



# Options Premiums, Options Chain, and Options Greeks

*Lesson 4*  
*presented by Arsh*

# Understanding Option Premiums

Options are insurance contracts whose premiums are determined by various factors, such as stock price, strike price, time until contract expiration, and volatility

# Stock Price

Options premiums are largely influenced by the current stock price, which has a direct, but not equal, impact on the option premium

# Stock Price

The influence changes in the stock price has on the option is measured by the option greek “delta”

# **Strike Price**

Also referred to as intrinsic value, this is the value by which the strike price of the option can be considered in-the-money

# Strike Price

Example: If stock \$XYZ is currently trading for \$50, then the \$45 call option has \$5 of intrinsic value

# Strike Price

Example: If stock \$XYZ is currently trading for \$50, then the \$55 call option has \$0 of intrinsic value

# Strike Price

Call Option Intrinsic Value = Current Stock Price - Call Strike Price



# Strike Price

Put Option Intrinsic Value = Current Stock Price - Put Strike Price

# Time Until Expiration

Also referred to as extrinsic or time value, it is additional premium charged by options sellers and is dependent on how much time there is until the contract expires

## Time Until Expiration

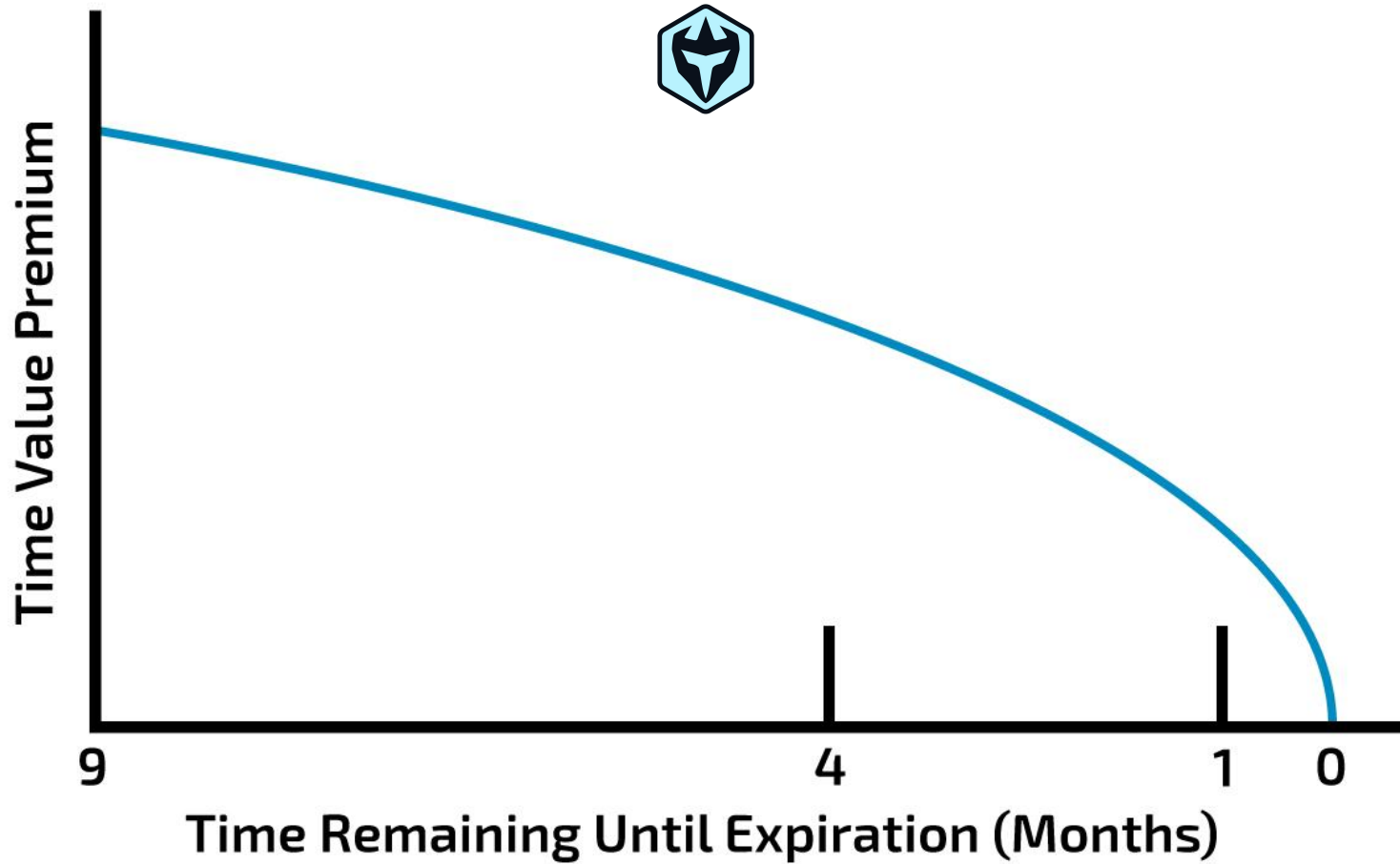
Example: \$TSLA is currently trading for \$310, while the closest expiration \$300 call is trading for \$16. There is \$10 of intrinsic value, with \$6 of extrinsic value

