

Options Homework for MFIN 820

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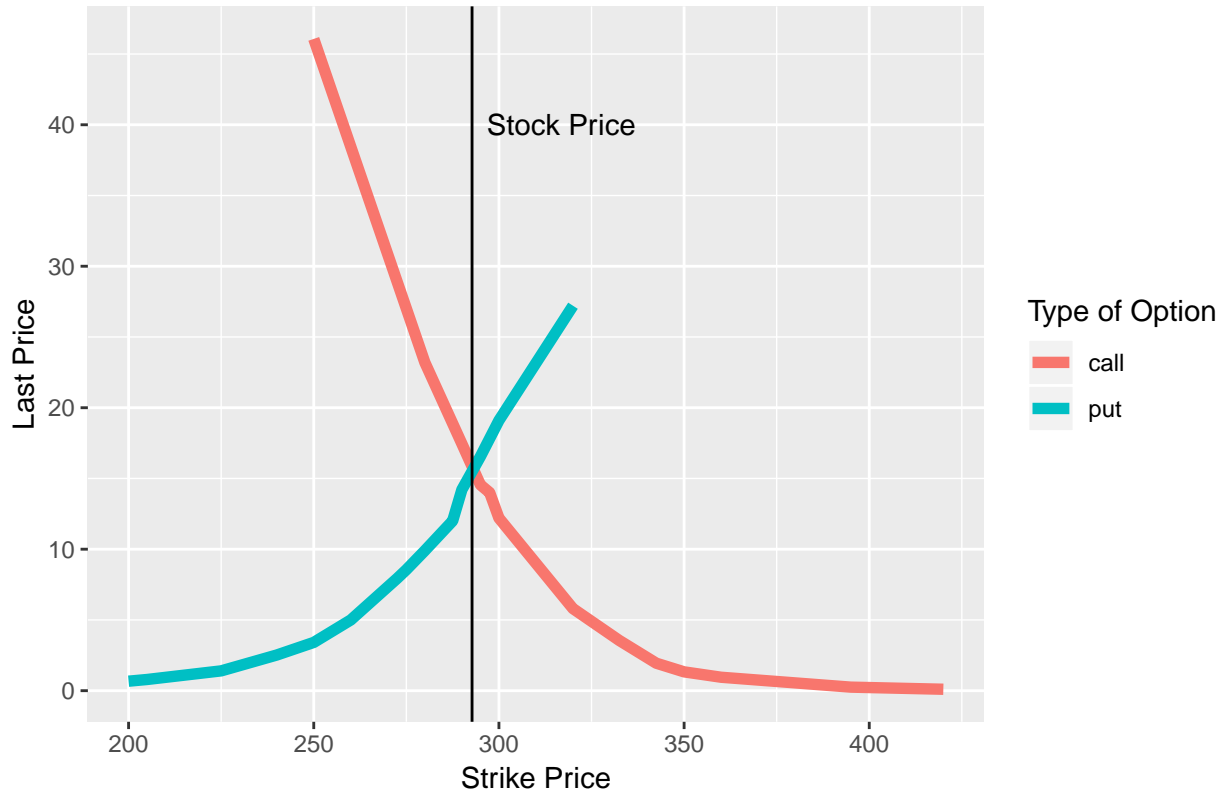
For my homework, I'm selecting Tesla, Inc. as my last name starts with T. As of this writing, Tesla's stock price is \$292.74. I have downloaded options prices from [Yahoo Finance](#) on 21/02/2019 15:08:00 EST. Raw data can be observed [here](#). The code written for generating this document can be seen [on Github](#).

Q1. Confirm that higher exercise prices mean lower call prices and higher put prices.

To confirm this, option prices have been filtered. Only options that have been traded in the last 3 hours and have a volume more than 20 are selected. Options used for this analysis have a maturity of 30 days. Data for this plot can be observed at the end of this report.

