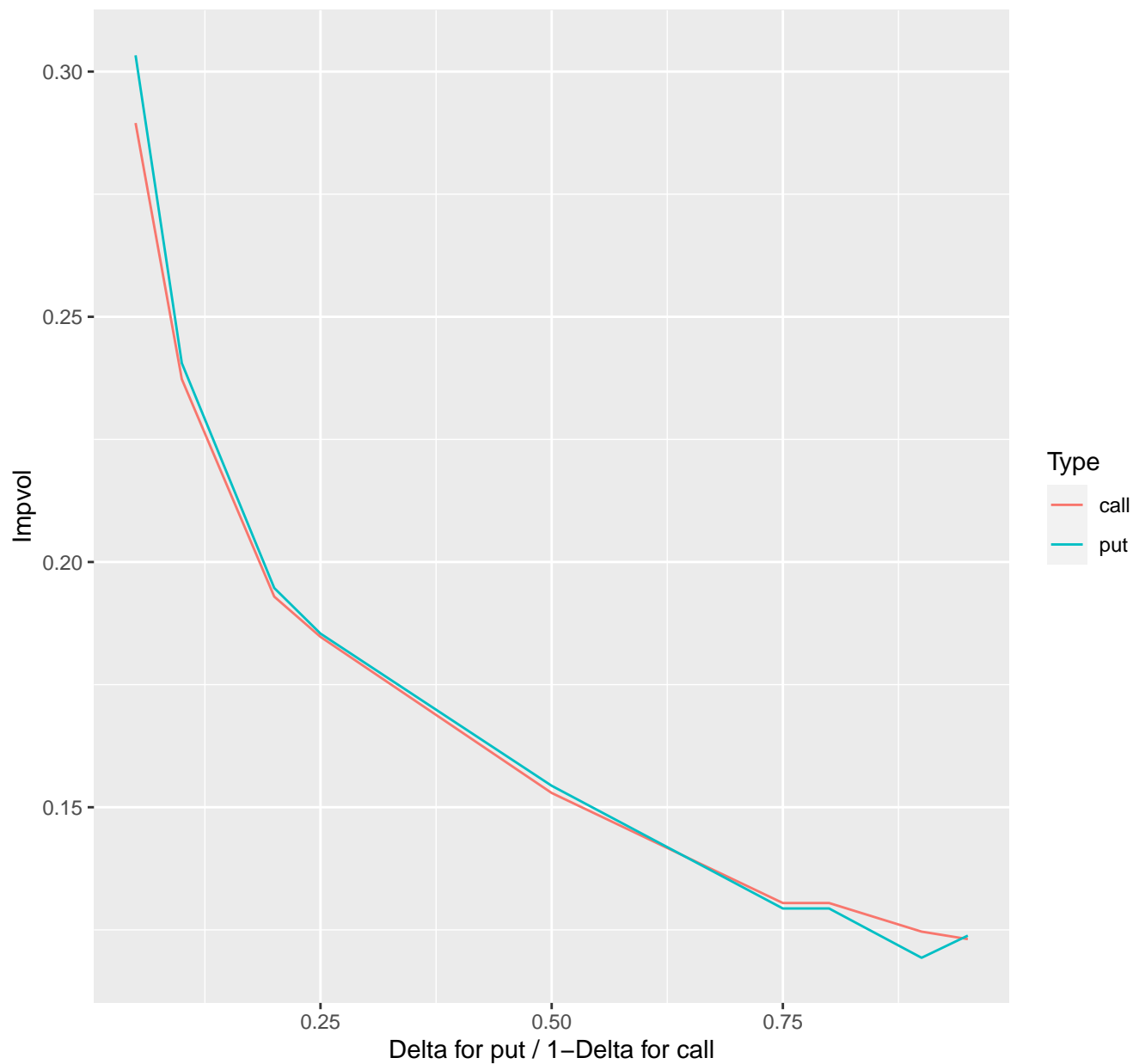


Impvol Smiles

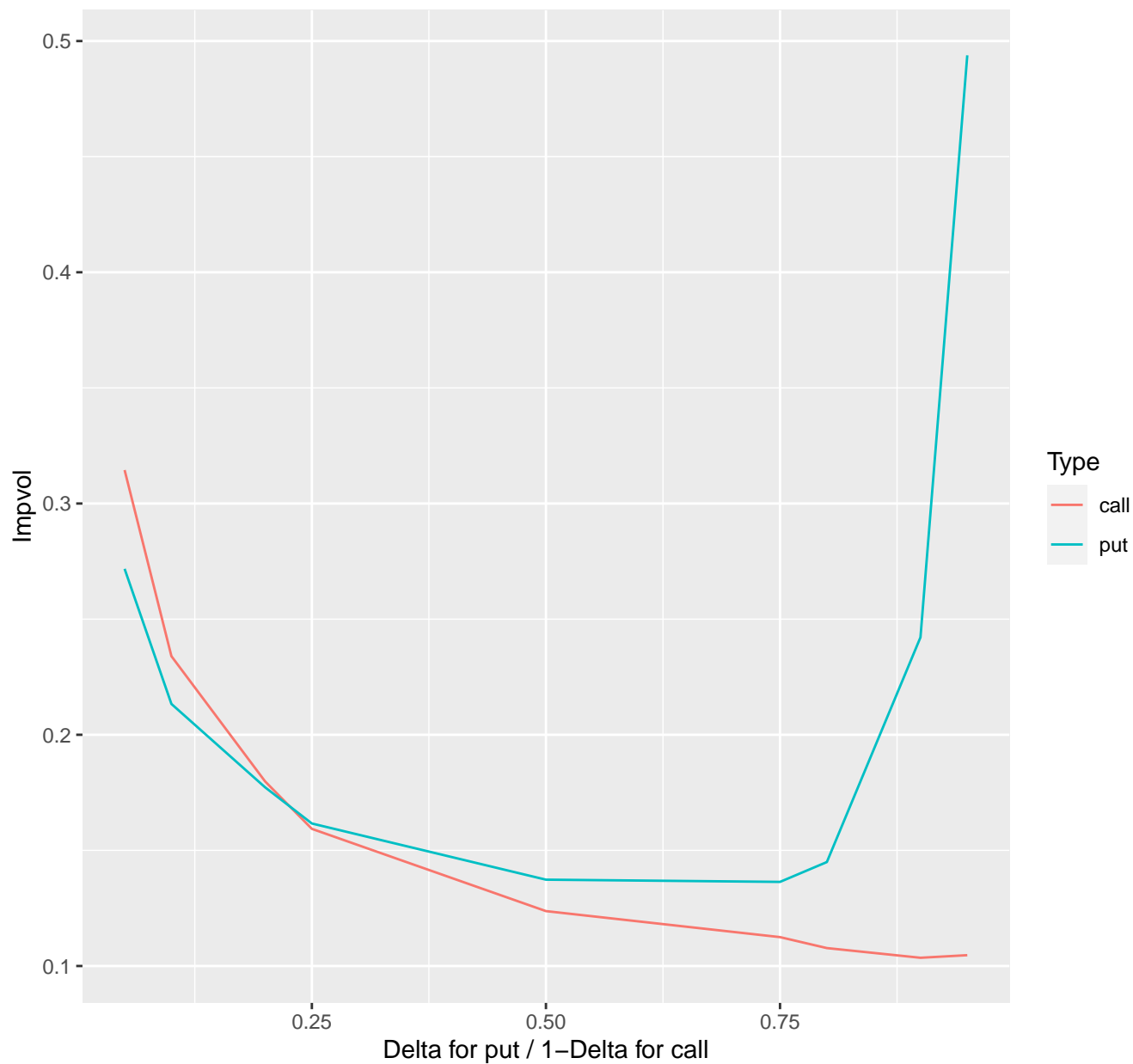
2011-01-21

x axis represents strike price, increasing



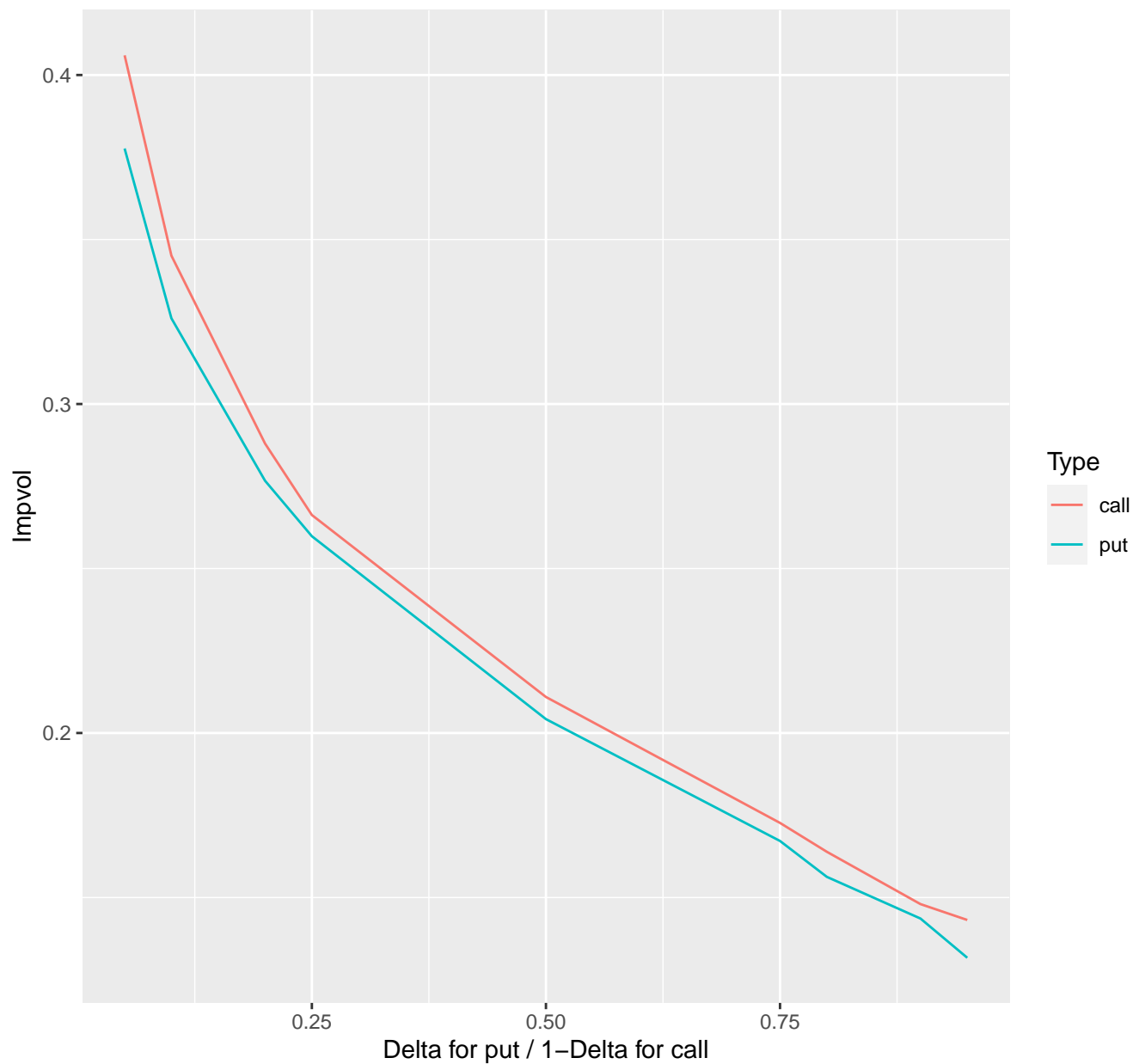
2011-02-18

x axis represents strike price, increasing



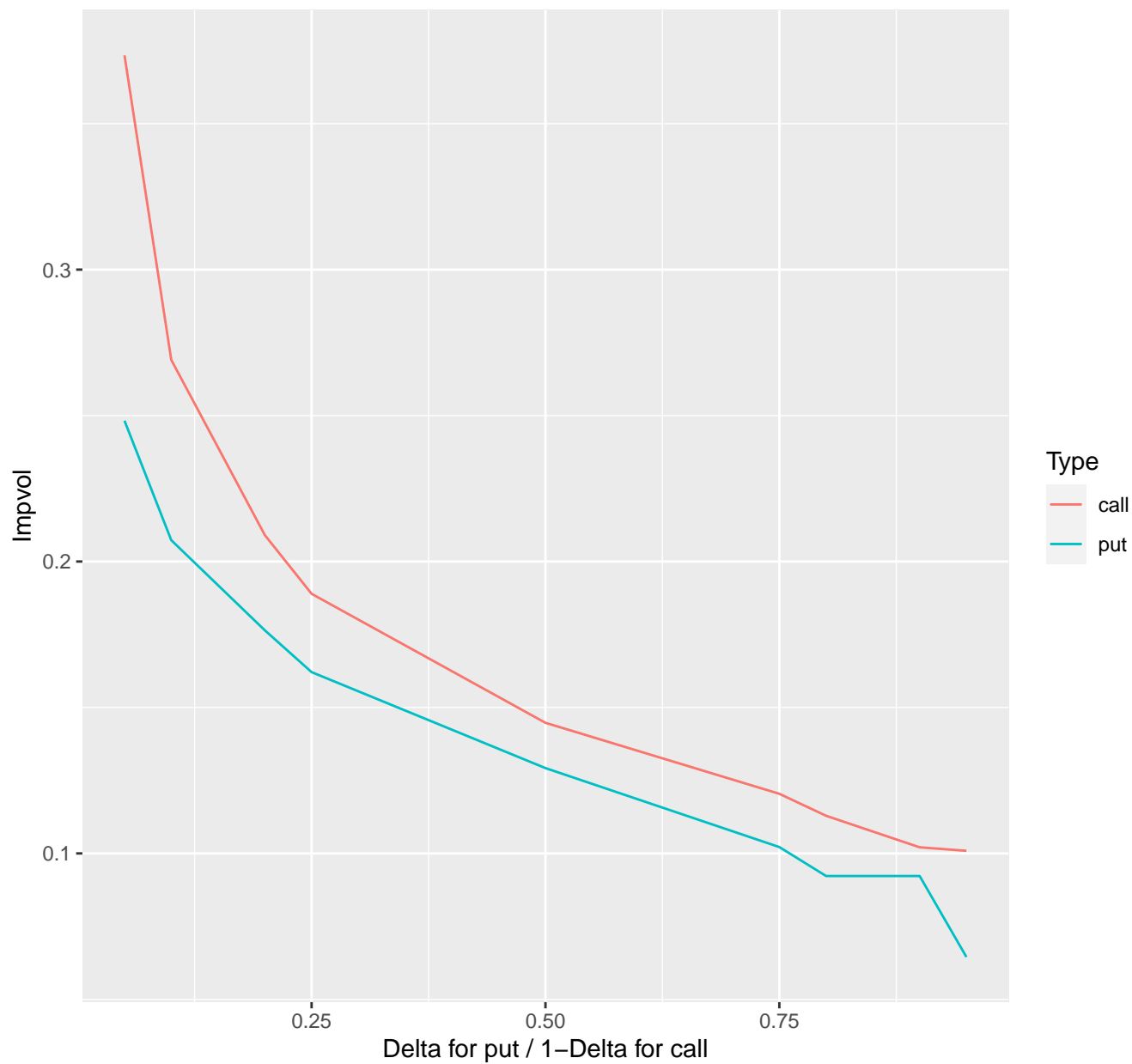
2011-03-18

x axis represents strike price, increasing



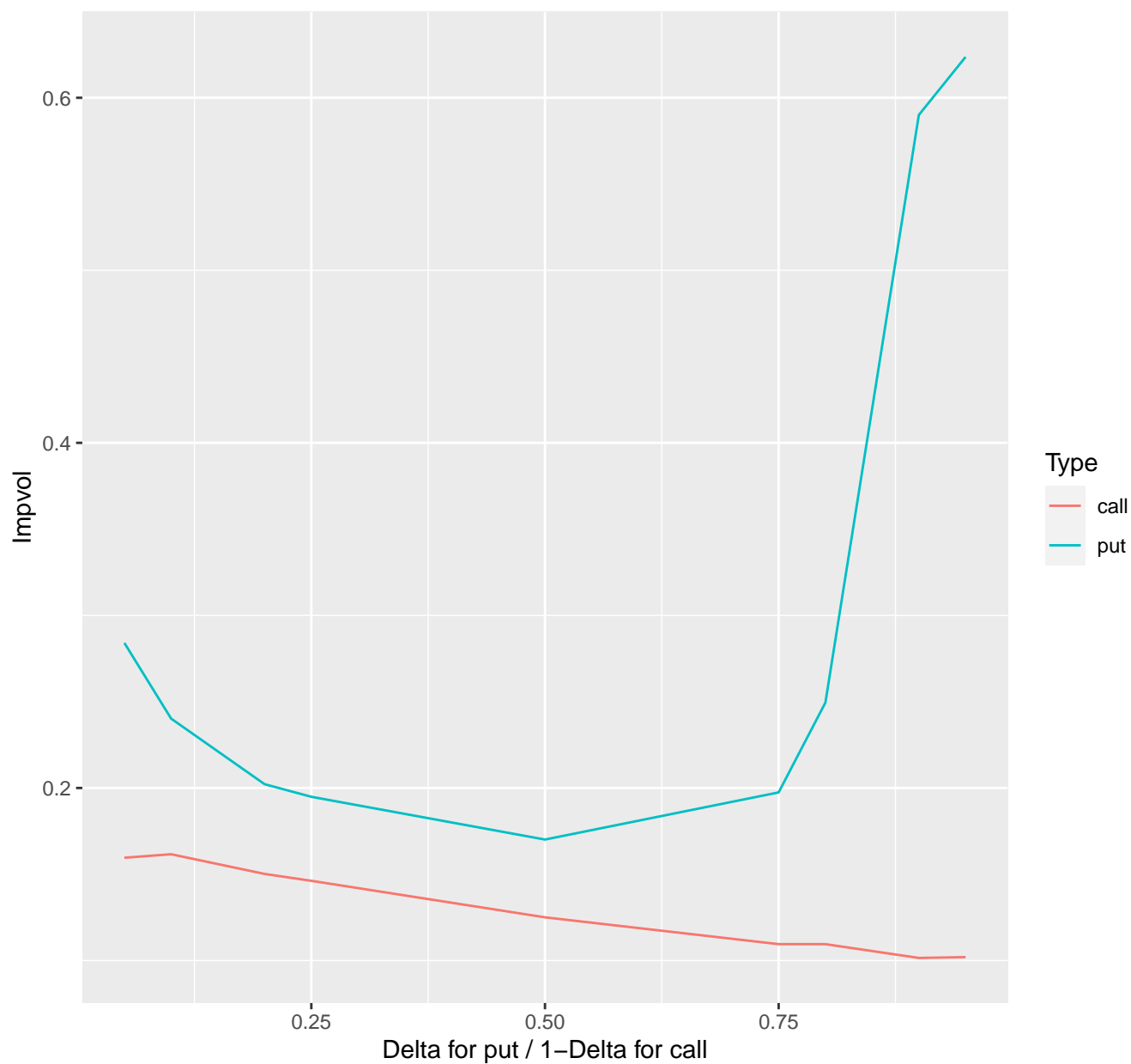
2011-04-15

x axis represents strike price, increasing



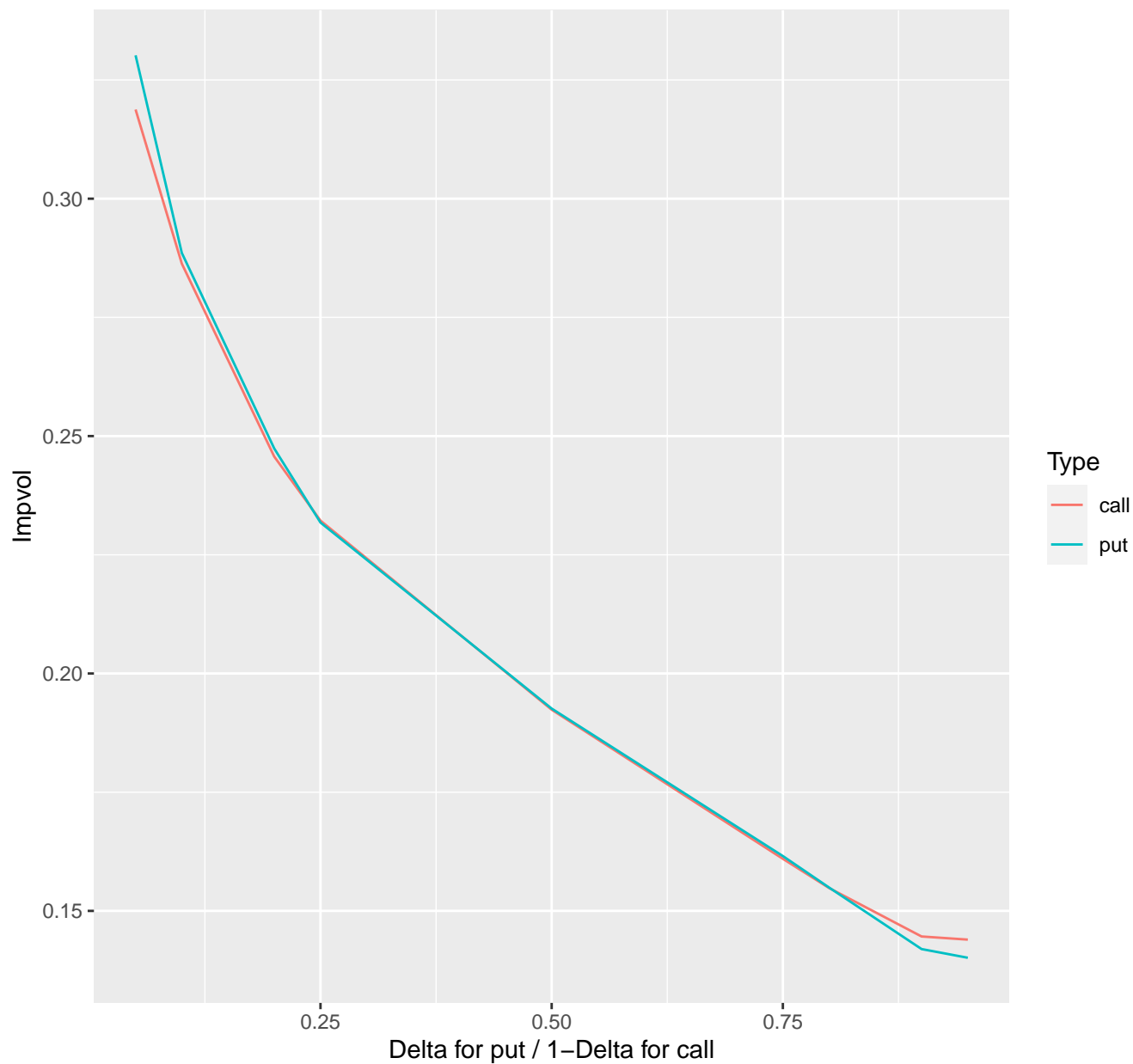
2011-05-20

x axis represents strike price, increasing



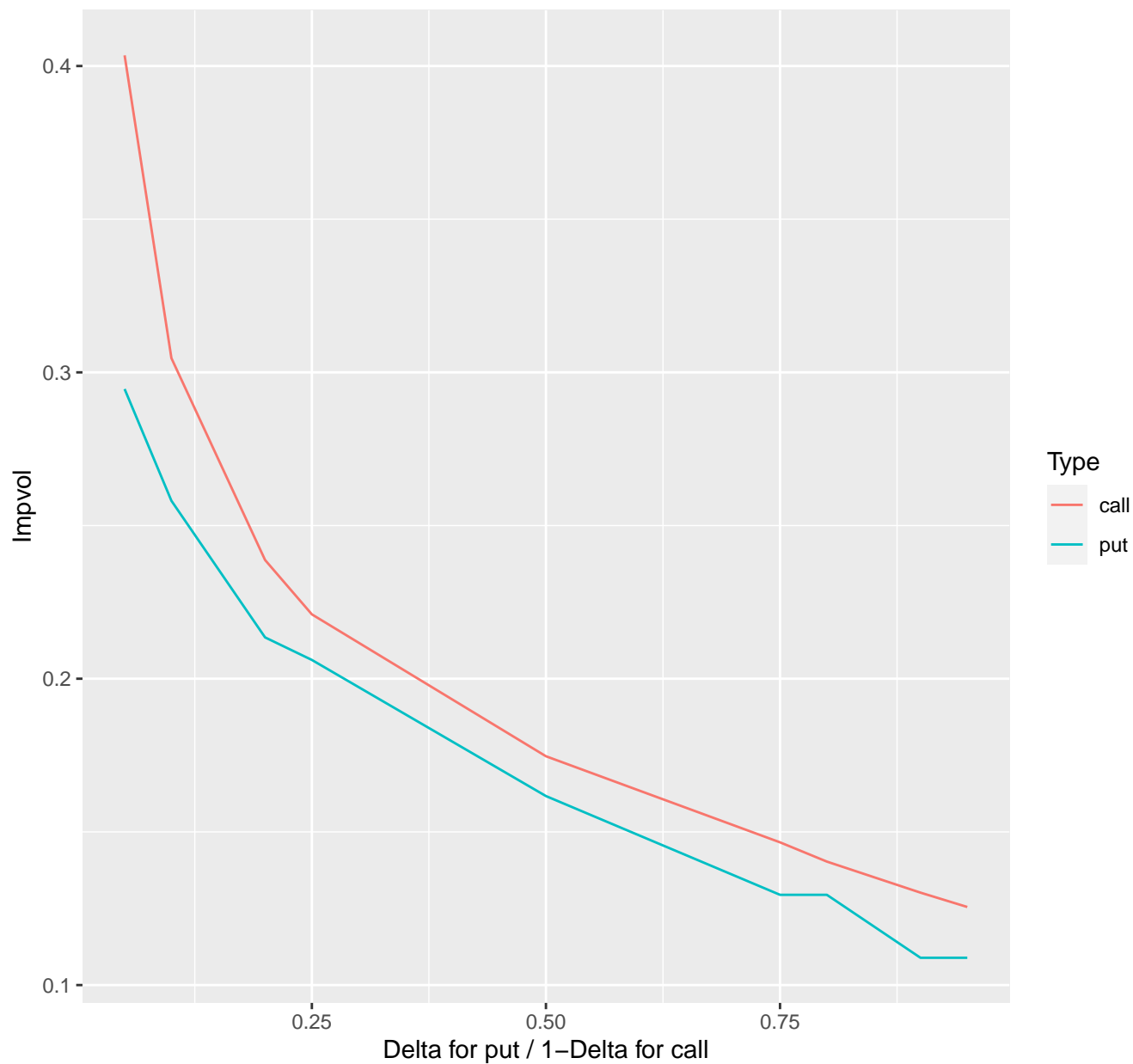
2011-06-17

x axis represents strike price, increasing



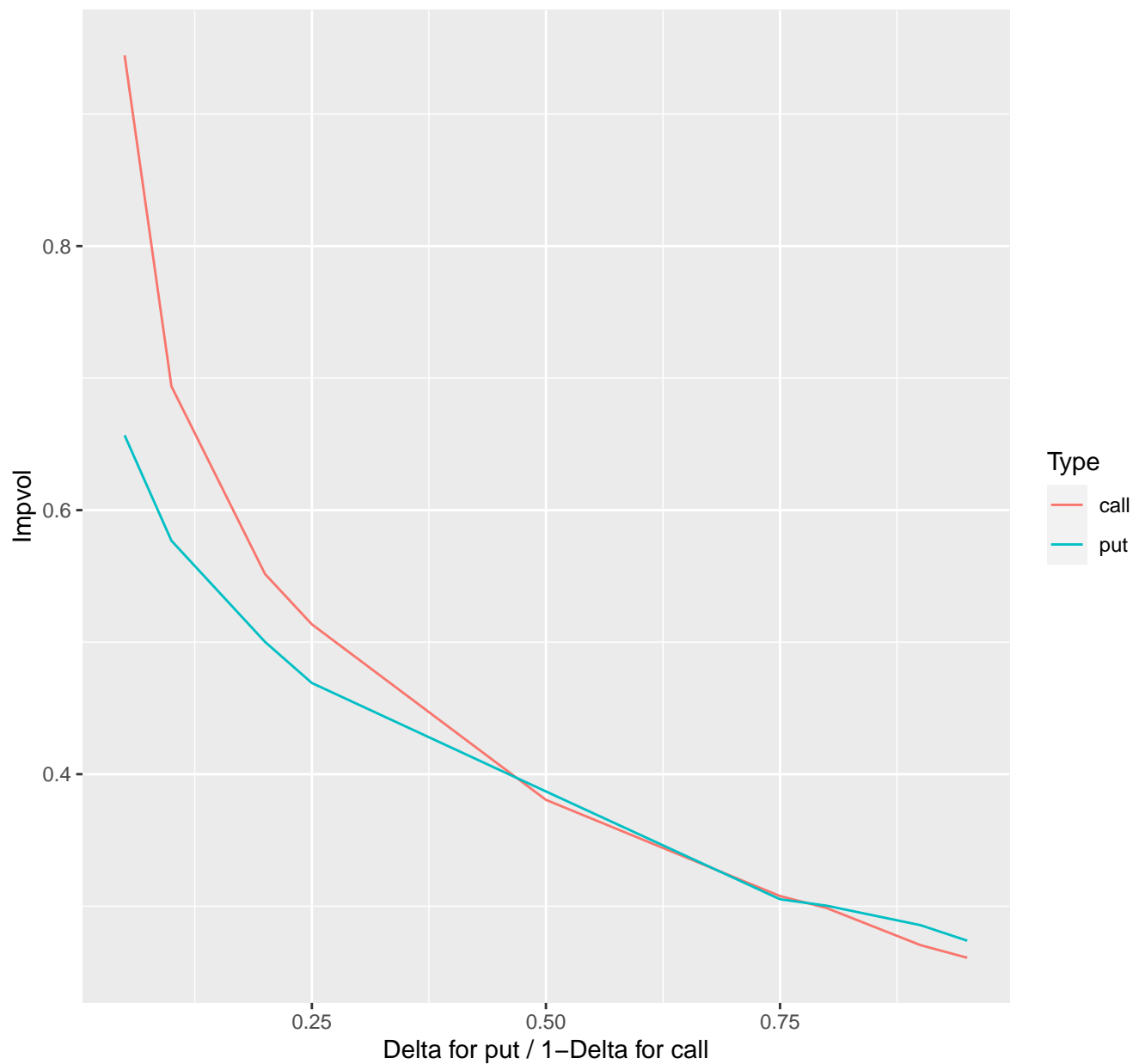
2011-07-15

x axis represents strike price, increasing



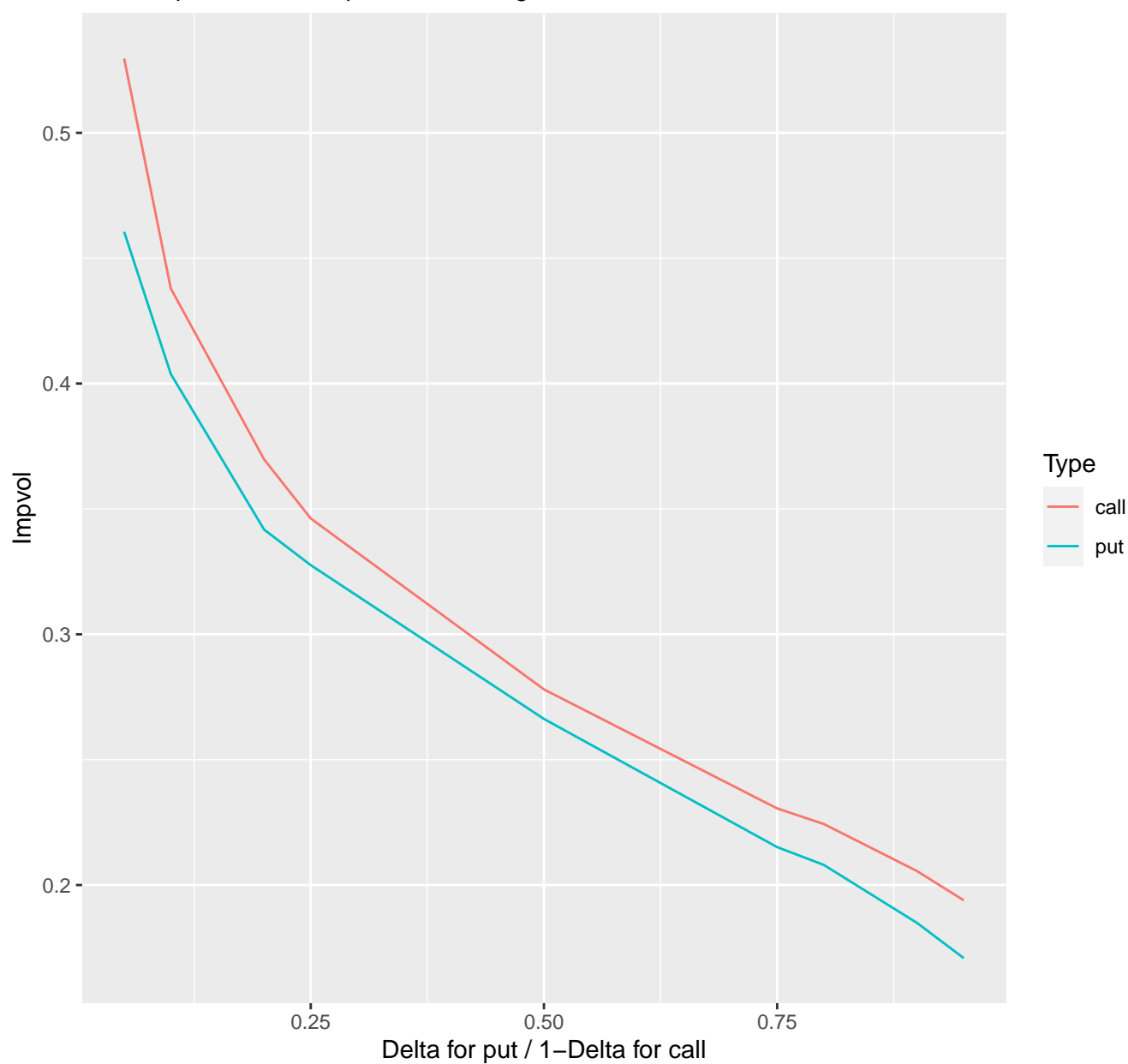
2011-08-19

x axis represents strike price, increasing



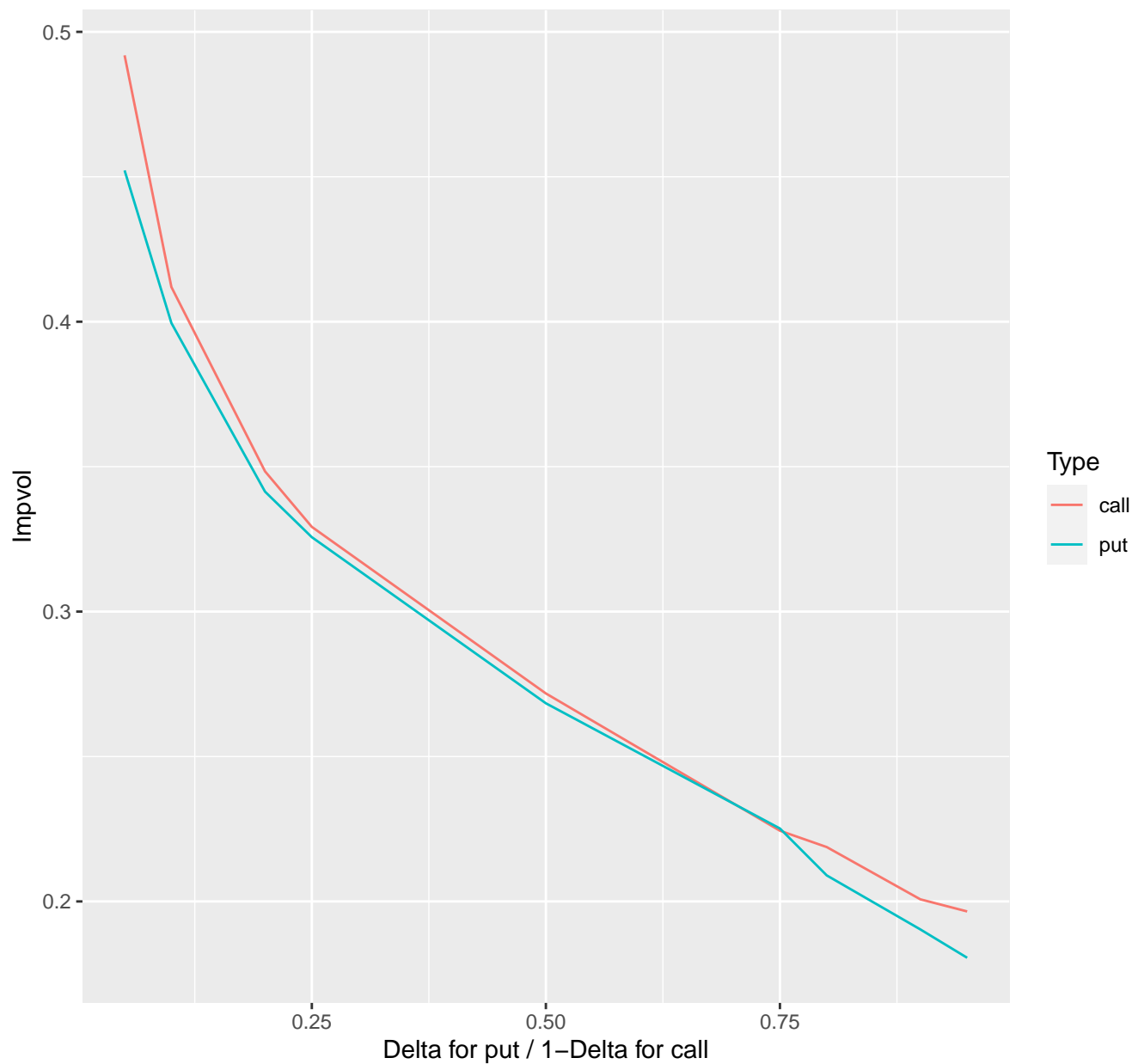
2011-09-16

x axis represents strike price, increasing



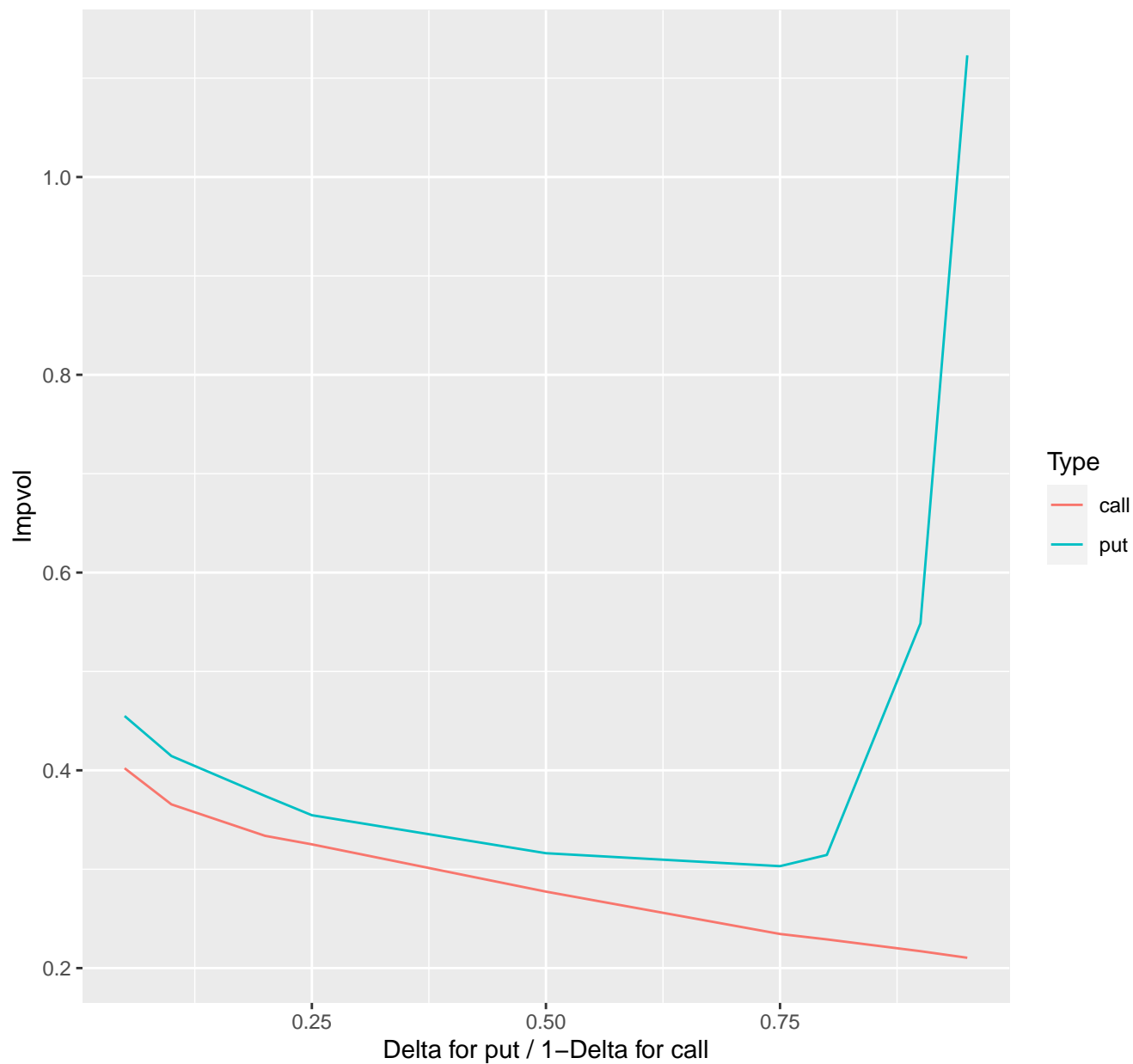
2011-10-21

x axis represents strike price, increasing



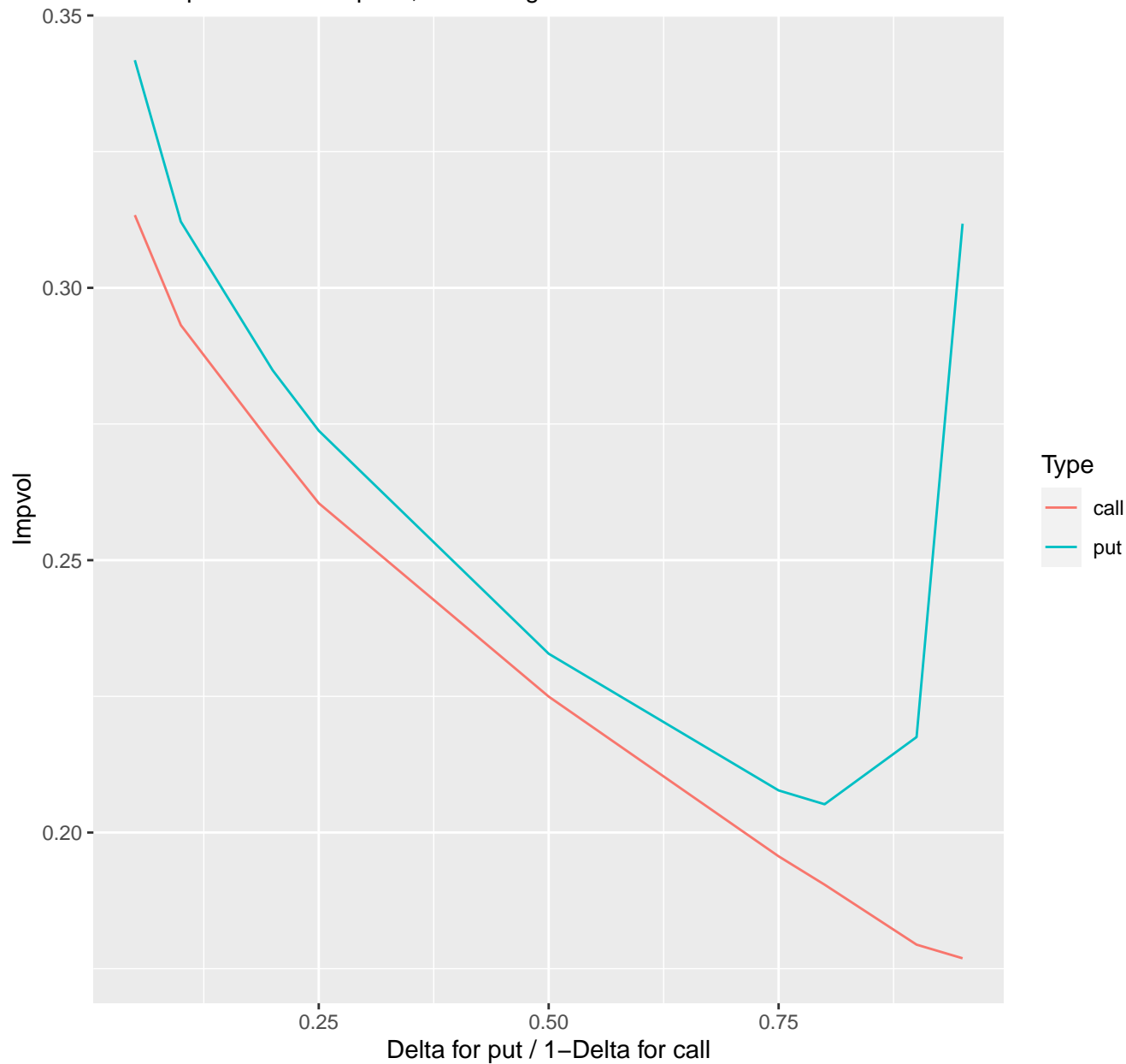
2011-11-18

x axis represents strike price, increasing



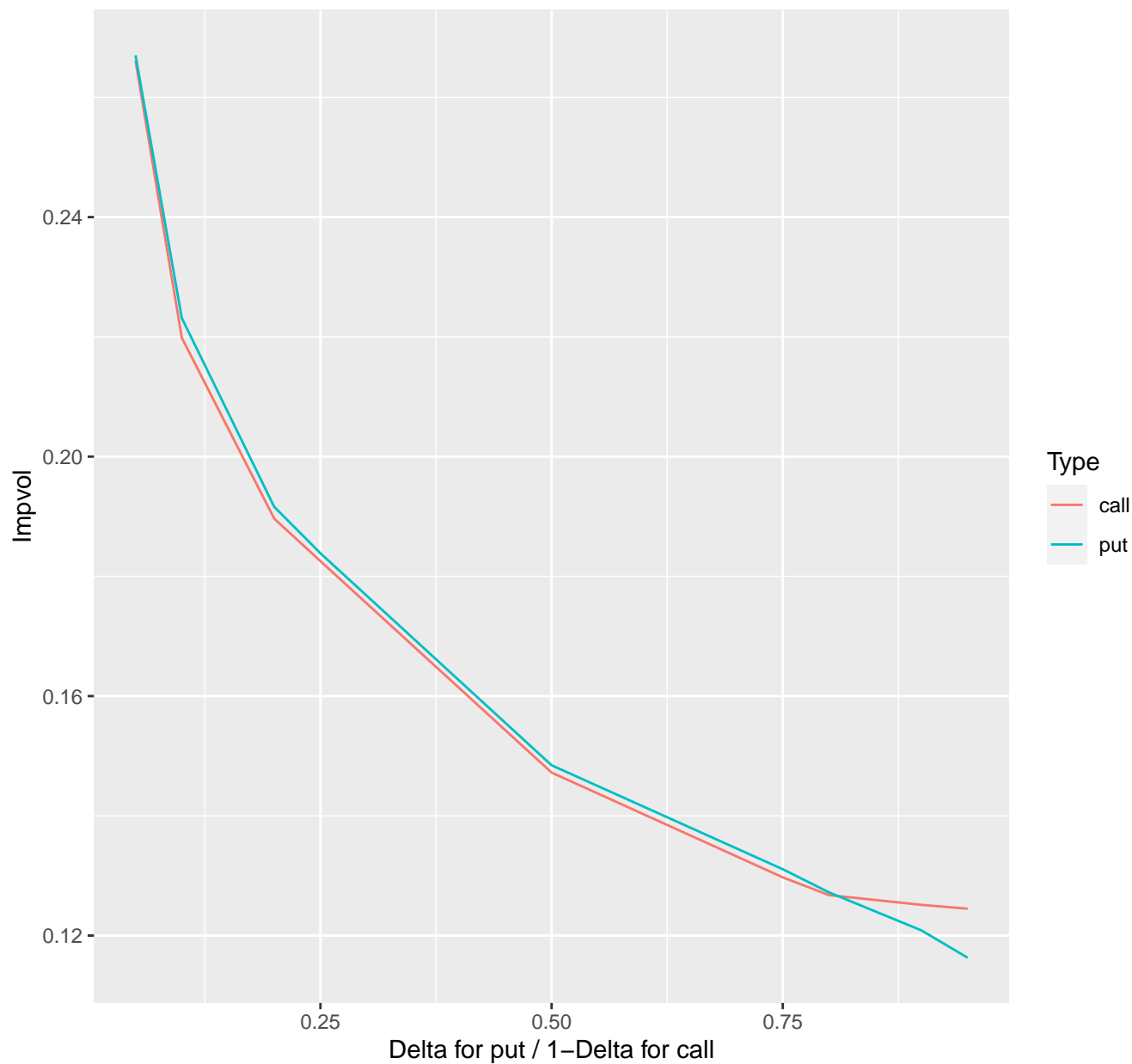
2011-12-16

x axis represents strike price, increasing



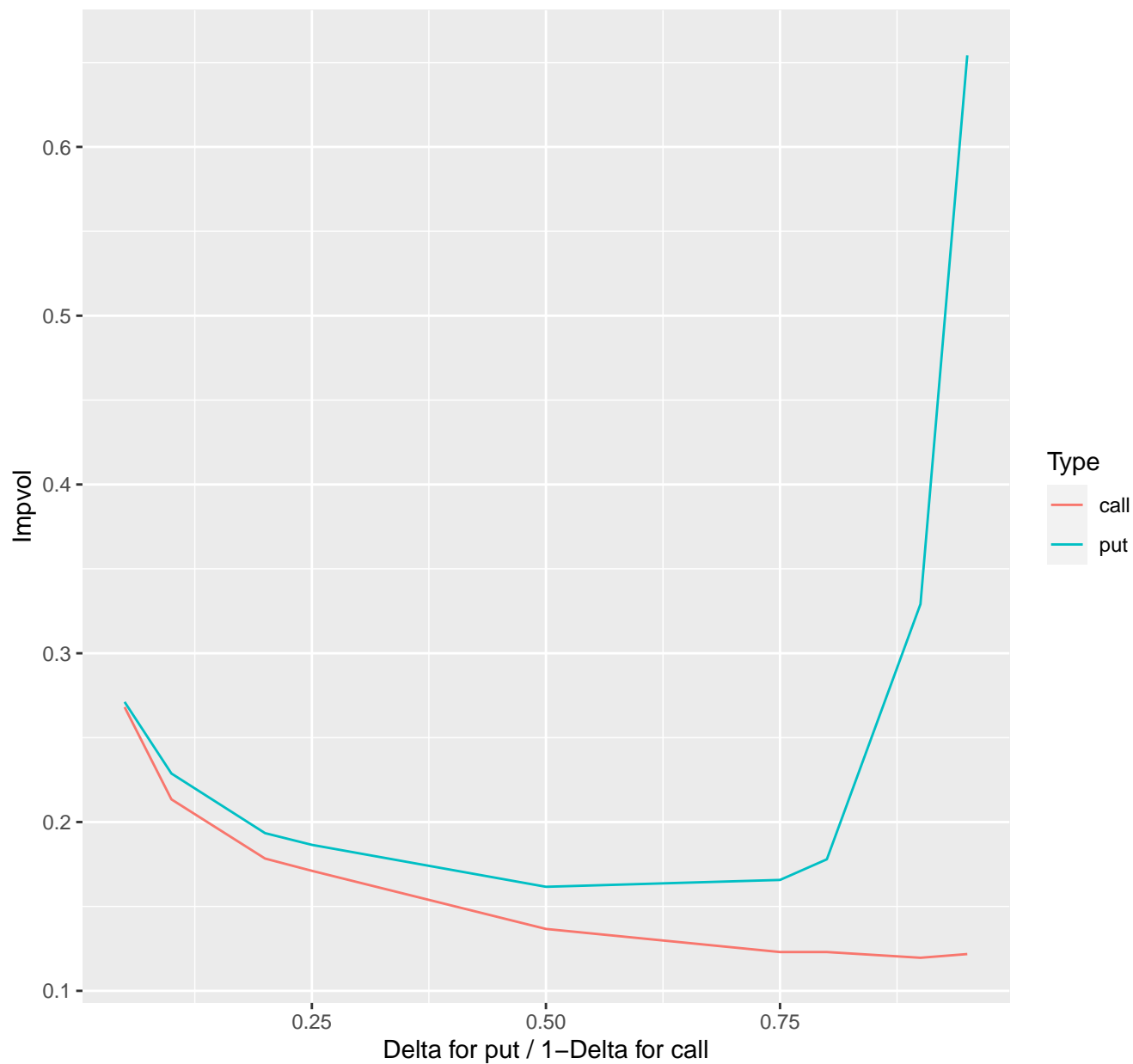
2012-01-20

x axis represents strike price, increasing



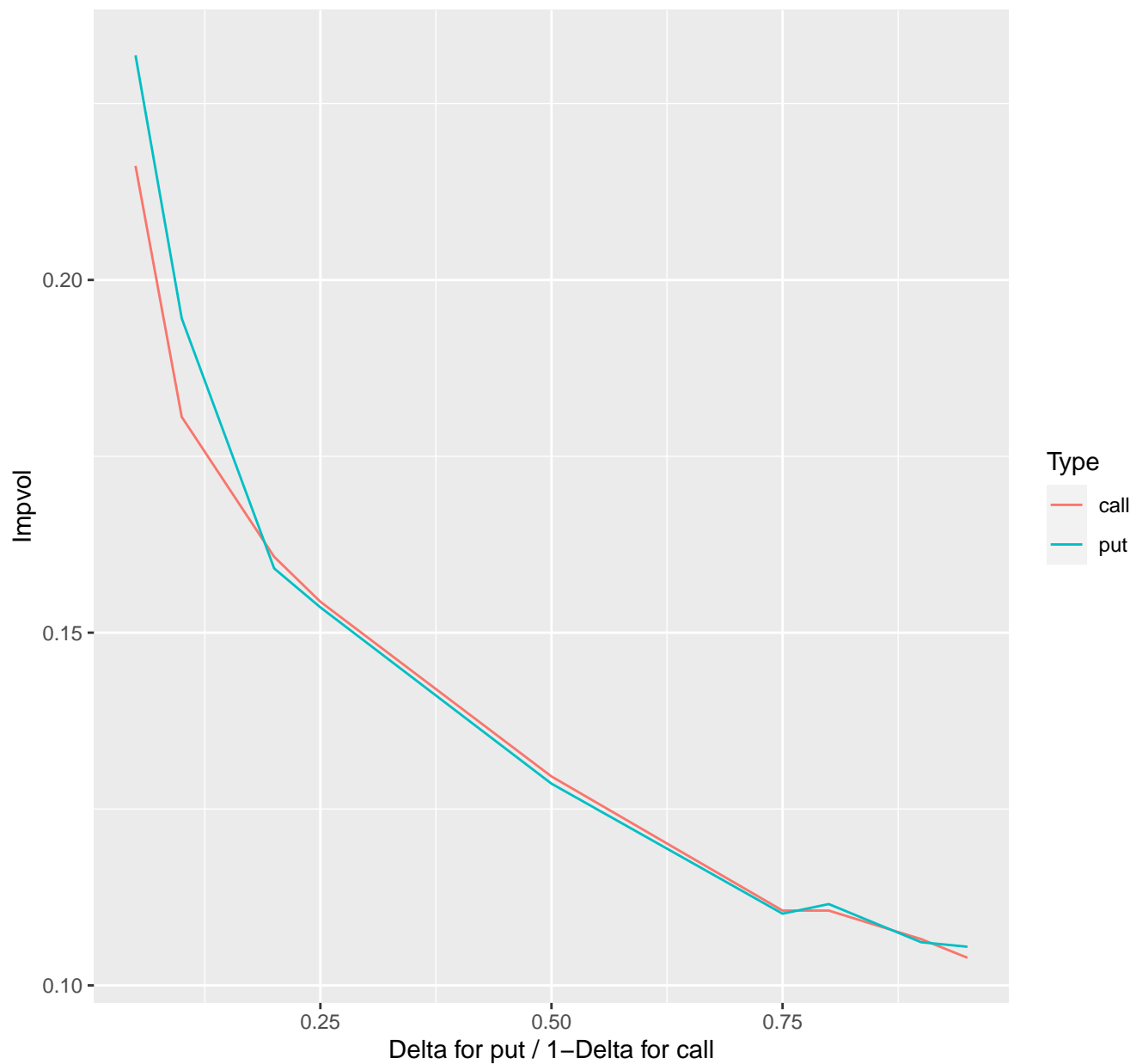
2012-02-17

x axis represents strike price, increasing



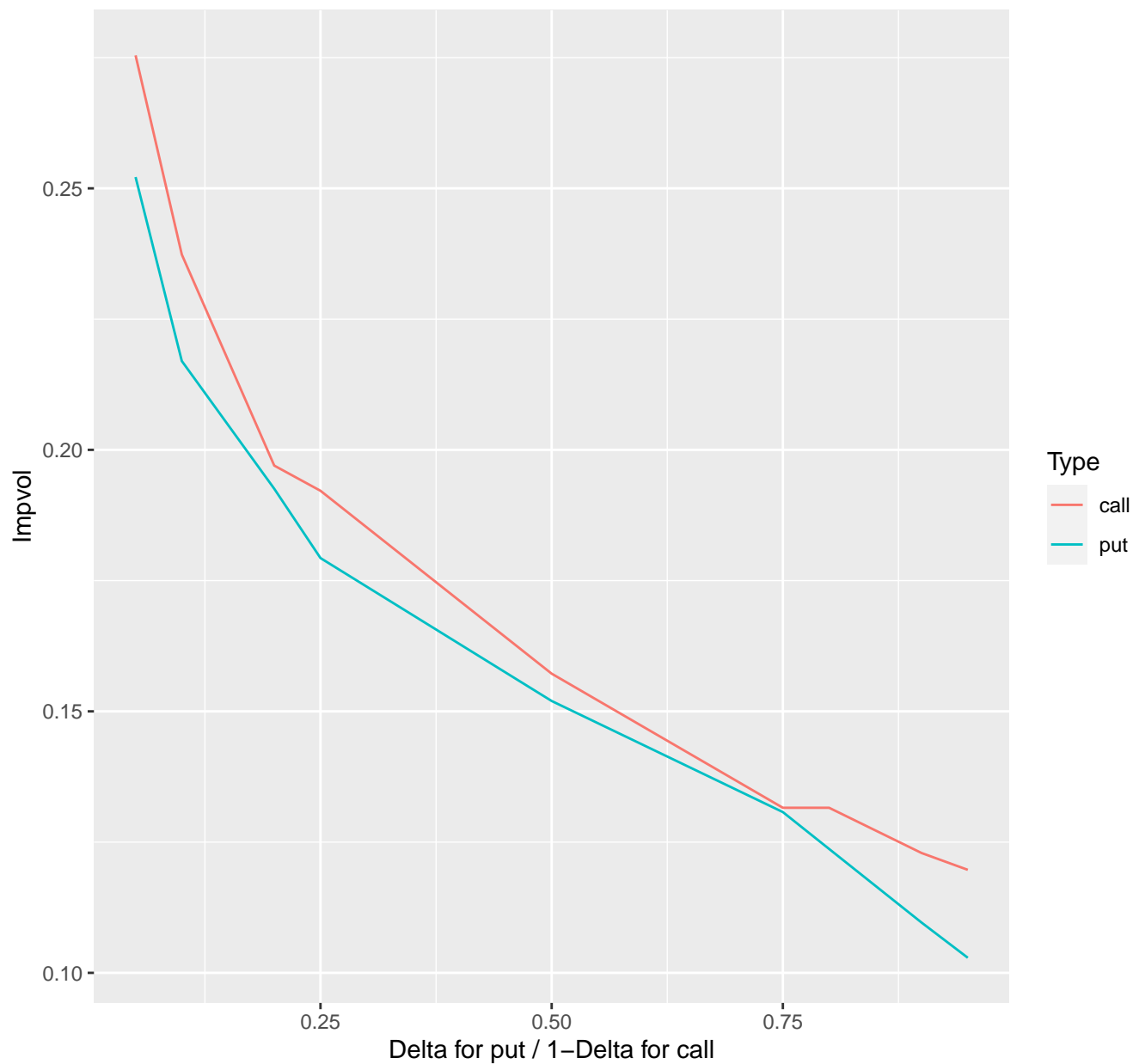
2012-03-16

x axis represents strike price, increasing



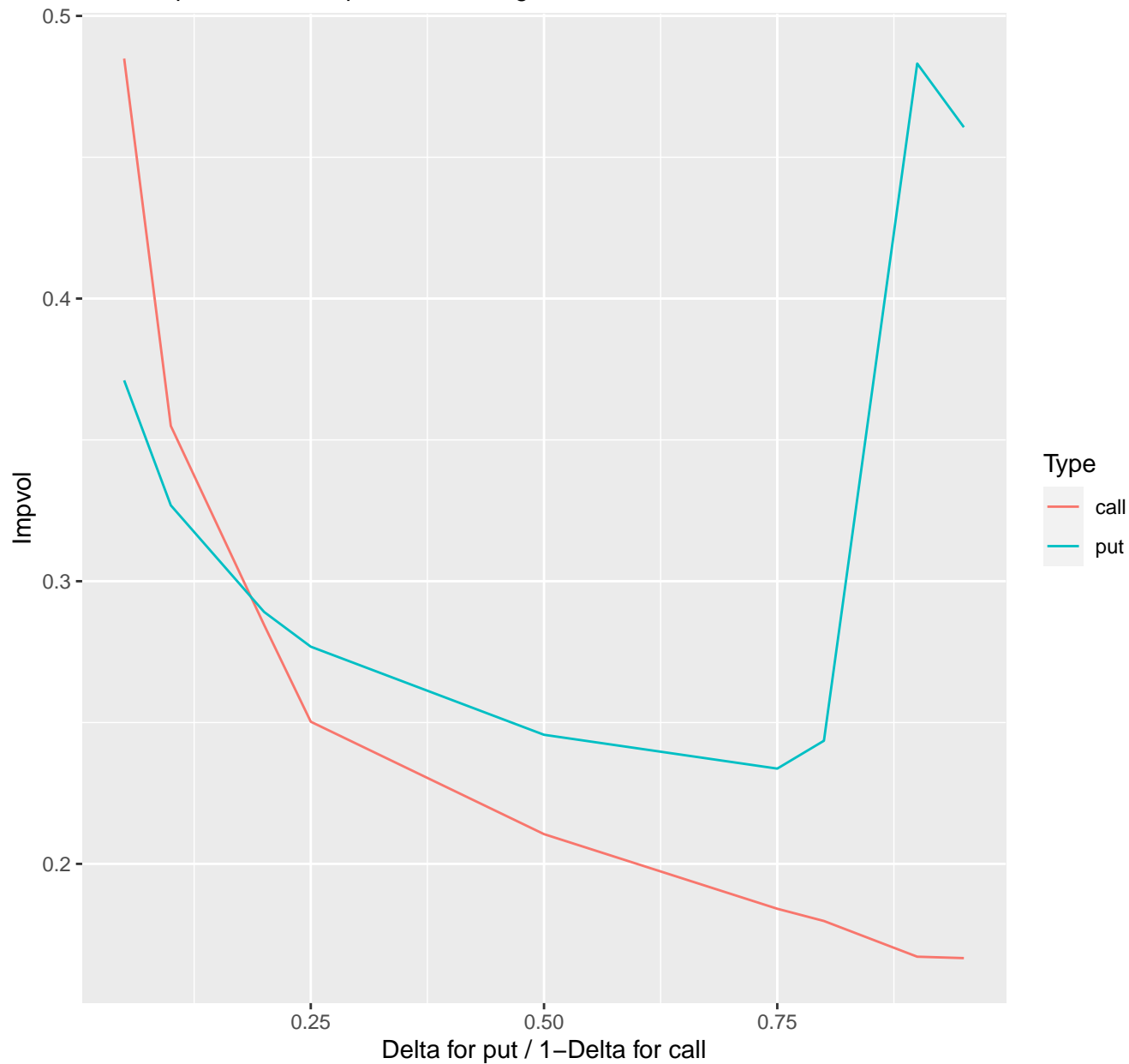
2012-04-20

x axis represents strike price, increasing



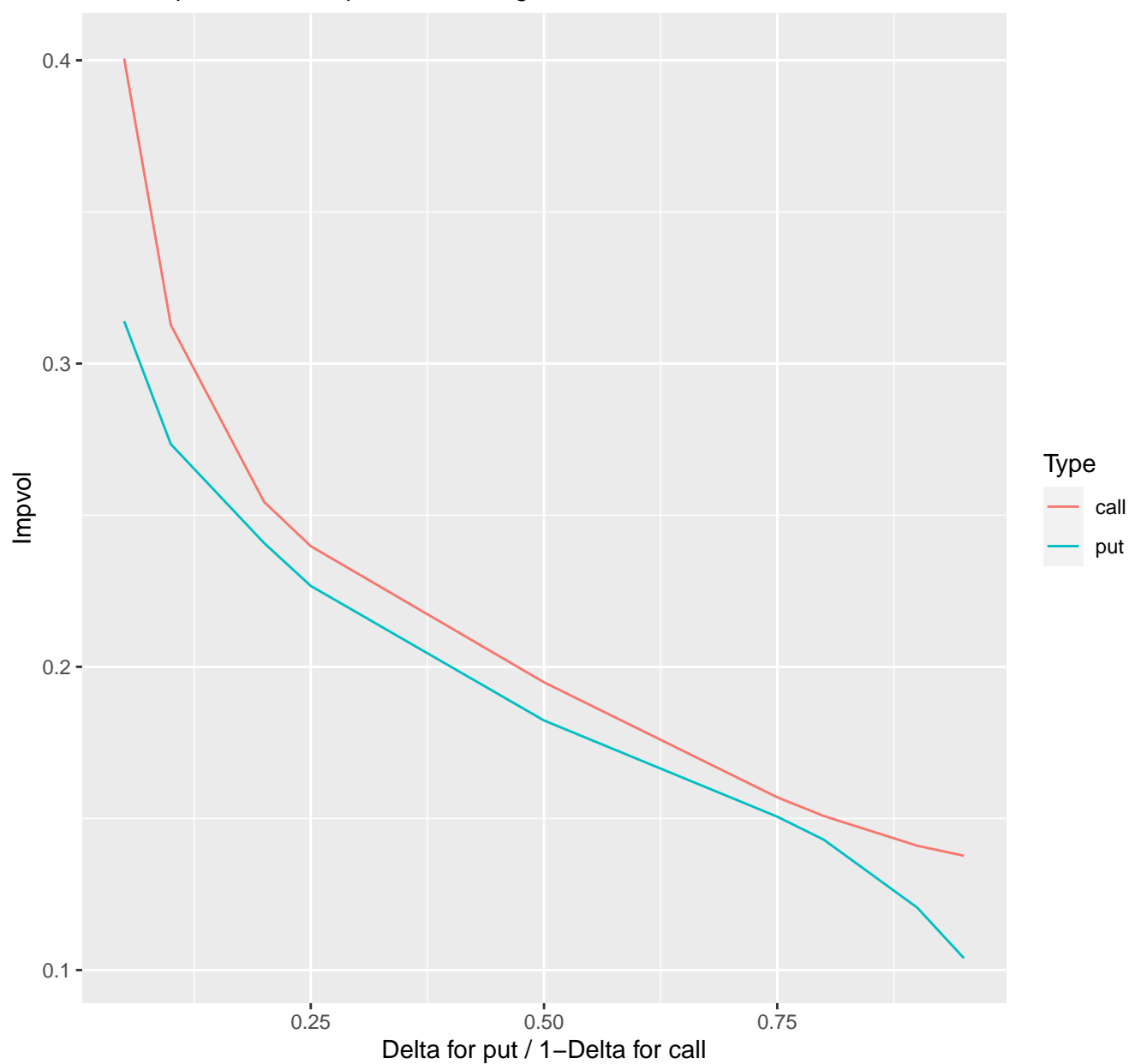
2012-05-18

x axis represents strike price, increasing



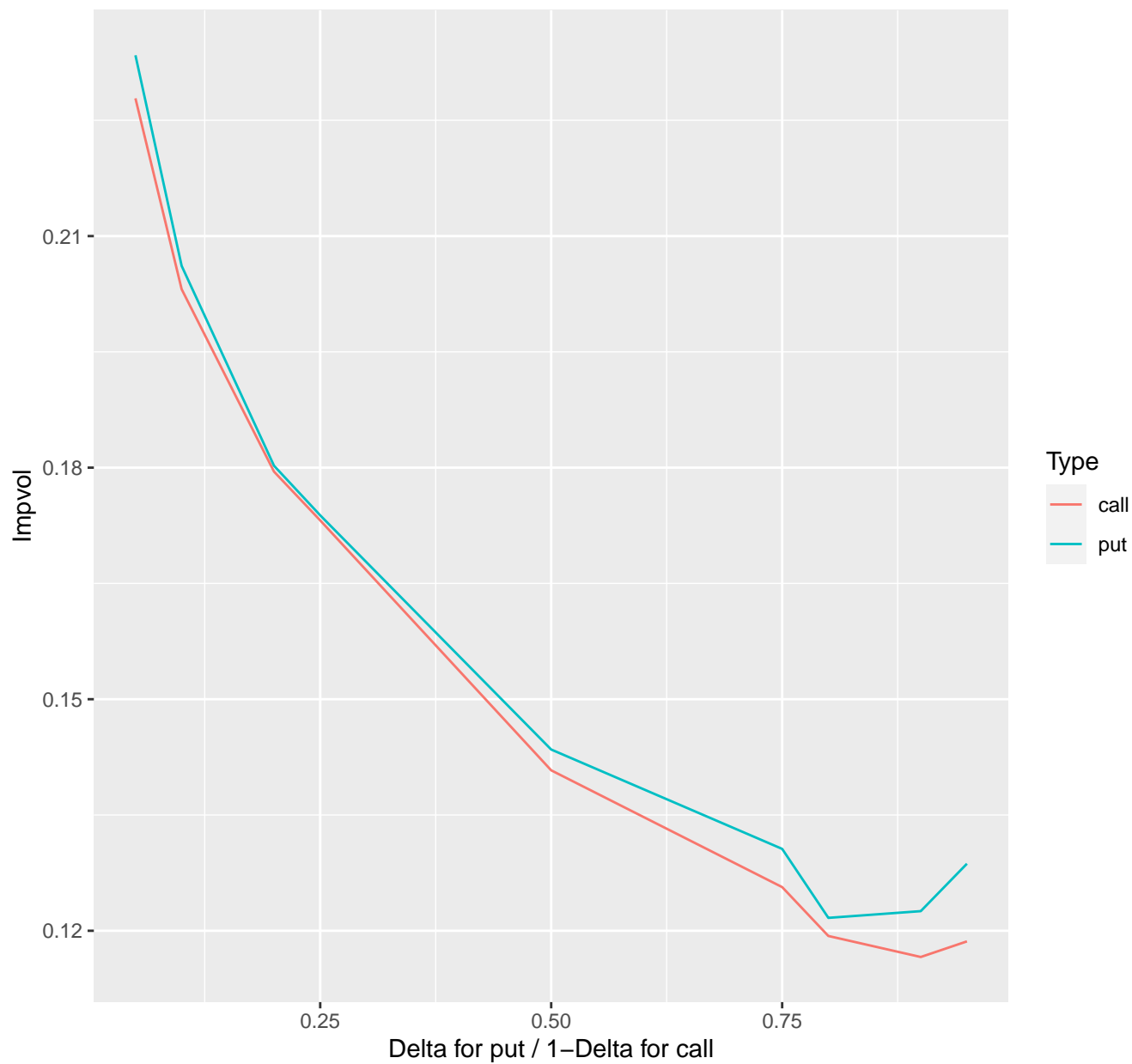
2012-06-15

x axis represents strike price, increasing



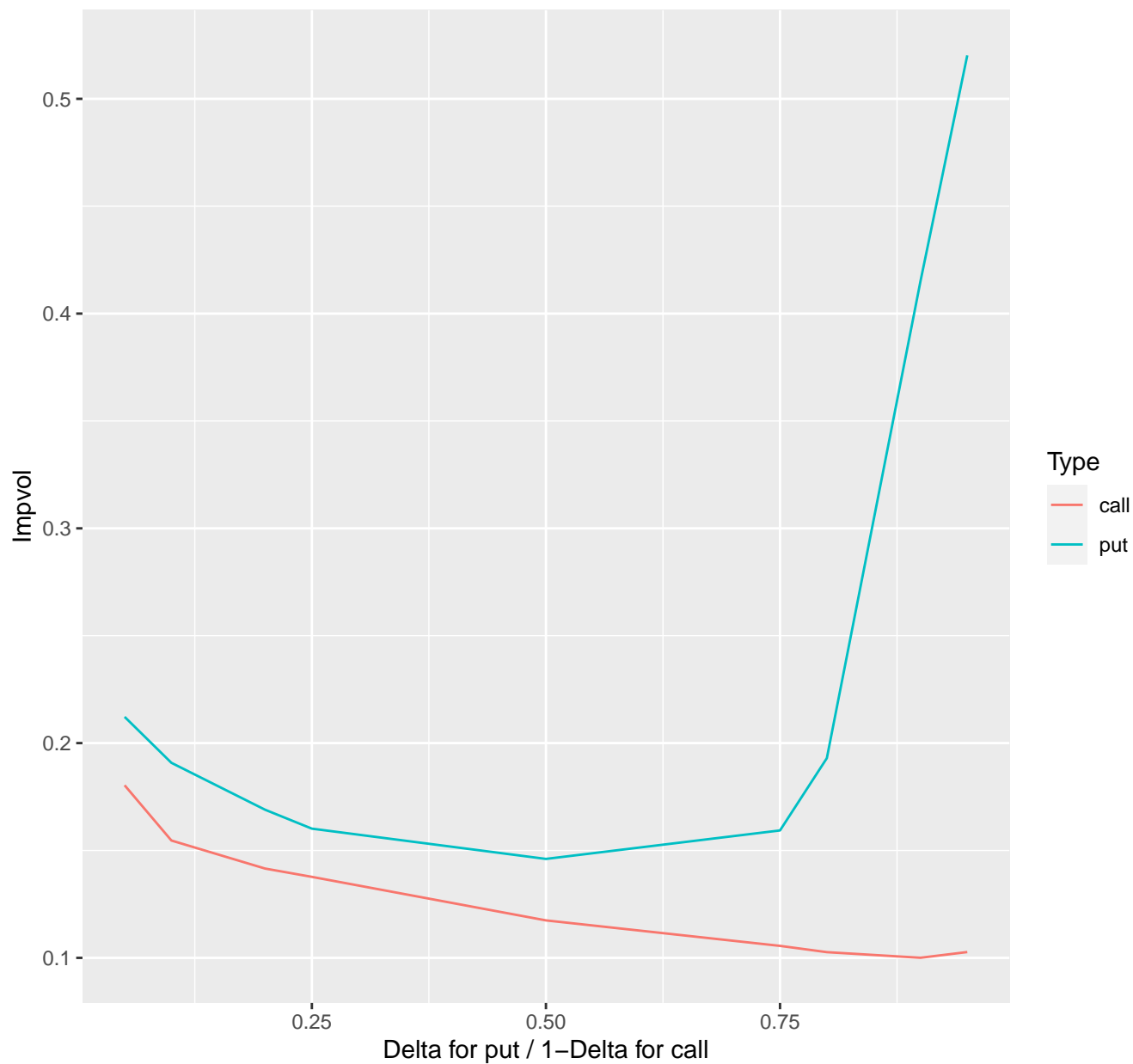
2012-07-20

x axis represents strike price, increasing



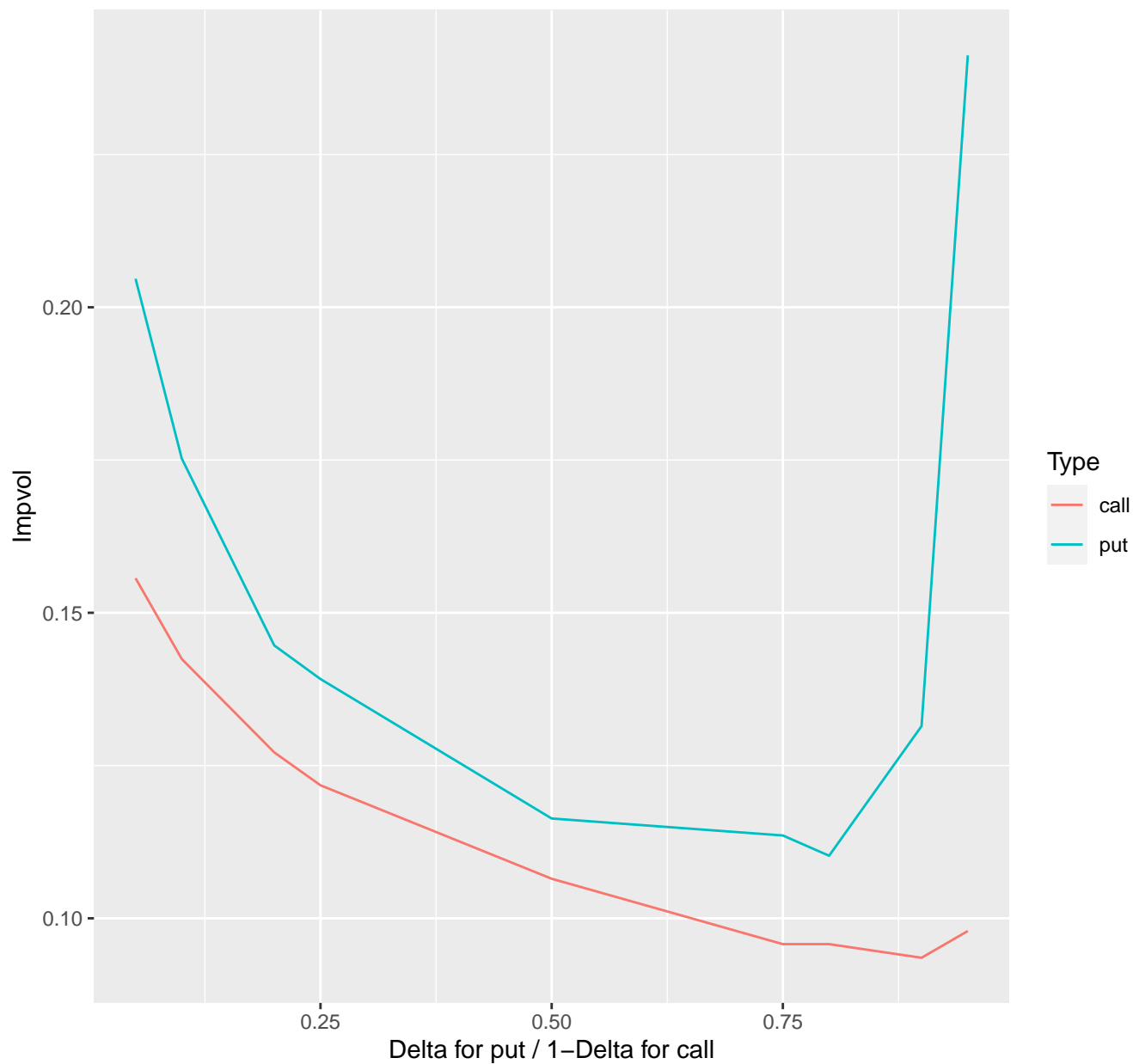
2012-08-17

x axis represents strike price, increasing



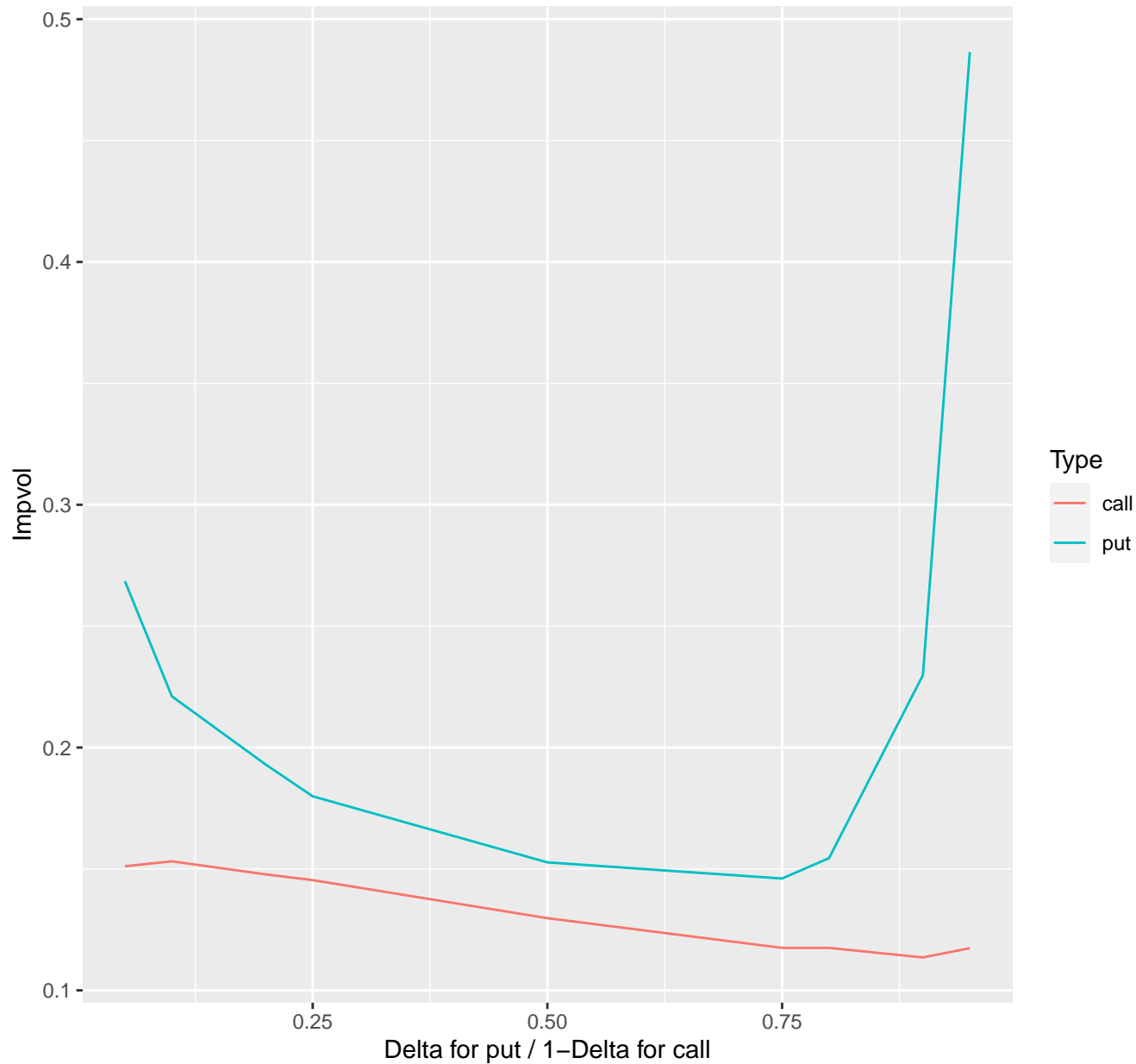
2012-09-21

x axis represents strike price, increasing



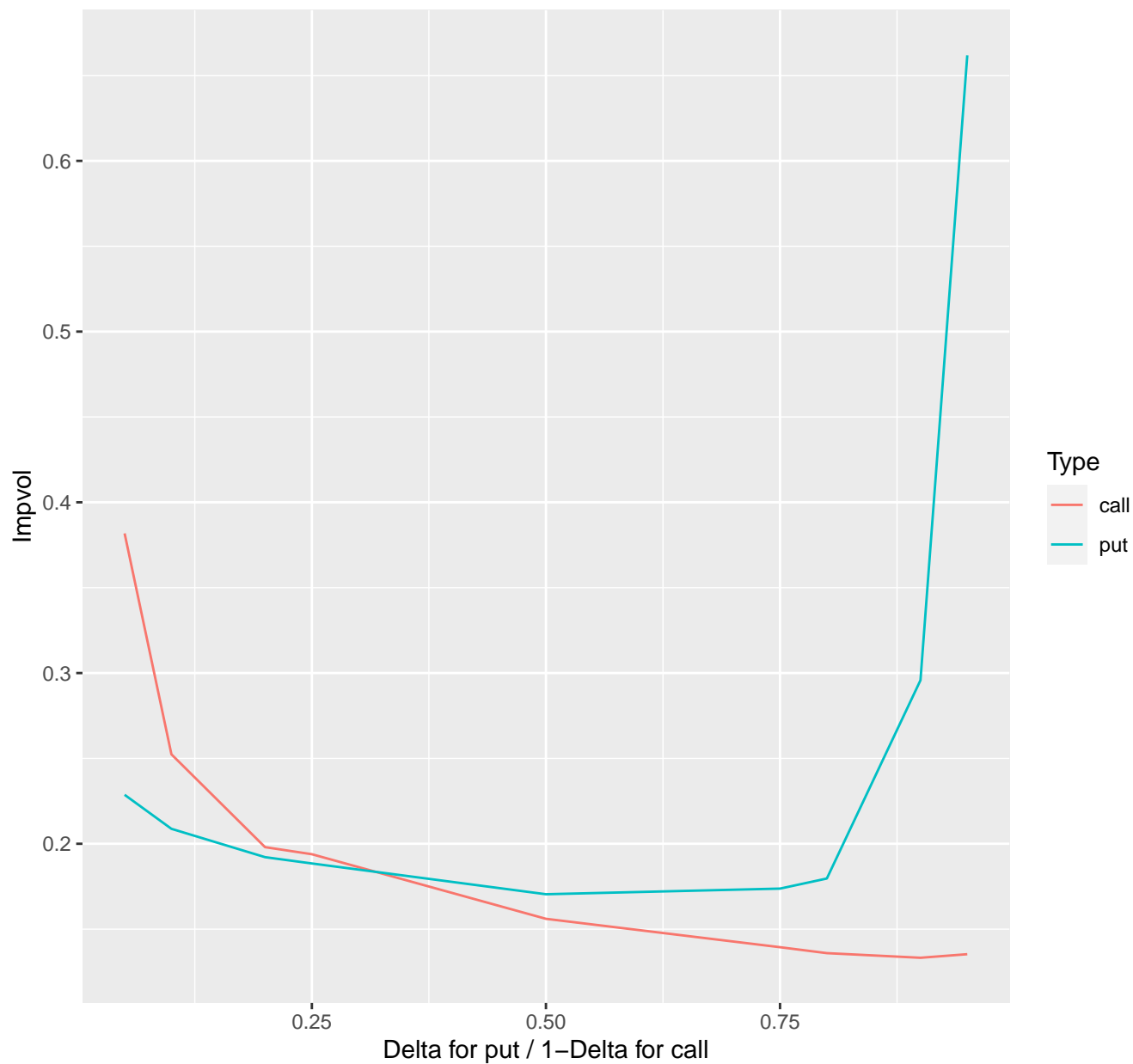
2012-10-19

x axis represents strike price, increasing



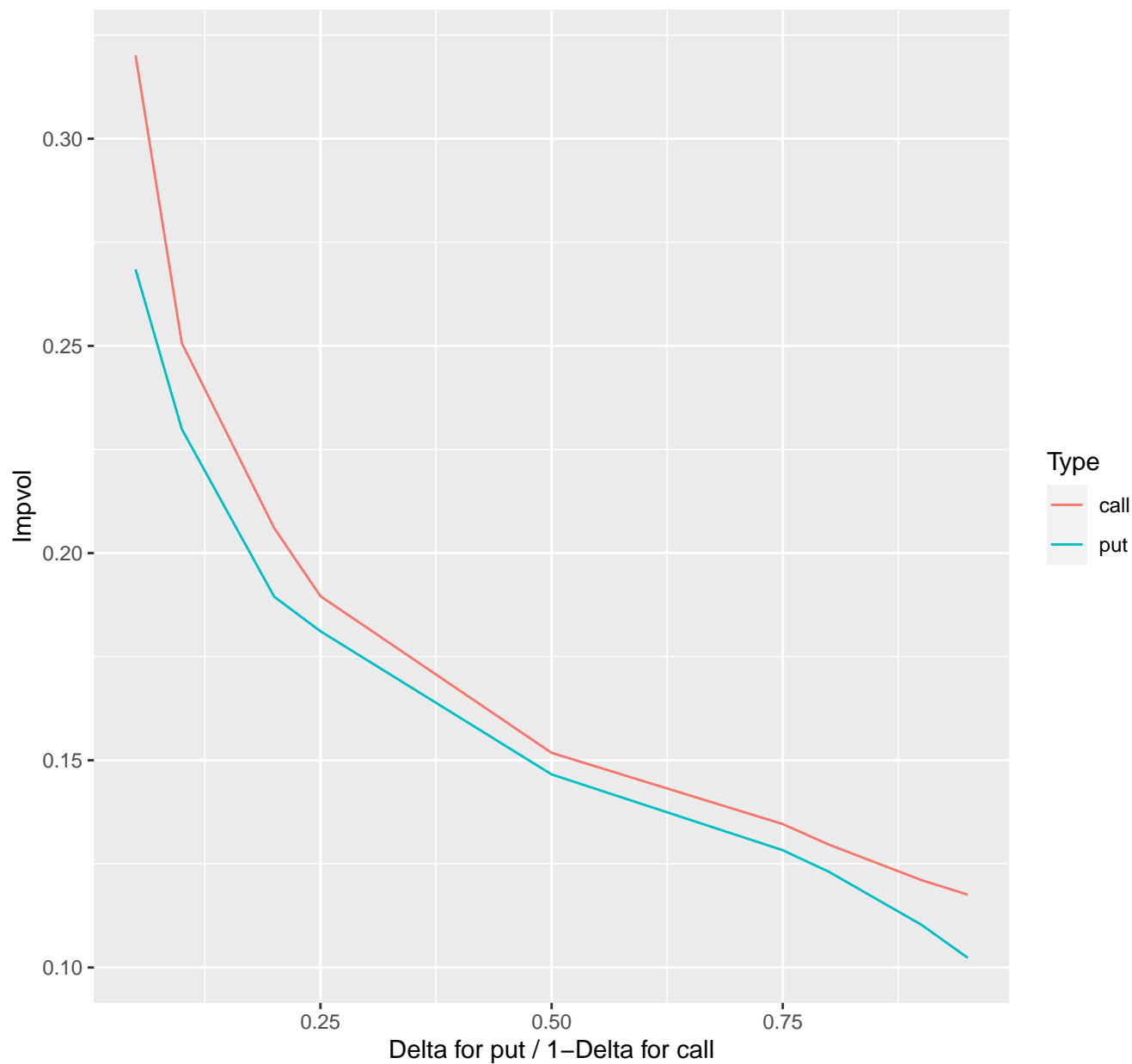
2012-11-16

x axis represents strike price, increasing



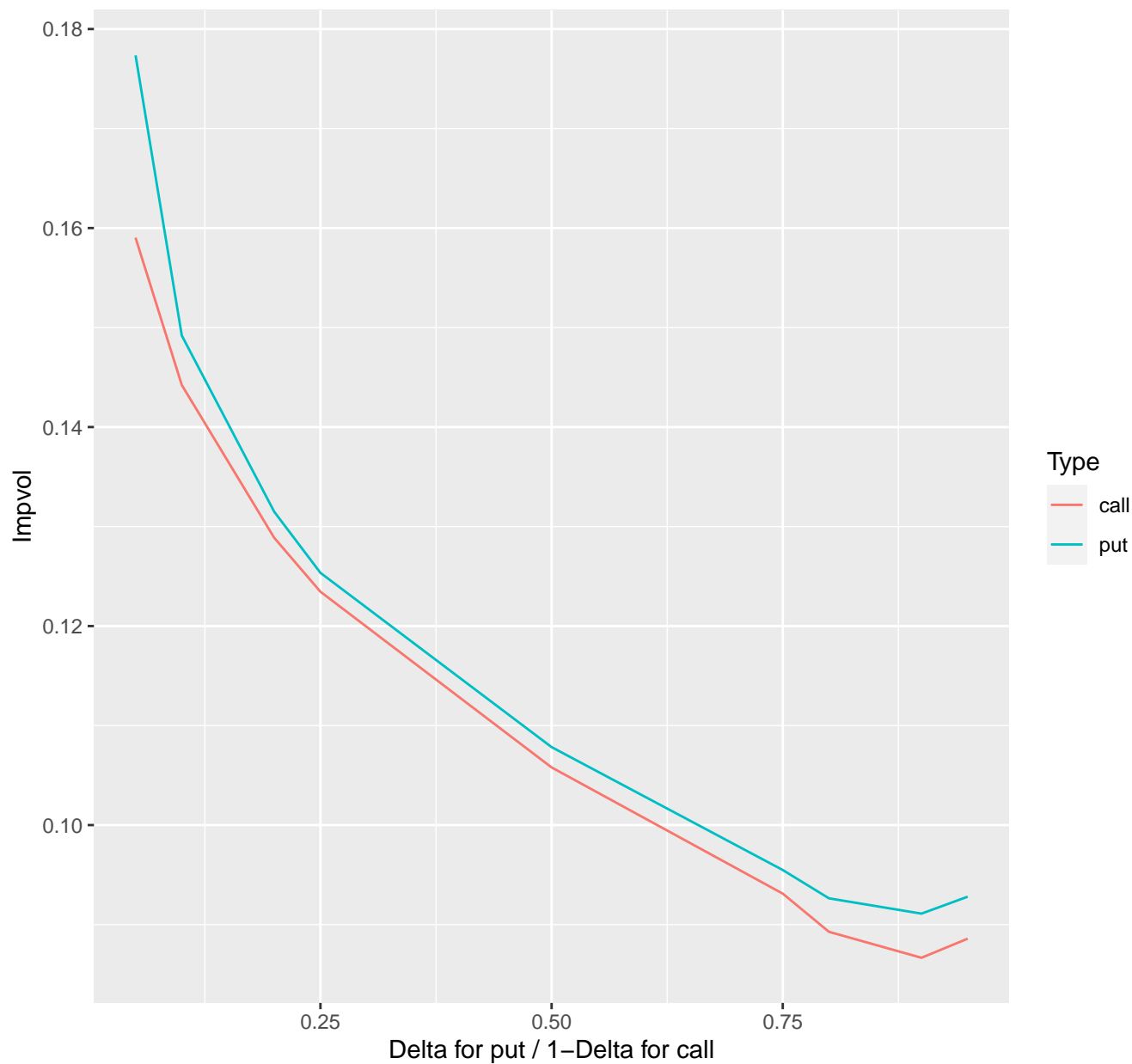
2012-12-21

x axis represents strike price, increasing



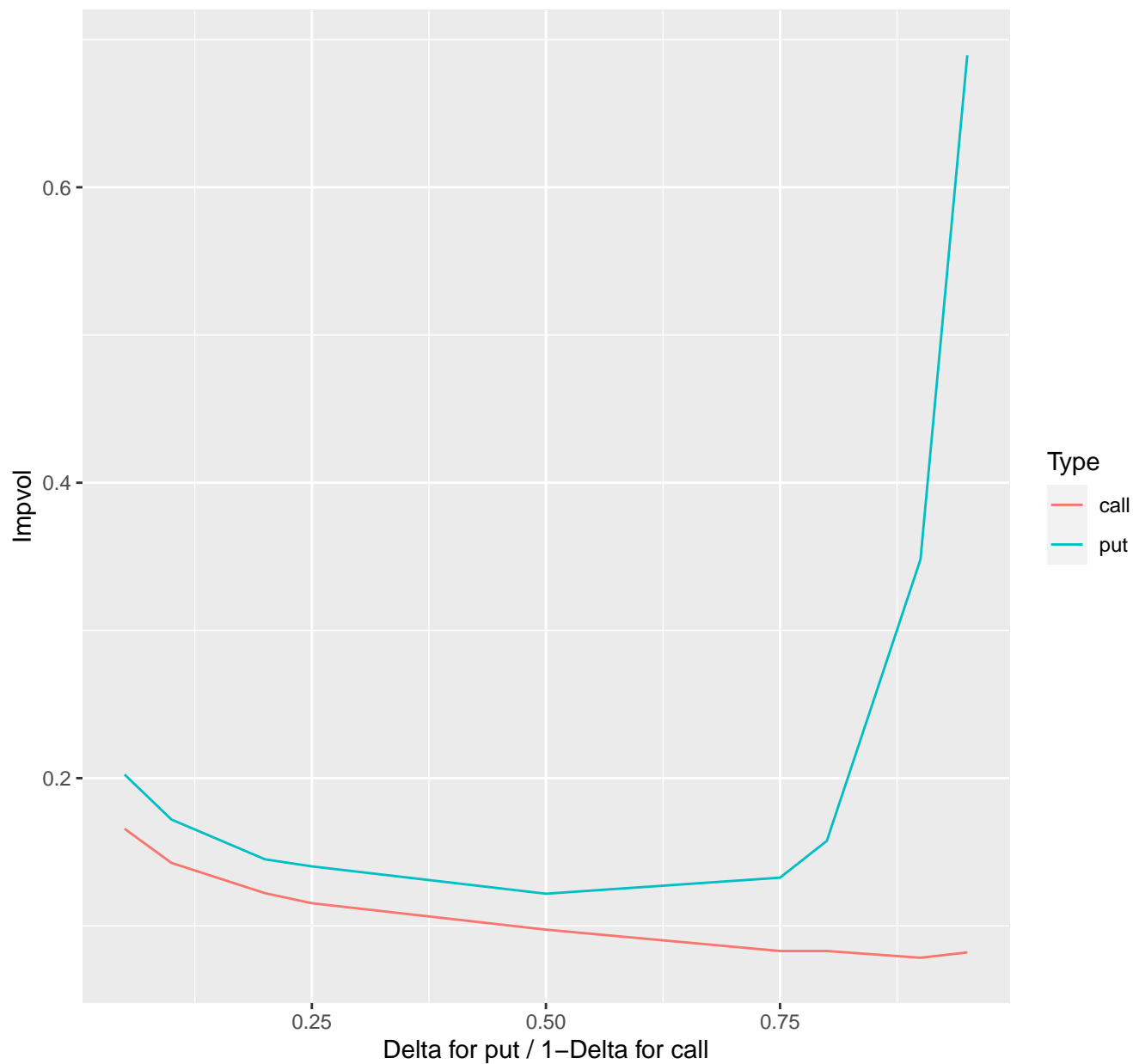
2013-01-18

x axis represents strike price, increasing



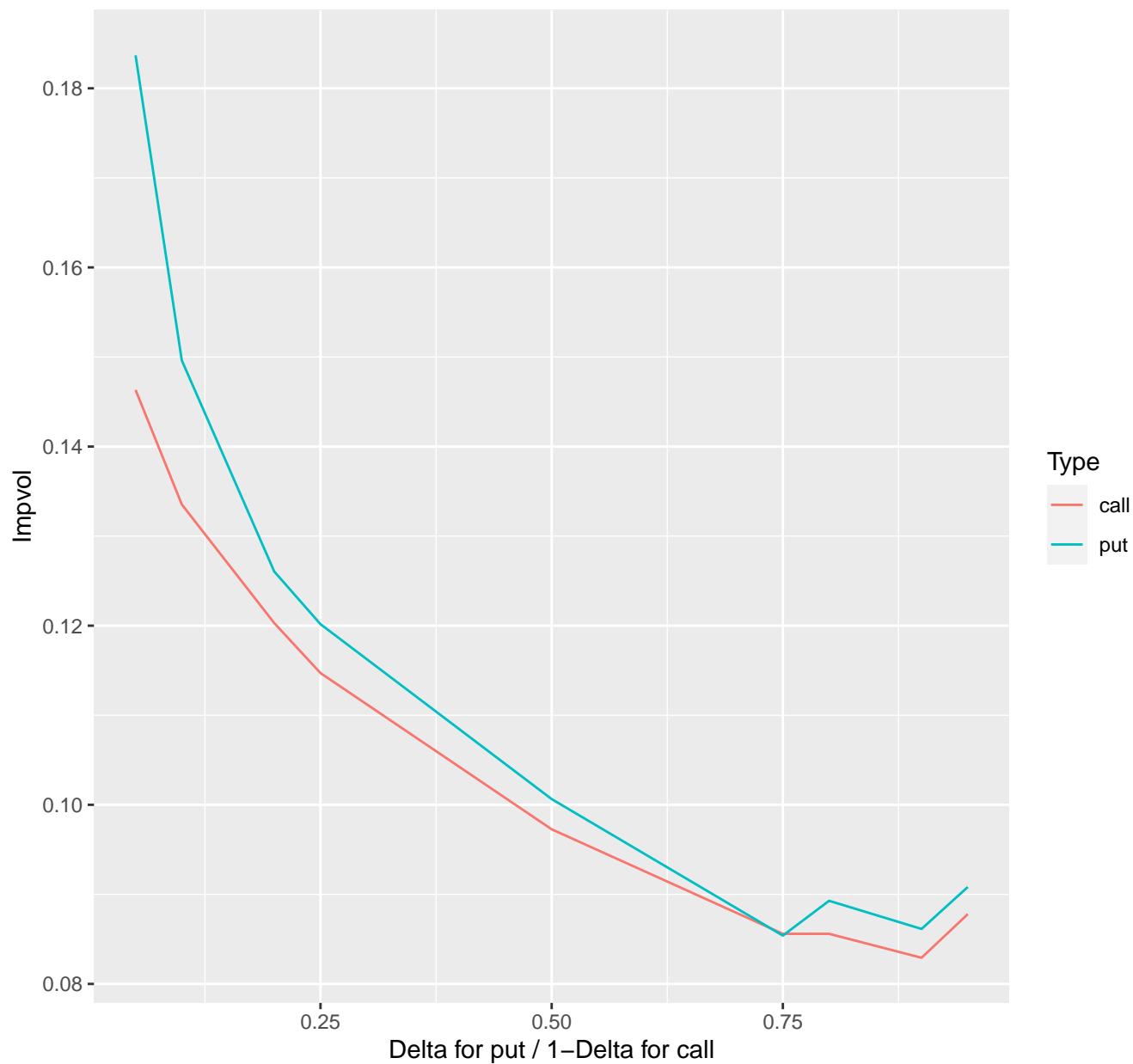