# Time Until Expiration

The more time there is until the expiration of an options contract, the more time value there will be

# Time Until Expiration

Referred to as time decay, it is how much value an option contract loses as it approaches expiration. Time value decreases over time and approaches 0 by expiration



# **Time Until Expiration**

Time decay is to the benefit of the option seller, while it is disadvantageous to the option buyer

# Time Until Expiration

The influence time value has on option premiums is measured by the option greek “theta”



# Volatility

Volatility is a measure of the risk or uncertainty within asset prices, which has a major impact on options prices

# Volatility

The two types of volatility are historical volatility and implied volatility

# Historical Volatility

A measure of changes in asset prices over a given period of time

# Implied Volatility

A prediction made by the options market regarding the future volatility of an asset

# Implied Volatility

Ex: A stock that is trading at \$200 with an implied volatility of 25% means that the stock market expects there to be a 68% chance that the stock will be trading between \$150 to \$250 within 1 year

# Implied Volatility

Ex: A stock that is trading at \$100 with an implied volatility of 50% means that the stock market expects there to be a 68% chance that the stock will be trading between \$50 to \$150 within 1 year

# Implied Volatility

An increase in demand for an option or a rise in expectations will lead to an increase in implied volatility, which translates to a more expensive option premium

# Implied Volatility

An decrease in demand for an option or a decrease in expectations will lead to a decrease in implied volatility, which translates to a less expensive option premium





# Implied Volatility

The influence changes in implied volatility has on option premiums is measured by the option greek “vega”

# **What is an Options Chain?**

Matrix within your brokerage software that shows all of the calls, puts, strikes, and pricing data for a specific expiration

