00	5.10	111.37%
30	5.60	5.80	105.84%
29	5.90	6.10	102.99%
28	6.20	6.40	99.96%
27	6.60	6.80	97.55%
26	7.00	7.20	94.48%

Call Skew



# Fidelity resources for volatility analysis

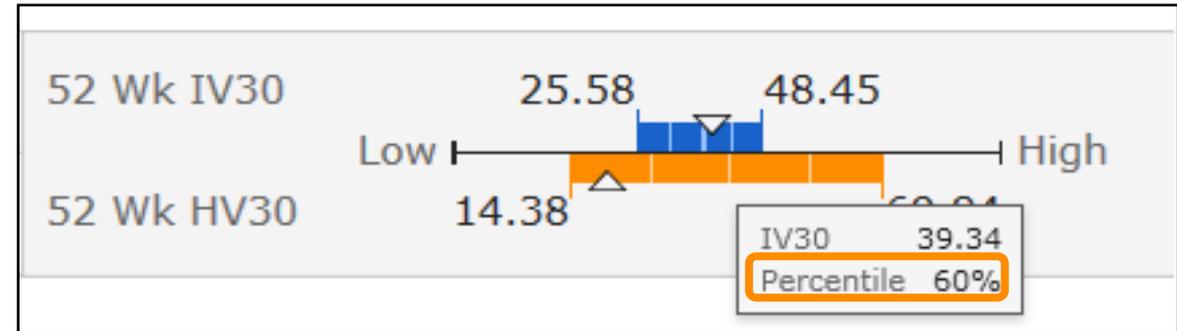
# Expensiveness

IV is a product of supply and demand for option contracts and, therefore, can be a measure of expensiveness



How can you determine whether a specific stock's IV is relatively expensive (or inexpensive)?

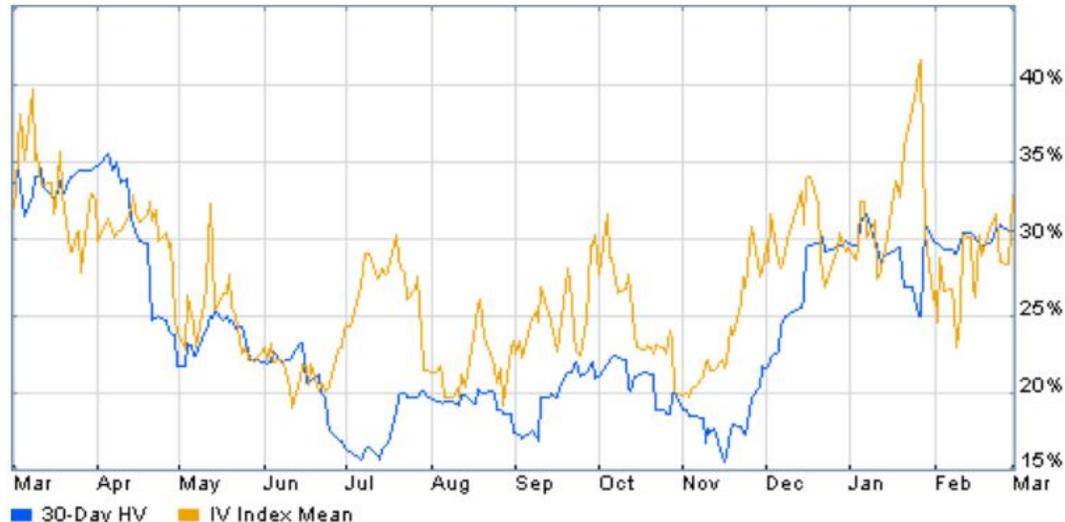
- IV percentile shows where a specific stock's IV is compared to where it has been in the last 52 weeks



# Expensiveness - continued

How can you determine whether a specific stock's IV is relatively expensive (or inexpensive)?

AAPL: Daily 1 Year Volatility Chart ( 3 months | 6 months | 1 Year )  
 IV Index Call | IV Index Put | IV Index Call & Put | IV Index Mean



**IV index chart**  
 compares  
 historical volatility  
 with implied  
 volatility over the  
 last year

*IV Index chart can be found in the option research section on Fidelity.com*

- Helps to compare current volatility data with historical data to identify high or low levels
- Allows traders to identify divergence and convergence between HV and IV
- Quick way to find when volatility measures are at extremes and may likely revert to their mean values

# Vega

Vega measures direct impact on option prices due to changes in Implied Volatility (IV)

It represents the amount an option contract's premium will change due to a 1% move in IV

166.7883 ↓ 3.5883 (2.20%)		V 47,548,3	
Calls		10 Strikes	
Mar 04 (W)		Mar 11 (W)	
▼	Strike	Bid	Ask
▼ Jan 20 '23 (324 days) CALLS			
	160	23.25	23.45
	165	20.45	20.65
	170	17.95	18.15
	175	15.65	15.80
			Vega
			0.5957
			0.6123
			0.6226
			0.6262

**Vega = 0.6226**

Theoretically, the option will make \$62.26/contract with each 1% move up in IV and lose \$62.26 with each 1% move down in IV.