2013-02-15

x axis represents strike price, increasing



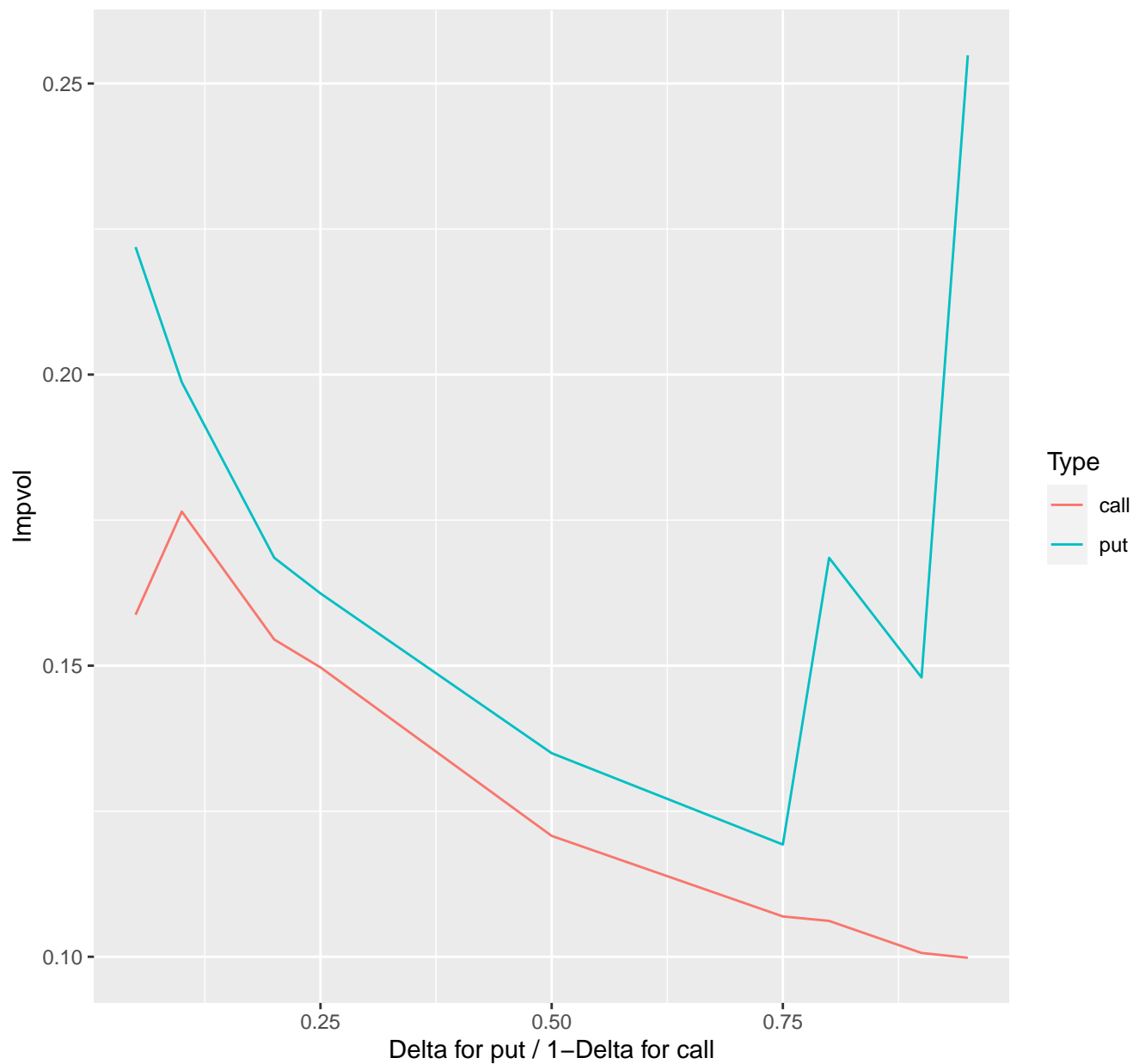
2013-03-15

x axis represents strike price, increasing



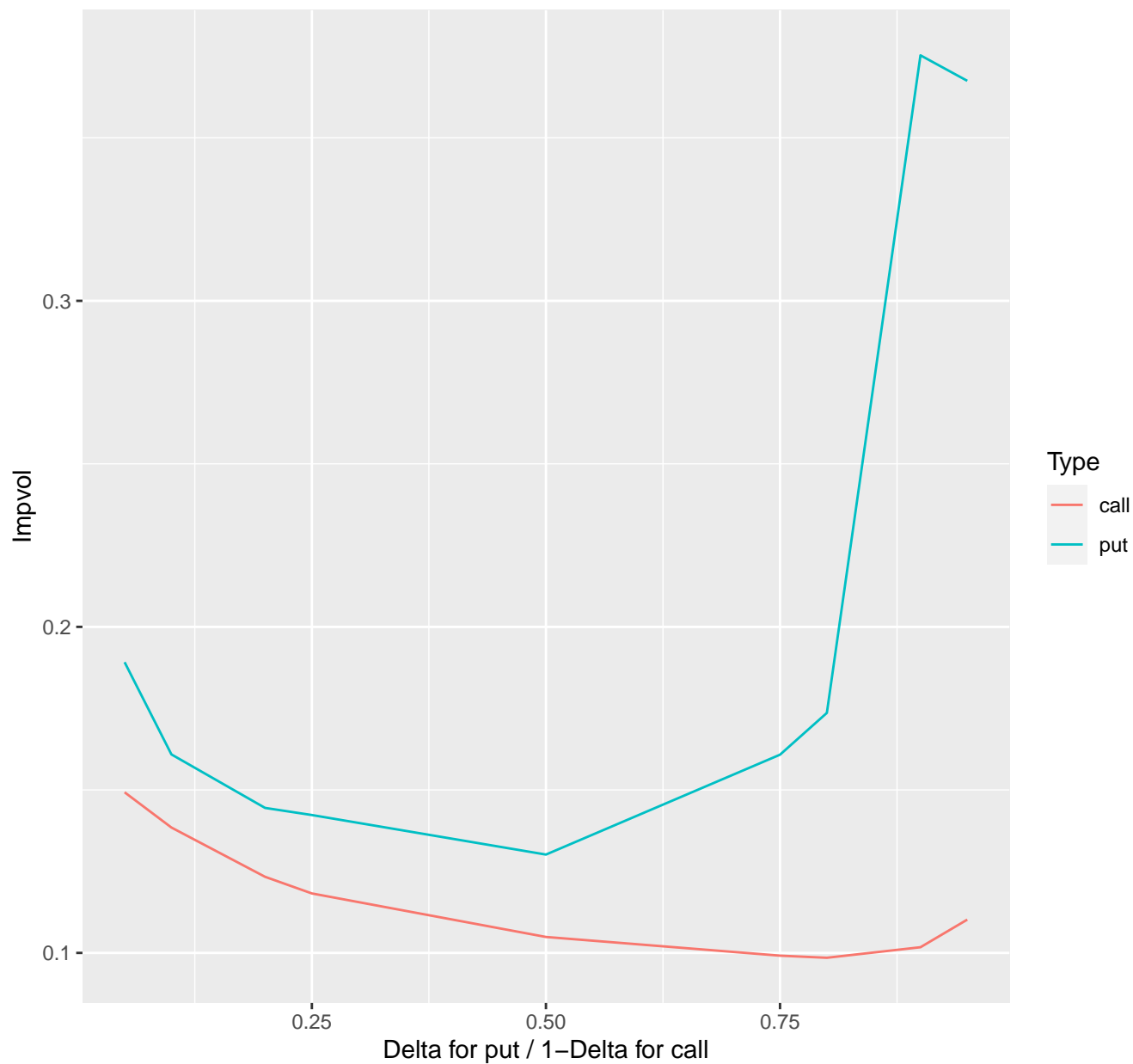
2013-04-19

x axis represents strike price, increasing



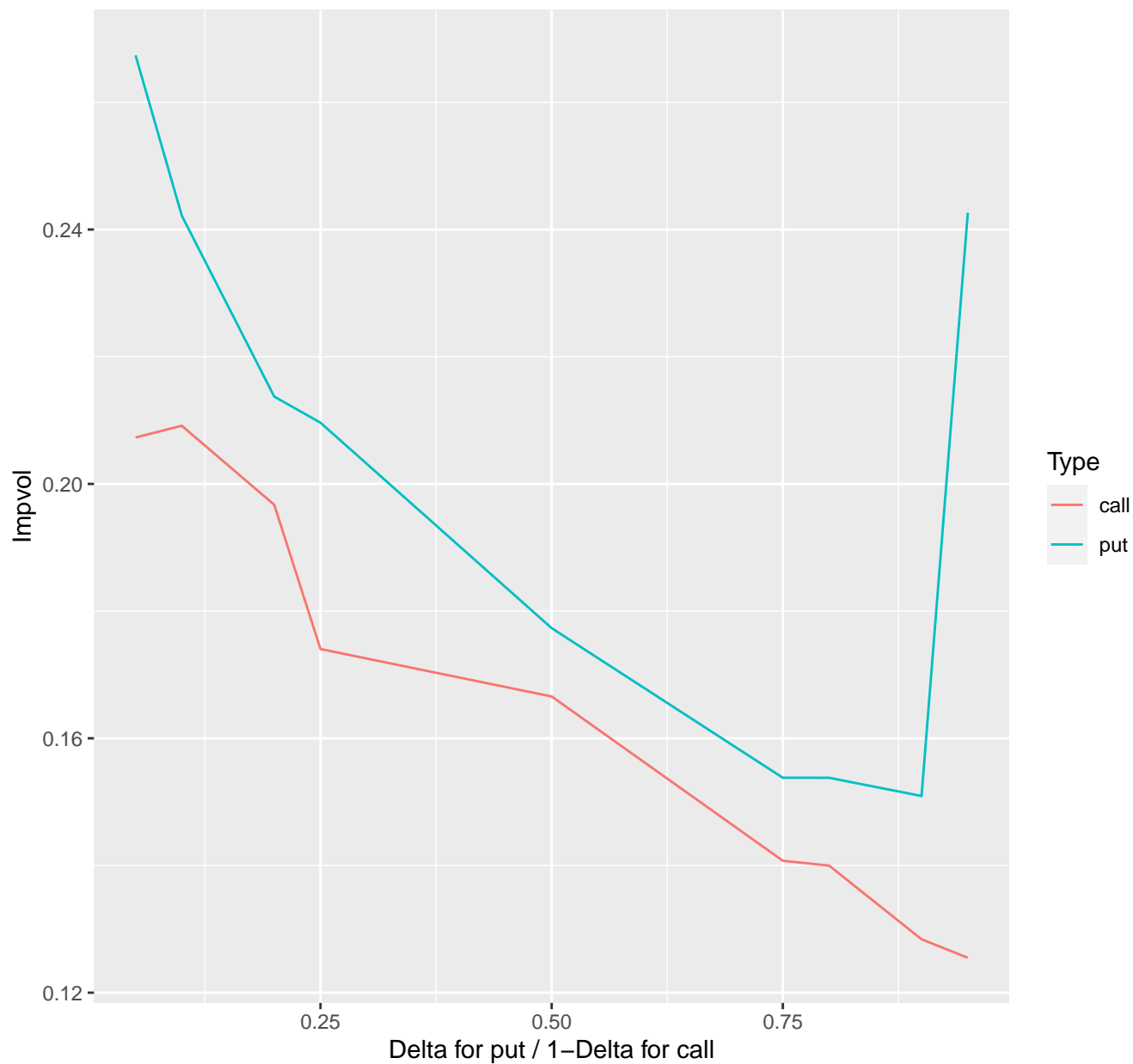
2013-05-17

x axis represents strike price, increasing



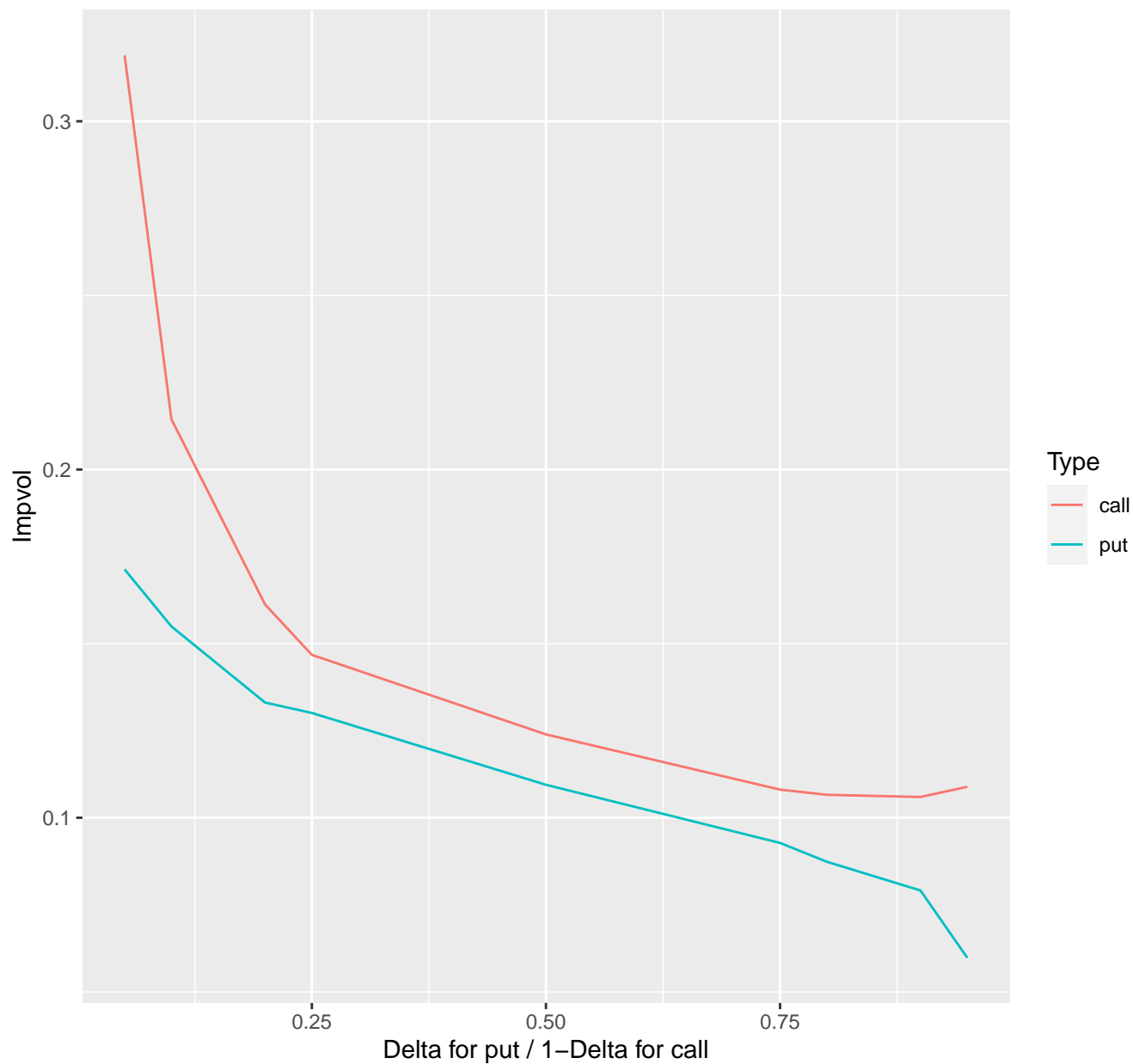
2013-06-21

x axis represents strike price, increasing



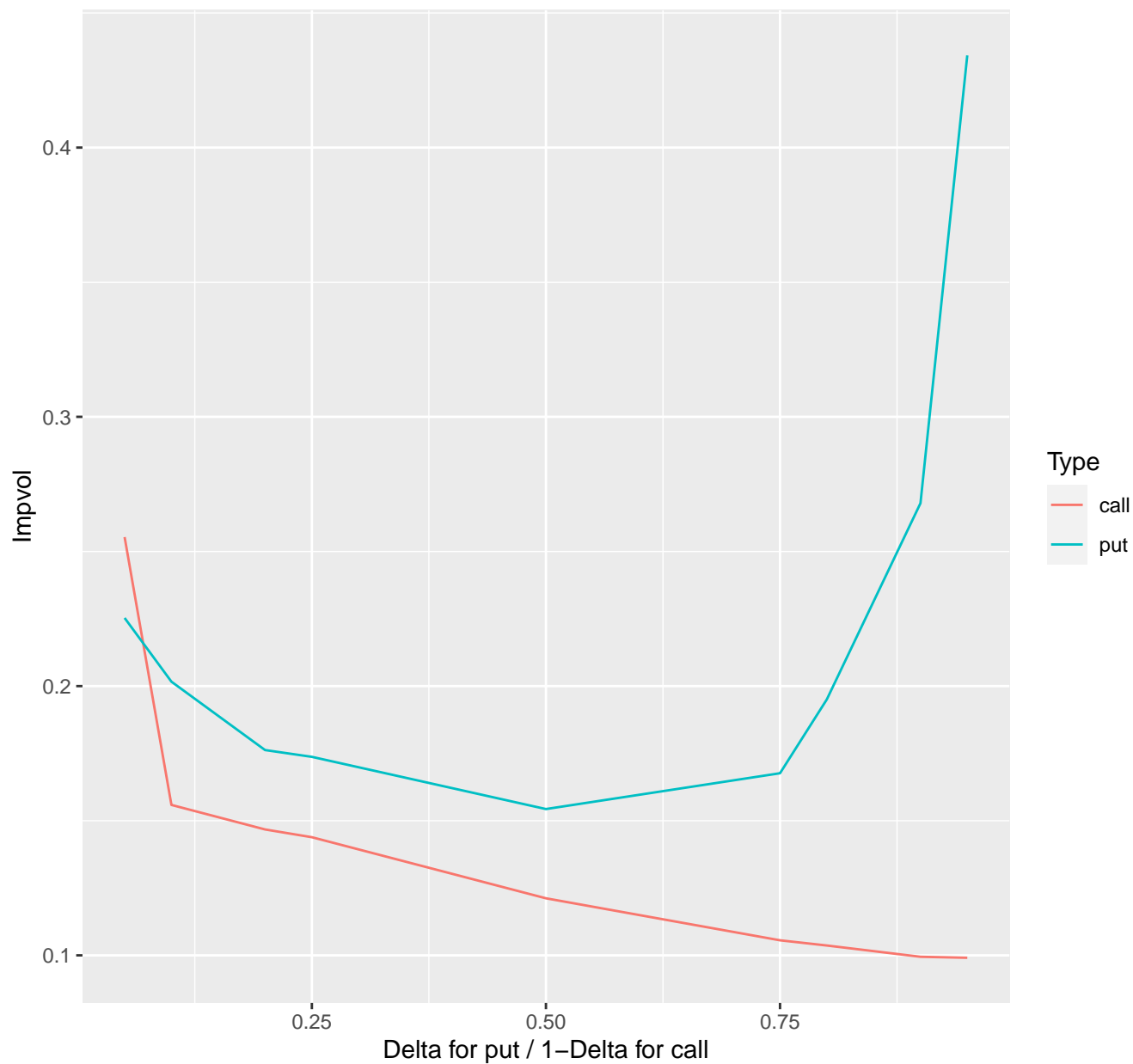
2013-07-19

x axis represents strike price, increasing



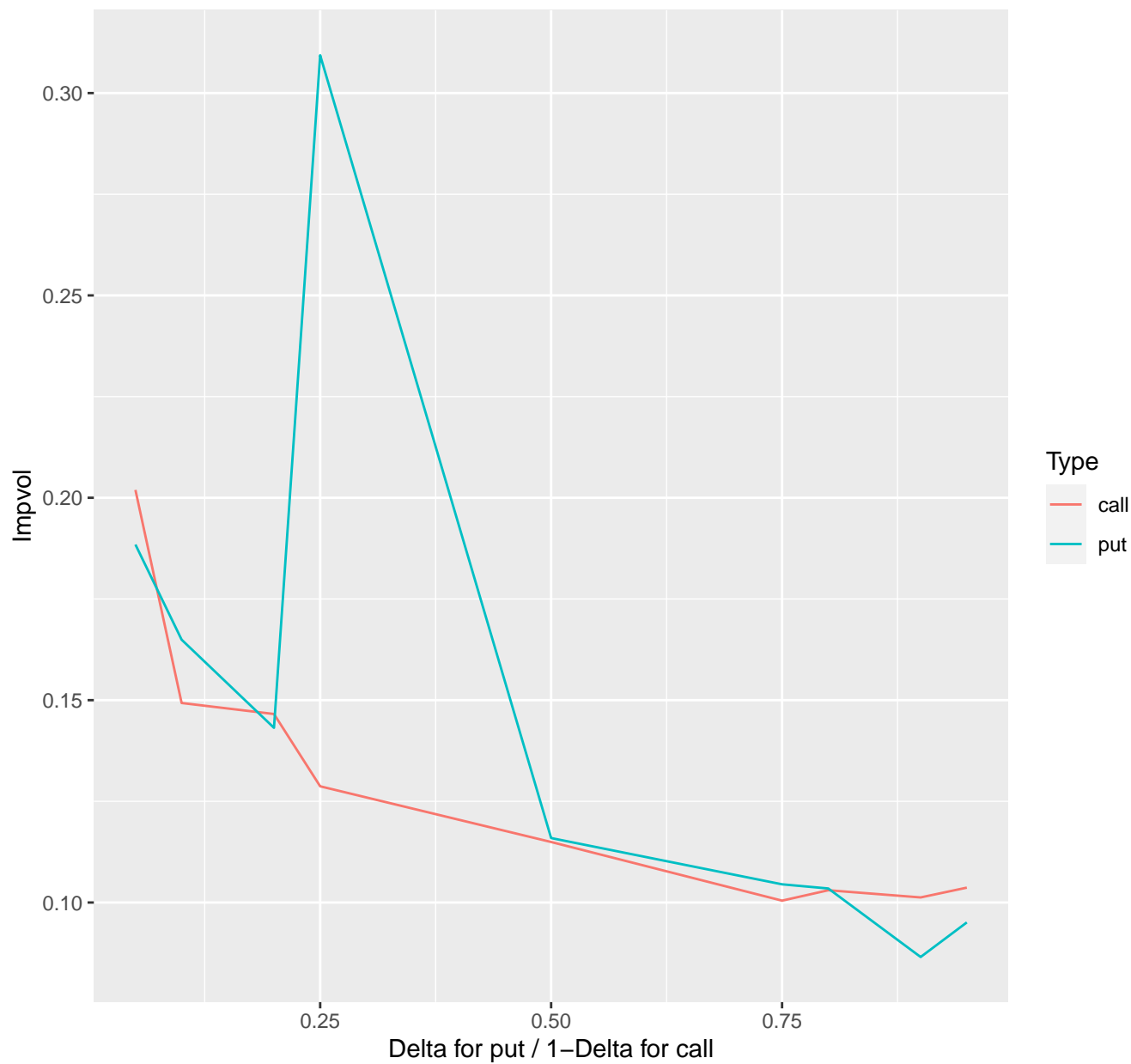
2013-08-16

x axis represents strike price, increasing



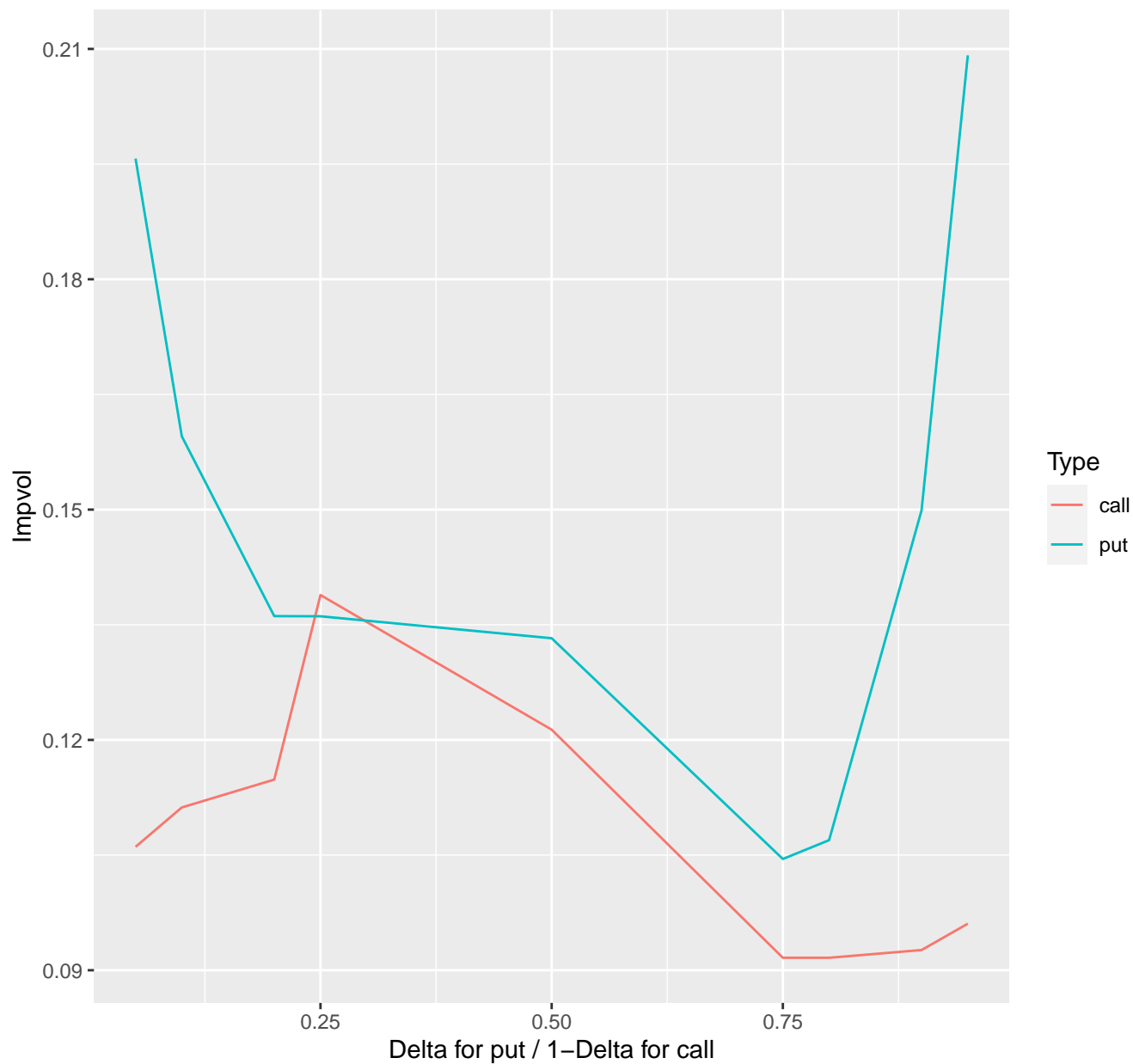
2013-09-20

x axis represents strike price, increasing



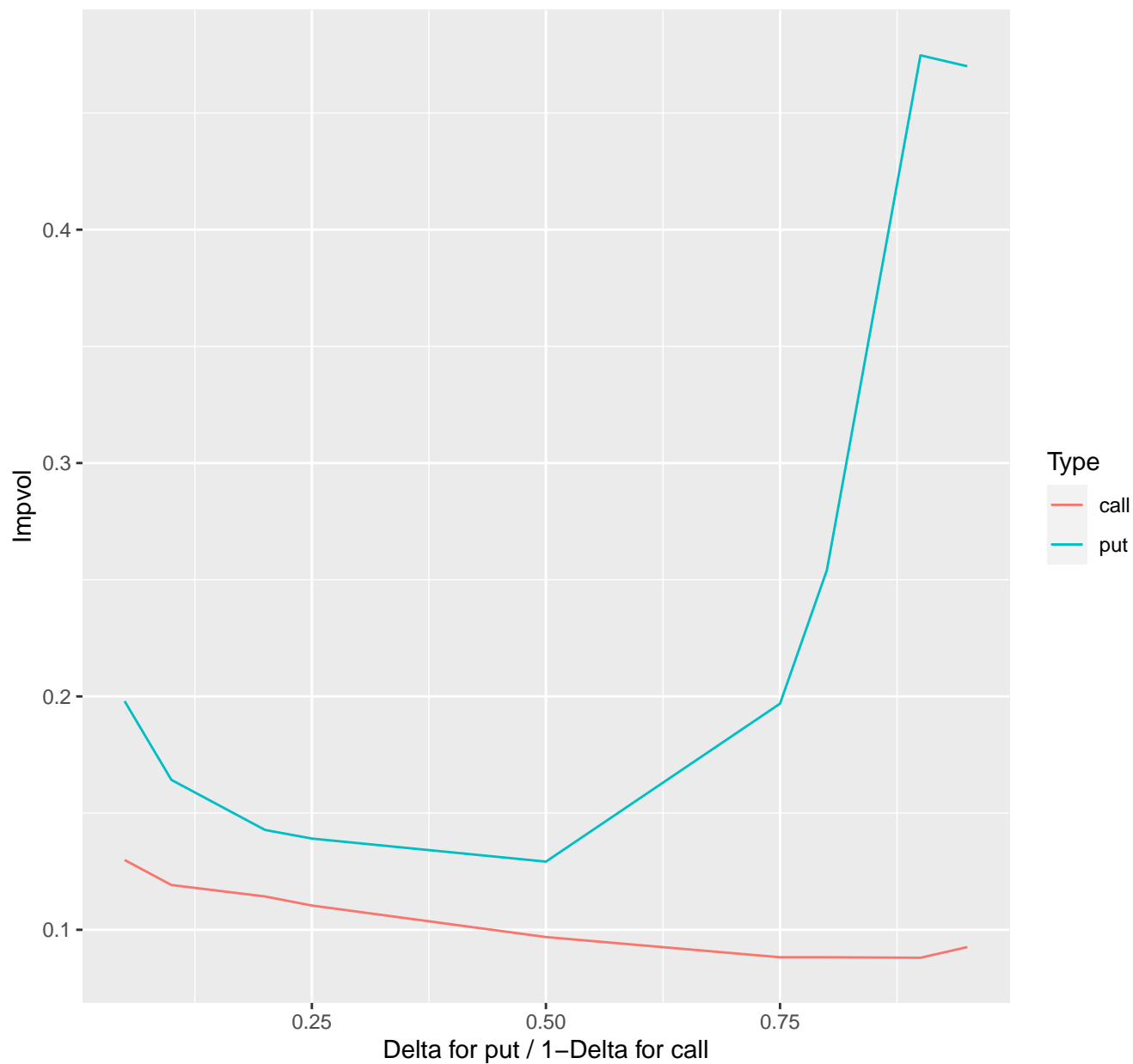
2013-10-18

x axis represents strike price, increasing



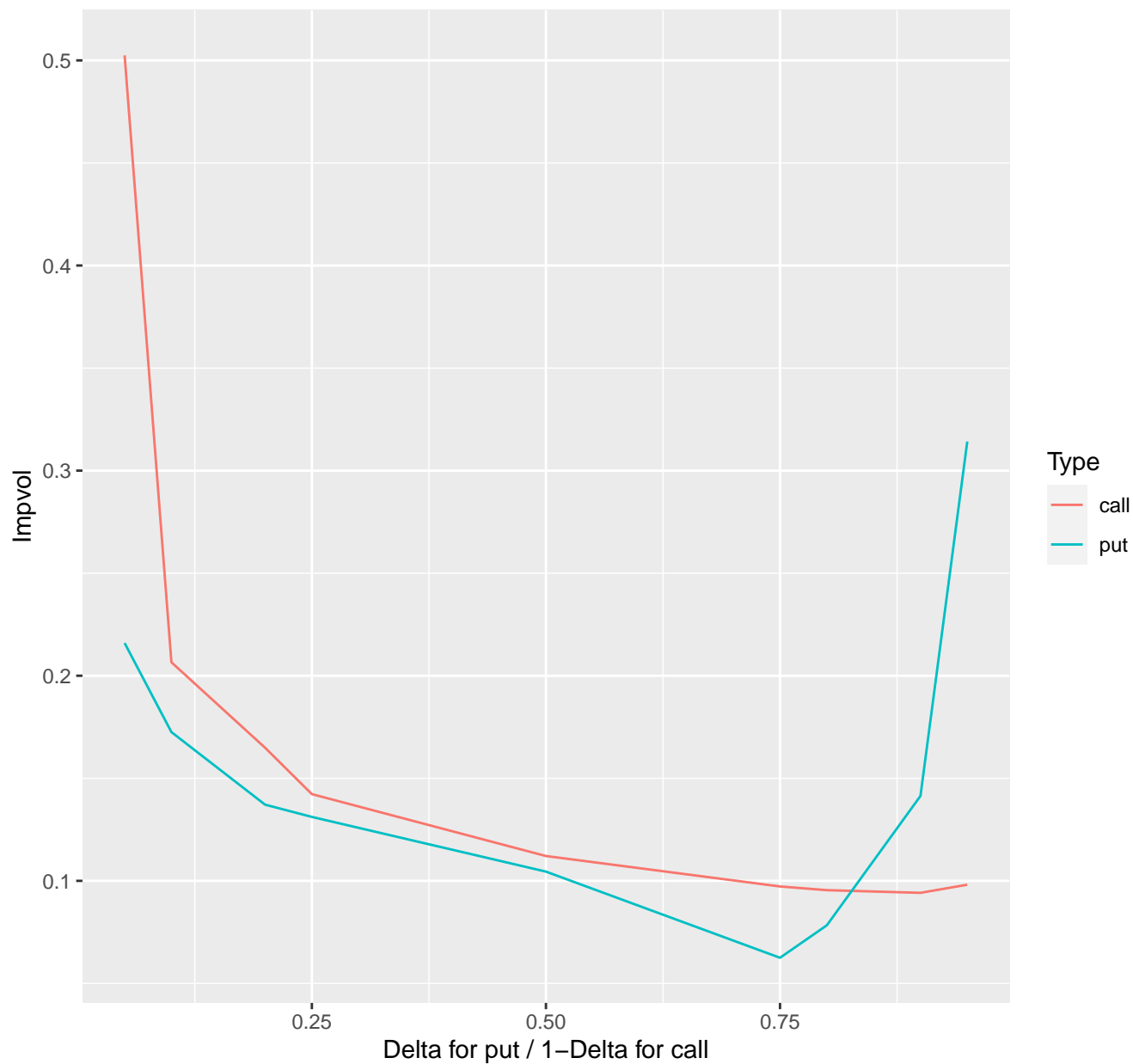
2013-11-15

x axis represents strike price, increasing



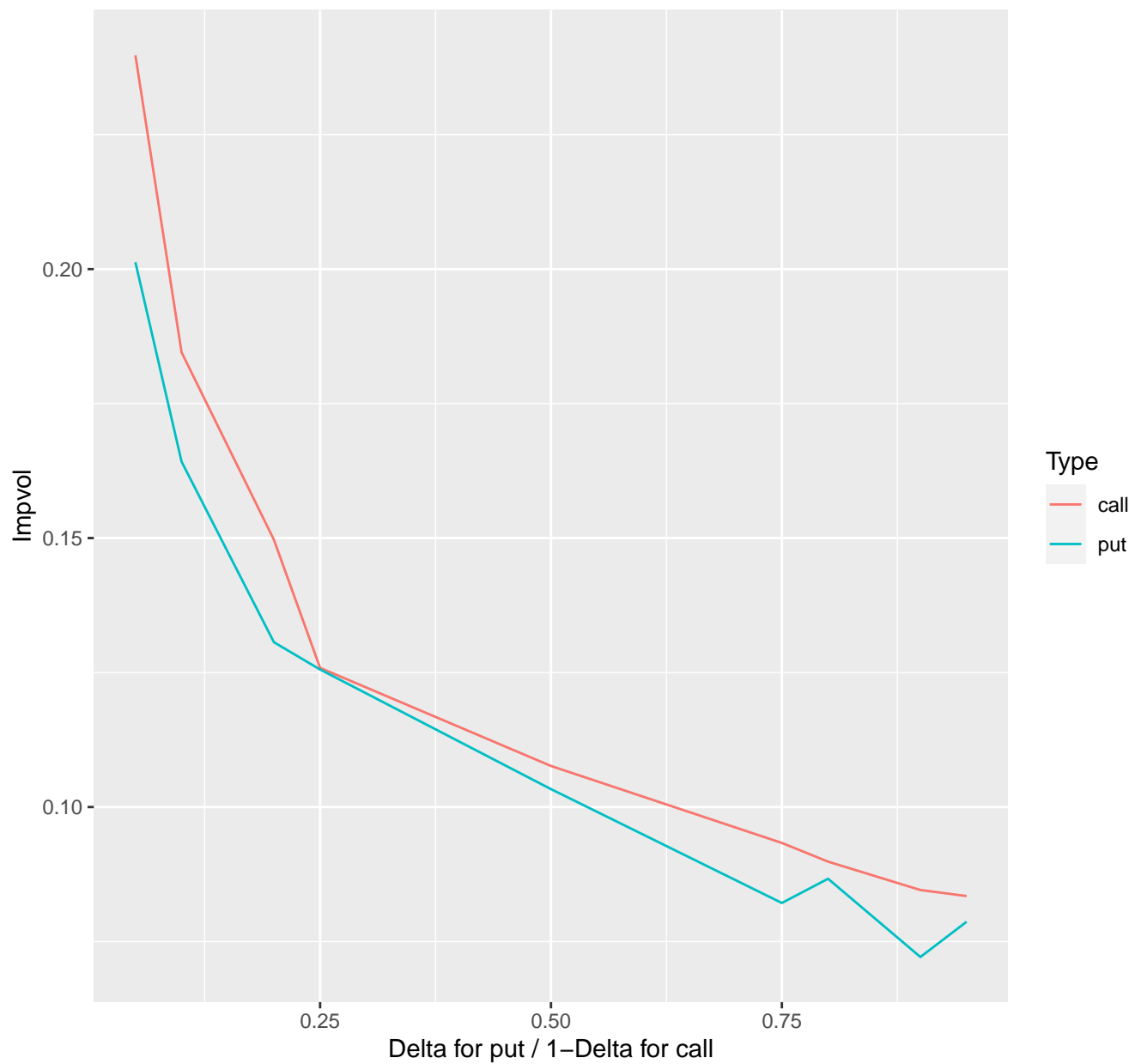
2013-12-20

x axis represents strike price, increasing



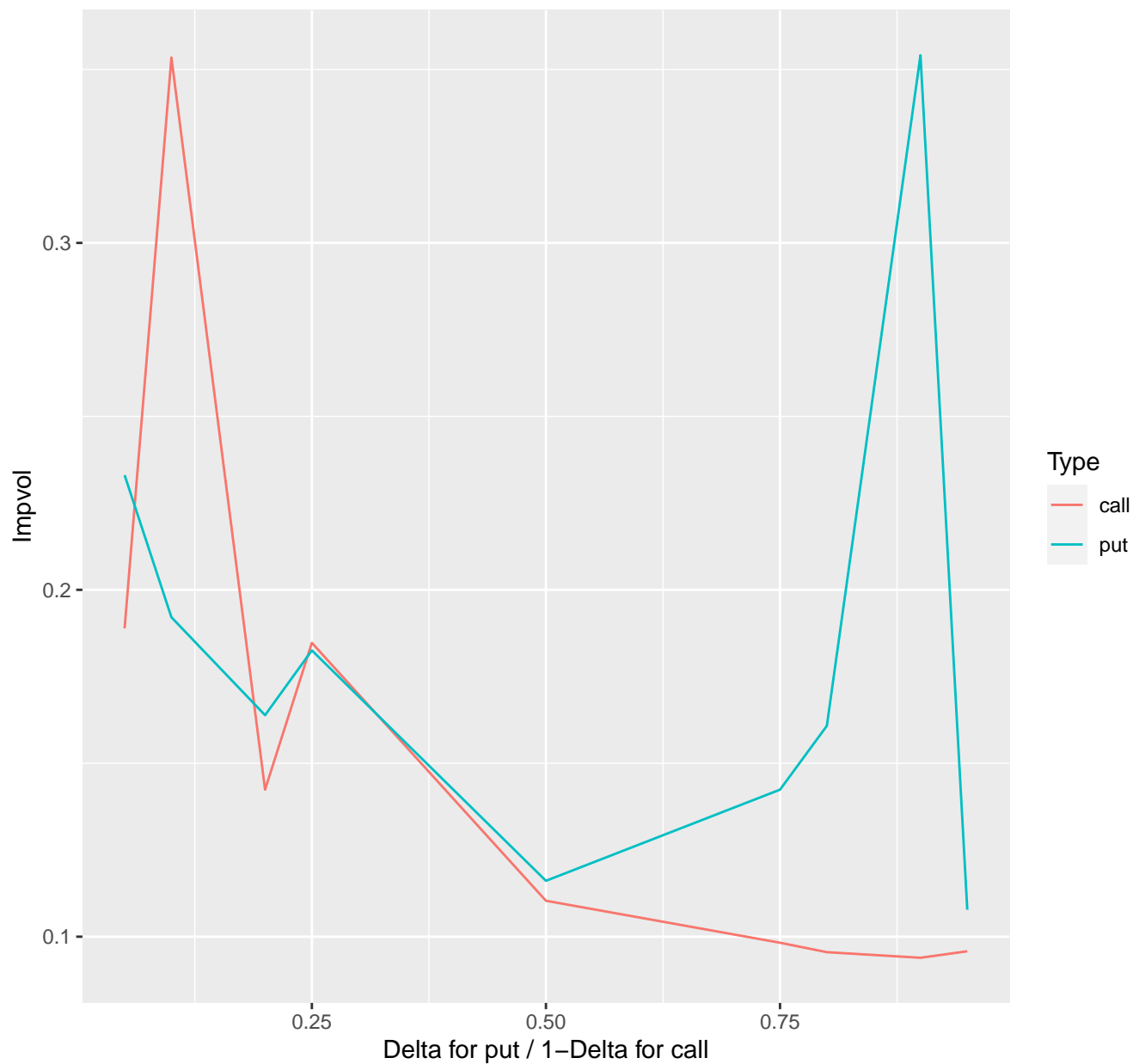
2014-01-17

x axis represents strike price, increasing



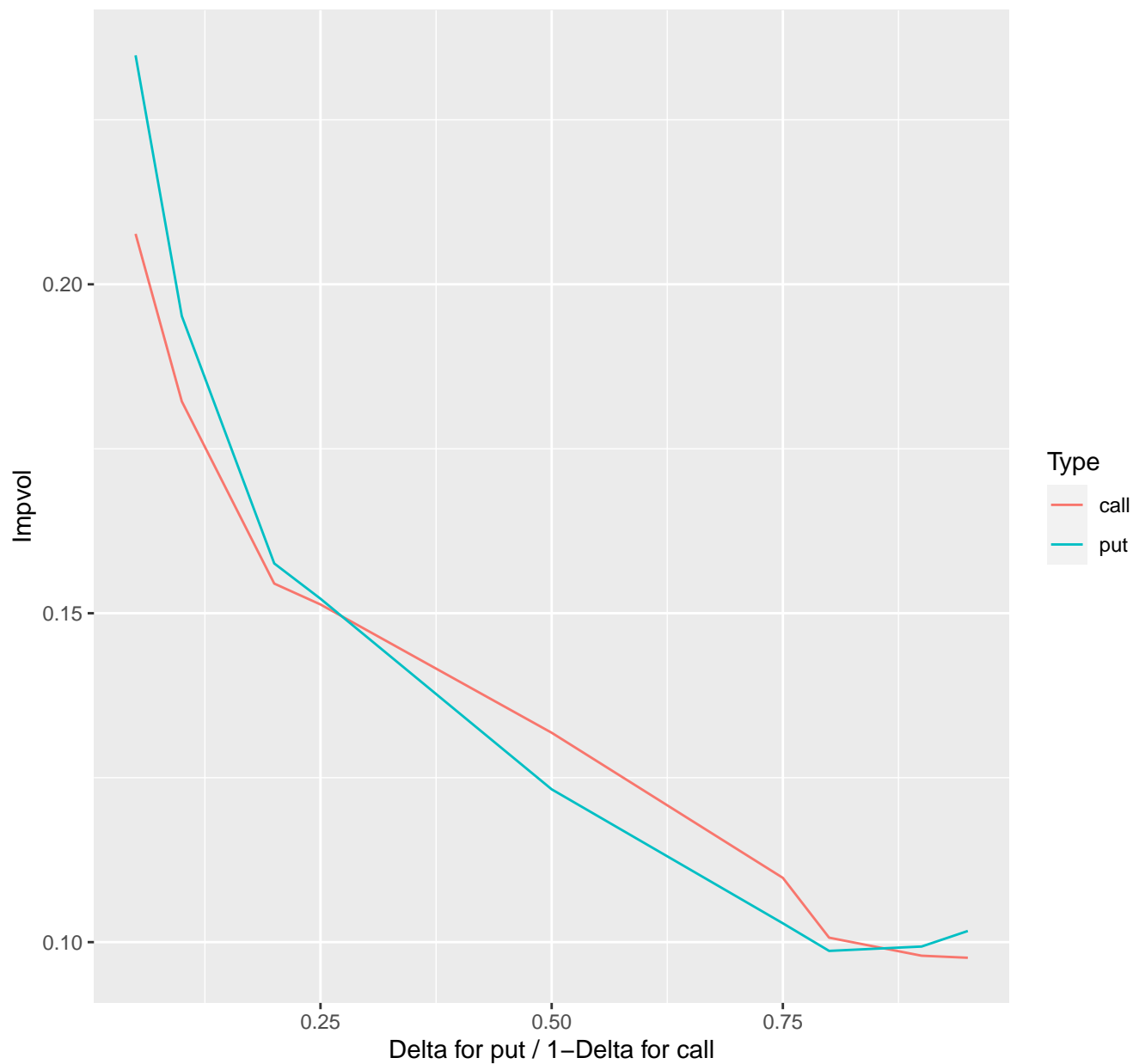
2014-02-21

x axis represents strike price, increasing



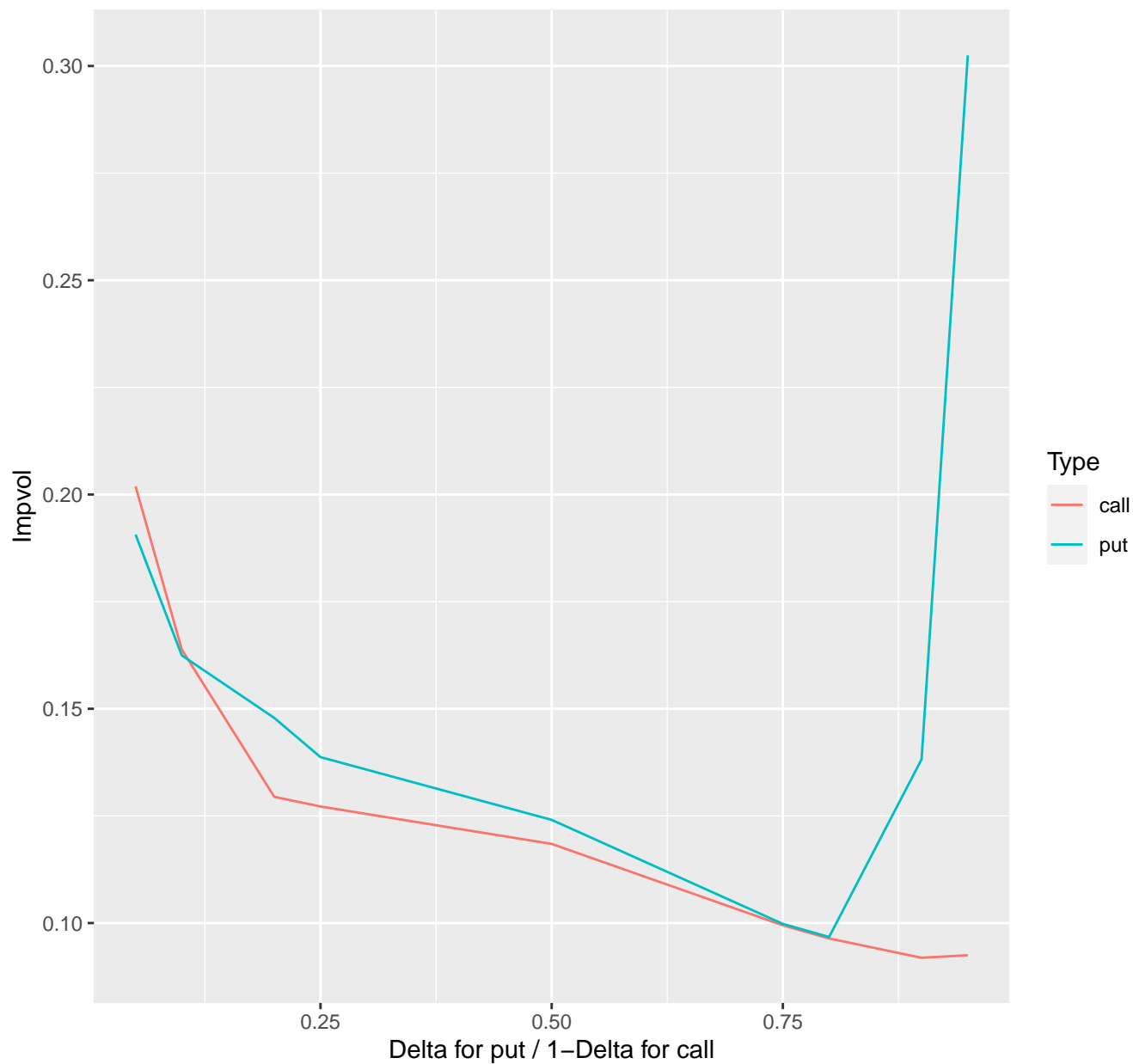
2014-03-21

x axis represents strike price, increasing



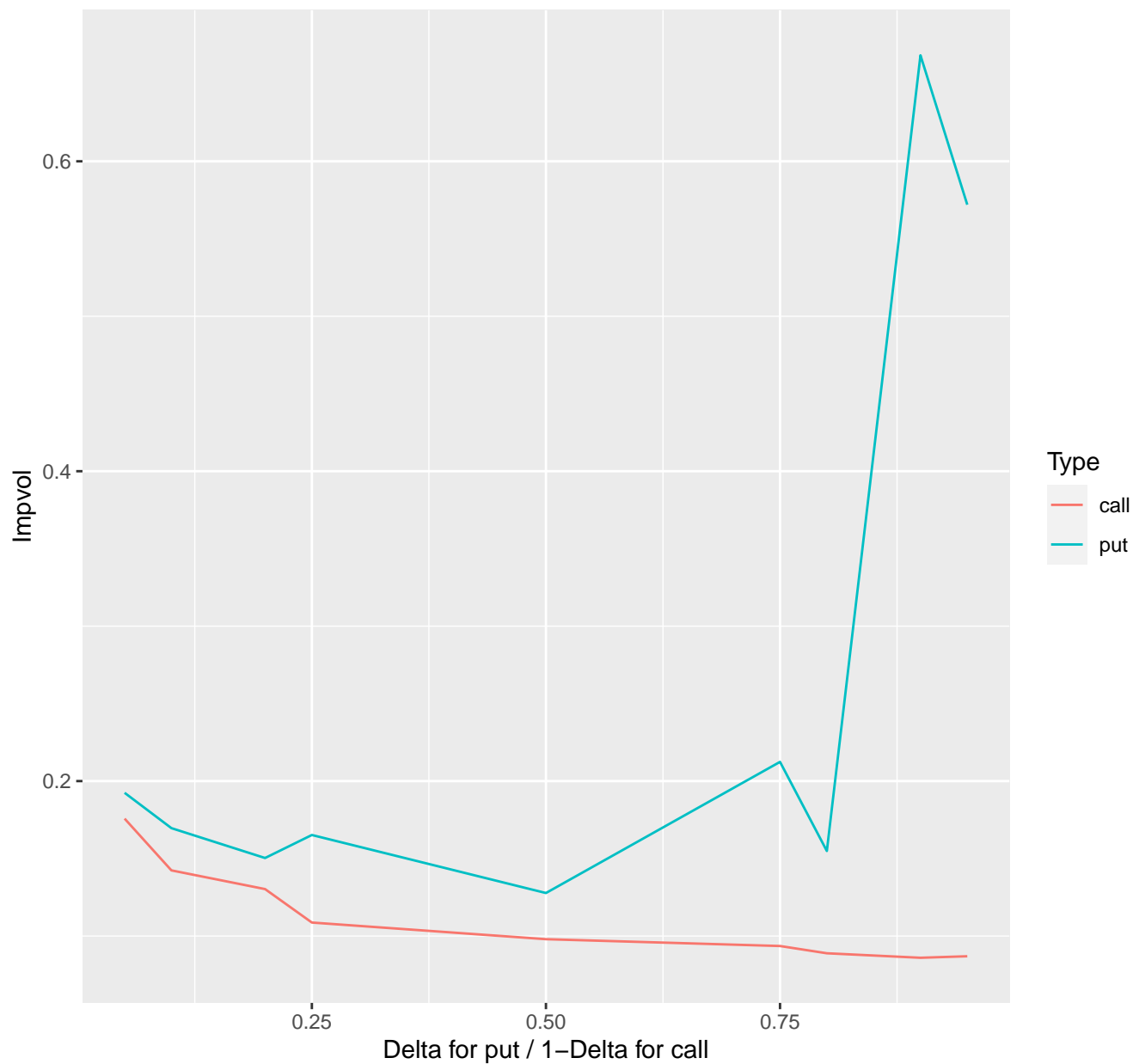
2014-04-17

x axis represents strike price, increasing



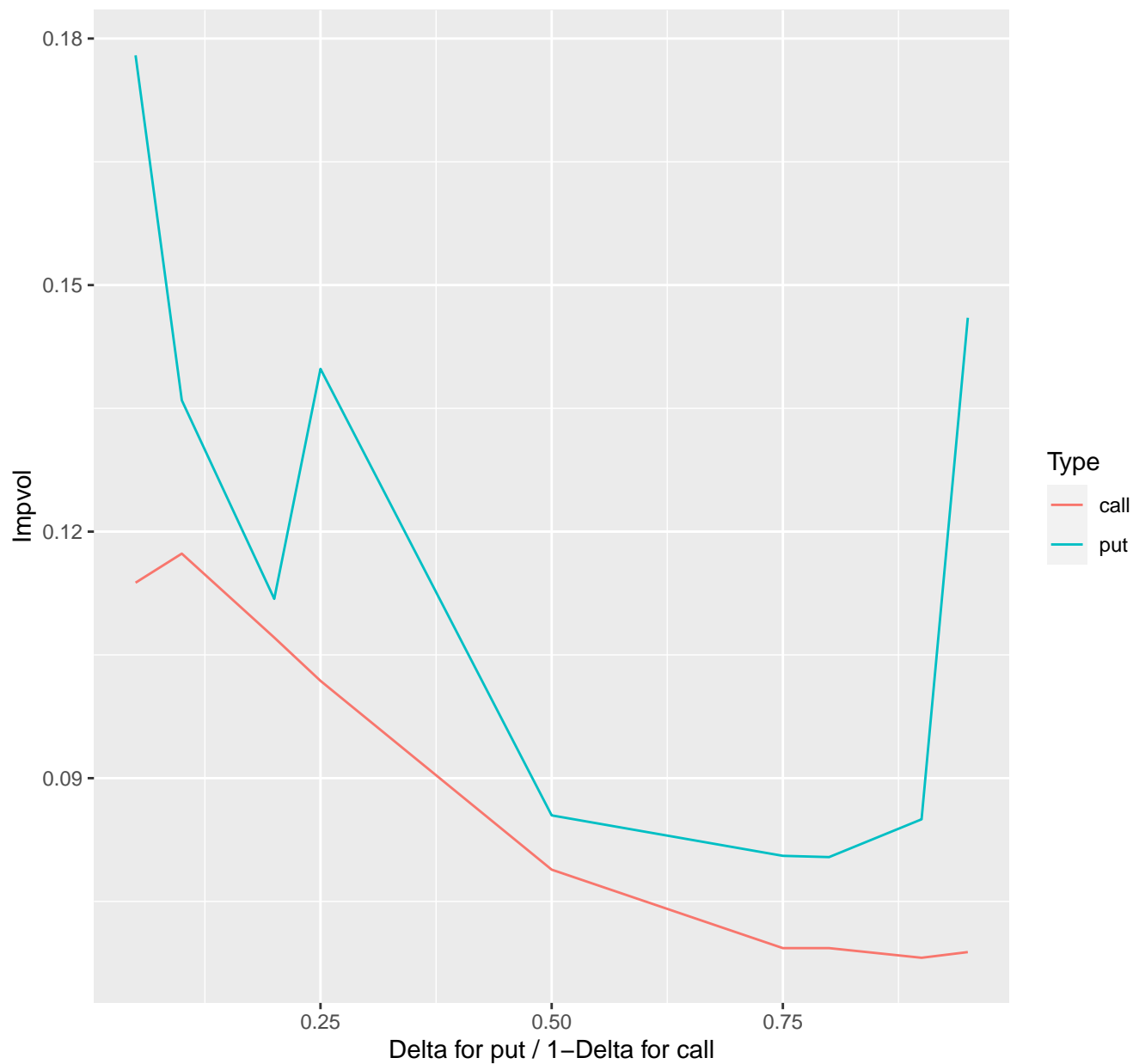
2014-05-16

x axis represents strike price, increasing



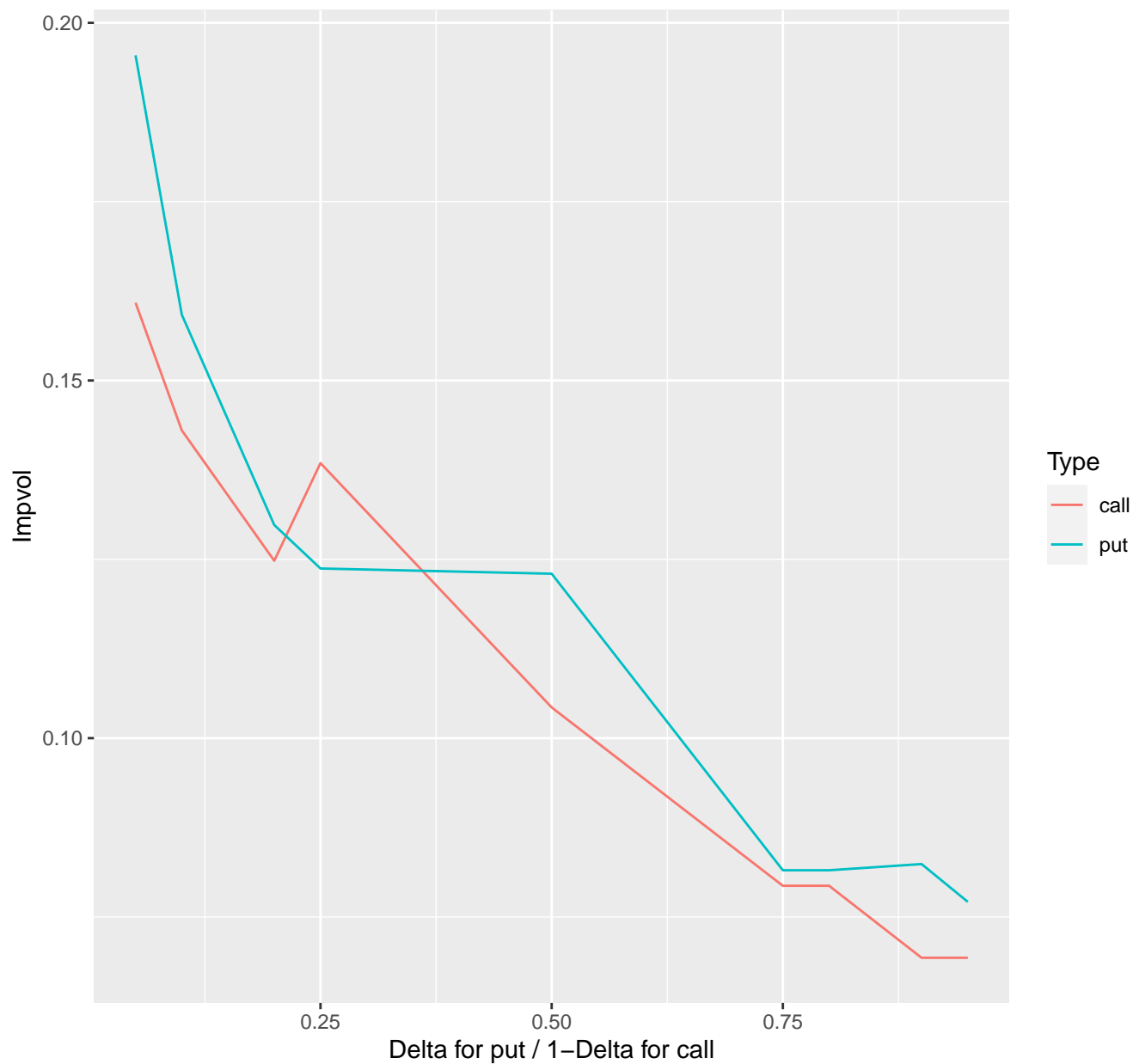
2014-06-20

x axis represents strike price, increasing



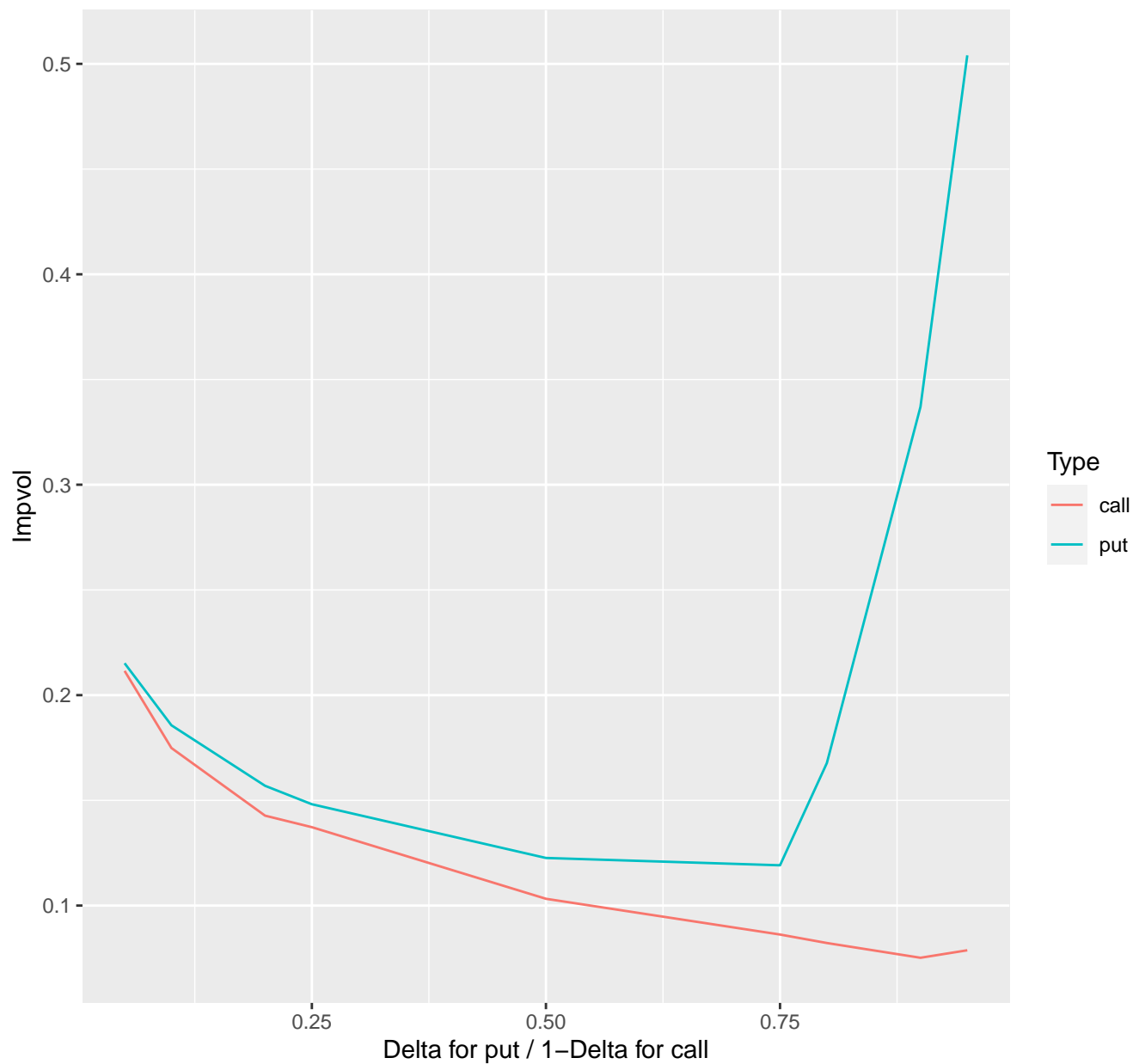
2014-07-18

x axis represents strike price, increasing



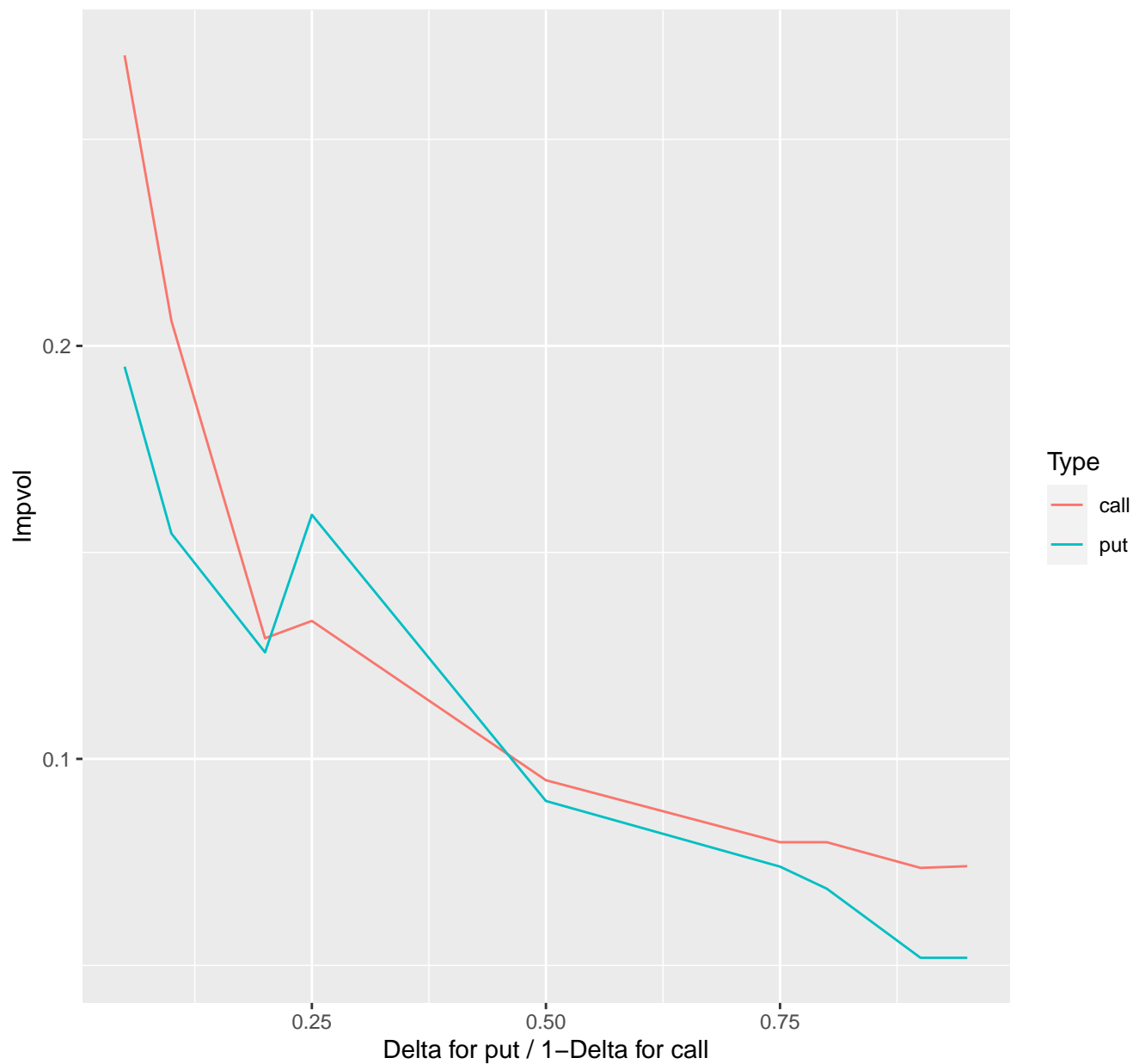
2014-08-15

x axis represents strike price, increasing



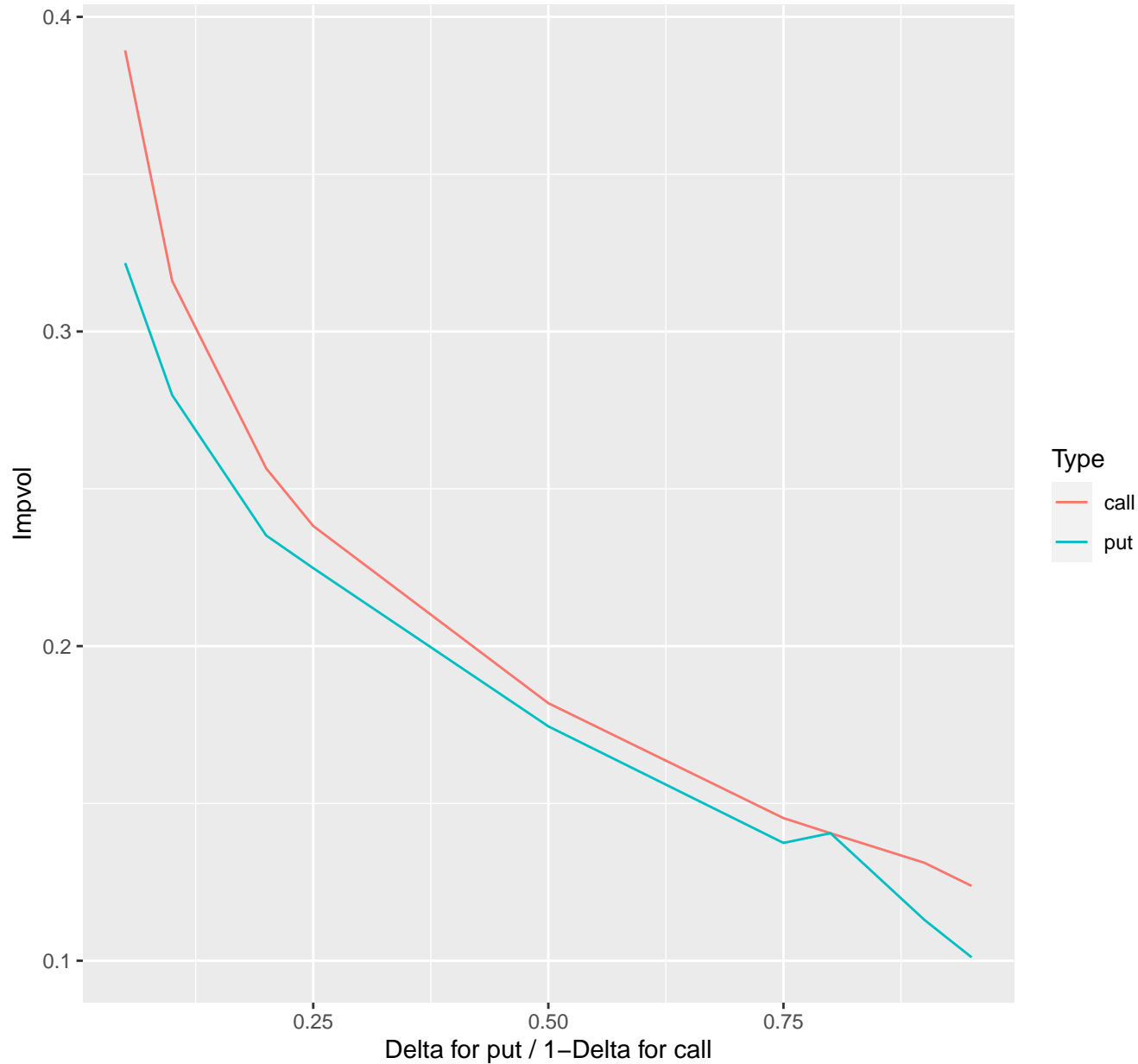
2014-09-19

x axis represents strike price, increasing



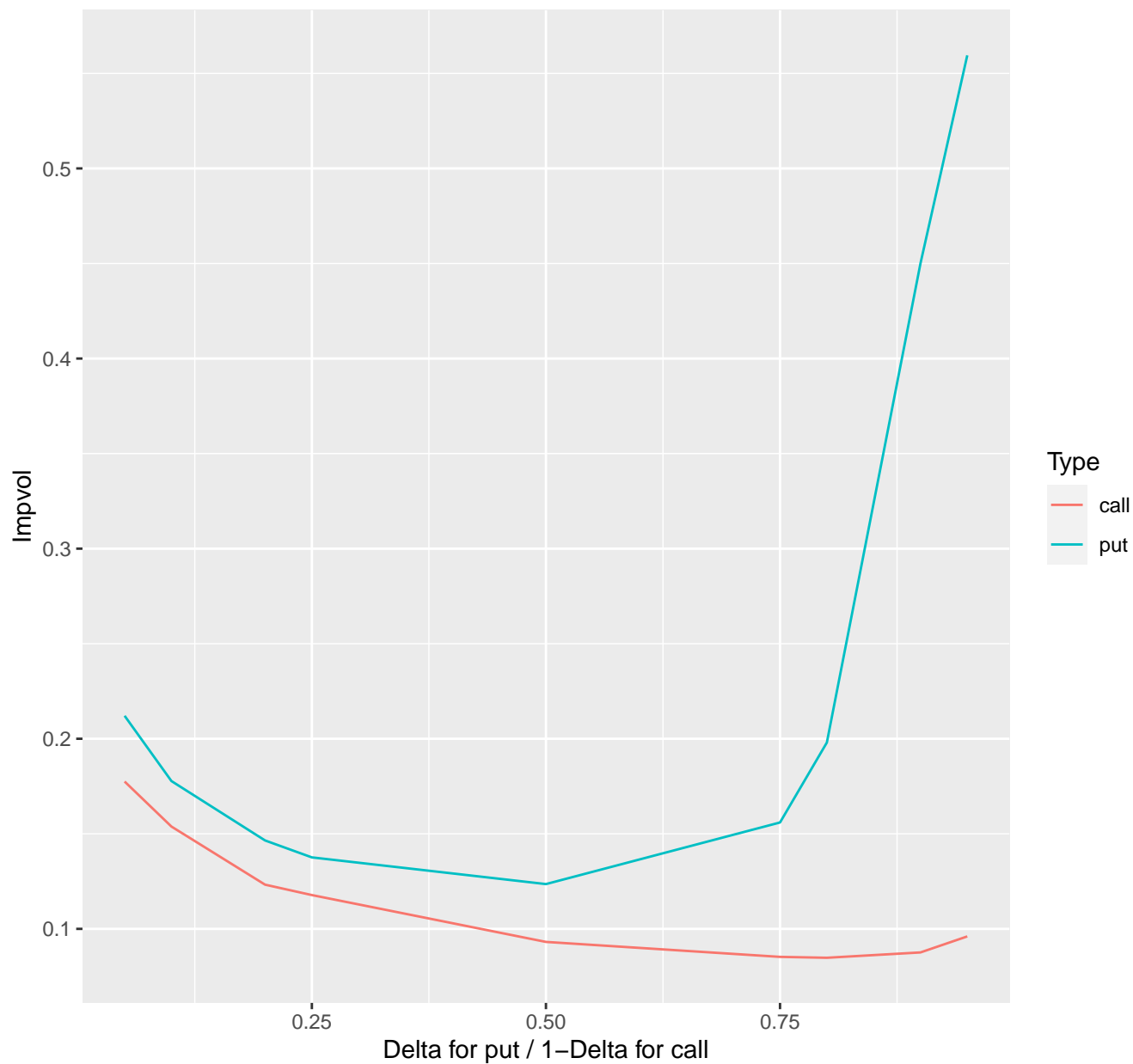
2014-10-17

x axis represents strike price, increasing



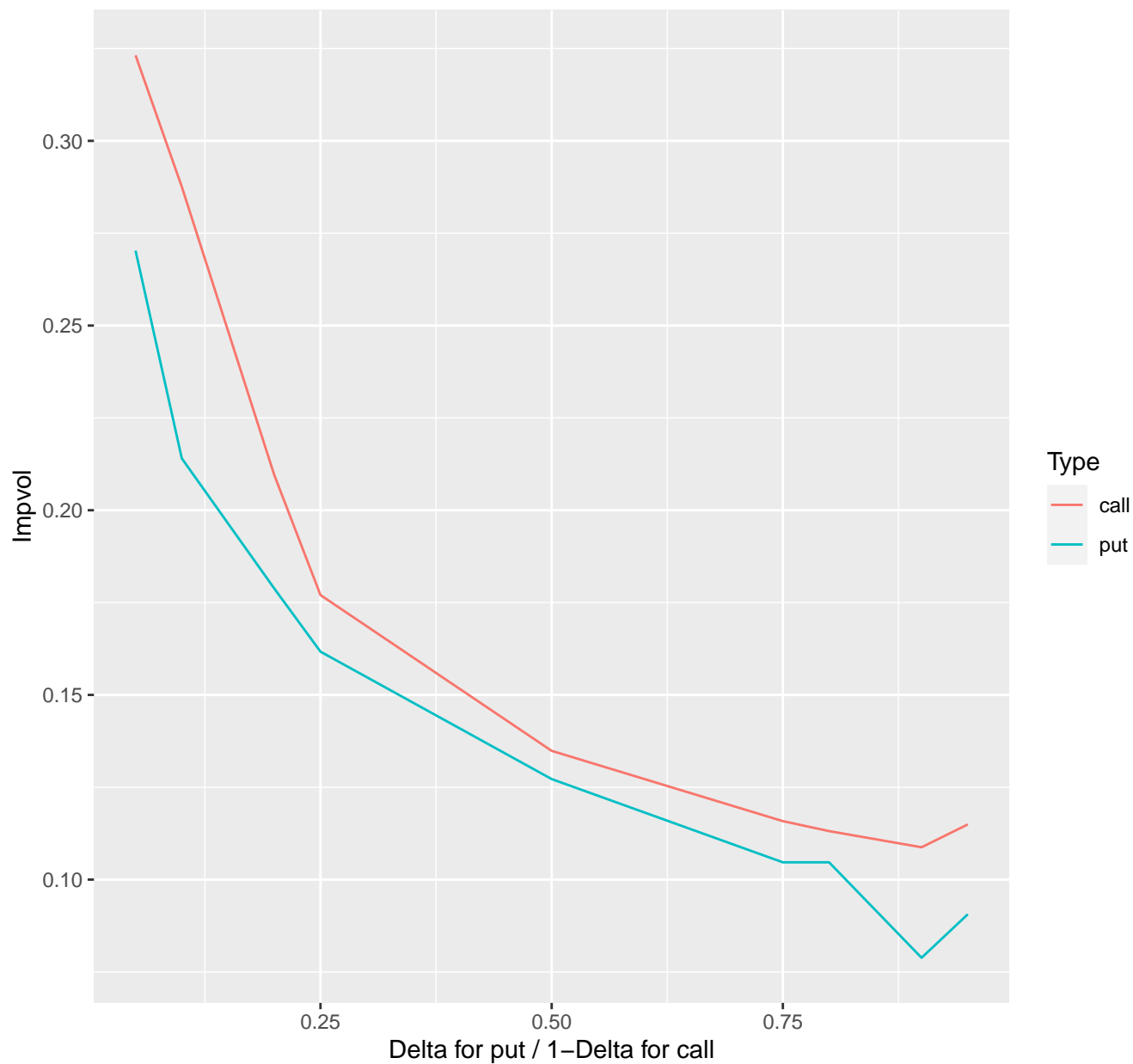
2014-11-21

x axis represents strike price, increasing



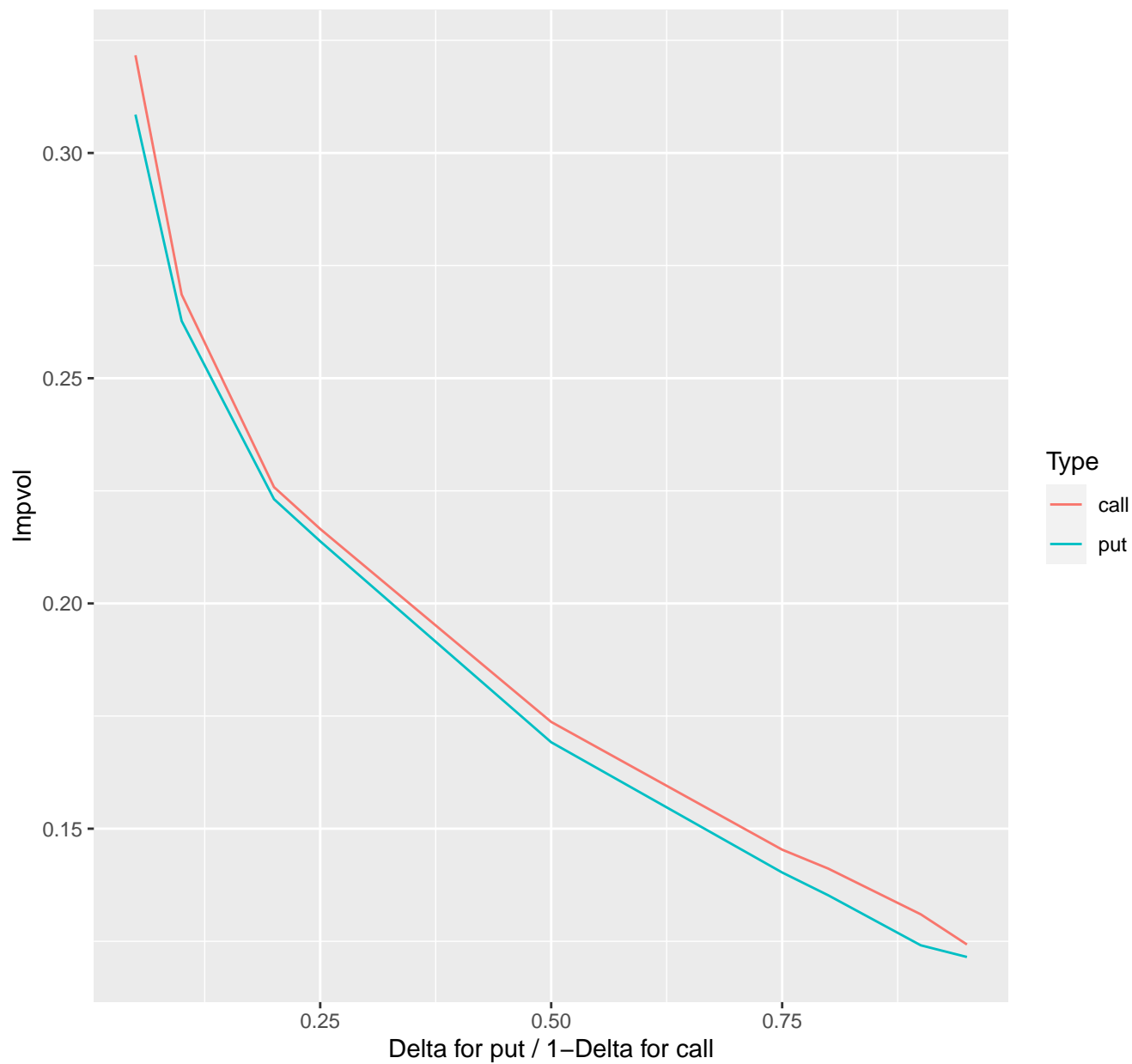
2014-12-19

x axis represents strike price, increasing



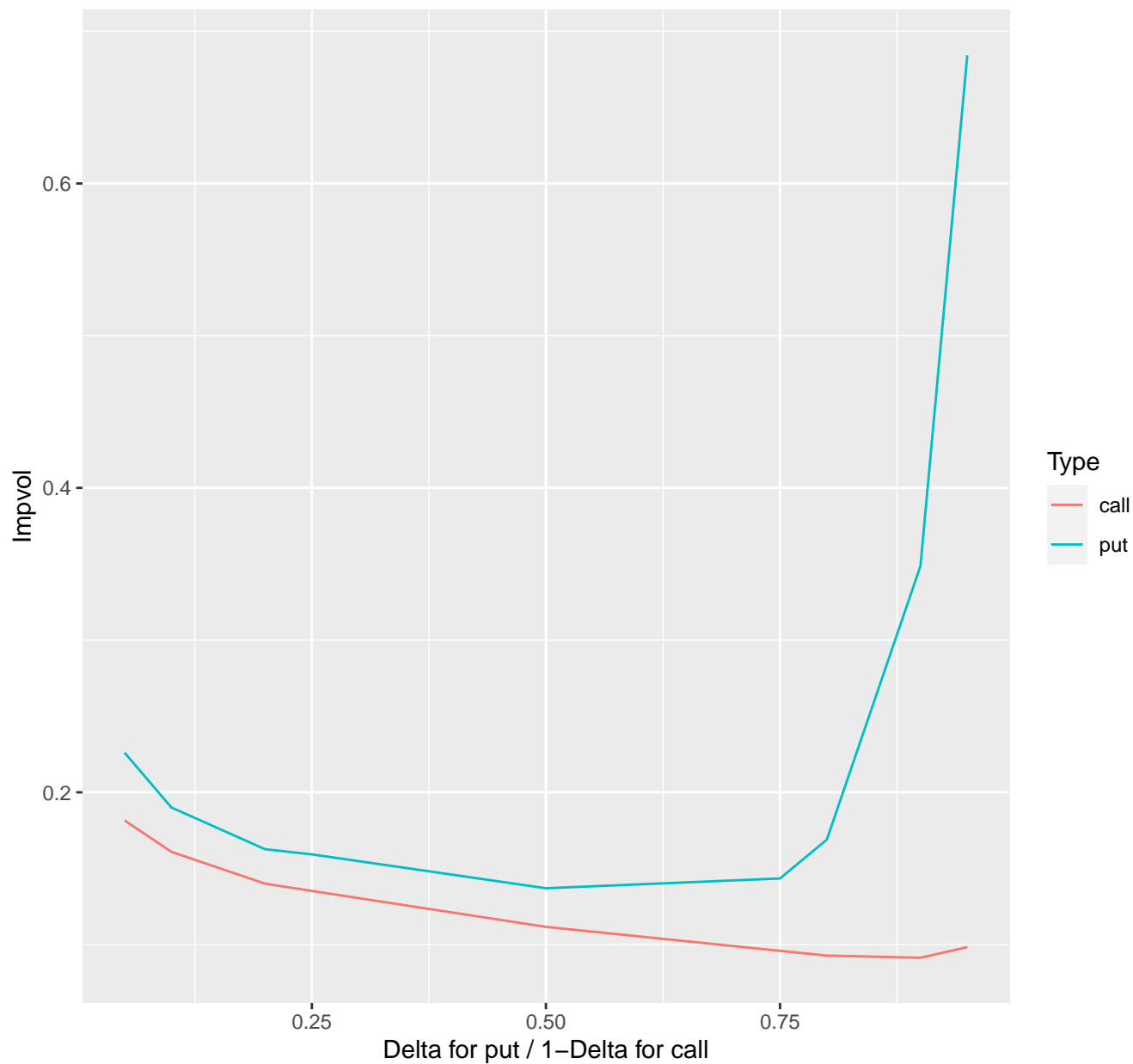
2015-01-16

x axis represents strike price, increasing



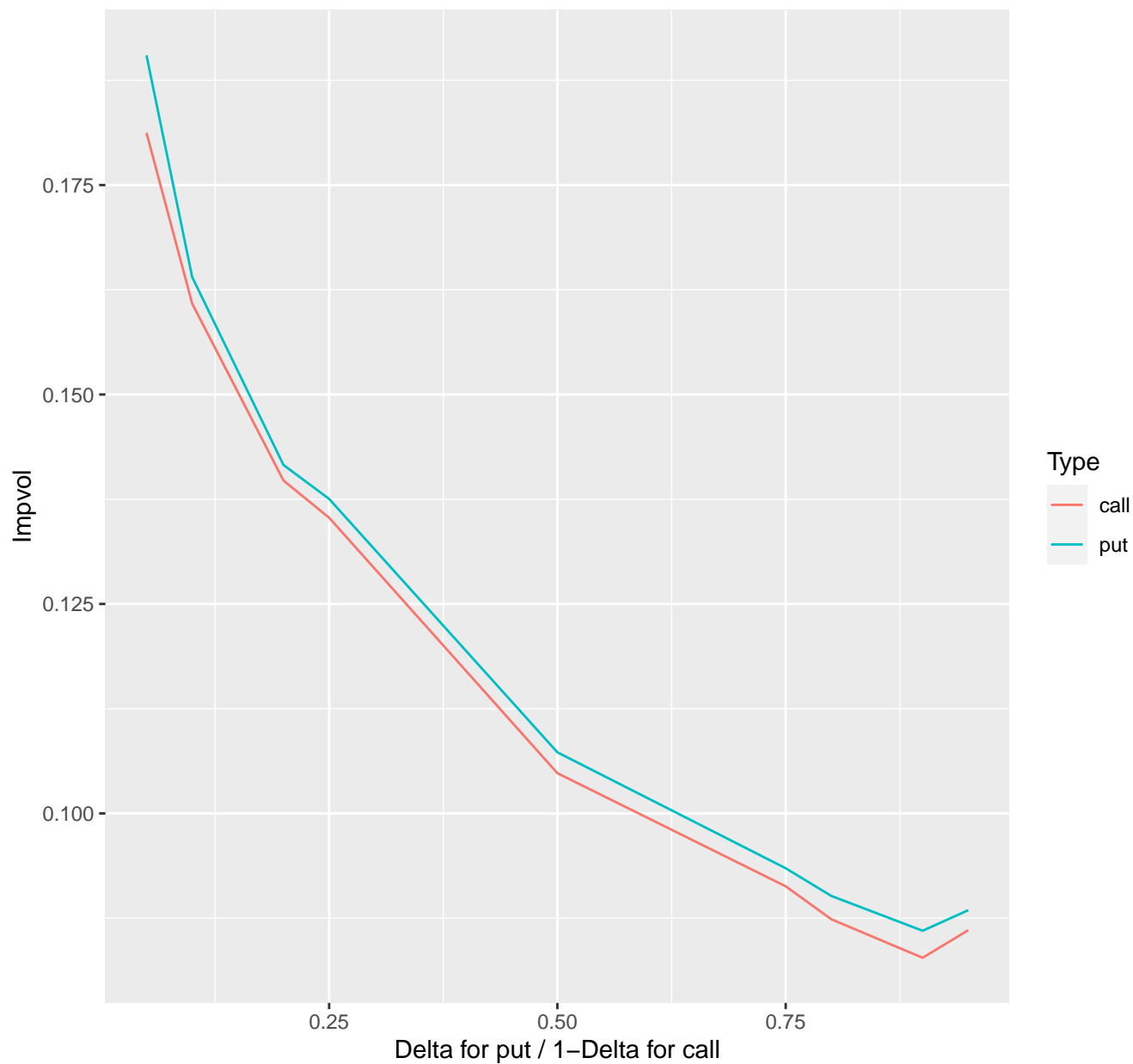
2015-02-20

x axis represents strike price, increasing



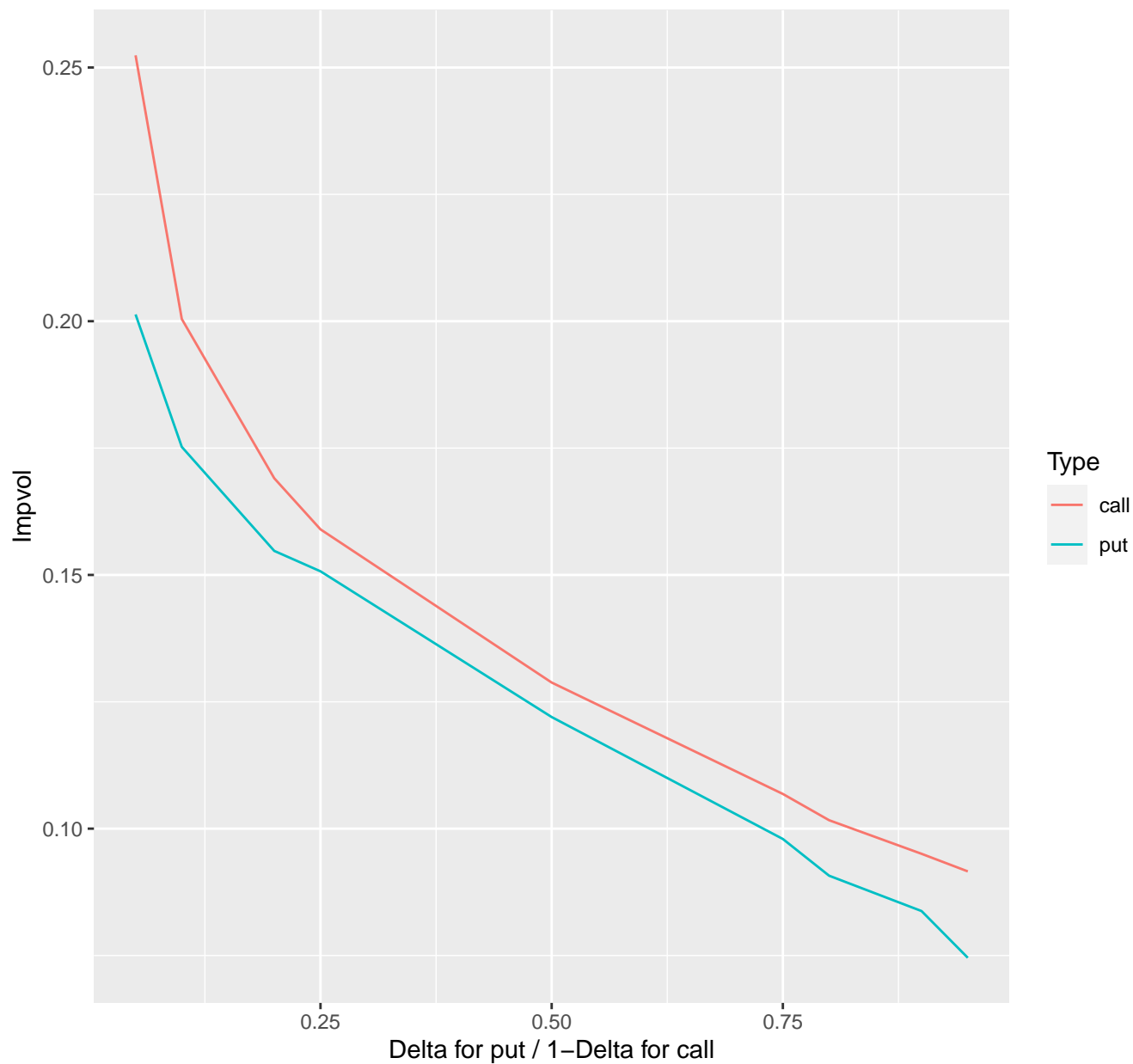
2015-03-20

x axis represents strike price, increasing