CALLS									PUTS							
Pos	Imp Volat...	Theta	Vega	Gamma	Delta	Bid	Ask	Strike	Bid	Ask	Delta	Gamma	Vega	Theta	Imp Volat...	Pos
	177.18 %	-0.66	0.01	0.003	0.98	34.85	35.55	185	0.00	0.01	0.00	0.000	0.00	-0.06	120.31 %	
	165.35 %	-0.64	0.01	0.003	0.98	30.90	34.50	187.5	0.00	0.01	0.00	0.000	0.00	-0.06	111.73 %	
	161.56 %	-0.77	0.01	0.004	0.97	29.95	30.55	190	0.00	0.01	0.00	0.000	0.00	-0.05	103.22 %	
	193.03 %	-1.73	0.01	0.007	0.93	26.75	29.70	192.5	0.00	0.01	0.00	0.001	0.00	-0.05	94.77 %	
	126.09 %	-0.52	0.01	0.004	0.98	24.90	25.45	195	0.01	0.02	0.00	0.001	0.00	-0.12	96.40 %	
	118.55 %	-0.58	0.01	0.005	0.97	22.35	23.05	197.5	0.01	0.03	-0.01	0.002	0.00	-0.14	90.14 %	
	103.35 %	-0.49	0.01	0.006	0.97	19.85	20.50	200	0.01	0.03	-0.01	0.002	0.00	-0.14	80.76 %	
	100.84 %	-0.65	0.01	0.008	0.96	15.80	19.70	202.5	0.01	0.03	-0.01	0.003	0.00	-0.13	71.40 %	
	93.04 %	-0.73	0.01	0.011	0.94	15.00	15.60	205	0.02	0.04	-0.01	0.005	0.00	-0.17	65.38 %	
	80.25 %	-0.68	0.01	0.014	0.94	12.50	13.10	207.5	0.04	0.05	-0.02	0.007	0.01	-0.21	58.95 %	
	65.54 %	-0.59	0.01	0.019	0.93	10.00	10.55	210	0.06	0.07	-0.03	0.012	0.01	-0.26	51.63 %	
	55.36 %	-0.61	0.02	0.028	0.91	7.50	8.15	212.5	0.10	0.11	-0.05	0.022	0.01	-0.33	44.58 %	
	41.24 %	-0.53	0.02	0.046	0.88	5.15	5.50	215	0.17	0.21	-0.10	0.044	0.02	-0.42	37.55 %	
	33.42 %	-0.62	0.03	0.086	0.77	2.95	3.15	217.5	0.40	0.46	-0.22	0.088	0.03	-0.56	31.58 %	
	28.96 %	-0.67	0.04	0.129	0.51	1.20	1.33	220	1.07	1.22	-0.49	0.135	0.04	-0.63	27.57 %	
	28.80 %	-0.51	0.03	0.096	0.22	0.36	0.40	222.5	2.64	2.85	-0.80	0.098	0.03	-0.43	26.37 %	
	31.40 %	-0.29	0.01	0.042	0.07	0.10	0.12	225	4.75	5.15	-1.00	0.000	0.00	0.01	Parity	
	34.79 %	-0.15	0.01	0.016	0.03	0.03	0.04	227.5	7.00	7.55	-1.00	0.000	0.00	0.00	NE	
	39.28 %	-0.09	0.00	0.007	0.01	0.01	0.02	230	9.55	10.00	-1.00	0.000	0.00	0.00	NE	
	47.54 %	-0.10	0.00	0.005	0.01	0.01	0.02	232.5	12.05	12.65	-1.00	0.000	0.00	0.00	NE	
	49.30 %	-0.05	0.00	0.002	0.00	0.00	0.01	235	14.45	15.05	-1.00	0.000	0.00	0.00	NE	
	56.38 %	-0.05	0.00	0.001	0.00	0.00	0.01	237.5	16.95	17.60	-1.00	0.000	0.00	0.00	NE	
	63.30 %	-0.05	0.00	0.001	0.00	0.00	0.01	240	19.45	20.15	-1.00	0.000	0.00	0.00	NE	
	70.08 %	-0.05	0.00	0.001	0.00	0.00	0.01	242.5	21.95	24.25	-0.90	0.011	0.02	-1.66	149.48 %	
	76.73 %	-0.05	0.00	0.001	0.00	0.00	0.01	245	24.50	25.25	-1.00	0.000	0.00	0.00	NE	
	83.25 %	-0.05	0.00	0.001	0.00	0.00	0.01	247.5	25.90	29.25	-0.96	0.006	0.01	-0.90	138.94 %	

# Understanding Options Greeks

Options greeks measure the sensitivity of an options premium to changes in those variables

# What Are The Most Important Options Greeks?

Delta

Gamma

Vega

Theta

# Delta

Delta measures the change in options price for a \$1 move in the underlying stock