The point where last prices of put and call options meet is the strike price that is equal to the stock price. At that point option premium is all time value and it is the maximum amount time value can become.

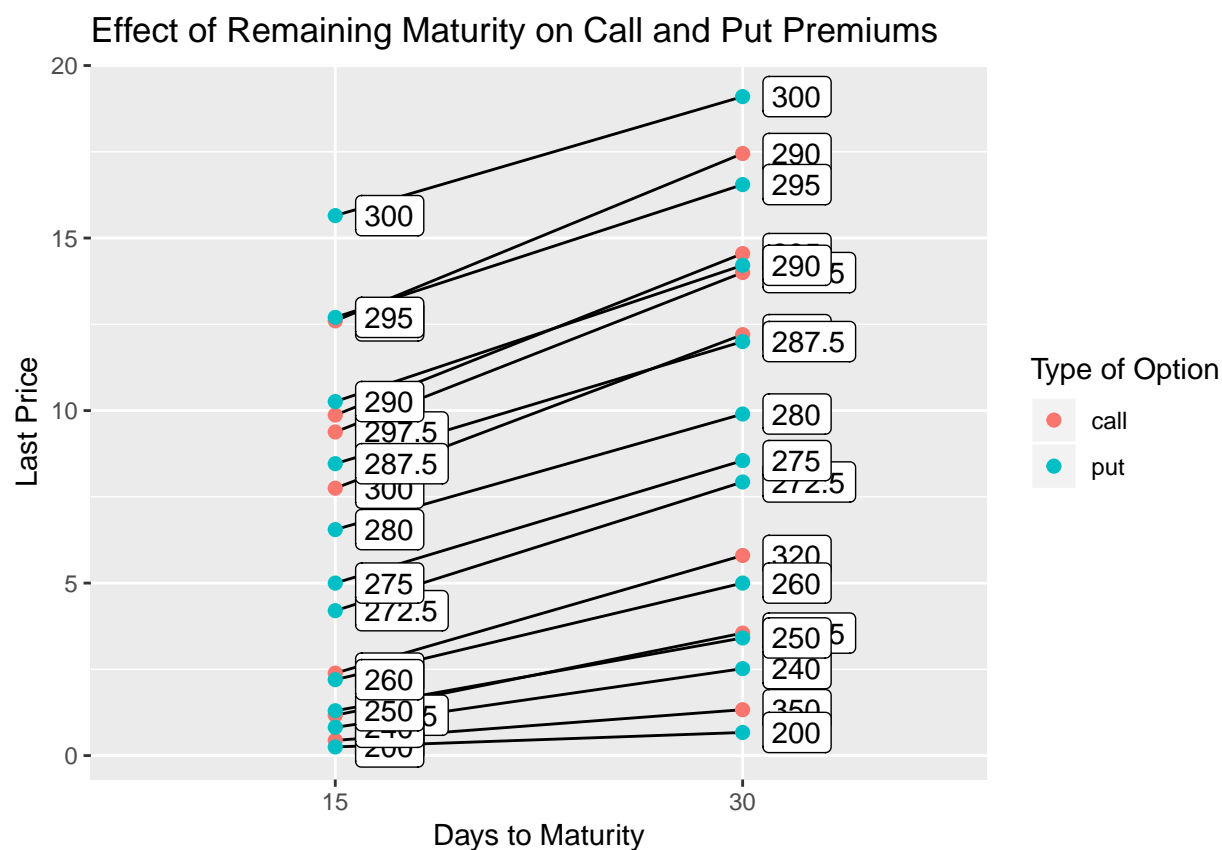
Effect of Strike Price on Call and Put Premiums



Q2. Confirm that longer maturity means higher prices for both calls and puts.

To observe the effect of maturity, options with 15 days and 30 days to expiry are compared. As it can be seen from the plot, in all cases the slopes are positive for both puts and calls. Maturity increases the premium.