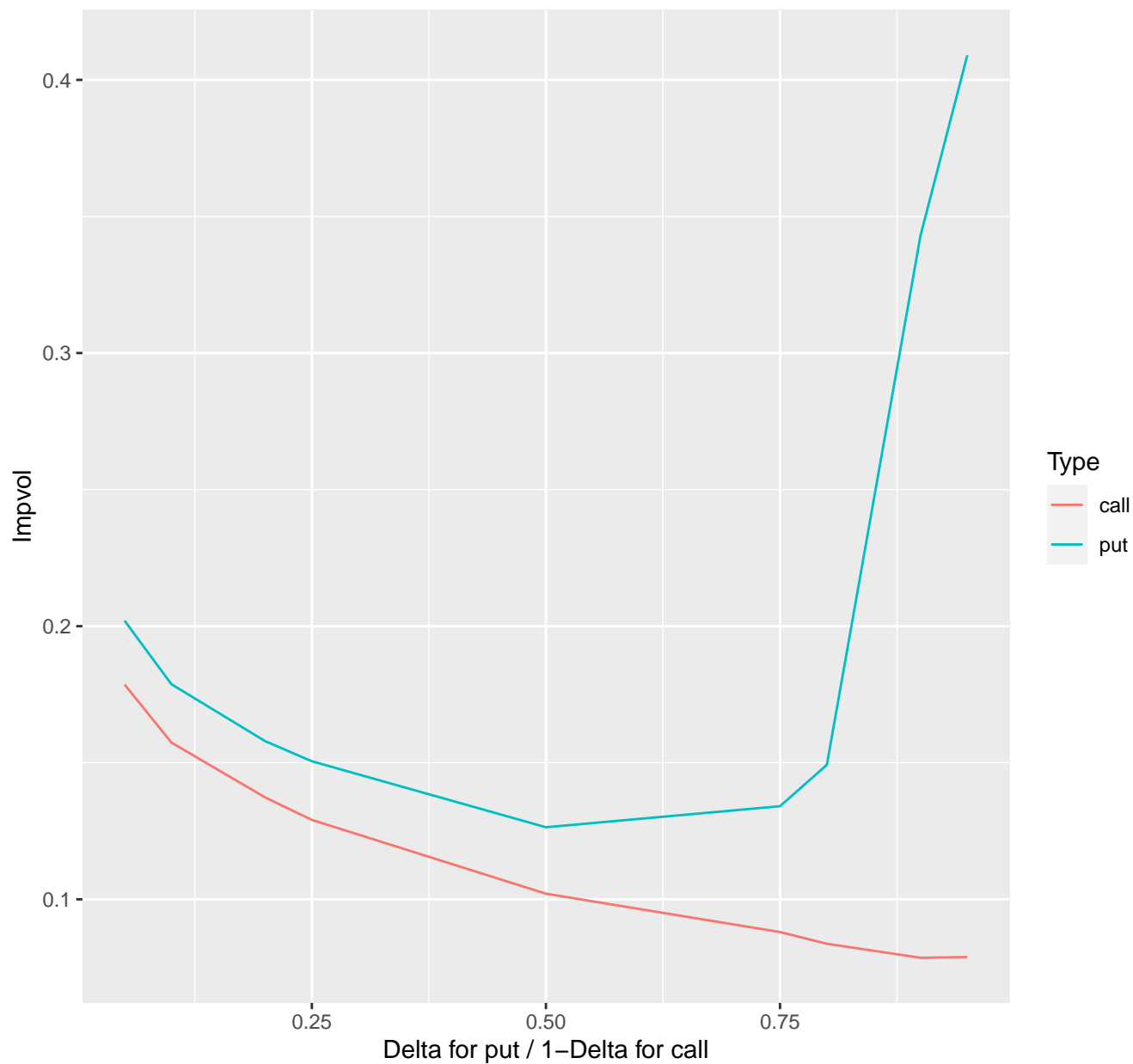
2015-04-17

x axis represents strike price, increasing



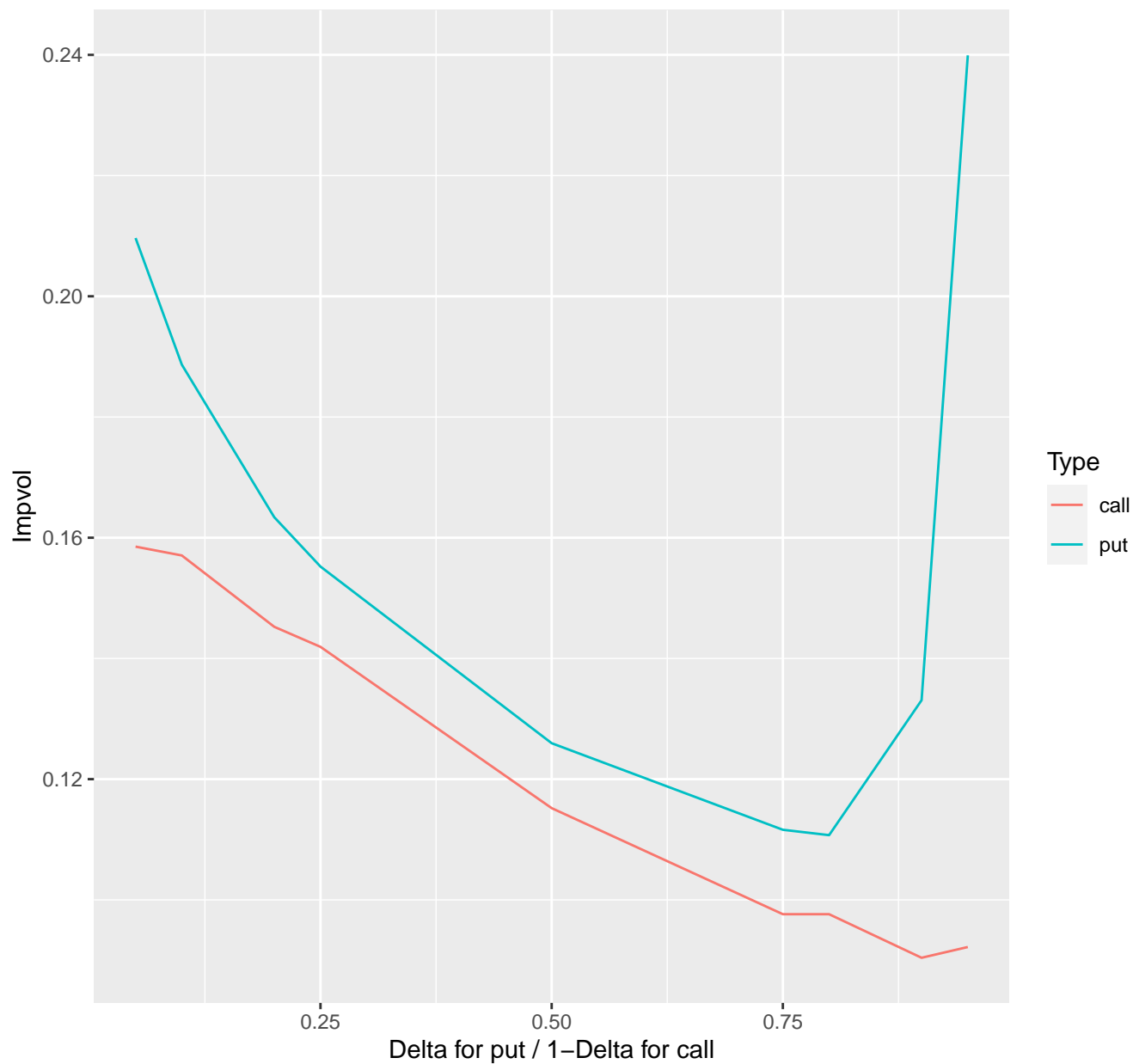
2015-05-15

x axis represents strike price, increasing



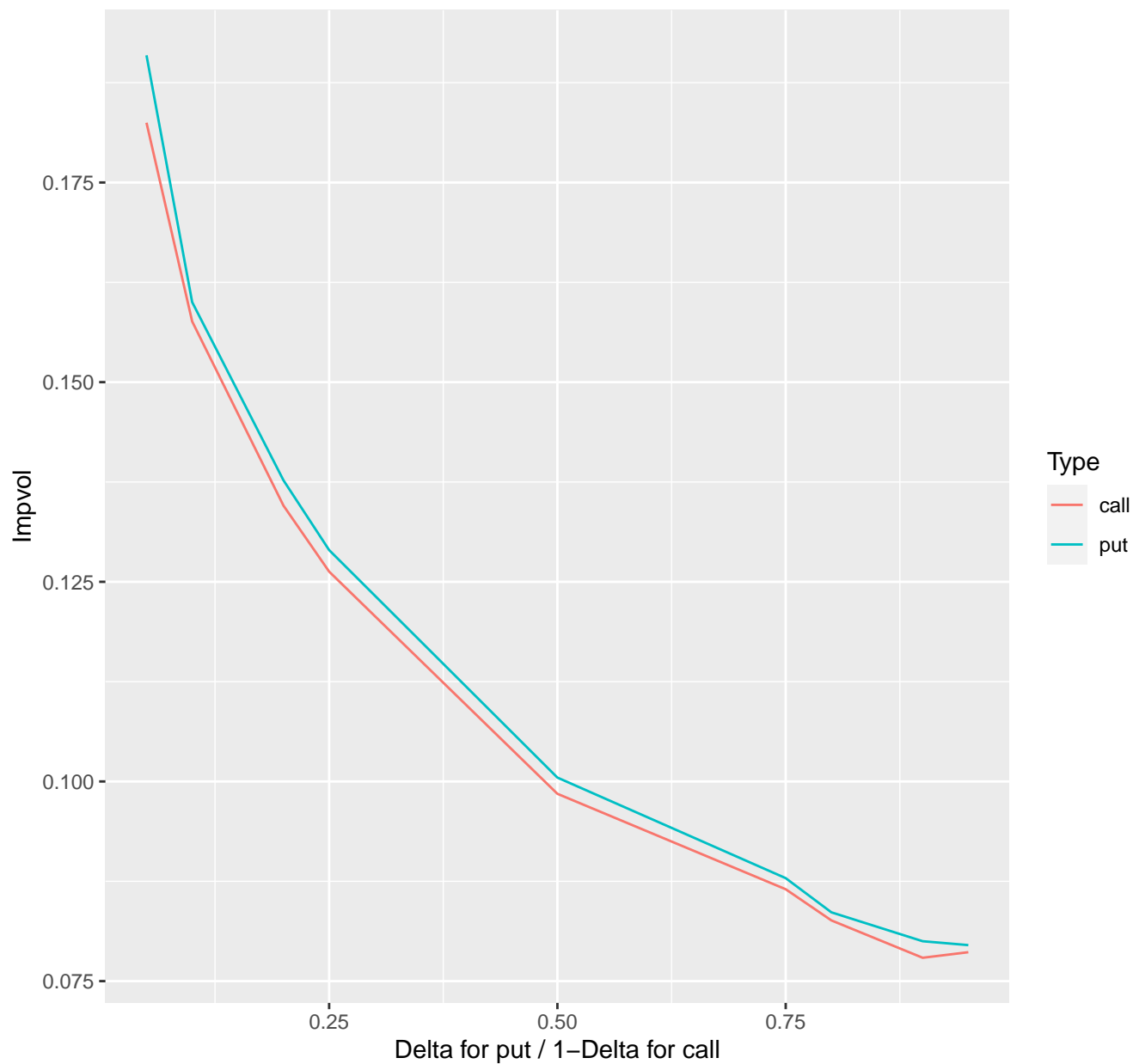
2015-06-19

x axis represents strike price, increasing



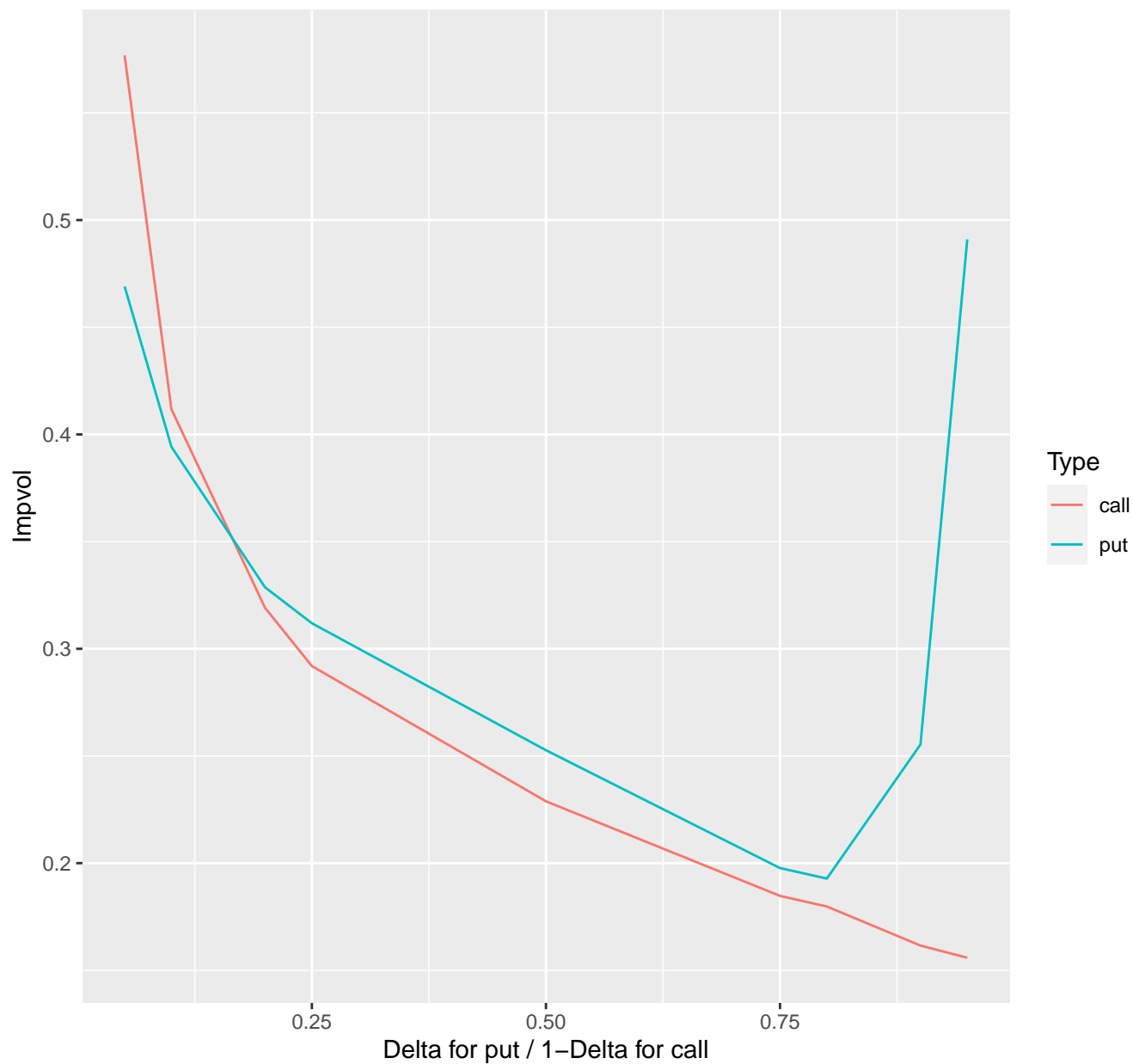
2015-07-17

x axis represents strike price, increasing



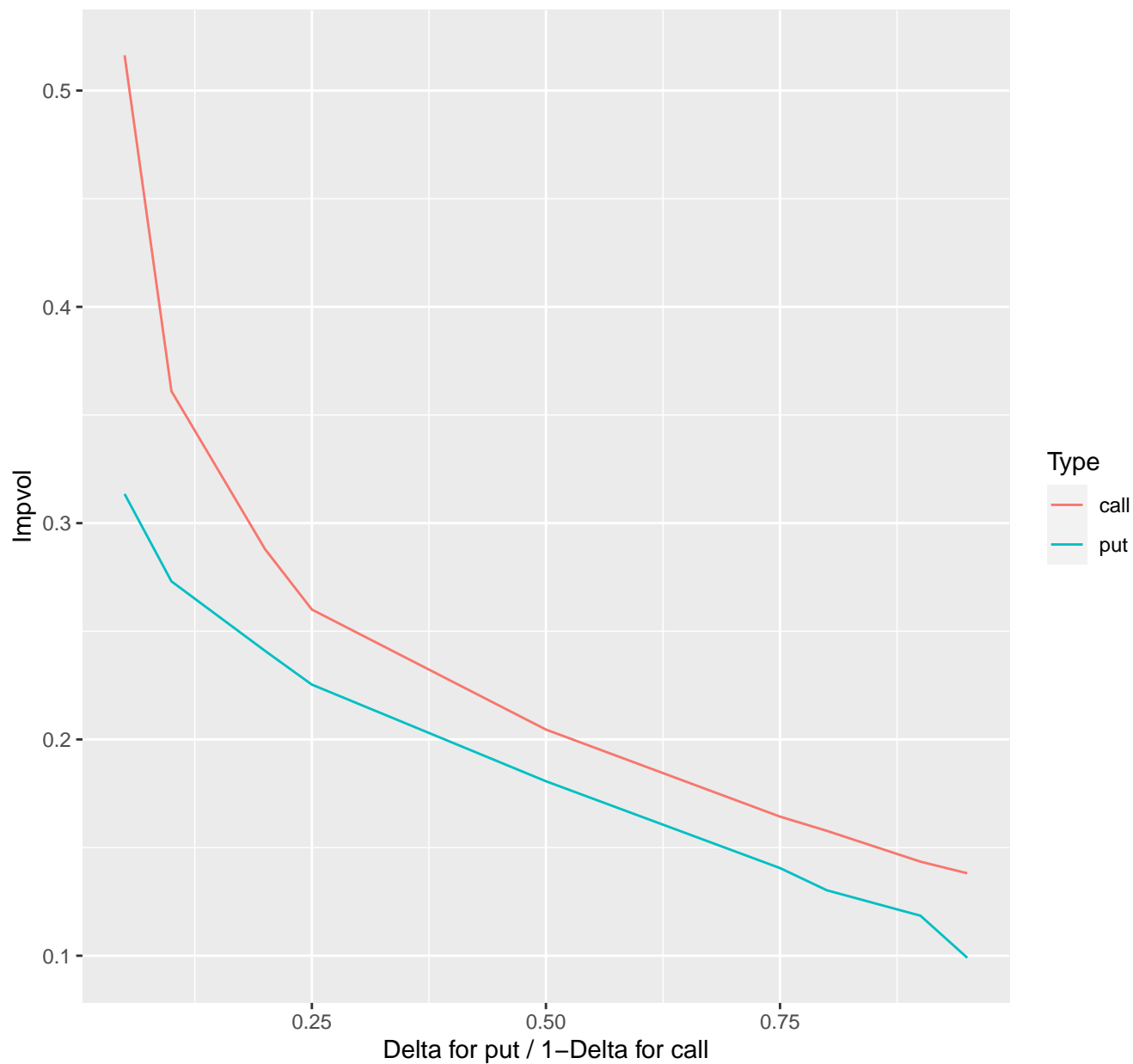
2015-08-21

x axis represents strike price, increasing



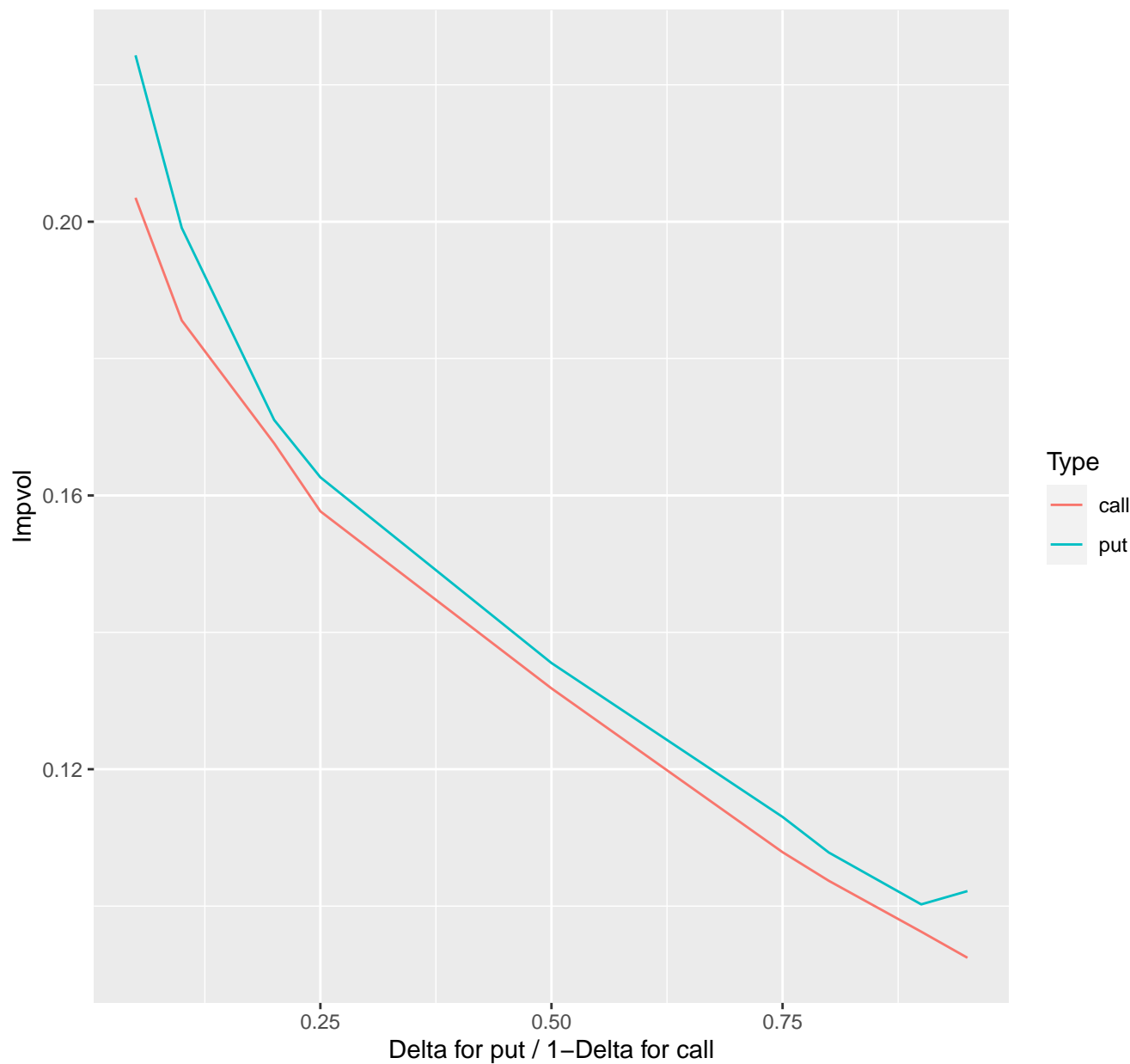
2015-09-18

x axis represents strike price, increasing



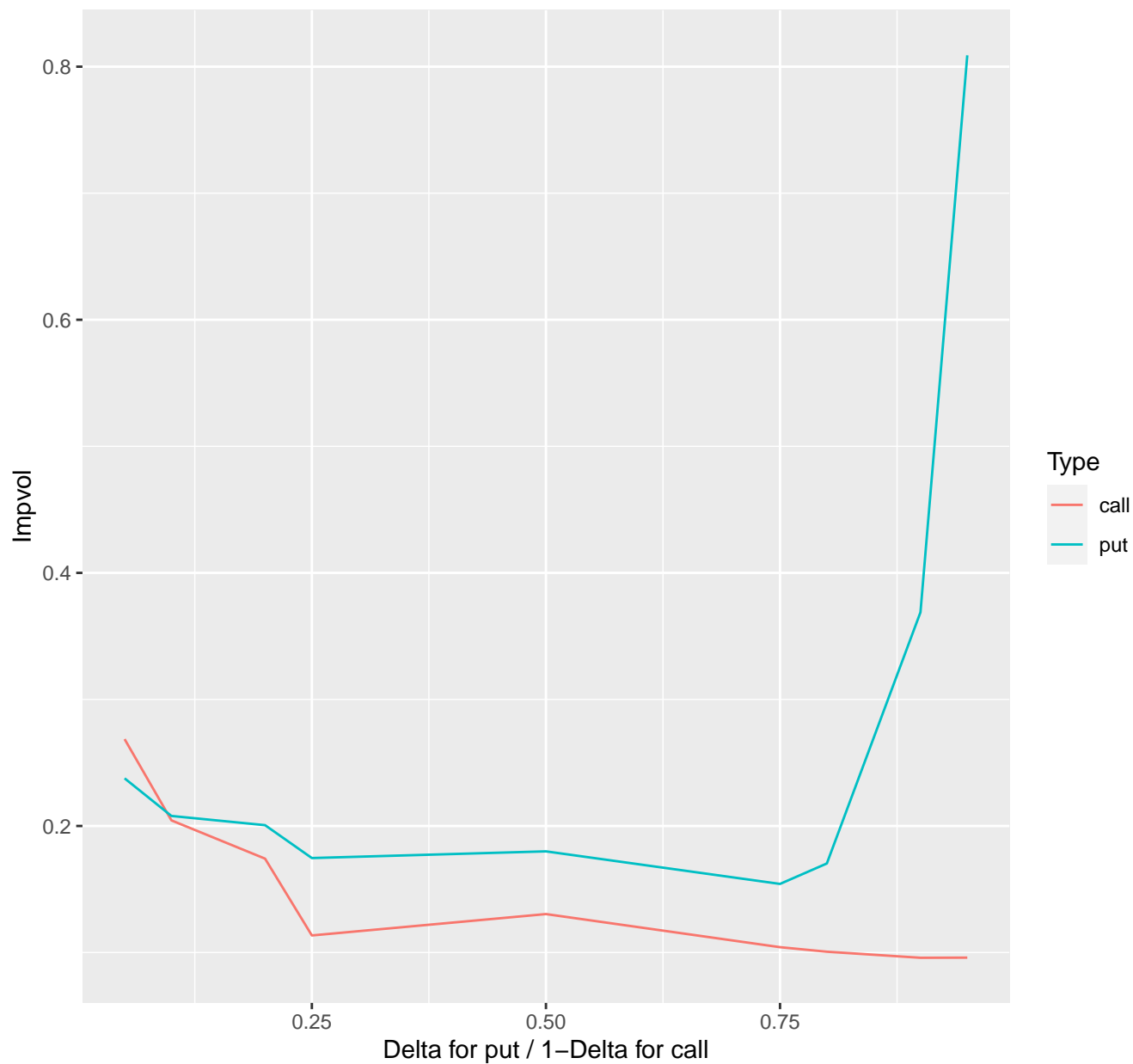
2015-10-16

x axis represents strike price, increasing



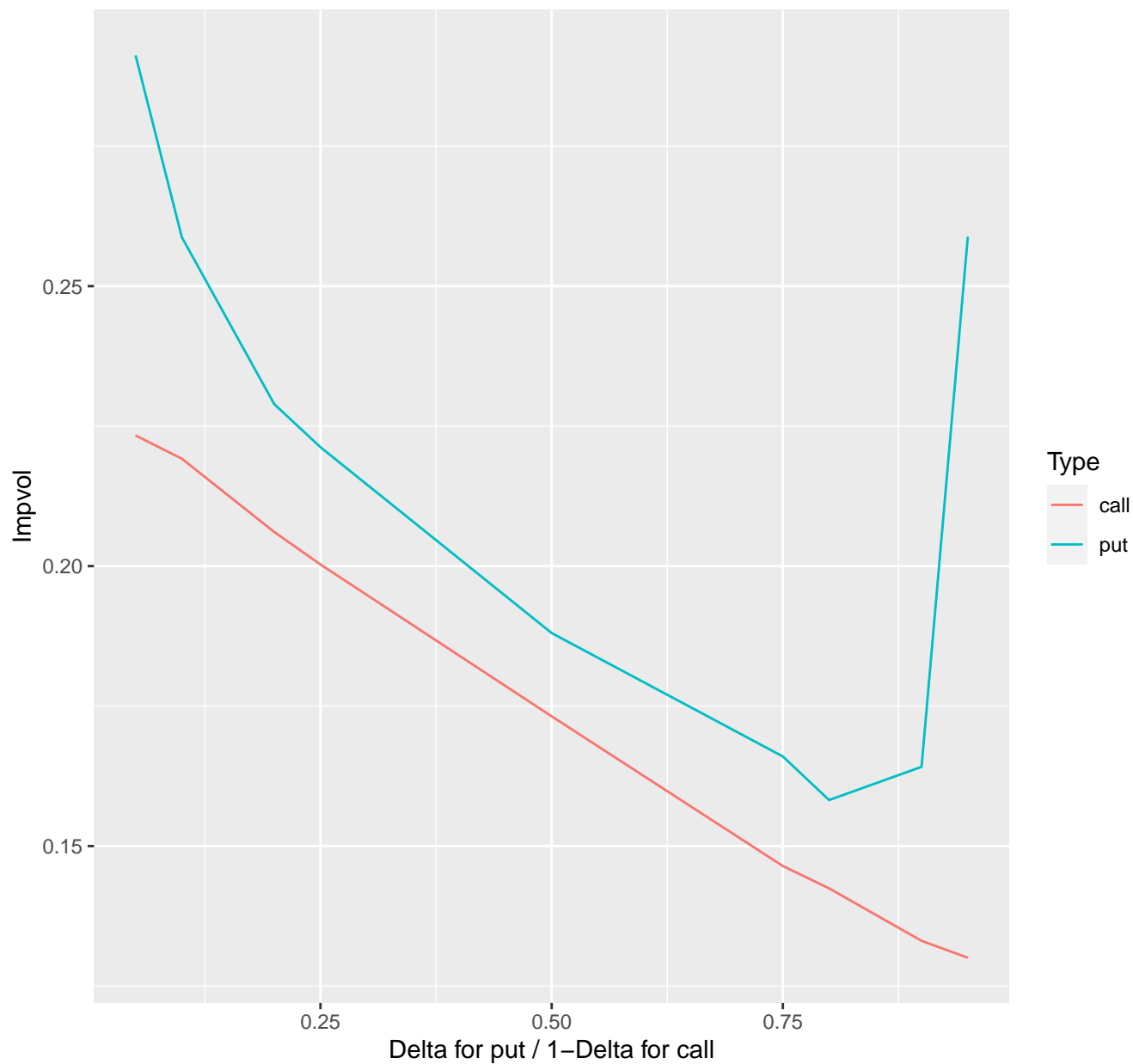
2015-11-20

x axis represents strike price, increasing



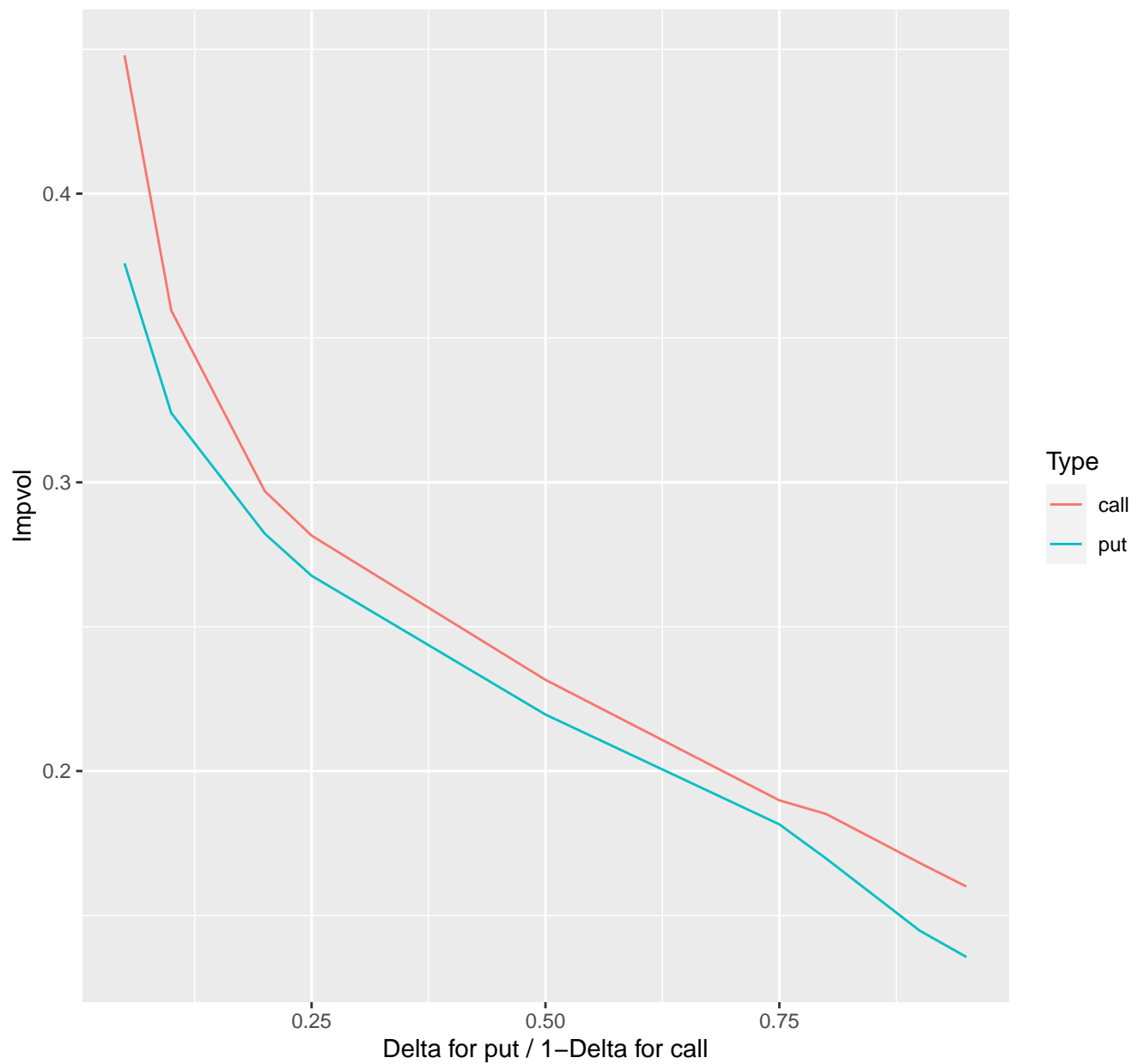
2015-12-18

x axis represents strike price, increasing



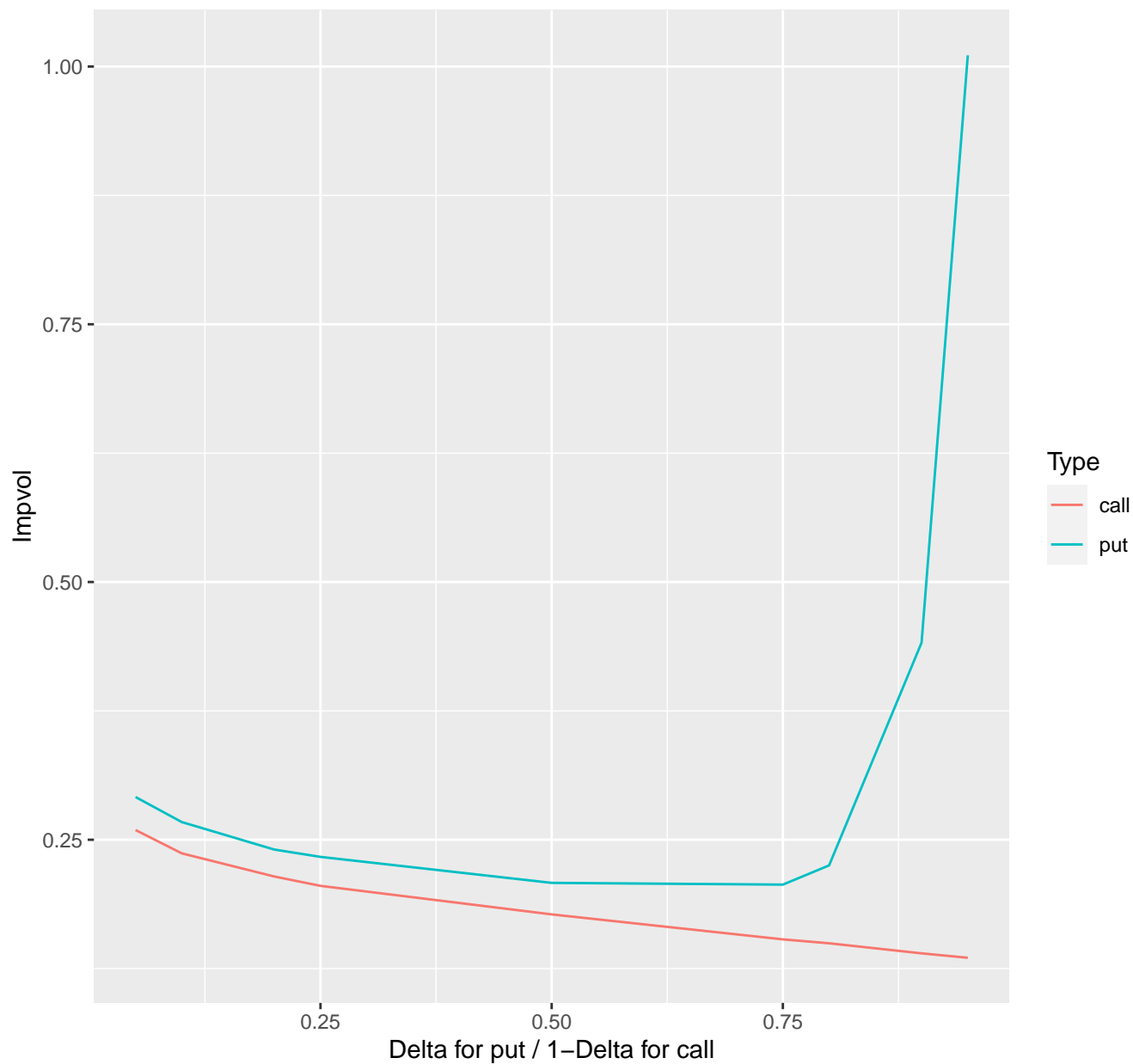
2016-01-15

x axis represents strike price, increasing



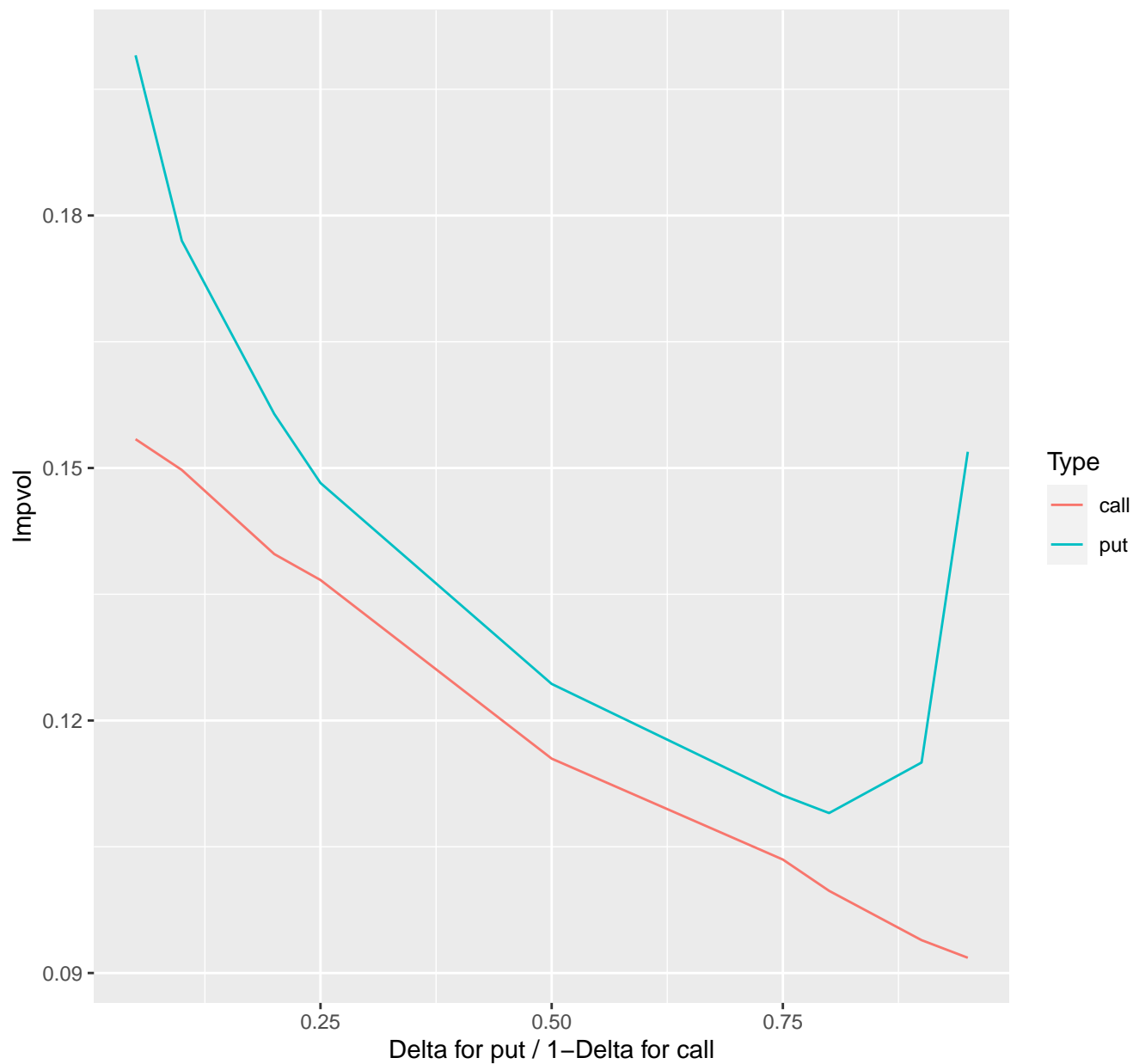
2016-02-19

x axis represents strike price, increasing



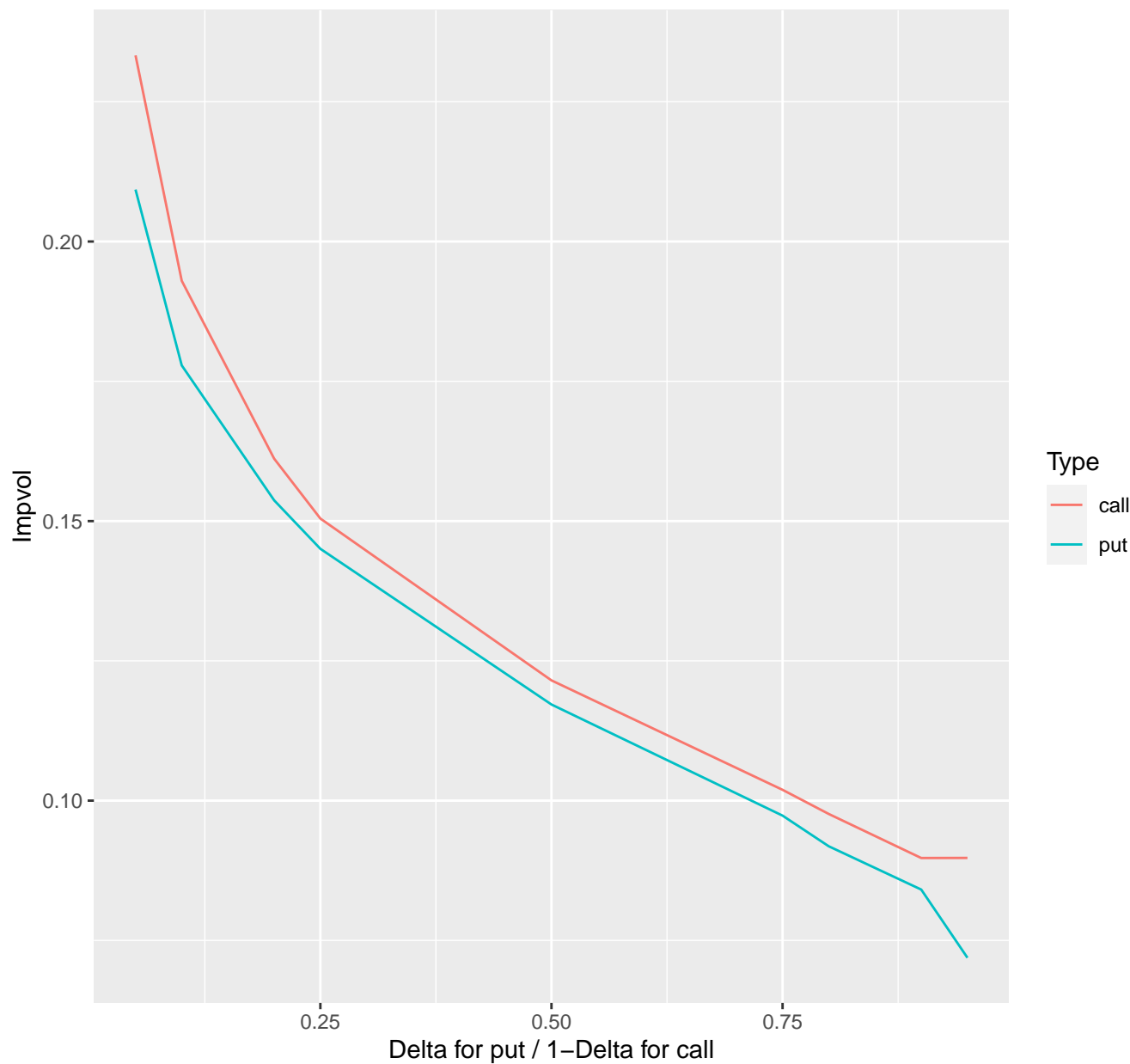
2016-03-18

x axis represents strike price, increasing



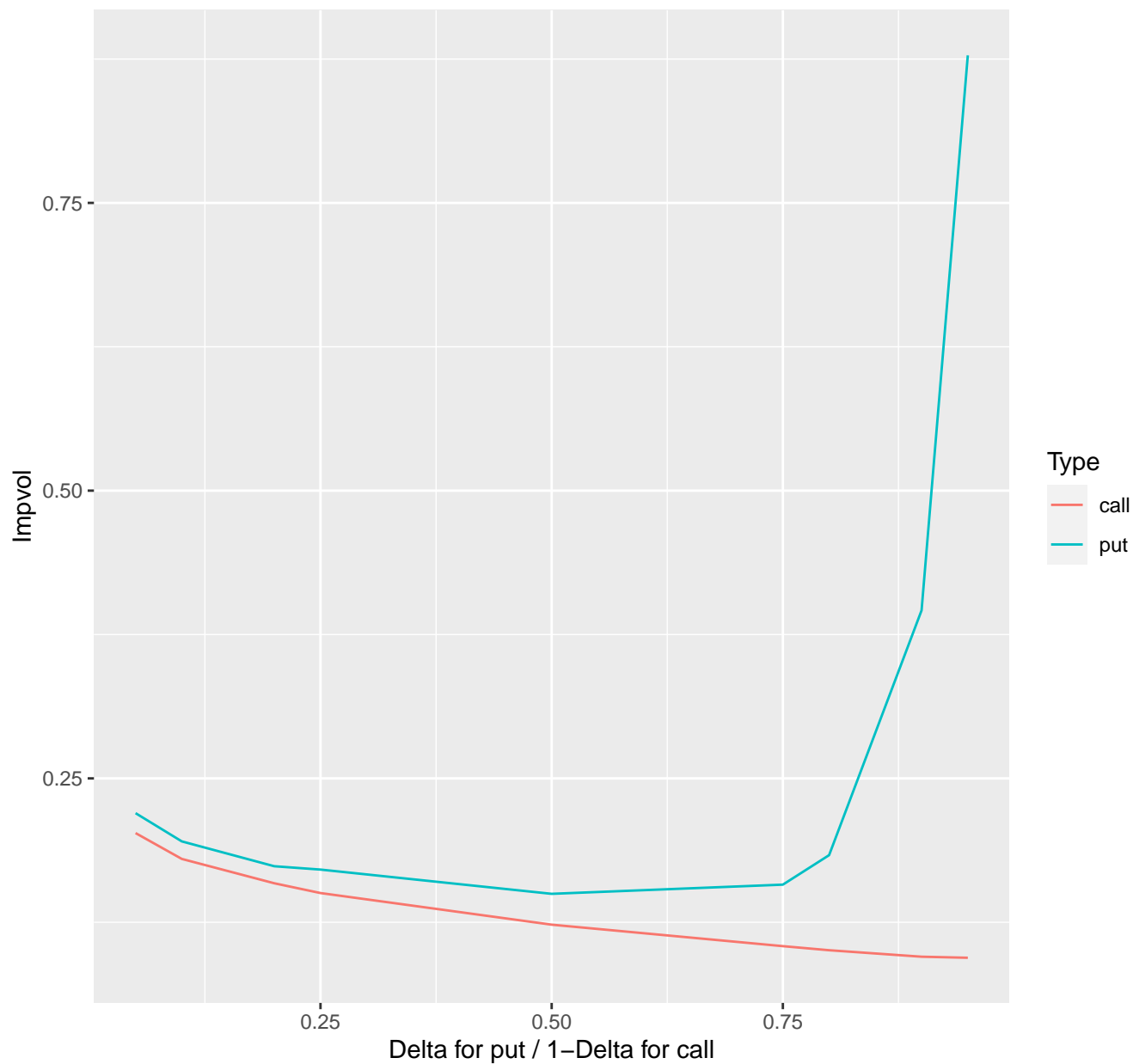
2016-04-15

x axis represents strike price, increasing



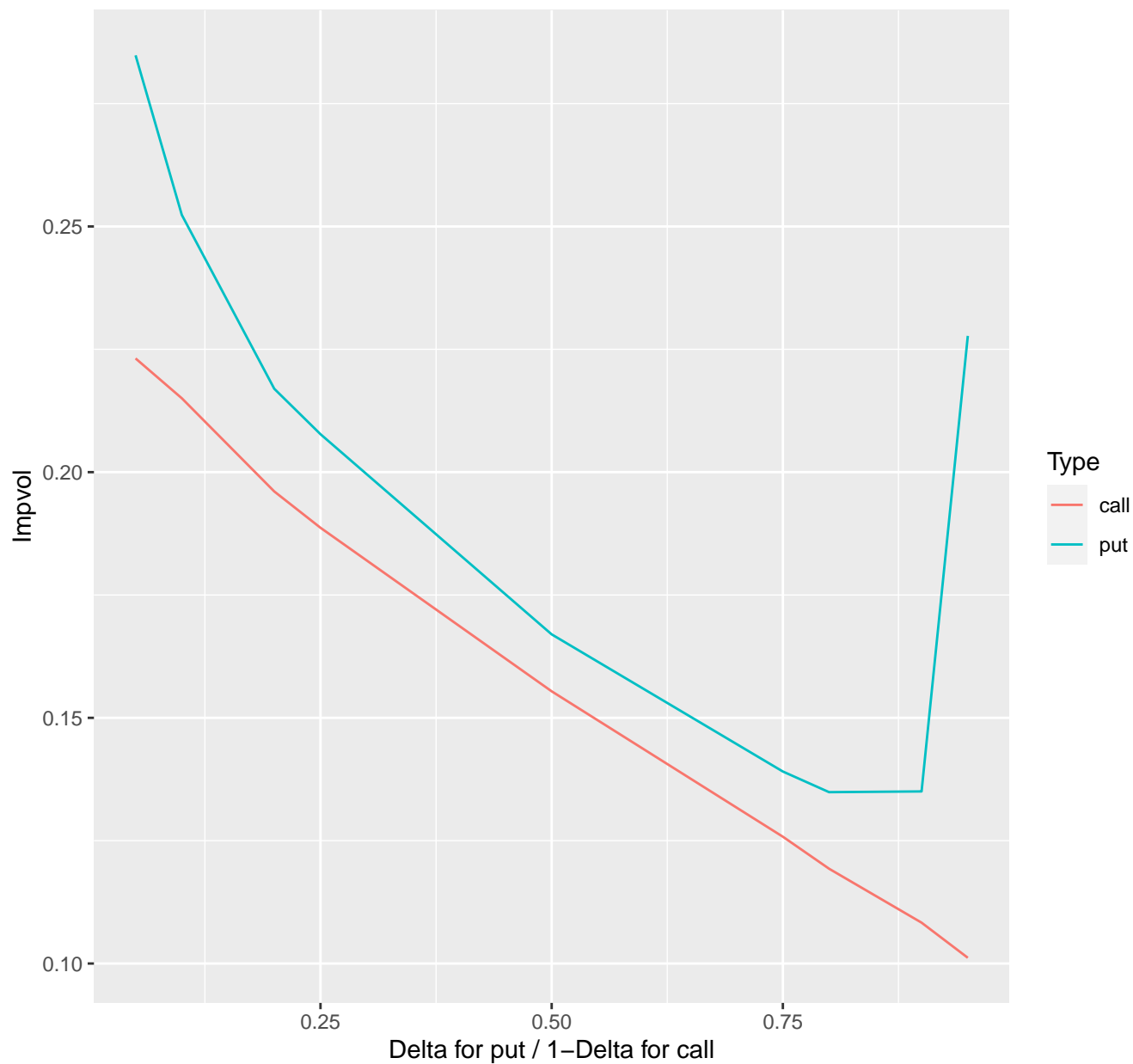
2016-05-20

x axis represents strike price, increasing



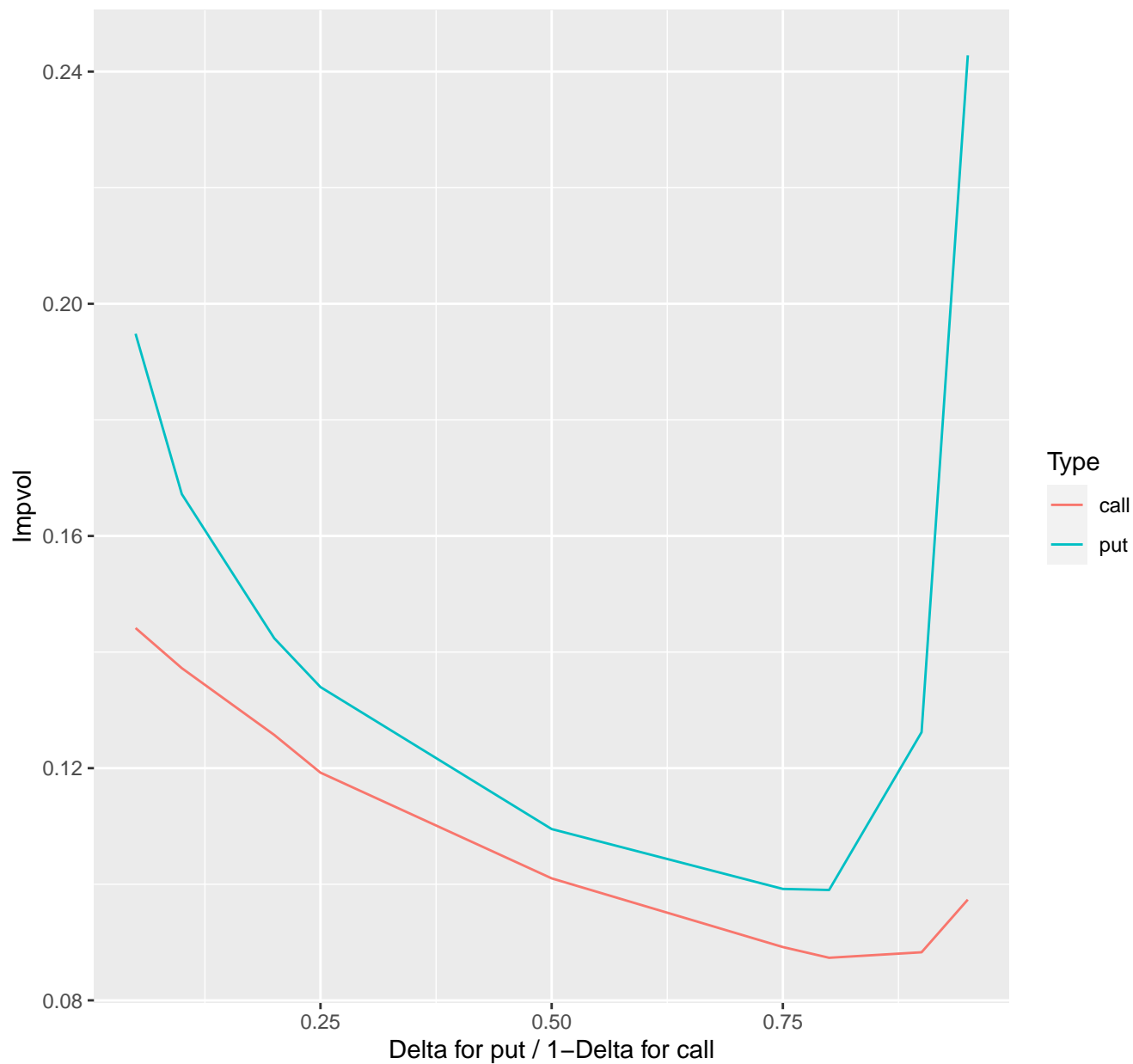
2016-06-17

x axis represents strike price, increasing



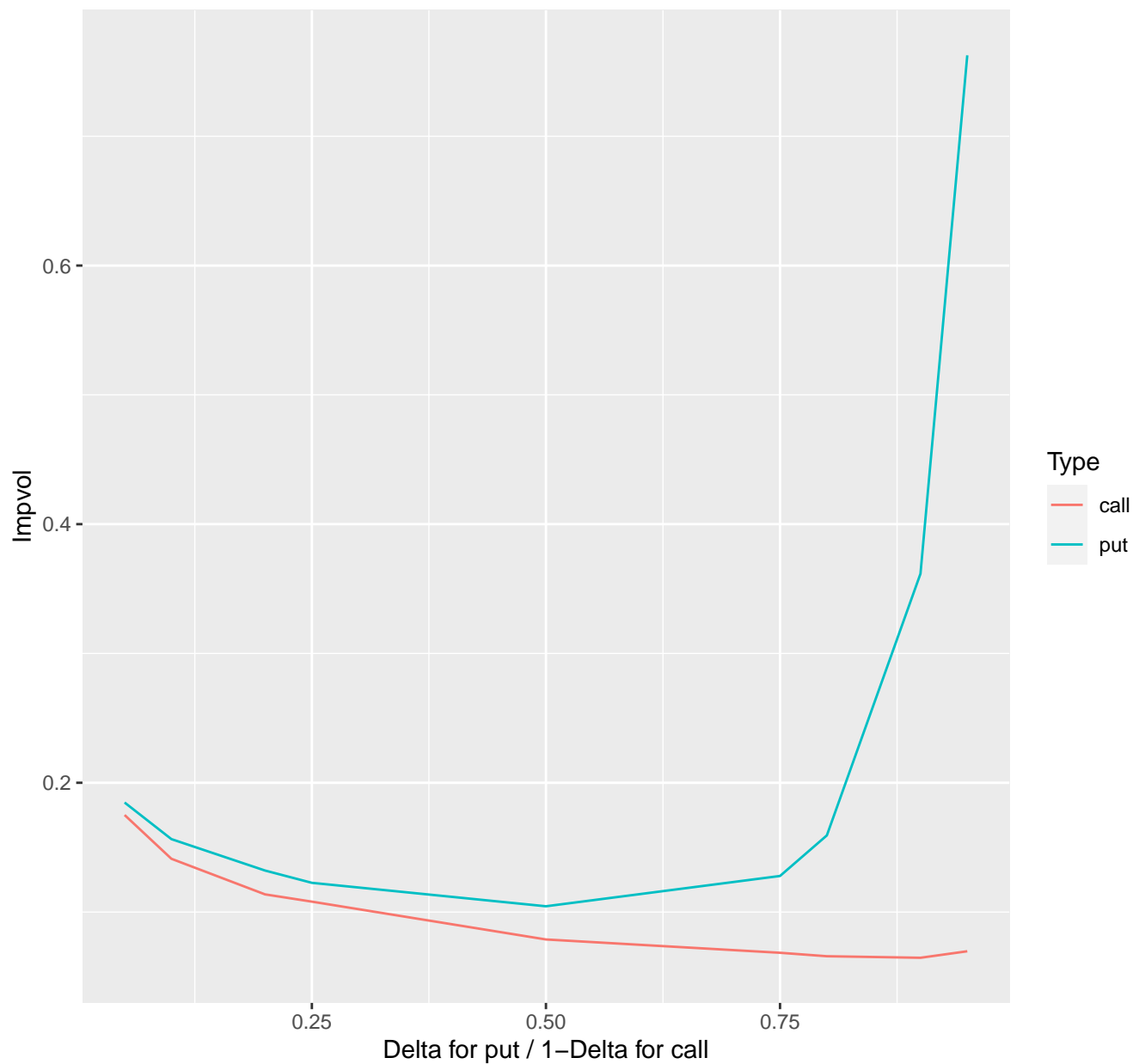
2016-07-15

x axis represents strike price, increasing



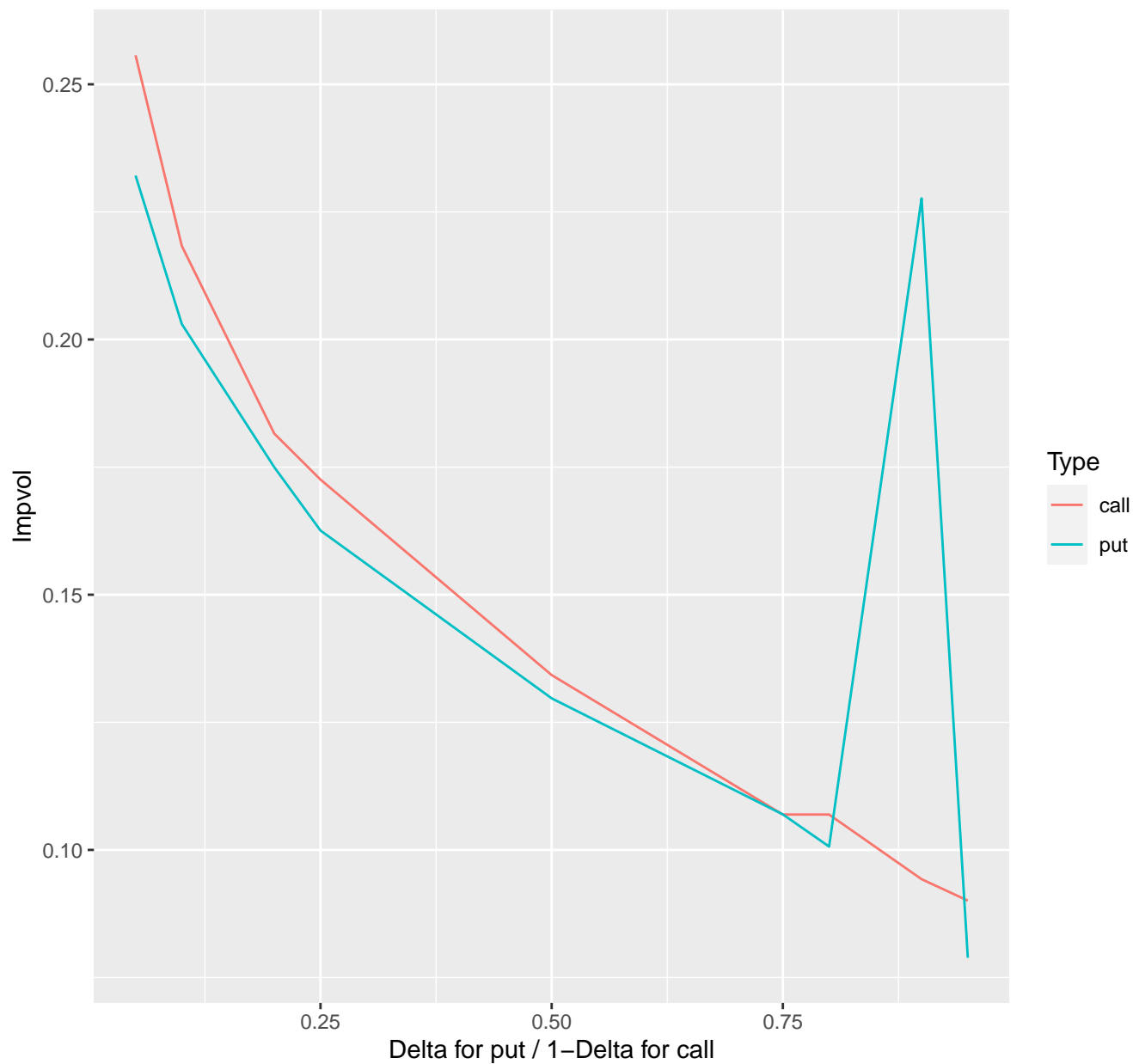
2016-08-19

x axis represents strike price, increasing



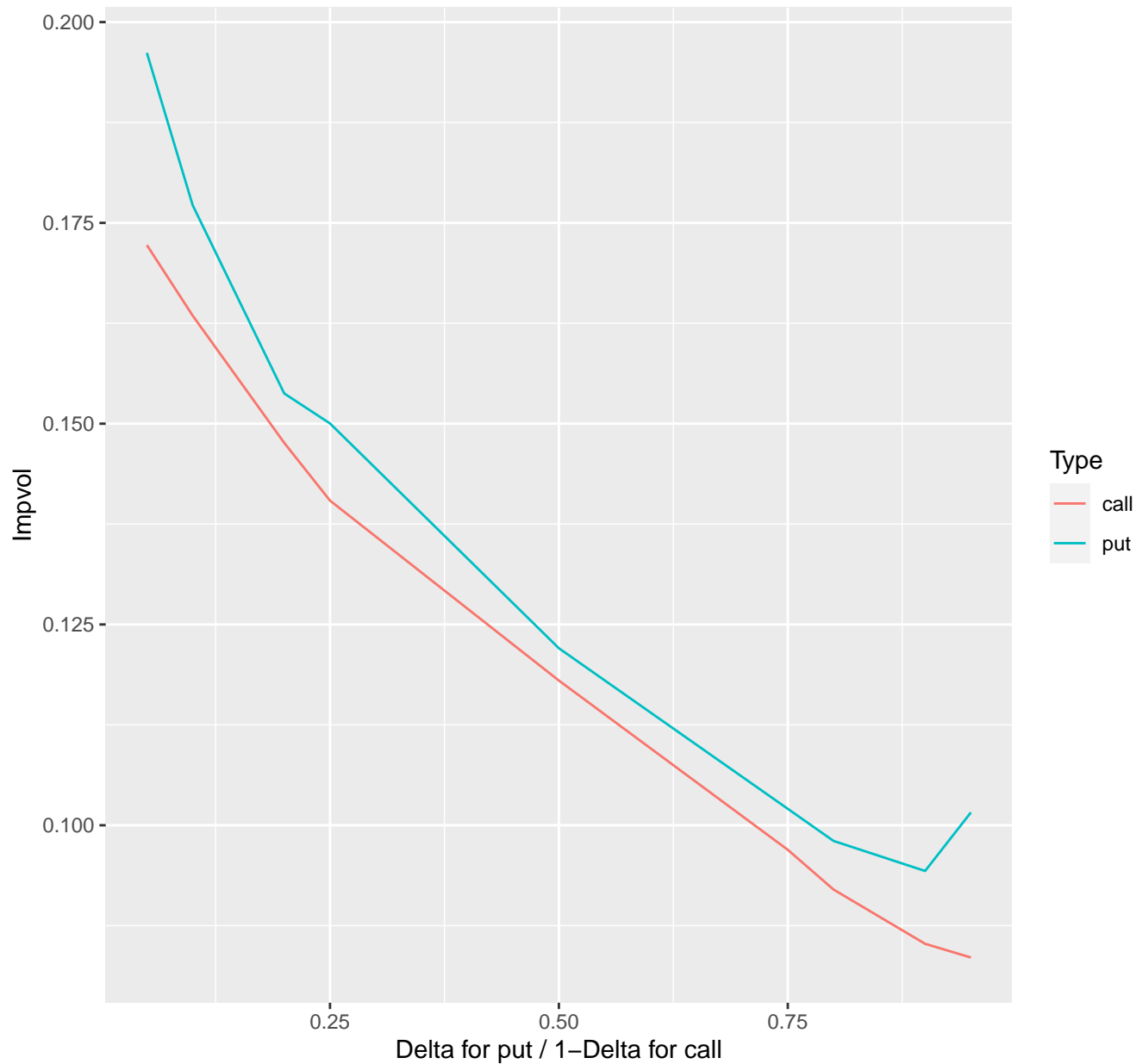
2016-09-16

x axis represents strike price, increasing



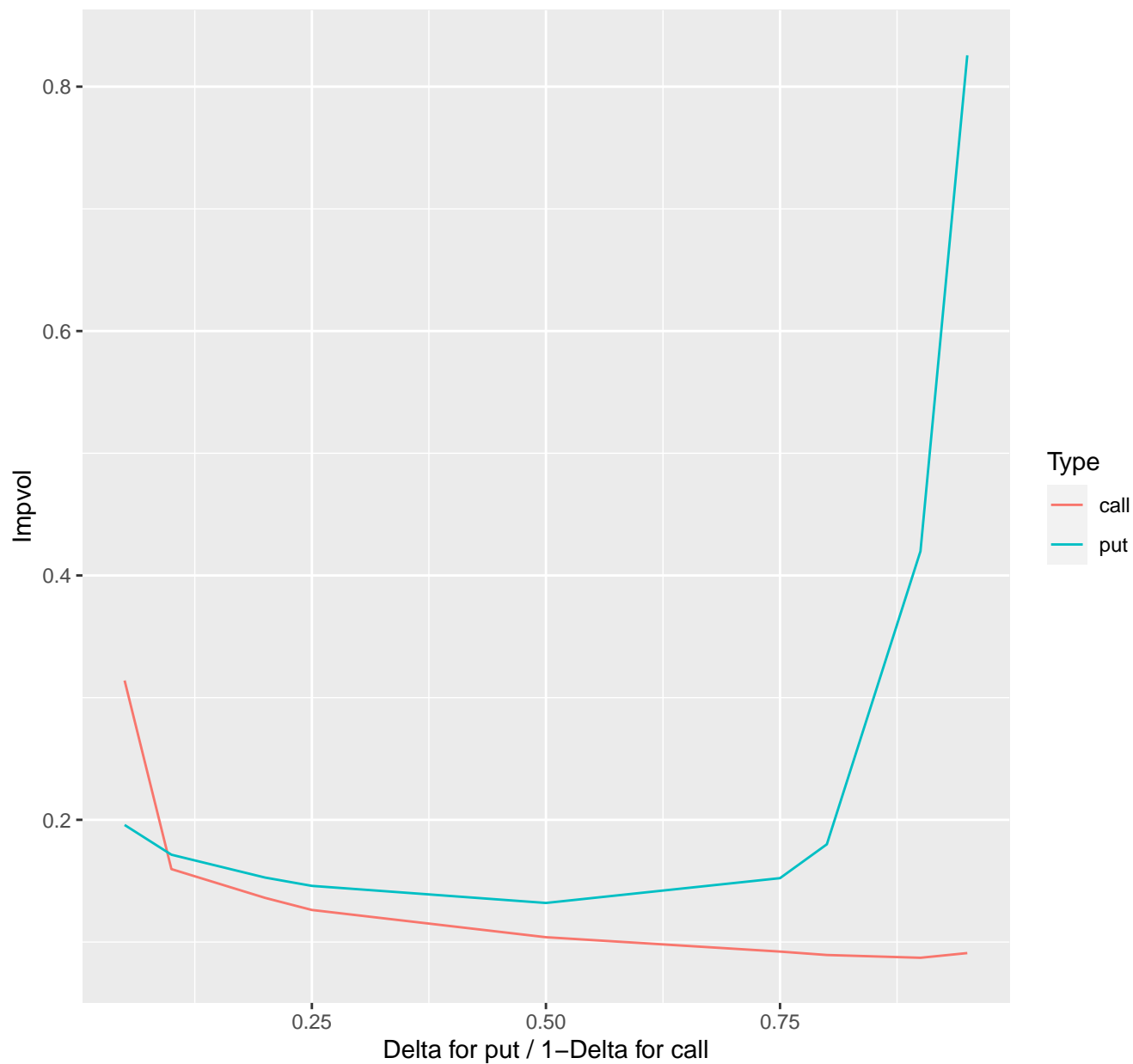
2016-10-21

x axis represents strike price, increasing



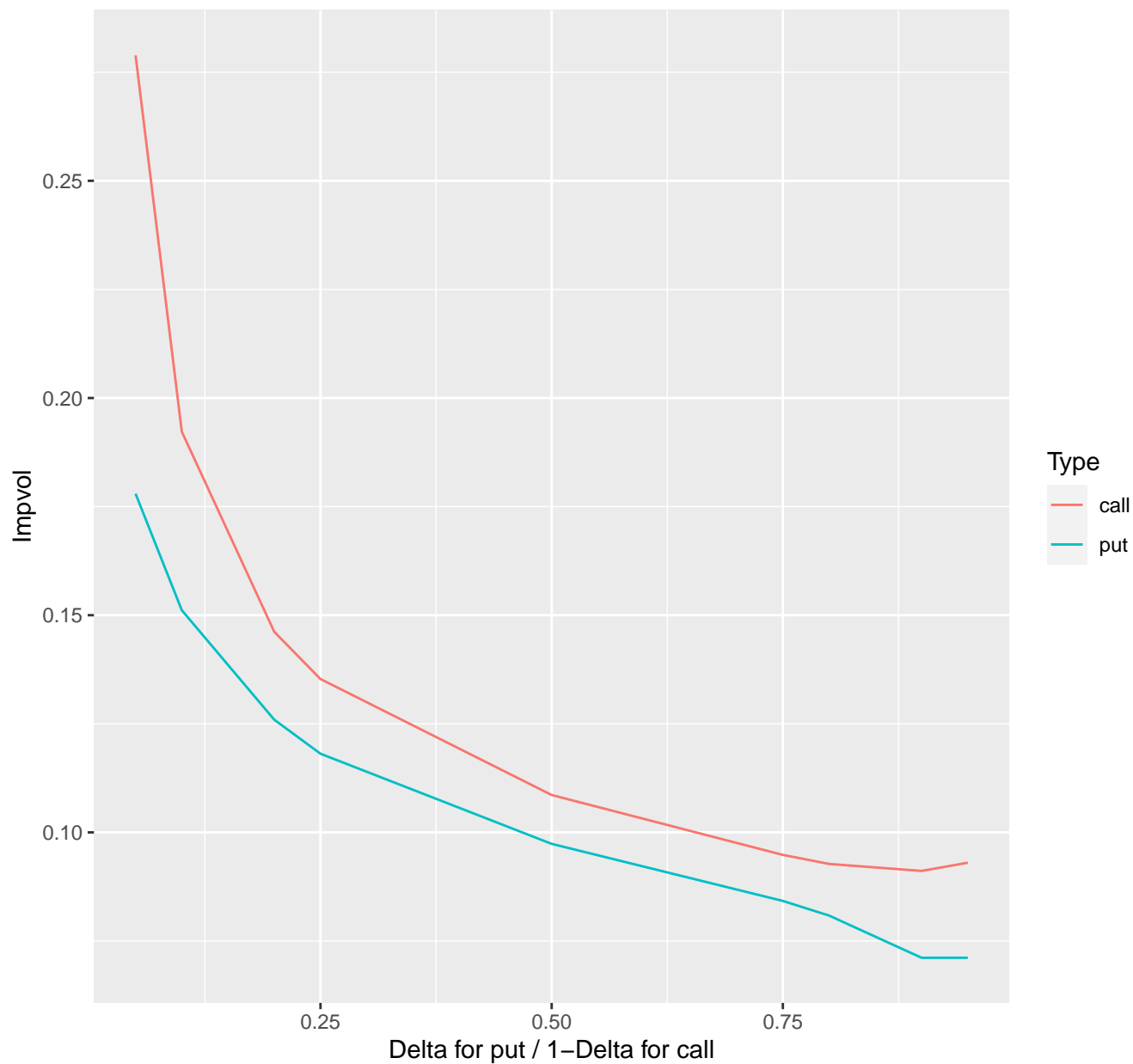
2016-11-18

x axis represents strike price, increasing



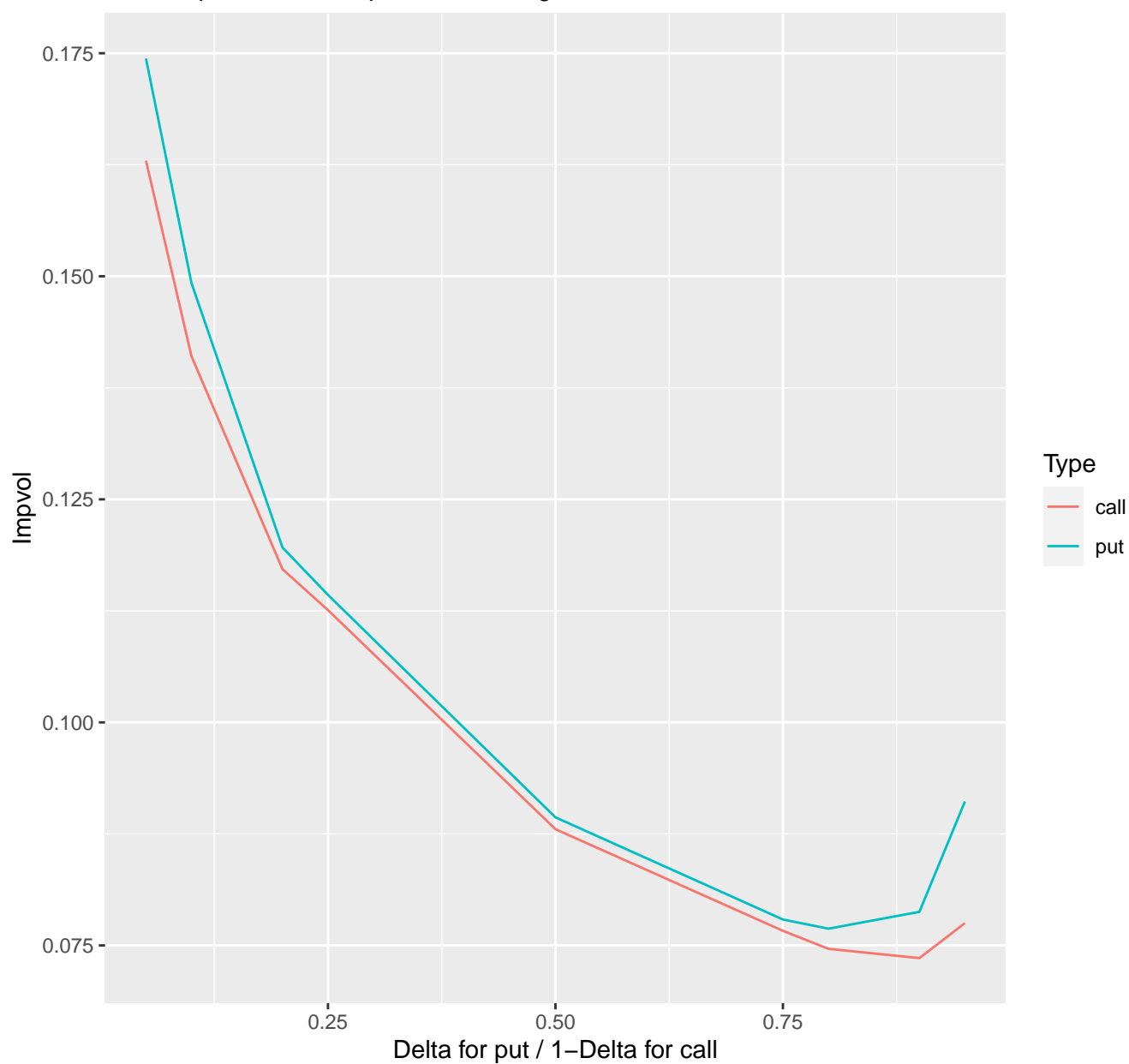
2016-12-16

x axis represents strike price, increasing



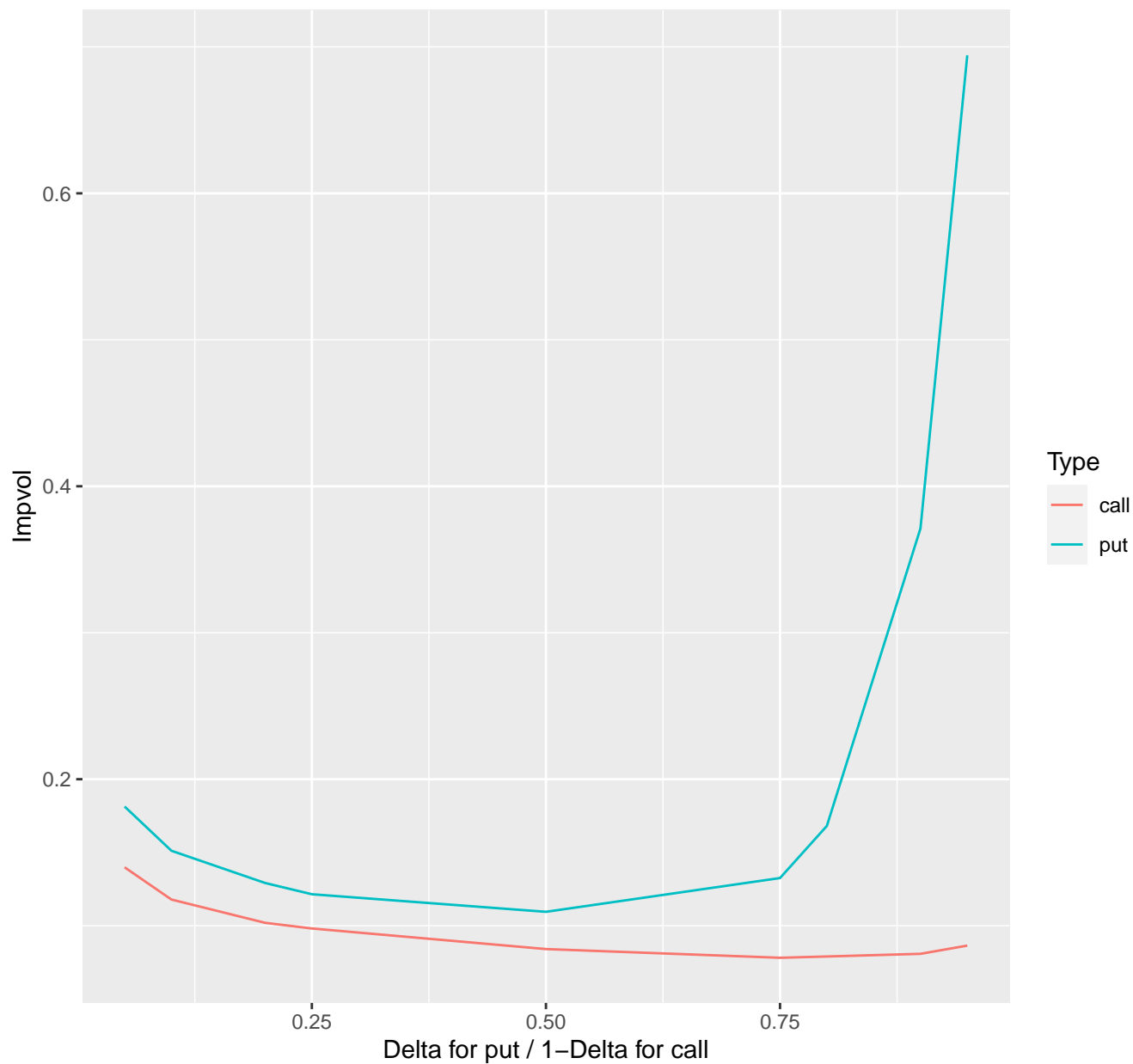
2017-01-20

x axis represents strike price, increasing



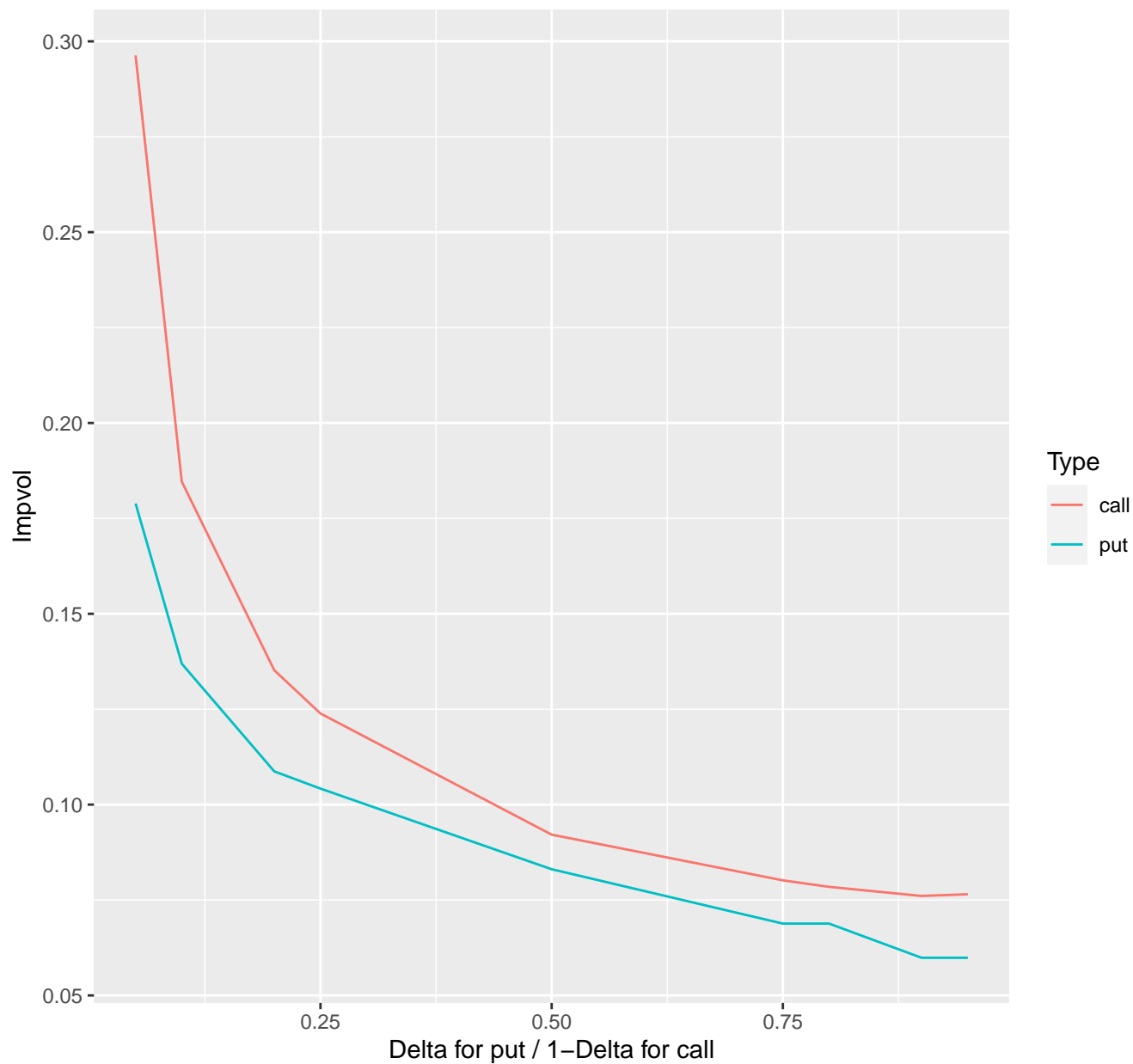
2017-02-17

x axis represents strike price, increasing



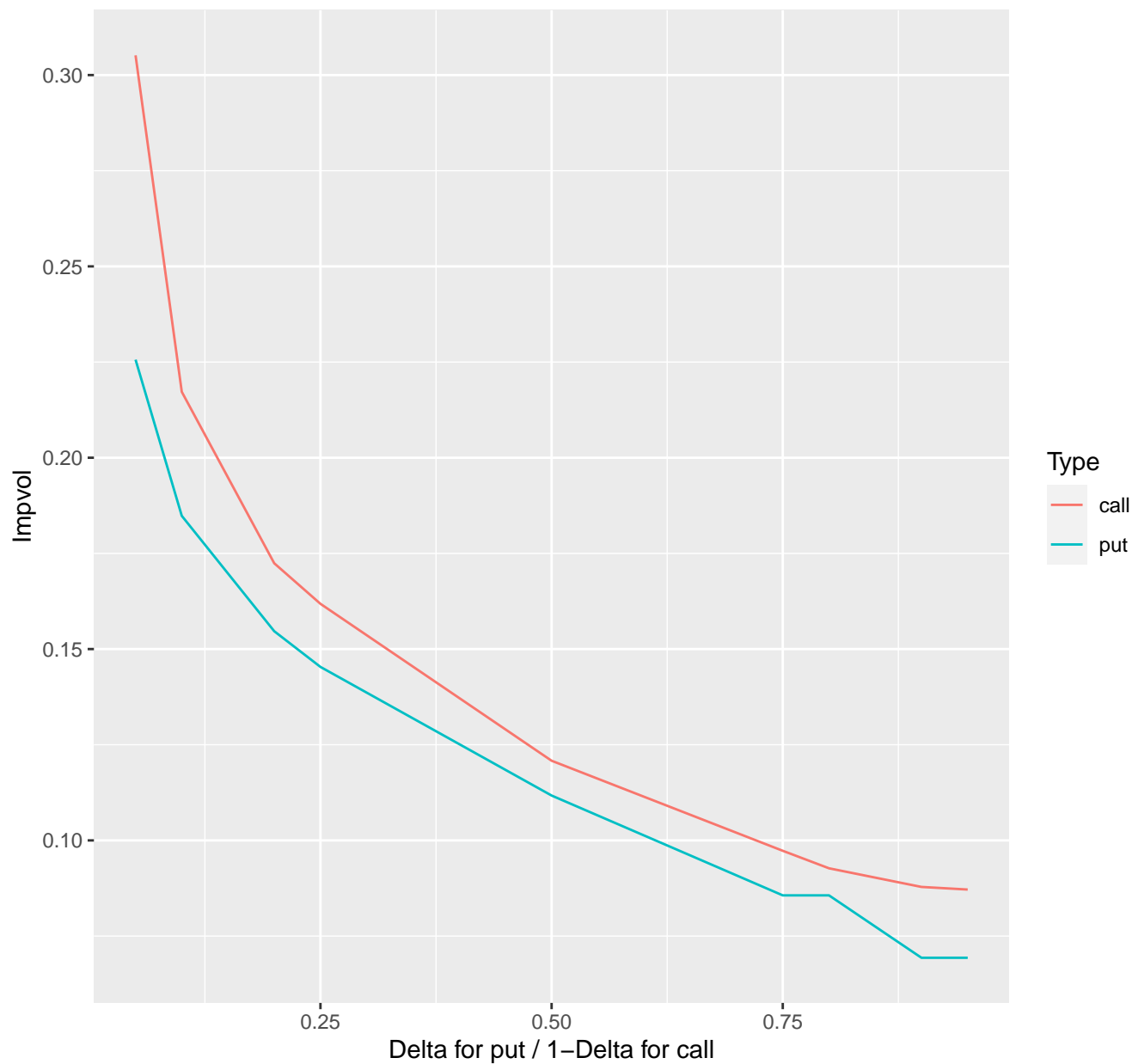
2017-03-17

x axis represents strike price, increasing



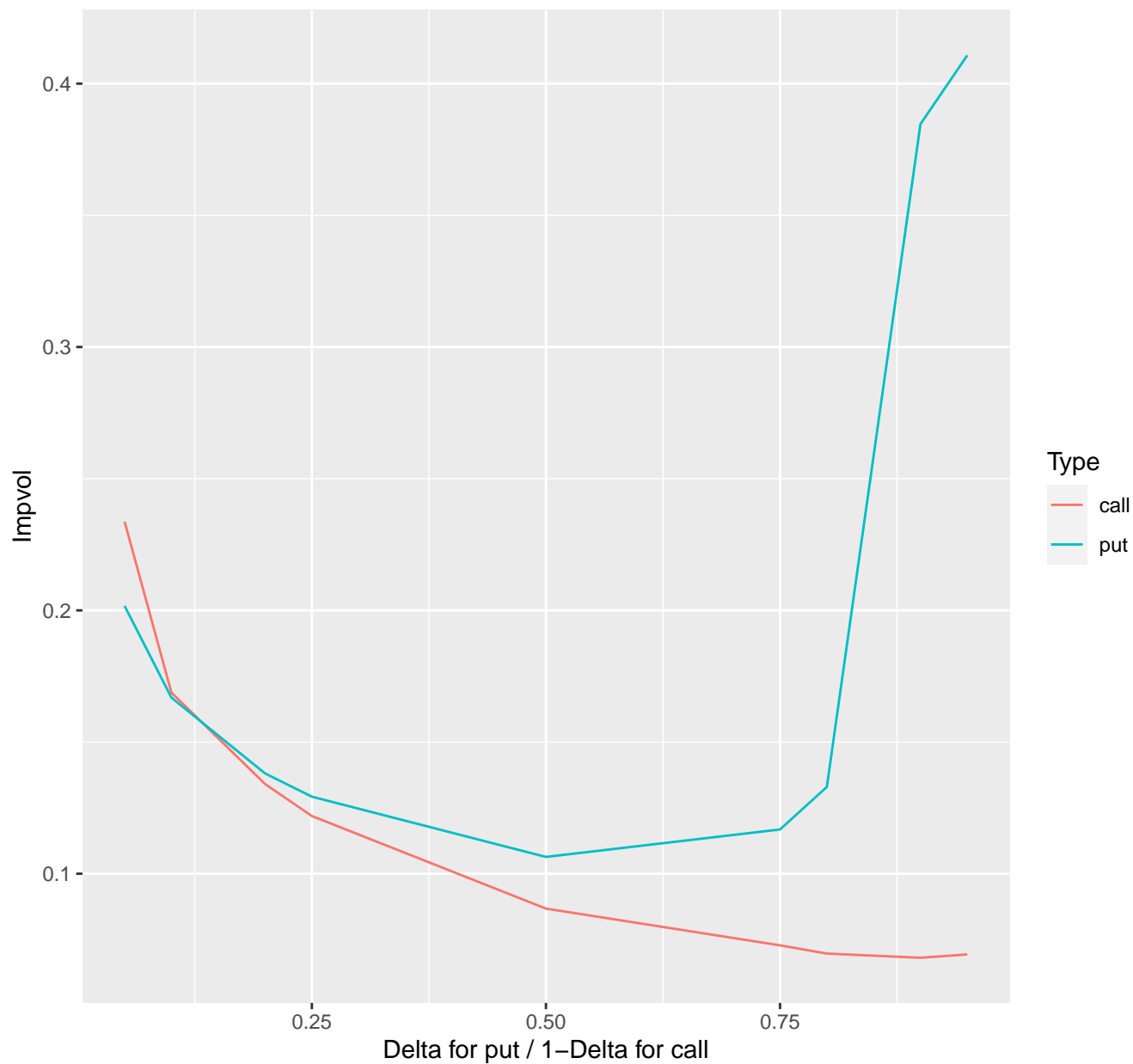
2017-04-21

x axis represents strike price, increasing



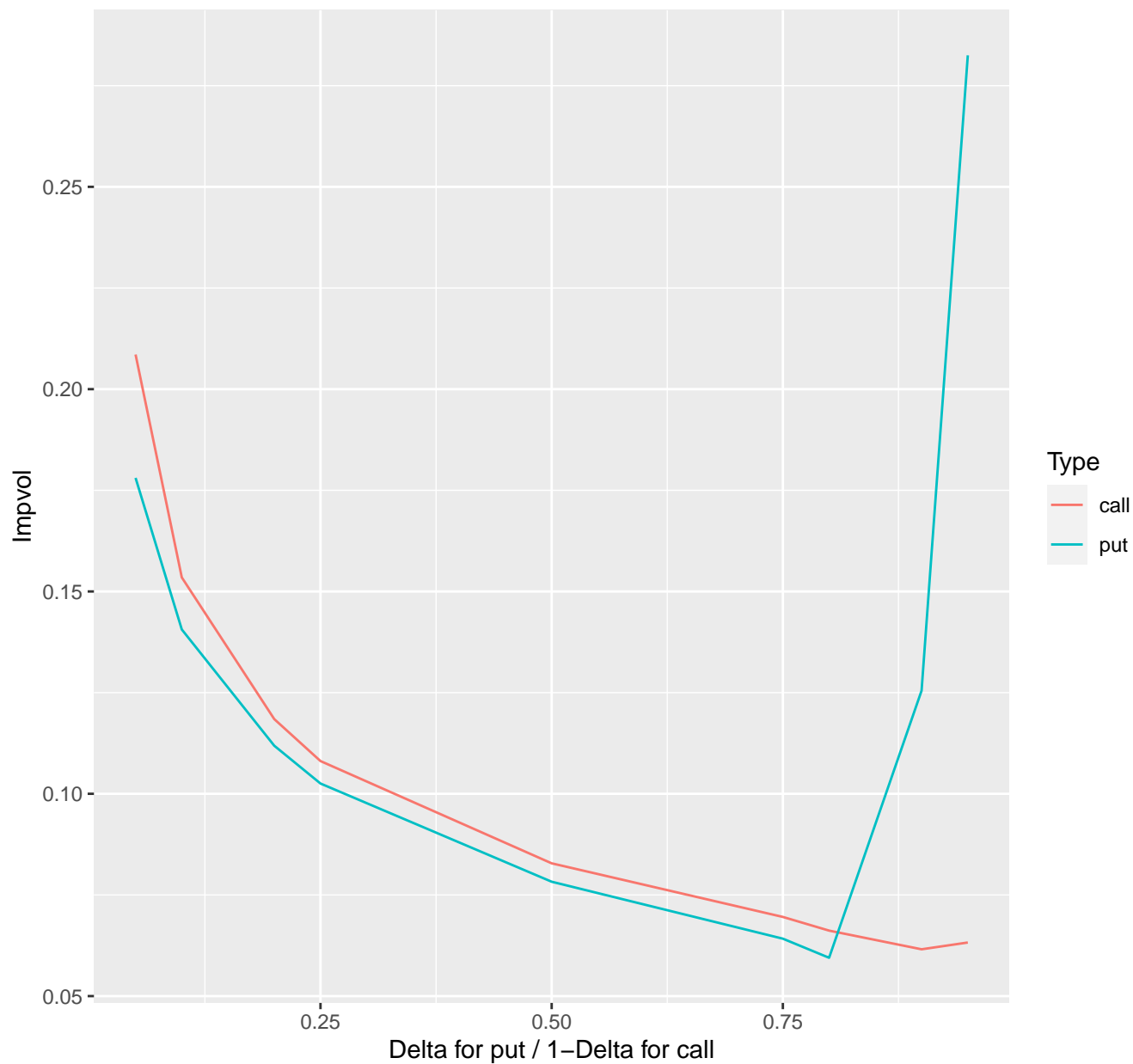
2017-05-19

x axis represents strike price, increasing