CALLS									PUTS							
Pos	Imp Volat...	Theta	Vega	Gamma	Delta	Bid	Ask	Strike	Bid	Ask	Delta	Gamma	Vega	Theta	Imp Volat...	Pos
	177.18 %	-0.66	0.01	0.003	0.98	34.85	35.55	185	0.00	0.01	0.00	0.000	0.00	-0.06	120.31 %	
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	65.54 %	-0.59	0.01	0.019	0.93	10.00	10.55	210	0.06	0.07	-0.03	0.012	0.01	-0.26	51.63 %	
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	41.24 %	-0.53	0.02	0.046	0.88	5.15	5.50	215	0.17	0.21	-0.10	0.044	0.02	-0.42	37.55 %	
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	28.80 %	-0.51	0.03	0.096	0.22	0.36	0.40	222.5	2.64	2.85	-0.80	0.098	0.03	-0.43	26.37 %	
	31.40 %	-0.29	0.01	0.042	0.07	0.10	0.12	225	4.75	5.15	-1.00	0.000	0.00	0.01	Parity	
	34.79 %	-0.15	0.01	0.016	0.03	0.03	0.04	227.5	7.00	7.55	-1.00	0.000	0.00	0.00	NE	
	39.28 %	-0.09	0.00	0.007	0.01	0.01	0.02	230	9.55	10.00	-1.00	0.000	0.00	0.00	NE	
	47.54 %	-0.10	0.00	0.005	0.01	0.01	0.02	232.5	12.05	12.65	-1.00	0.000	0.00	0.00	NE	
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	56.38 %	-0.05	0.00	0.001	0.00	0.00	0.01	237.5	16.95	17.60	-1.00	0.000	0.00	0.00	NE	
	63.30 %	-0.05	0.00	0.001	0.00	0.00	0.01	240	19.45	20.15	-1.00	0.000	0.00	0.00	NE	
	70.08 %	-0.05	0.00	0.001	0.00	0.00	0.01	242.5	21.95	24.25	-0.90	0.011	0.02	-1.66	149.48 %	
	76.73 %	-0.05	0.00	0.001	0.00	0.00	0.01	245	24.50	25.25	-1.00	0.000	0.00	0.00	NE	
	83.25 %	-0.05	0.00	0.001	0.00	0.00	0.01	247.5	25.90	29.25	-0.96	0.006	0.01	-0.90	138.94 %	



# Delta

Delta approaches 1 the further an option becomes in the money, and approaches 0 the further a option becomes out of the money

# Delta

An \$50 call option for a stock currently at \$50 will have a 0.5 delta

# Delta

If all else remains unchanged, an option with a 0.25 delta will move \$0.25 for every \$1 move in the stock price

# Delta

If all else remains unchanged, an option with a 0.75 delta will move \$0.75 for every \$1 move in the stock price

# Gamma

Gamma measures how much the delta will change for every \$1 move in the stock price