## Example:

*You are predicting an 8% drop in IV after an earnings announcement.*

*- 8 x .6226 x 100 = - \$498.08 / contract*

*You are expecting the contract price to go **from 18.15 to 13.17** (18.15 - [.6226 x 8] rounded) resulting in a change of \$498.08 from the 8% IV drop, assuming all else remains constant.*



# Key Takeaways

Volatility measures the amount a stock fluctuates. It is considered a measure of risk, uncertainty and fear.

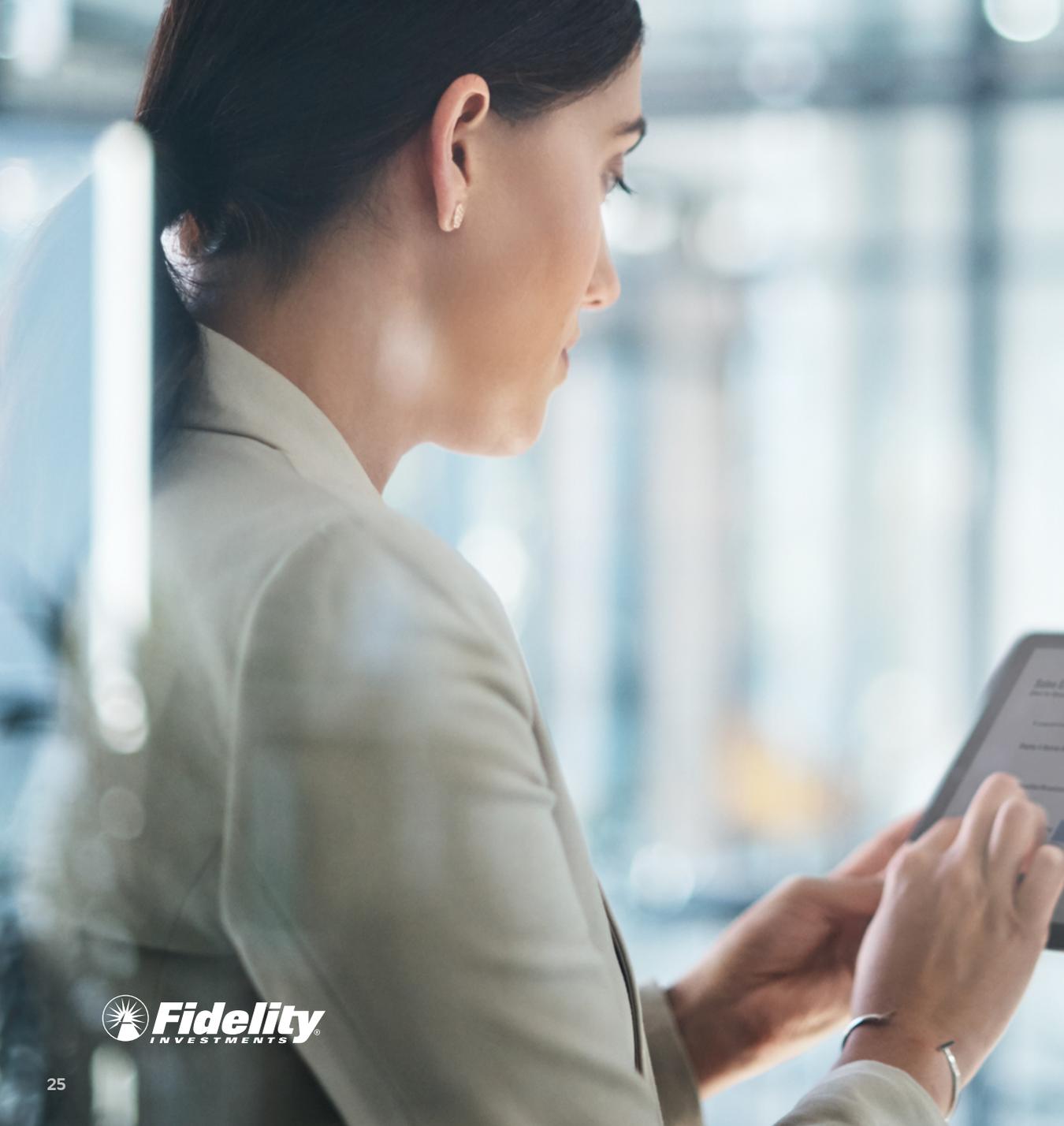
Option traders consider 2 types of volatility: Historical volatility (HV) and Implied volatility (IV). HV looks at **past** price movement. IV is the option market's expectation of **future** movement.

IV is expressed as an annualized percentage of the stock price and represents a one standard deviation move. It can be used to calculate future expected move on an annual basis, or for a more specific time period.

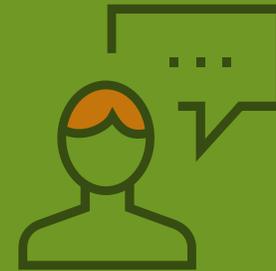
IV is a product of supply and demand for specific option contracts. It can be used as a gauge to determine whether options are relatively cheap or expensive.

Fidelity provides the IV percentile, IV index and more for option traders to use to analyze past and present volatility and to formulate an outlook on volatility.

Vega measures how much a 1% move up or down in IV will affect option prices.



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