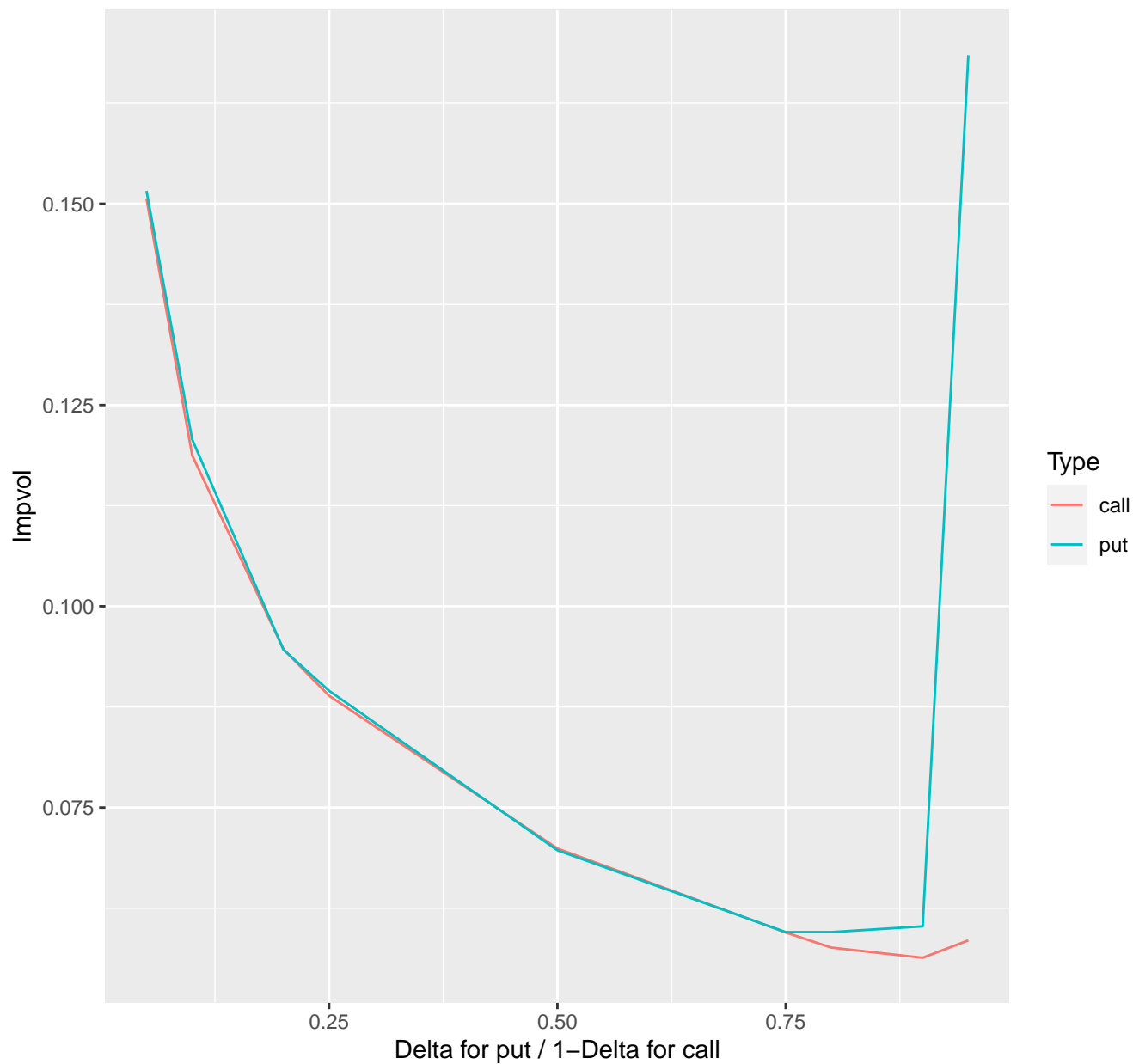
2017-06-16

x axis represents strike price, increasing



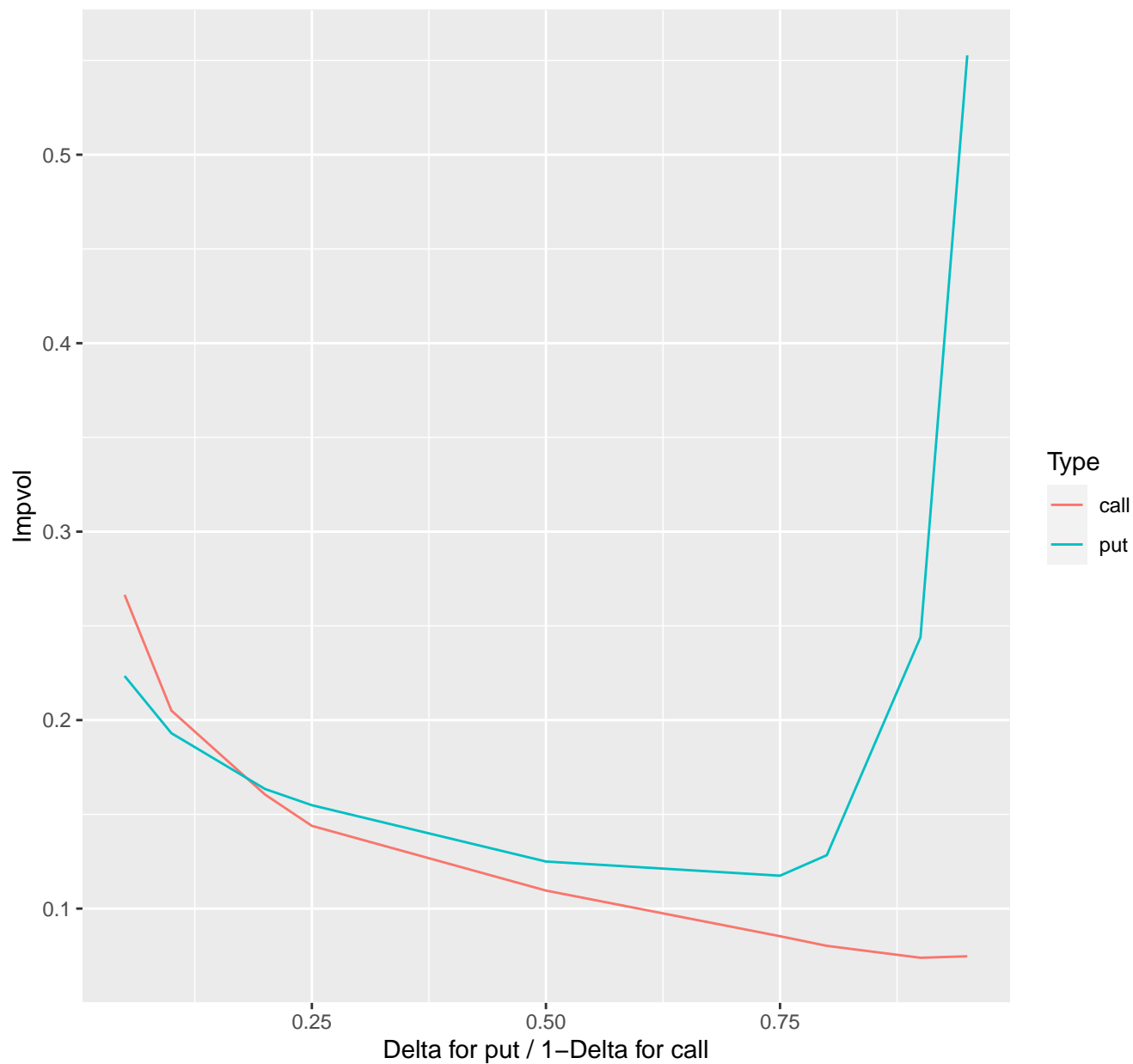
2017-07-21

x axis represents strike price, increasing



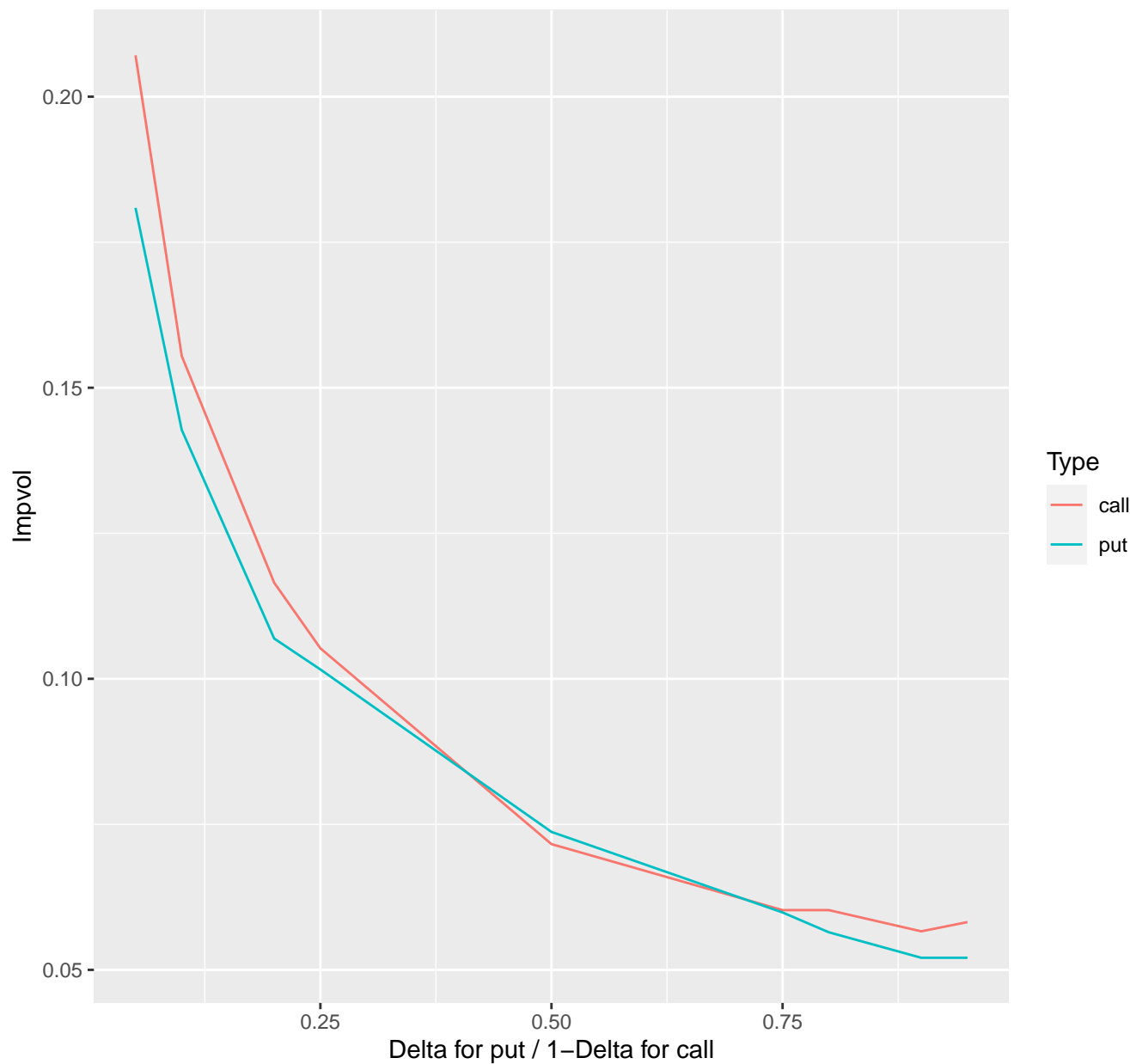
2017-08-18

x axis represents strike price, increasing



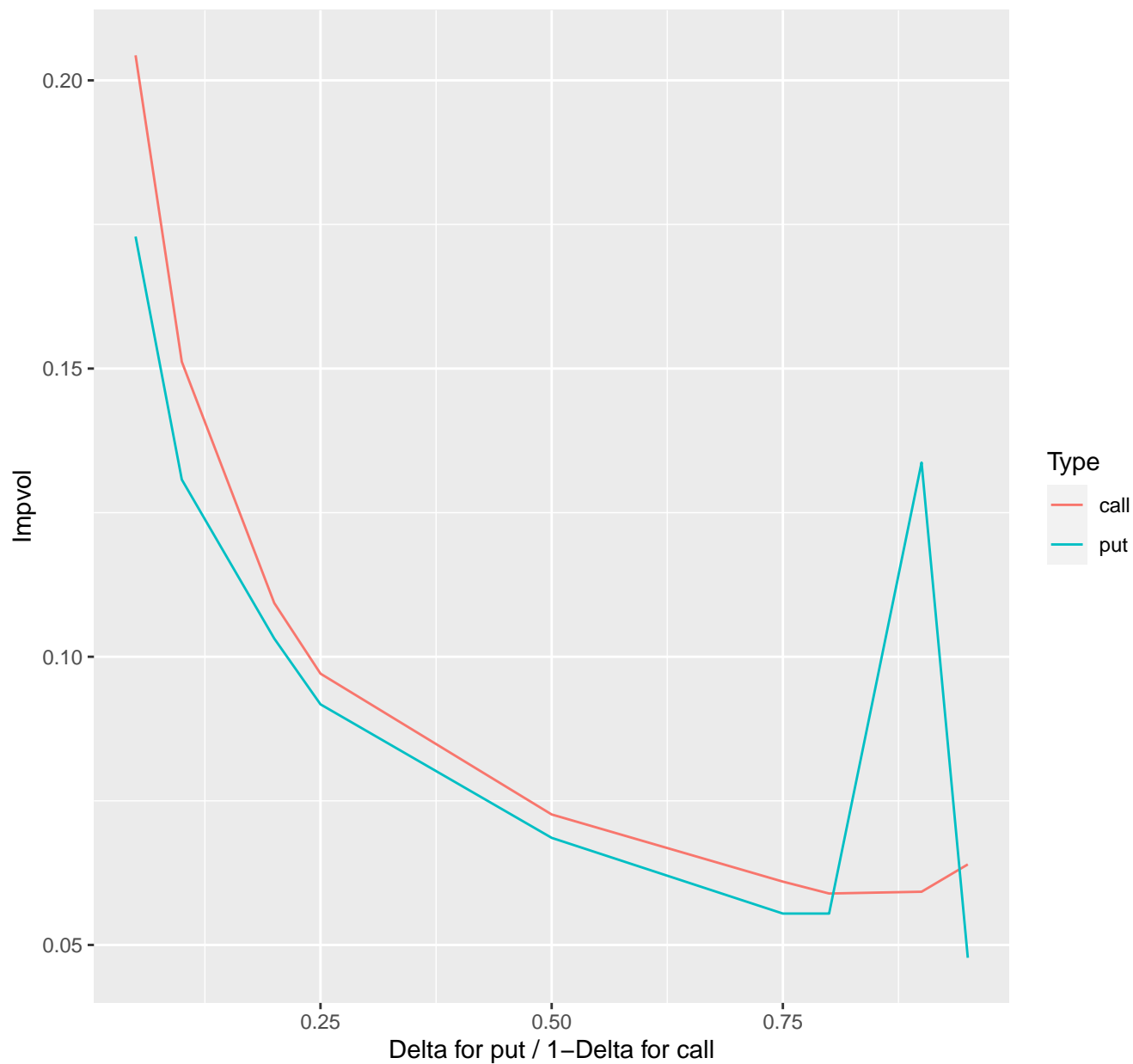
2017-09-15

x axis represents strike price, increasing



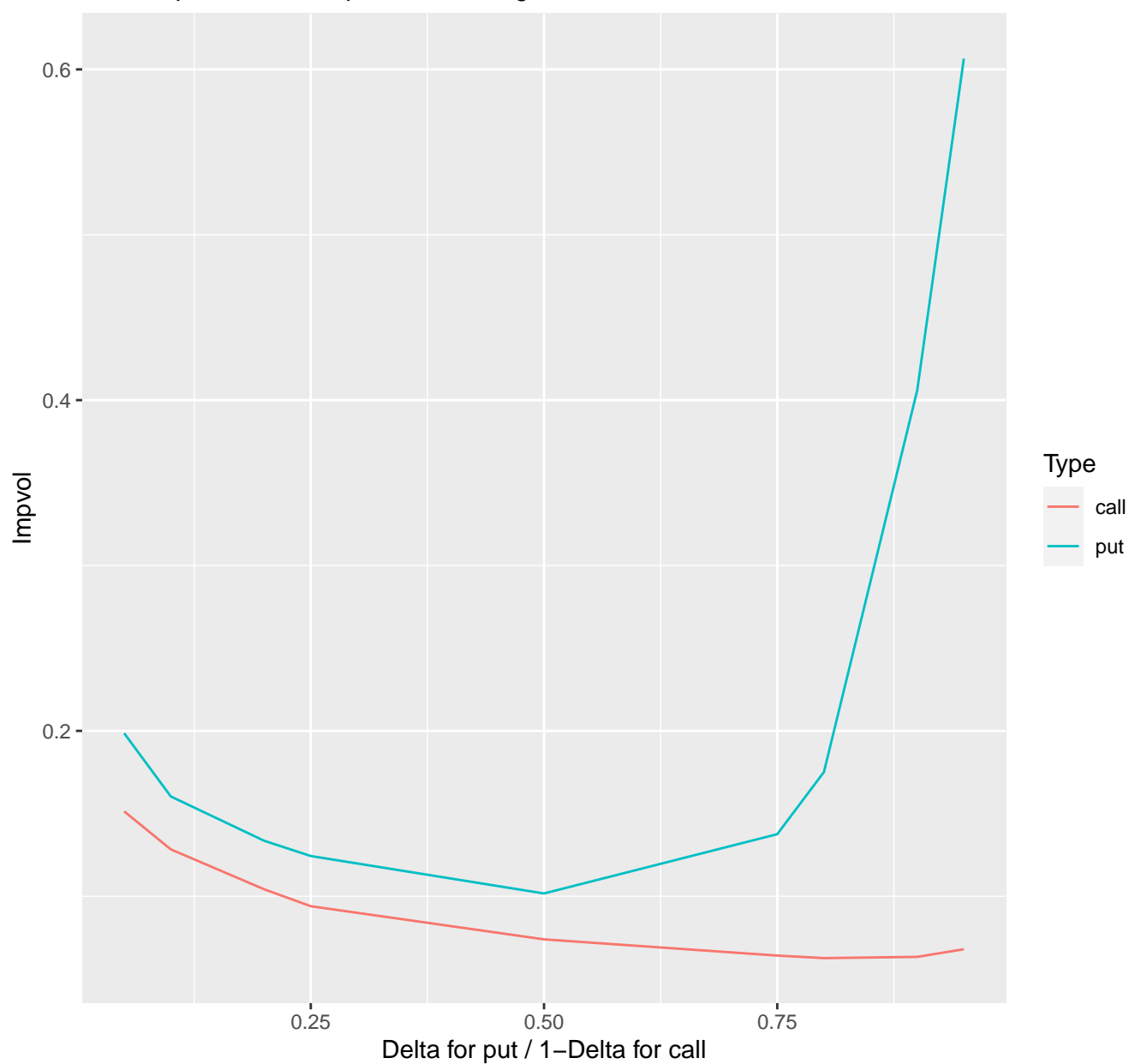
2017-10-20

x axis represents strike price, increasing



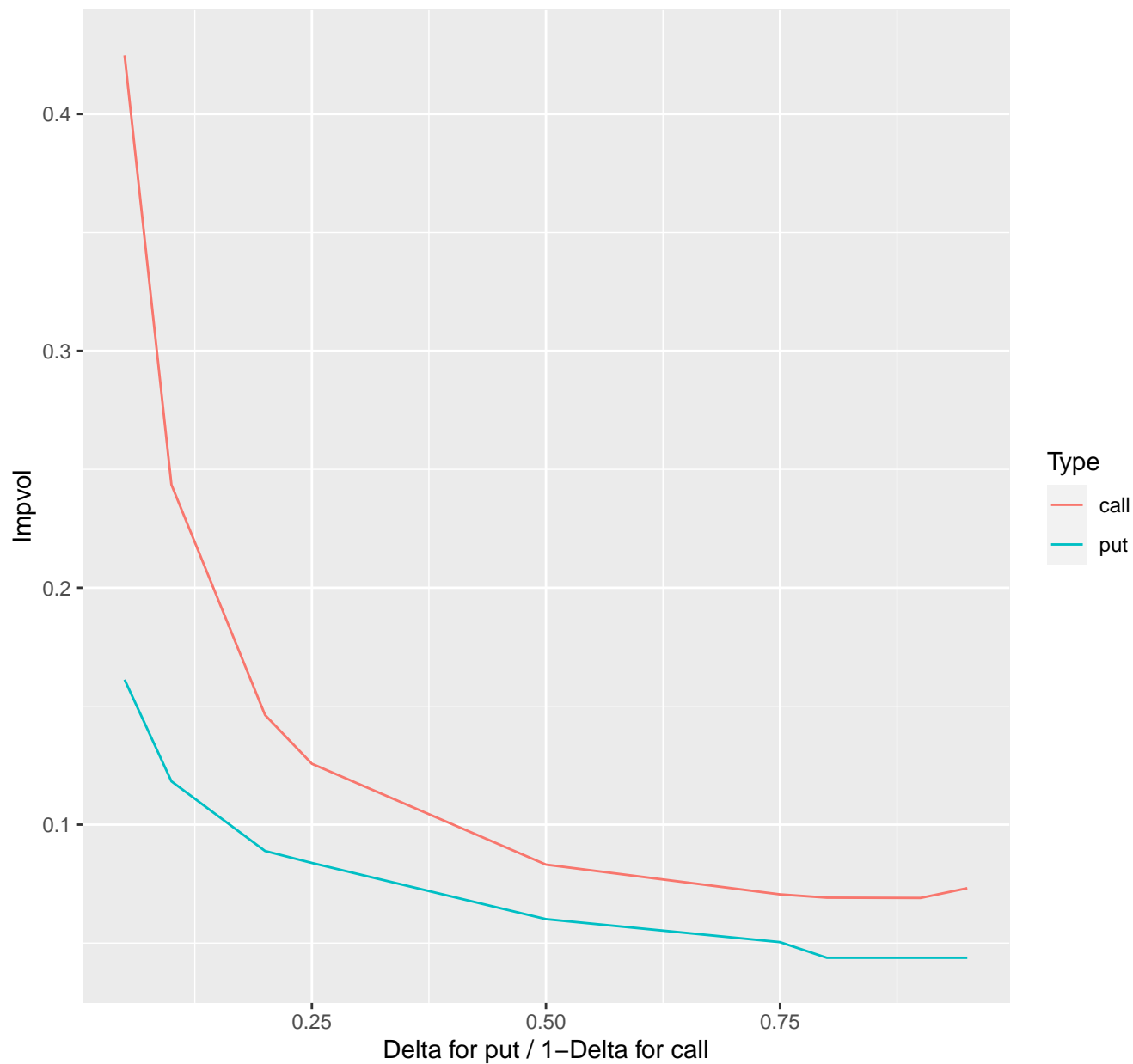
2017-11-17

x axis represents strike price, increasing



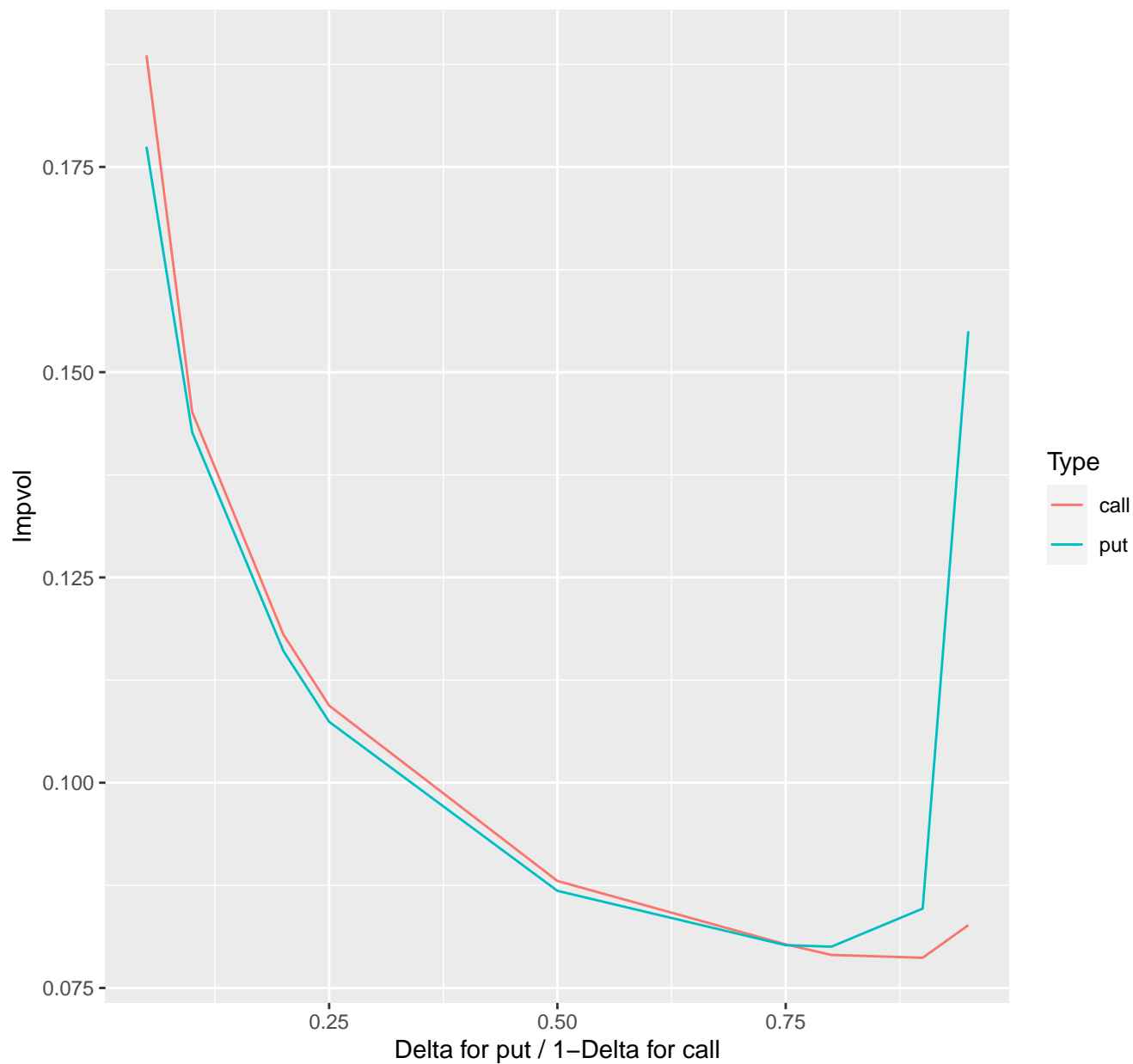
2017-12-15

x axis represents strike price, increasing



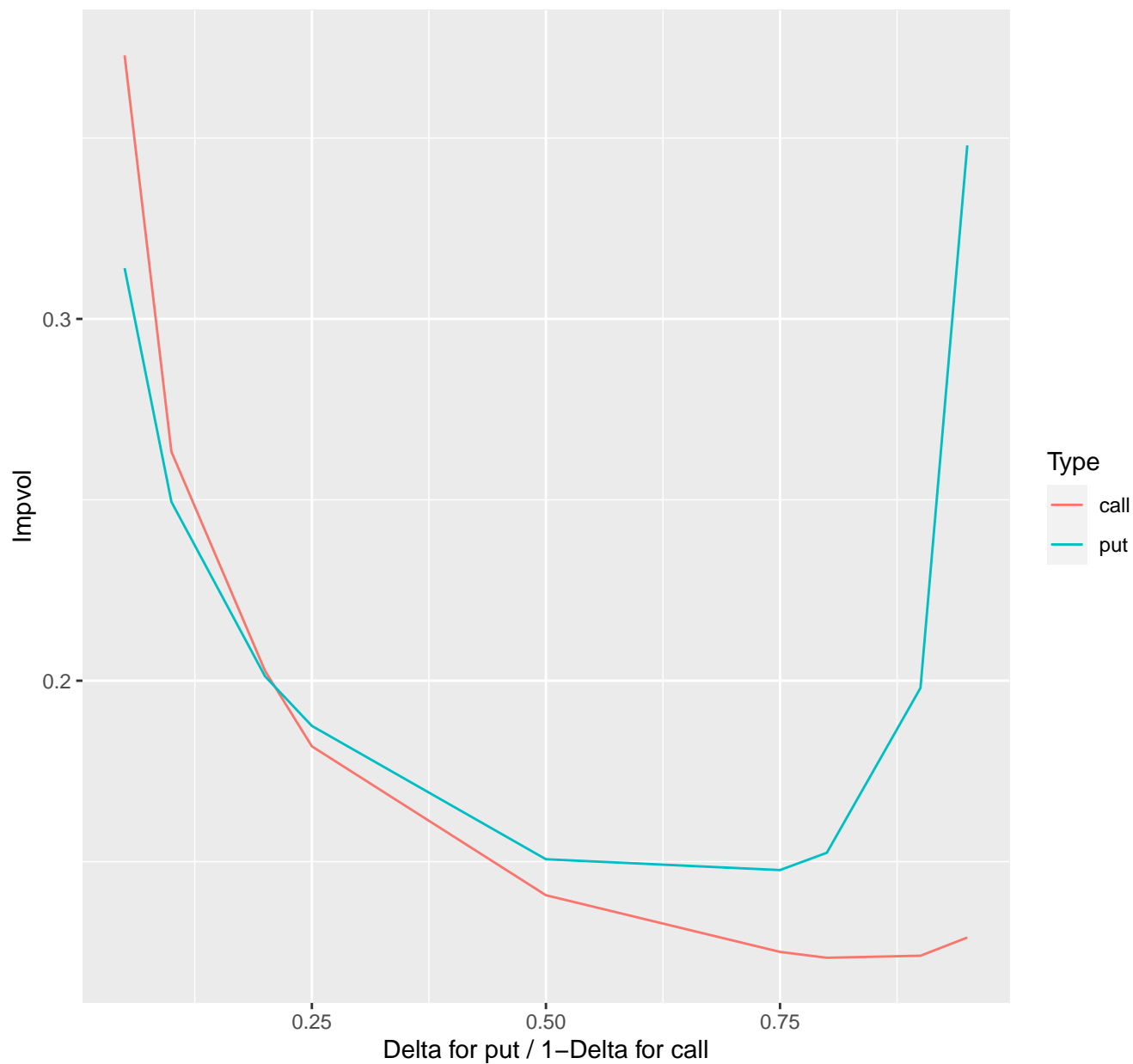
2018-01-19

x axis represents strike price, increasing



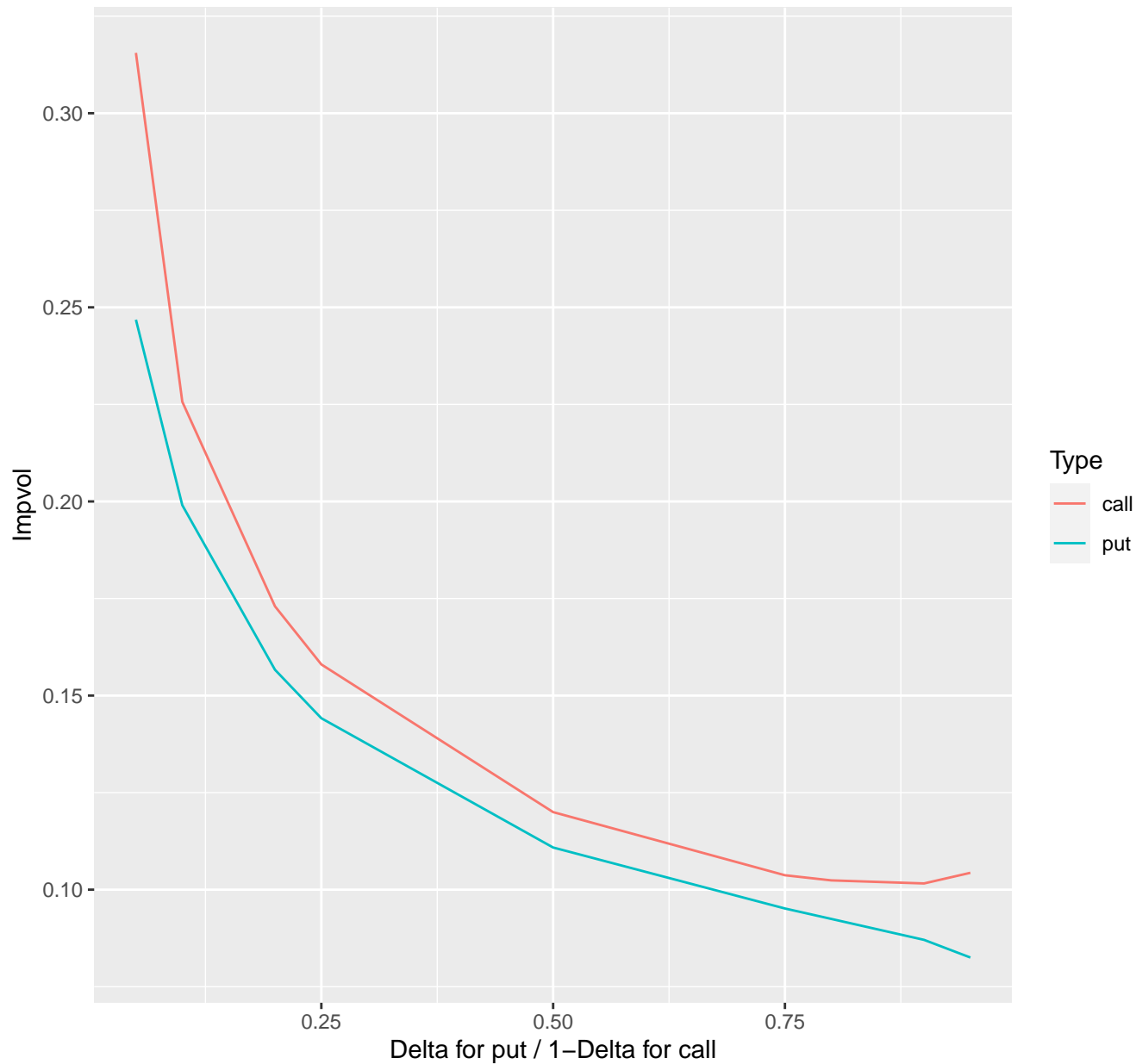
2018-02-16

x axis represents strike price, increasing



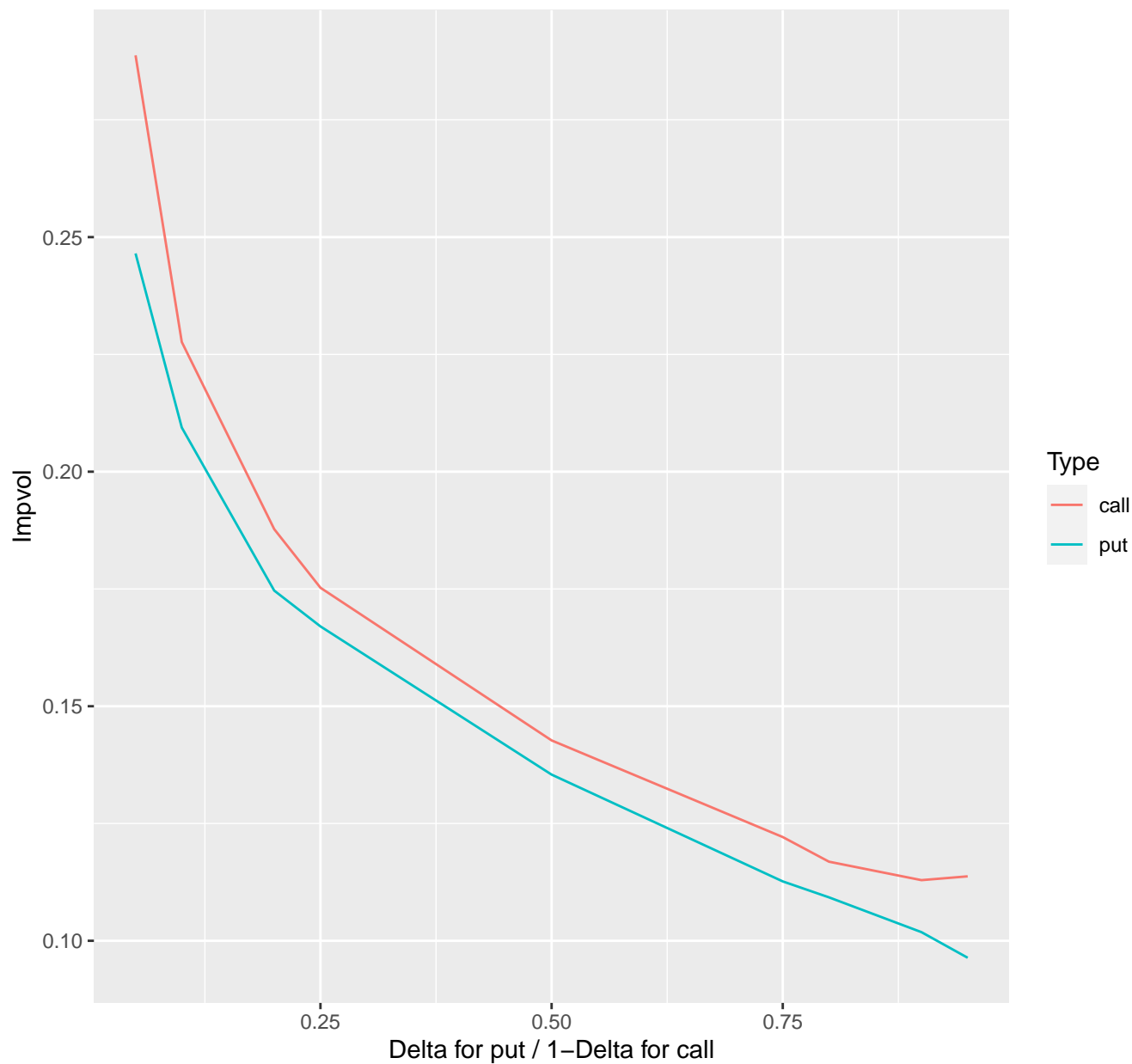
2018-03-16

x axis represents strike price, increasing



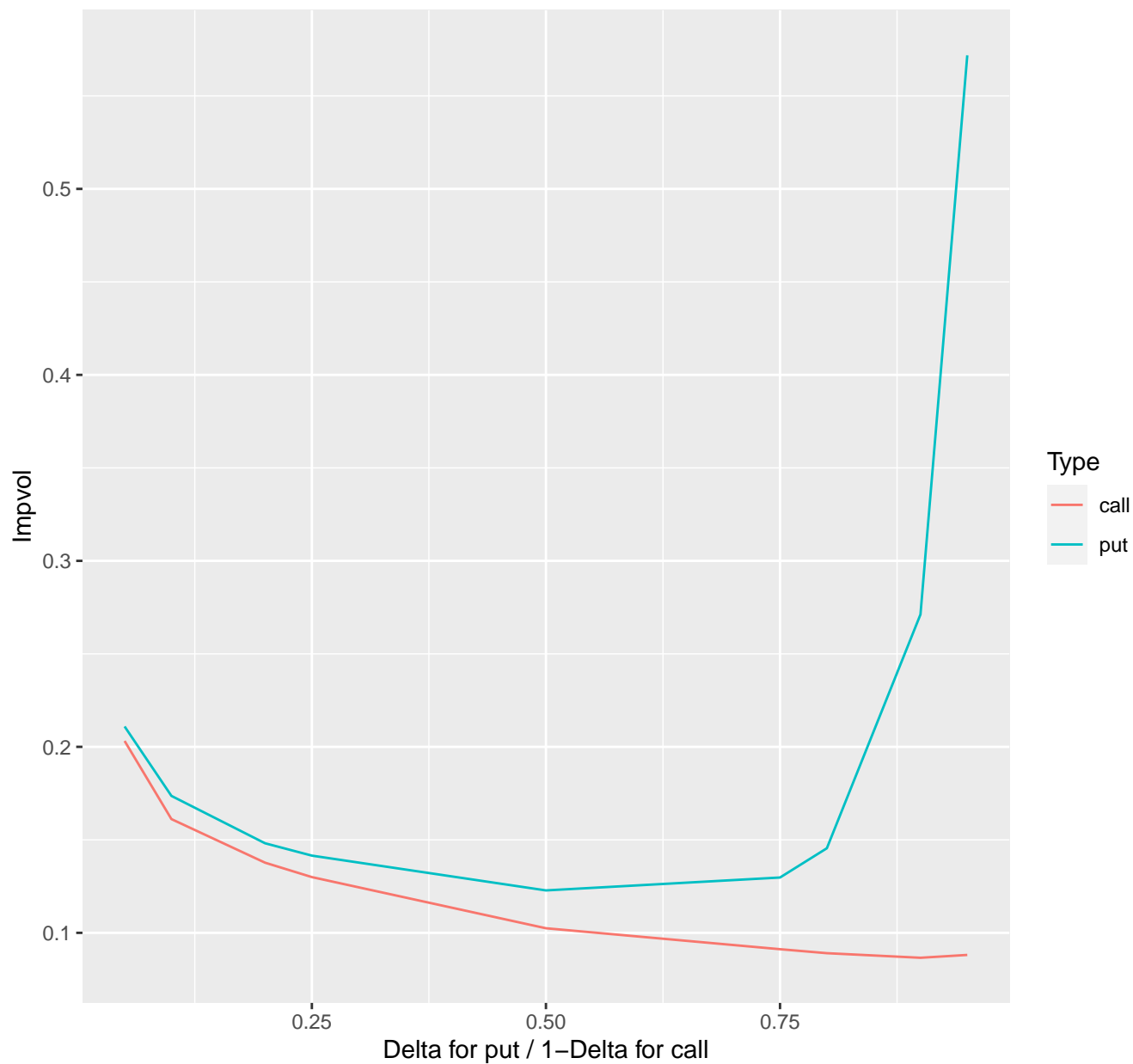
2018-04-20

x axis represents strike price, increasing



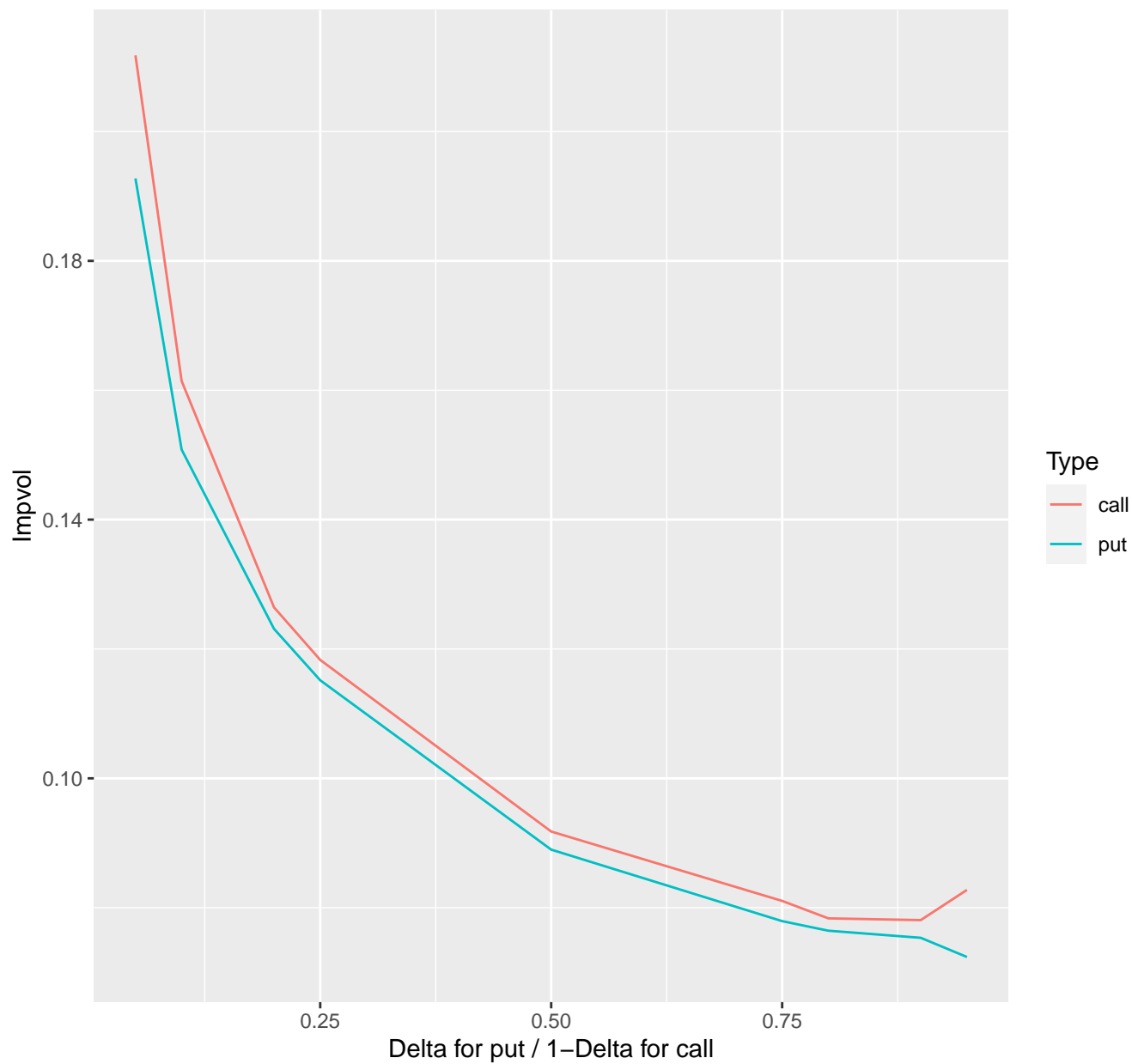
2018-05-18

x axis represents strike price, increasing



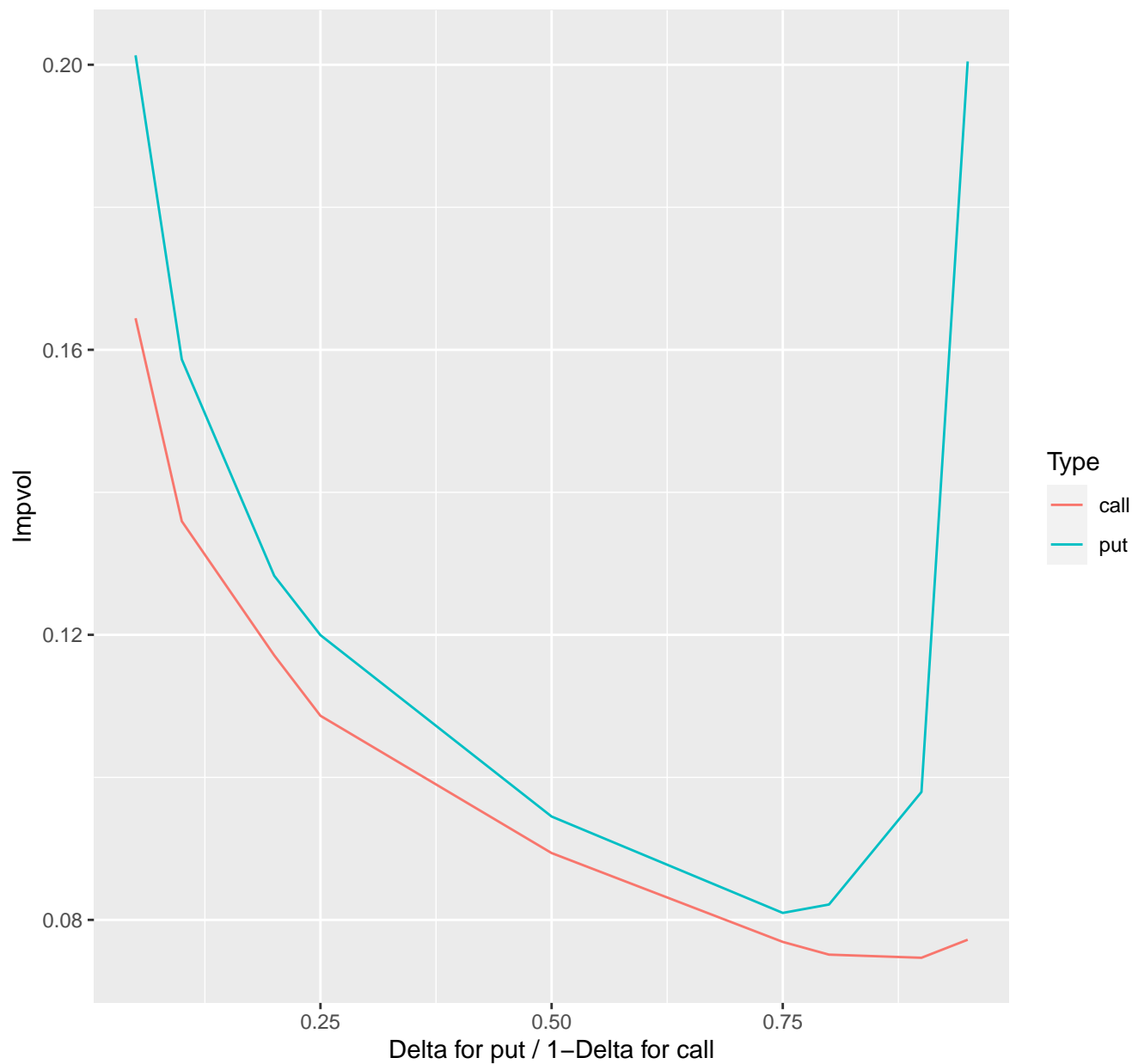
2018-06-15

x axis represents strike price, increasing



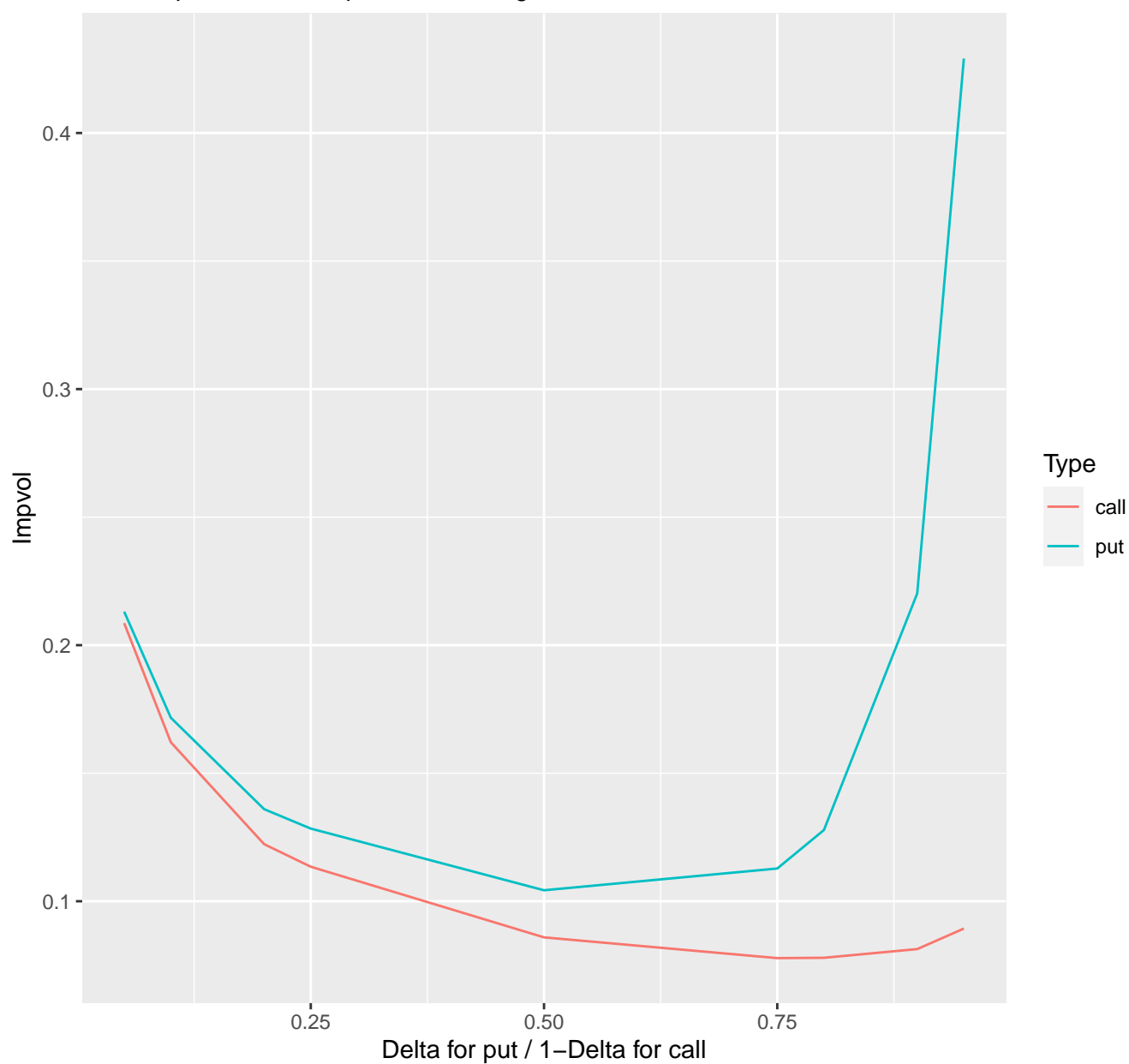
2018-07-20

x axis represents strike price, increasing



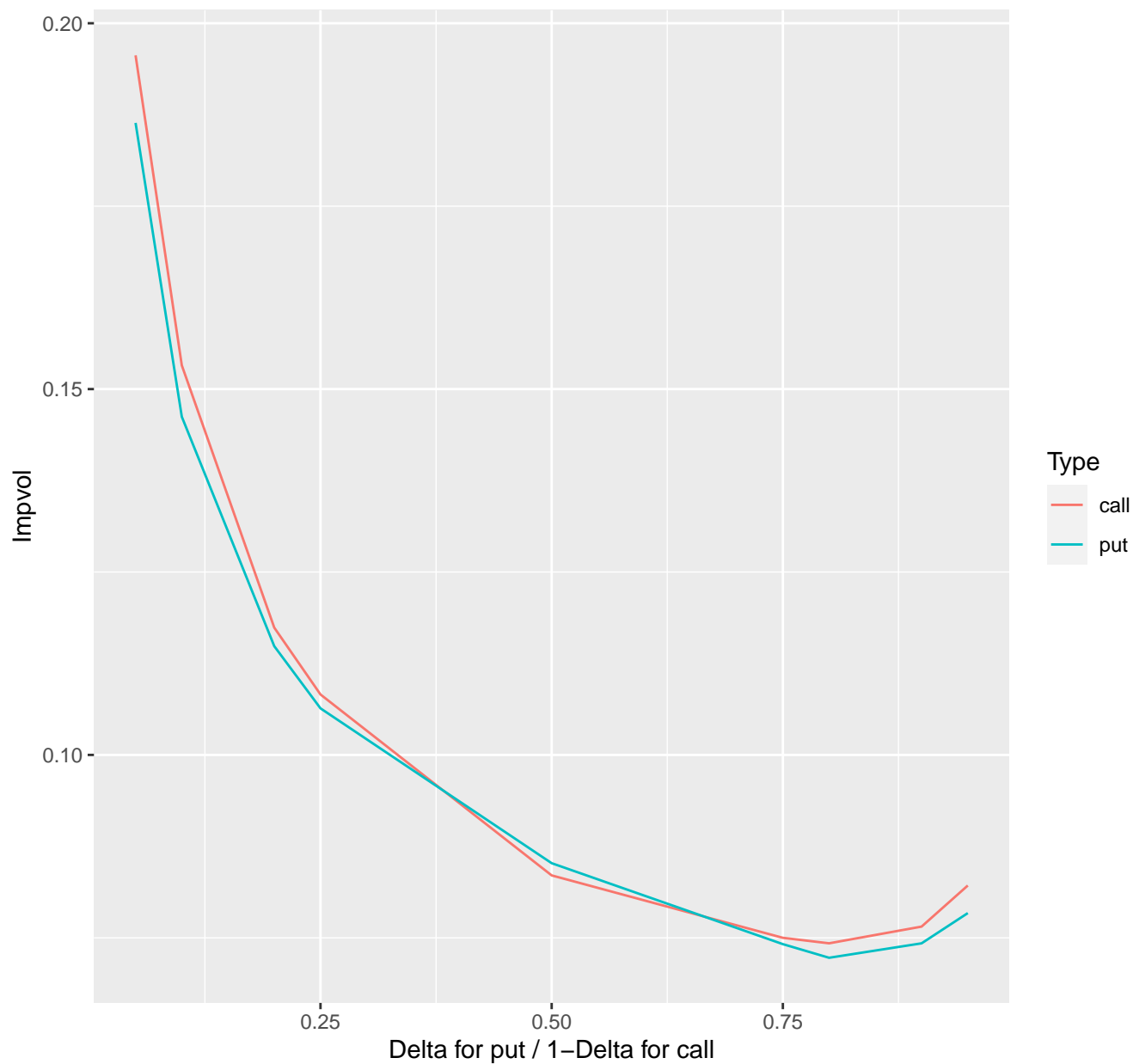
2018-08-17

x axis represents strike price, increasing



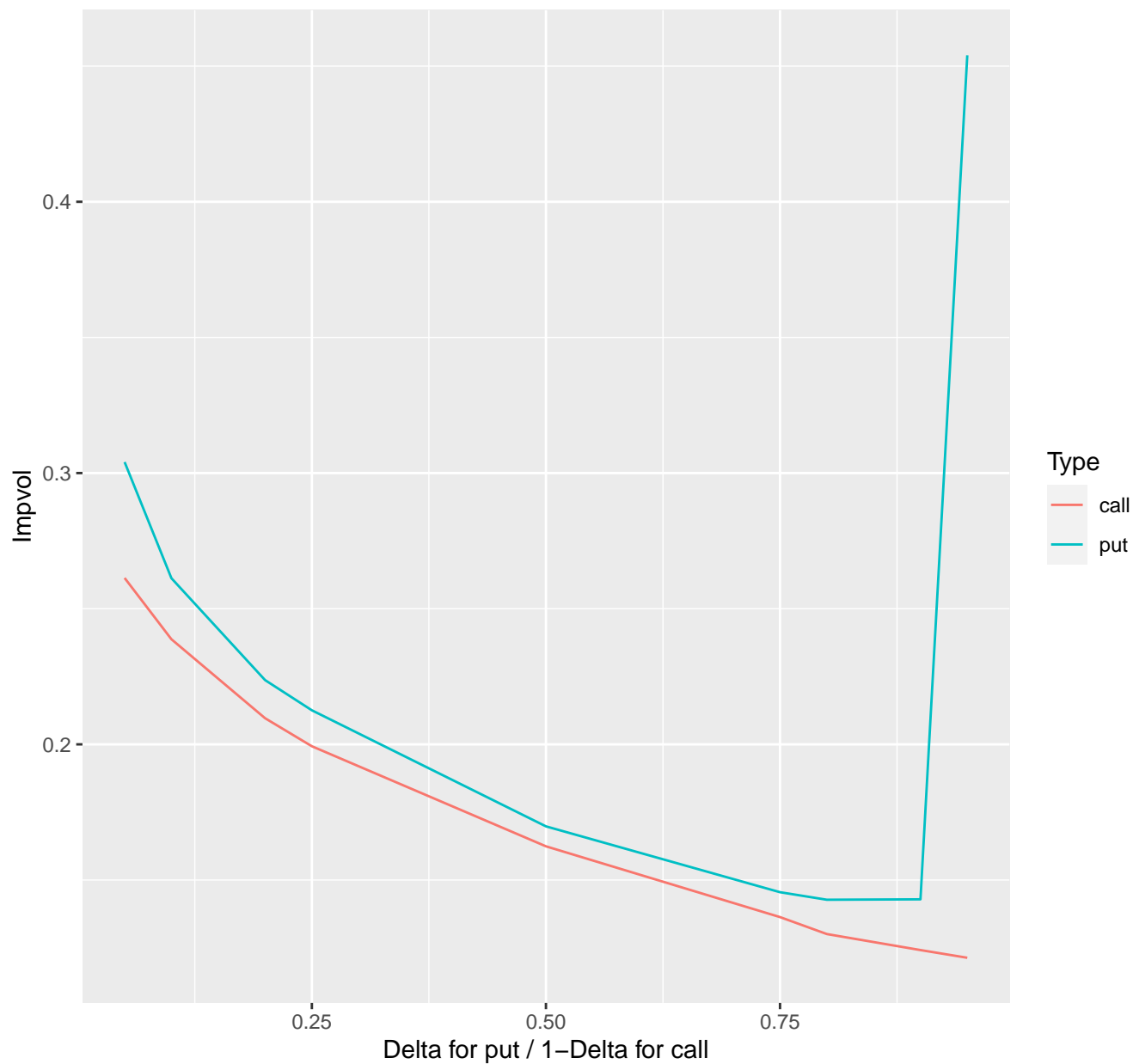
2018-09-21

x axis represents strike price, increasing



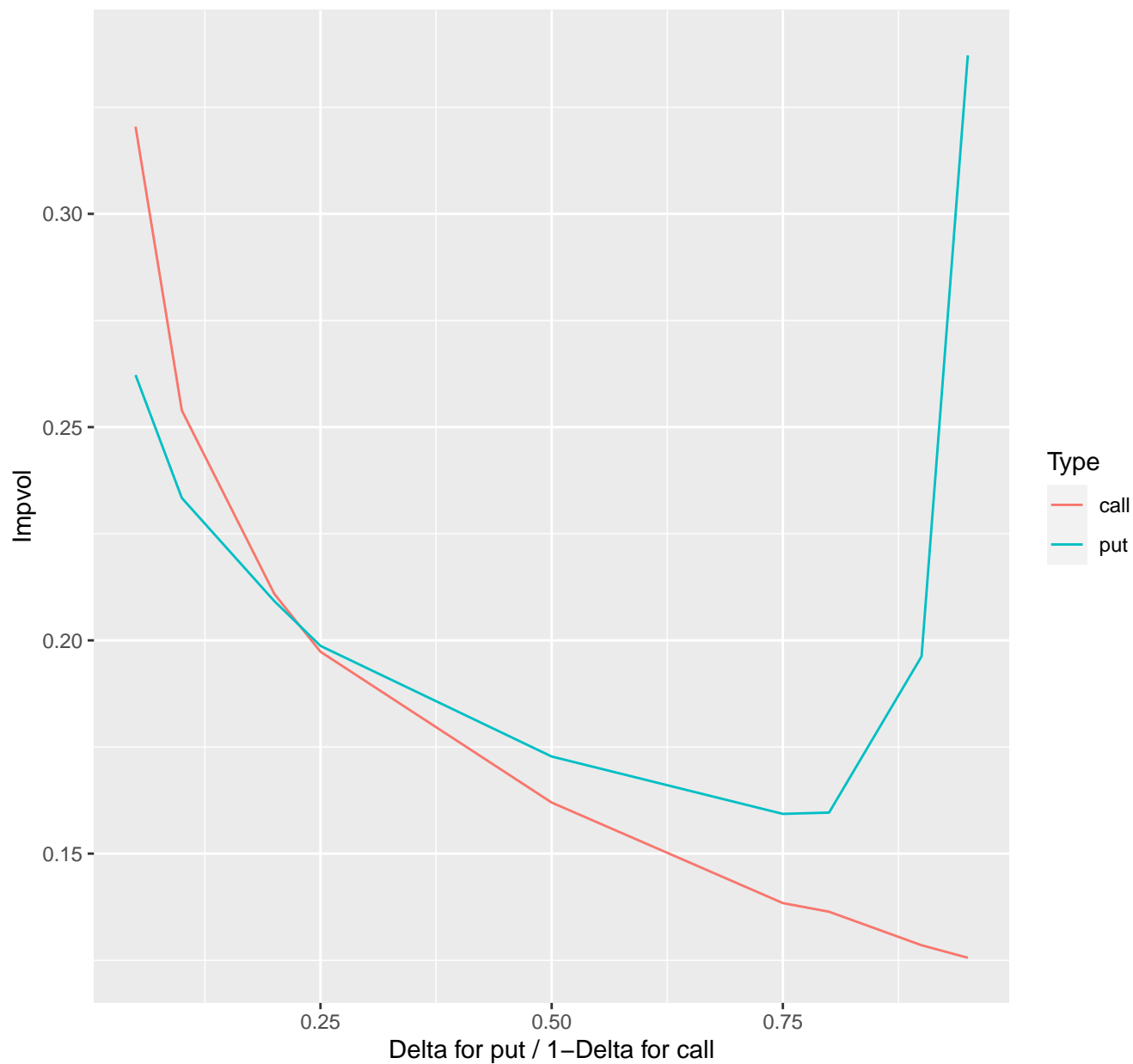
2018-10-19

x axis represents strike price, increasing



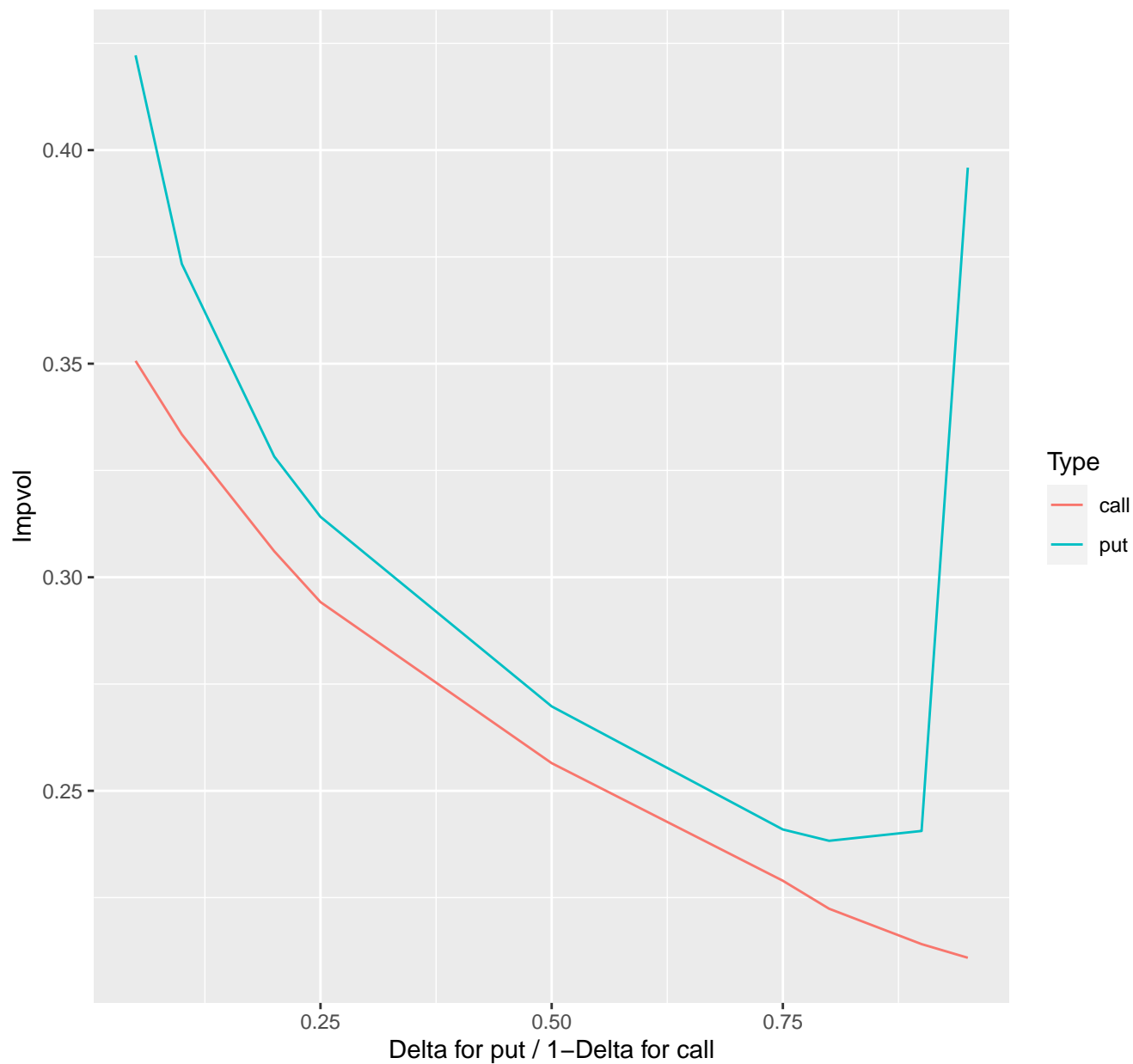
2018-11-16

x axis represents strike price, increasing



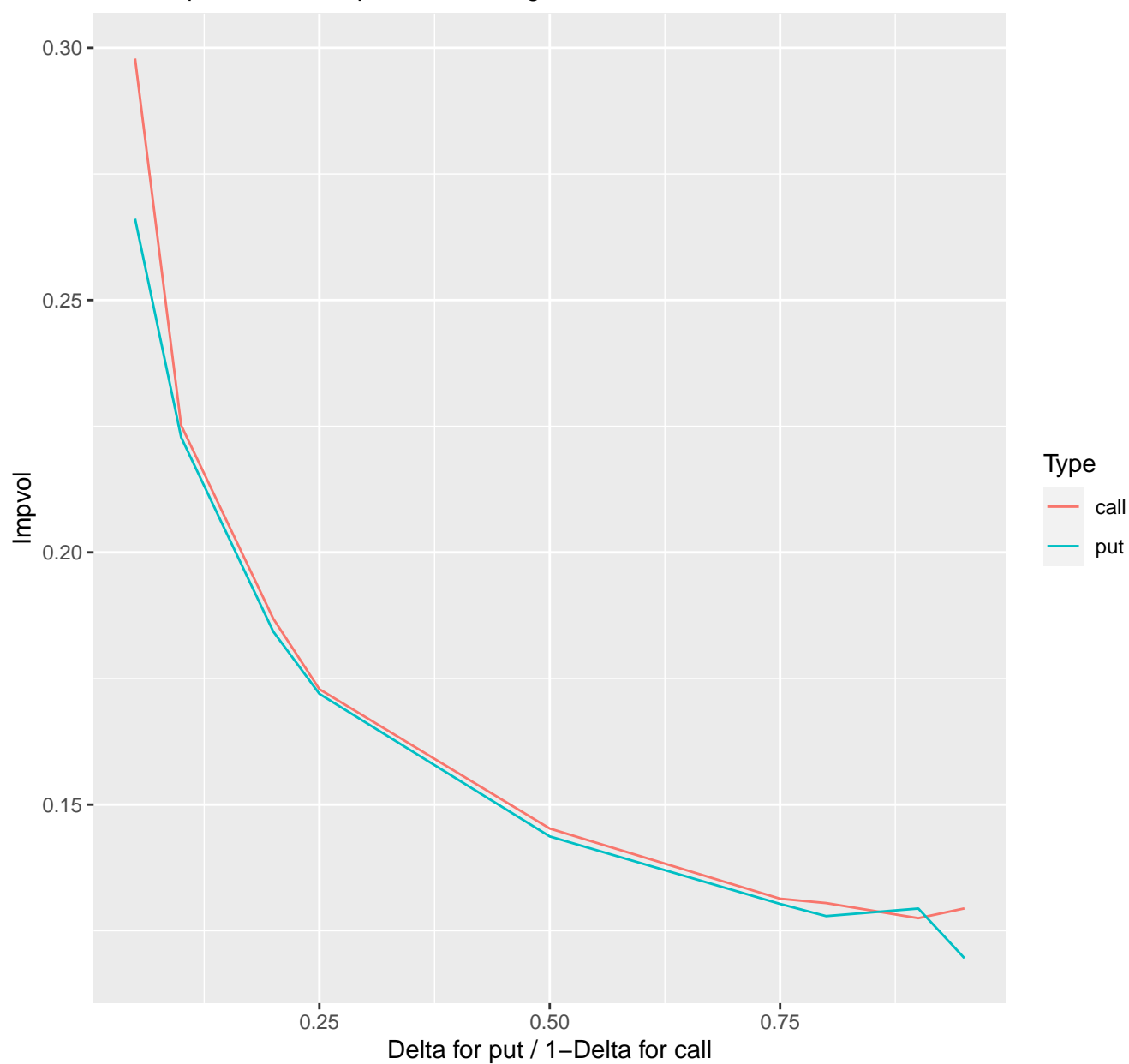
2018-12-21

x axis represents strike price, increasing



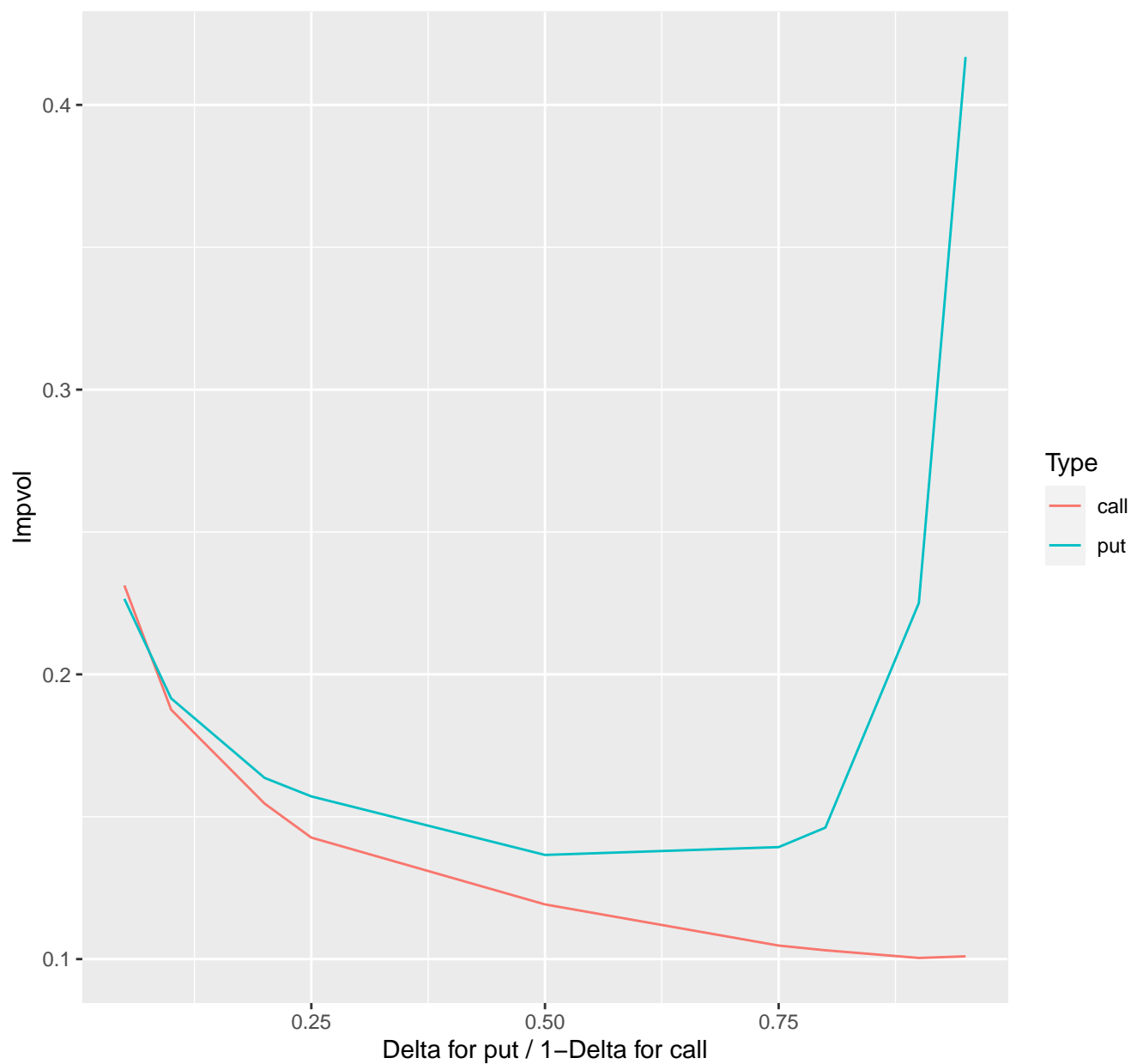
2019-01-18

x axis represents strike price, increasing



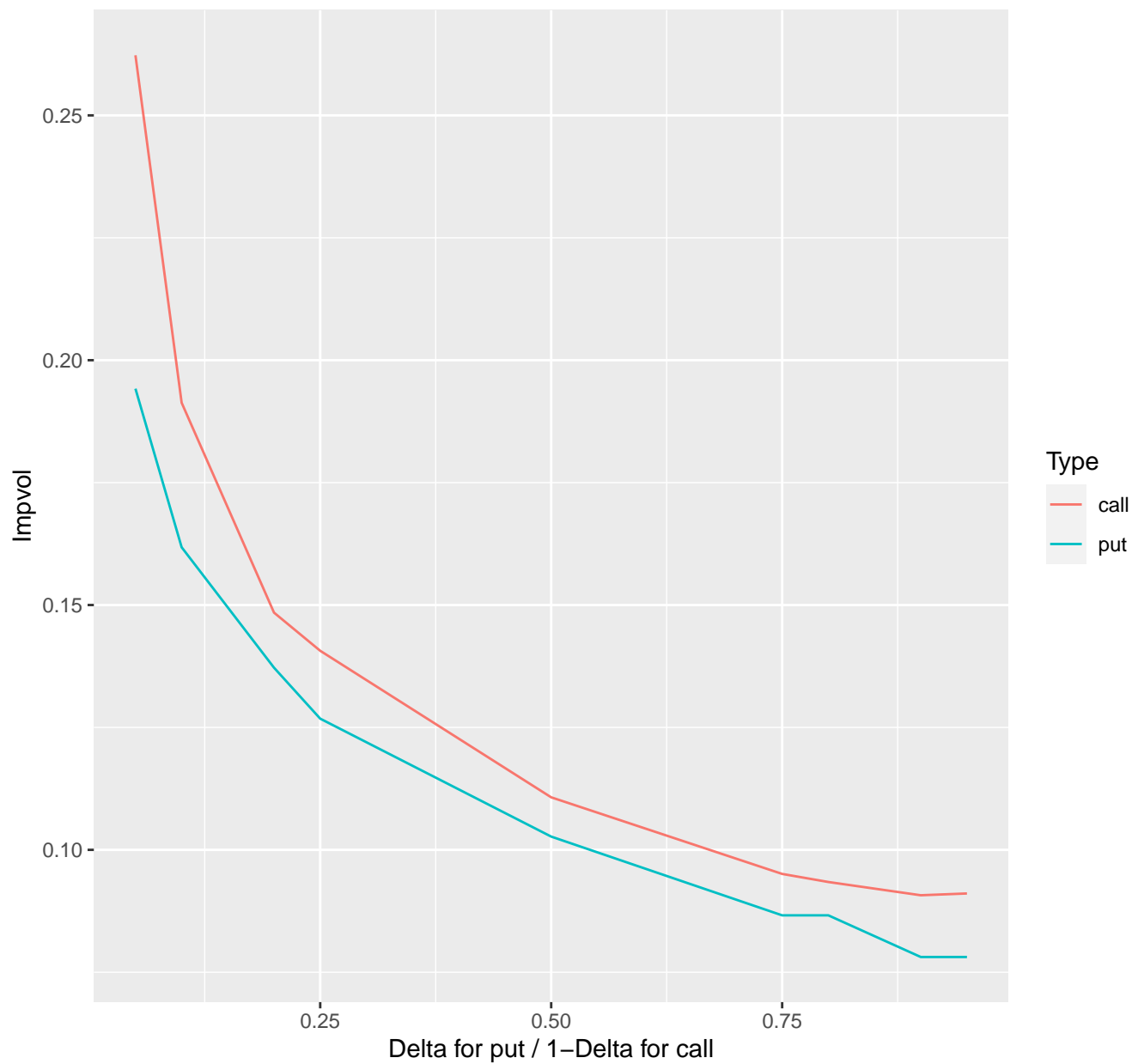
2019-02-15

x axis represents strike price, increasing



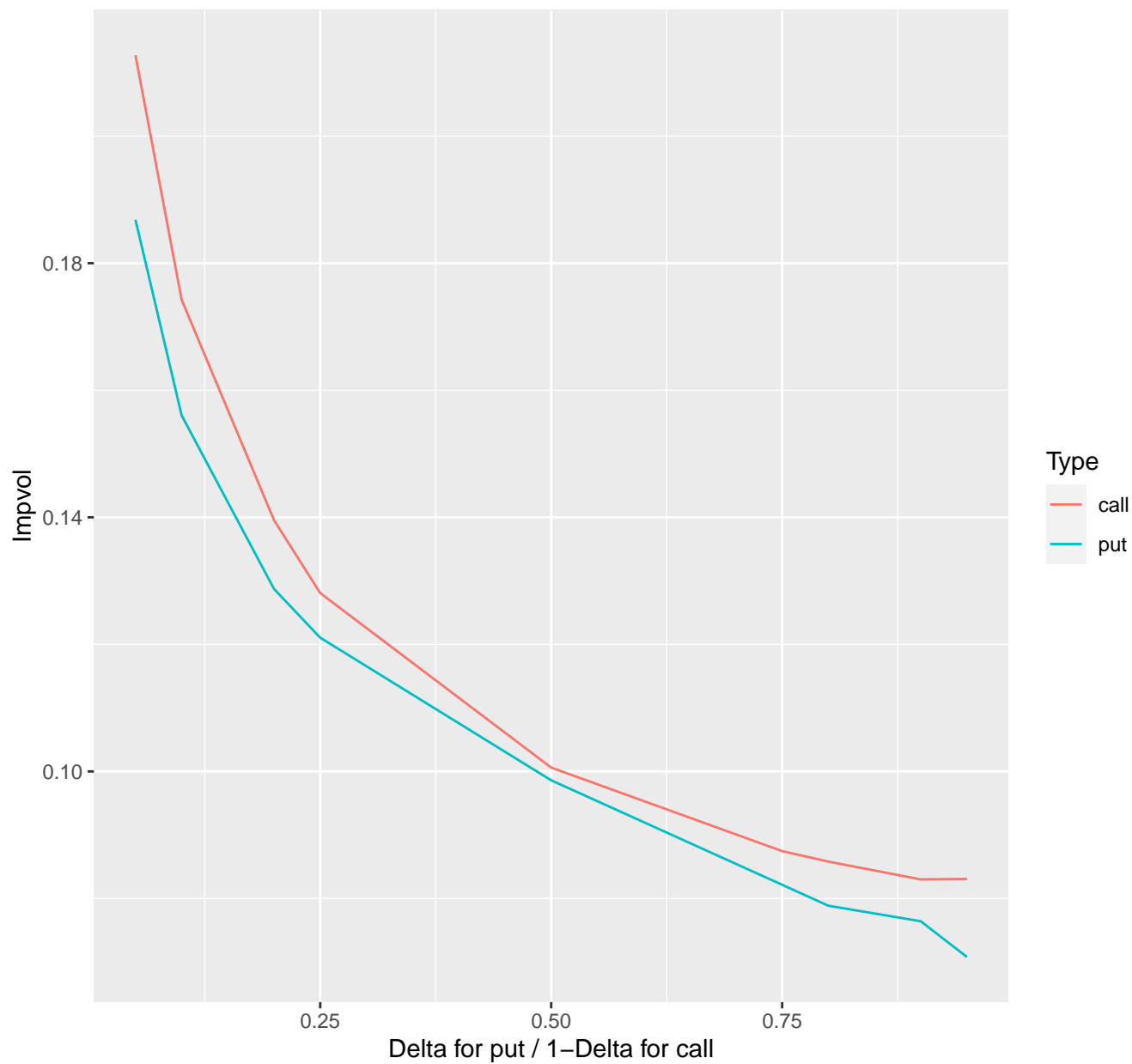
2019-03-15

x axis represents strike price, increasing



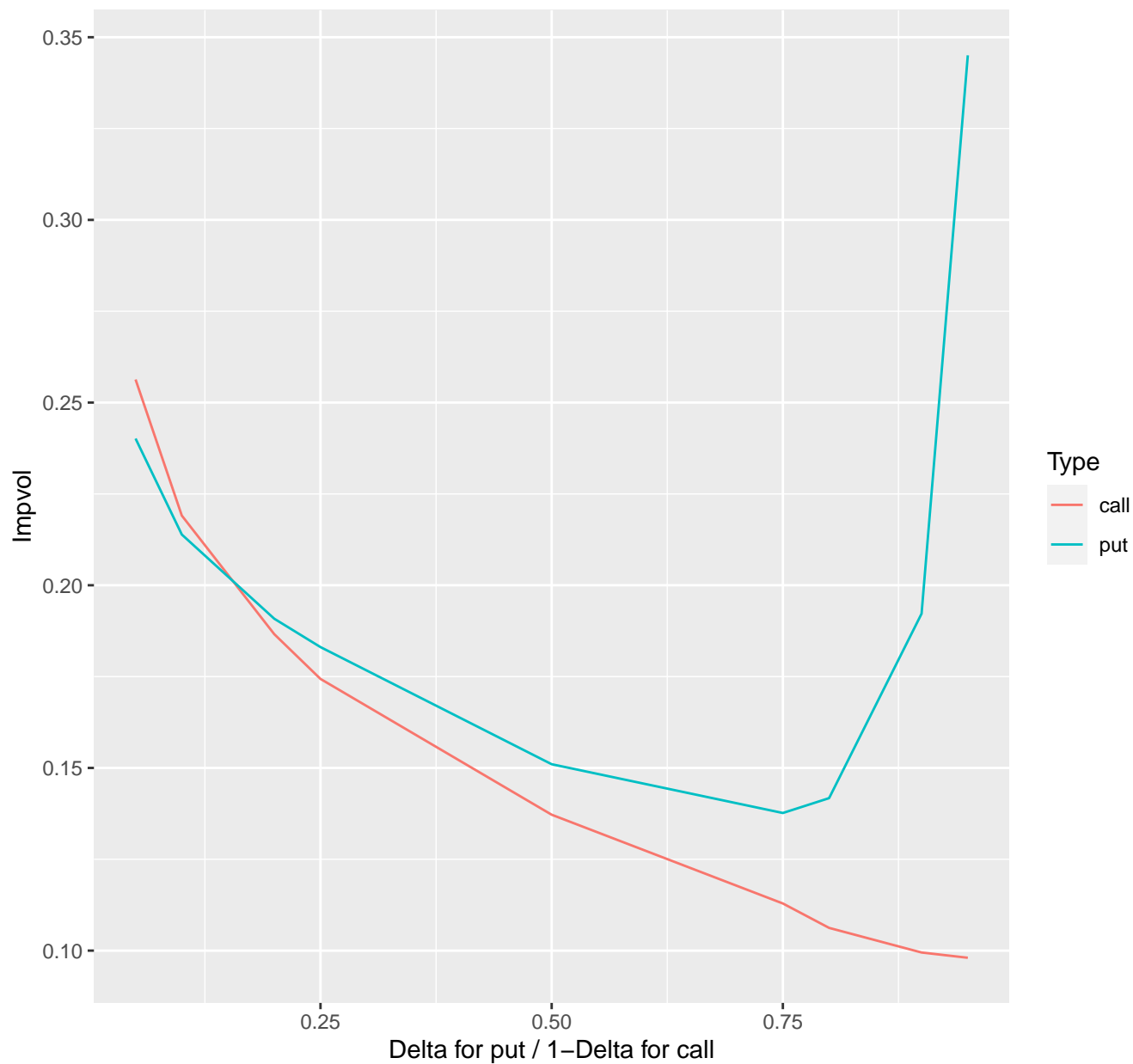
2019-04-18

x axis represents strike price, increasing



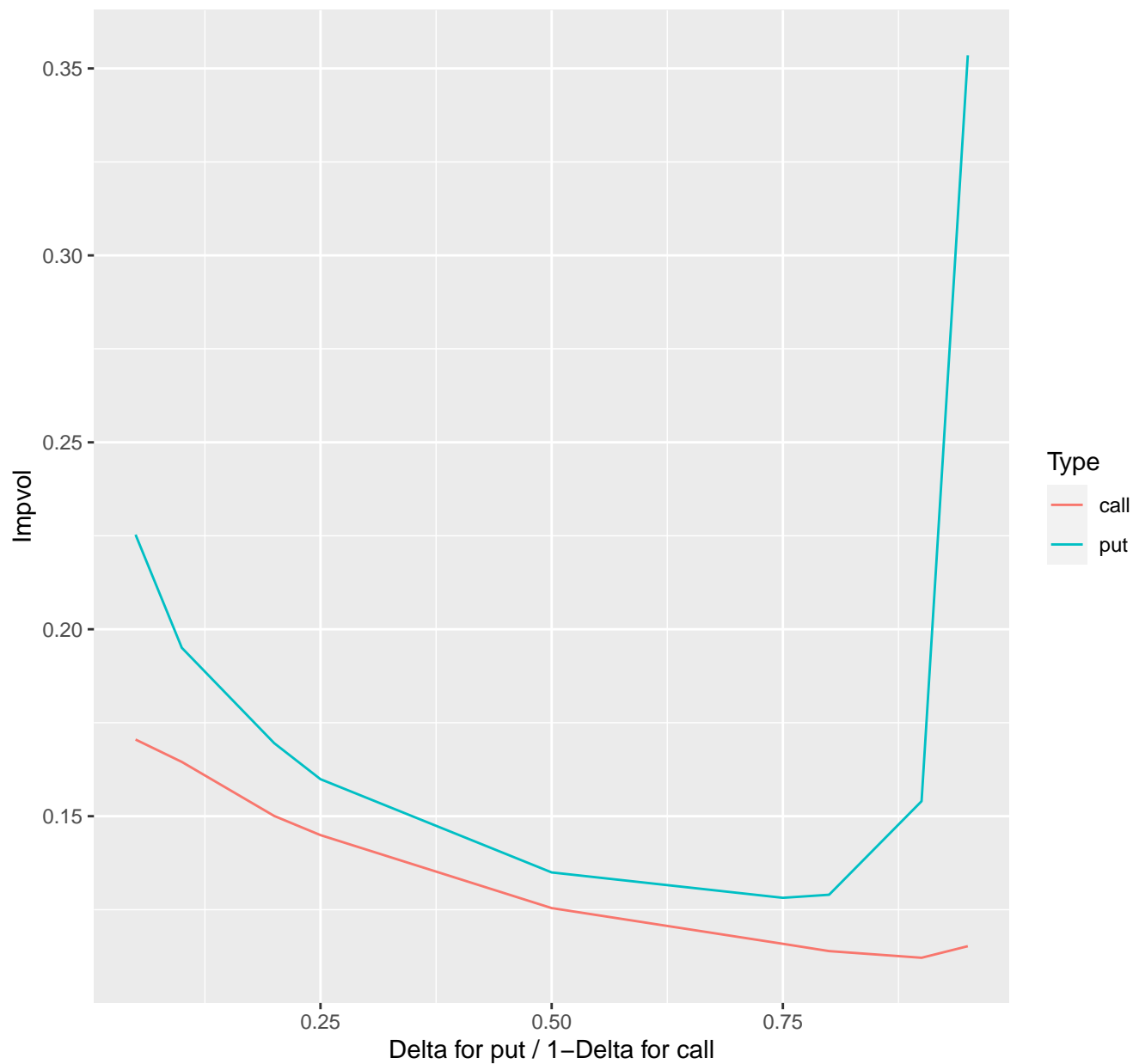
2019-05-17

x axis represents strike price, increasing



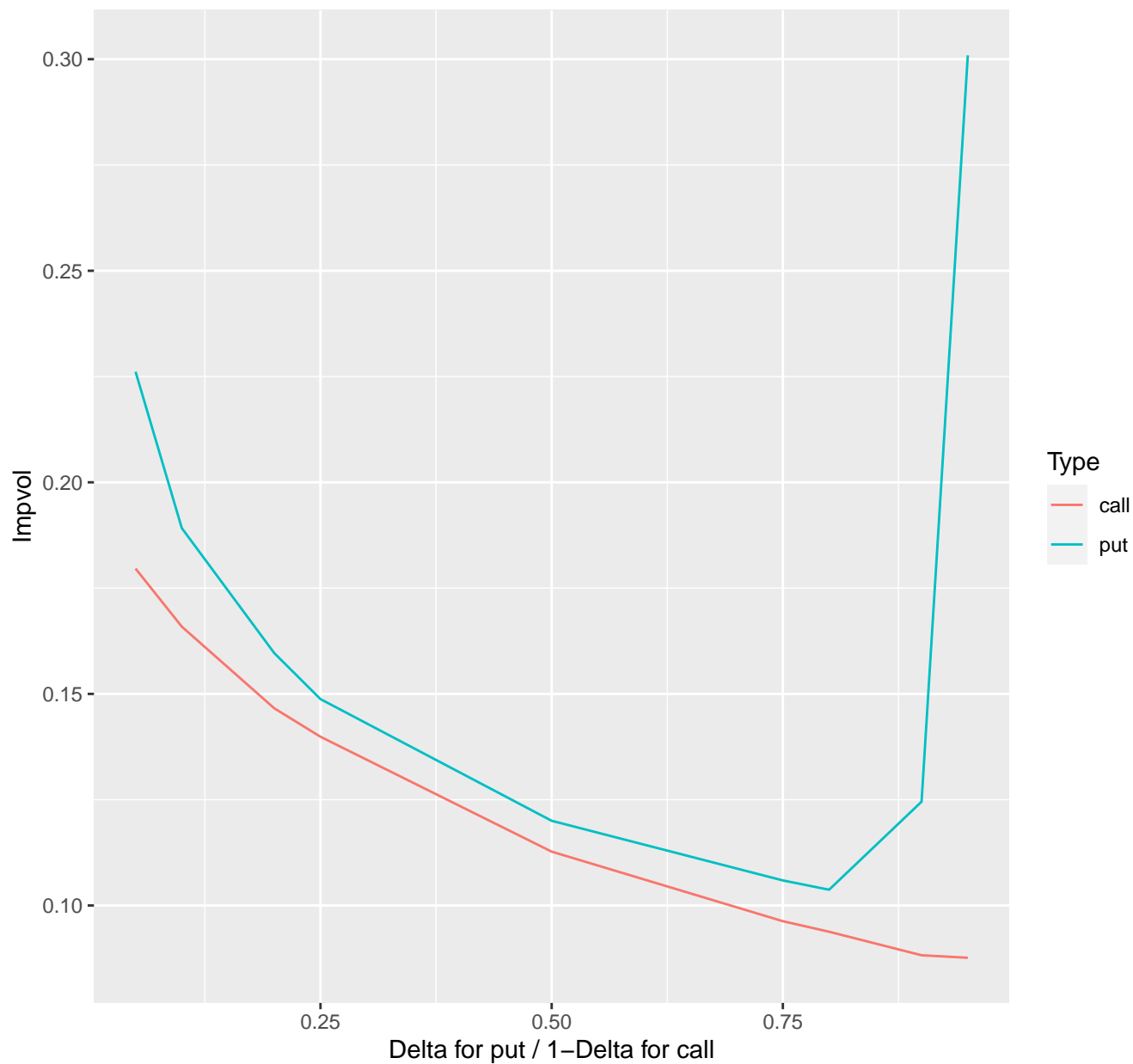
2019-06-21

x axis represents strike price, increasing



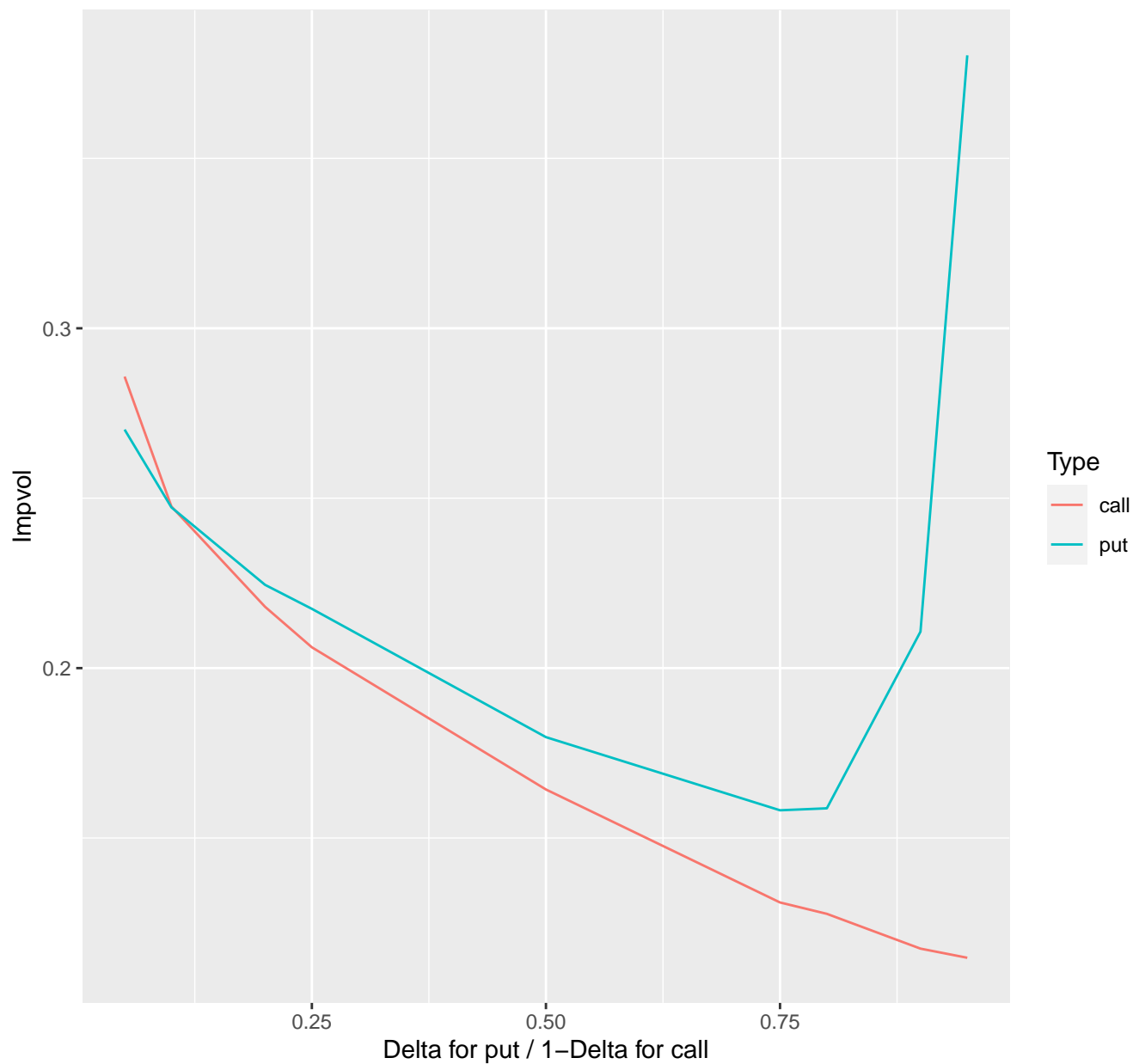
2019-07-19

x axis represents strike price, increasing