Symbol	Description	Last	Net Chg	Bid	Ask	High	Low	Volume	Hist Vola...	Positi...	Beta Weighting	Account	?	⚙		
AAPL	Apple Inc	220.05	1.68	220.05	220.14	222.28	219.15	26,599,183	18.56 %		<input type="checkbox"/> SPY	All Accounts				
Spread Single Filter Exp:2 Strikes ALL Click to: Trade																
CALLS									PUTS							
Pos	Imp Volat...	Theta	Vega	Gamma	Delta	Bid	Ask	Strike	Bid	Ask	Delta	Gamma	Vega	Theta	Imp Volat...	Pos
	177.18 %	-0.66	0.01	0.003	0.98	34.85	35.55	185	0.00	0.01	0.00	0.000	0.00	-0.06	120.31 %	
	165.35 %	-0.64	0.01	0.003	0.98	30.90	34.50	187.5	0.00	0.01	0.00	0.000	0.00	-0.06	111.73 %	
	161.56 %	-0.77	0.01	0.004	0.97	29.95	30.55	190	0.00	0.01	0.00	0.000	0.00	-0.05	103.22 %	
	193.03 %	-1.73	0.01	0.007	0.93	26.75	29.70	192.5	0.00	0.01	0.00	0.001	0.00	-0.05	94.77 %	
	126.09 %	-0.52	0.01	0.004	0.98	24.90	25.45	195	0.01	0.02	0.00	0.001	0.00	-0.12	96.40 %	
	118.55 %	-0.58	0.01	0.005	0.97	22.35	23.05	197.5	0.01	0.03	-0.01	0.002	0.00	-0.14	90.14 %	
	103.35 %	-0.49	0.01	0.006	0.97	19.85	20.50	200	0.01	0.03	-0.01	0.002	0.00	-0.14	80.76 %	
	100.84 %	-0.65	0.01	0.008	0.96	15.80	19.70	202.5	0.01	0.03	-0.01	0.003	0.00	-0.13	71.40 %	
	93.04 %	-0.73	0.01	0.011	0.94	15.00	15.60	205	0.02	0.04	-0.01	0.005	0.00	-0.17	65.38 %	
	80.25 %	-0.68	0.01	0.014	0.94	12.50	13.10	207.5	0.04	0.05	-0.02	0.007	0.01	-0.21	58.95 %	
	65.54 %	-0.59	0.01	0.019	0.93	10.00	10.55	210	0.06	0.07	-0.03	0.012	0.01	-0.26	51.63 %	
	55.36 %	-0.61	0.02	0.028	0.91	7.50	8.15	212.5	0.10	0.11	-0.05	0.022	0.01	-0.33	44.58 %	
	41.24 %	-0.53	0.02	0.046	0.88	5.15	5.50	215	0.17	0.21	-0.10	0.044	0.02	-0.42	37.55 %	
	33.42 %	-0.62	0.03	0.086	0.77	2.95	3.15	217.5	0.40	0.46	-0.22	0.088	0.03	-0.56	31.58 %	
	28.96 %	-0.67	0.04	0.129	0.51	1.20	1.33	220	1.07	1.22	-0.49	0.135	0.04	-0.63	27.57 %	
	28.80 %	-0.51	0.03	0.096	0.22	0.36	0.40	222.5	2.64	2.85	-0.80	0.098	0.03	-0.43	26.37 %	
	31.40 %	-0.29	0.01	0.042	0.07	0.10	0.12	225	4.75	5.15	-1.00	0.000	0.00	0.01	Parity	
	34.79 %	-0.15	0.01	0.016	0.03	0.03	0.04	227.5	7.00	7.55	-1.00	0.000	0.00	0.00	NE	
	39.28 %	-0.09	0.00	0.007	0.01	0.01	0.02	230	9.55	10.00	-1.00	0.000	0.00	0.00	NE	
	47.54 %	-0.10	0.00	0.005	0.01	0.01	0.02	232.5	12.05	12.65	-1.00	0.000	0.00	0.00	NE	
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	70.08 %	-0.05	0.00	0.001	0.00	0.00	0.01	242.5	21.95	24.25	-0.90	0.011	0.02	-1.66	149.48 %	
	76.73 %	-0.05	0.00	0.001	0.00	0.00	0.01	245	24.50	25.25	-1.00	0.000	0.00	0.00	NE	
	83.25 %	-0.05	0.00	0.001	0.00	0.00	0.01	247.5	25.90	29.25	-0.96	0.006	0.01	-0.90	138.94 %	
Options Analysis Manage Search																
Trade																

# Gamma

If all else remains unchanged, an option with a 0.13 gamma will change the delta of the option by 0.13 for every \$1 move in the underlying stock

# Gamma

If all else remains unchanged, an option with a 0.25 gamma will change the delta of the option by 0.25 for every \$1 move in the underlying stock



# Vega

Vega measures the change in option price for a 1% change in the implied volatility of the option

