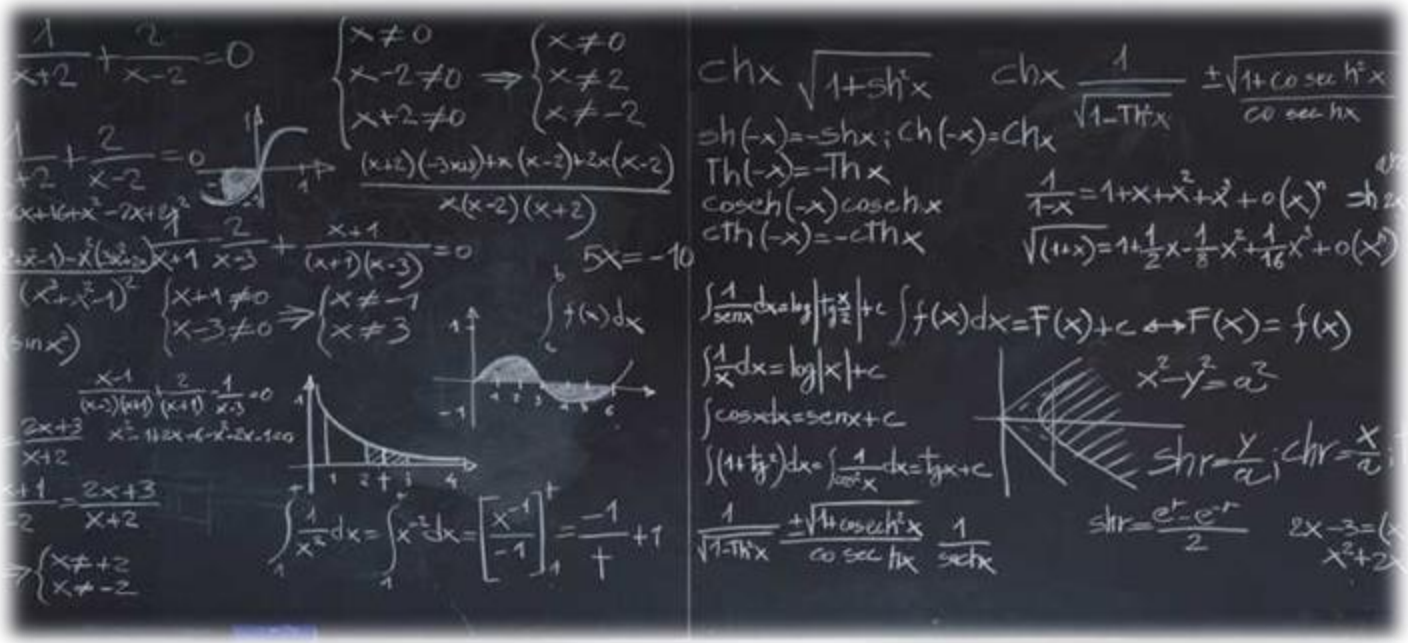


Equity Markets (Options)

STG SS25 Week 3

Agenda

- Announcements
- Market Update
- Open Discussion
- Options
- Q&A

Announcements - Trading Competition

- Update!
- This will be a chance to showcase your skills and compete against your peers to see who can generate the most profit during the semester
- Starts 01/30, ends 04/17
- **This will not require any capital on your end!**

Announcements – Eboard Positions

- 2 positions available
- Great experience and resume builder
- An intro position will help earn higher leadership in upcoming semesters
- If interested, talk to one of us and send us your resume
- From there we will plan interviews

Market Update

- S&P 500 6,118.71 +0.53%
- NASDAQ 20,053.68 +0.22%
- DOW Jones 44,565.07 +0.92%
- Crude Oil 74.62 -1.09%
- Gold 2,765.00 -0.21%
- 10-Year Yield 4.64%

Open Discussion

- Recent Trades?
- News?
- Predictions?
- Economic Data?
- Earnings?
- Etc.

Options

An option is a contract that gives the owner the **right**, but not the **obligation**, to buy or sell a security at an agreed upon price before, or on, an agreed upon future date.