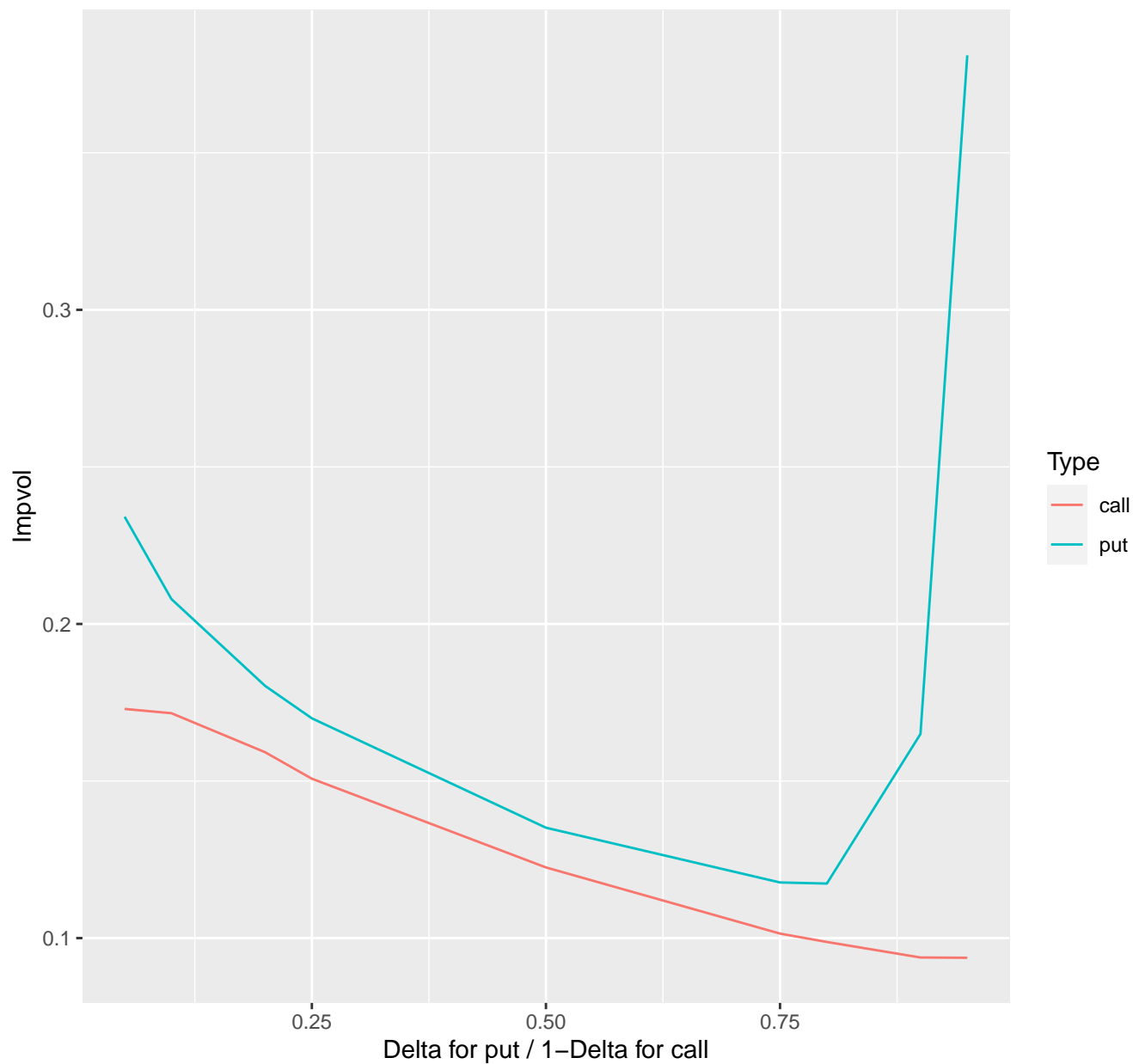
2019-08-16

x axis represents strike price, increasing



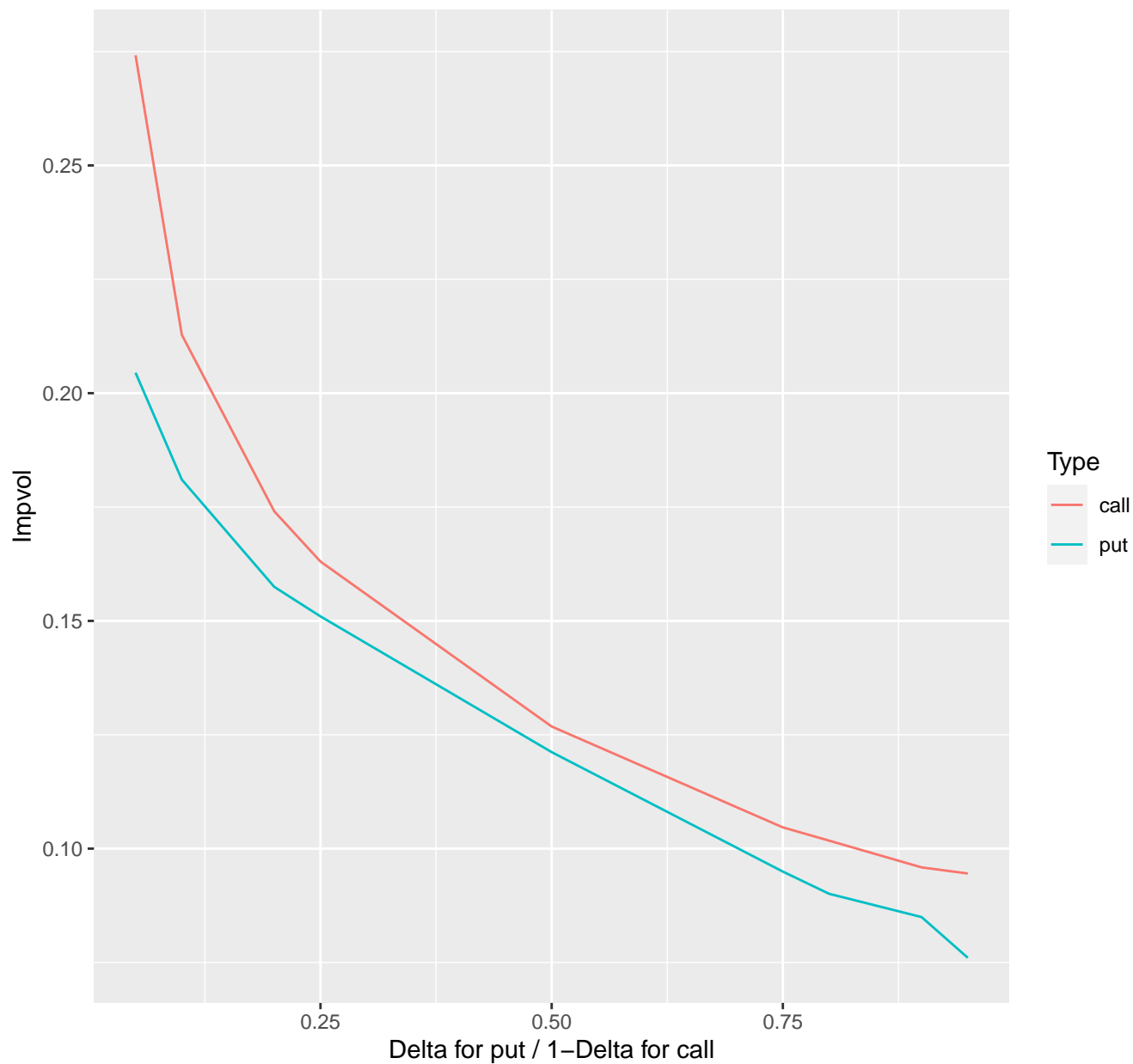
2019-09-20

x axis represents strike price, increasing



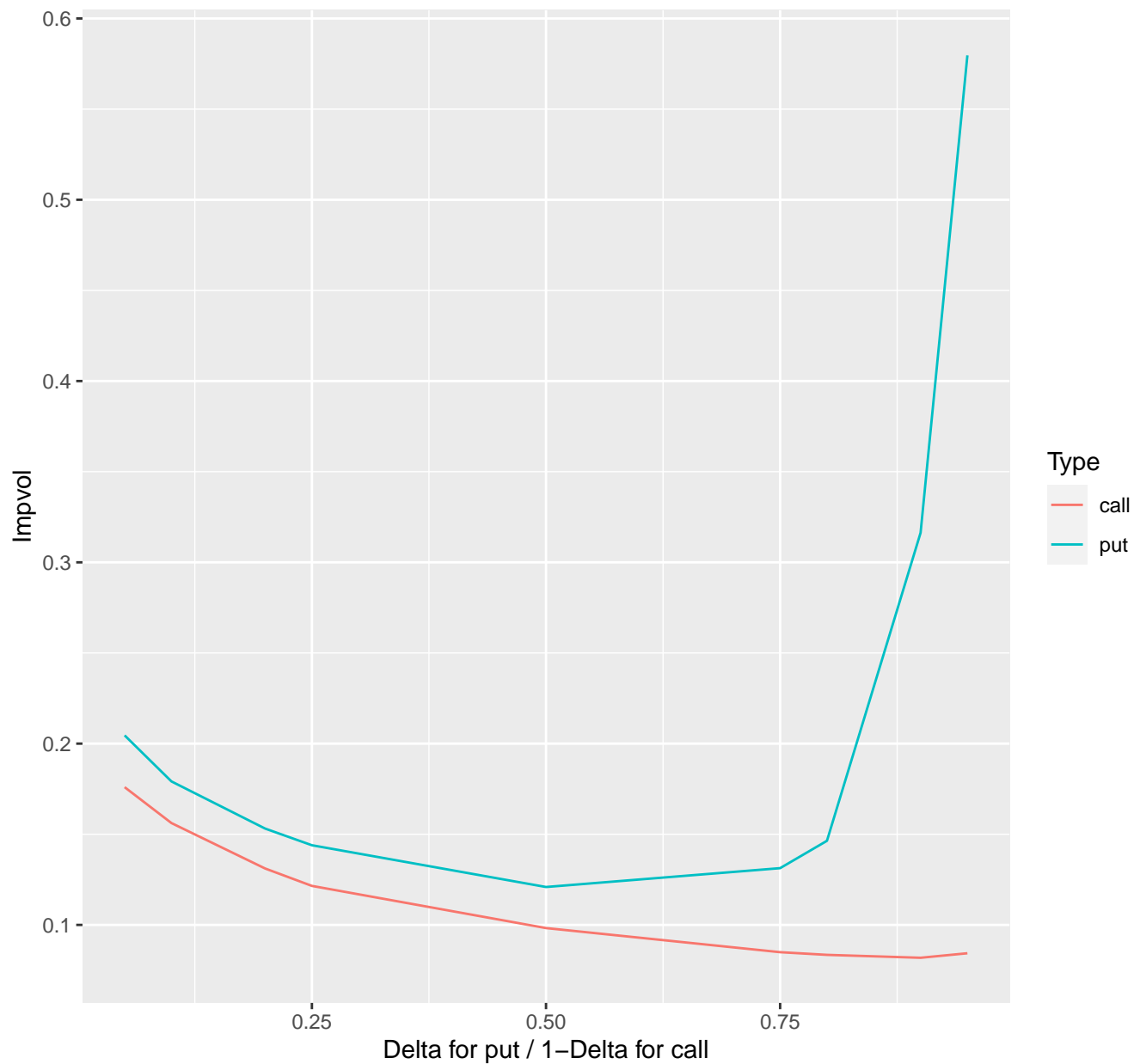
2019-10-18

x axis represents strike price, increasing



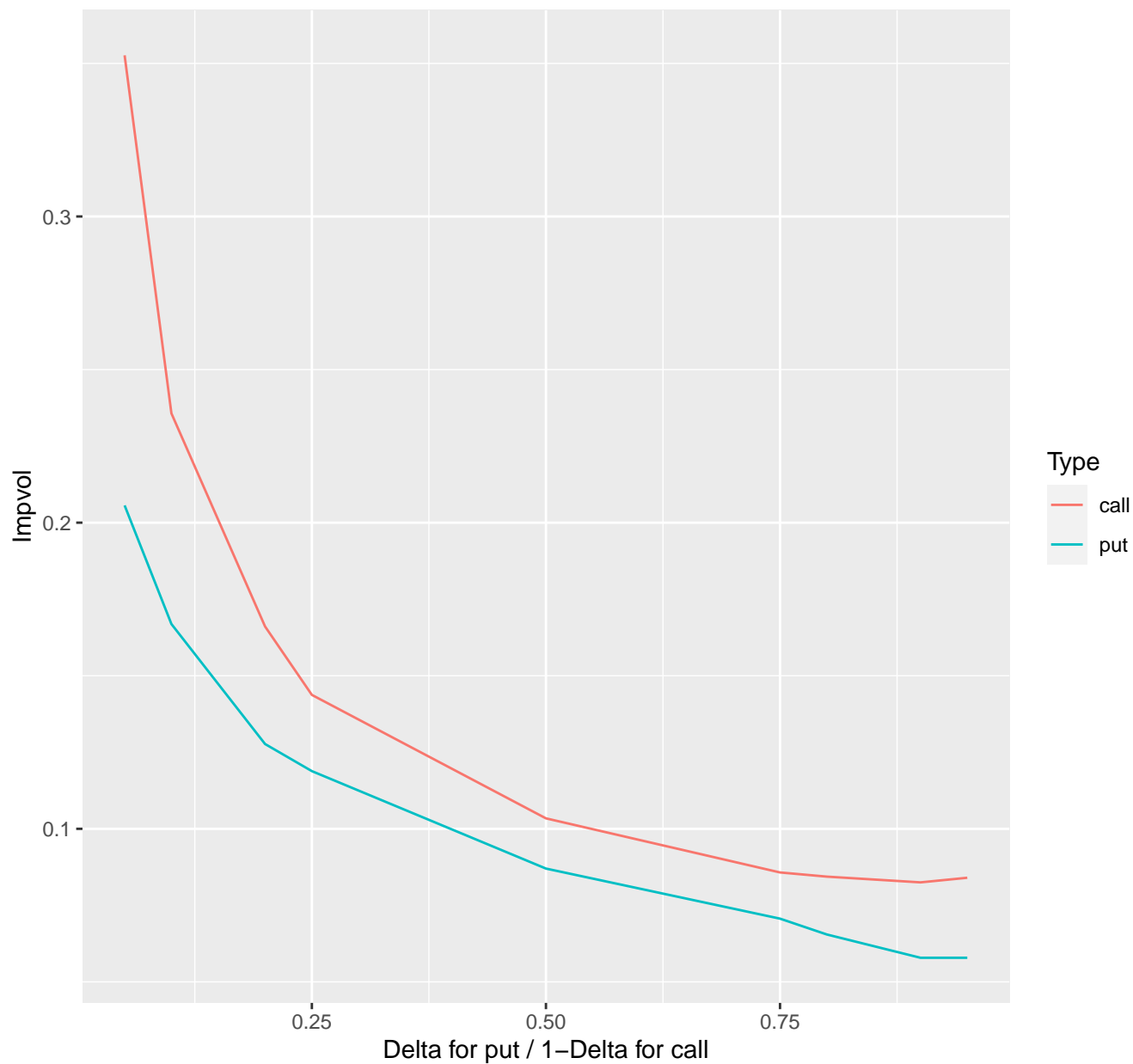
2019-11-15

x axis represents strike price, increasing



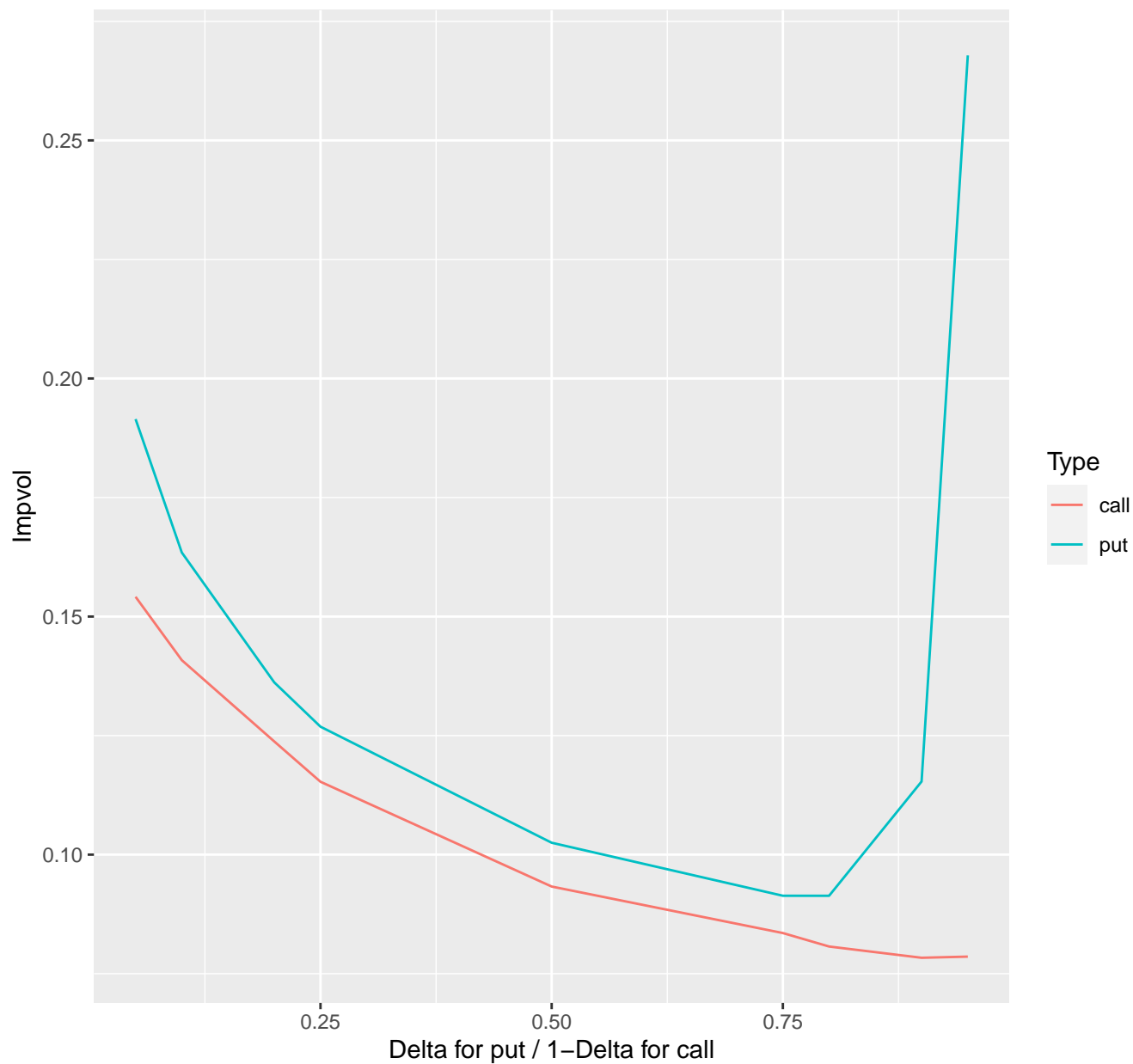
2019-12-20

x axis represents strike price, increasing



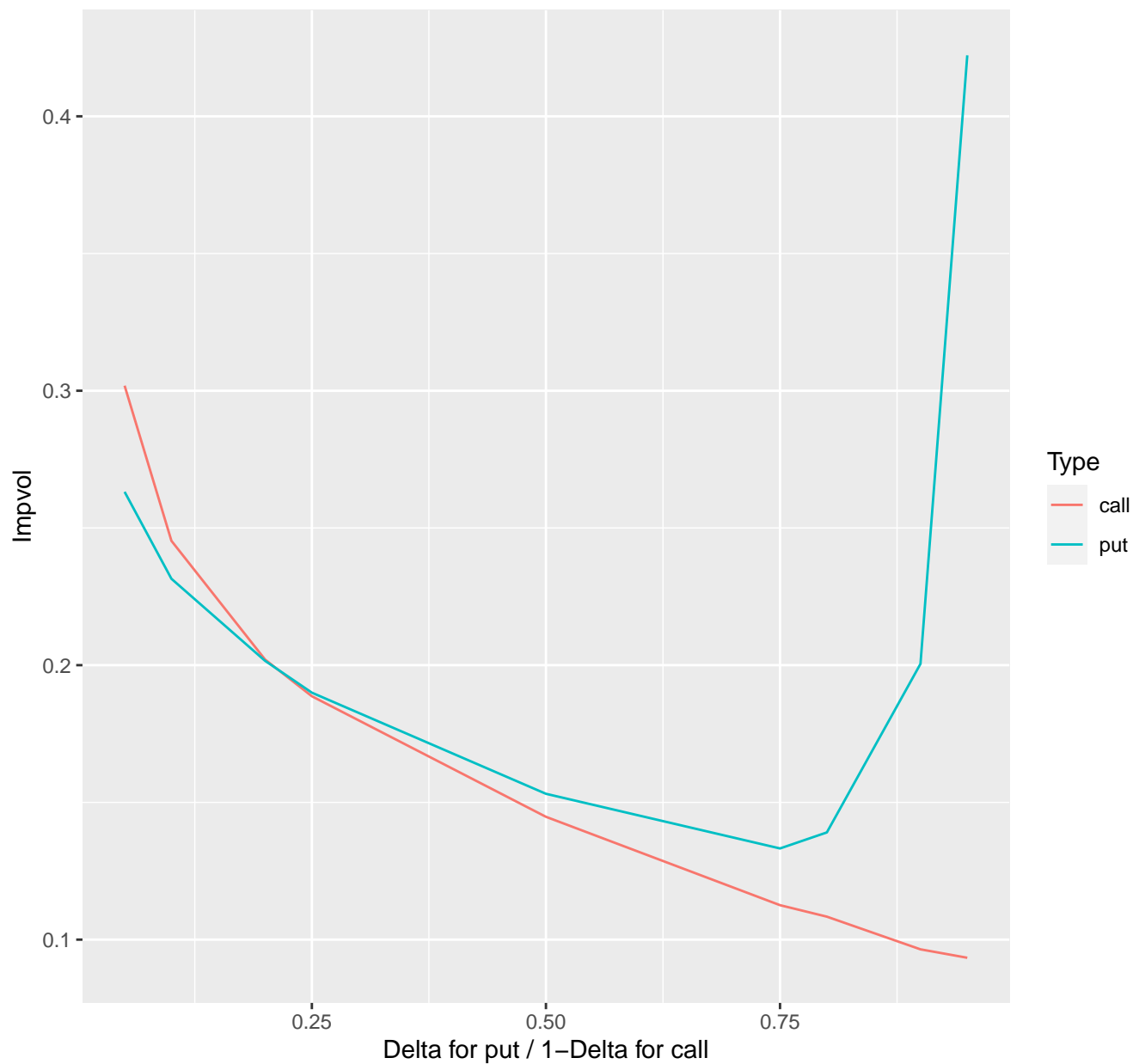
2020-01-17

x axis represents strike price, increasing



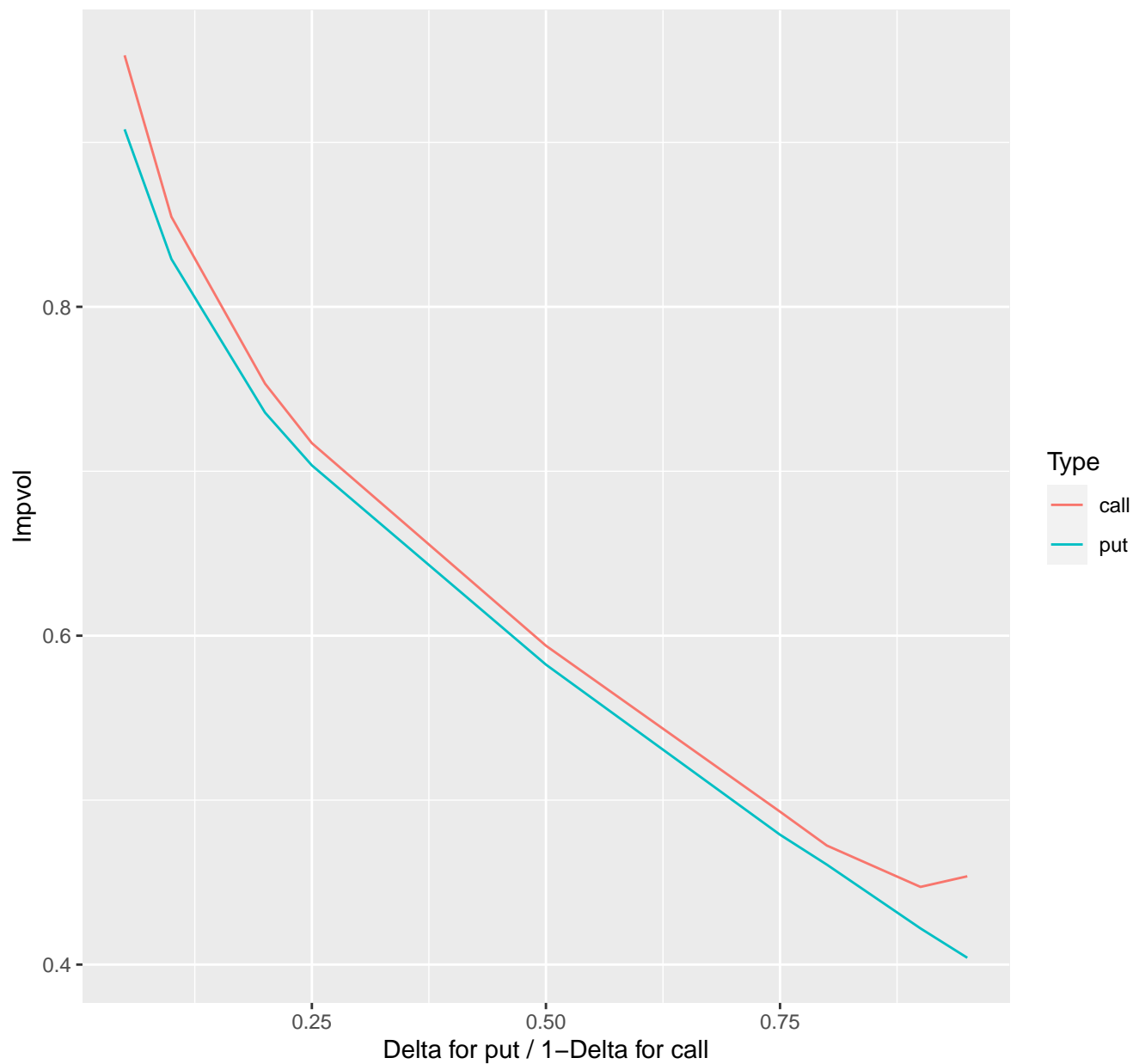
2020-02-21

x axis represents strike price, increasing



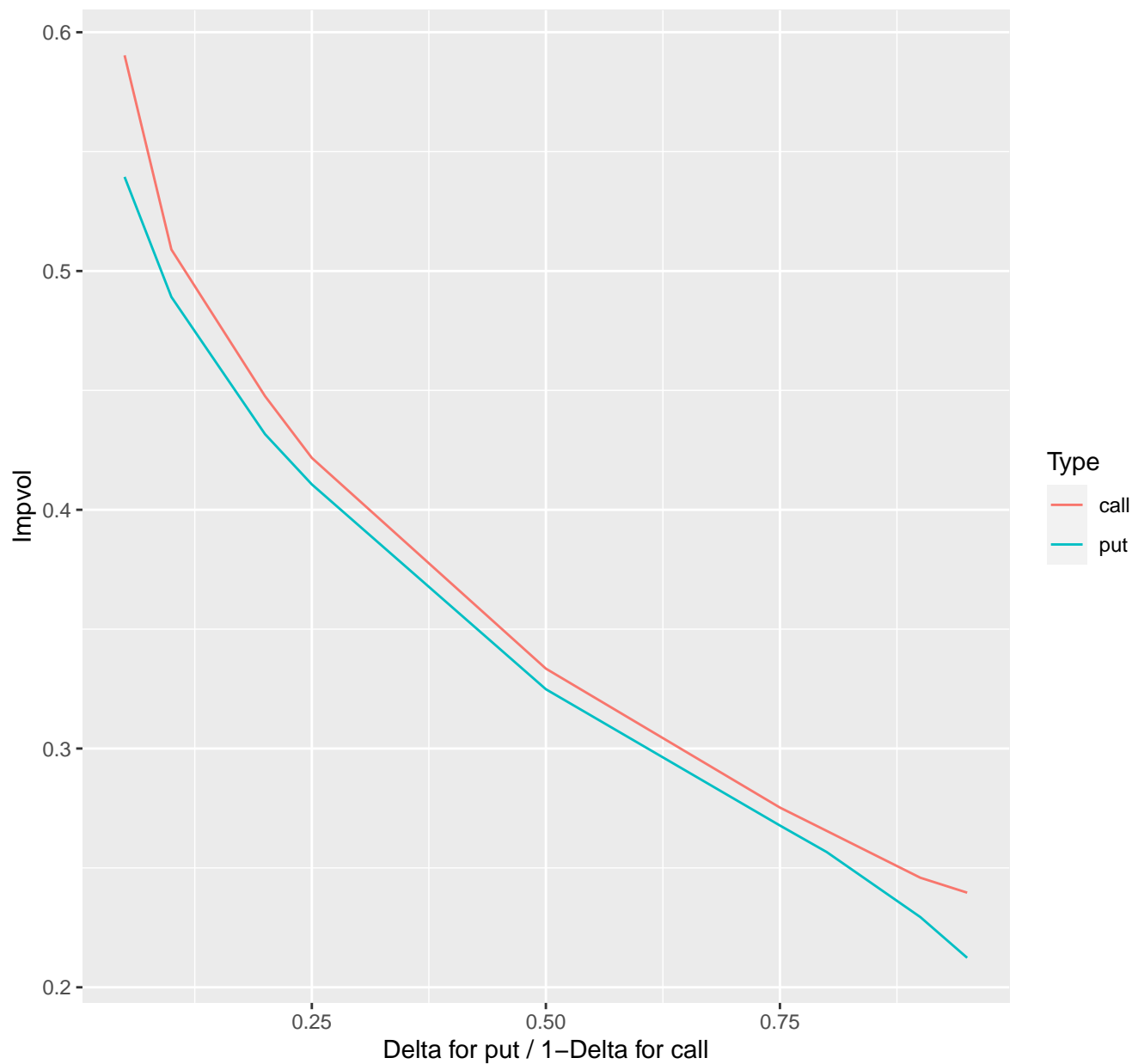
2020-03-20

x axis represents strike price, increasing



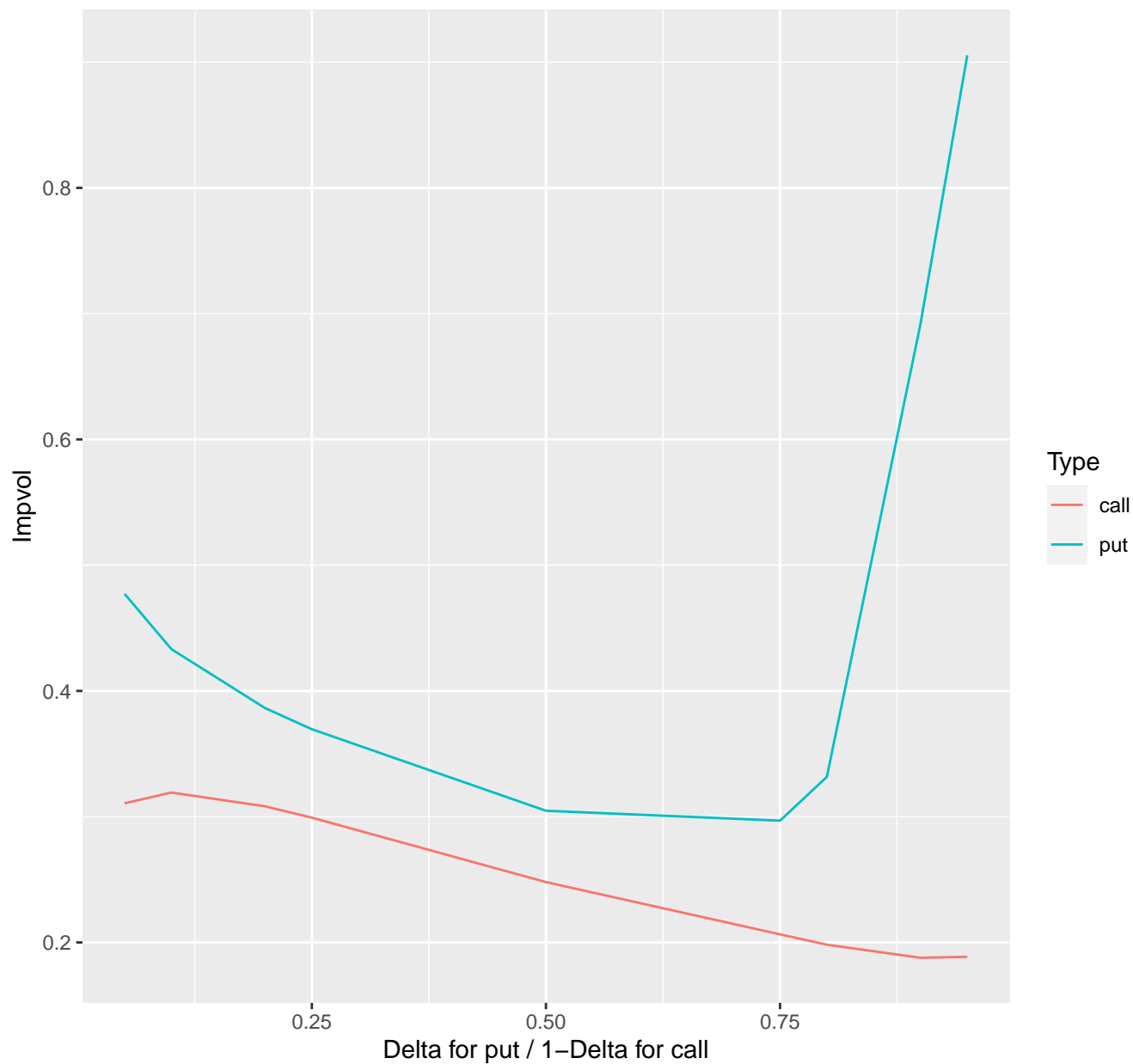
2020-04-17

x axis represents strike price, increasing



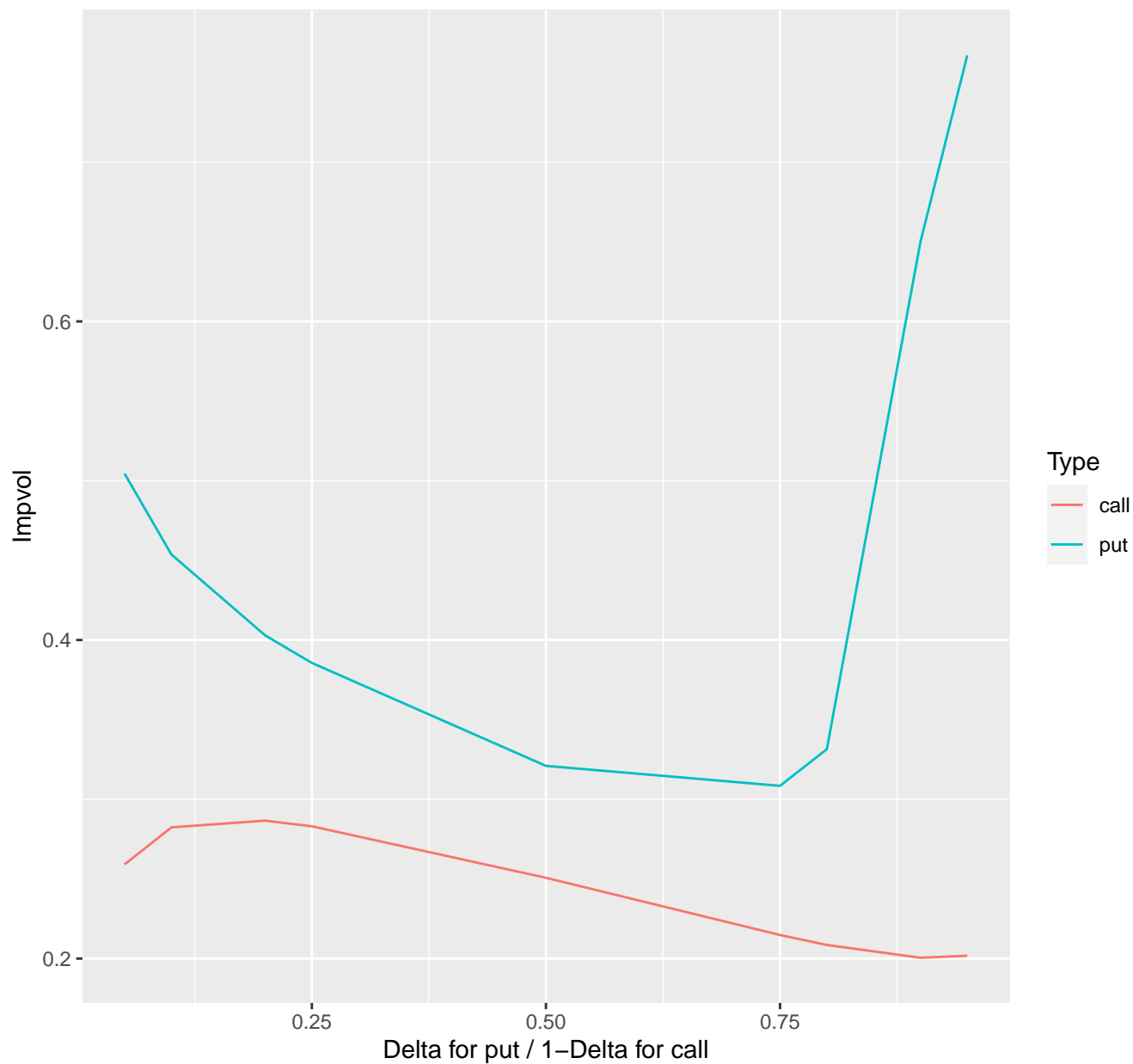
2020-05-15

x axis represents strike price, increasing



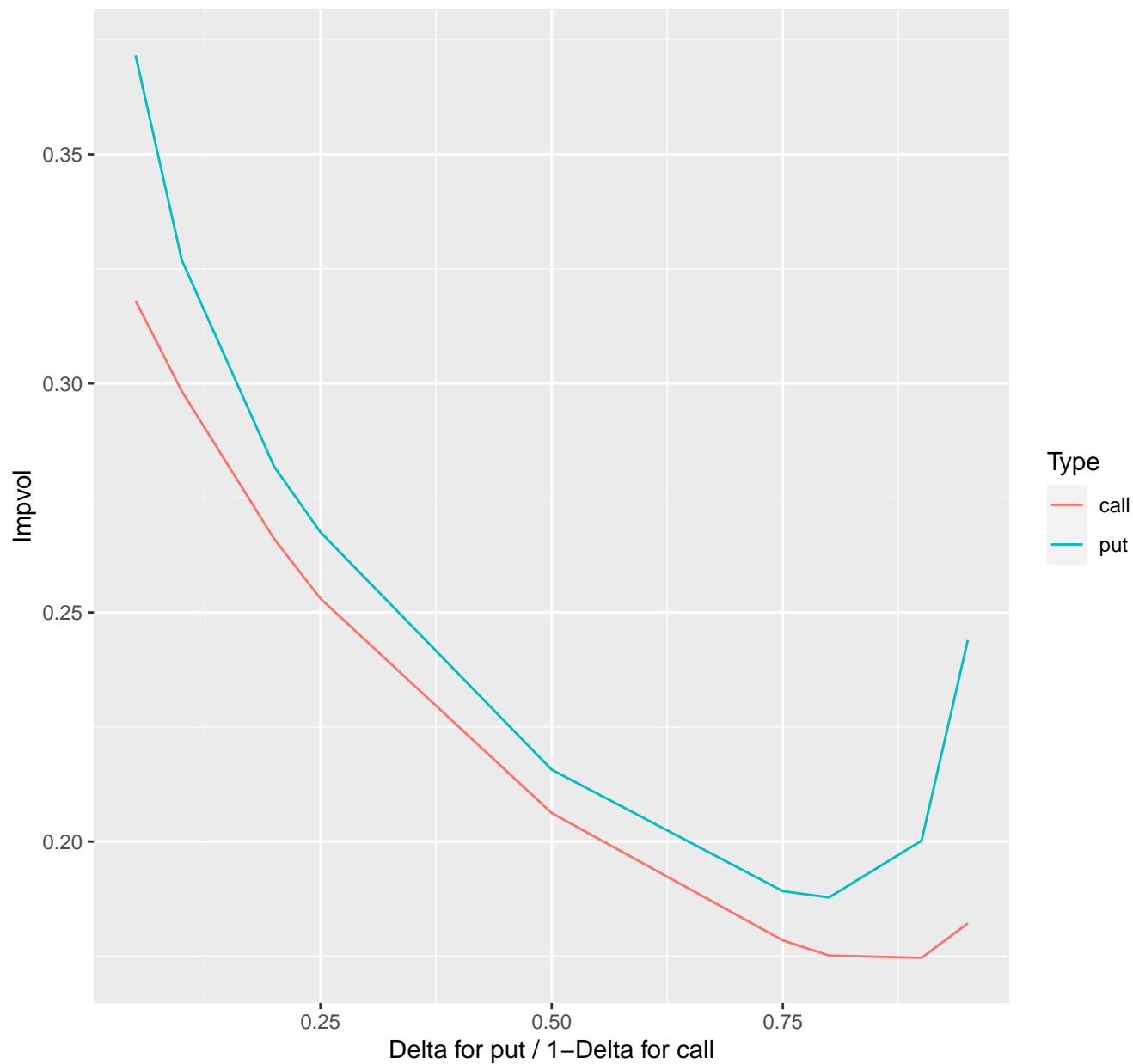
2020-06-19

x axis represents strike price, increasing



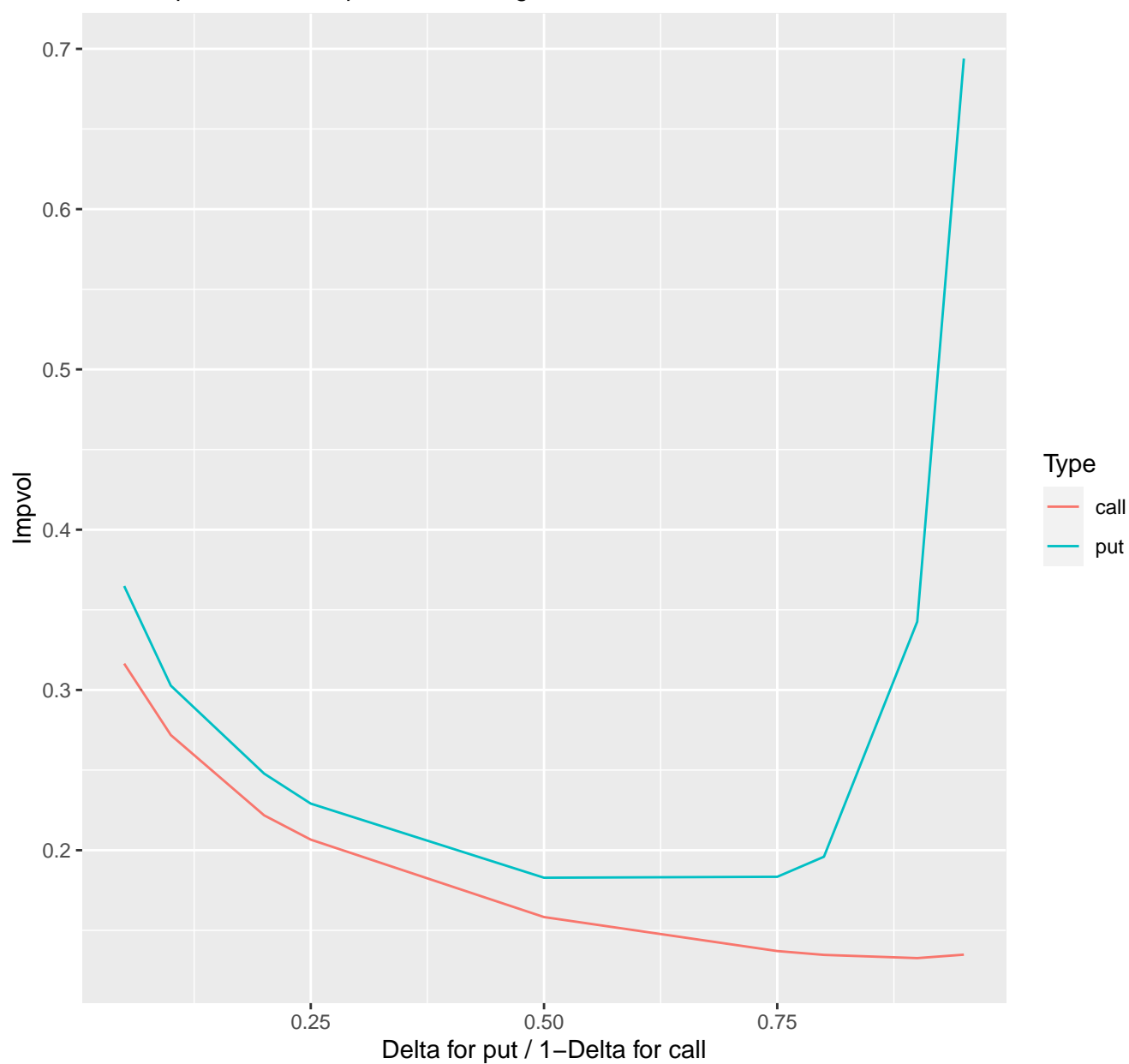
2020-07-17

x axis represents strike price, increasing



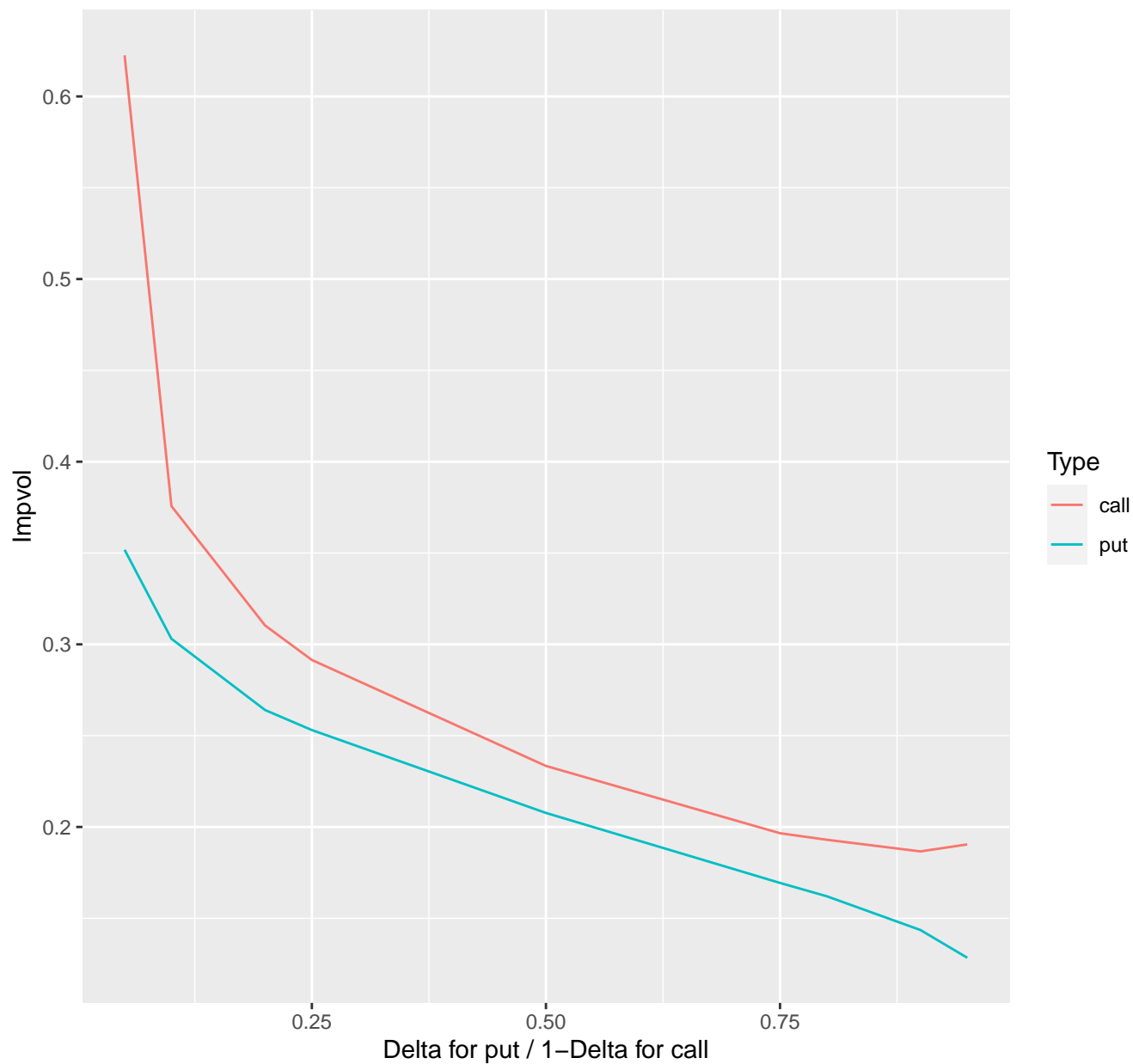
2020-08-21

x axis represents strike price, increasing



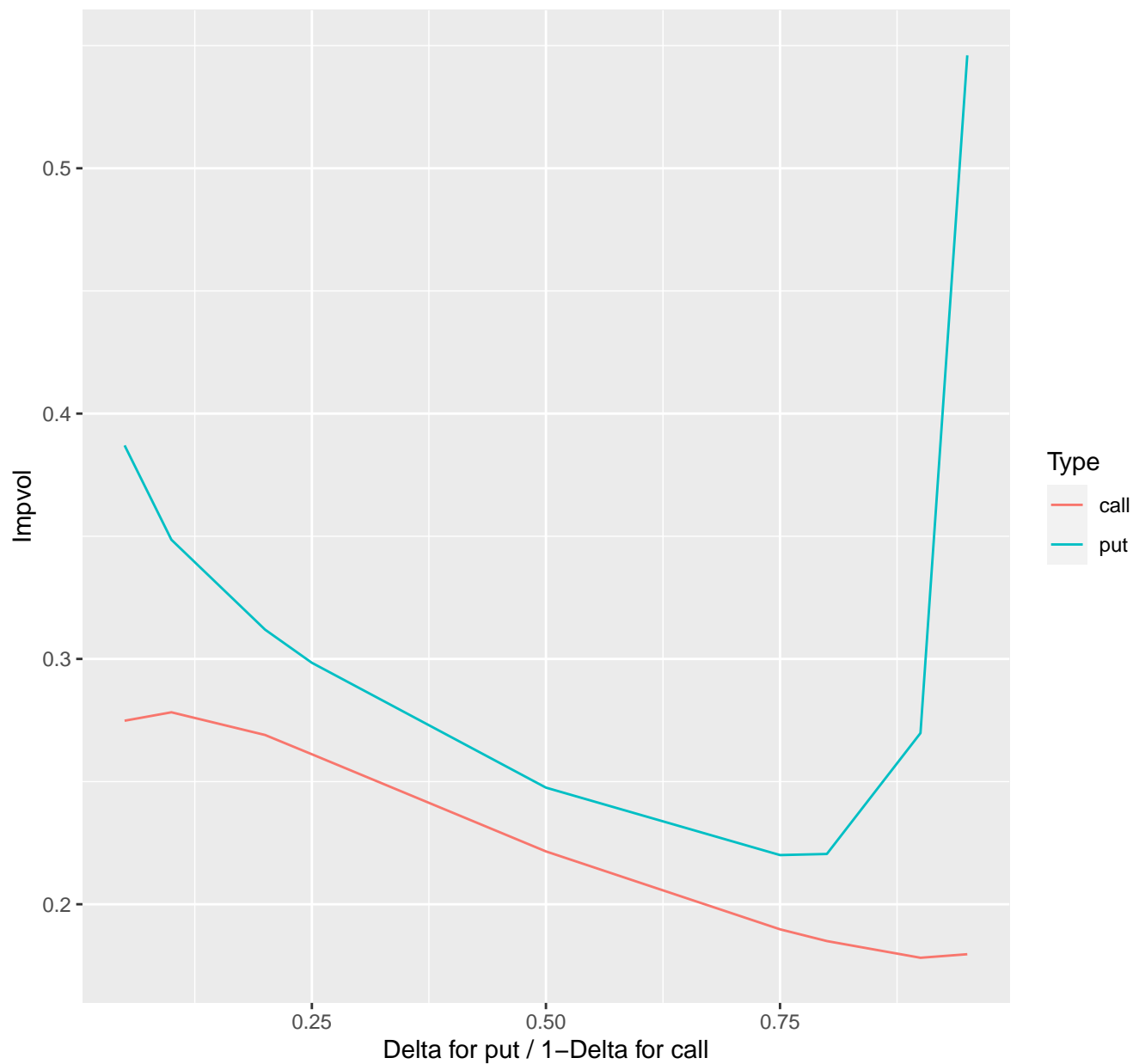
2020-09-18

x axis represents strike price, increasing



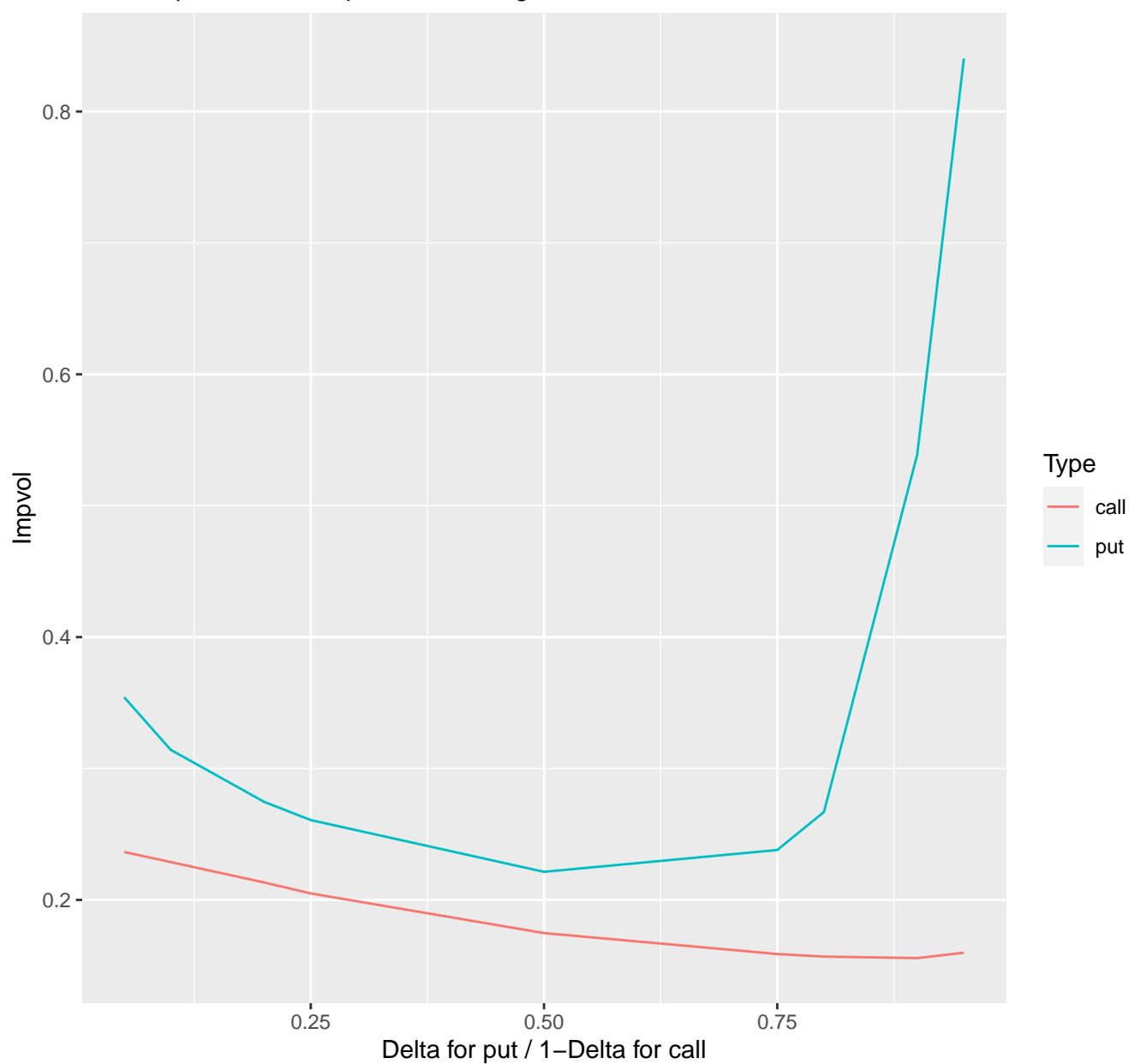
2020-10-16

x axis represents strike price, increasing



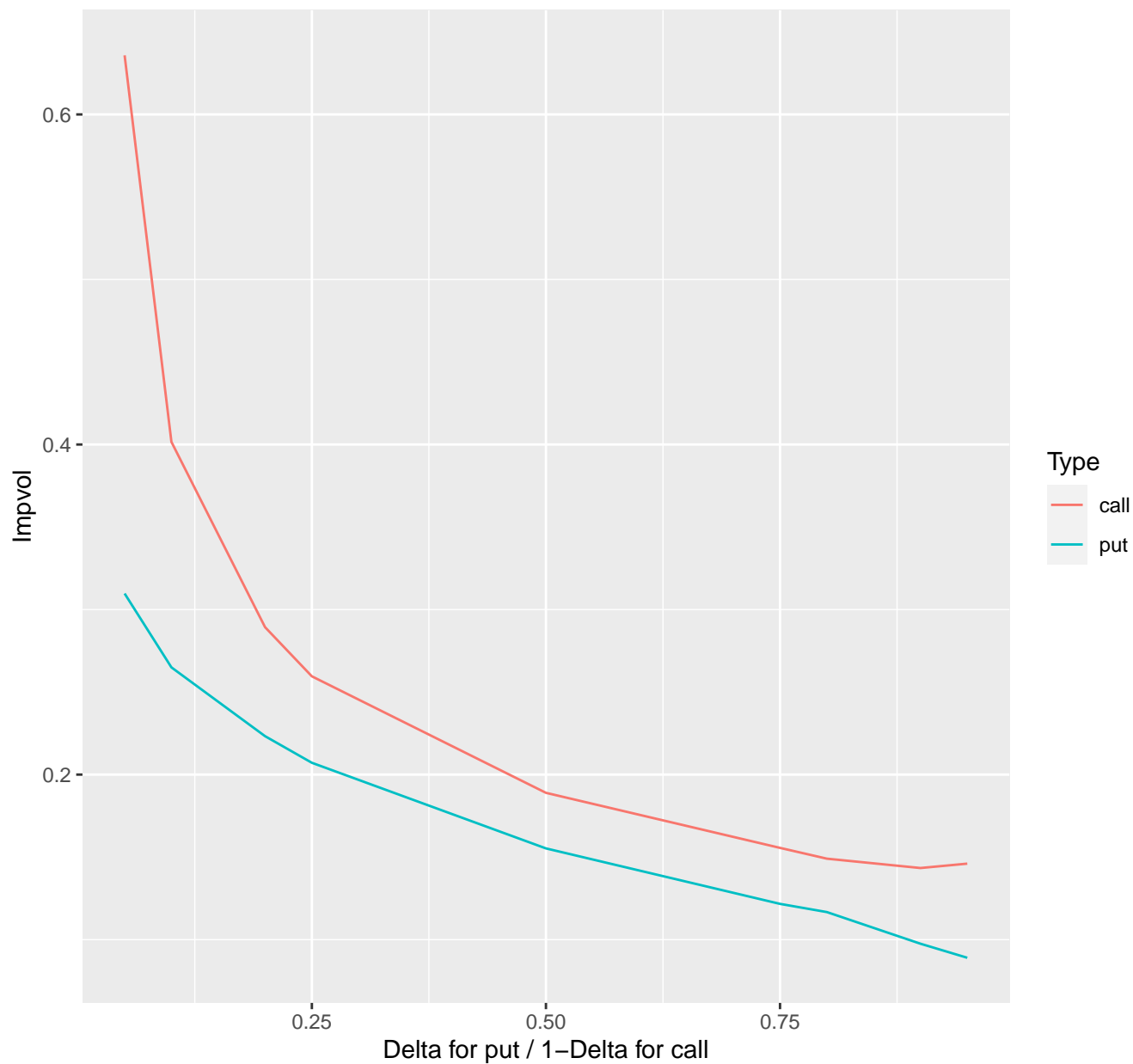
2020-11-20

x axis represents strike price, increasing



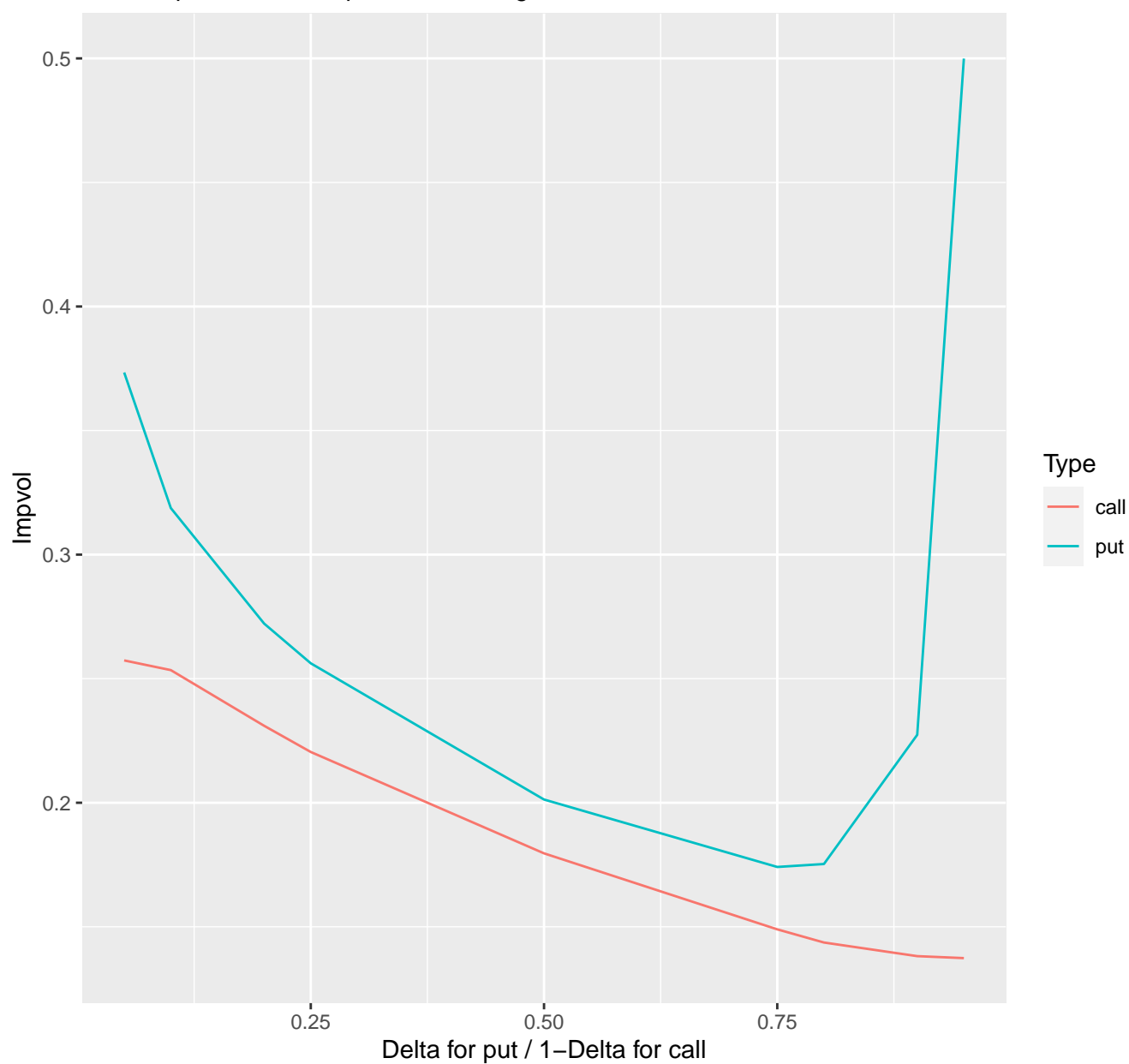
2020-12-18

x axis represents strike price, increasing



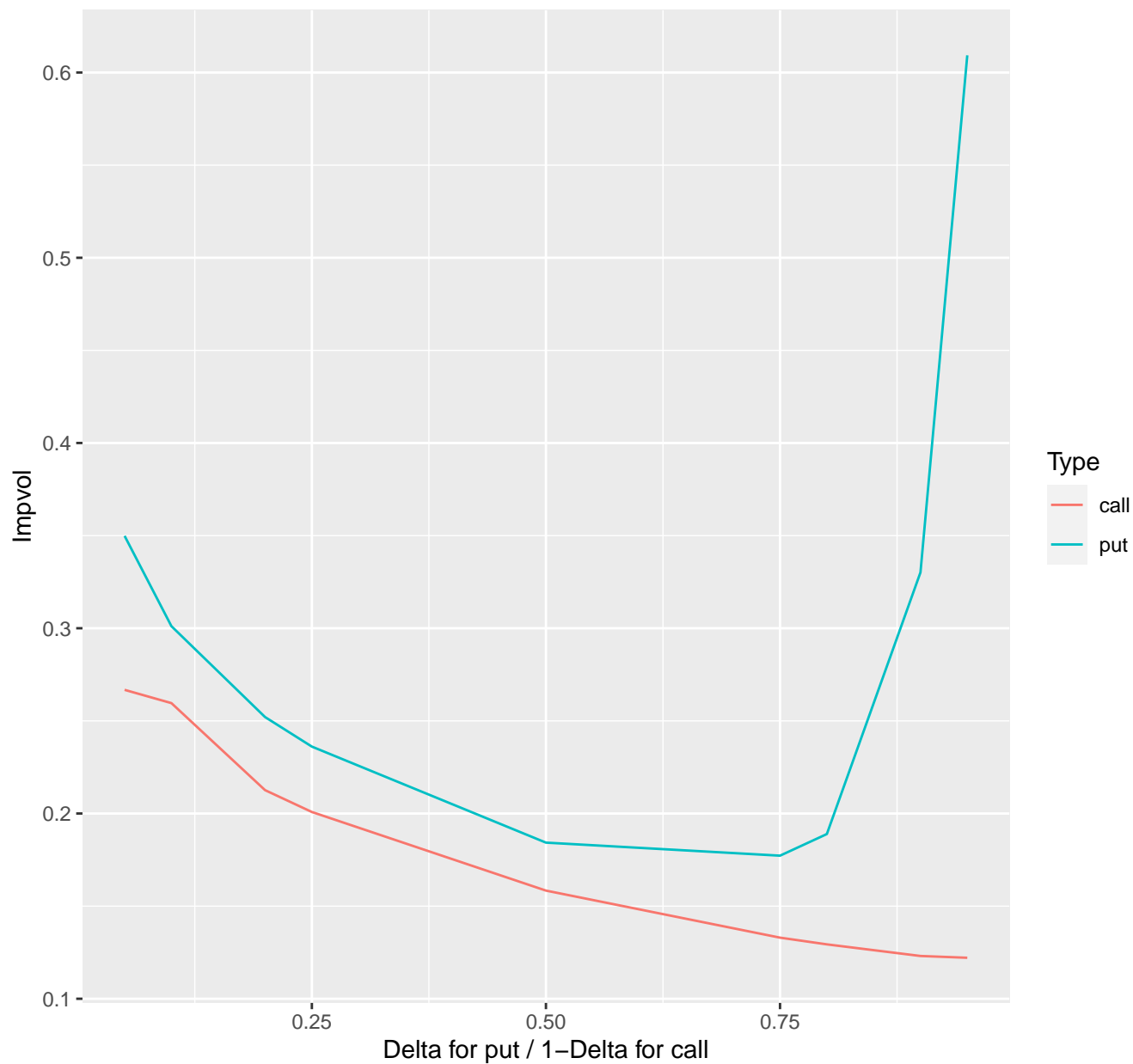
2021-01-15

x axis represents strike price, increasing



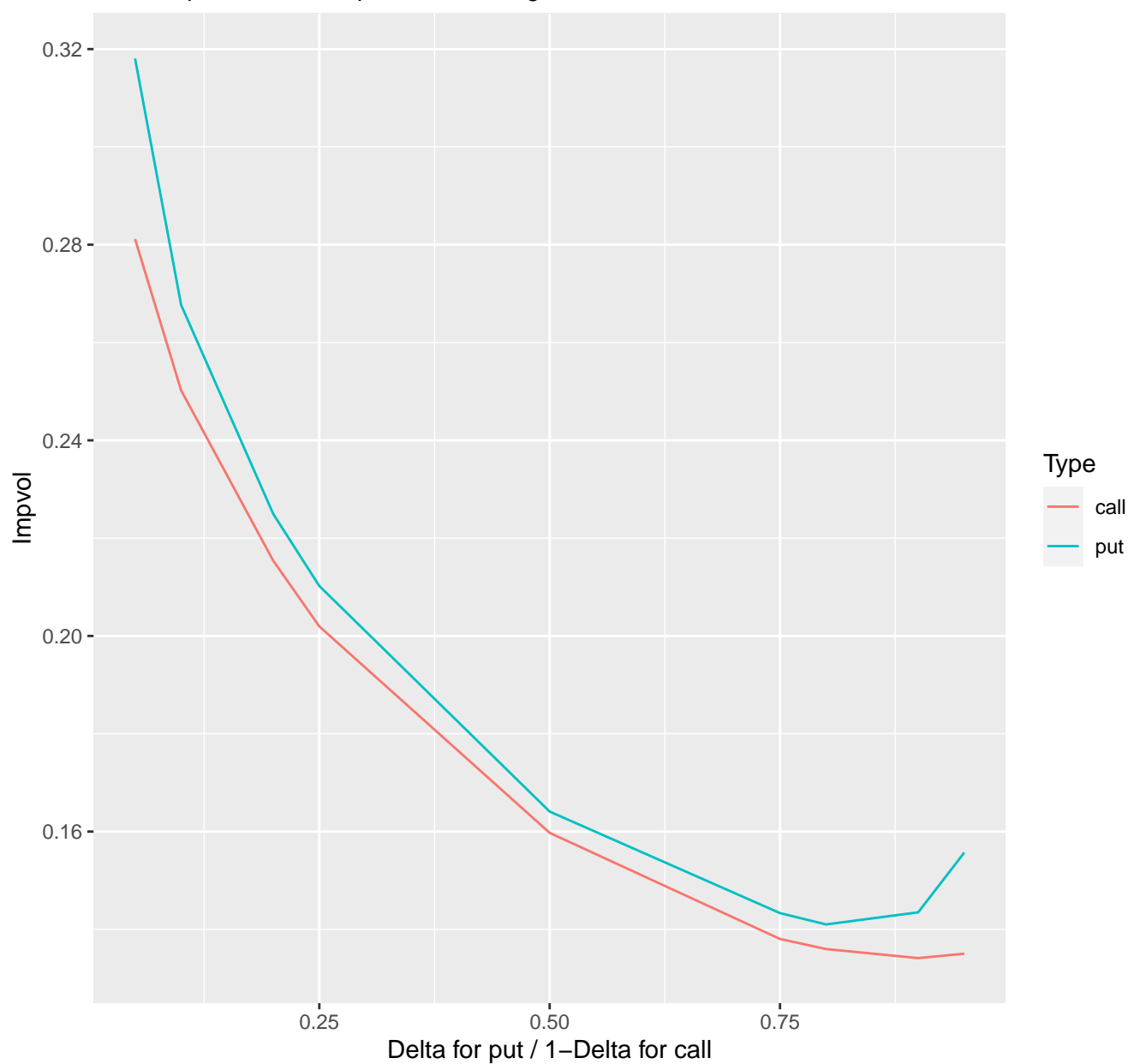
2021-02-19

x axis represents strike price, increasing



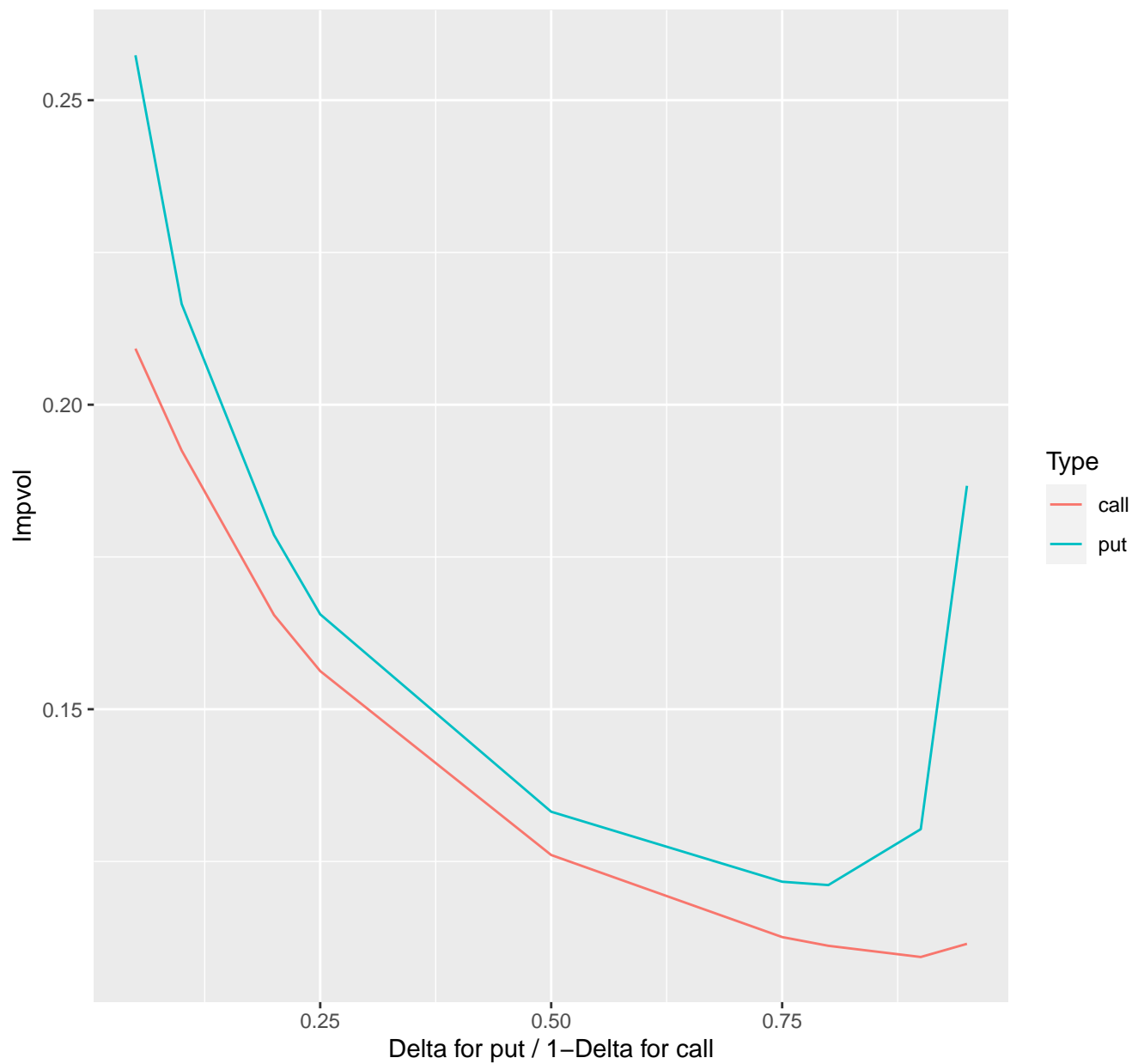
2021-03-19

x axis represents strike price, increasing



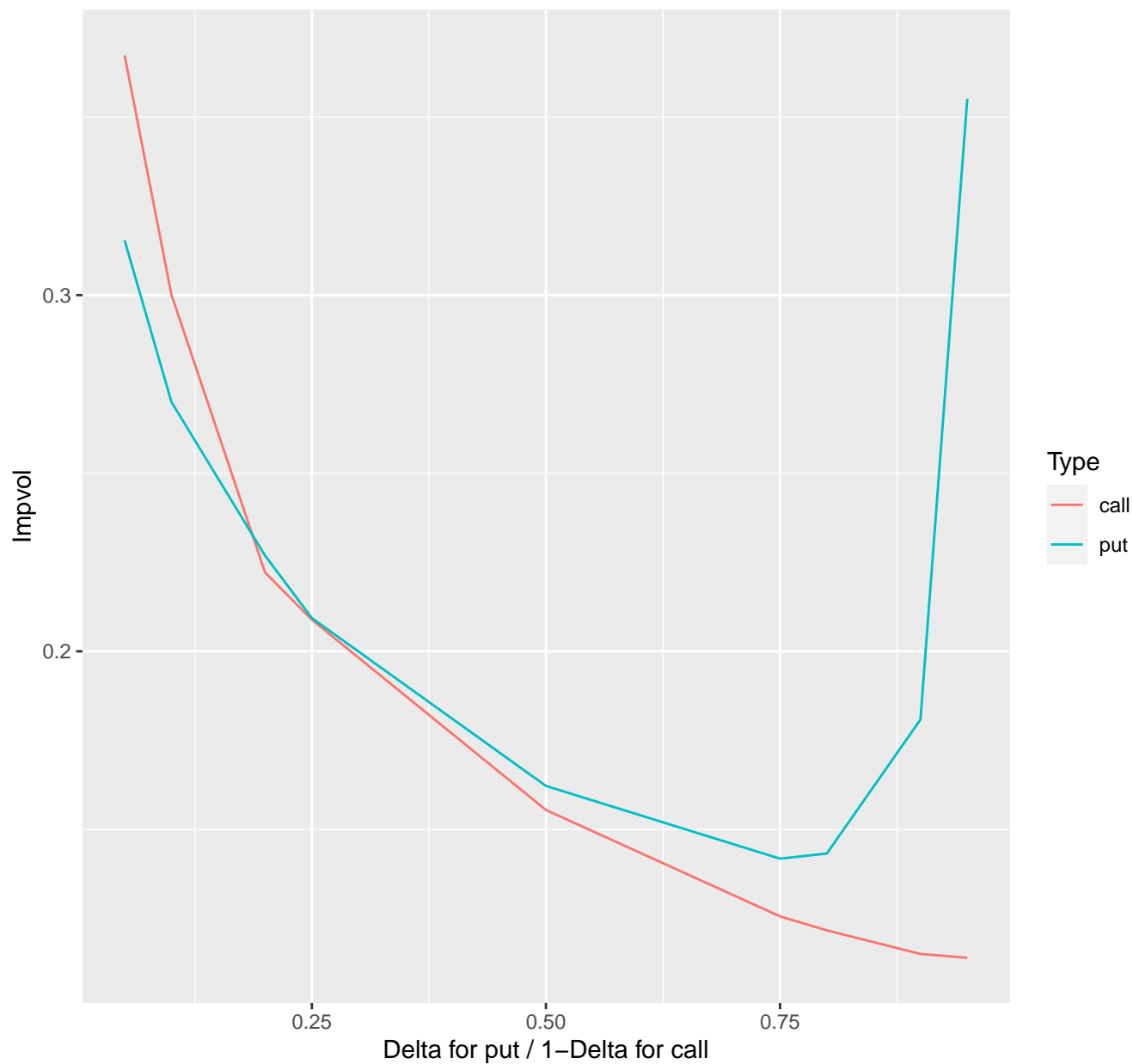
2021-04-16

x axis represents strike price, increasing



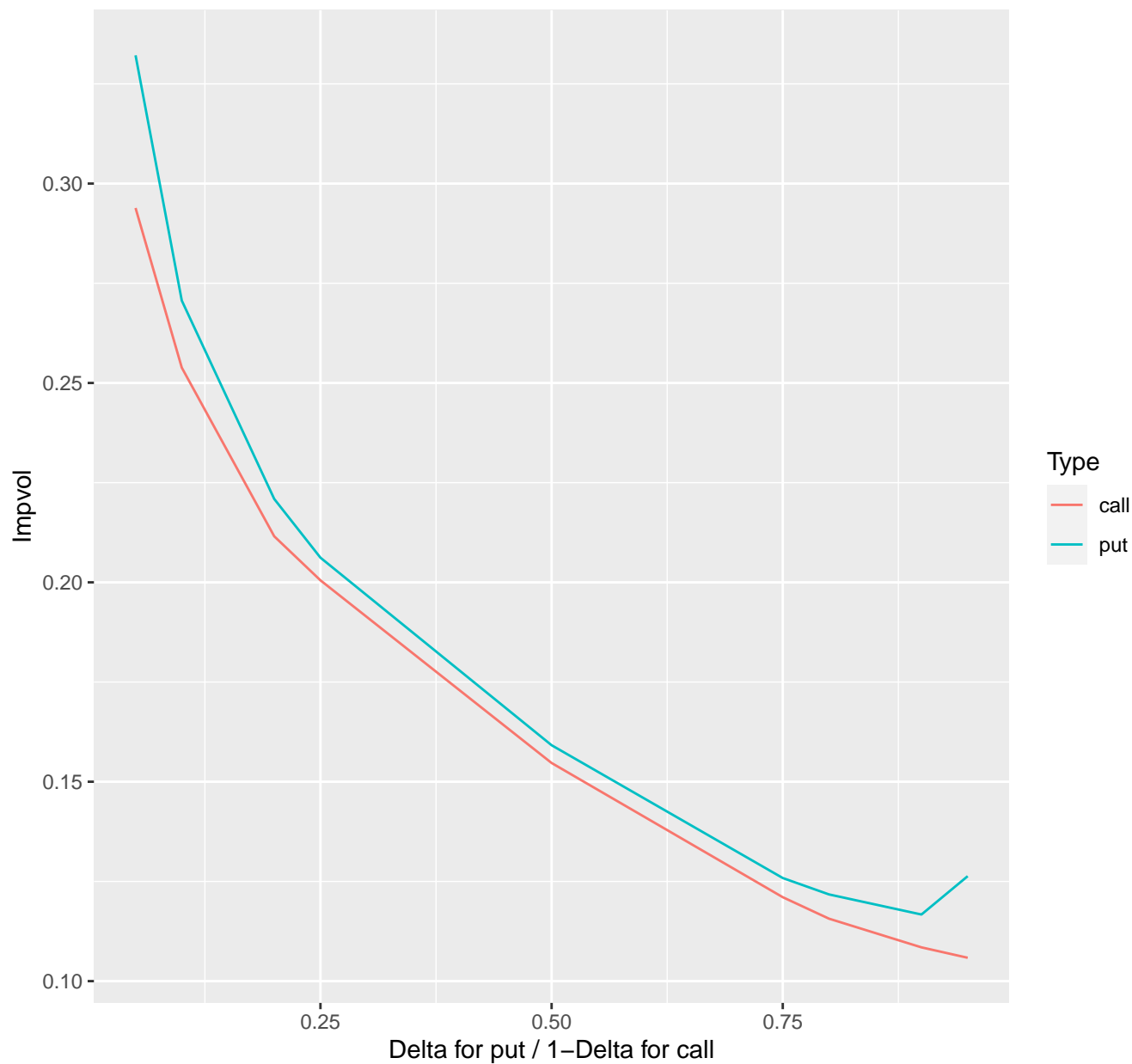
2021-05-21

x axis represents strike price, increasing



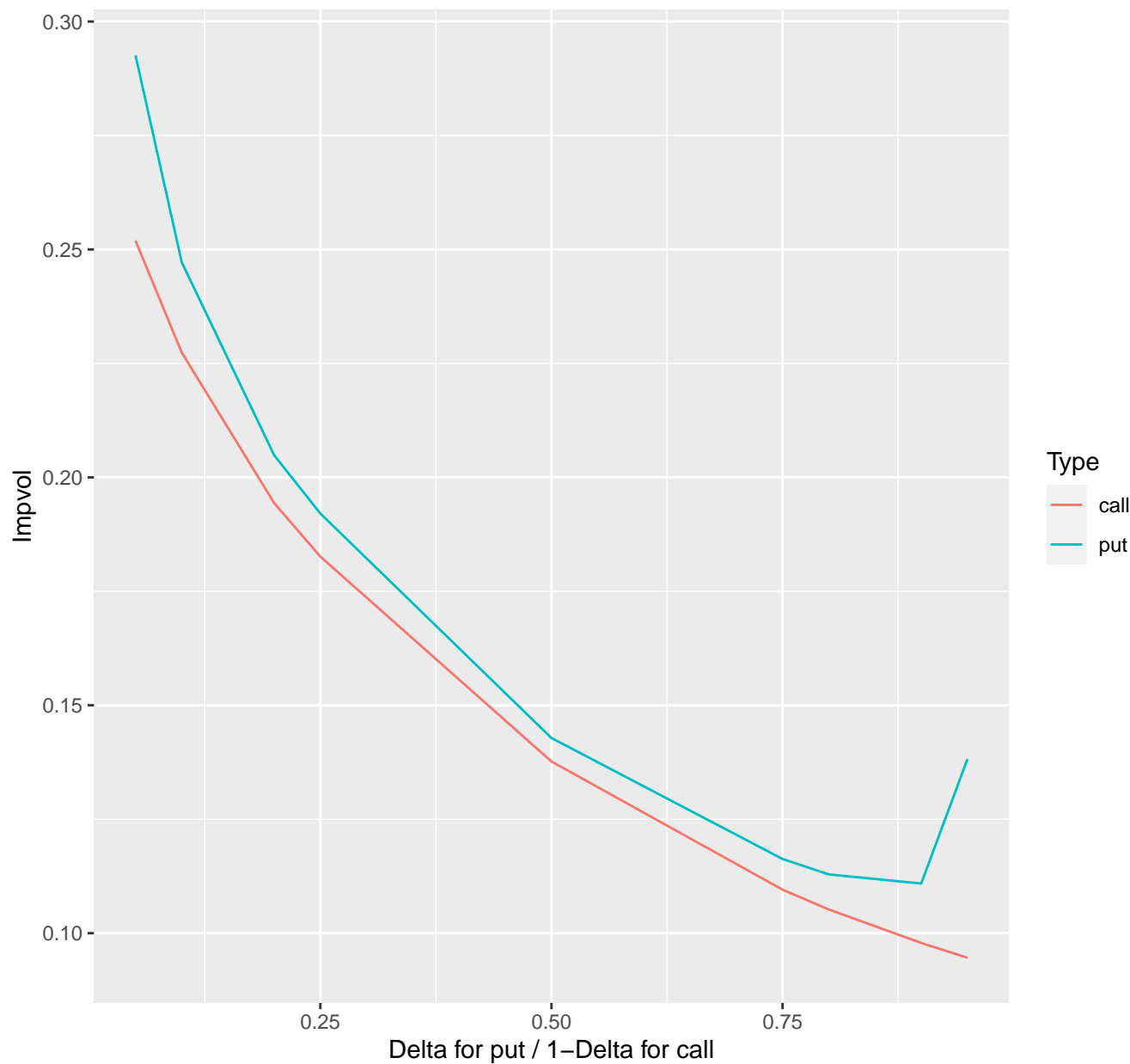
2021-06-18

x axis represents strike price, increasing



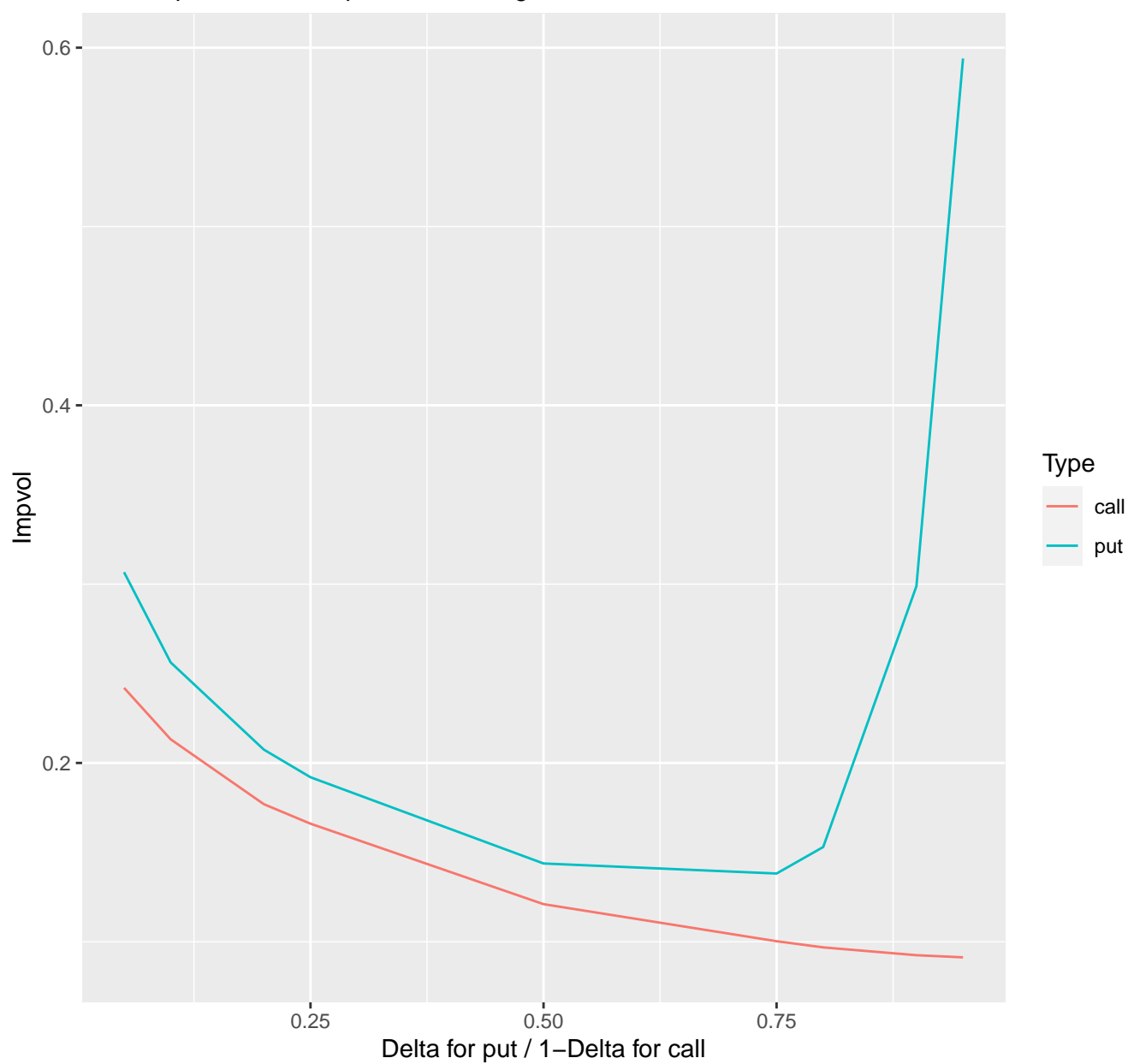
2021-07-16

x axis represents strike price, increasing



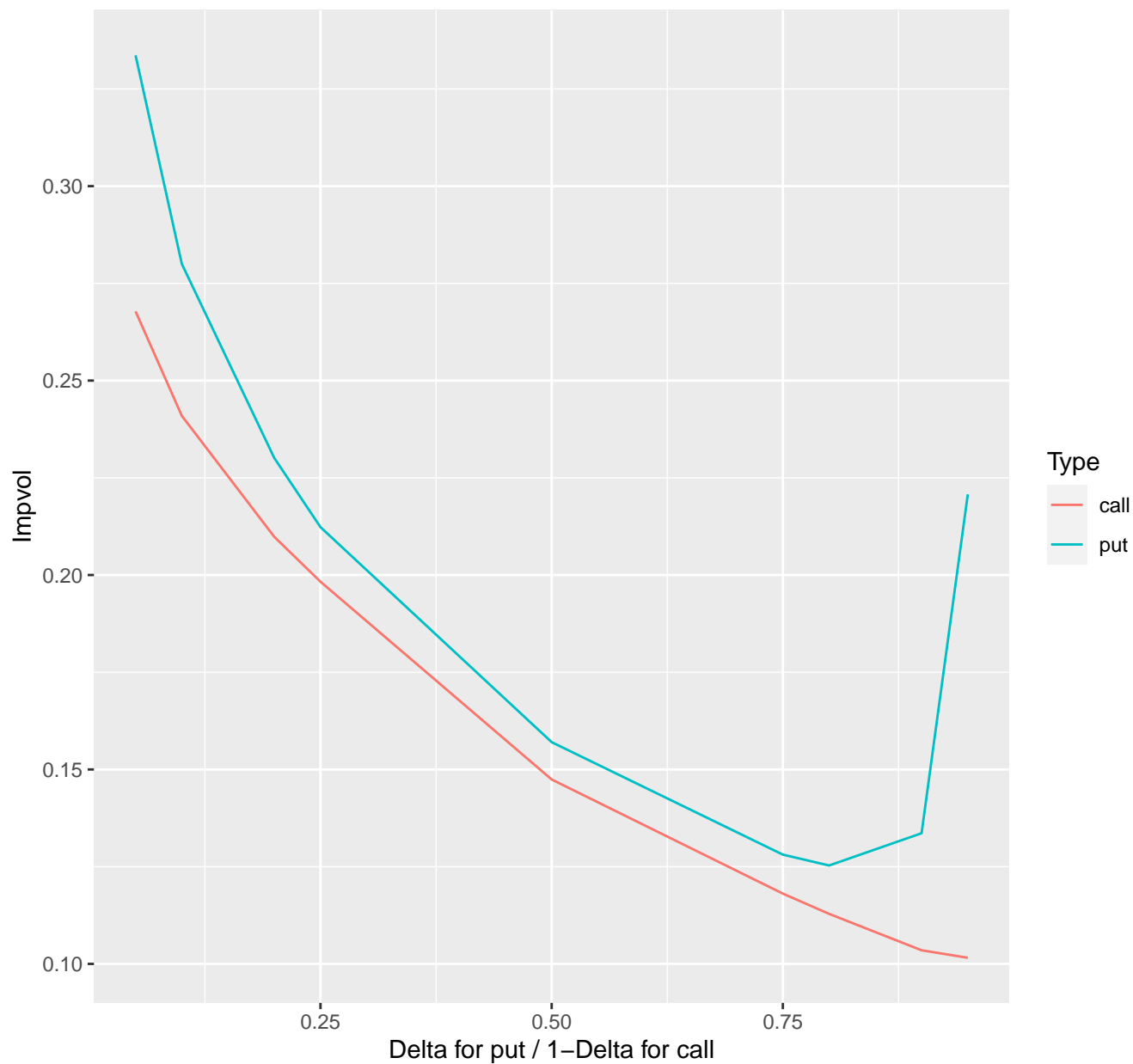
2021-08-20

x axis represents strike price, increasing



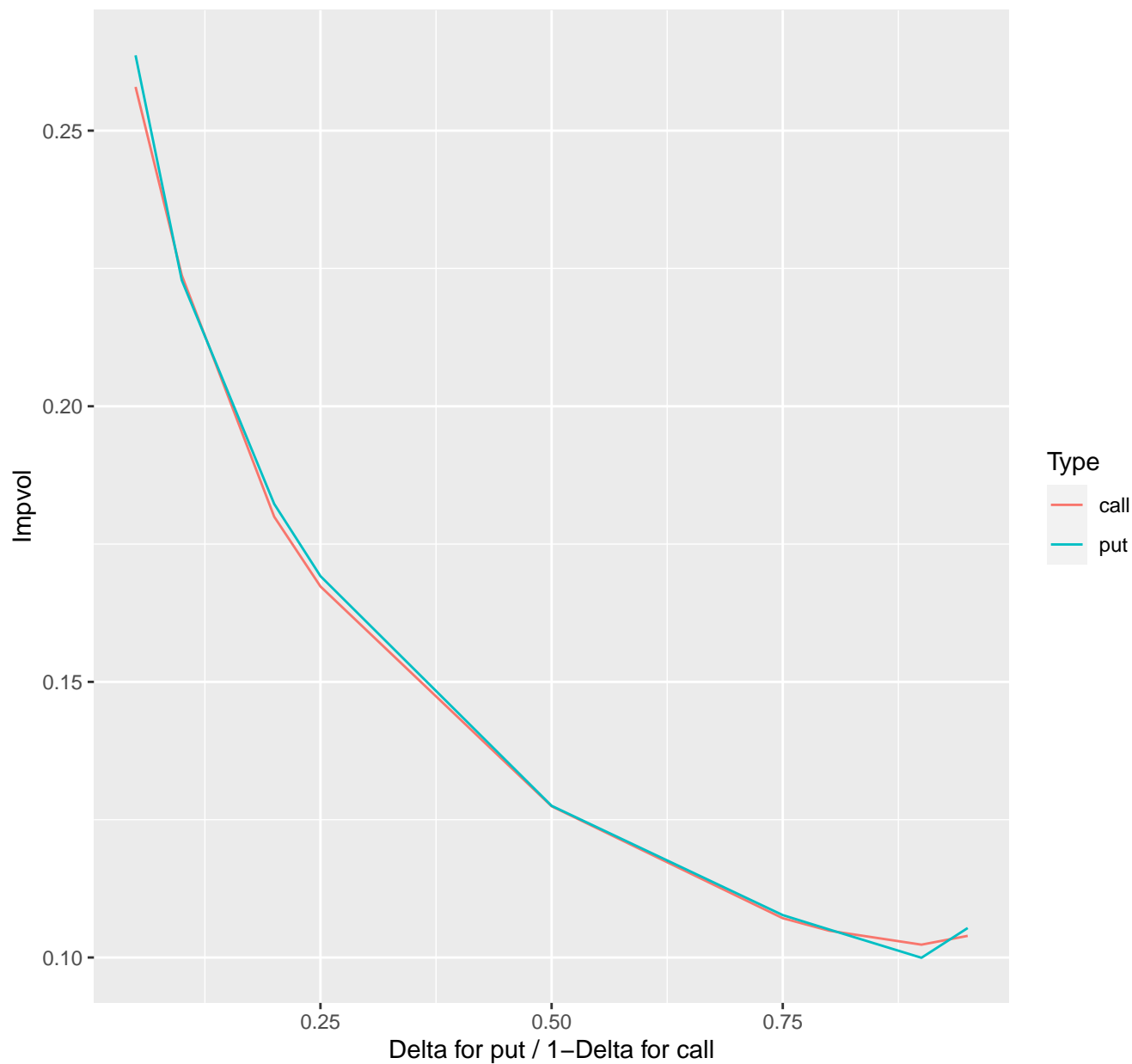
2021-09-17

x axis represents strike price, increasing