	Symbol	Description	Last	Net Chg	Bid	Ask	High	Low	Volume	Hist Vola...	Positi...	Beta Weighting	Account	?	⚙			
	AAPL	Apple Inc	220.05	1.68	220.05	220.14	222.28	219.15	26,599,183	18.56 %		SPY	All Accounts					
Spread	Single	Filter	Exp:2	Strikes	ALL											Click to:	Trade	⚡
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Pos	Imp Volat...	Theta	Vega	Gamma	Delta	Bid	Ask	Strike	Bid	Ask	Delta	Gamma	Vega	Theta	Imp Volat...	Pos		
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	39.28 %	-0.09	0.00	0.007	0.01	0.01	0.02	230	9.55	10.00	-1.00	0.000	0.00	0.00	NE			
	47.54 %	-0.10	0.00	0.005	0.01	0.01	0.02	232.5	12.05	12.65	-1.00	0.000	0.00	0.00	NE			
	49.30 %	-0.05	0.00	0.002	0.00	0.00	0.01	235	14.45	15.05	-1.00	0.000	0.00	0.00	NE			
	56.38 %	-0.05	0.00	0.001	0.00	0.00	0.01	237.5	16.95	17.60	-1.00	0.000	0.00	0.00	NE			
	63.30 %	-0.05	0.00	0.001	0.00	0.00	0.01	240	19.45	20.15	-1.00	0.000	0.00	0.00	NE			
	70.08 %	-0.05	0.00	0.001	0.00	0.00	0.01	242.5	21.95	24.25	-0.90	0.011	0.02	-1.66	149.48 %			
	76.73 %	-0.05	0.00	0.001	0.00	0.00	0.01	245	24.50	25.25	-1.00	0.000	0.00	0.00	NE			
	83.25 %	-0.05	0.00	0.001	0.00	0.00	0.01	247.5	25.90	29.25	-0.96	0.006	0.01	-0.90	138.94 %			
Options	Analysis	Manage	Search															
Trade																		

# Vega

If all else remains unchanged, an option with a vega of 0.25 should gain \$0.25 for a 1% gain in the implied volatility

# Vega

If all else remains unchanged, an option with a vega of 0.50 should gain \$0.50 for a 1% gain in the implied volatility

# Theta

Theta measures the time decay of an option, or how much value the option loses every day