Type	Strike	15 days	30 days
call	290.0	12.60	17.45
call	295.0	9.87	14.55
call	297.5	9.38	14.00
call	300.0	7.75	12.20
call	320.0	2.39	5.80
call	332.5	1.17	3.55
call	350.0	0.44	1.33
put	200.0	0.25	0.67
put	240.0	0.82	2.52
put	250.0	1.30	3.41
put	260.0	2.20	5.00
put	272.5	4.20	7.93
put	275.0	5.00	8.55
put	280.0	6.55	9.90
put	287.5	8.46	12.00
put	290.0	10.26	14.21
put	295.0	12.70	16.55
put	300.0	15.65	19.10



Q3. Choose a put and call with the same exercise price and maturity. Confirm that the put-call parity holds

Risk free 1 month treasury yield curve rate observed at the time of this report is 2.43%. Stock price for Tesla, Inc. is \$292.74. Only options with 30 days to maturity are taken into account. Put-call parity holds nearly perfectly.

Strike	C	P	PV(X)	C + PV(X)	P + S	Difference
250	46.07	3.41	249.49	295.56	296.15	0.59
280	23.20	9.90	279.43	302.63	302.64	0.01
290	17.45	14.21	289.41	306.86	306.95	0.09
295	14.55	16.55	294.40	308.95	309.29	0.34
300	12.20	19.10	299.39	311.59	311.84	0.25
320	5.80	27.21	319.35	325.15	319.95	-5.20

Appendix: Data

Type	Maturity	Strike Price	Last Price
call	15	287.5	15.00
call	15	290.0	12.60
call	15	295.0	9.87
call	15	297.5	9.38
call	15	300.0	7.75
call	15	302.5	6.75
call	15	305.0	5.87
call	15	307.5	5.50
call	15	310.0	4.84
call	15	312.5	3.70
call	15	315.0	3.50
call	15	317.5	2.99
call	15	320.0	2.39
call	15	322.5	2.00
call	15	325.0	1.85
call	15	327.5	1.47
call	15	330.0	1.34
call	15	332.5	1.17
call	15	335.0	1.01
call	15	340.0	0.71
call	15	345.0	0.55
call	15	350.0	0.44
call	15	390.0	0.08
call	15	400.0	0.05
call	30	250.0	46.07
call	30	280.0	23.20
call	30	290.0	17.45
call	30	295.0	14.55
call	30	297.5	14.00
call	30	300.0	12.20
call	30	320.0	5.80
call	30	332.5	3.55
call	30	342.5	1.94
call	30	350.0	1.33
call	30	360.0	0.95
call	30	395.0	0.25
call	30	420.0	0.10
put	15	150.0	0.11
put	15	155.0	0.12
put	15	160.0	0.33
put	15	200.0	0.25
put	15	240.0	0.82
put	15	245.0	1.04
put	15	250.0	1.30
put	15	252.5	1.49
put	15	255.0	1.53
put	15	260.0	2.20
put	15	265.0	2.74
put	15	267.5	3.19

(continued)

Type	Maturity	Strike Price	Last Price
put	15	270.0	3.85
put	15	272.5	4.20
put	15	275.0	5.00
put	15	277.5	4.85
put	15	280.0	6.55
put	15	282.5	7.43
put	15	285.0	8.35
put	15	287.5	8.46
put	15	290.0	10.26
put	15	292.5	10.95
put	15	295.0	12.70
put	15	297.5	13.33
put	15	300.0	15.65
put	15	305.0	18.37
put	15	310.0	22.00
put	30	200.0	0.67
put	30	205.0	0.79
put	30	225.0	1.40
put	30	240.0	2.52
put	30	250.0	3.41
put	30	260.0	5.00
put	30	272.5	7.93
put	30	275.0	8.55
put	30	280.0	9.90
put	30	287.5	12.00
put	30	290.0	14.21
put	30	295.0	16.55
put	30	300.0	19.10
put	30	320.0	27.21