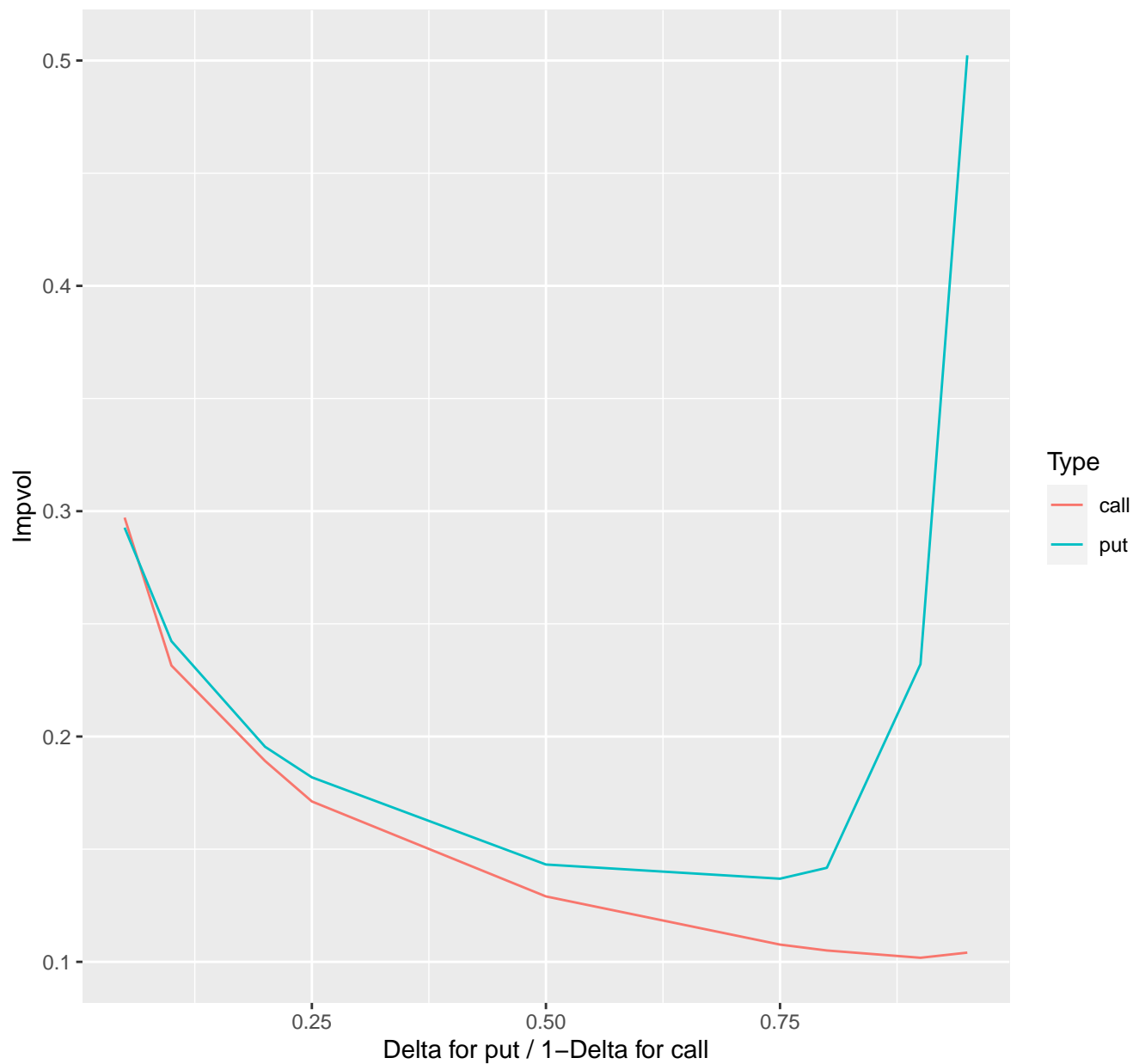
2021-10-15

x axis represents strike price, increasing



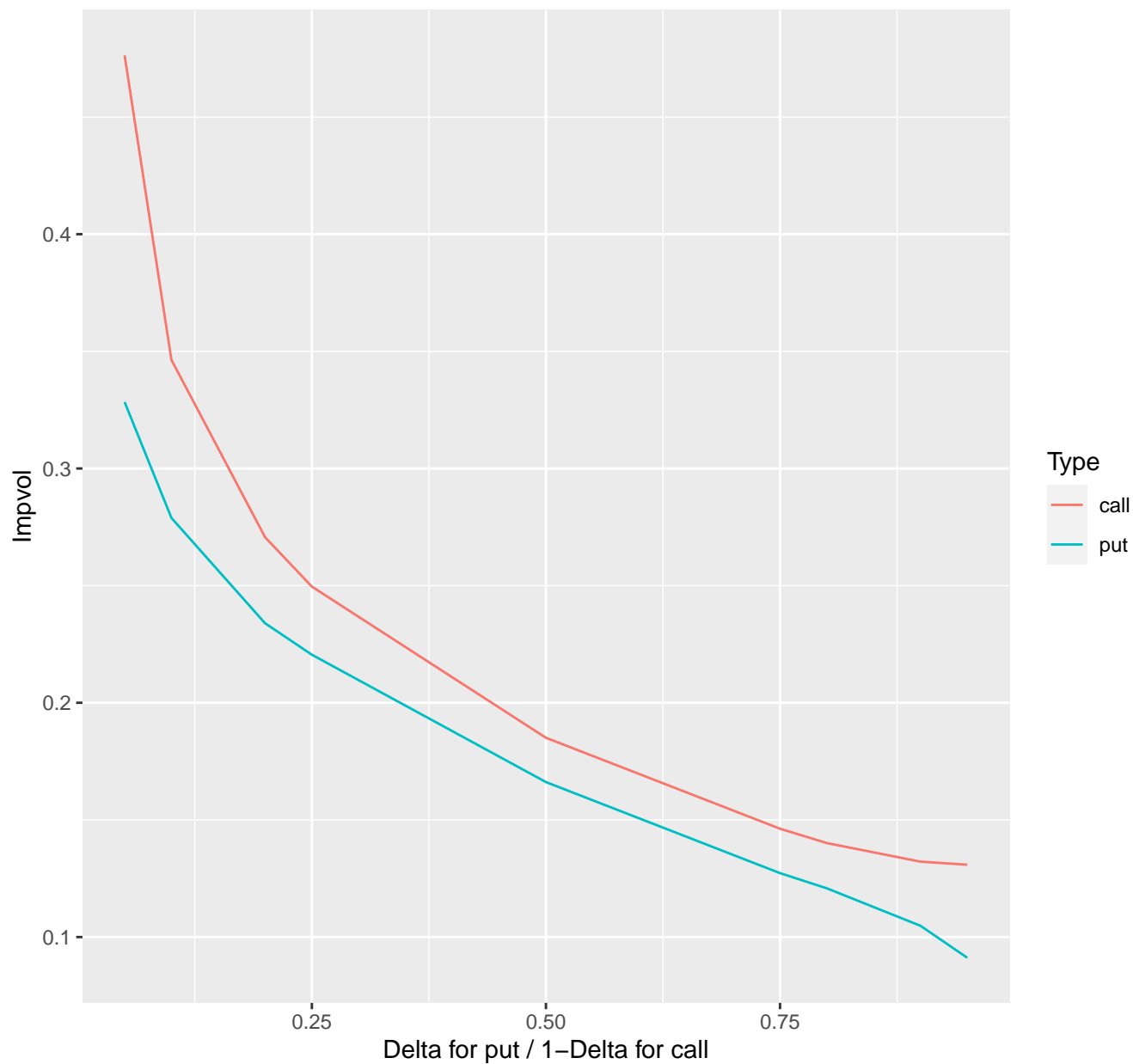
2021-11-19

x axis represents strike price, increasing



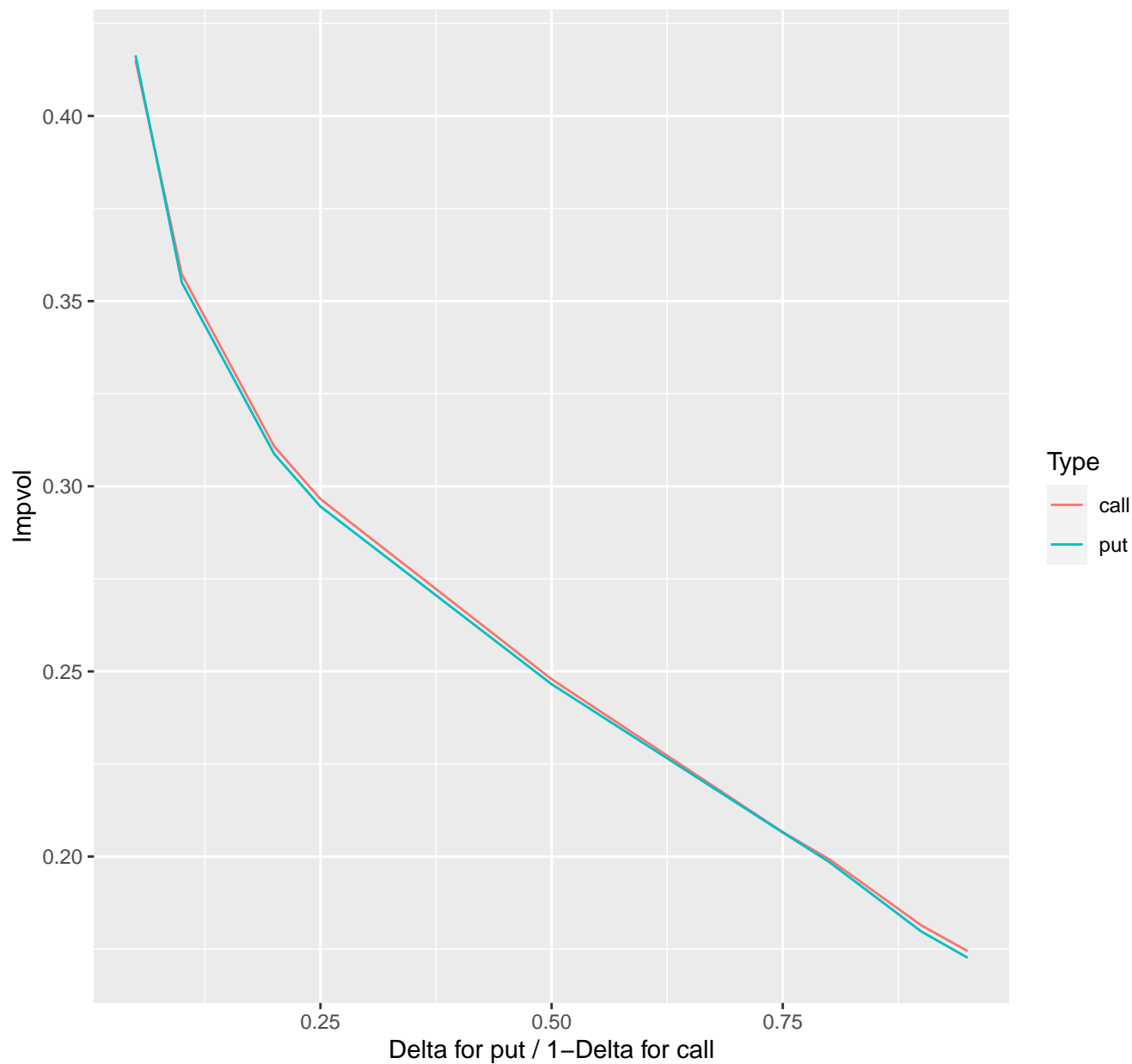
2021-12-17

x axis represents strike price, increasing



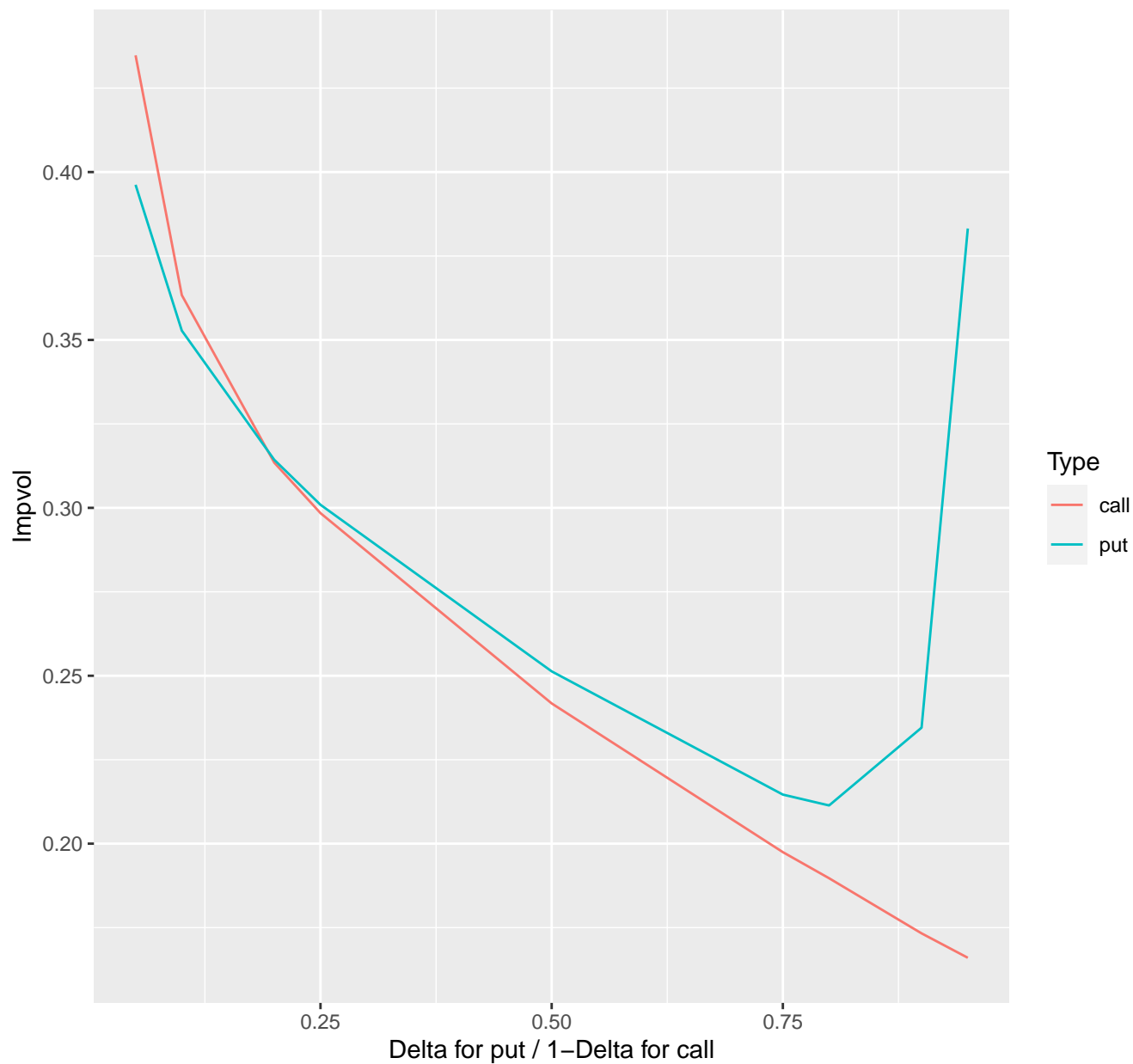
2022-01-21

x axis represents strike price, increasing



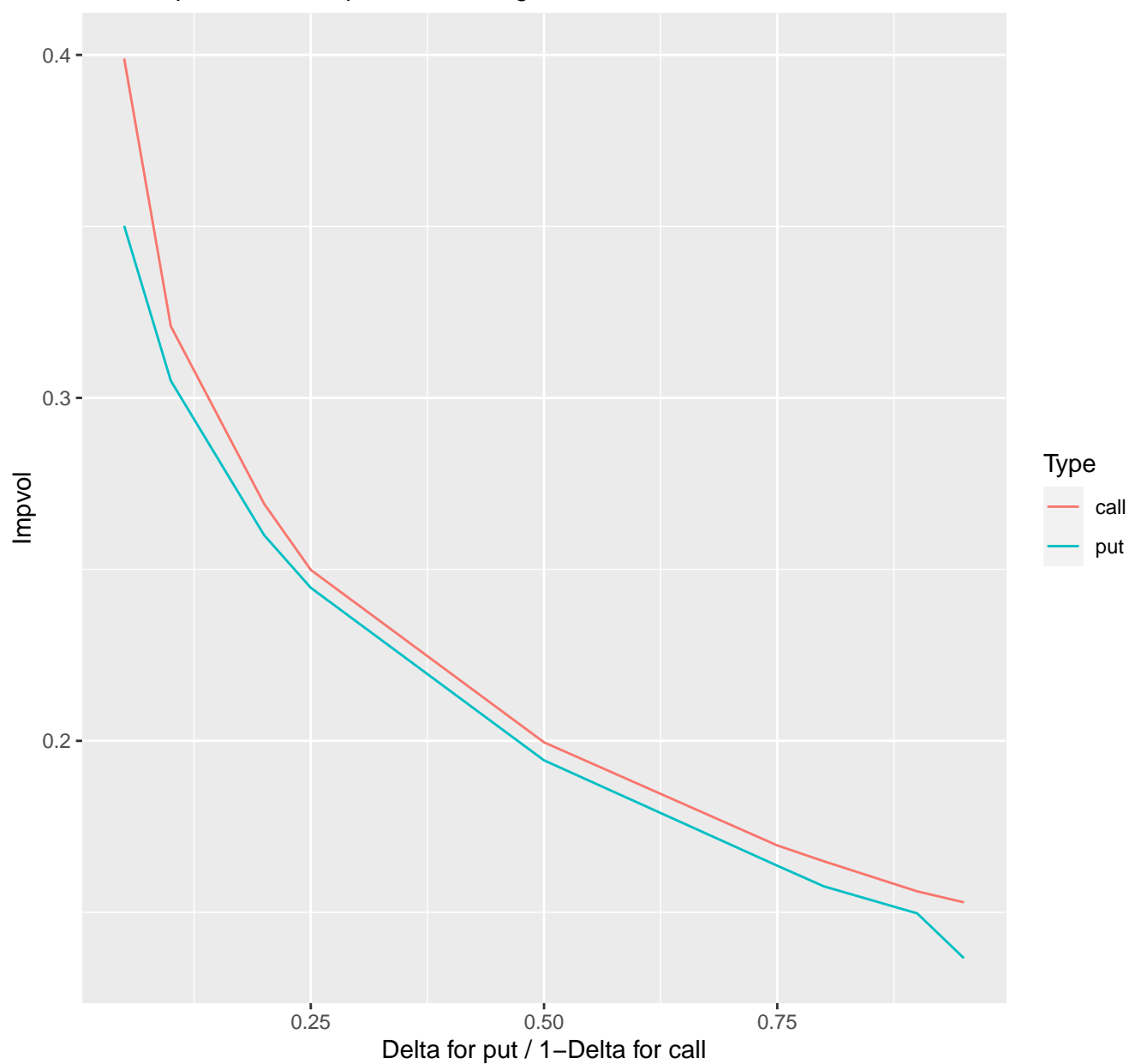
2022-02-18

x axis represents strike price, increasing



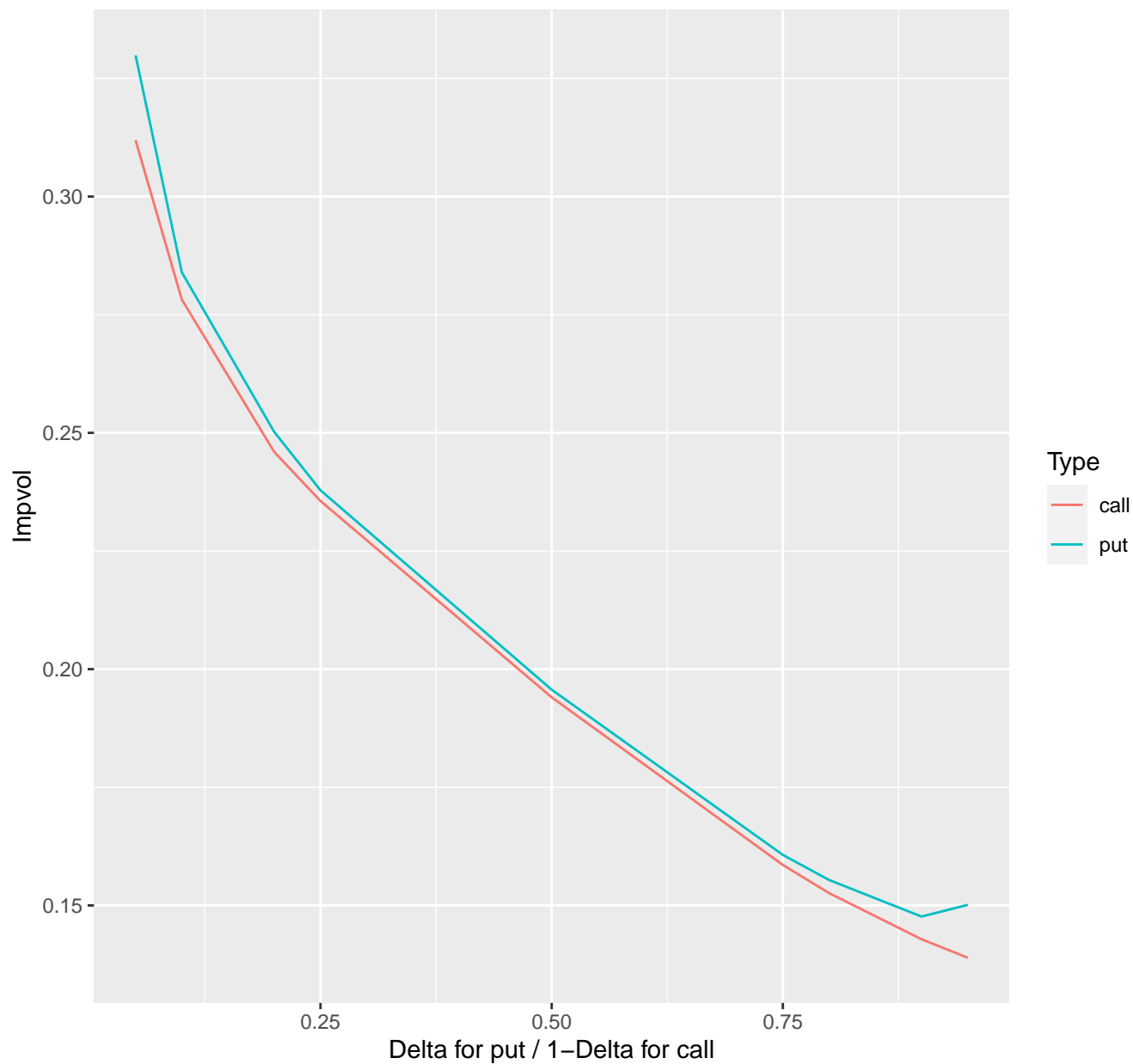
2022-03-18

x axis represents strike price, increasing



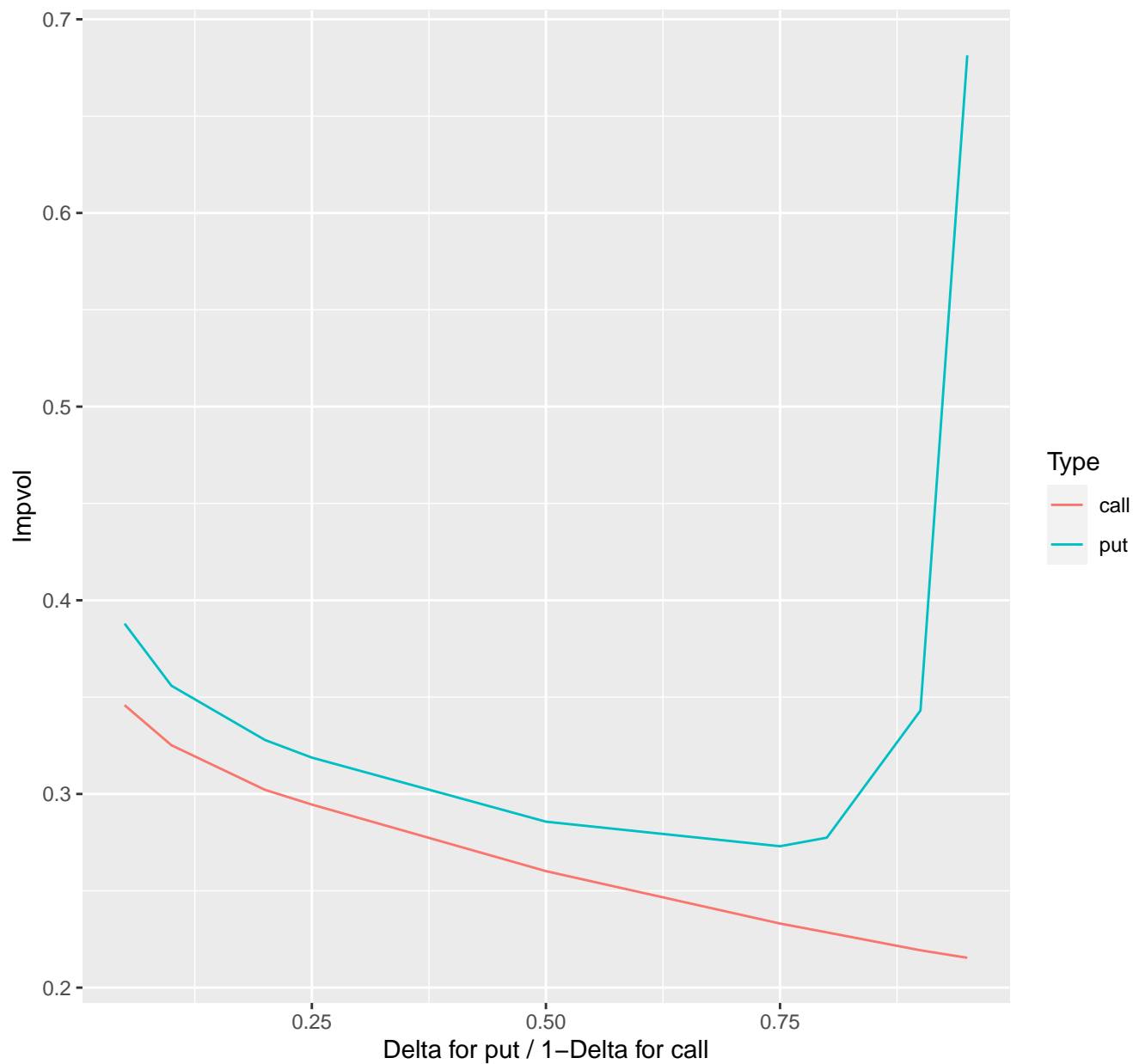
2022-04-14

x axis represents strike price, increasing



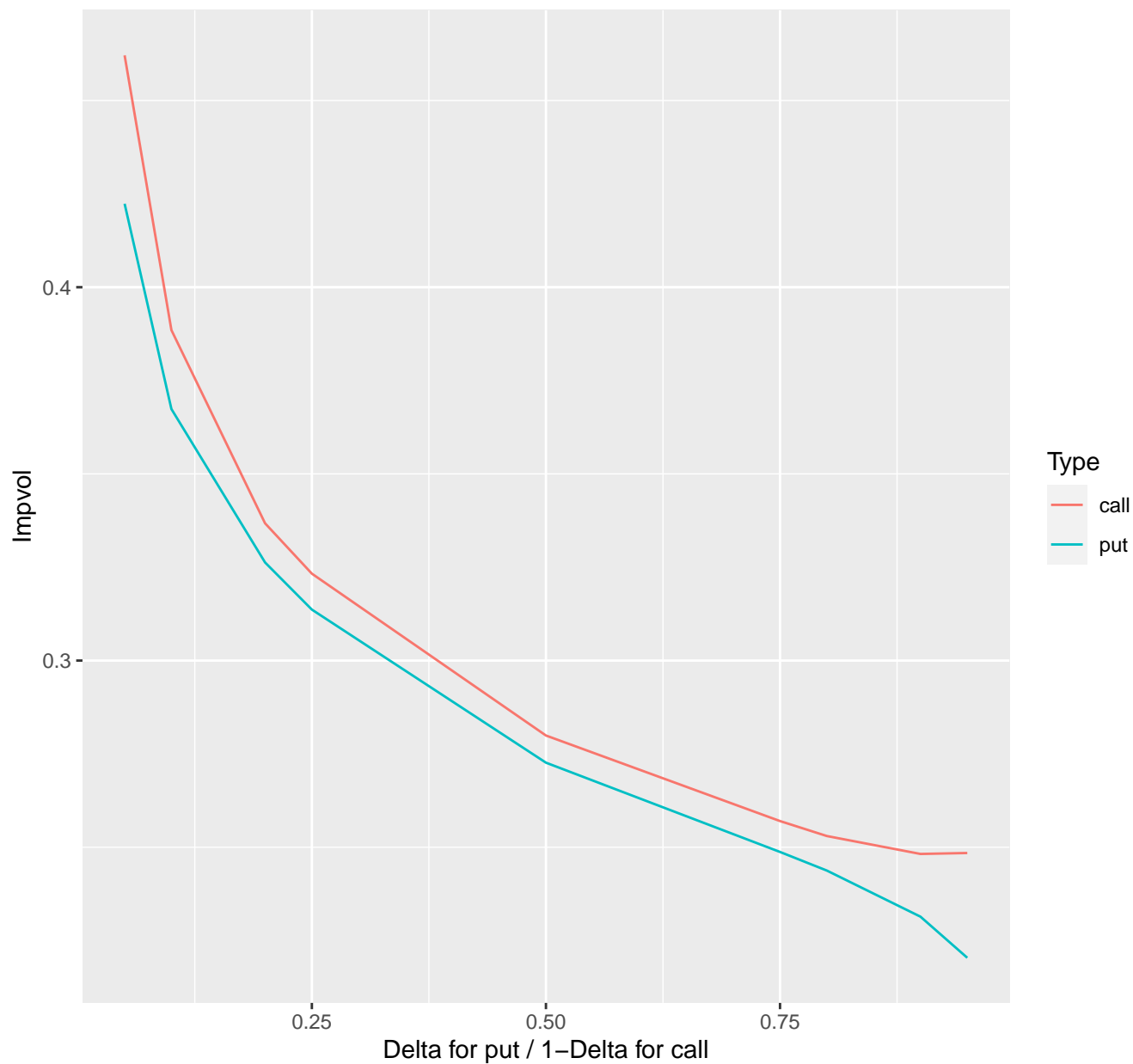
2022-05-20

x axis represents strike price, increasing



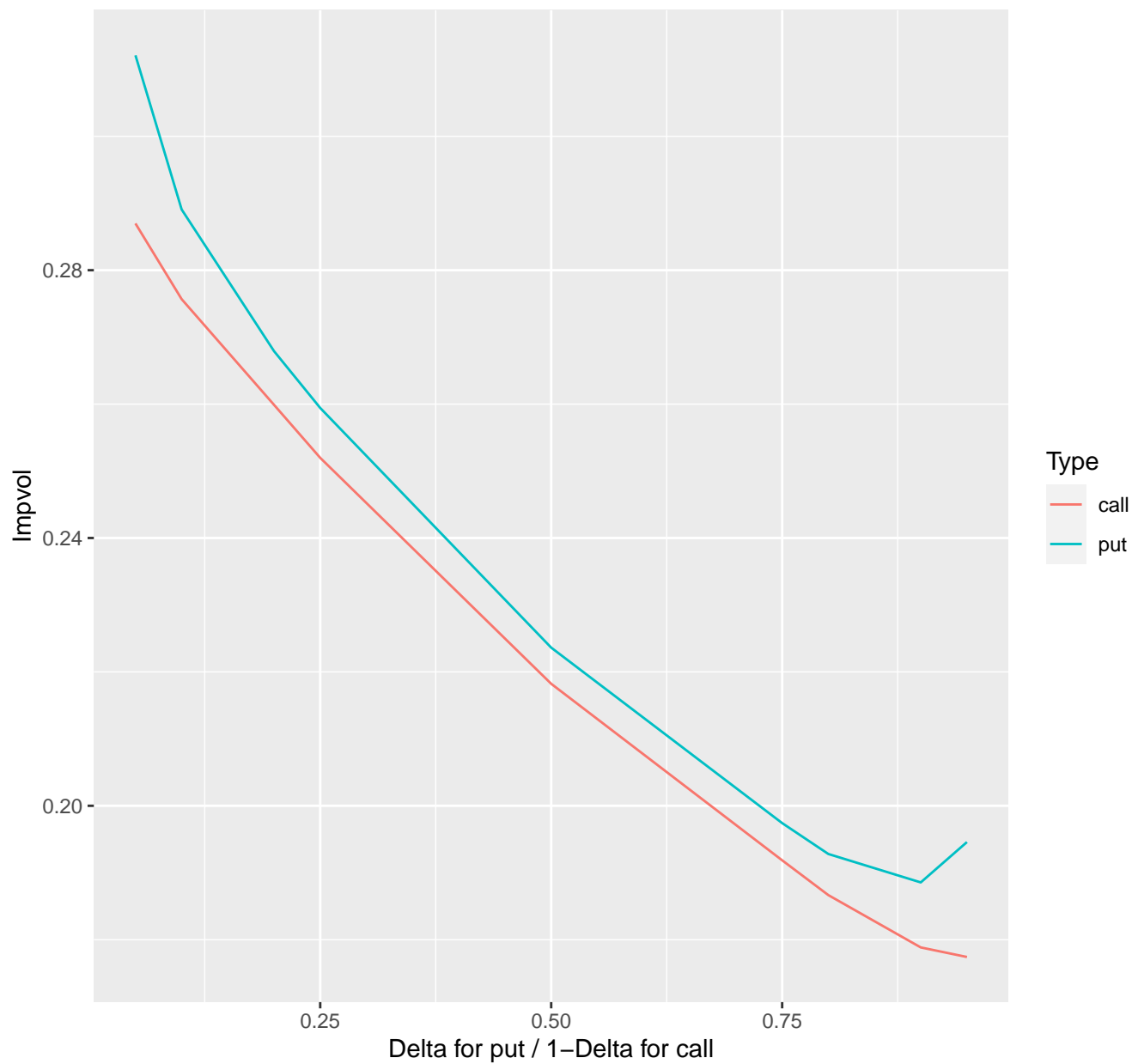
2022-06-17

x axis represents strike price, increasing



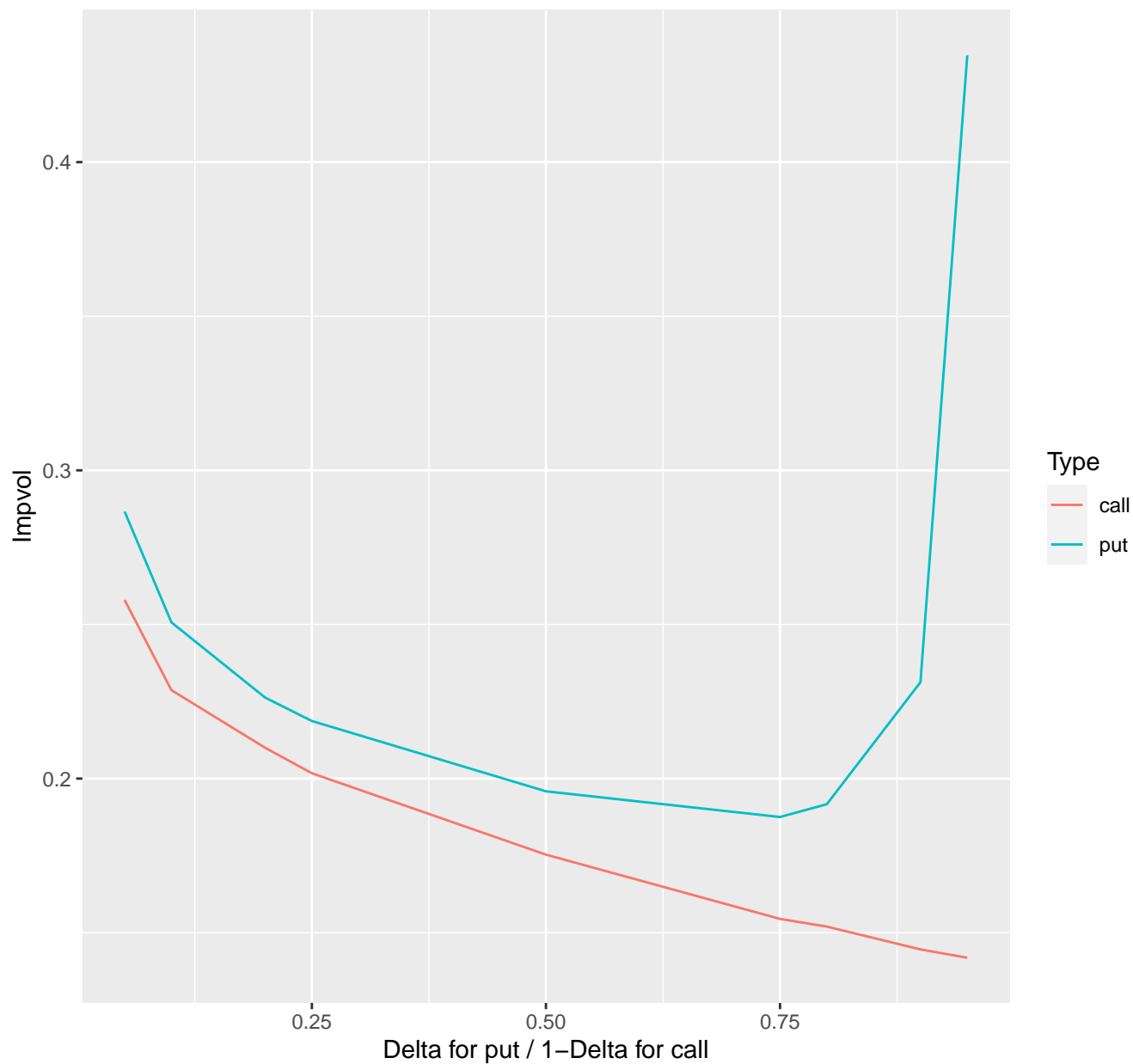
2022-07-15

x axis represents strike price, increasing



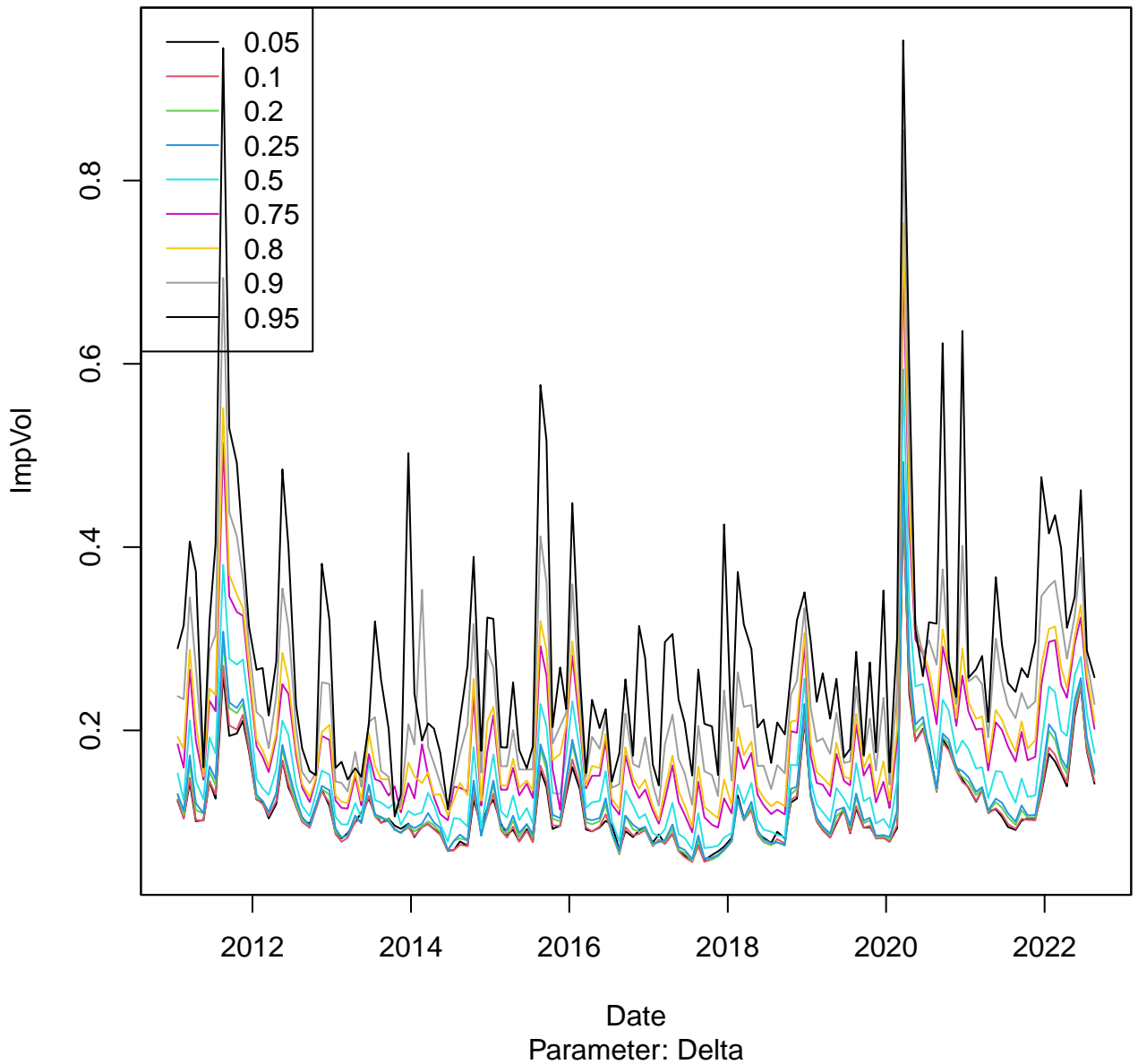
2022-08-19

x axis represents strike price, increasing

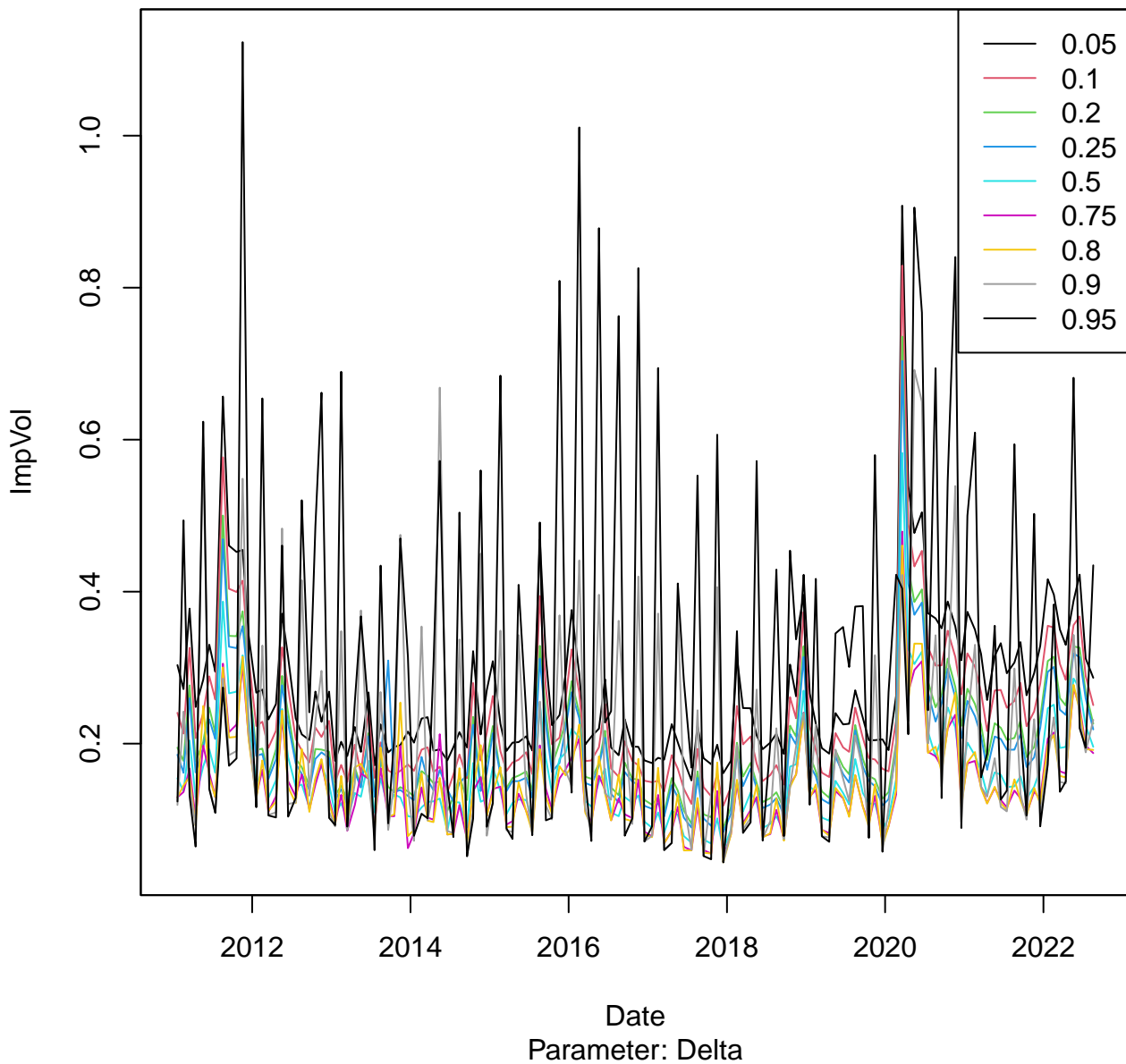


Option Volatilities

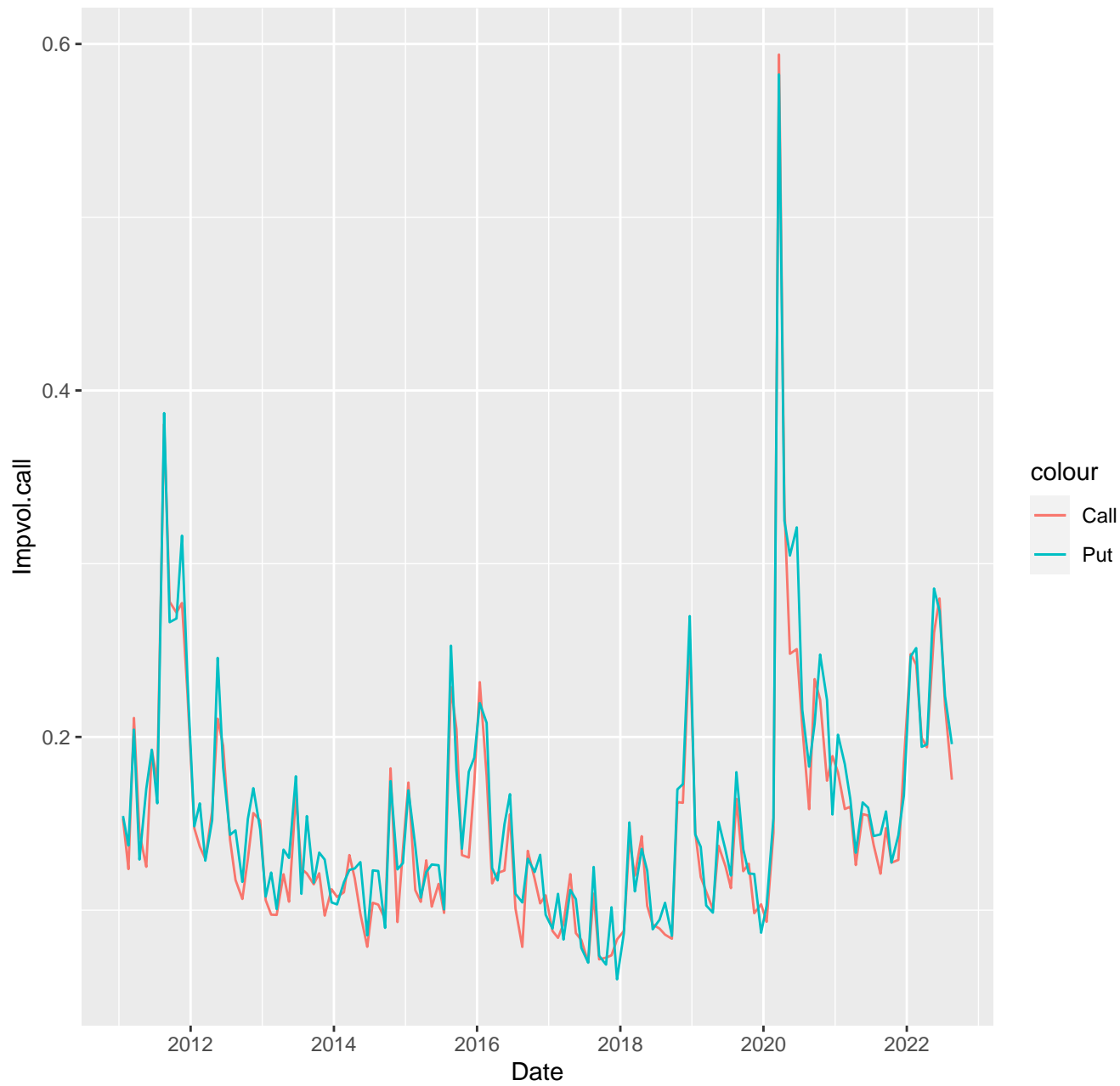
Call



Put

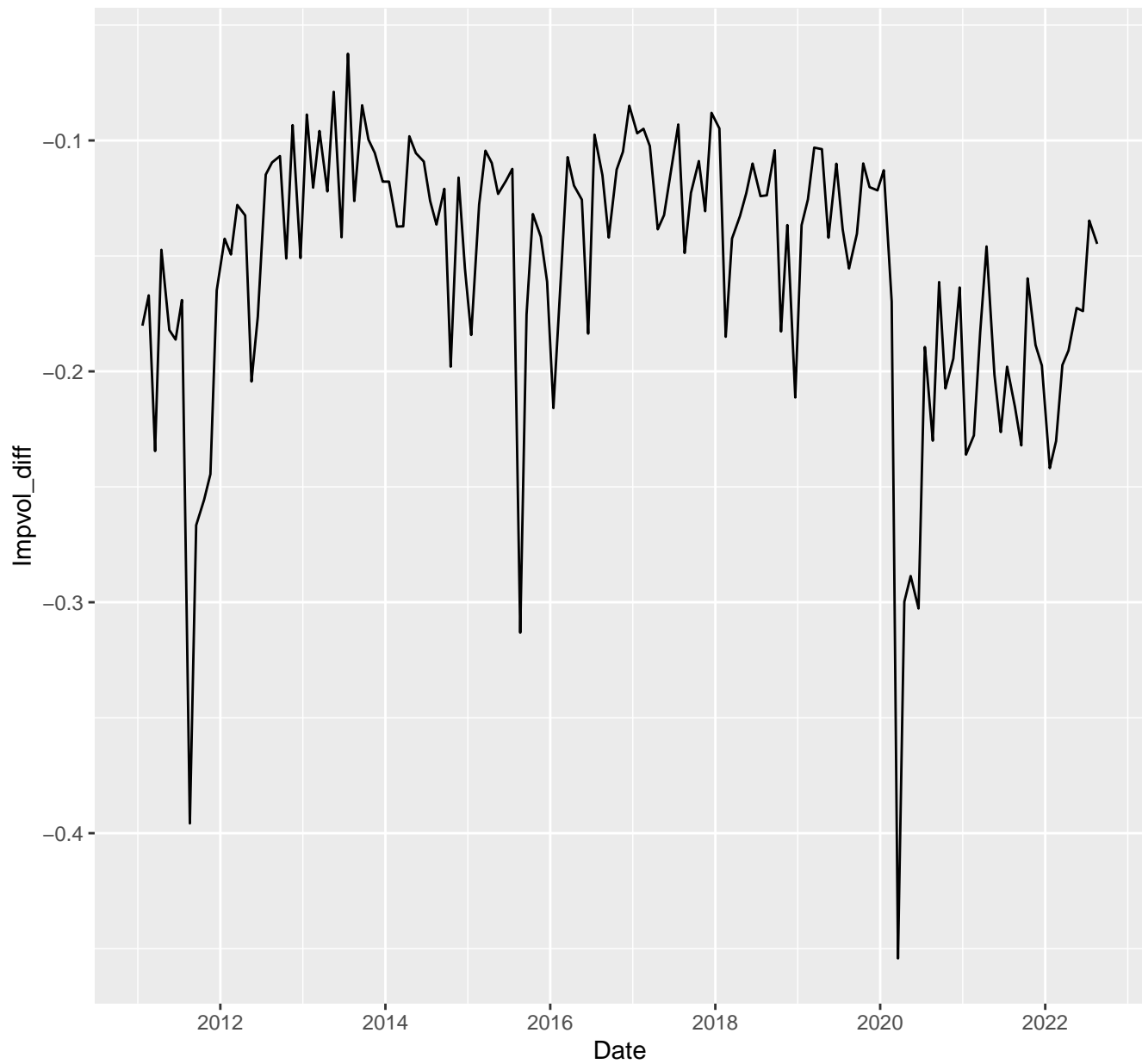


ATM



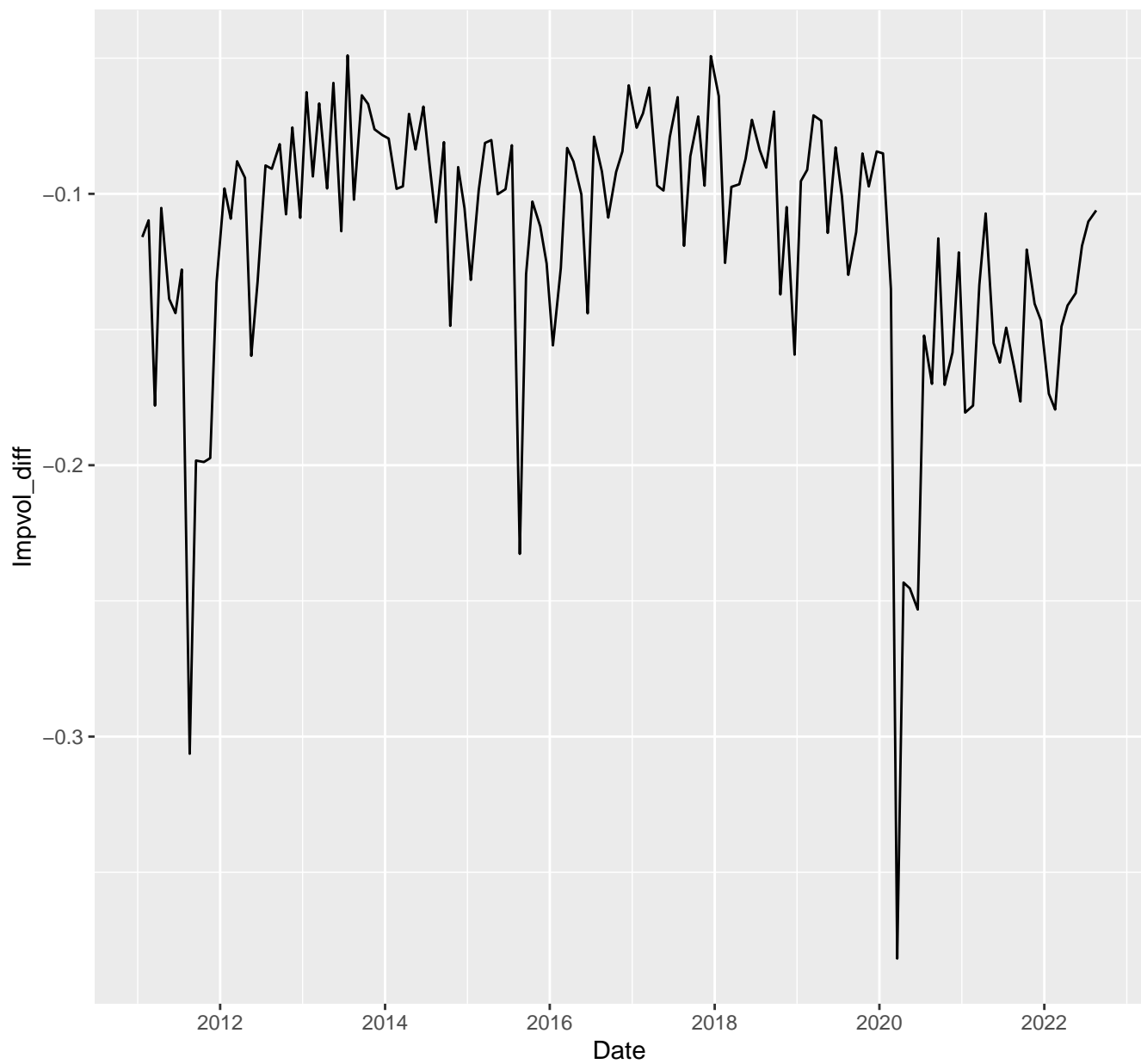
RiskReversal

Call delta 0.05 – Put delta 0.05



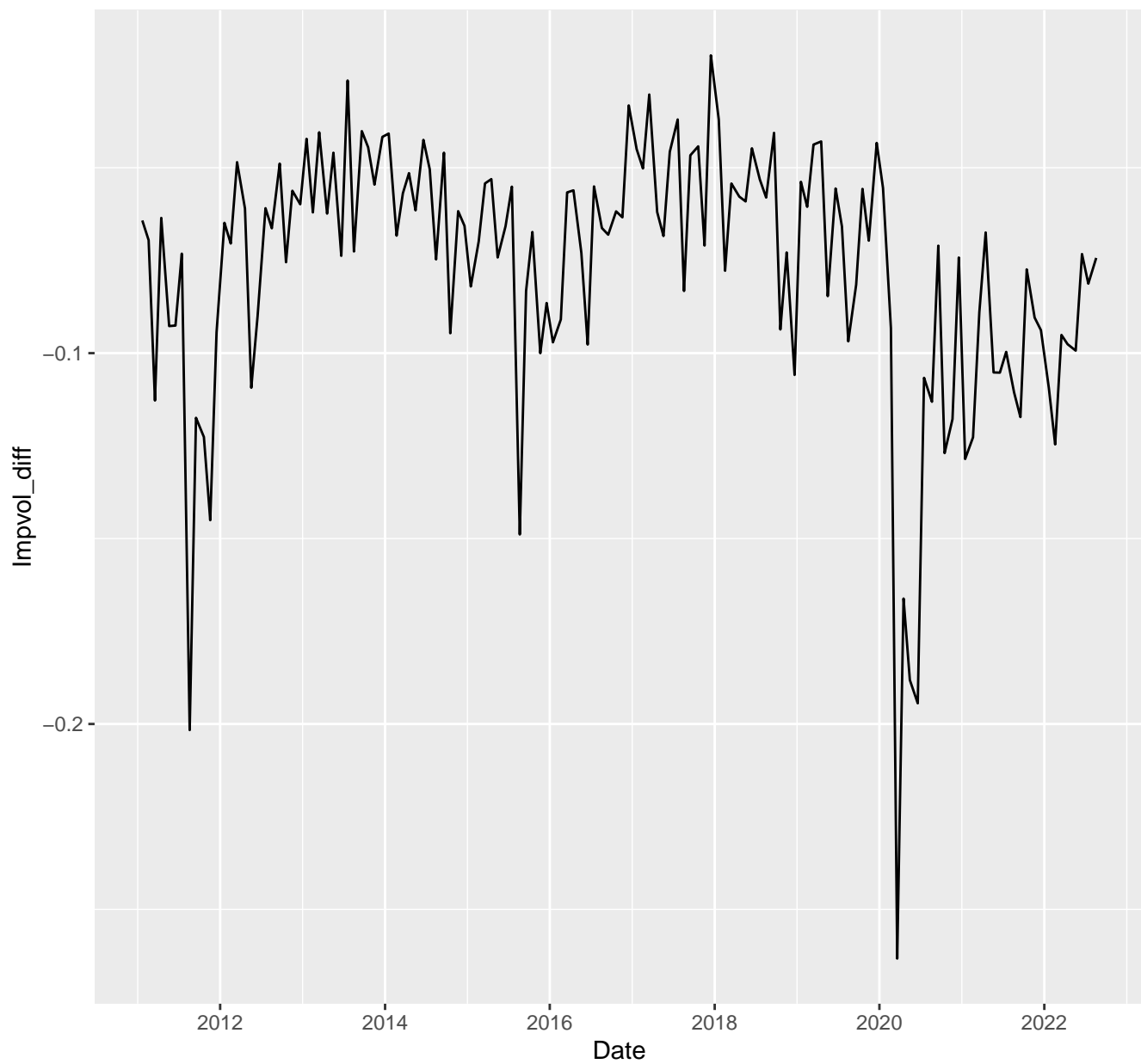
RiskReversal

Call delta 0.1 – Put delta 0.1



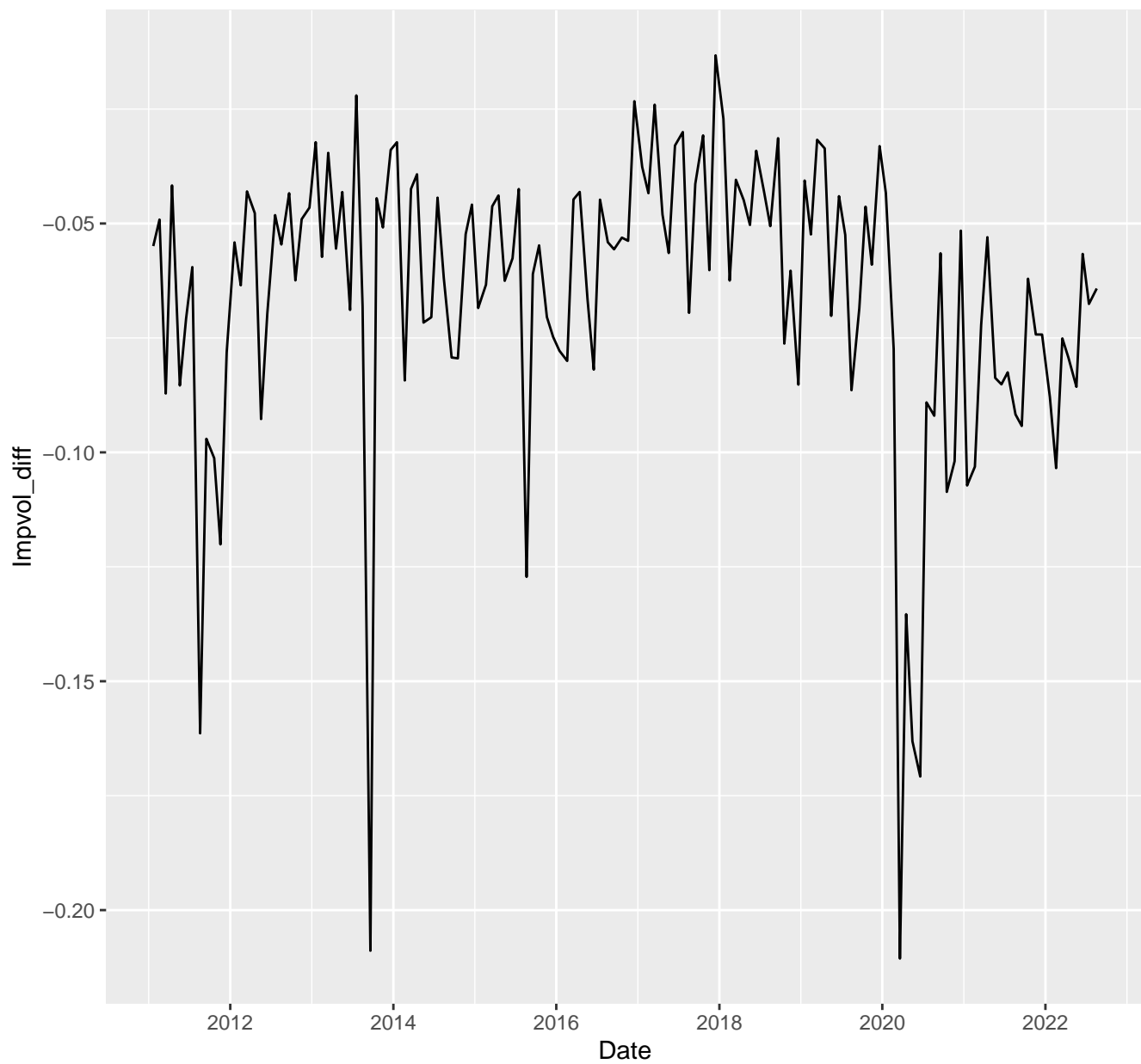
RiskReversal

Call delta 0.2 – Put delta 0.2



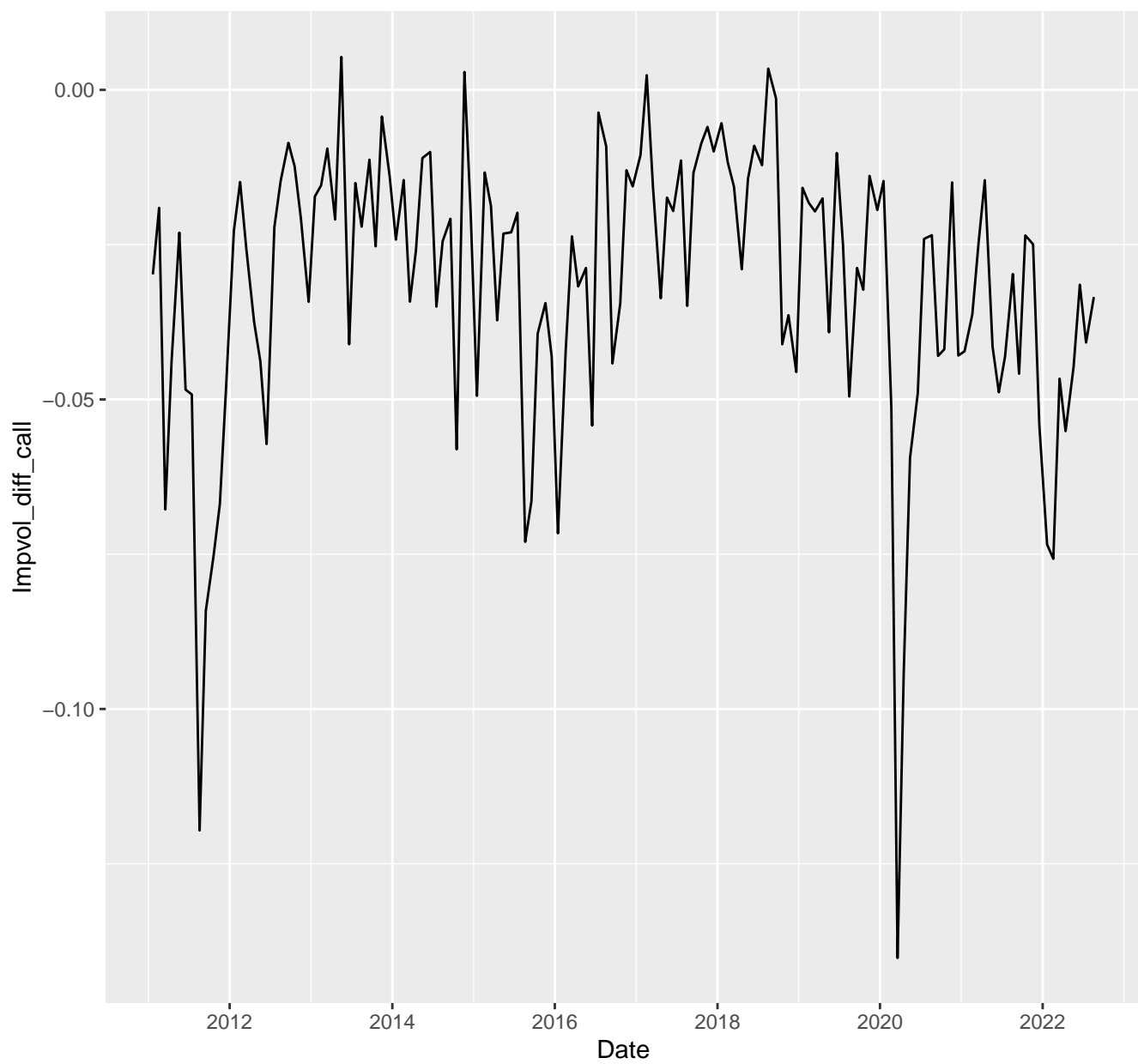
RiskReversal

Call delta 0.25 – Put delta 0.25



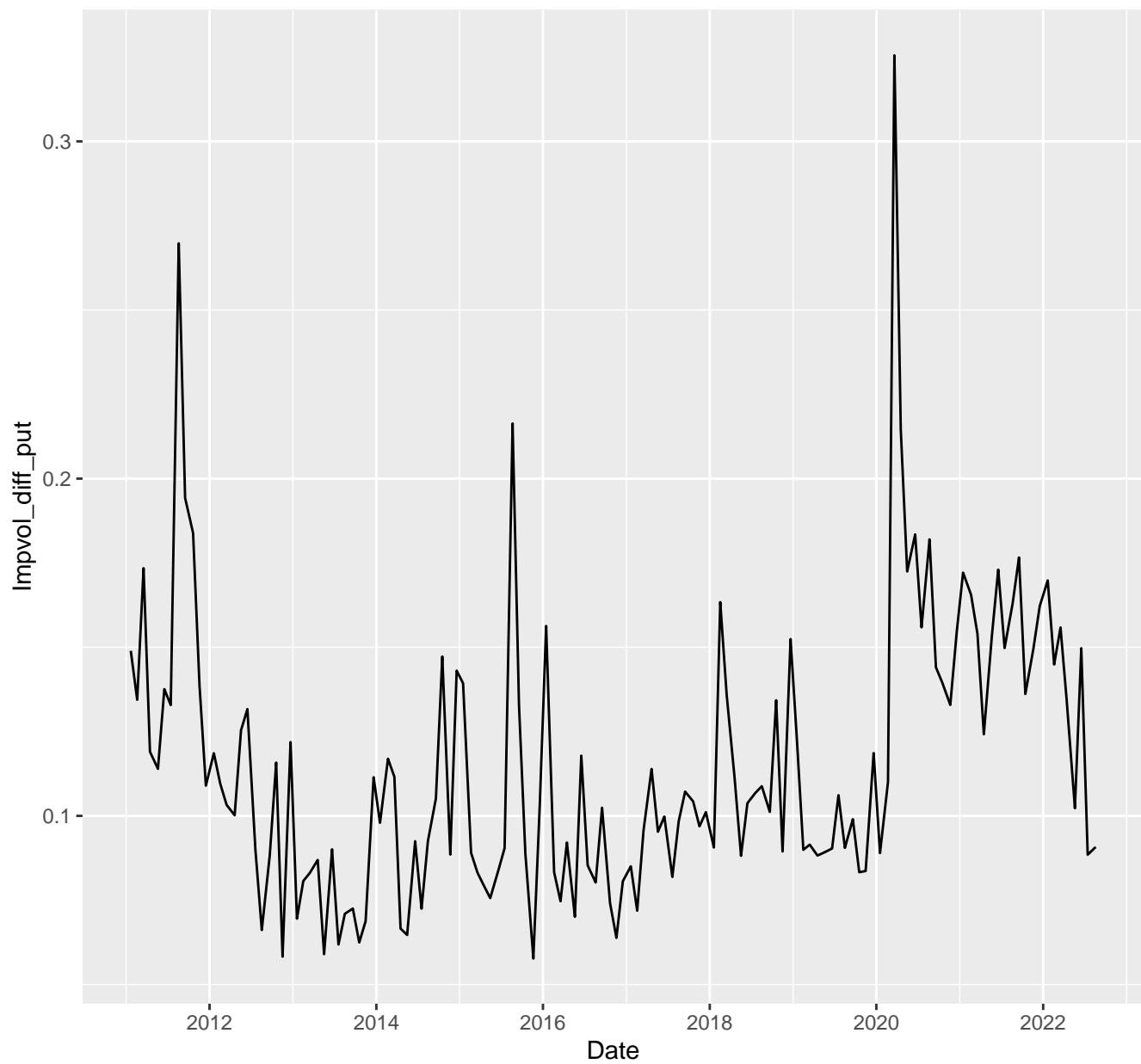
Call Spread

Call 0.05– Call 0.5



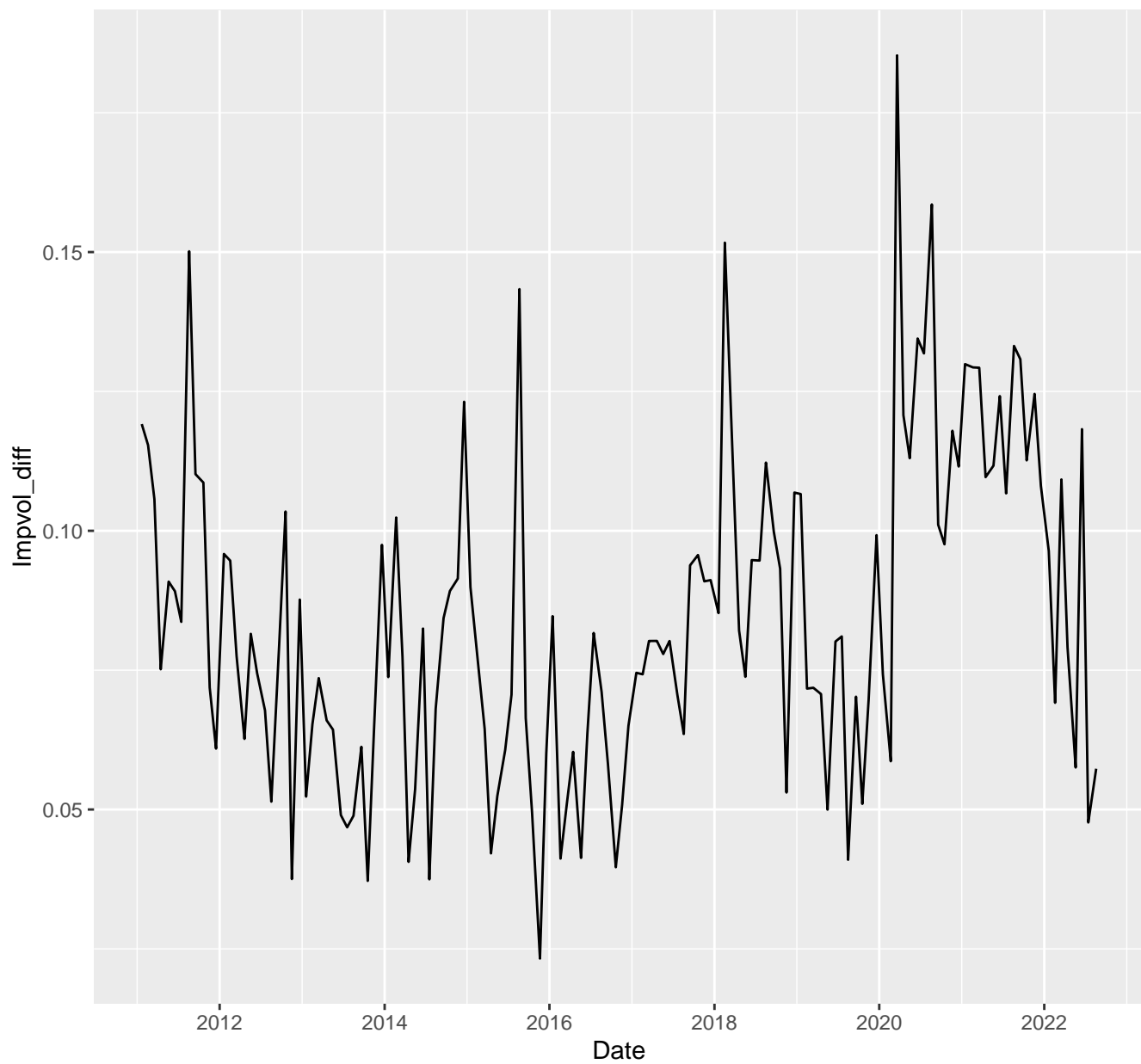
Put Spread

Put 0.05– Put 0.5



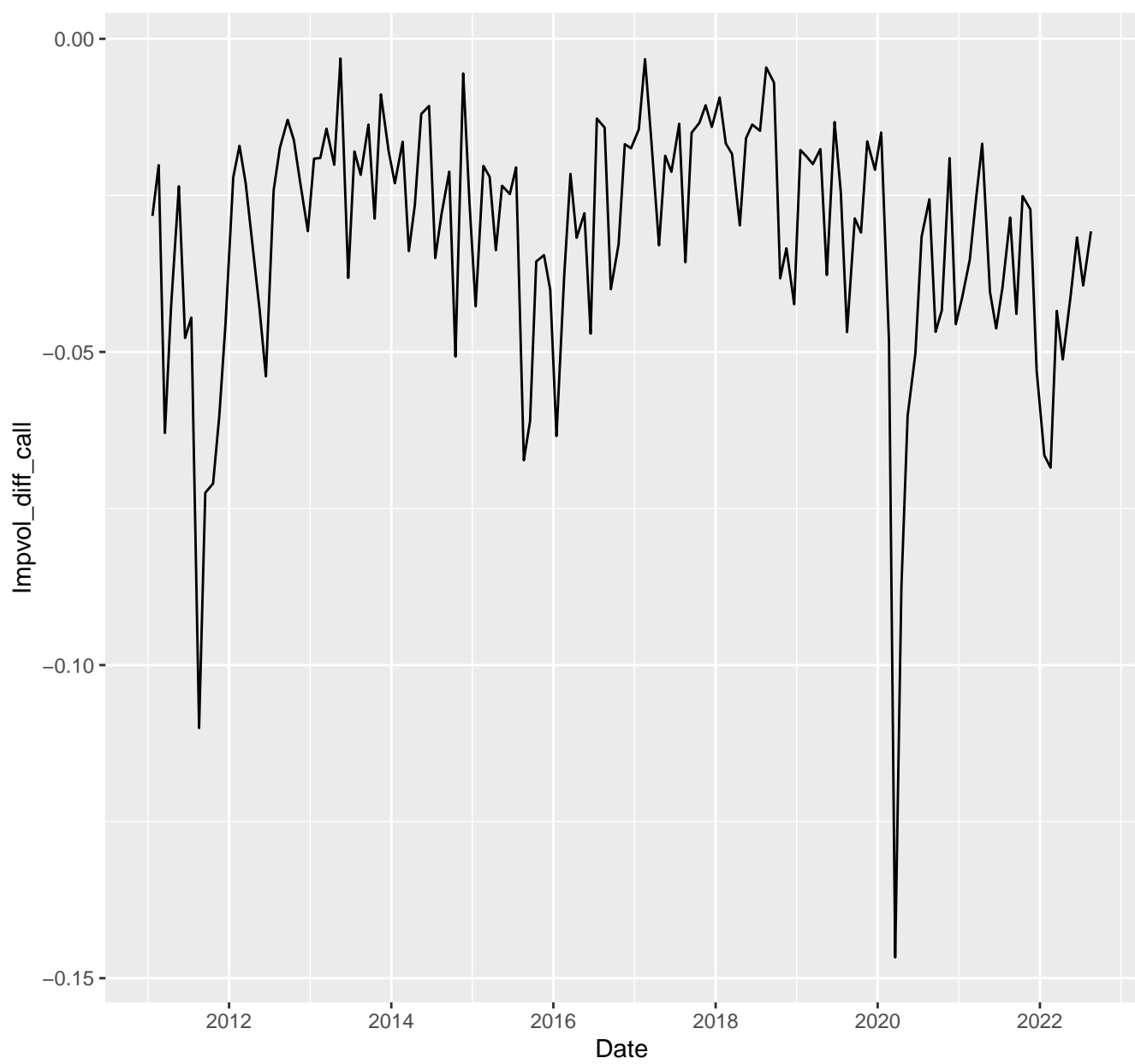
Butterfly

Call 0.05 – Call 0.5 – Put 0.5 + Put 0.05



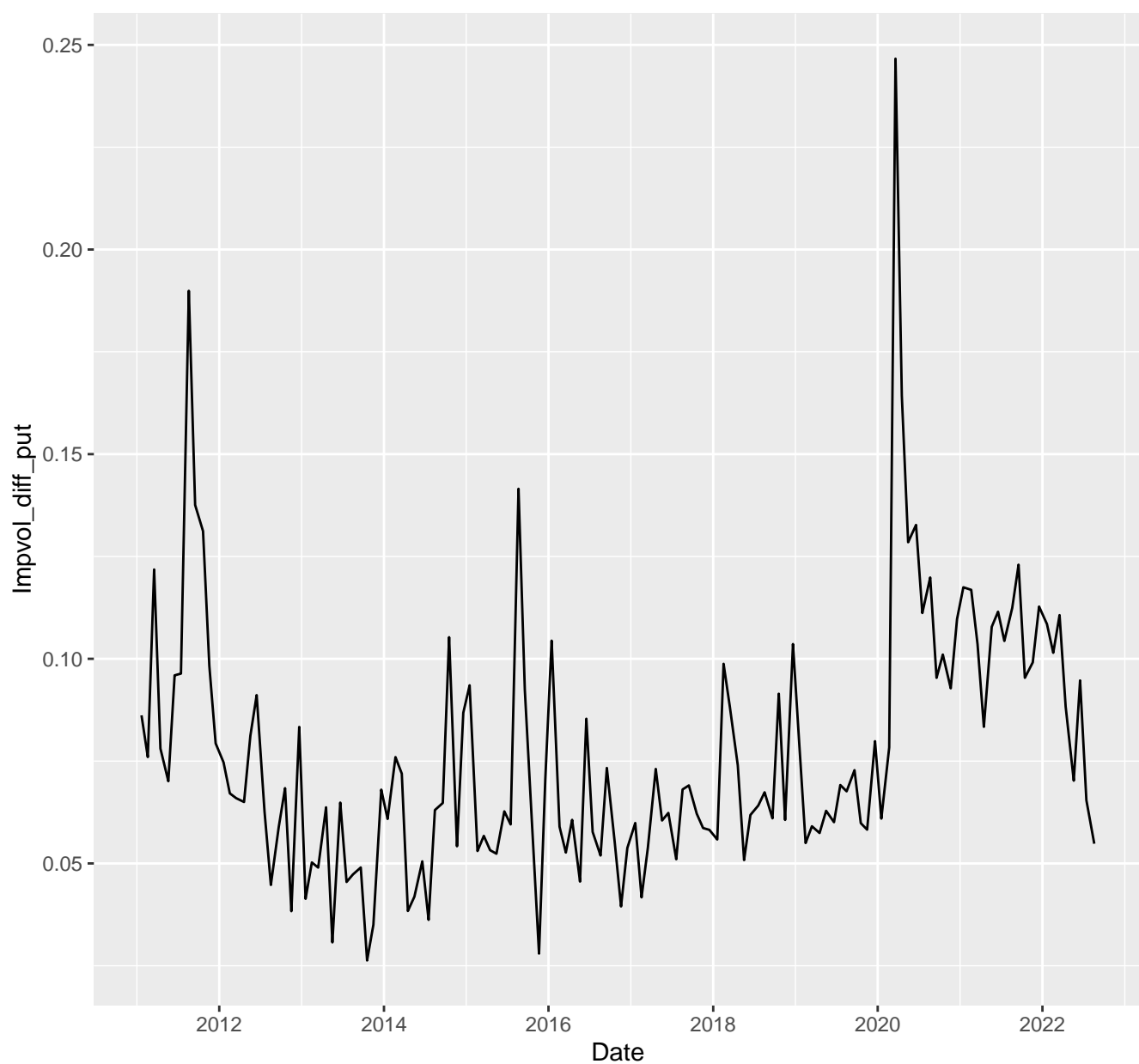
Call Spread

Call 0.1– Call 0.5



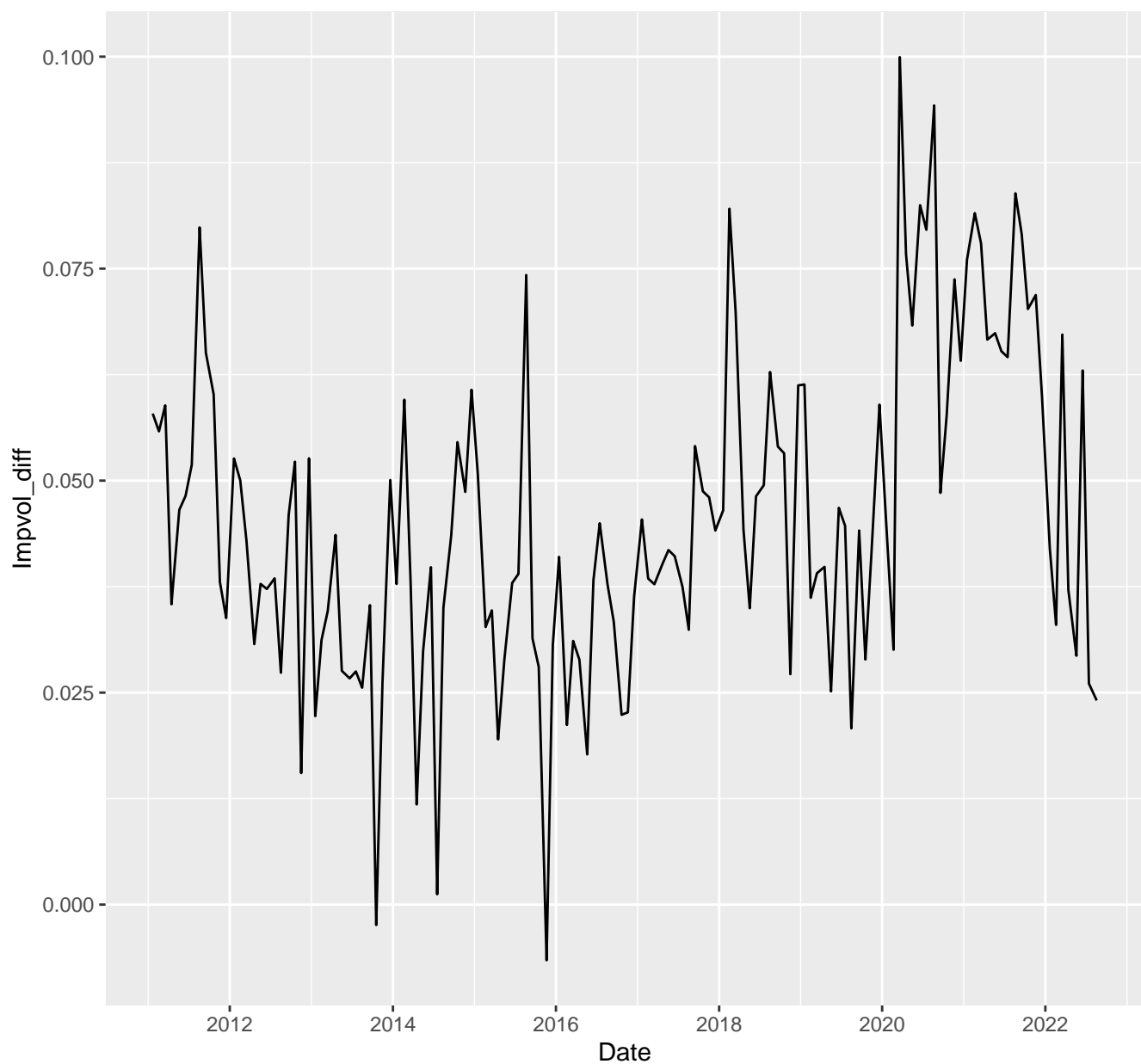
Put Spread

Put 0.1– Put 0.5



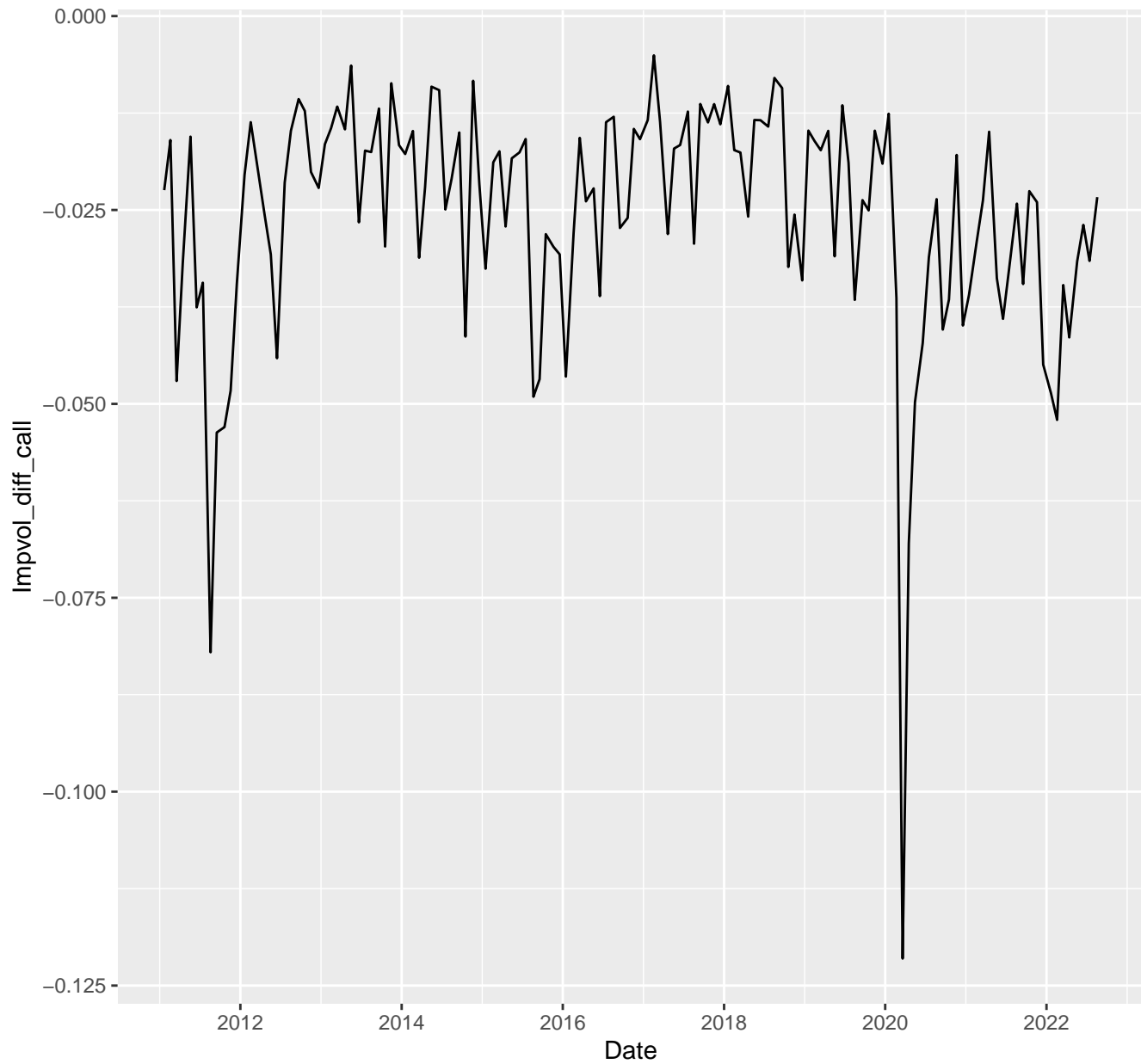
Butterfly

Call 0.1 – Call 0.5 – Put 0.5 + Put 0.1



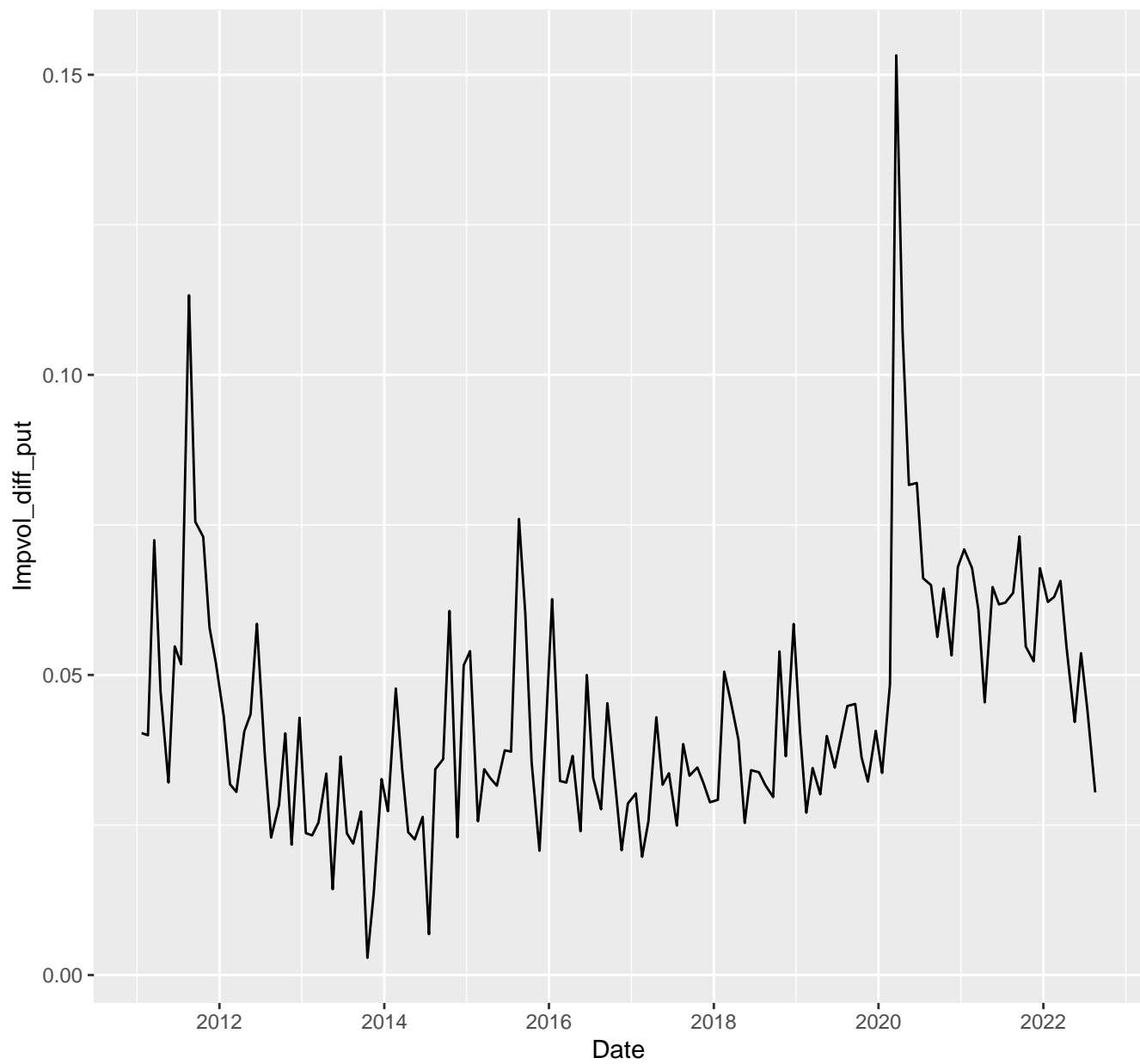
Call Spread

Call 0.2– Call 0.5



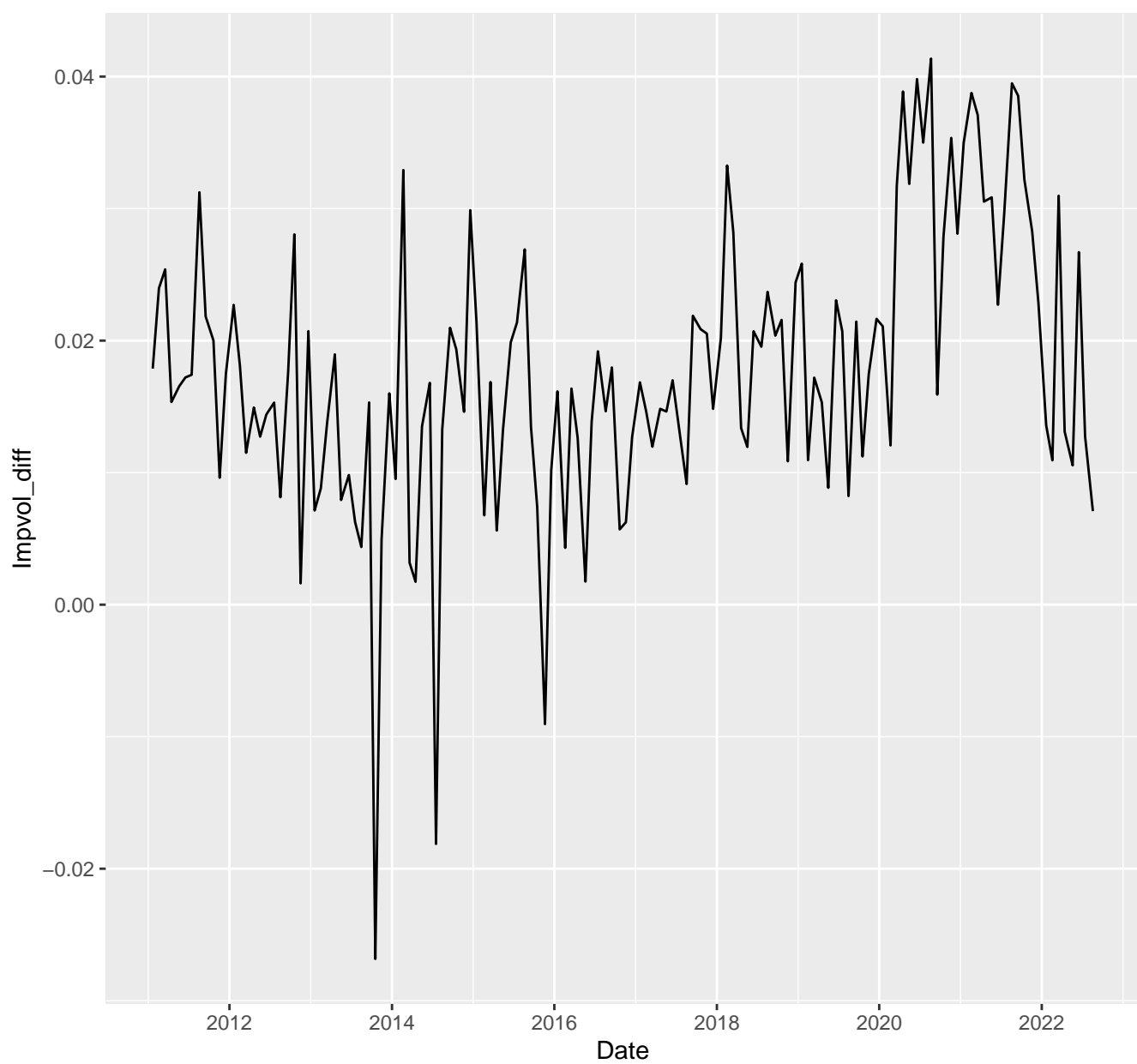
Put Spread

Put 0.2– Put 0.5



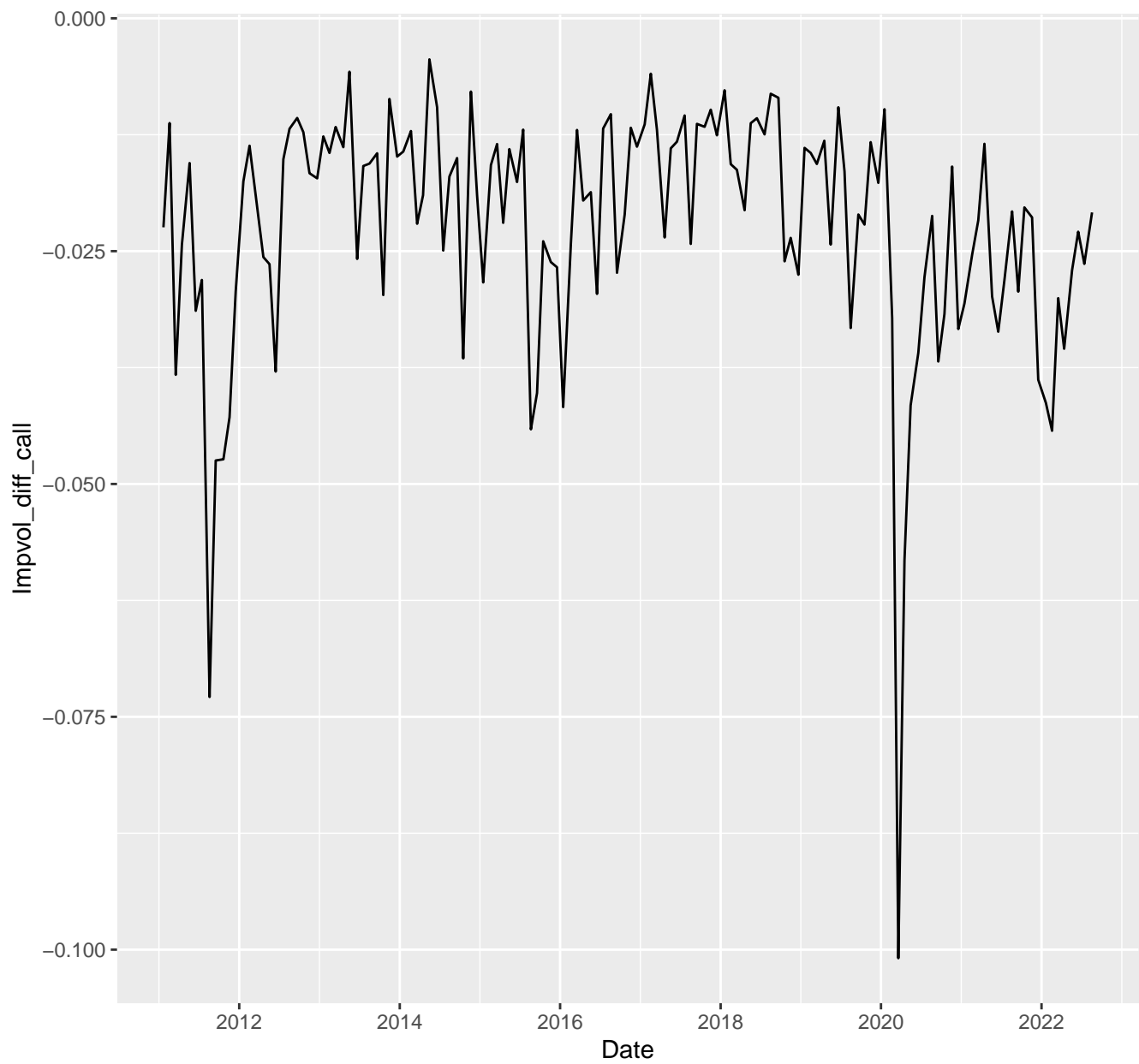
Butterfly

Call 0.2 – Call 0.5 – Put 0.5 + Put 0.2



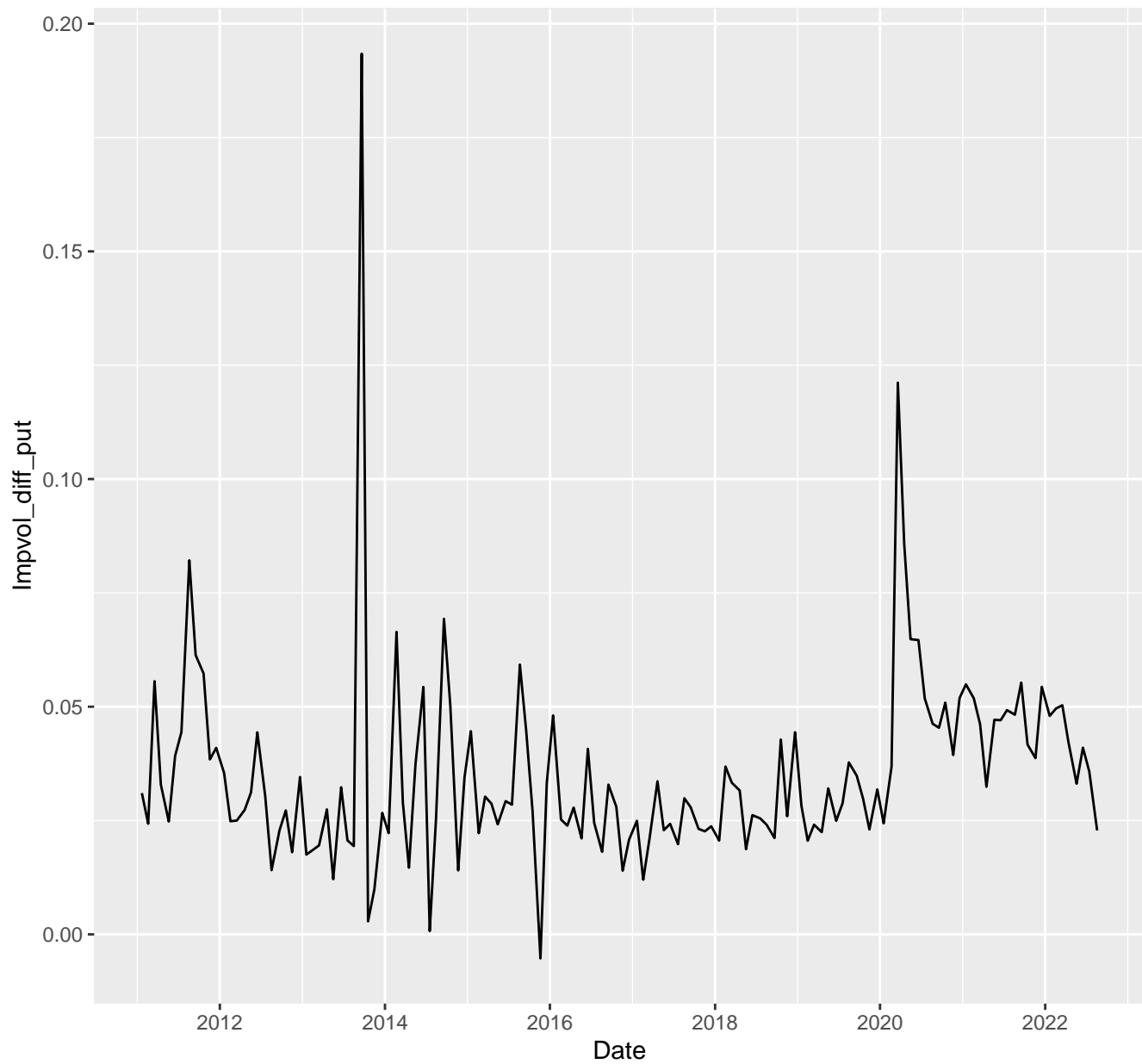
Call Spread

Call 0.25- Call 0.5



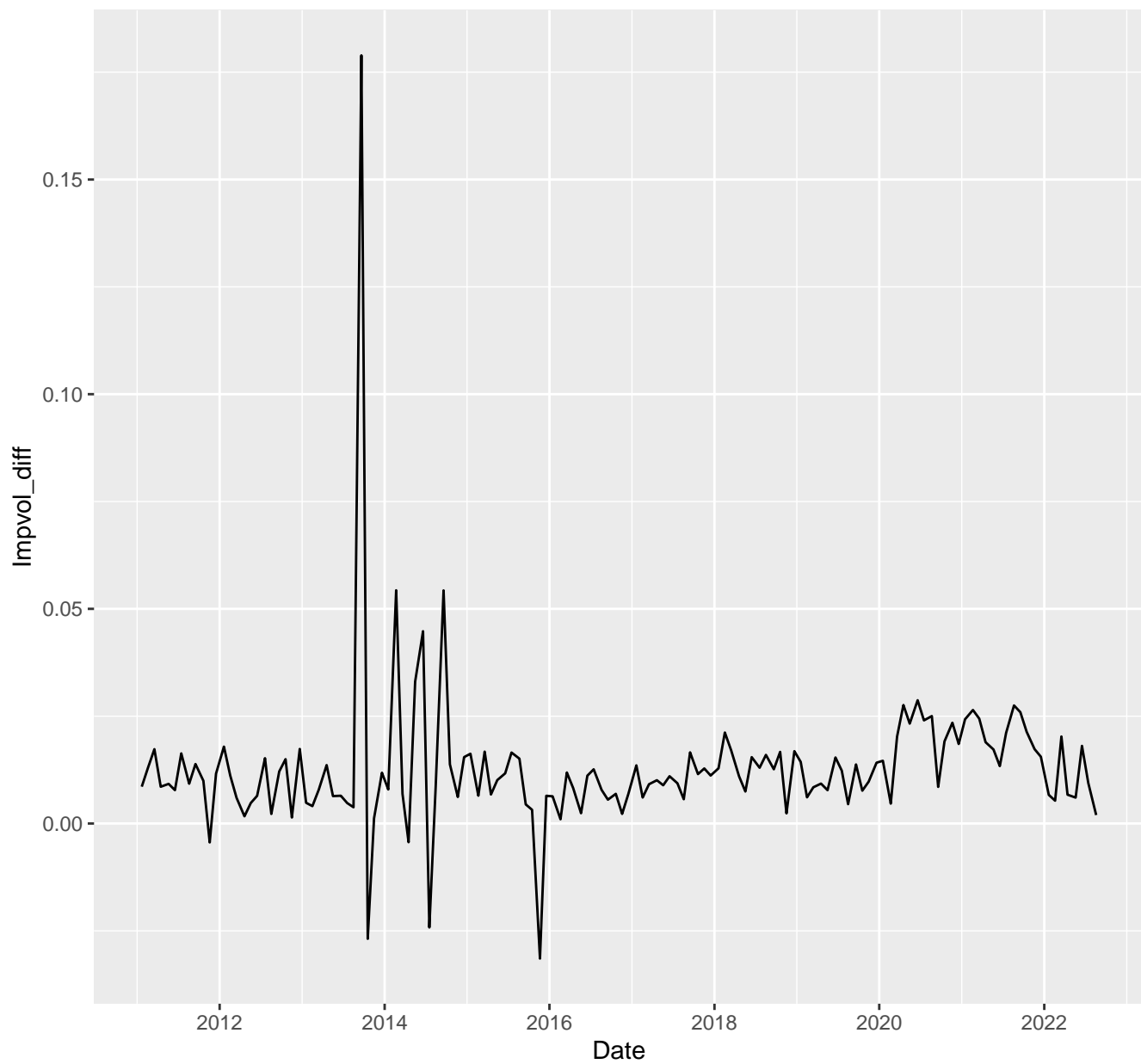
Put Spread

Put 0.25– Put 0.5



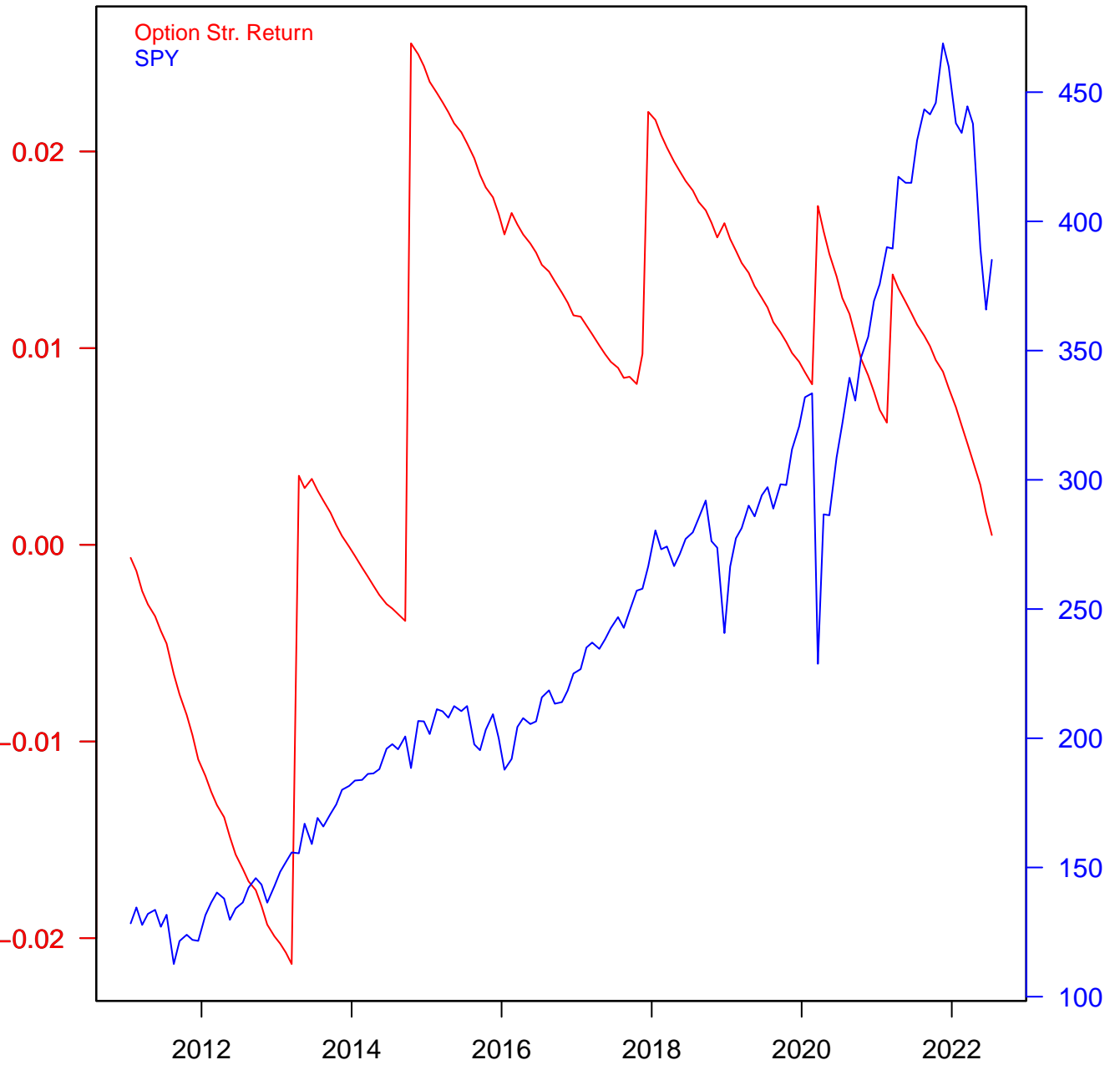
Butterfly