CALLS								PUTS								
Pos	Imp Volatility	Theta	Vega	Gamma	Delta	Bid	Ask	Strike	Bid	Ask	Delta	Gamma	Vega	Theta	Imp Volatility	Pos
05 Oct 18	(1d) Weekly														103.19%	(±1.26)
12 Oct 18	(8d) Weekly														70.26%	(±2.31)
19 Oct 18	(15d)														118.17%	(±5.36)
26 Oct 18	(22d) Weekly														80.77%	(±4.42)
	60.51 %	0.00	0.00	0.008	0.99	6.50	8.75	20	0.13	0.24	-0.06	0.020	0.01	-0.02	92.18 %	
	102.53 %	-0.03	0.01	0.031	0.87	6.10	7.15	21.5	0.19	0.39	-0.10	0.030	0.01	-0.02	85.30 %	
	92.50 %	-0.03	0.01	0.034	0.87	5.45	6.70	22	0.26	0.42	-0.11	0.034	0.01	-0.02	83.37 %	
	98.44 %	-0.04	0.02	0.037	0.83	5.30	6.25	22.5	0.31	0.54	-0.14	0.038	0.01	-0.03	83.34 %	
	95.72 %	-0.04	0.02	0.041	0.81	4.90	5.80	23	0.40	0.60	-0.16	0.043	0.02	-0.03	81.83 %	
	96.45 %	-0.04	0.02	0.044	0.79	4.60	5.40	23.5	0.51	0.77	-0.19	0.047	0.02	-0.03	83.34 %	
	92.78 %	-0.04	0.02	0.049	0.77	4.20	4.95	24	0.65	0.75	-0.21	0.053	0.02	-0.03	79.70 %	
	93.33 %	-0.05	0.02	0.051	0.74	3.90	4.60	24.5	0.79	0.88	-0.24	0.058	0.02	-0.04	79.32 %	
	85.56 %	-0.05	0.02	0.058	0.72	3.60	3.90	25	0.94	1.08	-0.27	0.061	0.02	-0.04	79.96 %	
	88.14 %	-0.05	0.02	0.060	0.68	3.15	3.85	25.5	1.06	1.28	-0.31	0.065	0.02	-0.04	79.11 %	
	84.24 %	-0.05	0.03	0.065	0.65	2.97	3.25	26	1.25	1.47	-0.34	0.069	0.02	-0.04	78.79 %	
	83.95 %	-0.05	0.03	0.067	0.62	2.65	3.00	26.5	1.47	1.64	-0.38	0.072	0.03	-0.04	77.93 %	
	83.00 %	-0.05	0.03	0.069	0.58	2.43	2.65	27	1.78	1.86	-0.42	0.073	0.03	-0.05	79.04 %	
	83.09 %	-0.05	0.03	0.070	0.55	2.20	2.40	27.5	1.85	2.10	-0.45	0.078	0.03	-0.04	75.30 %	
	79.94 %	-0.05	0.03	0.073	0.51	1.96	2.03	28	2.17	2.35	-0.49	0.078	0.03	-0.05	75.73 %	
	80.77 %	-0.05	0.03	0.073	0.48	1.65	1.96	28.5	2.56	2.69	-0.53	0.075	0.03	-0.05	78.42 %	
	82.09 %	-0.05	0.03	0.071	0.44	1.57	1.73	29	2.70	3.05	-0.57	0.076	0.03	-0.04	76.20 %	
	80.57 %	-0.05	0.03	0.071	0.41	1.30	1.57	29.5	3.05	3.50	-0.60	0.072	0.03	-0.05	78.97 %	
	81.29 %	-0.05	0.03	0.069	0.38	1.25	1.34	30	3.40	3.70	-0.64	0.072	0.03	-0.04	76.36 %	
	81.47 %	-0.05	0.03	0.067	0.35	1.08	1.23	30.5	3.85	4.25	-0.65	0.066	0.03	-0.05	82.05 %	
	81.72 %	-0.05	0.02	0.064	0.32	0.97	1.09	31	4.10	4.55	-0.69	0.066	0.02	-0.04	78.20 %	
	80.79 %	-0.04	0.02	0.062	0.29	0.81	0.97	31.5	4.50	4.95	-0.72	0.063	0.02	-0.04	78.90 %	
	81.95 %	-0.04	0.02	0.059	0.26	0.76	0.86	32	4.80	5.35	-0.75	0.061	0.02	-0.04	76.81 %	
	80.57 %	-0.04	0.02	0.056	0.24	0.65	0.72	32.5	5.25	5.75	-0.78	0.057	0.02	-0.03	77.64 %	
	82.30 %	-0.04	0.02	0.053	0.22	0.58	0.69	33	5.55	6.15	-0.81	0.054	0.02	-0.03	74.04 %	
	81.62 %	-0.03	0.02	0.050	0.19	0.49	0.60	33.5	5.60	6.65	-0.87	0.048	0.01	-0.02	64.02 %	
	82.07 %	-0.03	0.02	0.047	0.18	0.43	0.54	34	5.60	7.15	-1.00	0.000	0.00	0.00	NE	
	81.81 %	-0.03	0.02	0.043	0.16	0.37	0.47	34.5	6.40	7.60	-0.92	0.036	0.01	-0.01	60.96 %	
	81.71 %	-0.03	0.02	0.040	0.14	0.32	0.41	35	6.50	8.00	-1.00	0.000	0.00	0.00	NE	
	82.92 %	-0.03	0.01	0.037	0.13	0.27	0.40	35.5	7.40	8.45	-0.95	0.026	0.01	-0.01	60.23 %	
	79.63 %	-0.02	0.01	0.034	0.10	0.21	0.29	36	7.80	8.95	-1.00	0.000	0.00	0.00	NE	
	82.82 %	-0.02	0.01	0.029	0.09	0.15	0.29	37	8.00	9.90	-1.00	0.000	0.00	0.00	NE	
	82.23 %	-0.02	0.01	0.024	0.07	0.10	0.22	38	9.70	10.90	-1.00	0.000	0.00	0.00	NE	
	81.66 %	-0.01	0.01	0.010	0.05	0.05	0.10	39	10.65	12.25	-0.99	0.001	0.01	0.00	82.86 %	

# Theta

If all else remains unchanged, an option with a theta of -0.15 will lose \$0.15 in value per day

# Theta

If all else remains unchanged, an option with a theta of -0.30 will lose \$0.30 in value per day



# Chapter 4 Recap

Understanding option premiums

What is an option chain?

Understanding option greeks

Option chain demonstration

# Chapter 4 Recap

Understanding option premiums

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## **Options Chain Demonstration**