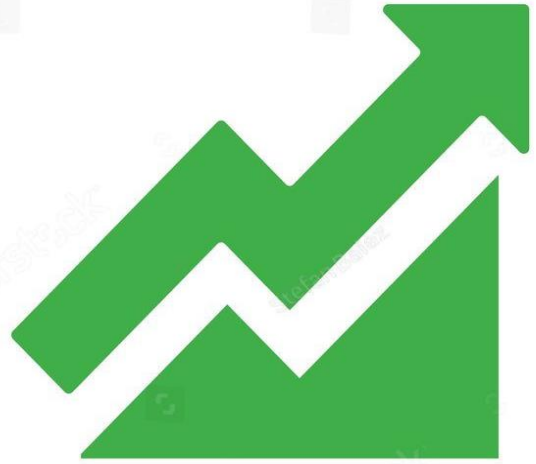
Each option contract represents **100 shares** of the underlying security. This makes options highly leveraged which increases both potential gains and potential losses.

Options

Calls & Puts

Call:

An option that provides the buyer with the right, but not the obligation, to **buy** assets at an agreed upon price on or before a particular date



Put:

An option that provides the buyer with the right, but not the obligation, to **sell** assets at an agreed upon price on or before a particular date

Options Terminology

Expiration Date: Date in which the option contract expires

Days to Expiration (DTE): Number of days left before option expires

Premium: Cost to buy an option contract

Will be shown as a **per share** cost

i.e., a premium of $1.00 will cost $100 for a single option contract

Implied Volatility (IV): percentage that measures the market's expectations for how much a stock's price will fluctuate in the future

i.e., an IV of 10% means the market predicts an Annualized SD of +/- 10%

Options Terminology

Strike Price: Predetermined price in which the security may be bought (call) or sold (put)

Exercised: Action is taken on the trade, if profitable for the buyer

Call- If strike price is lower than market price, shares will be bought at strike price

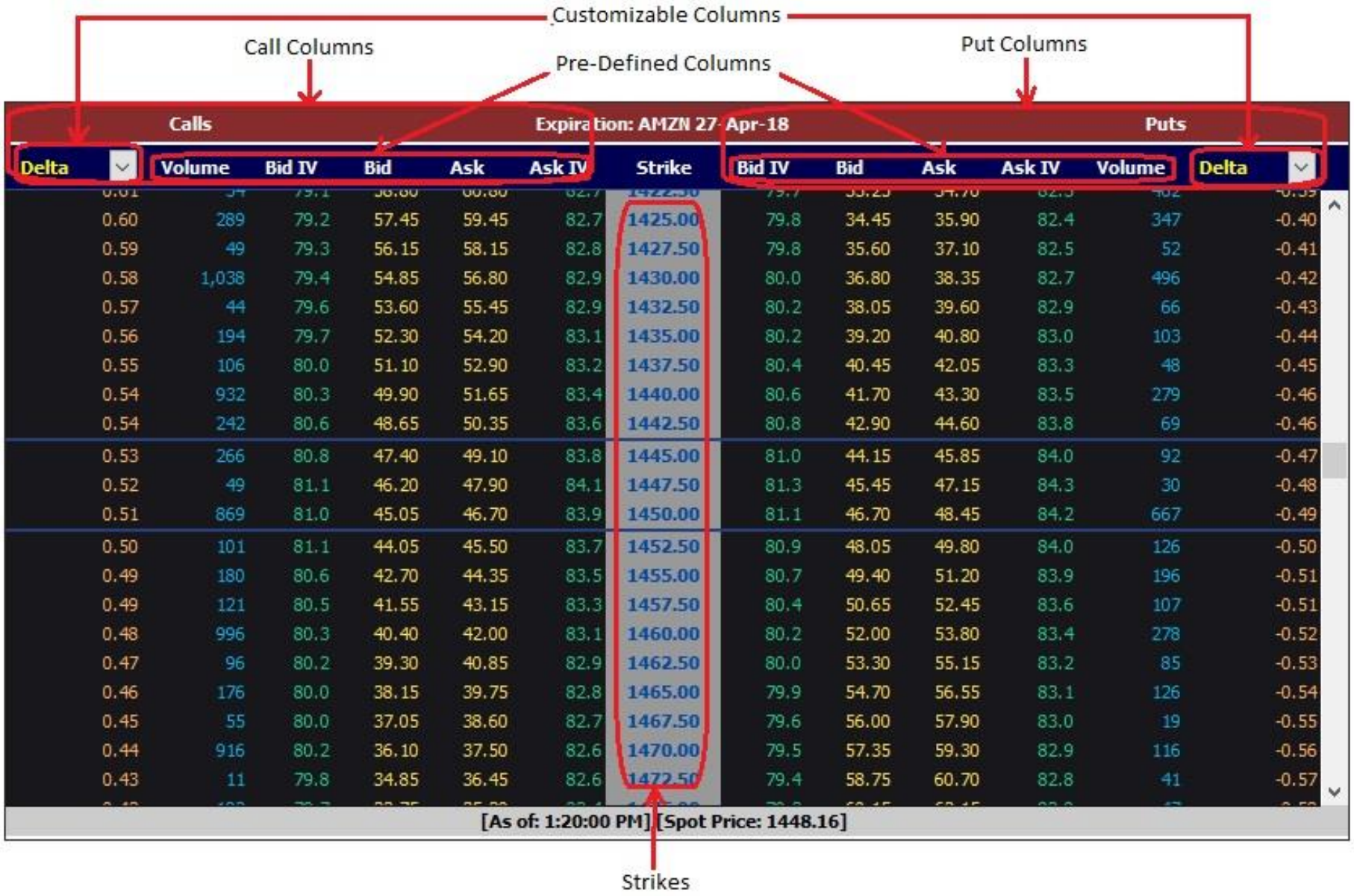
i.e., K = \$100, S_t = \$105 ∴ Shares are bought at \$100 (\$5 less than S_t)