Call 0.25– Call 0.5 – Put 0.5 + Put 0.25

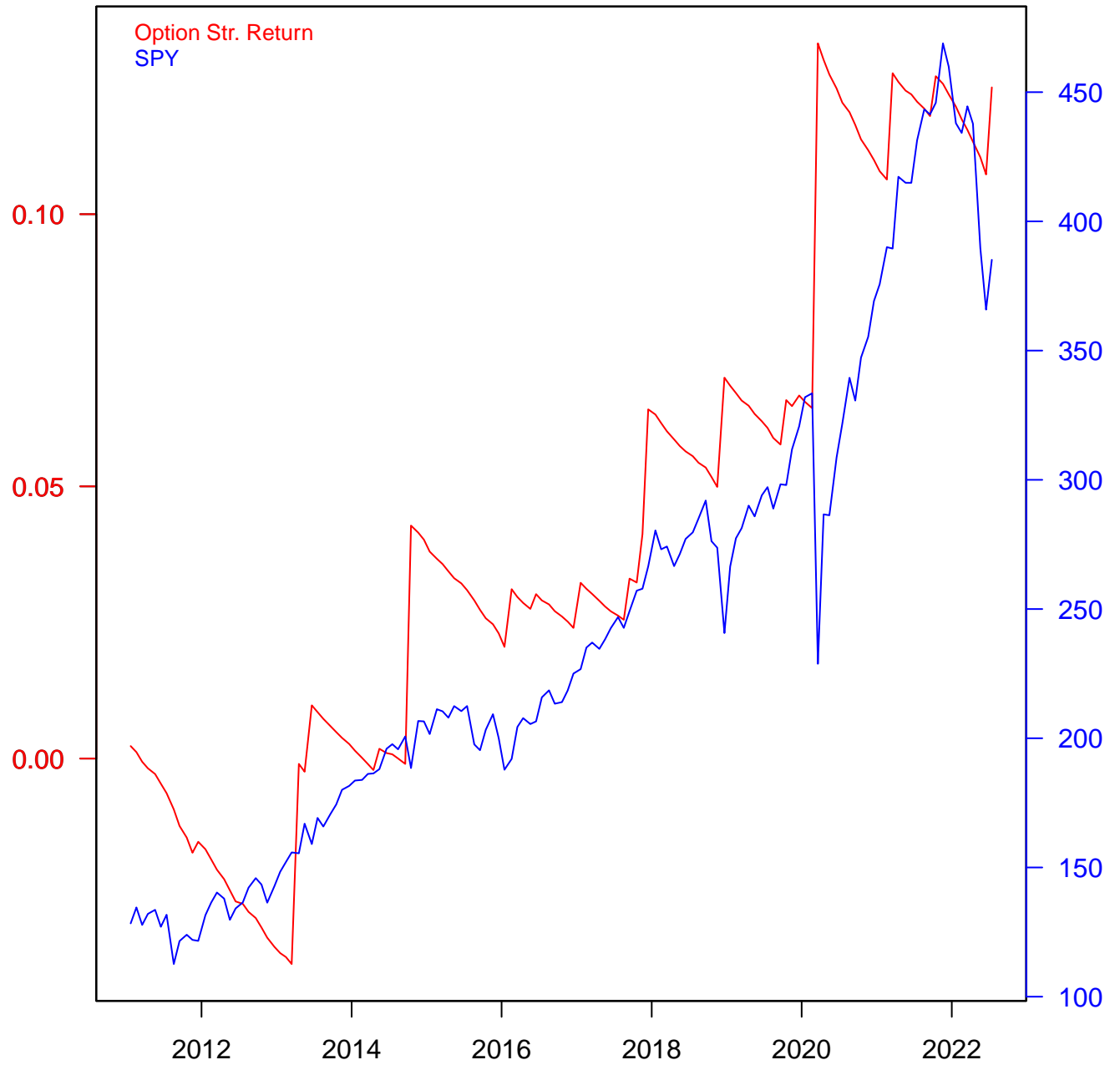


Basic Strategy Returns

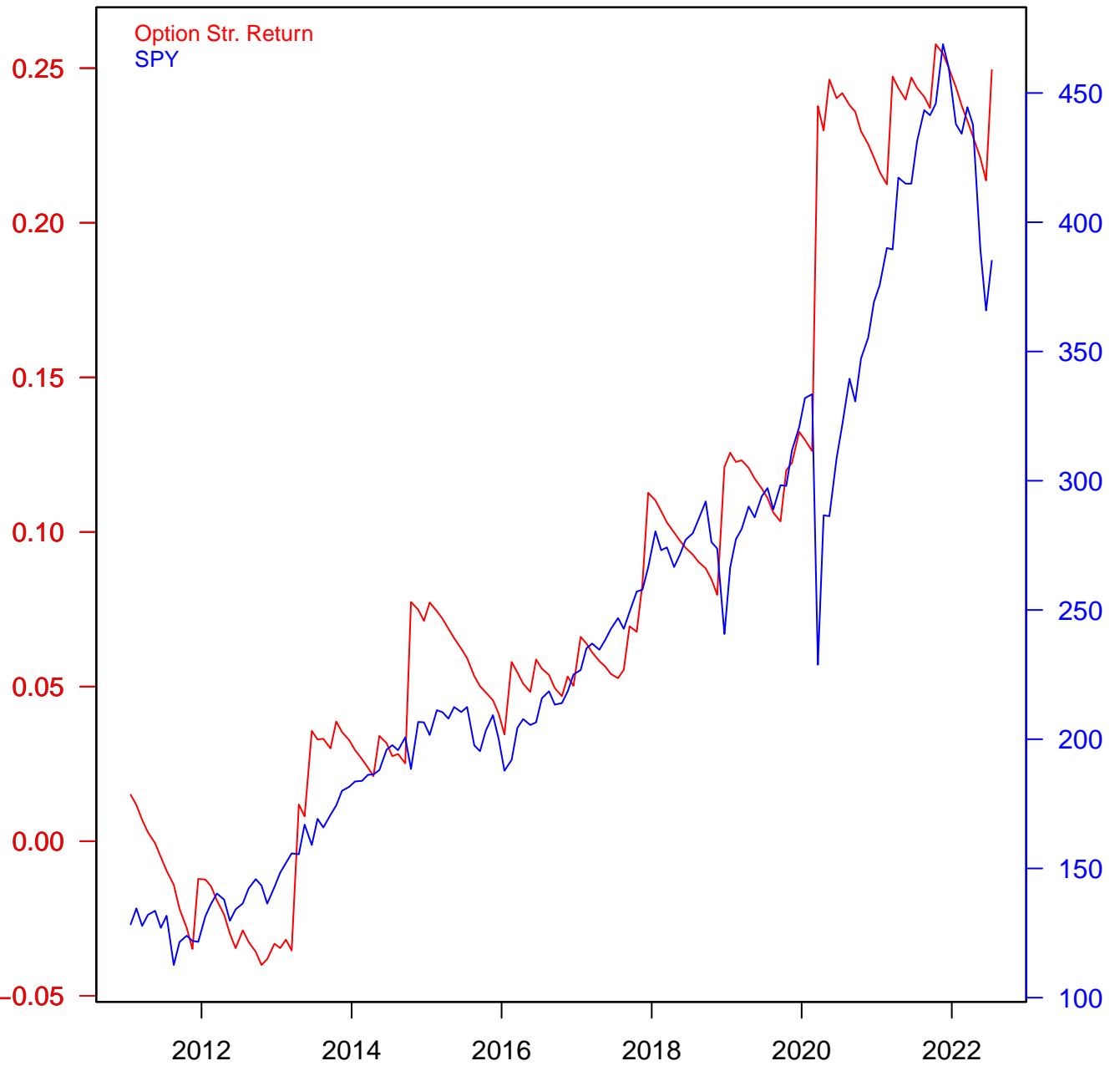
call_delta_0.05



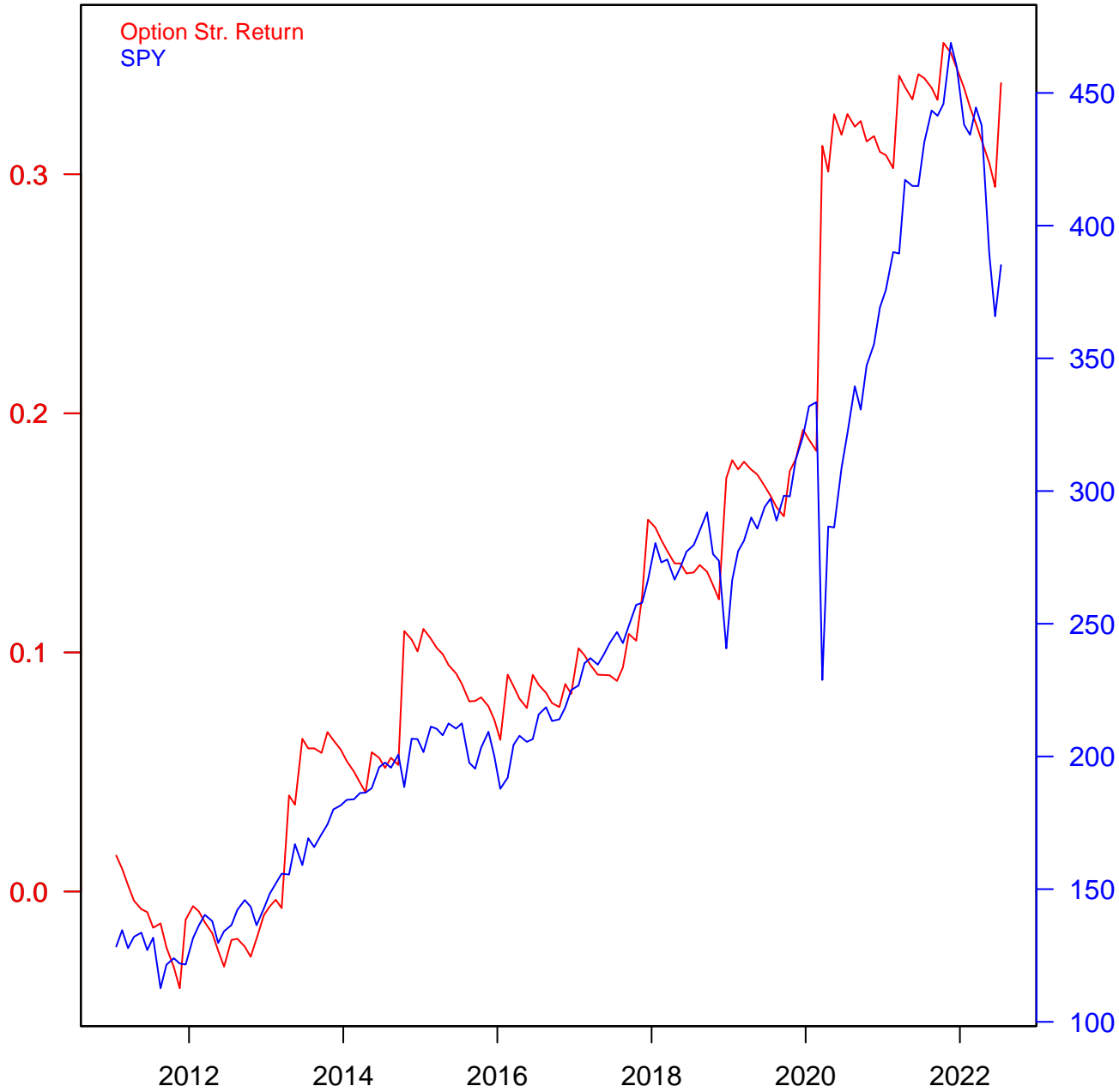
call_delta_0.1



call_delta_0.2

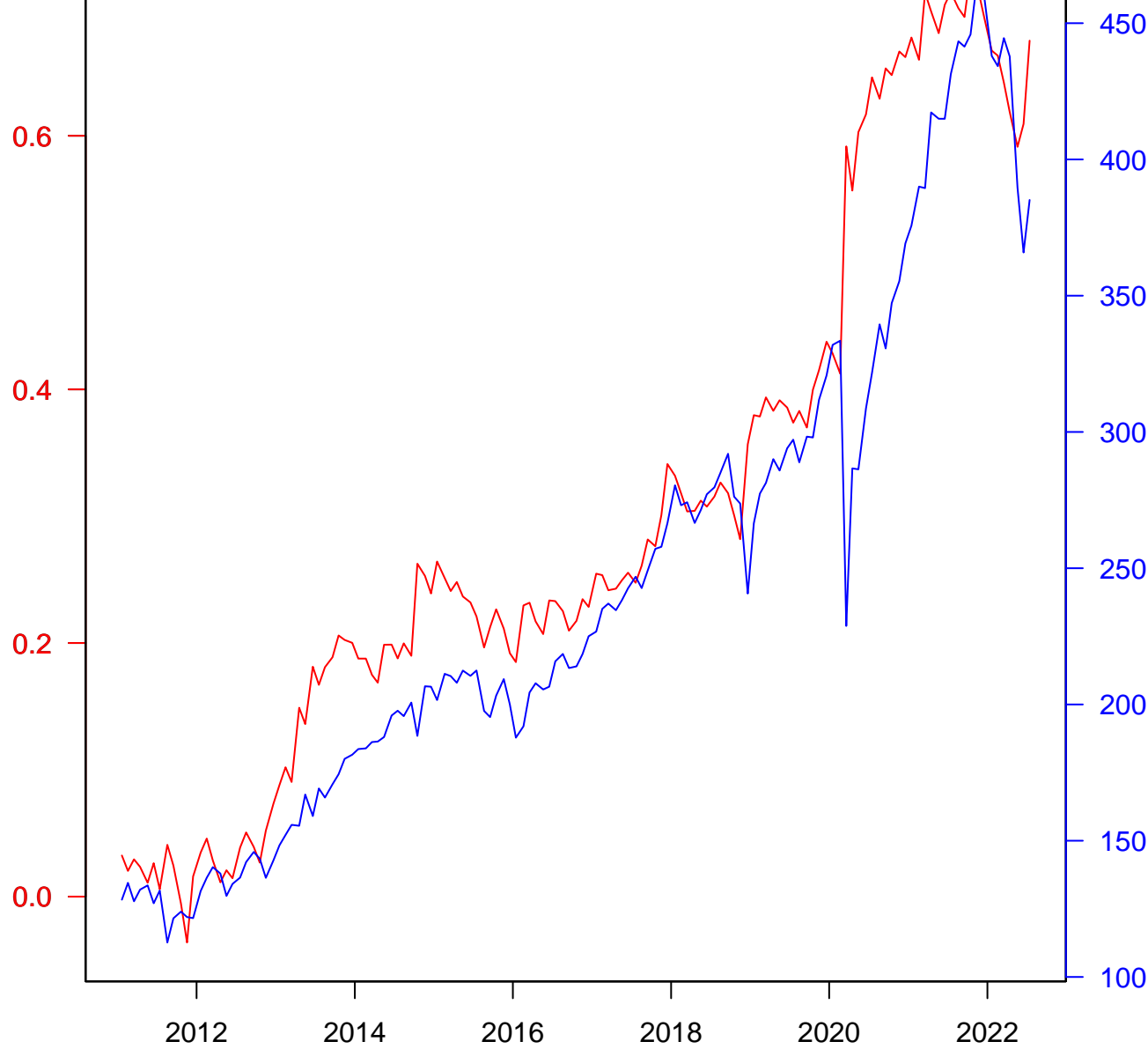


call_delta_0.25

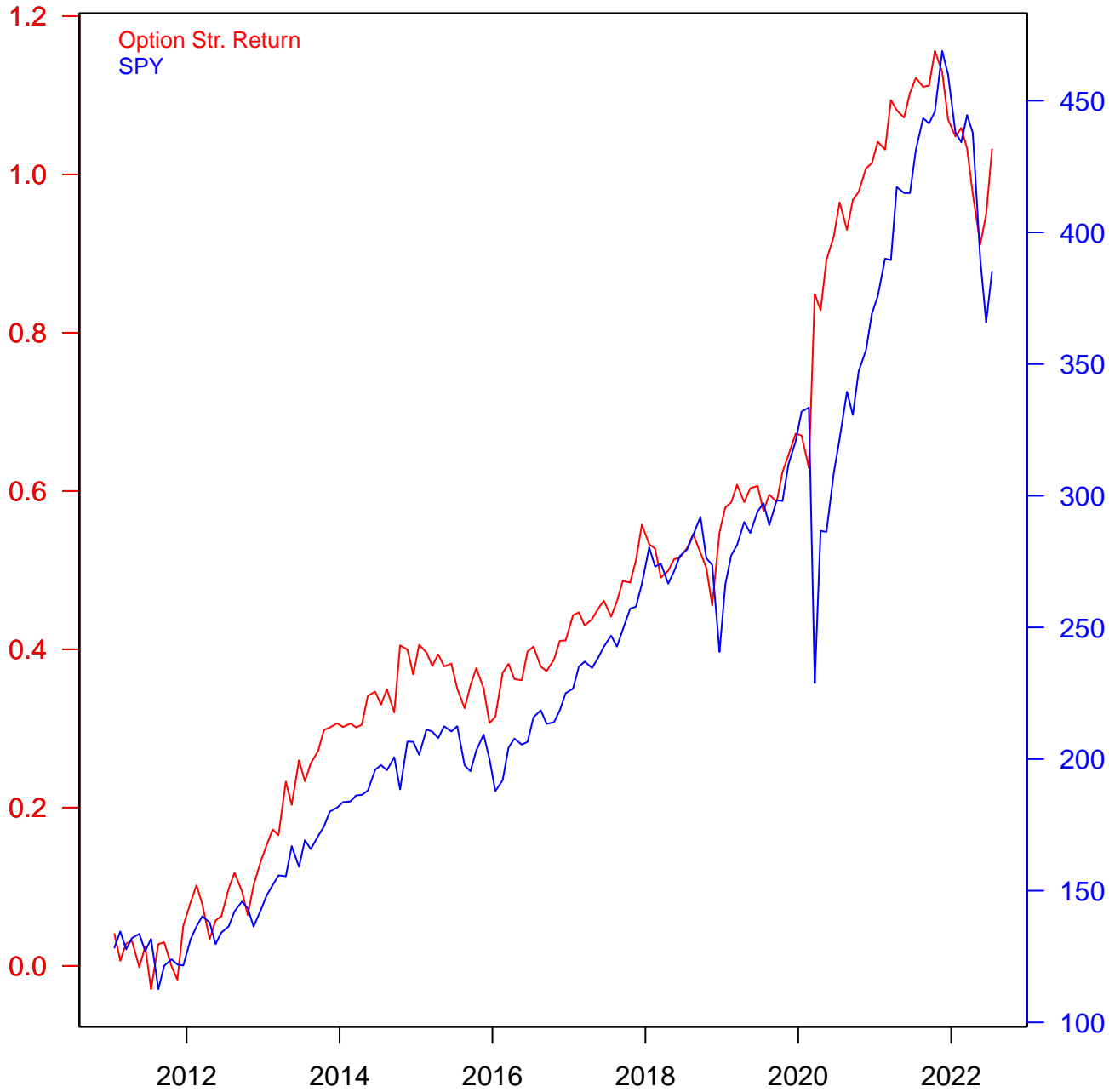


call_delta_0.5

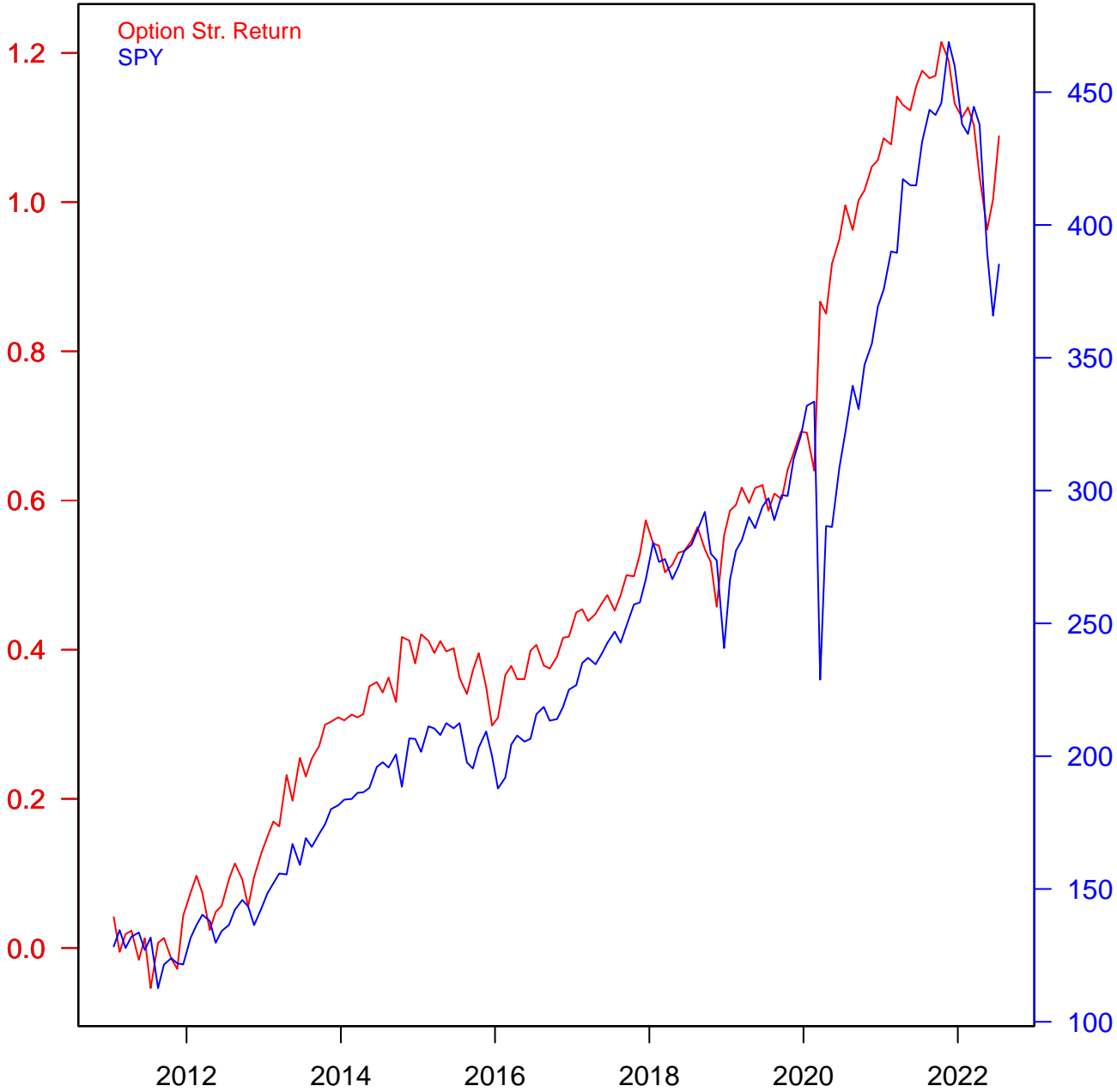
Option Str. Return
SPY



call_delta_0.75

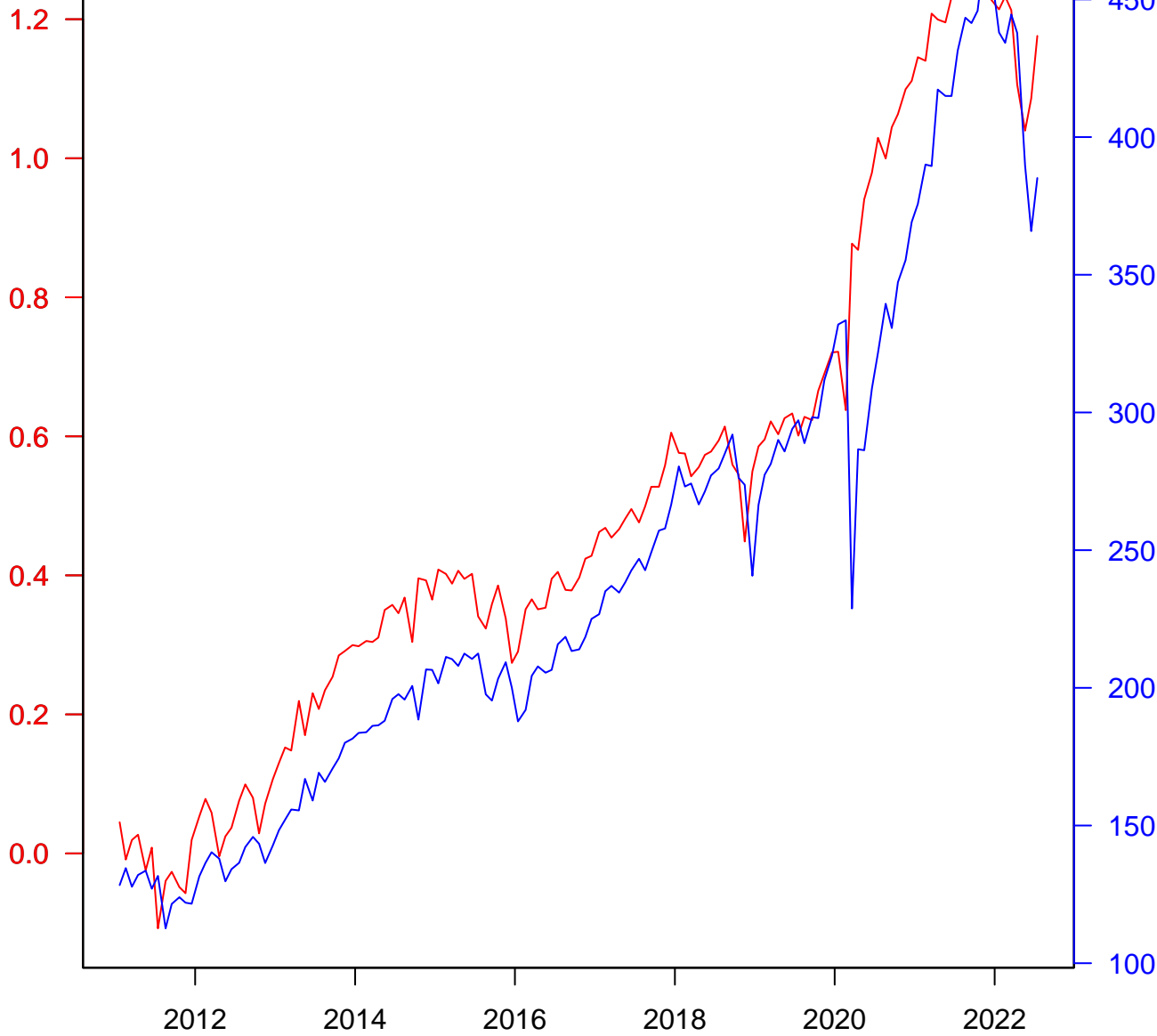


call_delta_0.8



call_delta_0.9

Option Str. Return
SPY



call_delta_0.95

Option Str. Return
SPY

1.0

0.5

0.0

2012

2014

2016

2018

2020

2022

450

400

350

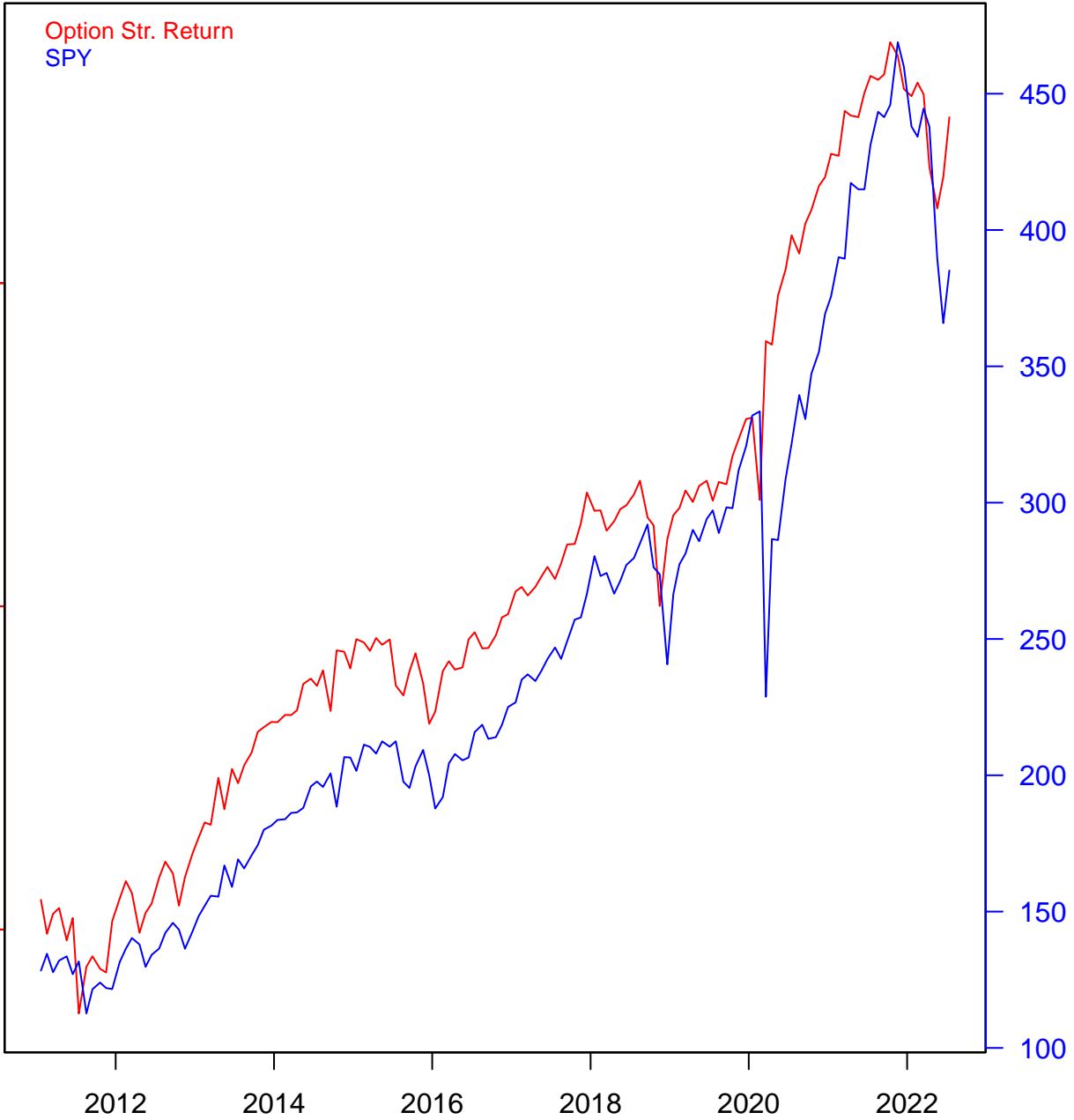
300

250

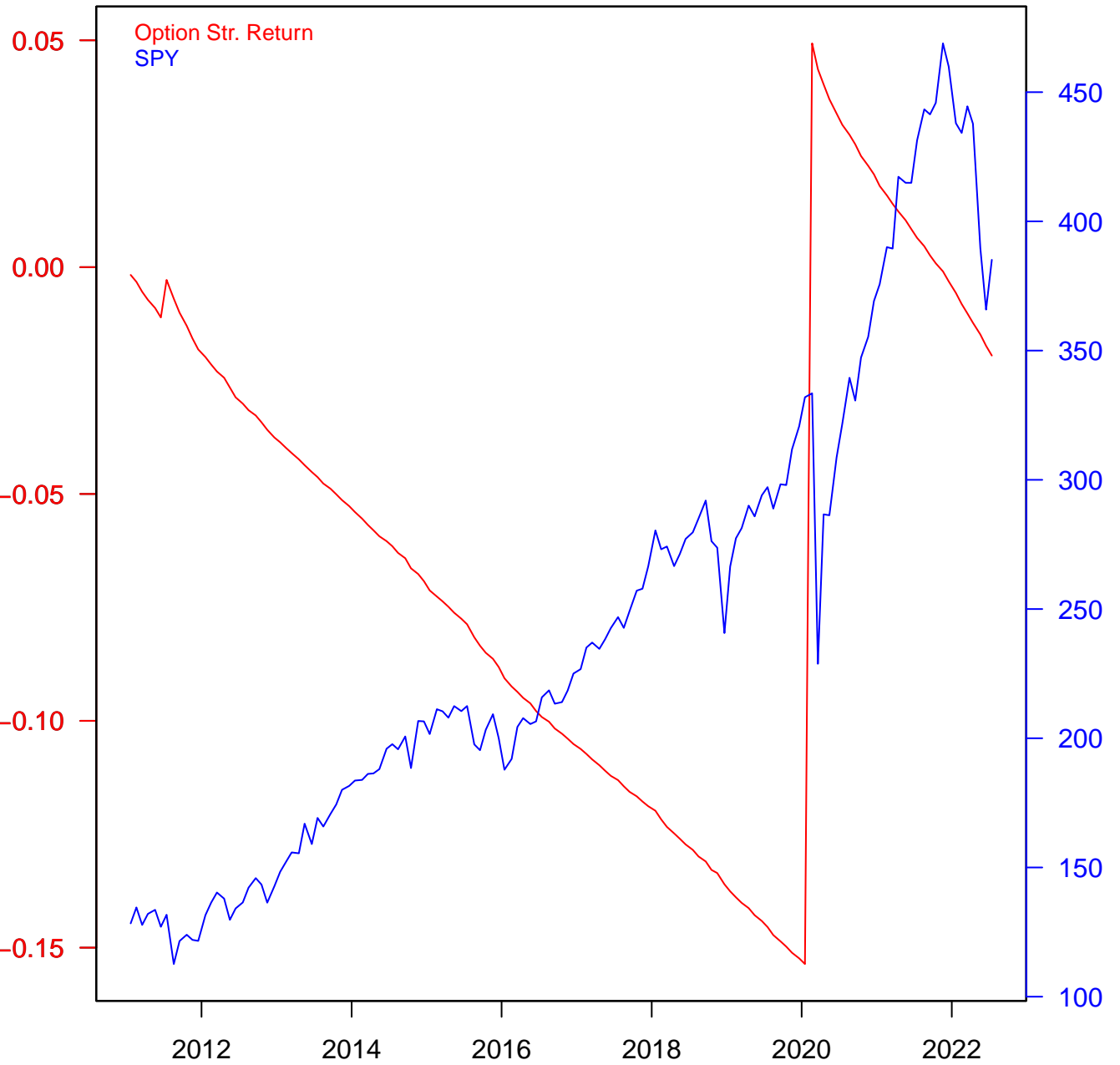
200

150

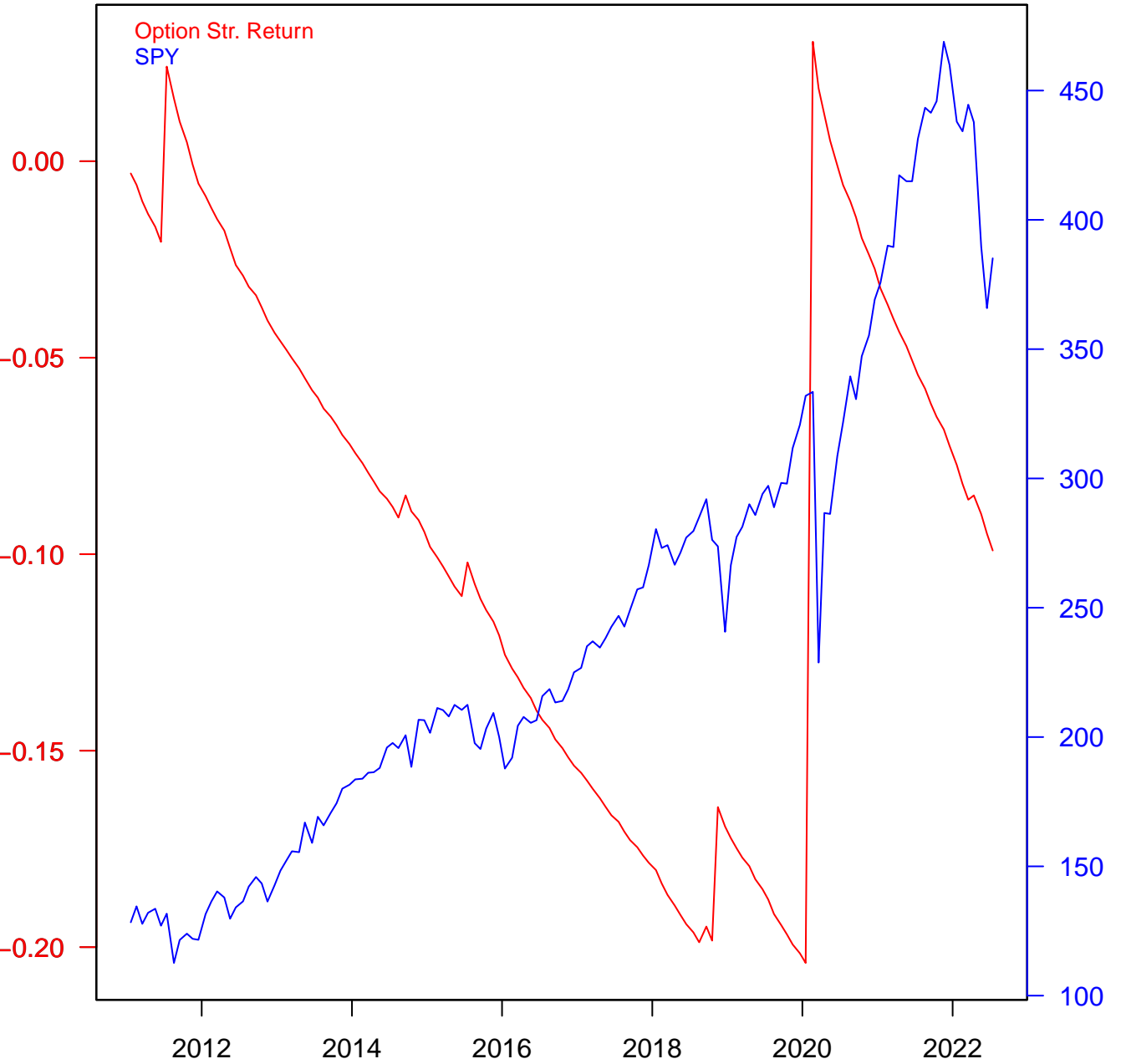
100



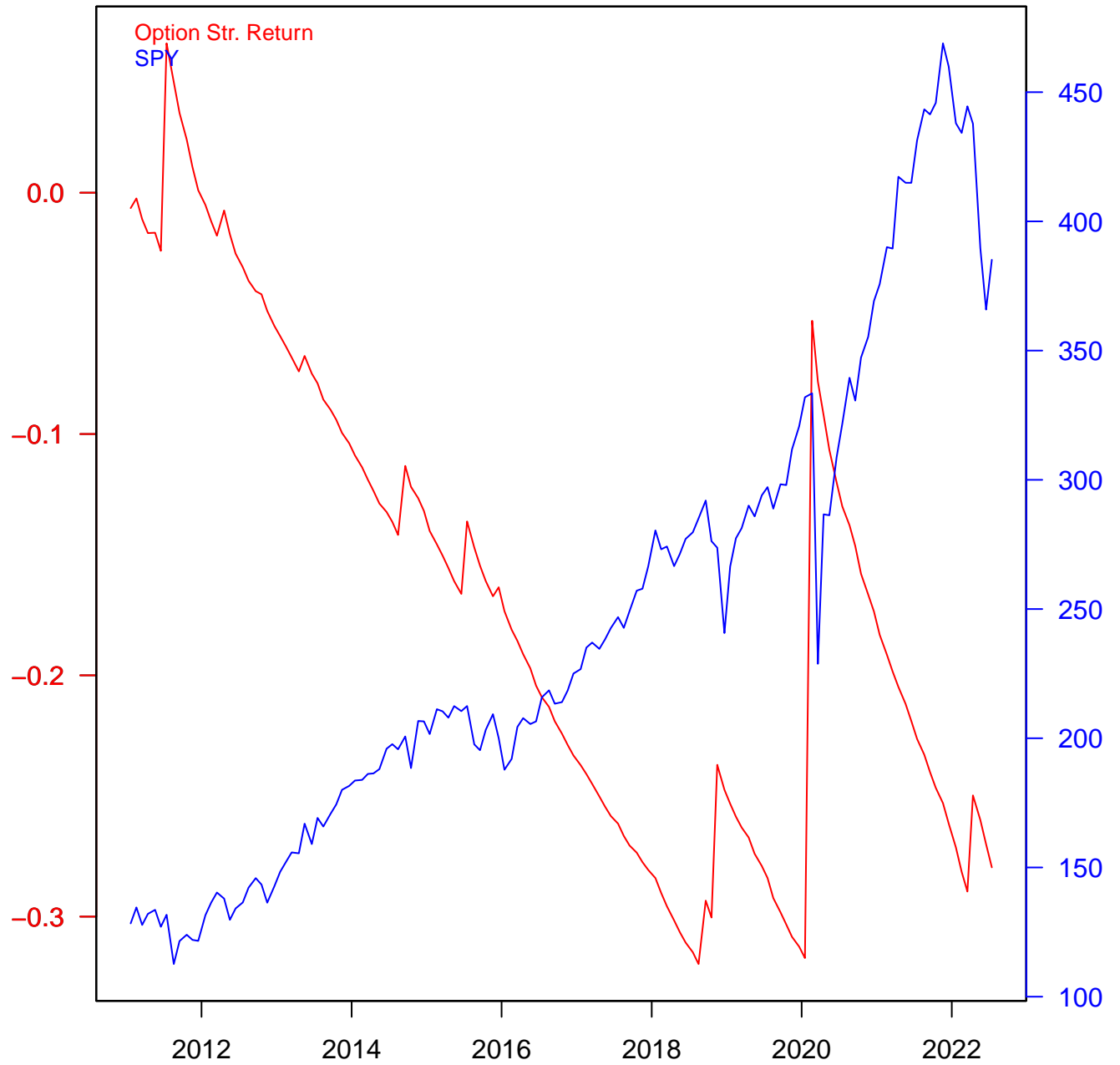
put_delta_0.05



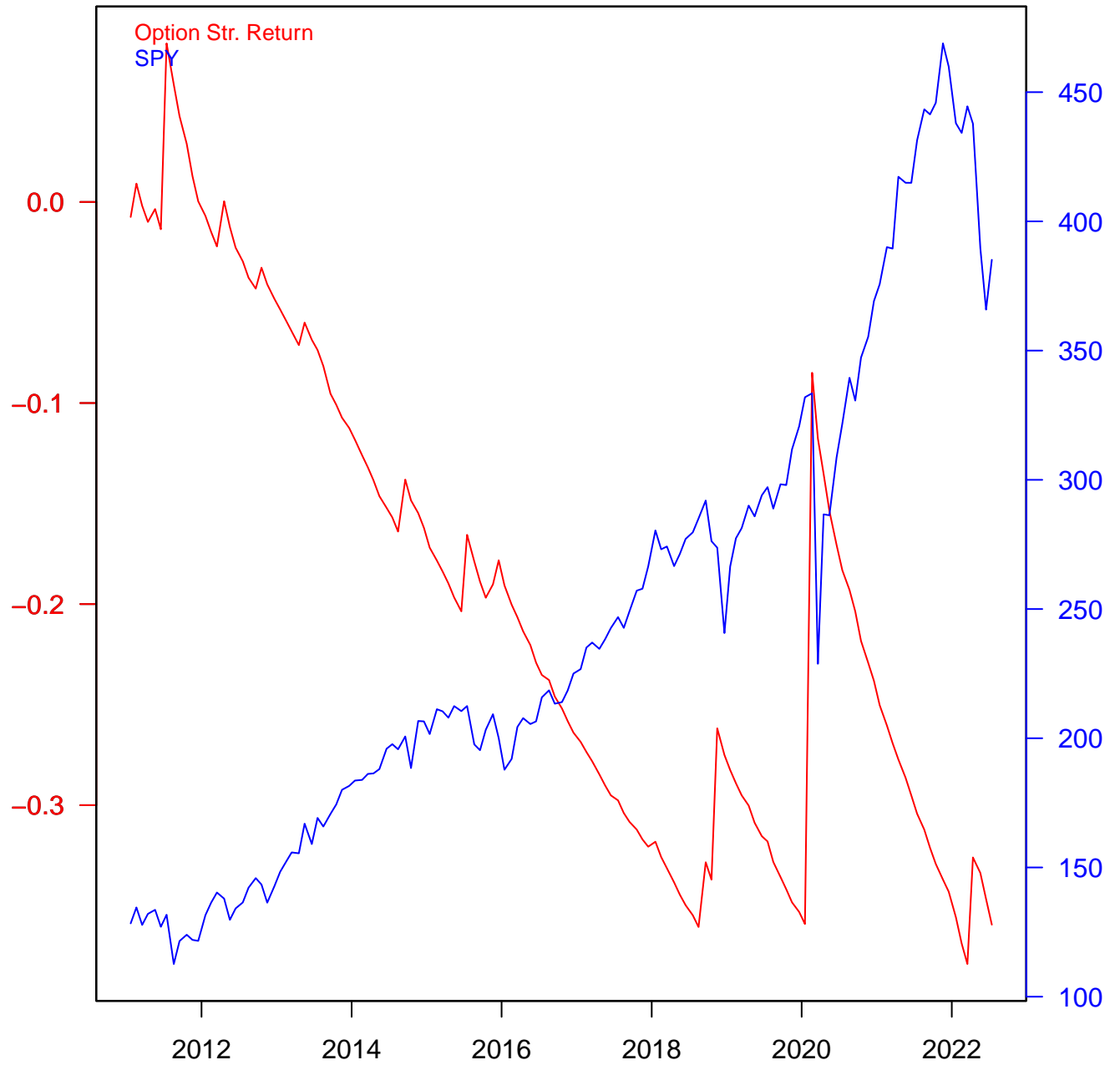
put_delta_0.1



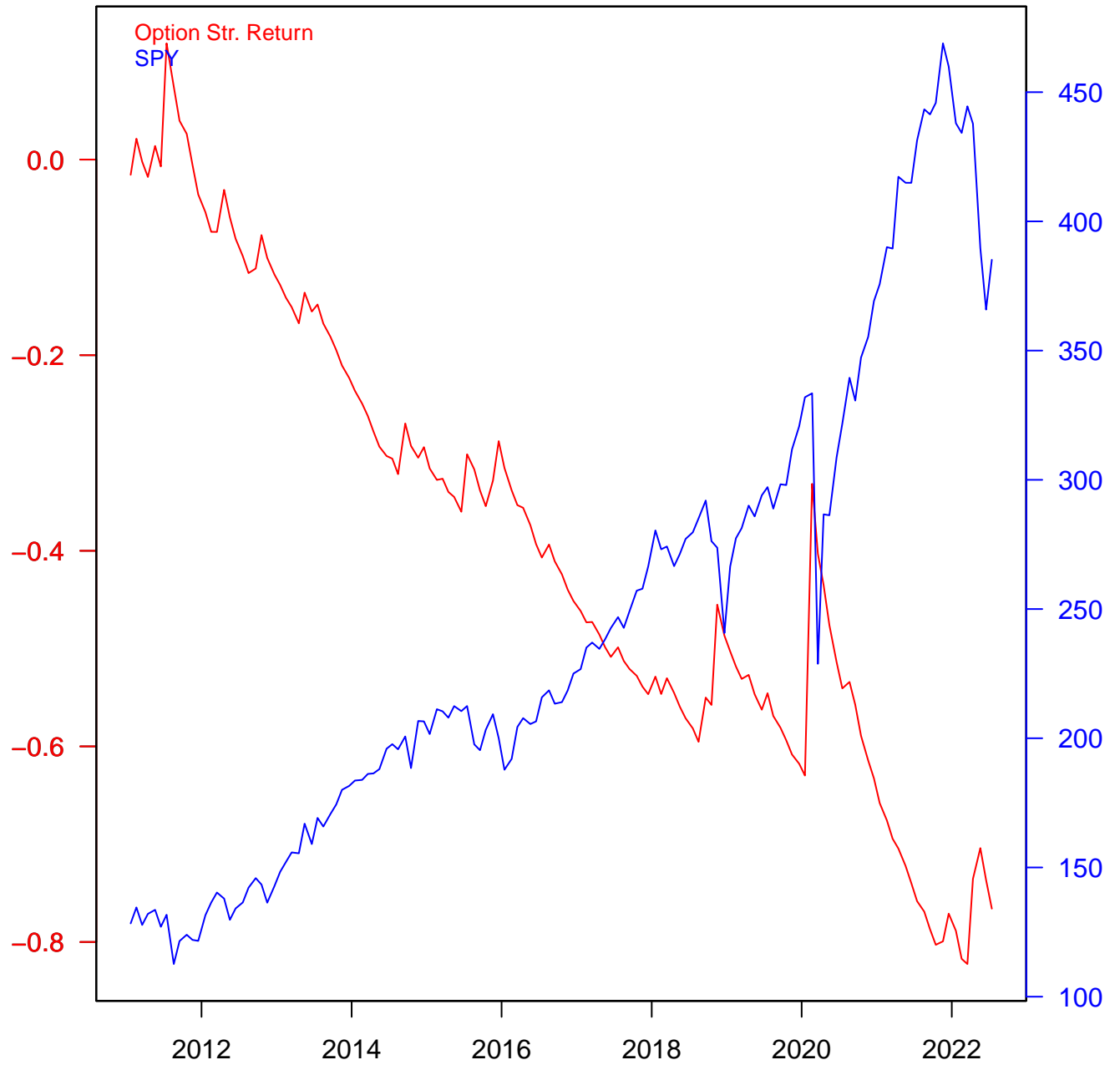
put_delta_0.2



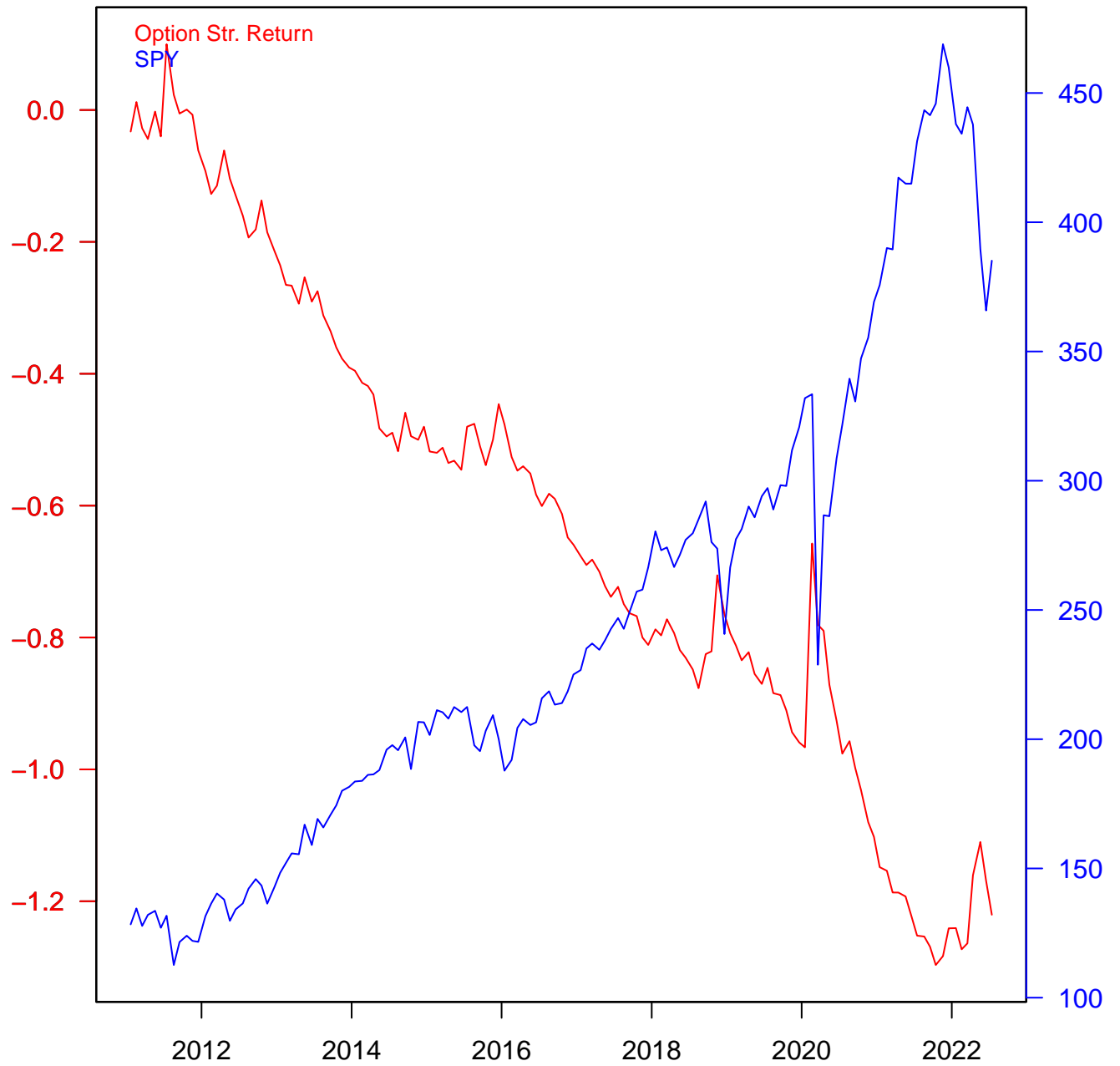
put_delta_0.25



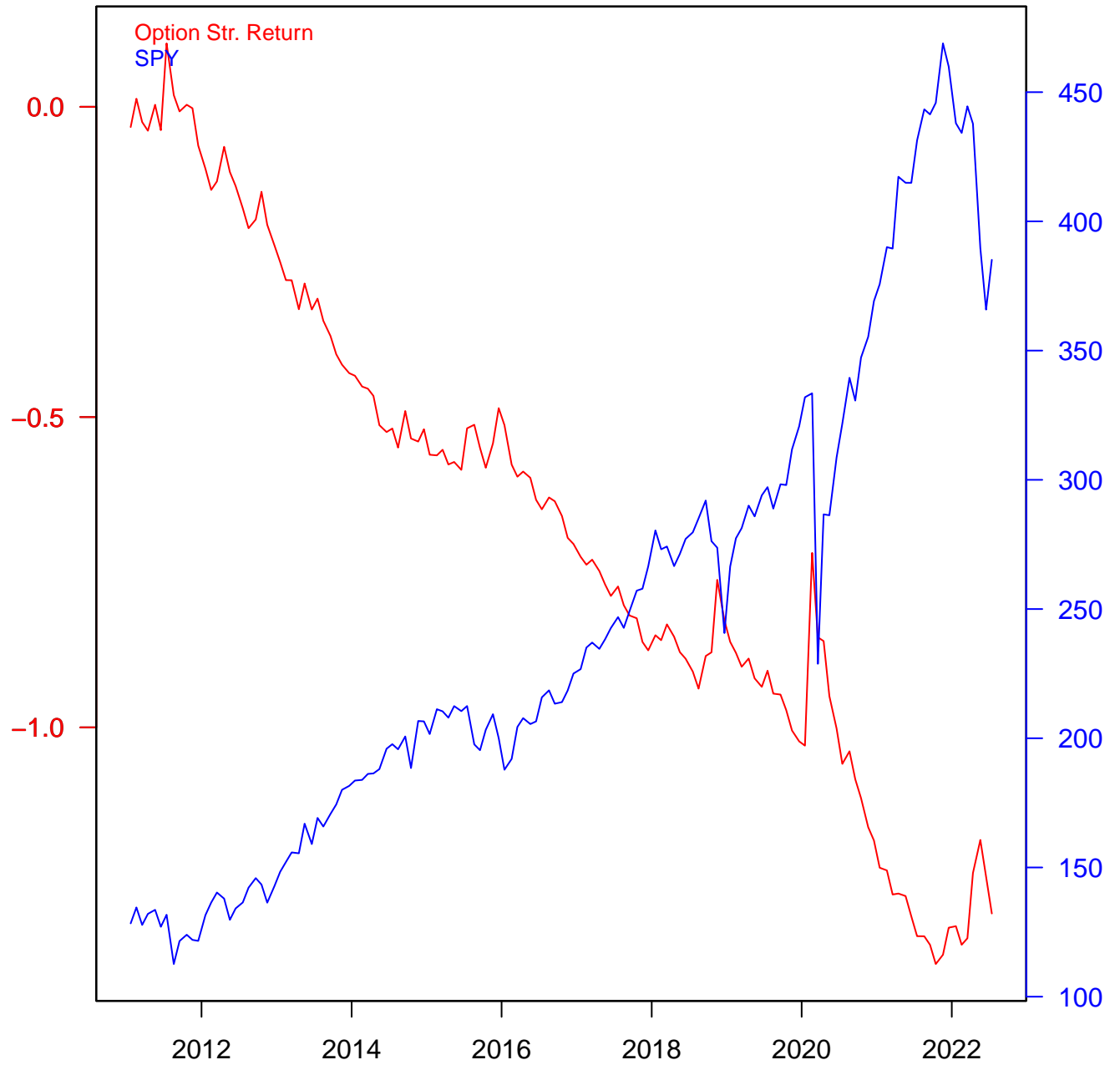
put_delta_0.5



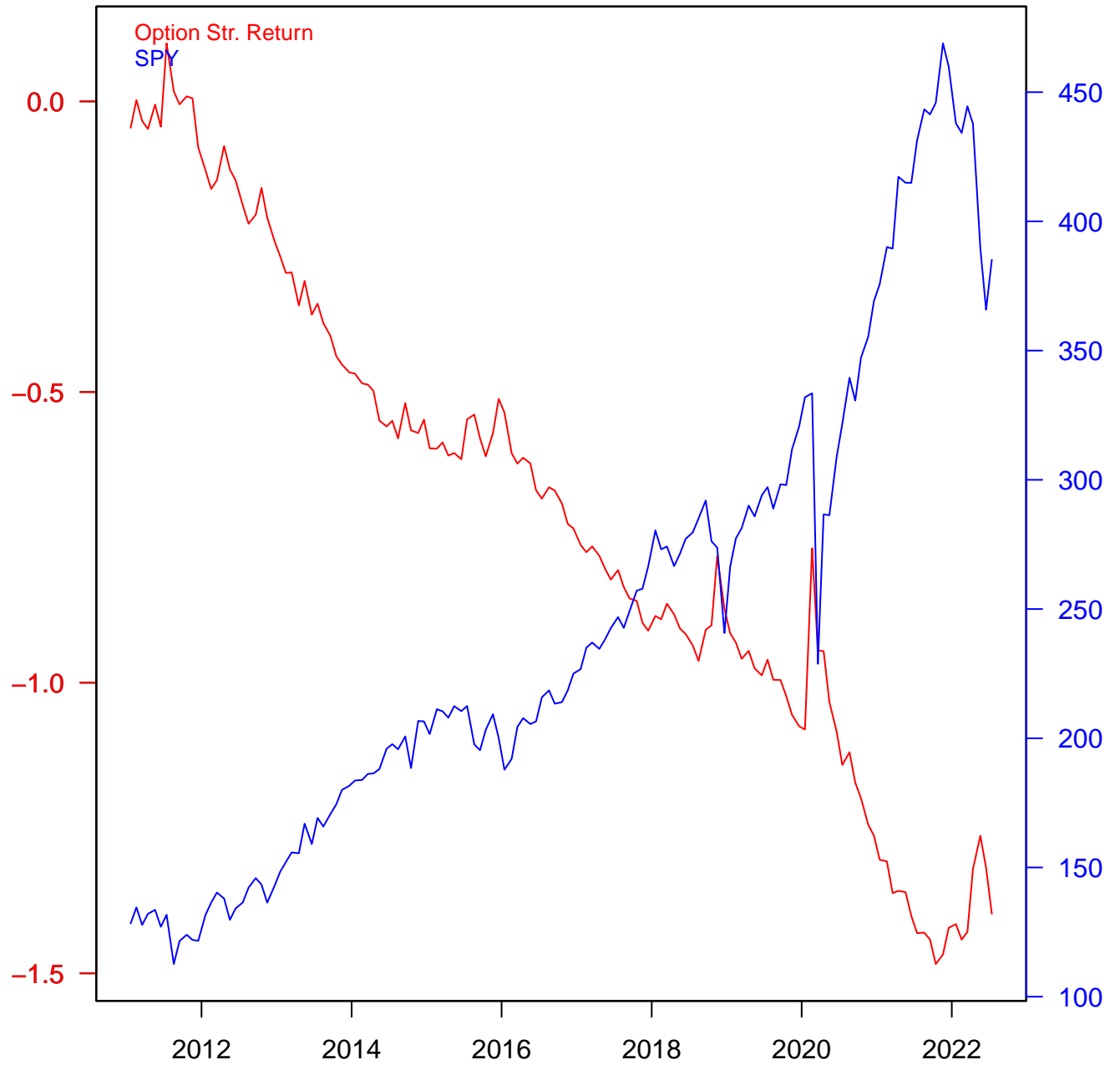
put_delta_0.75



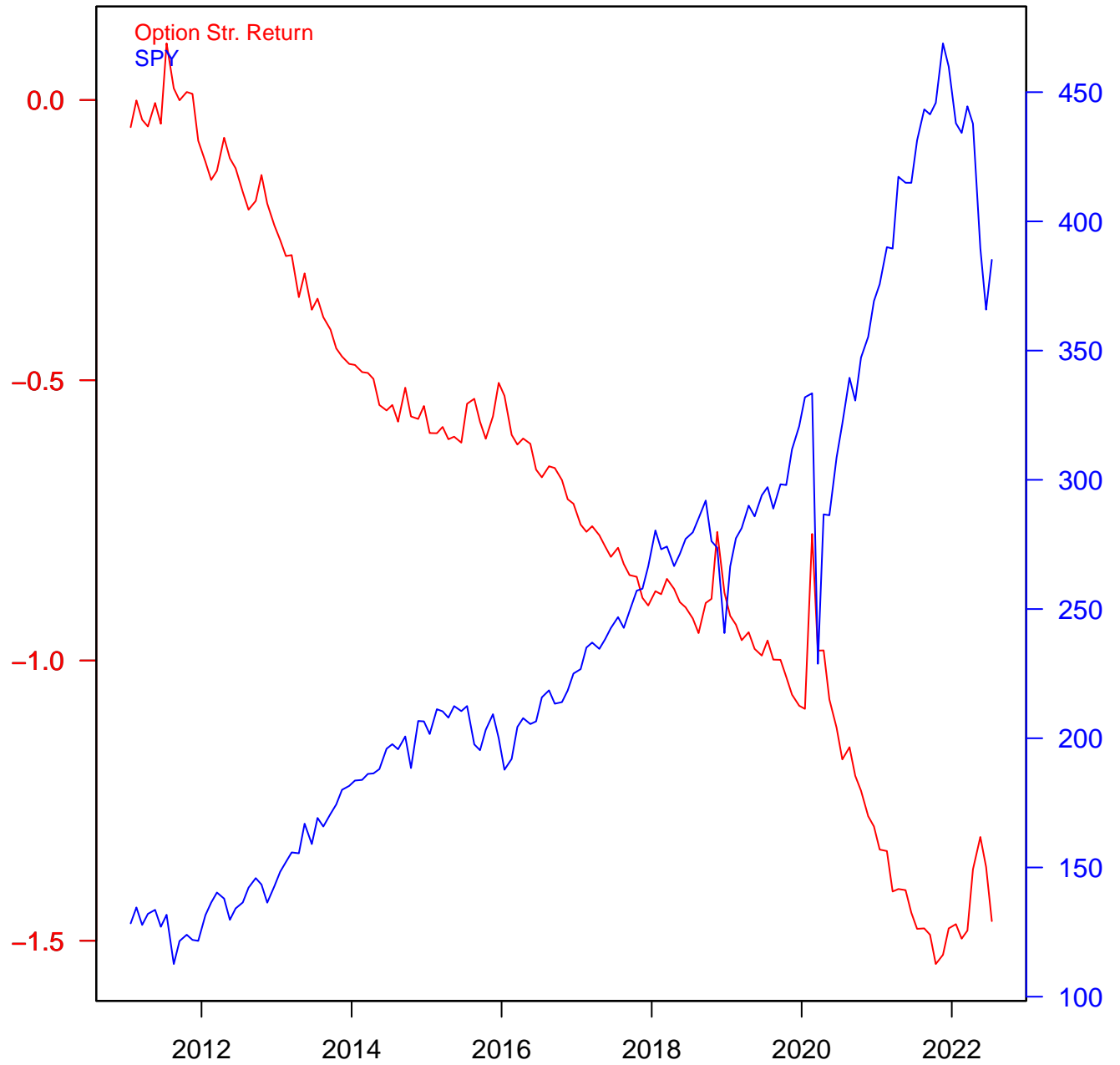
put_delta_0.8



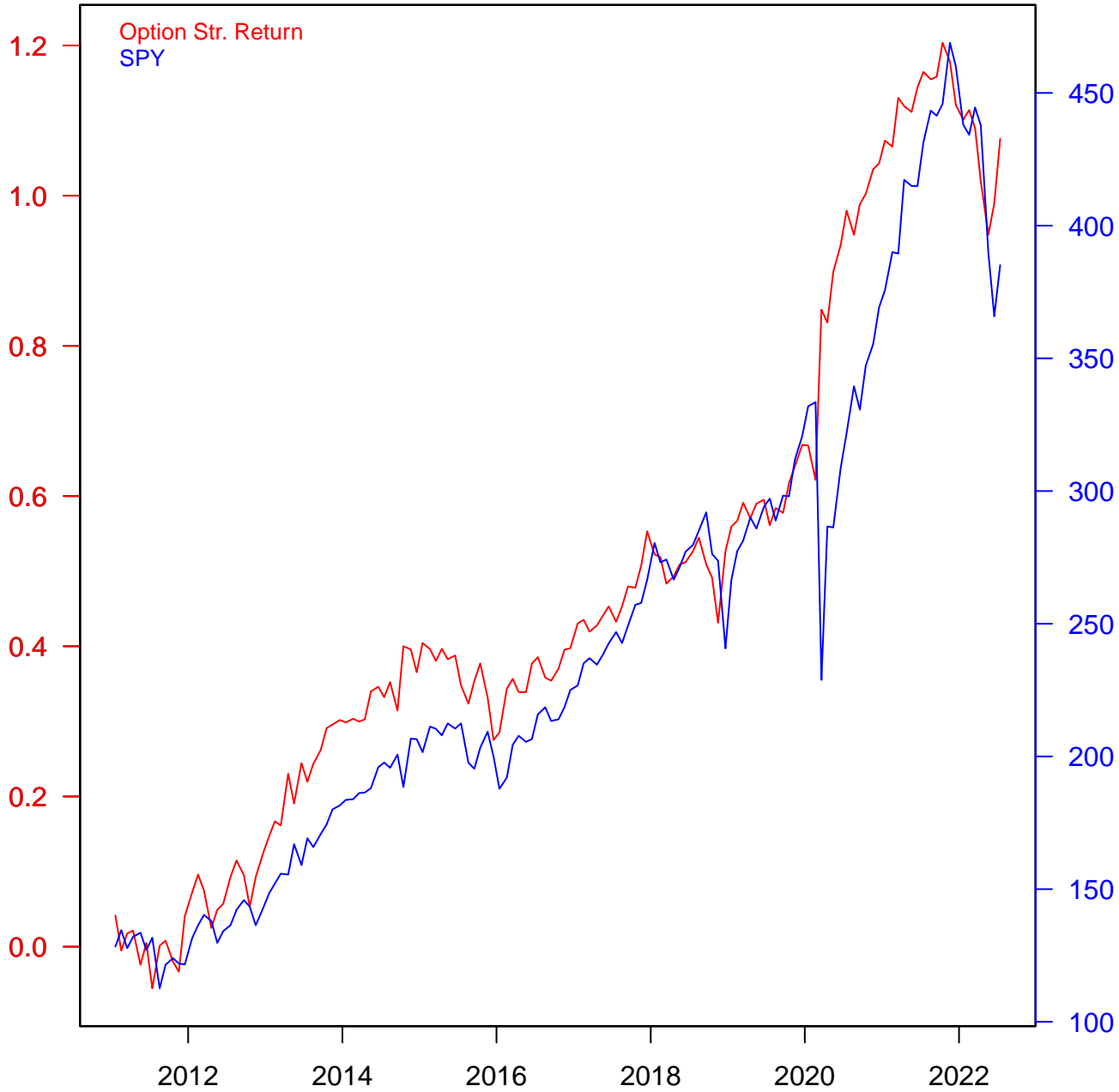
put_delta_0.9



put_delta_0.95

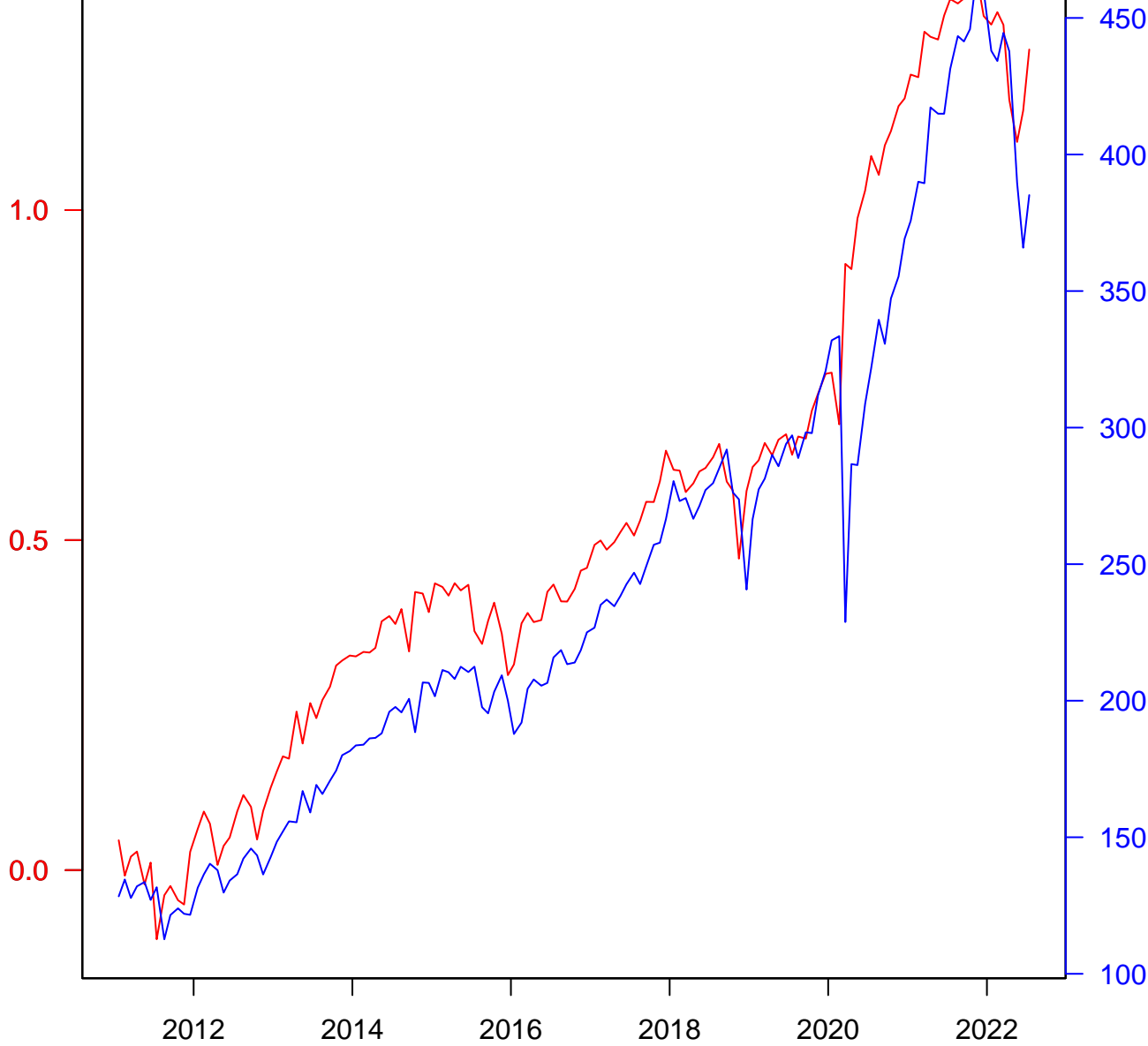


call_moneyness_-1



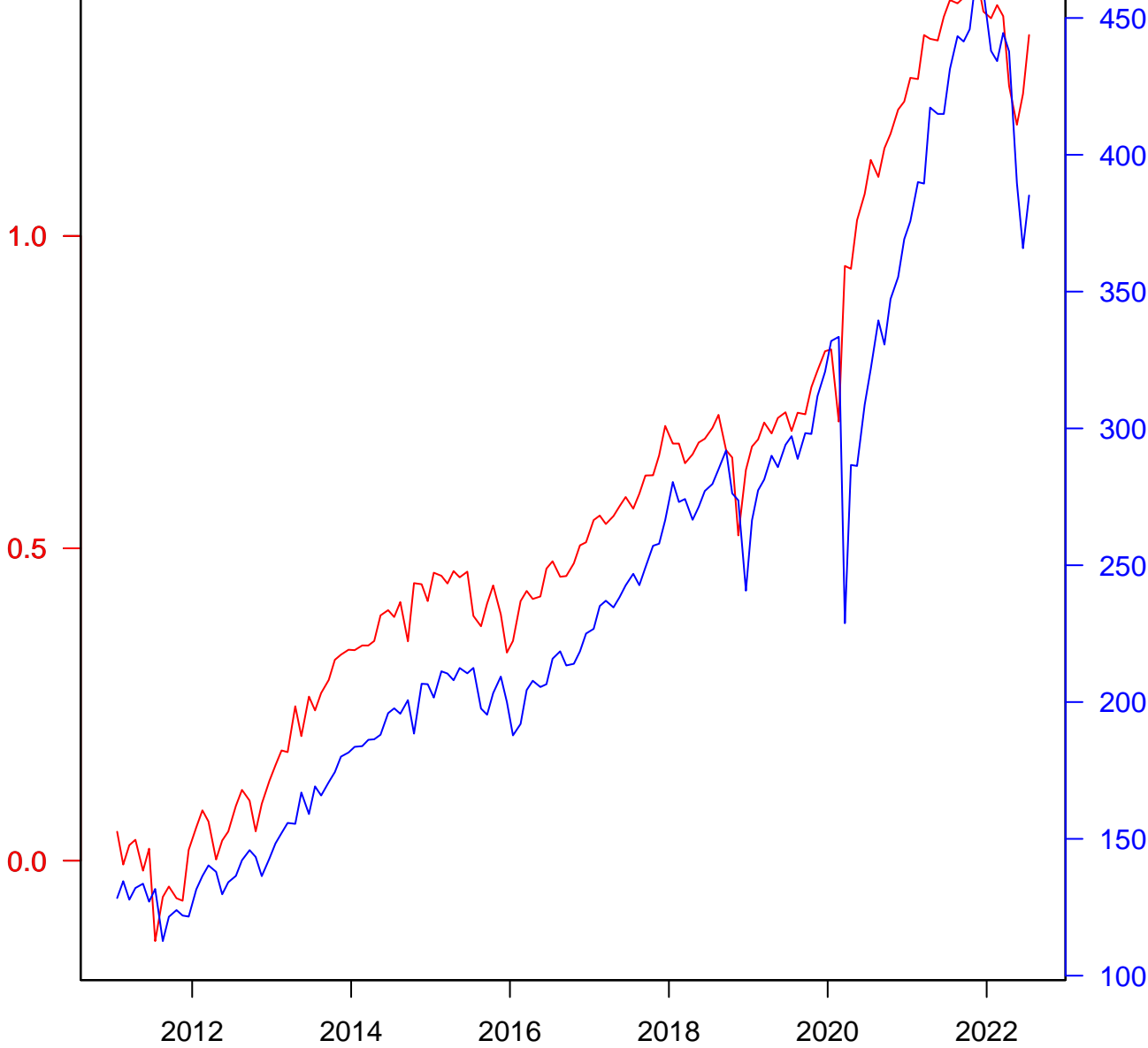
call_moneyness_-2

Option Str. Return
SPY

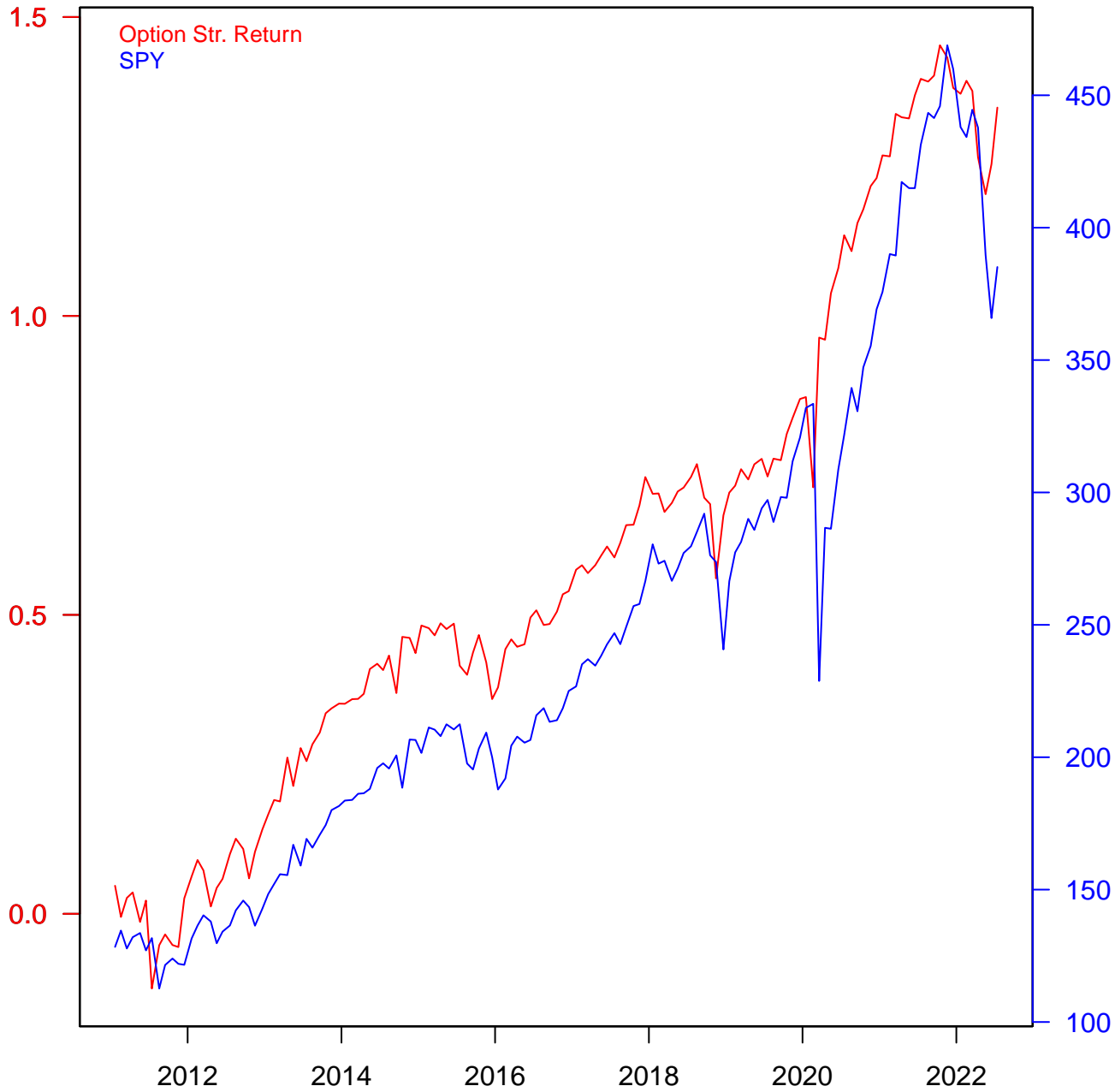


call_moneyness_-3

Option Str. Return
SPY

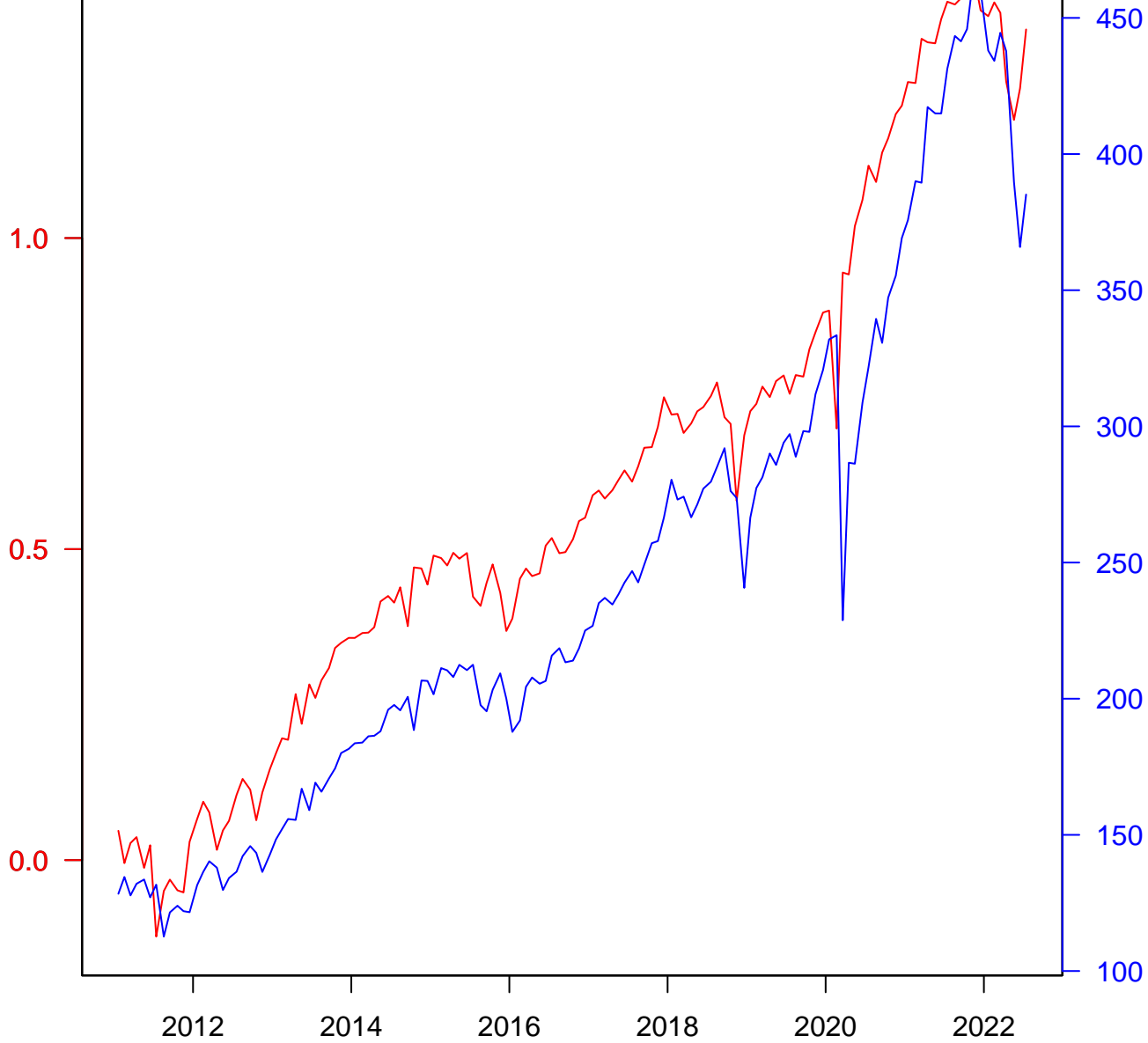


call_moneyness_-4



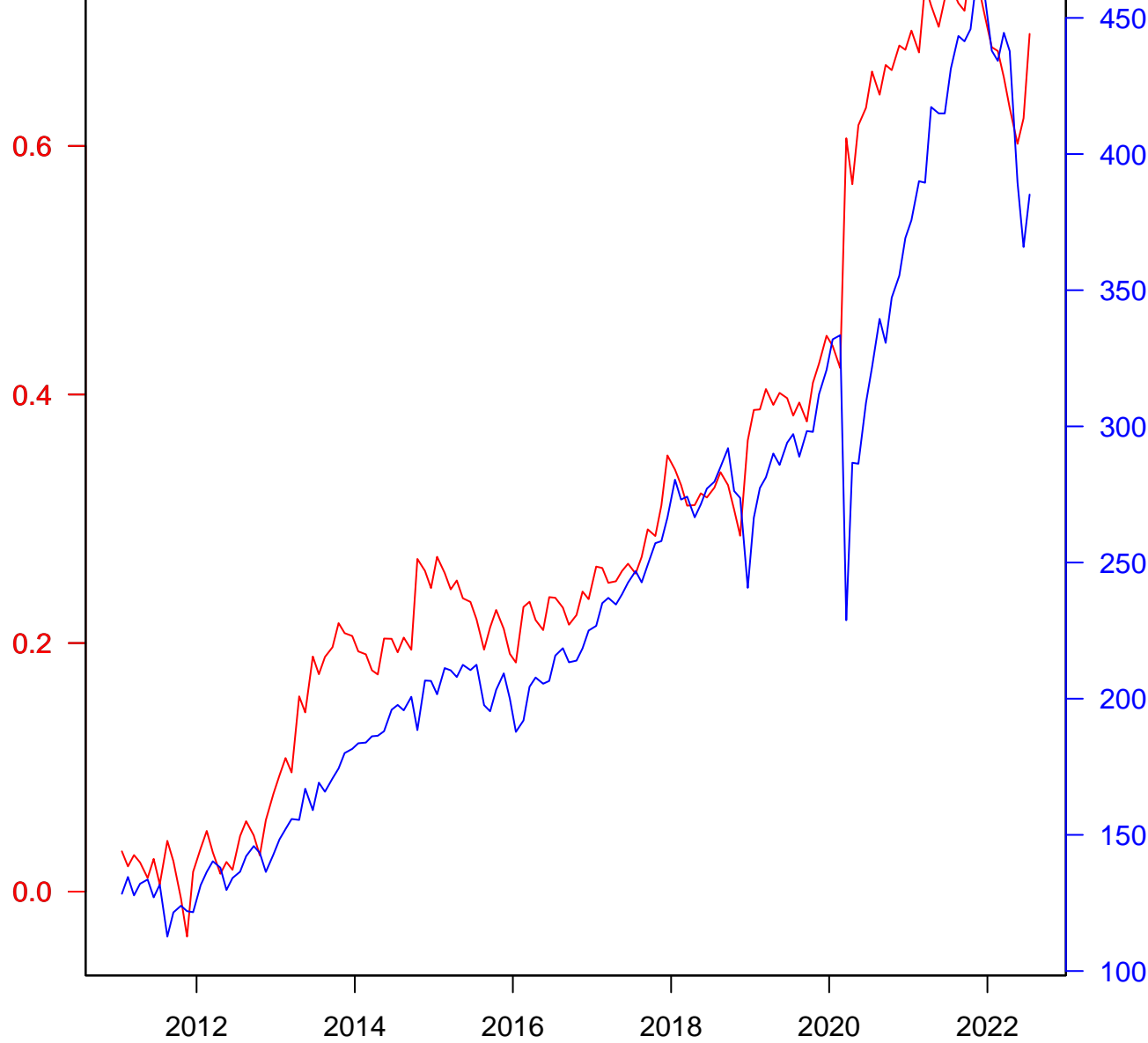
call_moneyness_-5

Option Str. Return
SPY

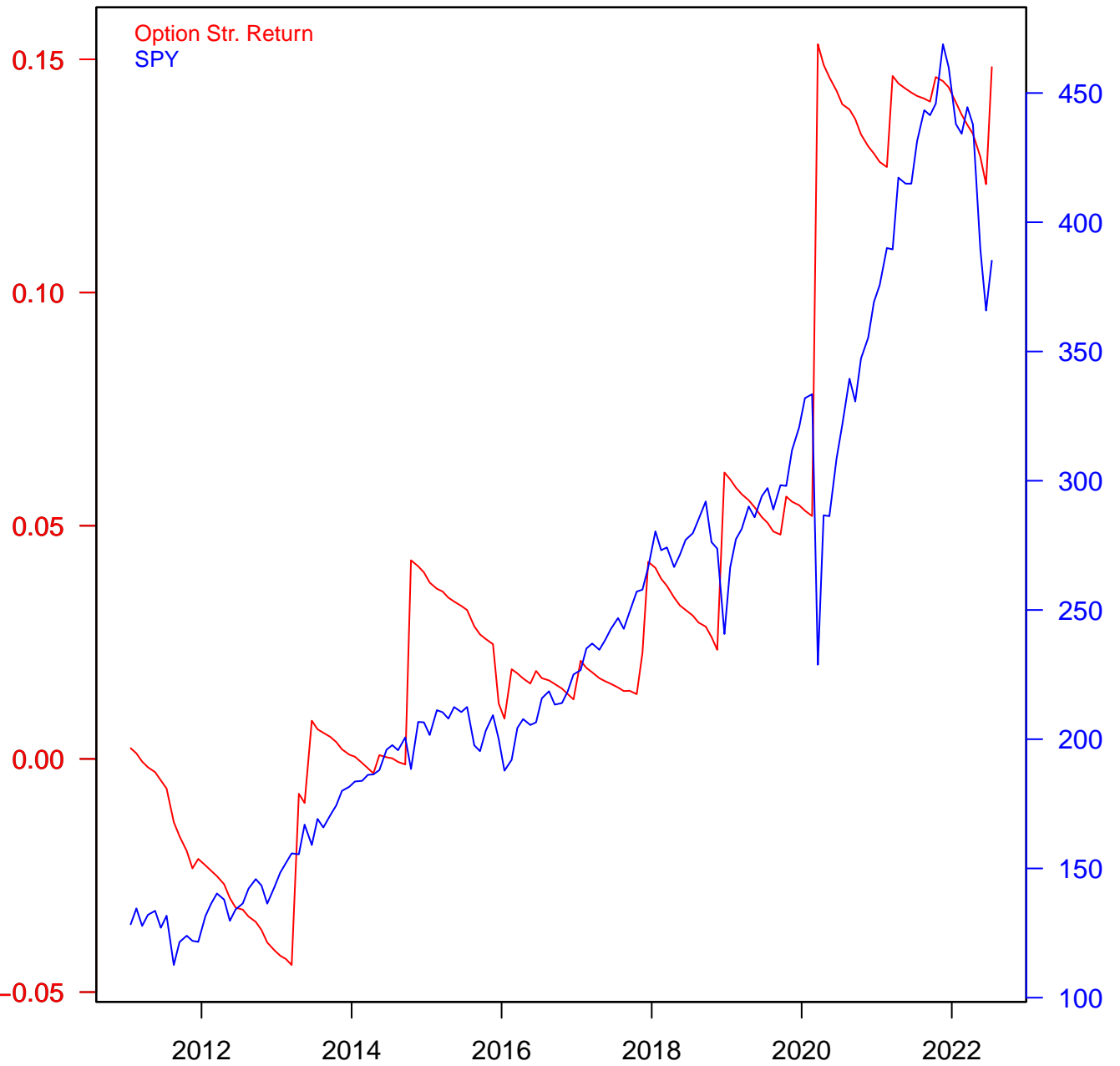


call_moneyness_0

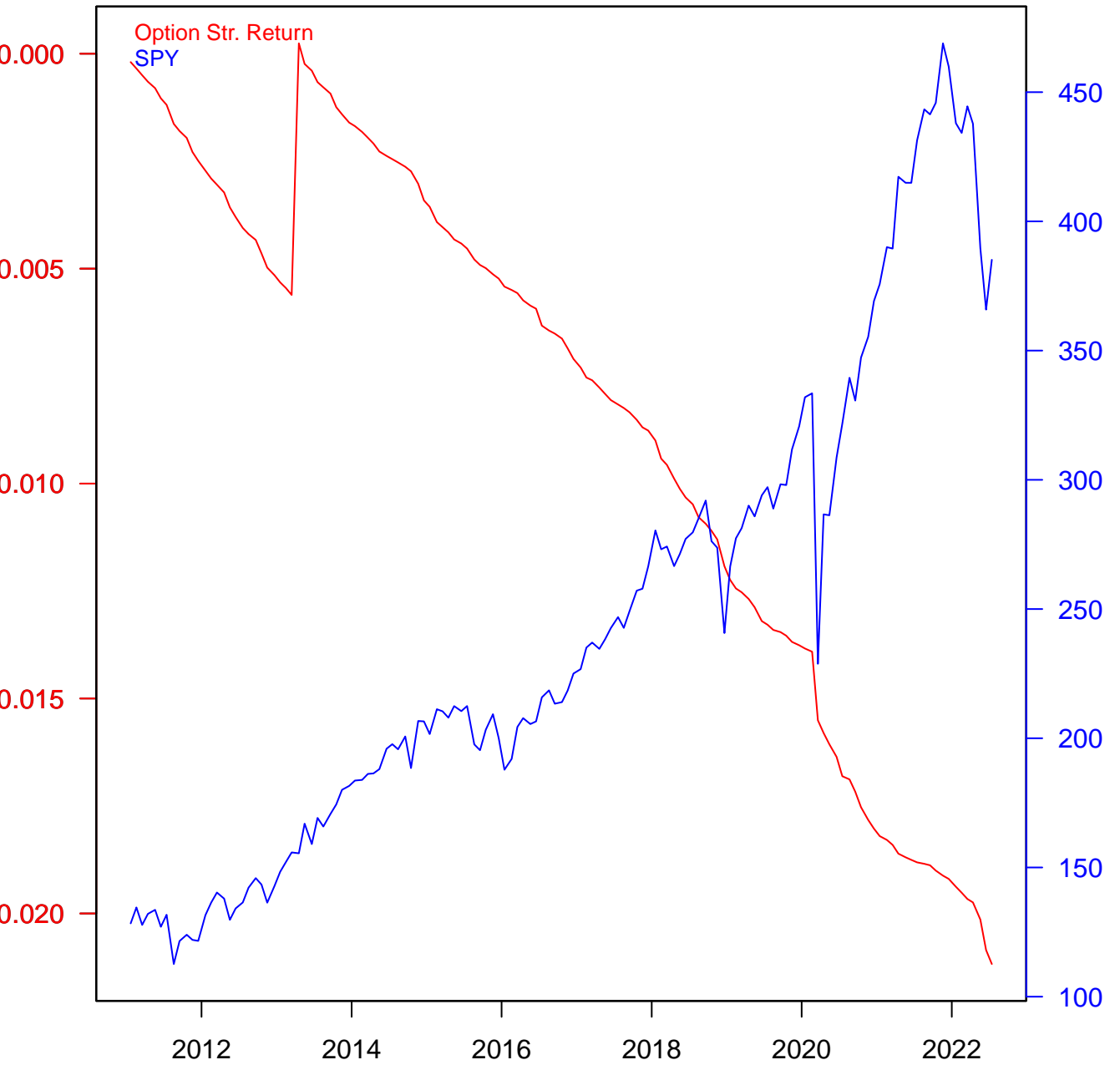
Option Str. Return
SPY



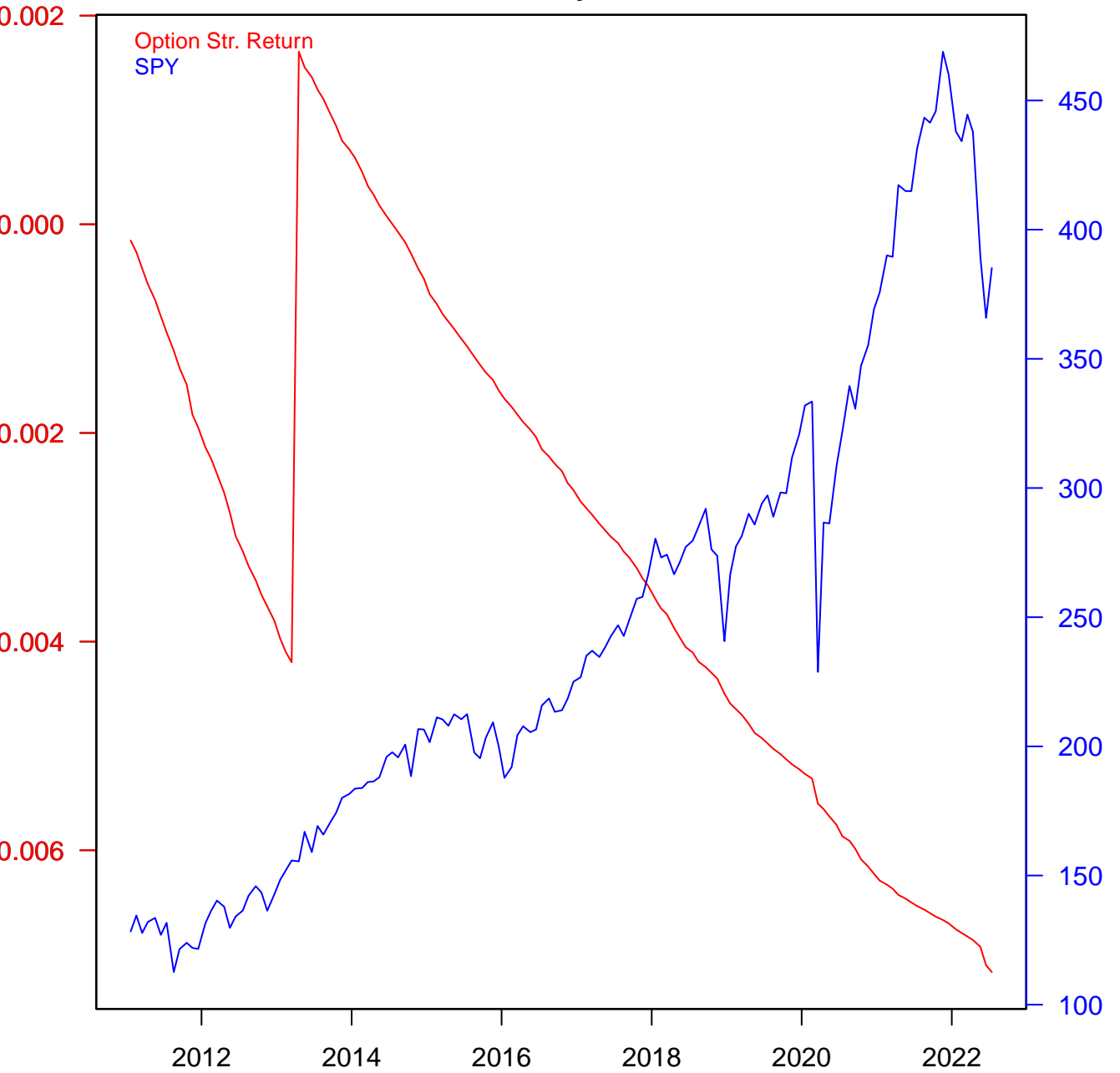
call_moneyness_1



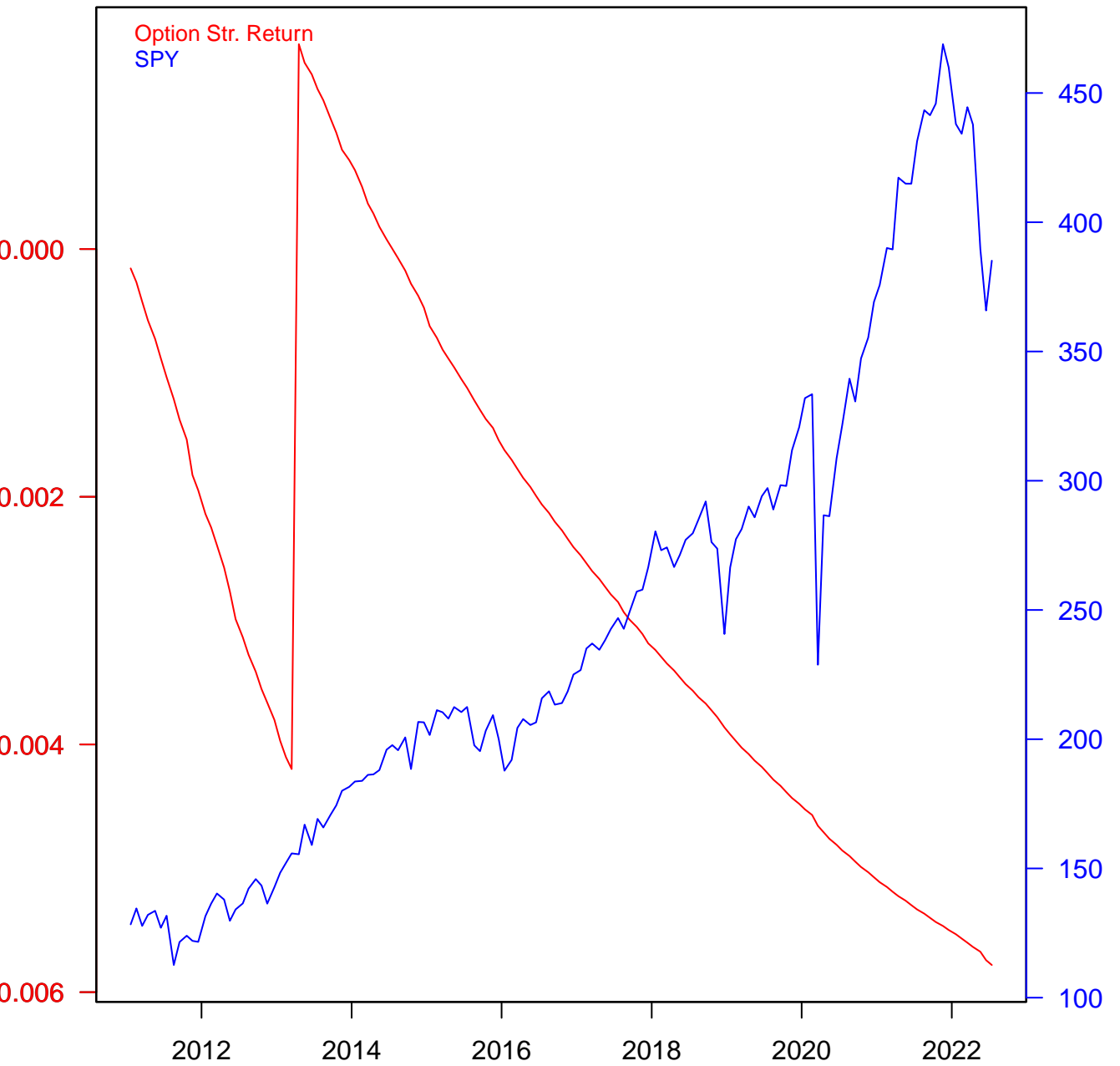
call_moneyness_2



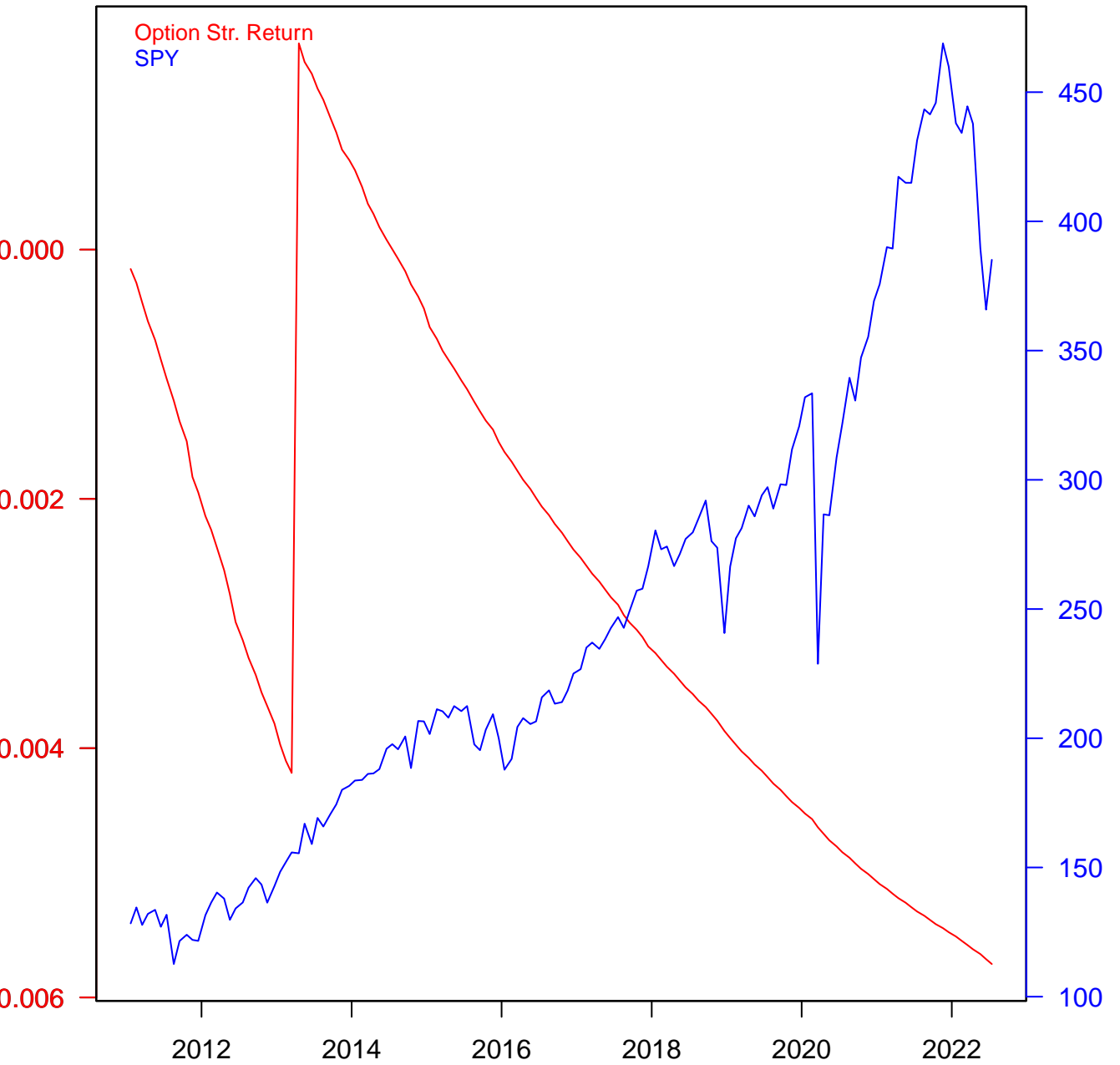
call_moneyness_3



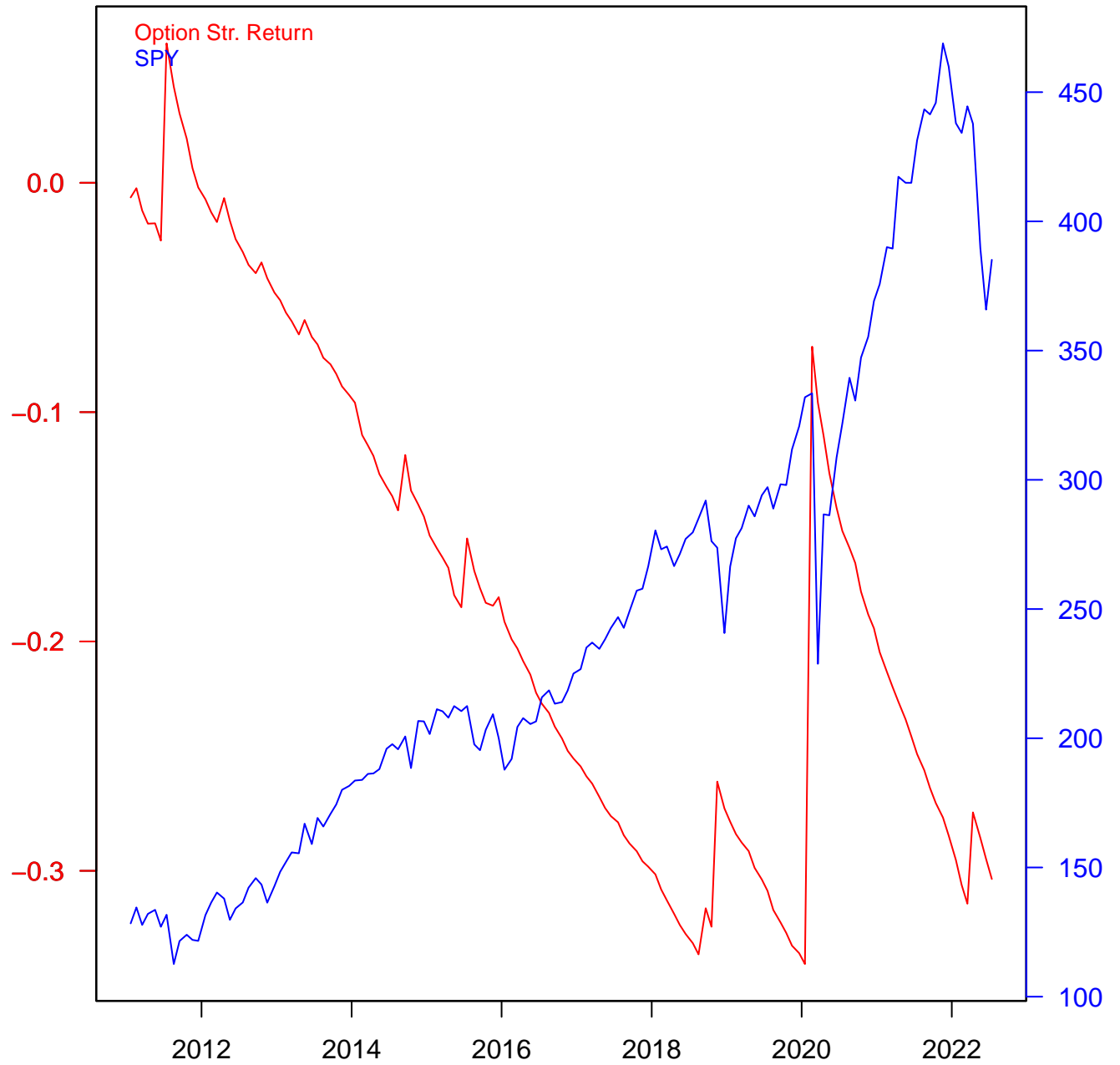
call_moneyness_4



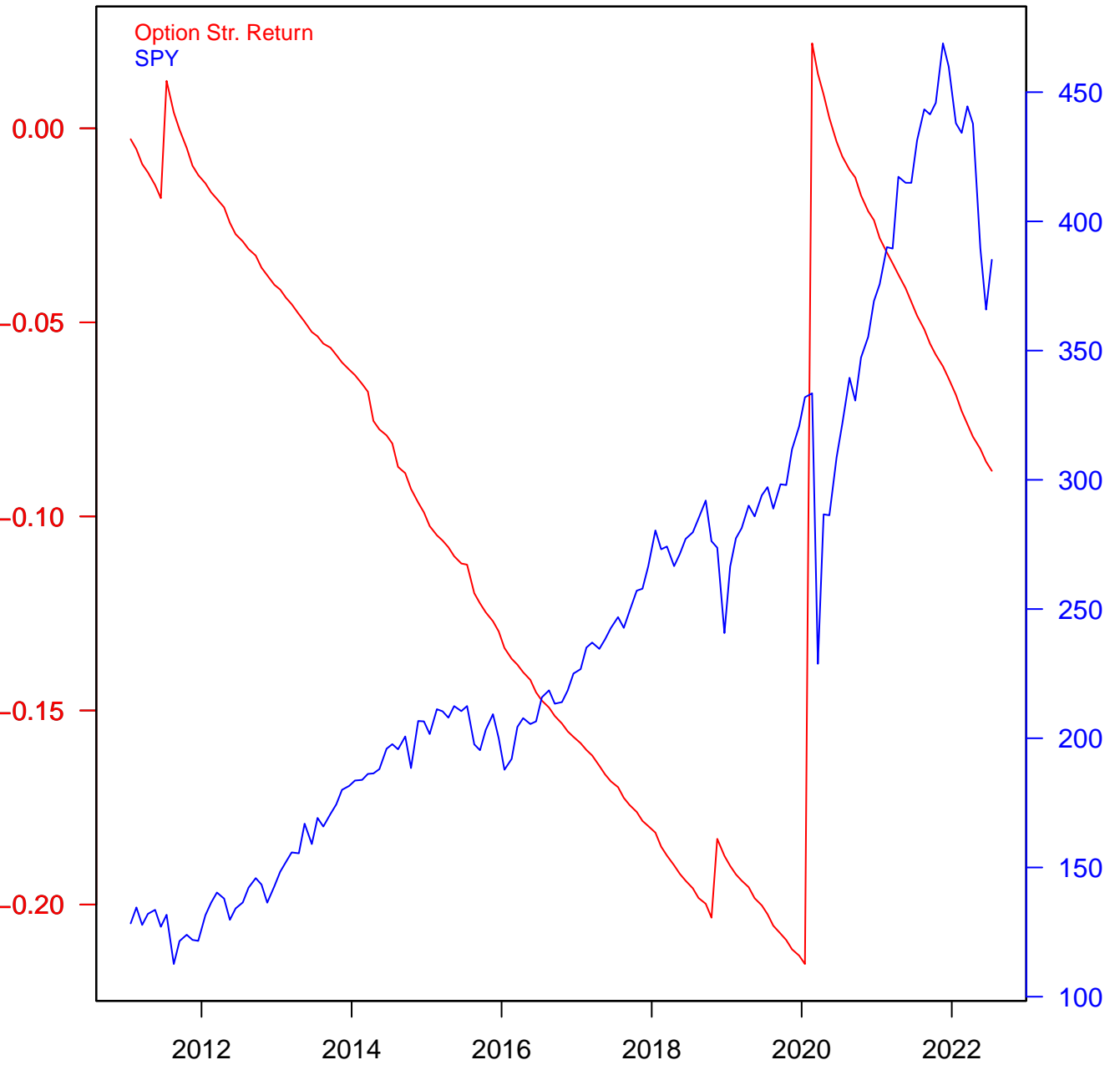
call_moneyness_5



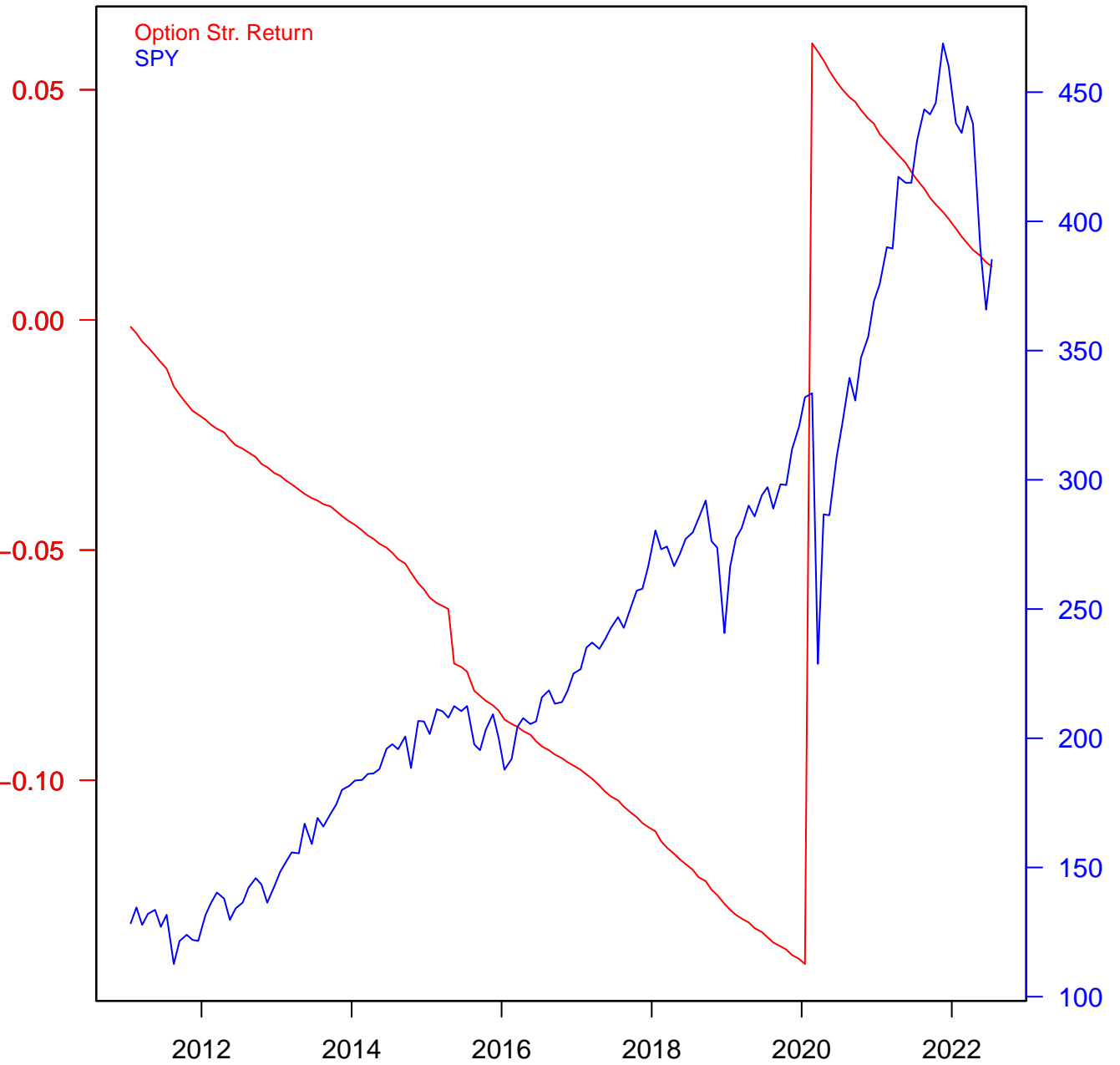
put_moneyness_-1



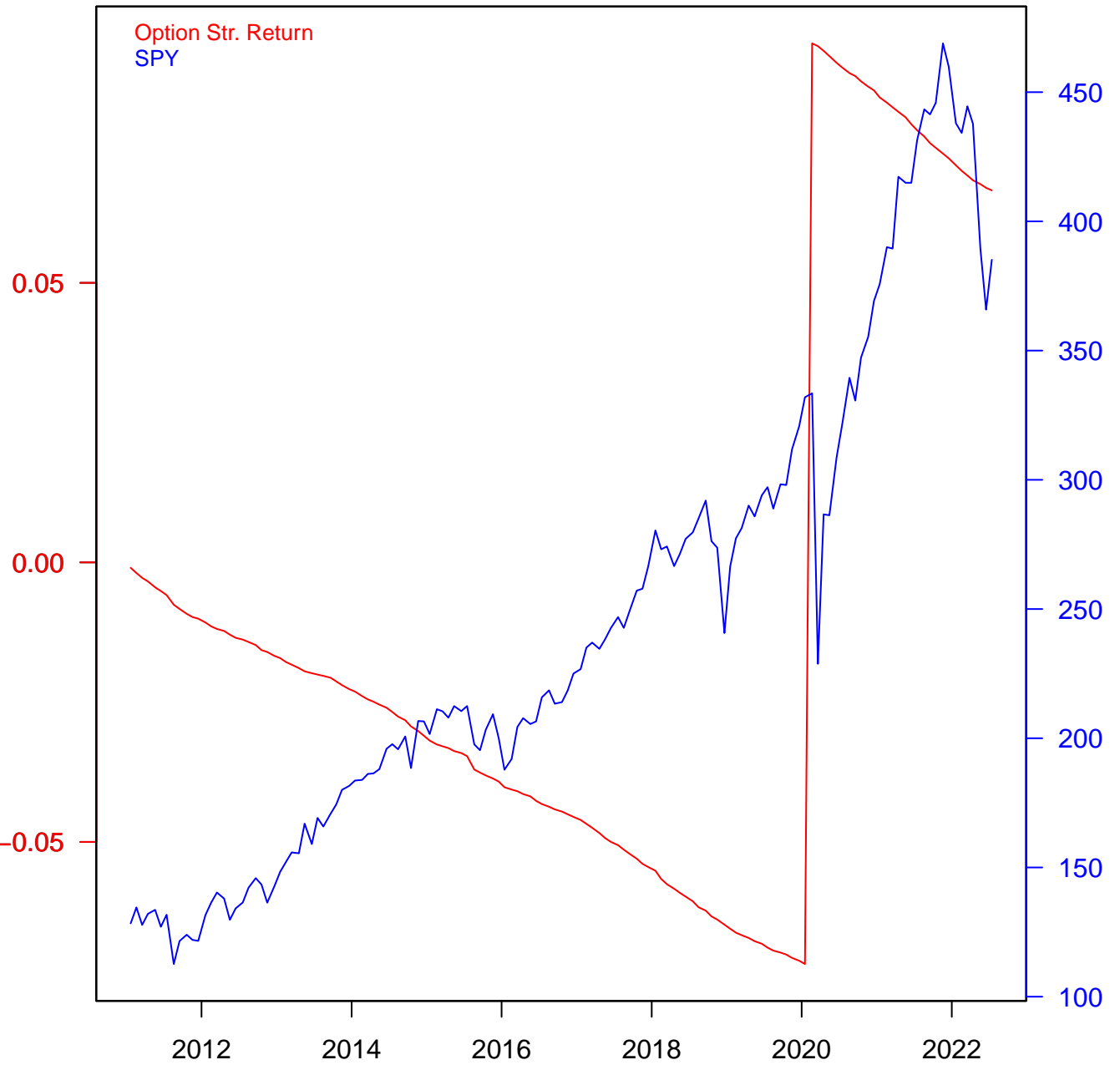
put_moneyness_-2



put_moneyness_-3



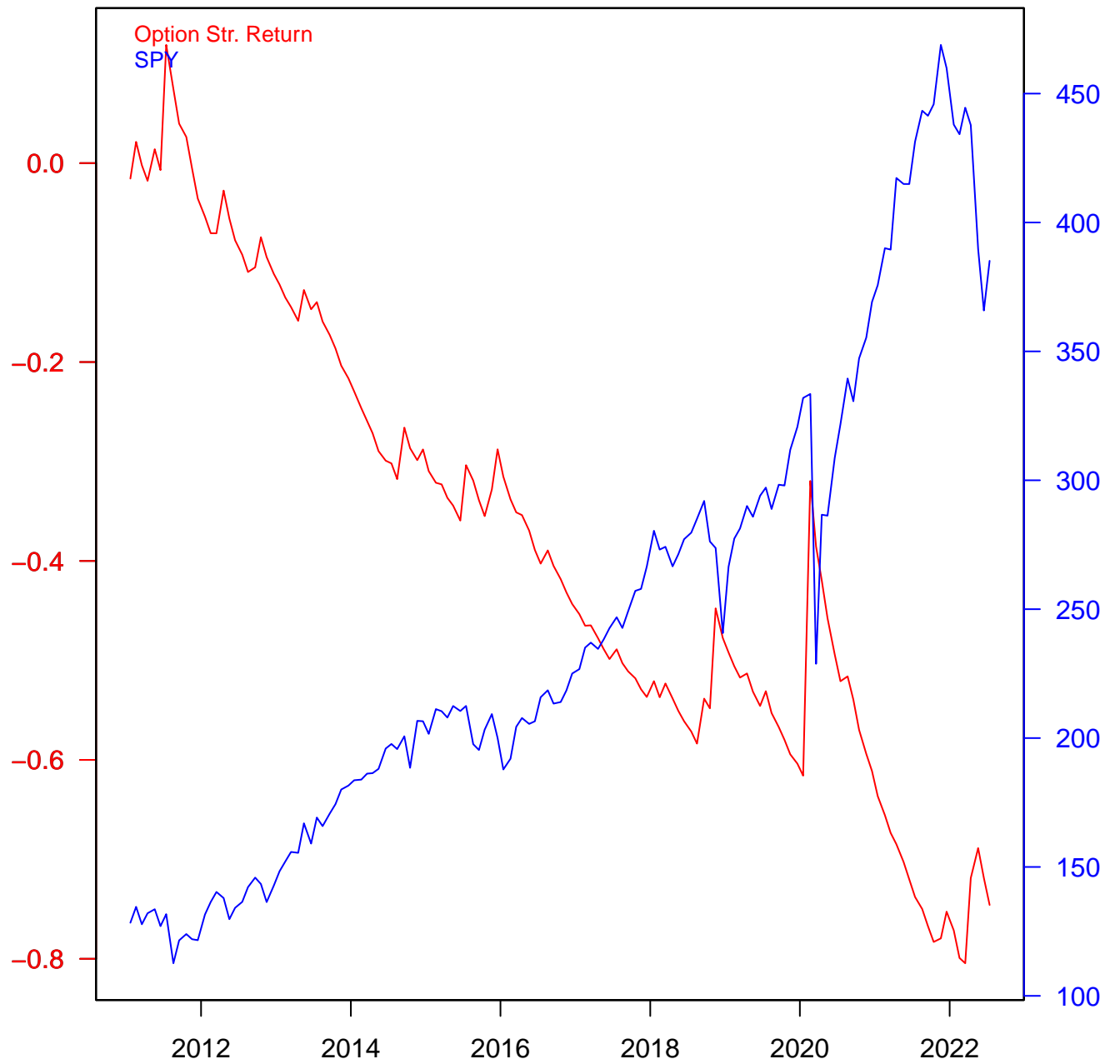
put_moneyness_-4



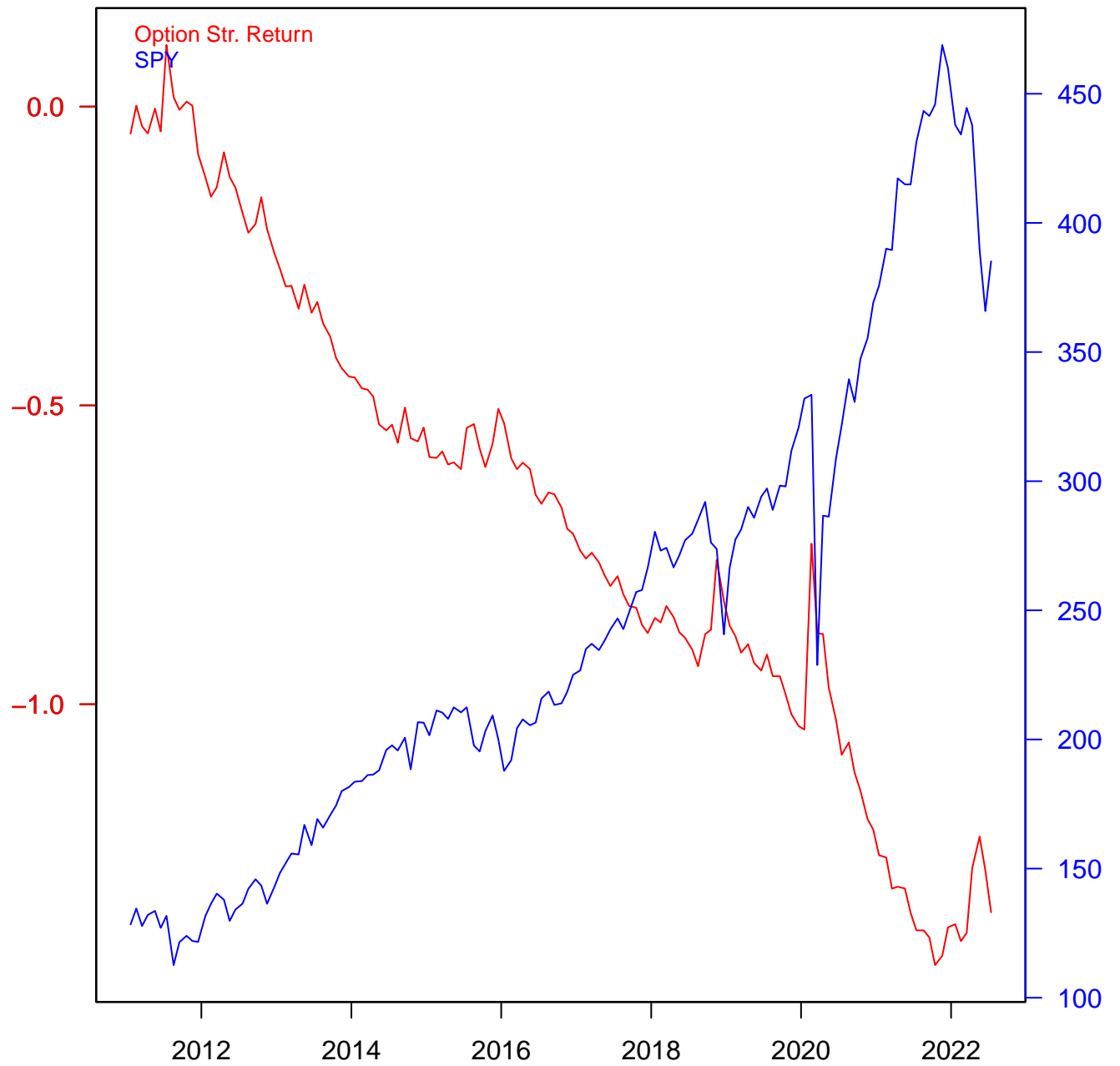
put_moneyness_-5



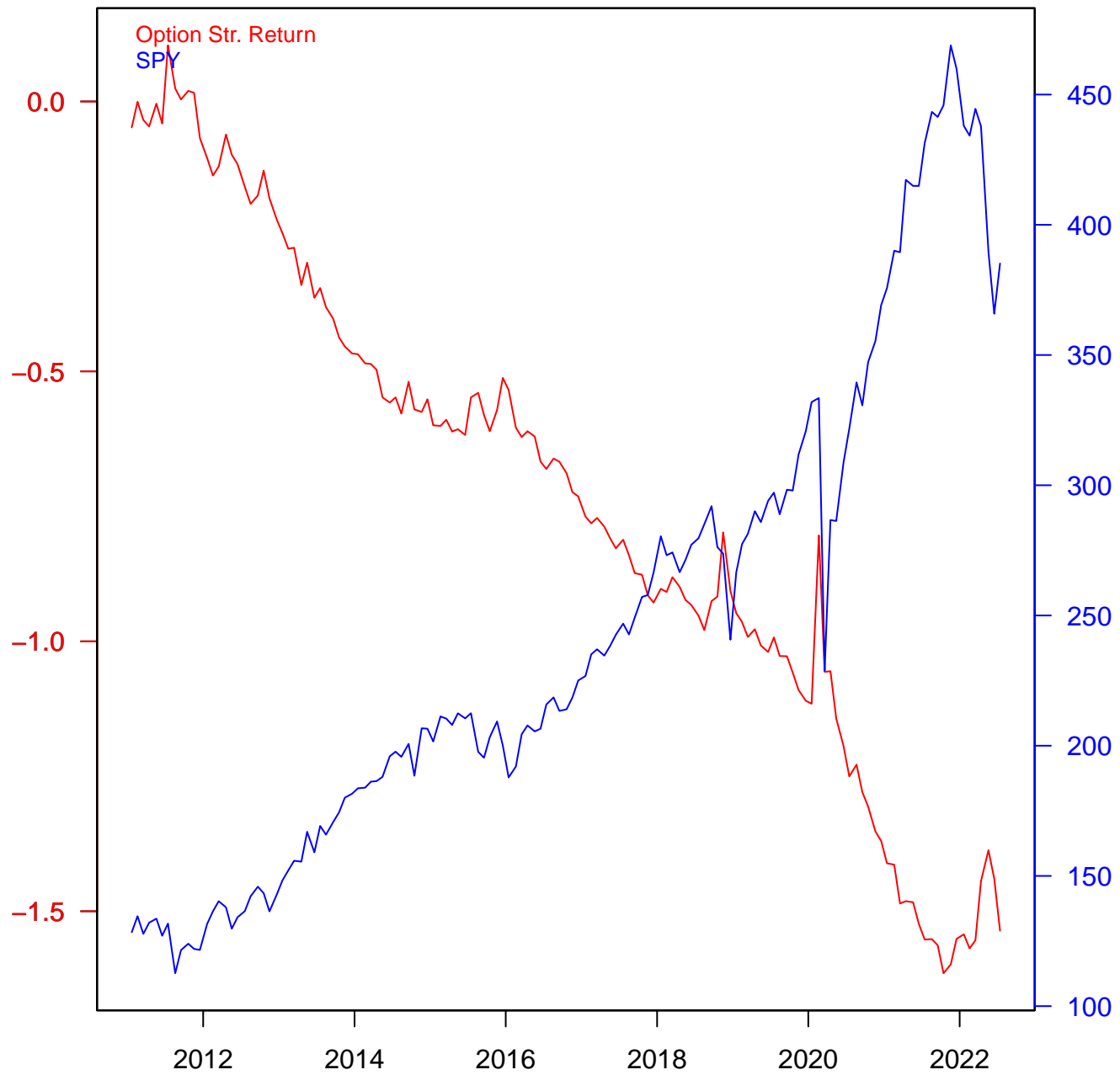
put_moneyness_0



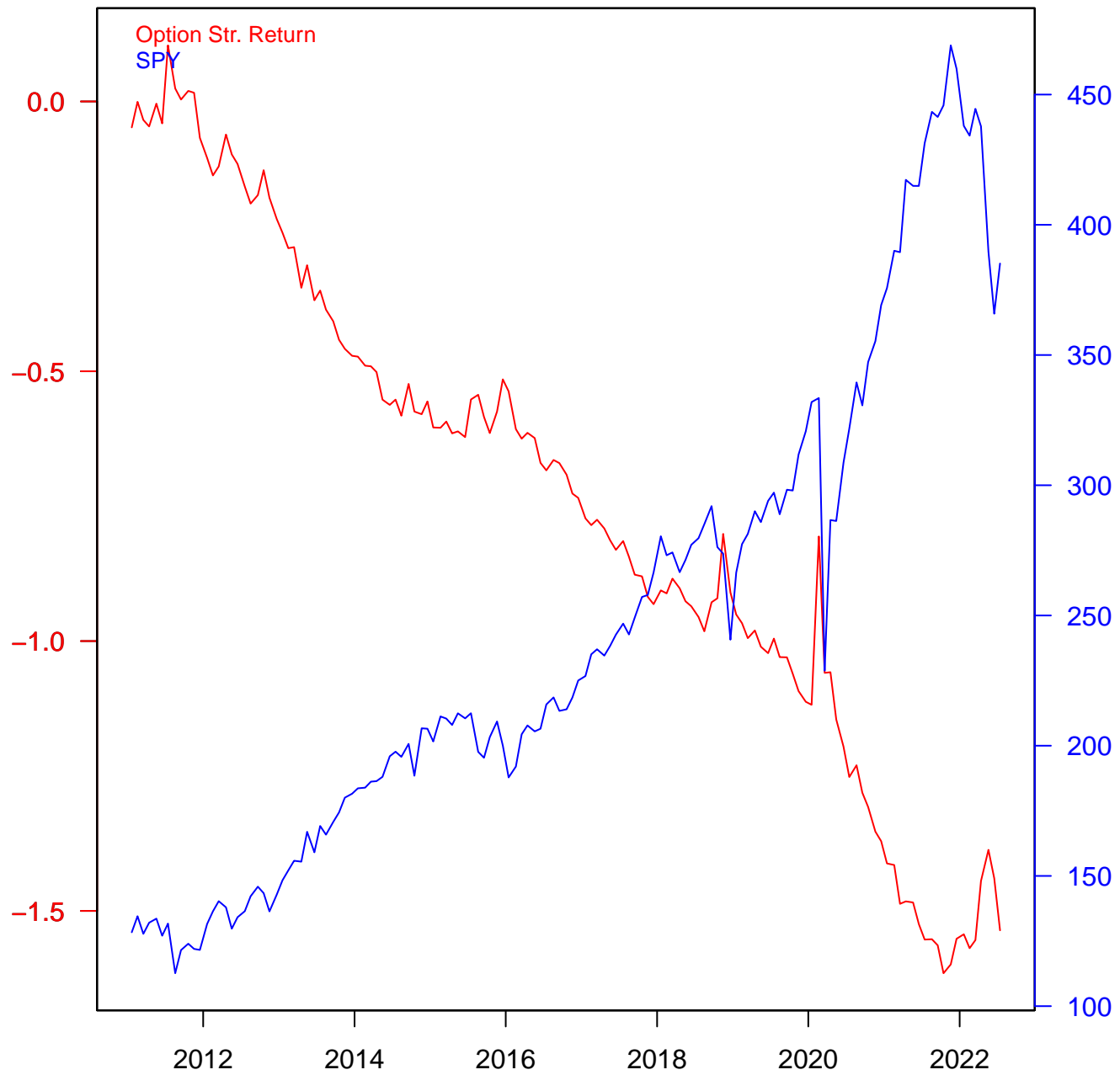
put_moneyness_1



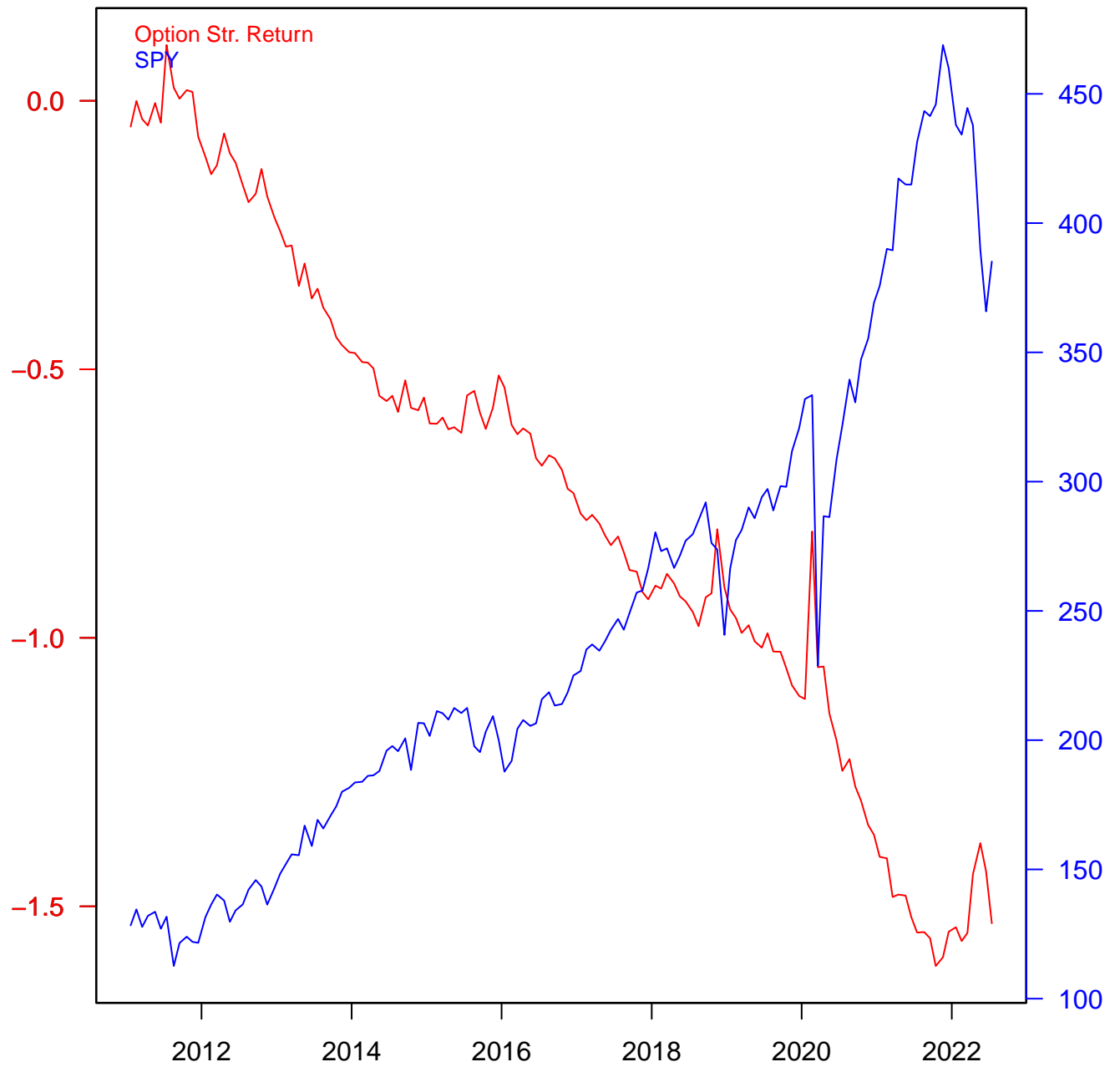
put_moneyness_2