Put- If strike price is higher than market price, shares will be sold at strike price

i.e., K = \$100, S_t = \$95 ∴ Shares are sold at \$100 (\$5 more than S_t)

In the Money (ITM): Option **can** currently be exercised

Out the Money (OTM): Option **cannot** currently be exercised



Delta	Volume	Bid IV	Bid	Ask	Ask IV	Strike	Bid IV	Bid	Ask	Ask IV	Volume	Delta
0.60	289	79.2	57.45	59.45	82.7	1425.00	79.8	34.45	35.90	82.4	347	-0.40
0.59	49	79.3	56.15	58.15	82.8	1427.50	79.8	35.60	37.10	82.5	52	-0.41
0.58	1,038	79.4	54.85	56.80	82.9	1430.00	80.0	36.80	38.35	82.7	496	-0.42
0.57	44	79.6	53.60	55.45	82.9	1432.50	80.2	38.05	39.60	82.9	66	-0.43
0.56	194	79.7	52.30	54.20	83.1	1435.00	80.2	39.20	40.80	83.0	103	-0.44
0.55	106	80.0	51.10	52.90	83.2	1437.50	80.4	40.45	42.05	83.3	48	-0.45
0.54	932	80.3	49.90	51.65	83.4	1440.00	80.6	41.70	43.30	83.5	279	-0.46
0.54	242	80.6	48.65	50.35	83.6	1442.50	80.8	42.90	44.60	83.8	69	-0.46
0.53	266	80.8	47.40	49.10	83.8	1445.00	81.0	44.15	45.85	84.0	92	-0.47
0.52	49	81.1	46.20	47.90	84.1	1447.50	81.3	45.45	47.15	84.3	30	-0.48
0.51	869	81.0	45.05	46.70	83.9	1450.00	81.1	46.70	48.45	84.2	667	-0.49
0.50	101	81.1	44.05	45.50	83.7	1452.50	80.9	48.05	49.80	84.0	126	-0.50
0.49	180	80.6	42.70	44.35	83.5	1455.00	80.7	49.40	51.20	83.9	196	-0.51
0.49	121	80.5	41.55	43.15	83.3	1457.50	80.4	50.65	52.45	83.6	107	-0.51
0.48	996	80.3	40.40	42.00	83.1	1460.00	80.2	52.00	53.80	83.4	278	-0.52
0.47	96	80.2	39.30	40.85	82.9	1462.50	80.0	53.30	55.15	83.2	85	-0.53
0.46	176	80.0	38.15	39.75	82.8	1465.00	79.9	54.70	56.55	83.1	126	-0.54
0.45	55	80.0	37.05	38.60	82.7	1467.50	79.6	56.00	57.90	83.0	19	-0.55
0.44	916	80.2	36.10	37.50	82.6	1470.00	79.5	57.35	59.30	82.9	116	-0.56
0.43	11	79.8	34.85	36.45	82.6	1472.50	79.4	58.75	60.70	82.8	41	-0.57

[As of: 1:20:00 PM] [Spot Price: 1448.16]

Options Chain

- A table displaying available option contracts for a specific stock, including calls and puts, strike prices, expiration dates, and key data points like volume and open interest.

Things To Look For

- Liquidity Check – High volume & open interest indicate good liquidity.
- Strike Selection – Choosing strikes based on risk-reward.
- IV Analysis – High IV suggests larger expected moves.
- Bid-Ask Spread – Tight spreads indicate better execution.

Why Options Are Used

Leverage & Capital Efficiency

- Options allow control of 100 shares per contract with less capital.
- Example: Buying a SPY call costs ~$5 per contract ($500 total), versus ~$50,000 for 100 SPY shares.

Higher Potential Returns

- Options can generate higher percentage gains than shares.
- A 1% stock move can result in a 10-50%+ move in an option due to delta & gamma.

Defined Risk

- Maximum loss is limited to the premium paid.
- Unlike margin trading stocks, there's no risk of margin calls.

Flexibility with Strategies

- Options allow strategies like spreads, straddles, and iron condors to profit in different market conditions.
- Can profit from up, down, or sideways moves.

Hedging & Shorting Made Easier

- Puts allow short exposure without needing margin accounts.
- Can hedge positions quickly with less capital.

Options Example

A trader buys **10**, 7DTE calls on SPY with a strike price of **$610**, for a premium of **$2.00** per share.

If SPY closes at **$630** at expiration, what is the traders profit?

Total Revenue = (630-610) * 100 * 10 = $20,000

Total Cost = 10(2.00 * 100) = $2,000

Profit = Revenue - Cost

Profit = $20,000 - $2,000 = $18,000

The trader will profit $18,000.

Option Mathematics

Option Notation

$S_0 = Current\ Stock\ Price$

$D = Dividends\ paid$

$S_t = Stock\ price\ at\ maturity$

$r = Risk\ free\ rate\ for\ T$

$K = Strike\ Price$

$\sigma = Volatility\ of\ stock\ price$

$T = Time\ to\ Expiration$

Option Greeks

★ *Delta Δ*

- Change in an option's price resulting from a change in the underlying
- Higher delta ⇒ Higher risk

★ *Theta Θ*

- Measures the rate of time decay in an options value
- How much the value of an option will decrease each day due to the depreciating nature of options

Gamma Γ

- Rate of change in delta over time.
- Does not change with the movement of the underlying asset

Vega ν

- Risk of changes in implied volatility or the forward-looking expected volatility of the underlying
- How much an option price will increase or decrease given an increase or decrease in the level of implied volatility

Option Greeks

Let V refer to the value of a put or call option,

Delta

$$\Delta = \frac{\partial V}{\partial S}$$

Gamma

$$\Gamma = \frac{\partial^2 V}{\partial S^2}$$

Rho

$$\rho = \frac{\partial V}{\partial r}$$

Theta

$$\Theta = \frac{\partial V}{\partial t}$$

Vega

$$\upsilon = \frac{\partial V}{\partial \sigma}$$

Option Valuation – Black Scholes Model

$$C = N(d_1)S_t - N(d_2)Ke^{-rt}$$

$$\text{where } d_1 = \frac{\ln \frac{S_t}{K} + (r + \frac{\sigma^2}{2})t}{\sigma\sqrt{t}}$$

$$\text{and } d_2 = d_1 - \sigma\sqrt{t}$$

S: Current stock price

N: Cumulative distribution function

K: Exercise or strike price

r: Risk-free interest rate (annualized)

t: Time to maturity (T-t)

σ: Annualized SD of log return (Volatility)

Black Scholes Example

Imagine a Call where, S =100, K = 105, r = 0.05, t = 1 month, σ = 1

$$d_1 = \frac{\ln\left(\frac{100}{105}\right) + \left(0.05 + \frac{1^2}{2}\right)\left(\frac{1}{12}\right)}{1\sqrt{\frac{1}{12}}}$$

$$d_2 = -0.01024 - \sqrt{\frac{1}{12}}$$

$$d_1 = -0.01024$$

$$d_2 = -0.29892$$

Black Scholes Example

Imagine a Call where, S =100, K = 105, r = 0.05, t = 1 month, σ = 1

$$C = N(-0.01024) * 100 \; - N(-0.29892) * 105e^{-.05\left(\frac{1}{12}\right)}$$

$$N(-0.01024) = normcdf(-1e^{99}, -0.01024, 0, 1) = 0.4959$$

$$N(-0.29892) = normcdf(-1e^{99}, -0.29892, 0, 1) = 0.3825$$

$$C = 0.4959(100) - \; 0.3825(104.5634)$$

$$Option\ Value = 49.59 - 39.99 = \$\mathbf{9.6}$$

Q&A