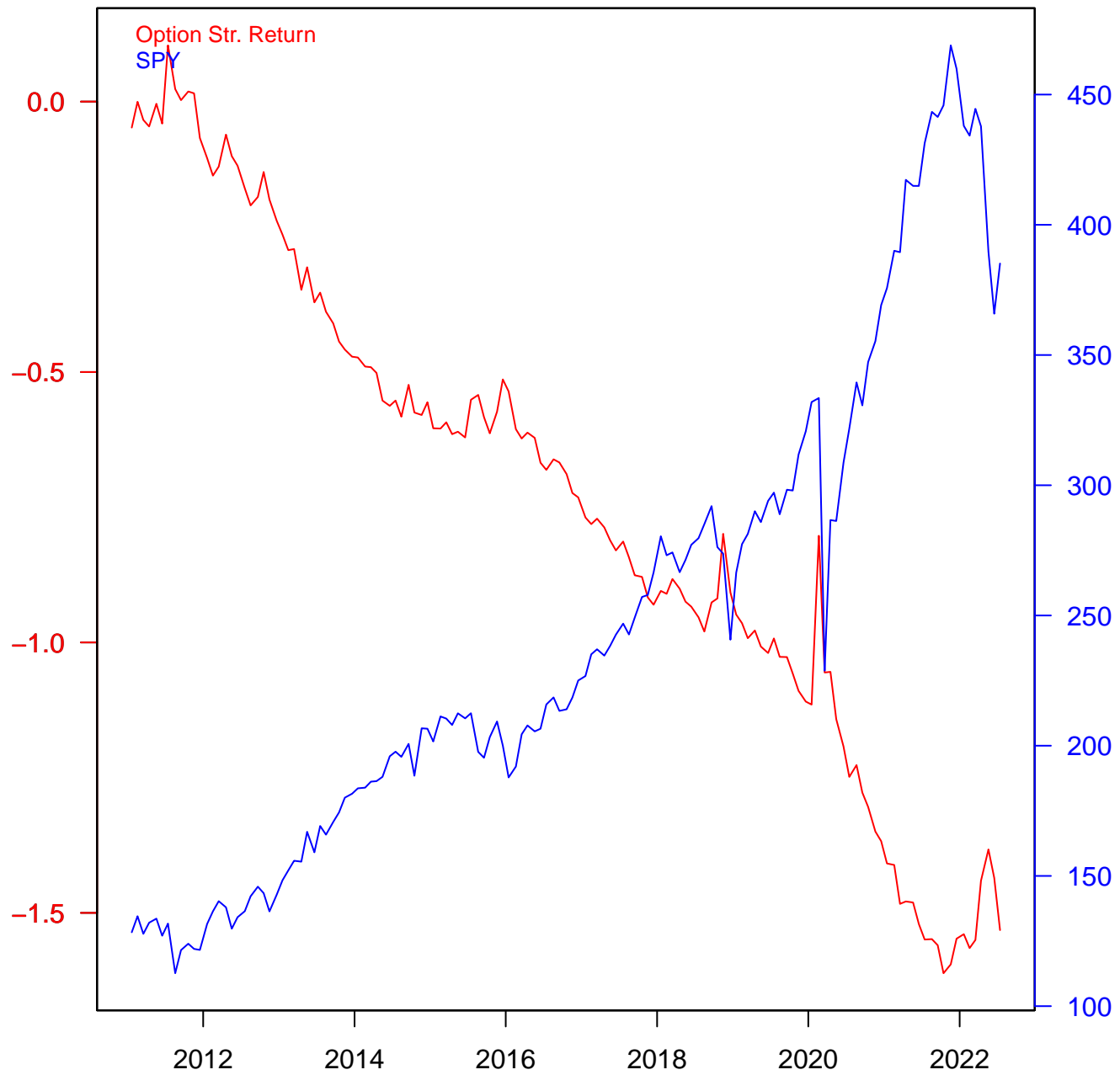
put_moneyness_3



put_moneyness_4



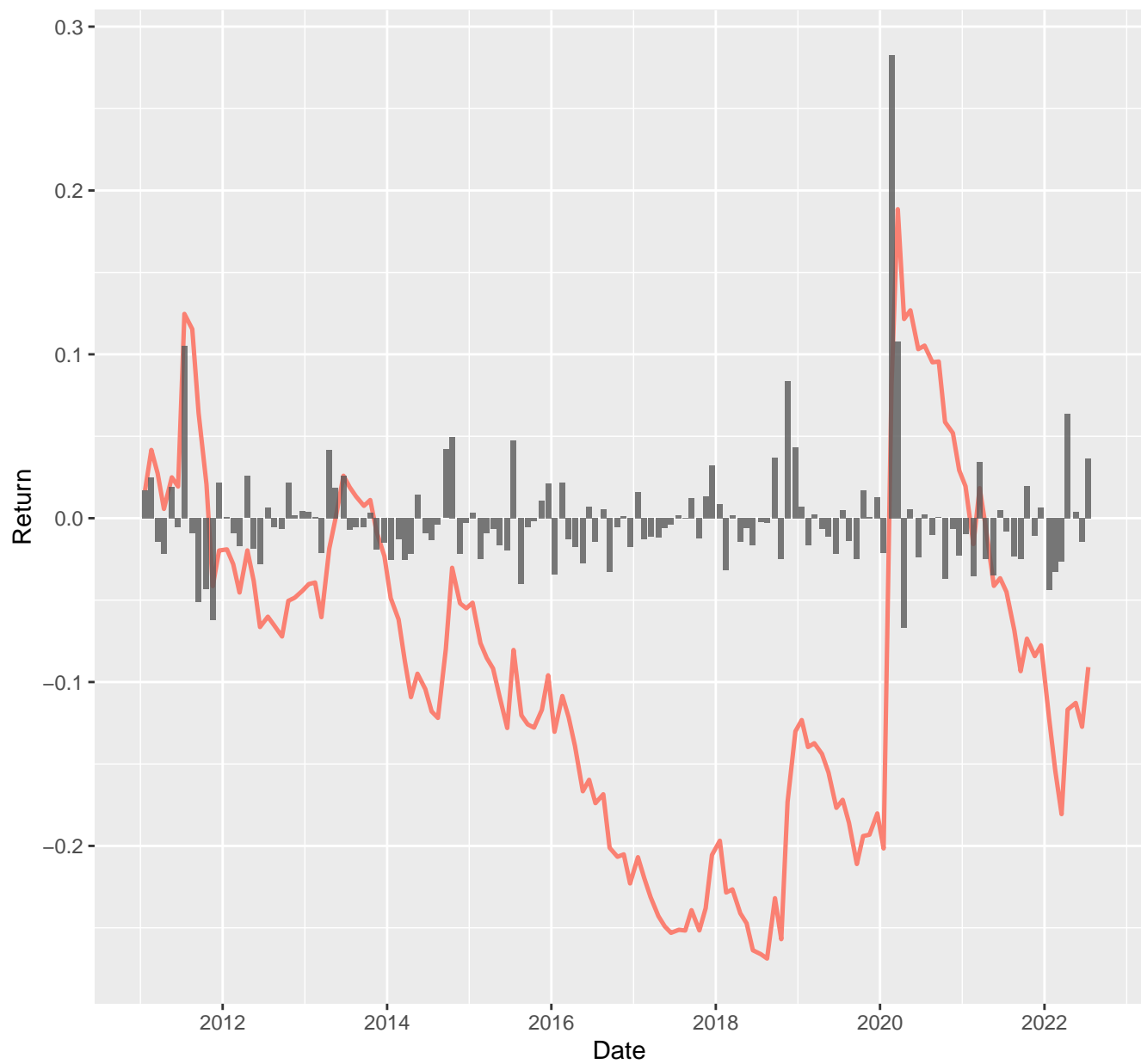
put_moneyness_5



Complex Strategy Returns

ATM Straddle

long 0.5 Delta call + long 0.5 Delta Put



Strangle 0.05

long 0.05 Delta call + long 0.05 Delta Put



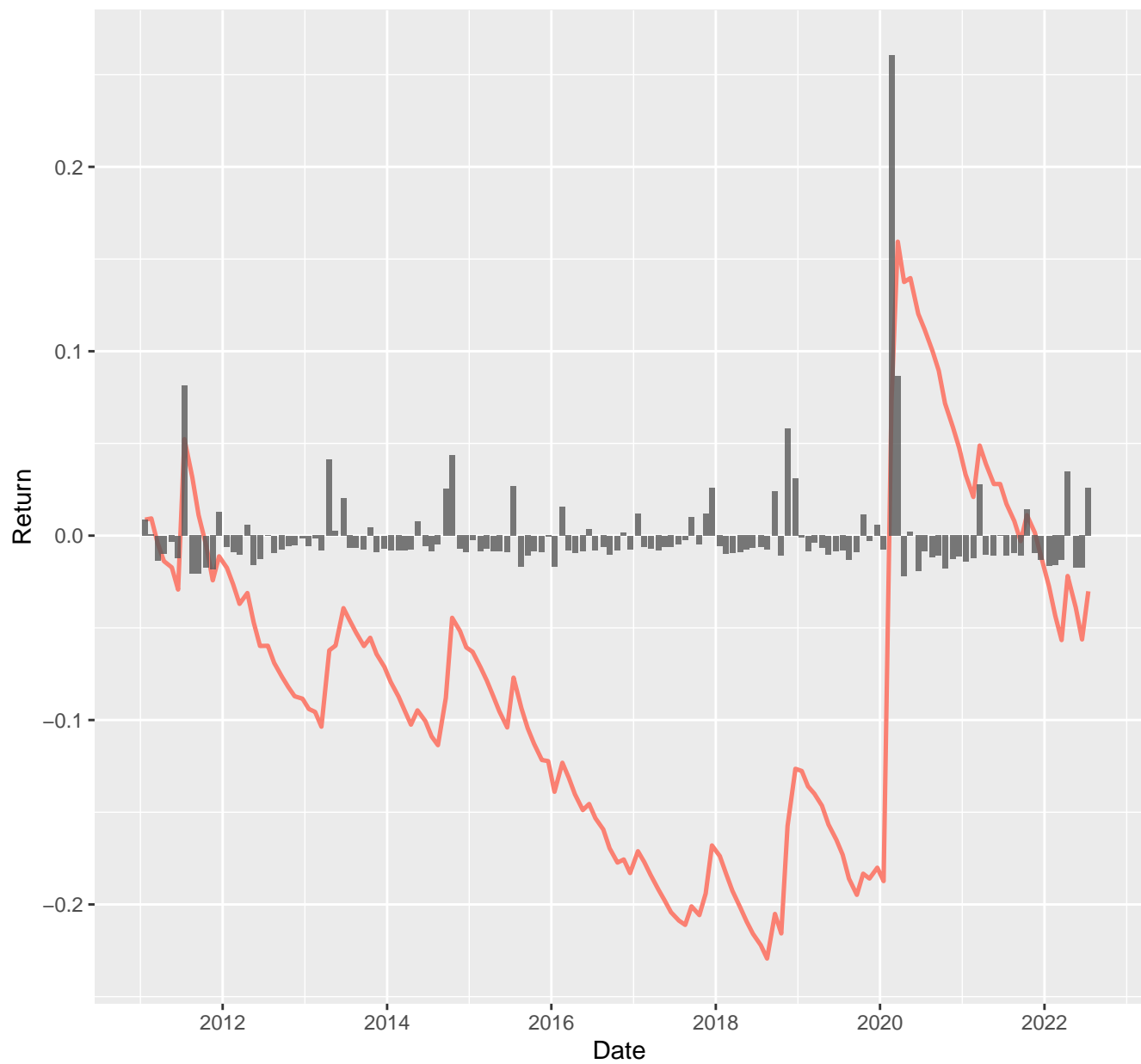
Strangle 0.1

long 0.1 Delta call + long 0.1 Delta Put



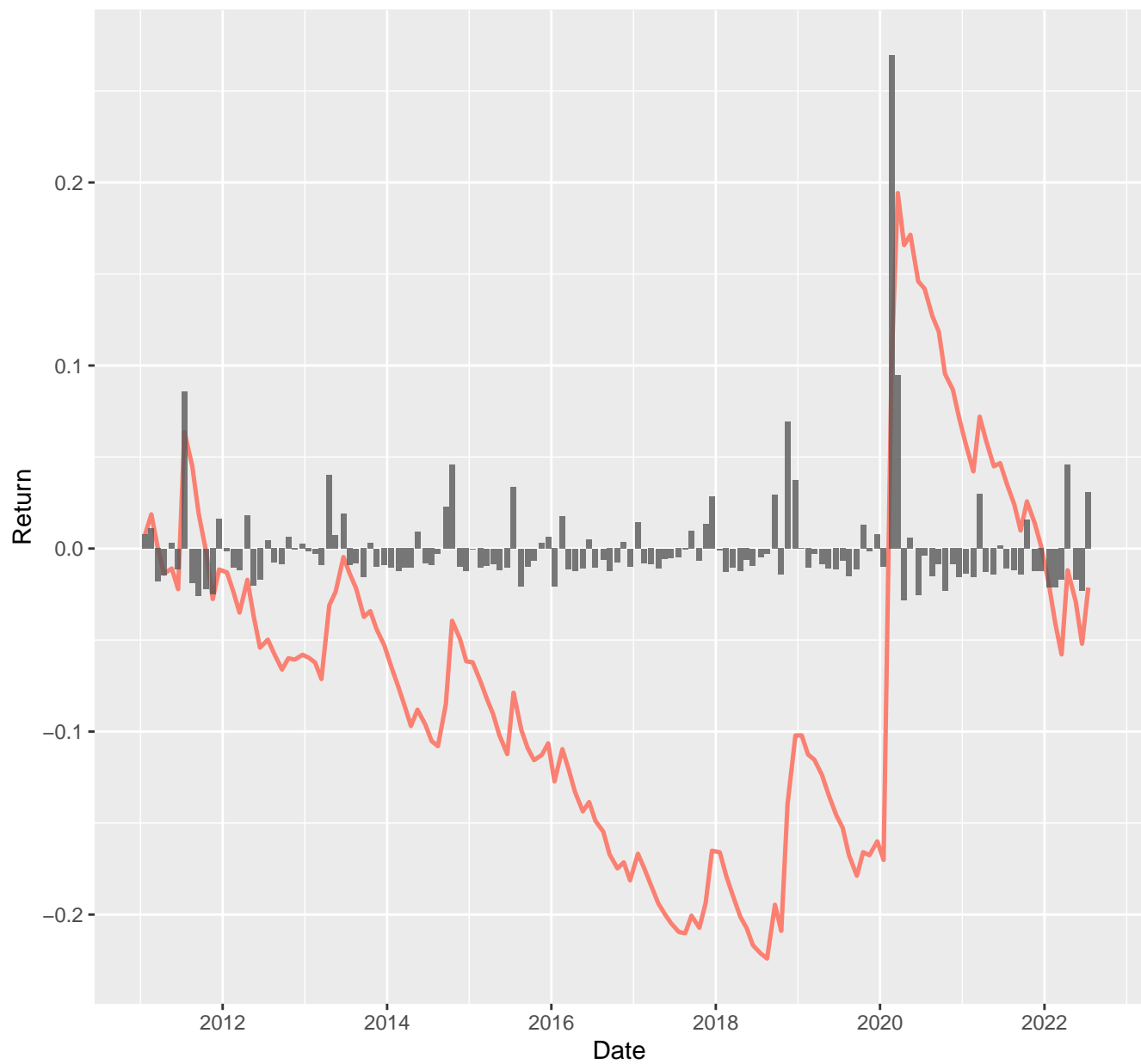
Strangle 0.2

long 0.2 Delta call + long 0.2 Delta Put



Strangle 0.25

long 0.25 Delta call + long 0.25 Delta Put



Risk Reversal 0.05

long 0.05 Delta call + short 0.05 Delta Put



Risk Reversal 0.1

long 0.1 Delta call + short 0.1 Delta Put



Risk Reversal 0.2

long 0.2 Delta call + short 0.2 Delta Put



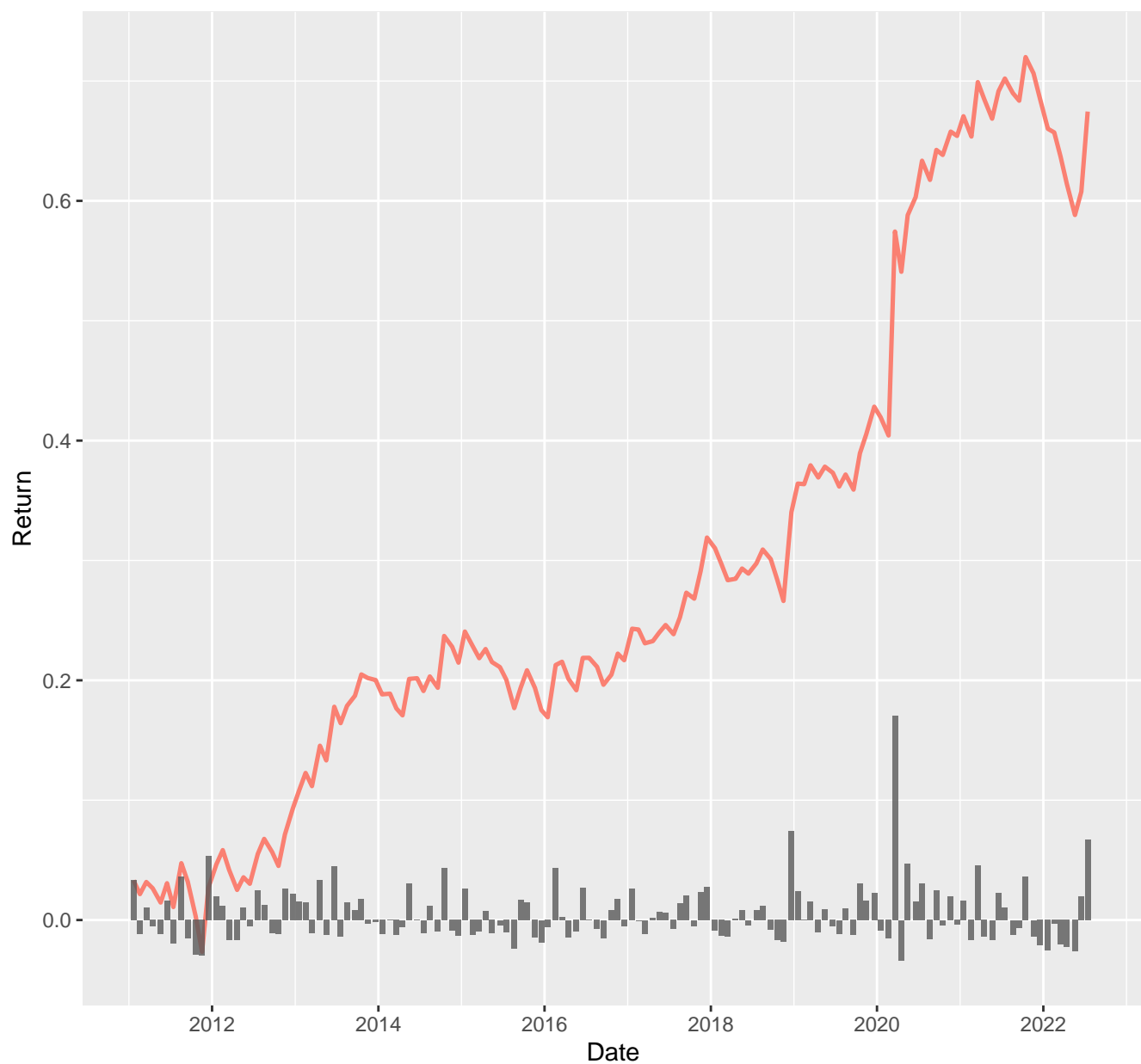
Risk Reversal 0.25

long 0.25 Delta call + short 0.25 Delta Put



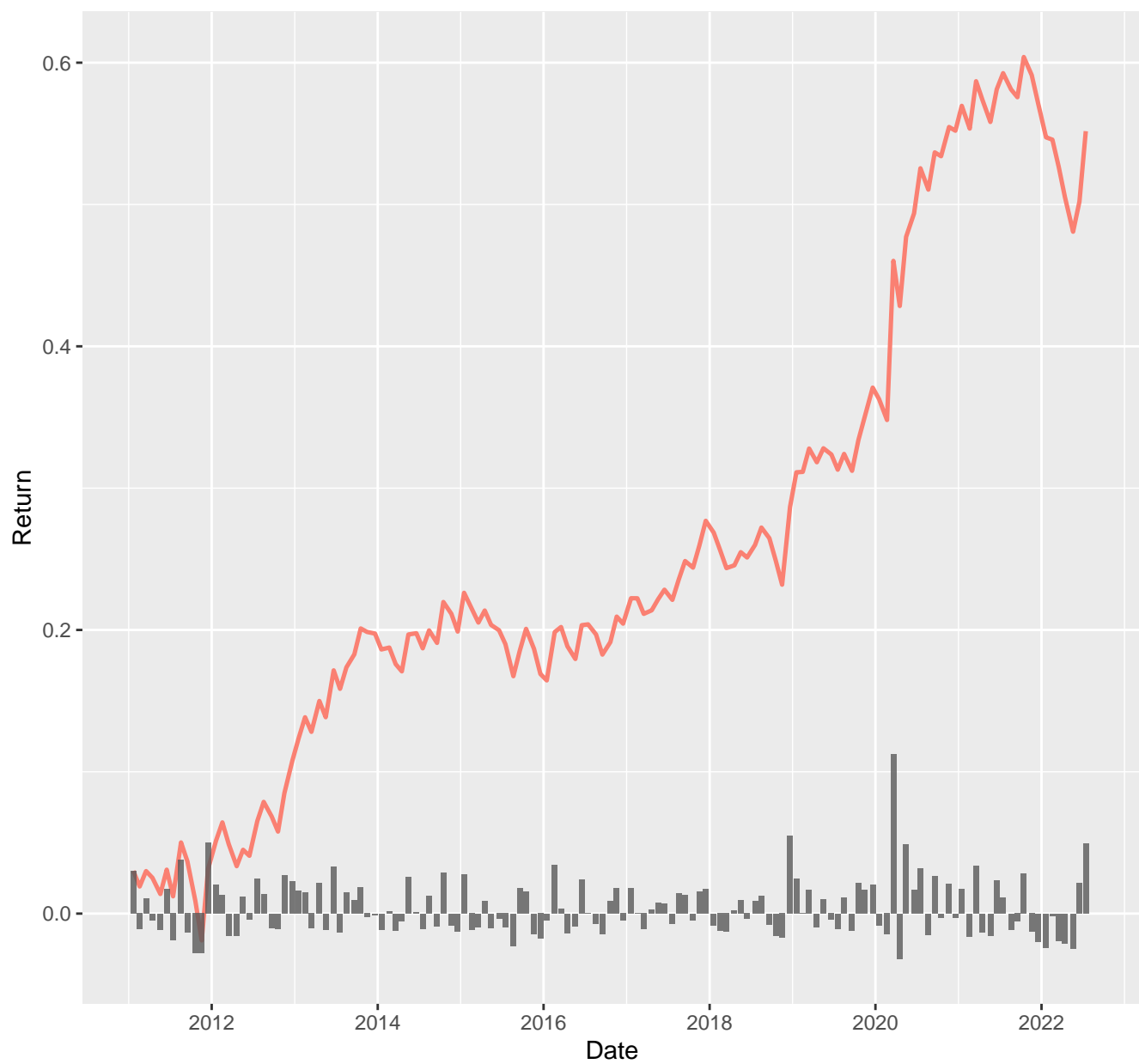
Bull Call Spread 0.05

long 0.5 Delta call + short 0.05 Delta call



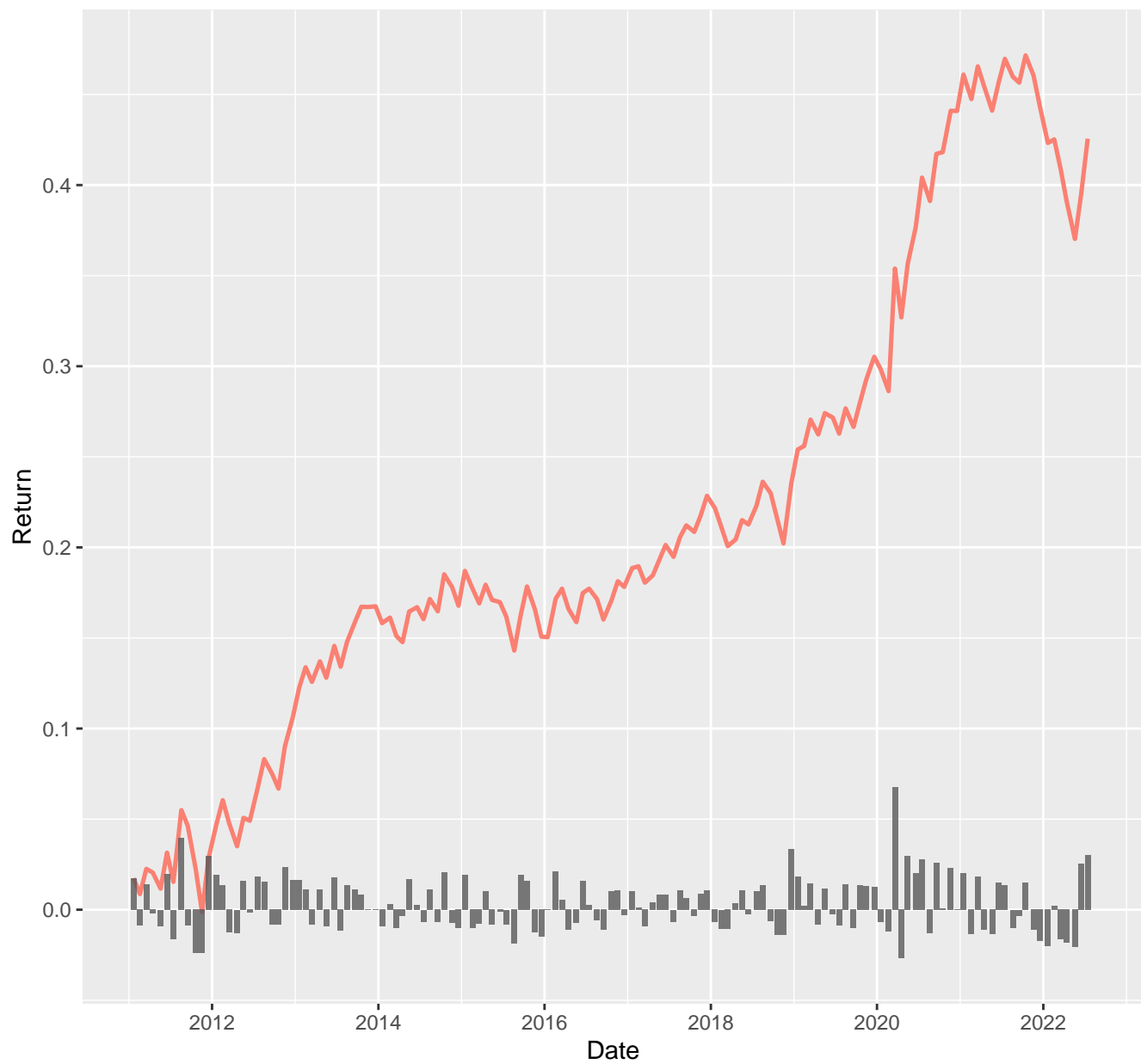
Bull Call Spread 0.1

long 0.5 Delta call + short 0.1 Delta call



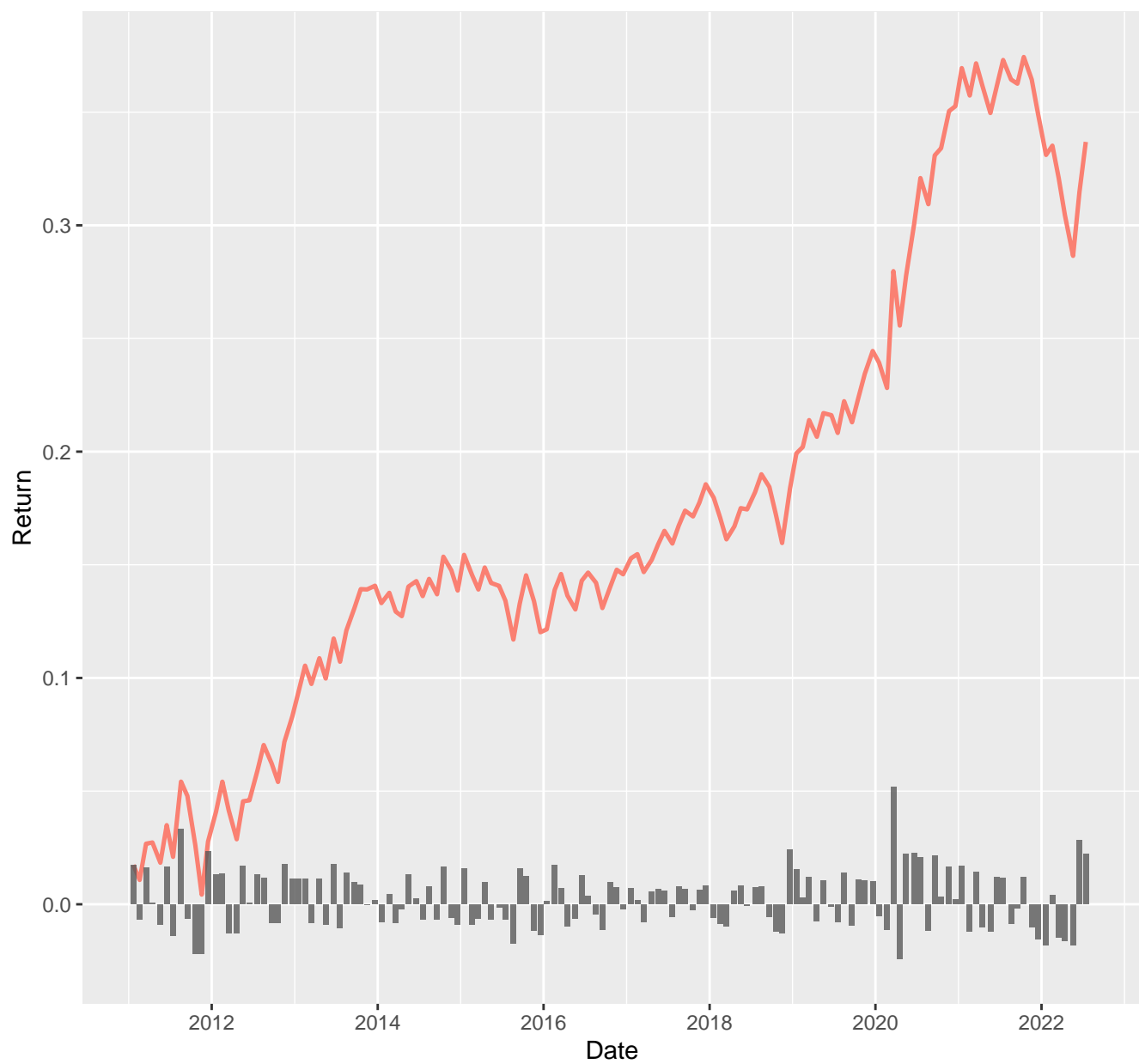
Bull Call Spread 0.2

long 0.5 Delta call + short 0.2 Delta call



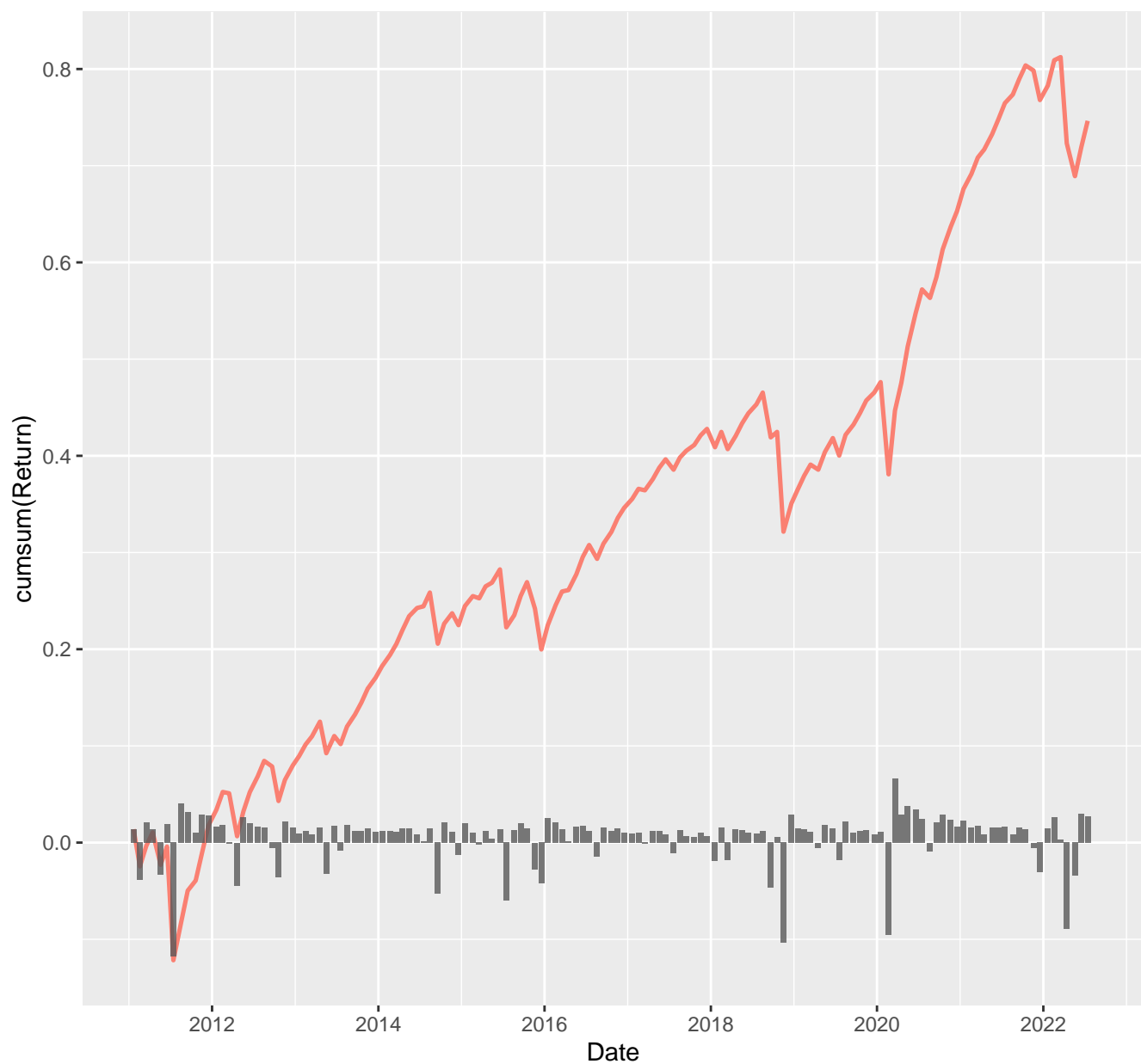
Bull Call Spread 0.25

long 0.5 Delta call + short 0.25 Delta call



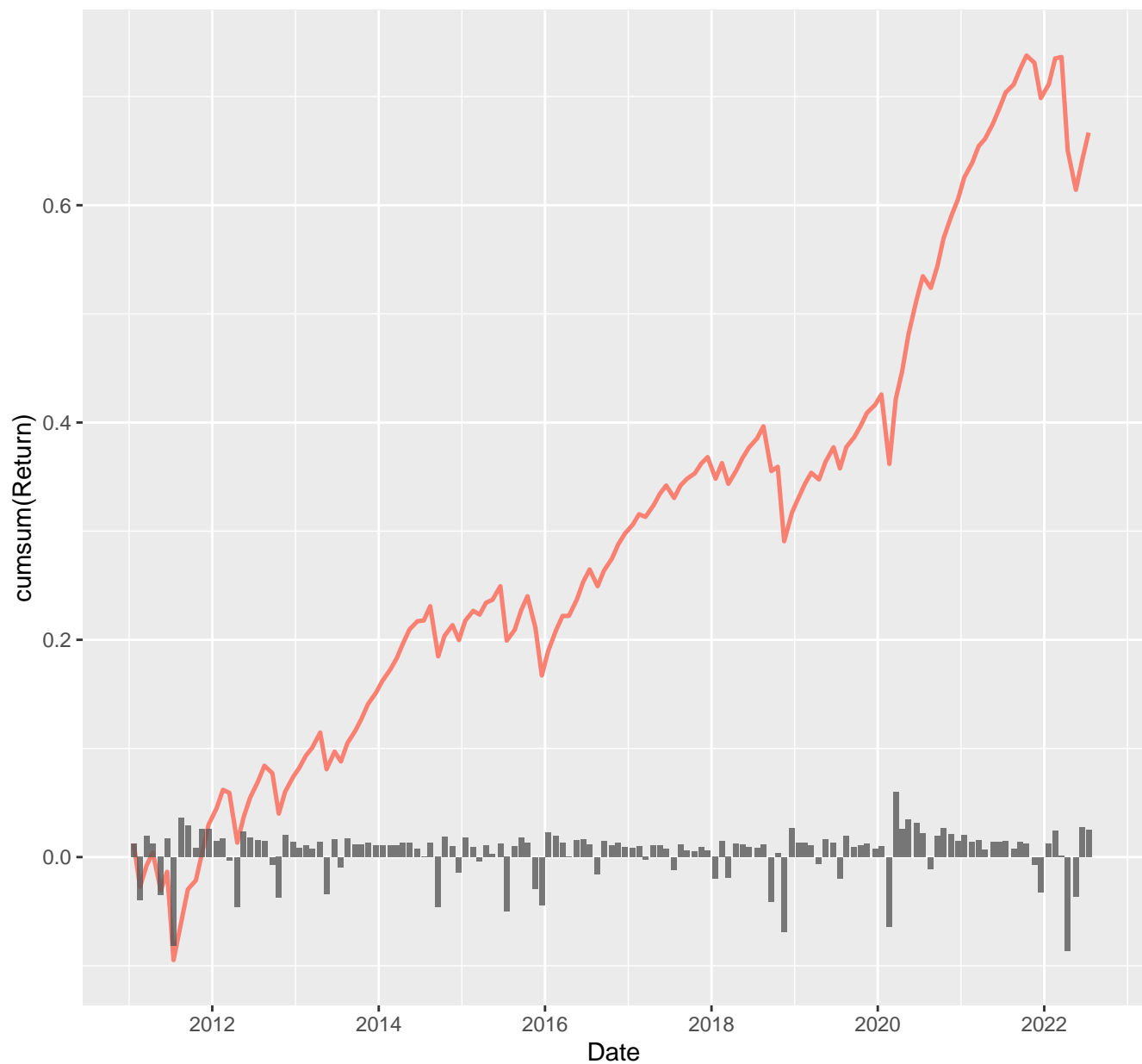
Bull Put Spread 0.05

short 0.5 Delta put + long 0.05 Delta put



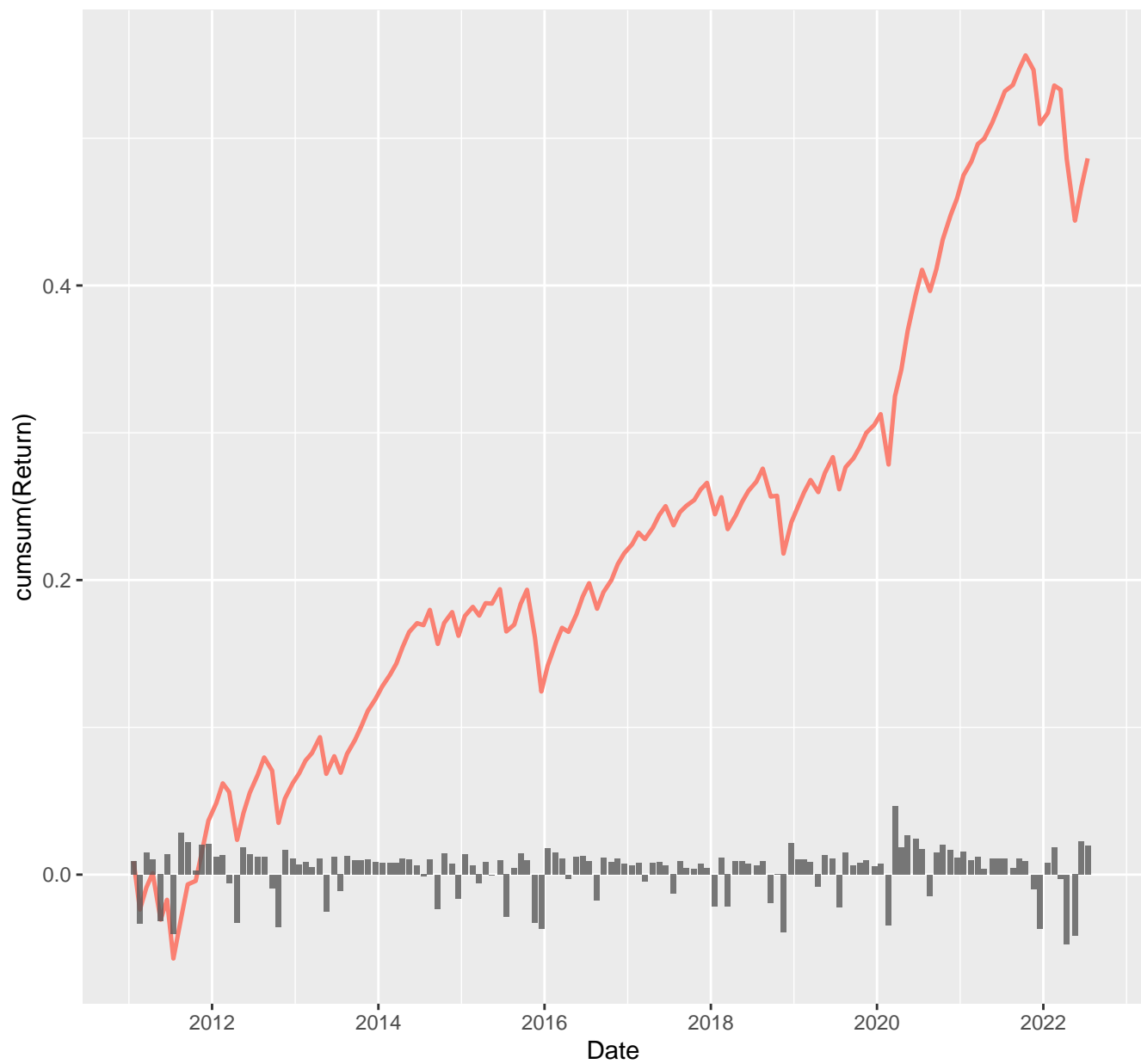
Bull Put Spread 0.1

short 0.5 Delta put + long 0.1 Delta put



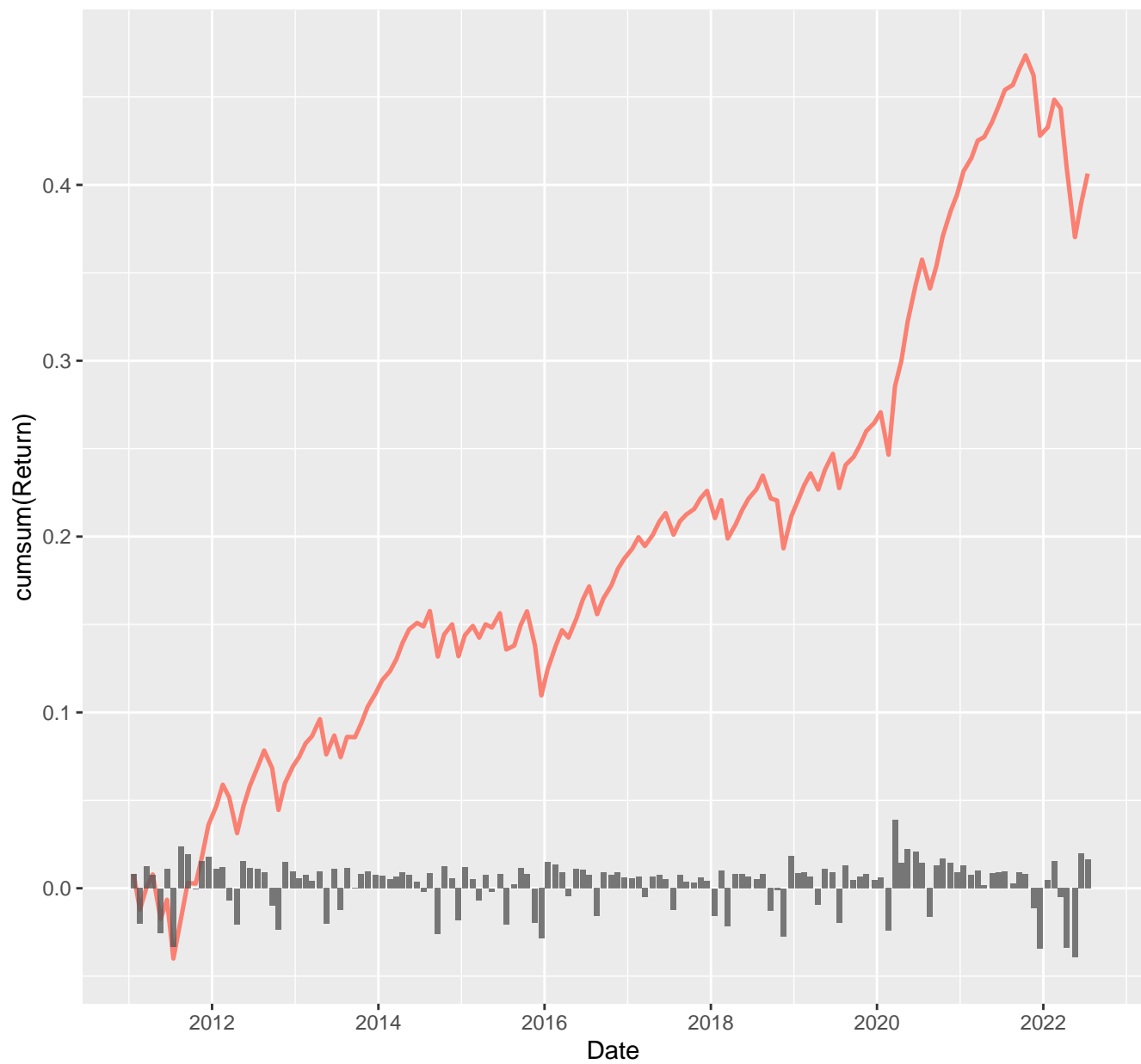
Bull Put Spread 0.2

short 0.5 Delta put + long 0.2 Delta put



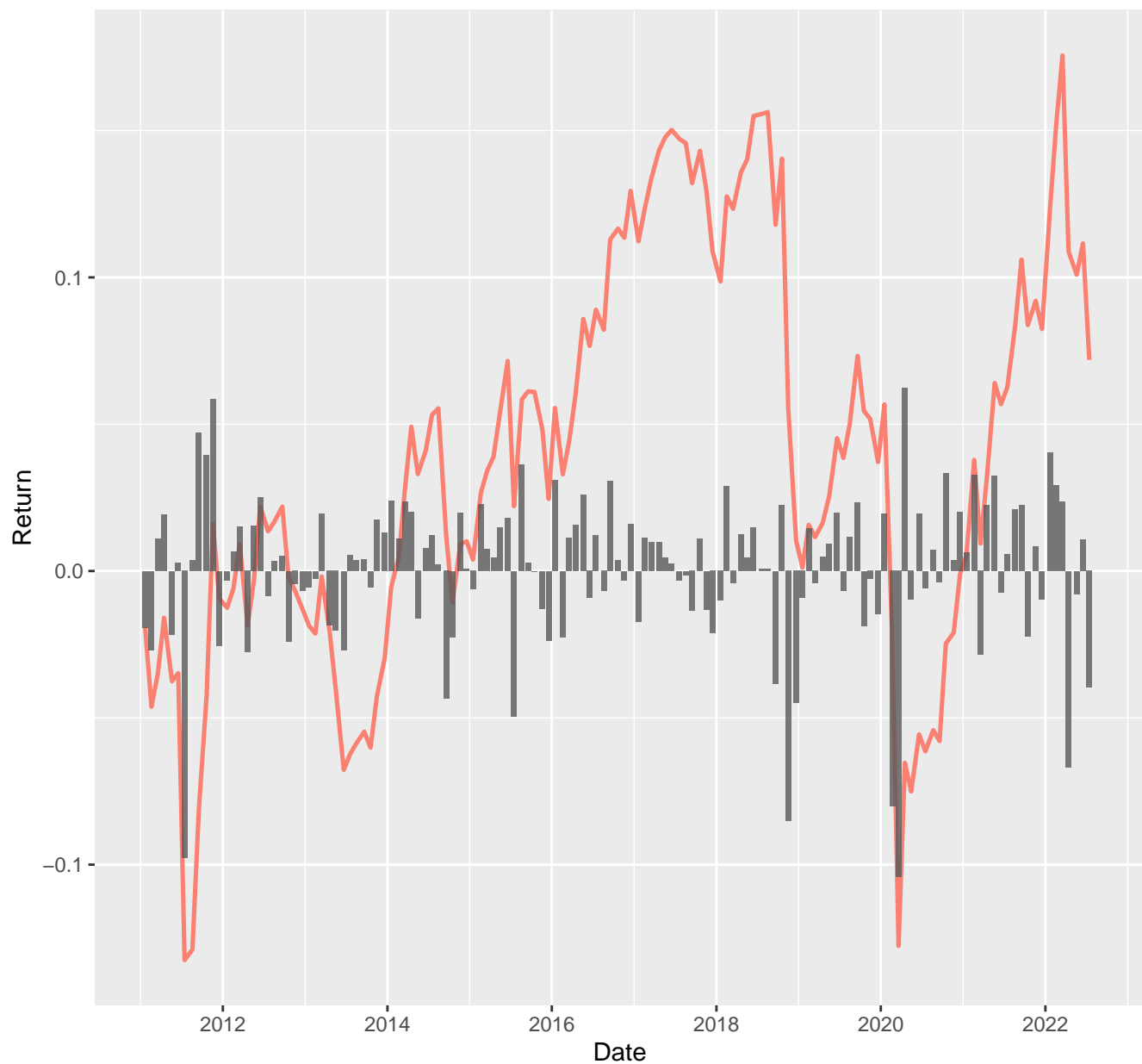
Bull Put Spread 0.25

short 0.5 Delta put + long 0.25 Delta put



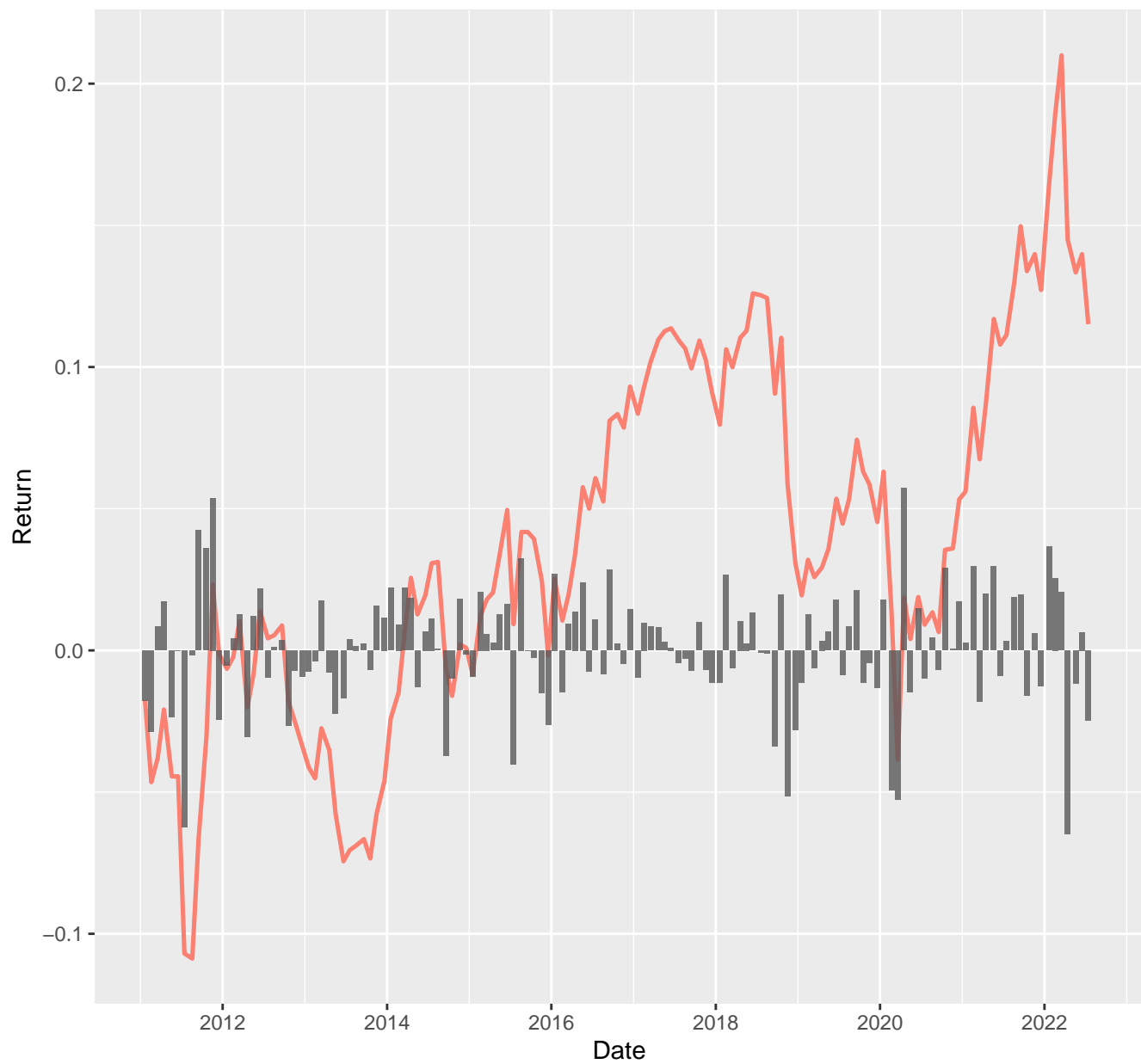
Butterfly 0.05

long 0.05 Delta strangle + short 0.5 Delta straddle



Butterfly 0.1

long 0.1 Delta strangle + short 0.5 Delta straddle



Butterfly 0.2

long 0.2 Delta strangle + short 0.5 Delta straddle



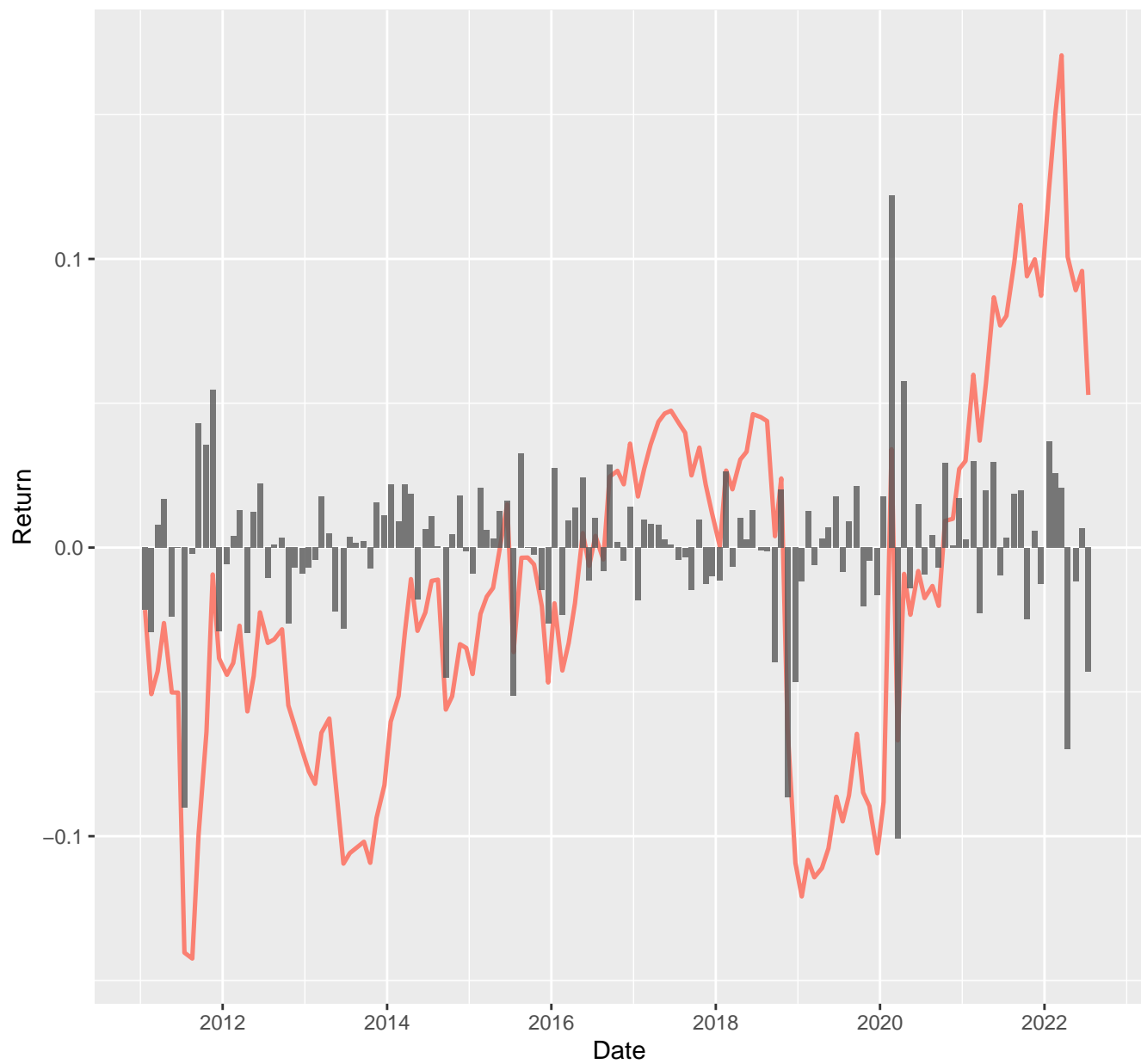
Butterfly 0.25

long 0.25 Delta strangle + short 0.5 Delta straddle



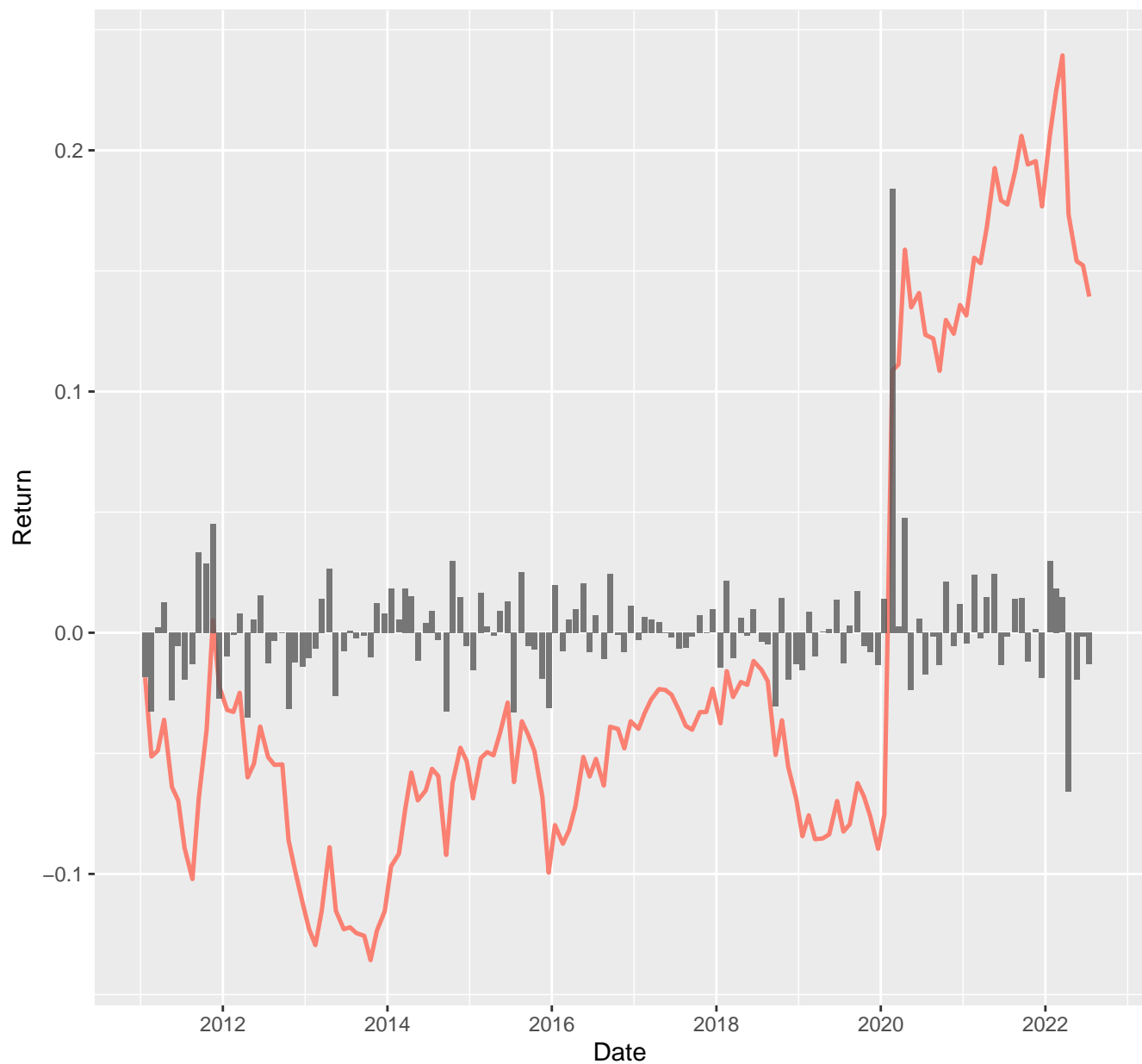
Christmas Tree 0.05

long 2x 0.05 Delta strangle + short 0.5 Delta straddle



Christmas Tree 0.1

long 2x 0.1 Delta strangle + short 0.5 Delta straddle



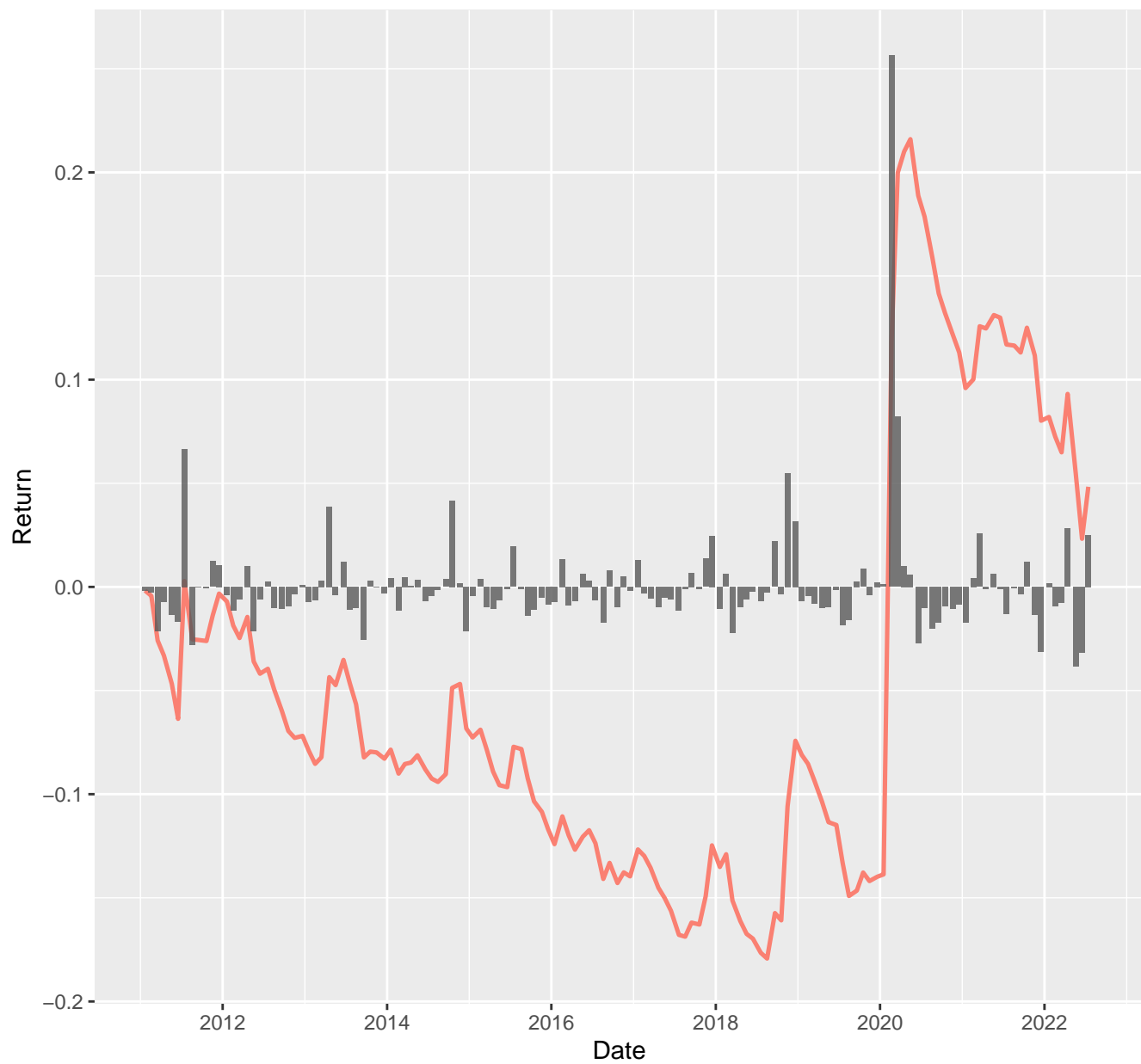
Christmas Tree 0.2

long 2x 0.2 Delta strangle + short 0.5 Delta straddle



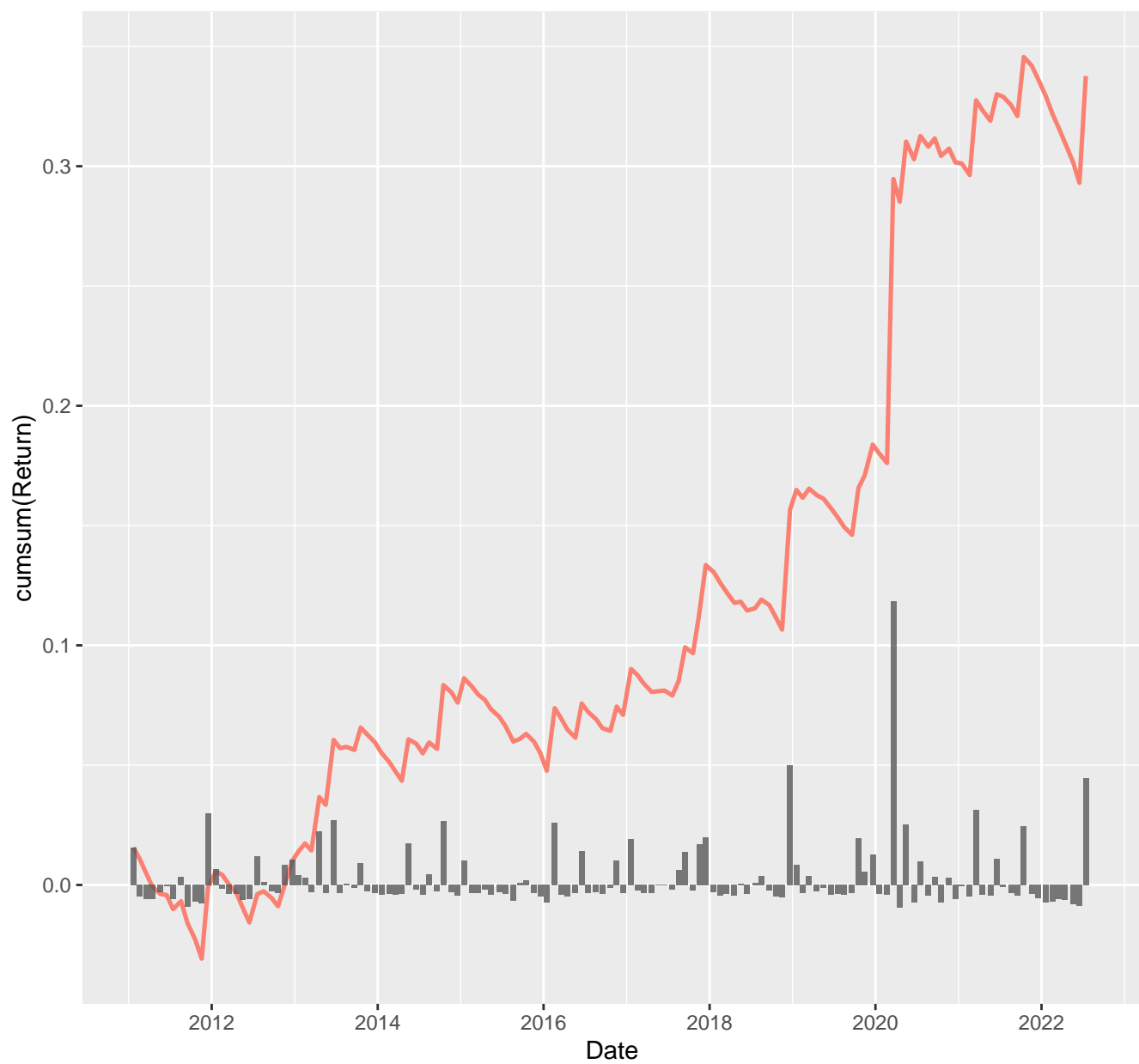
Christmas Tree 0.25

long 2x 0.25 Delta strangle + short 0.5 Delta straddle



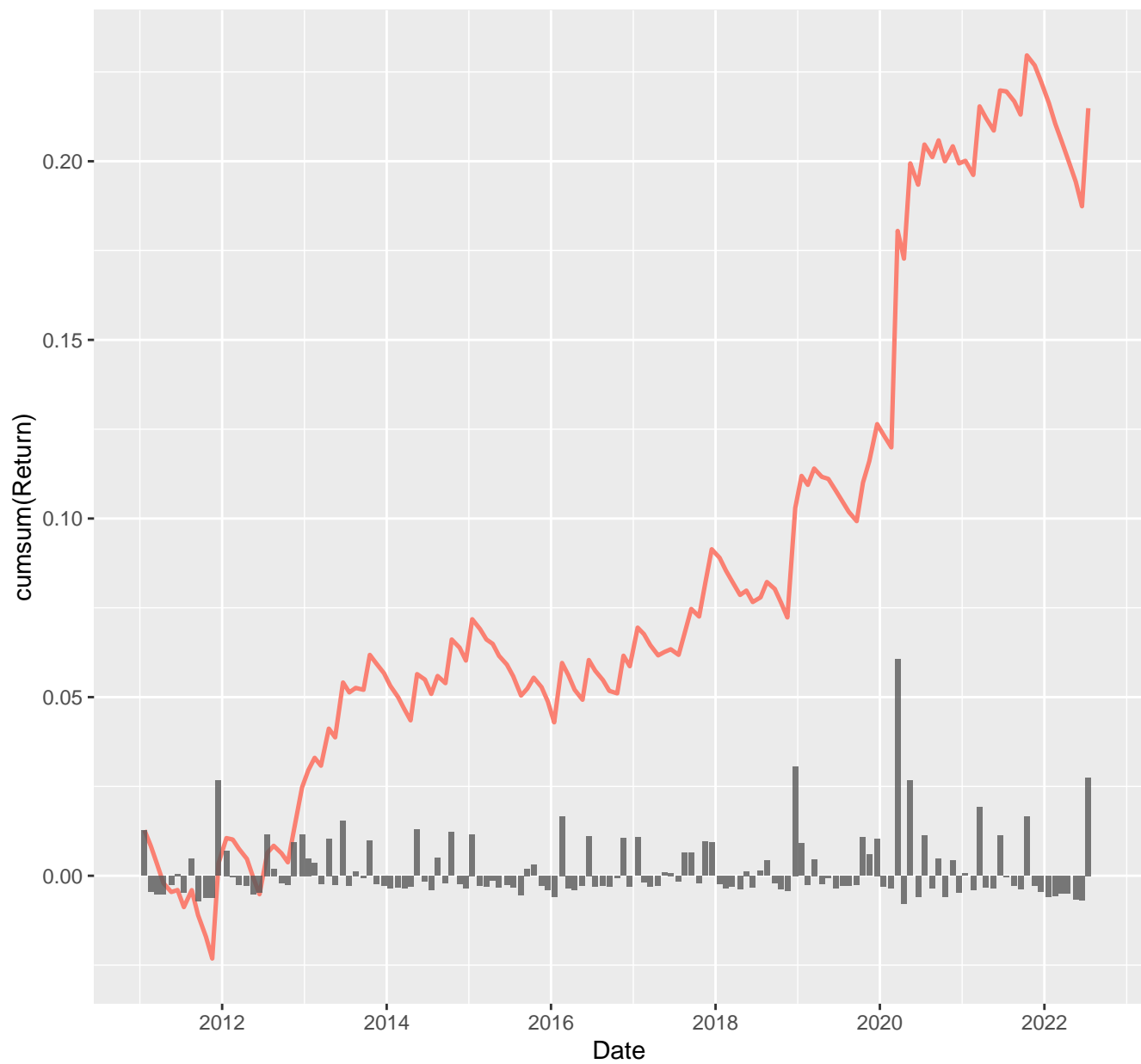
Bull Call Spread 0.05 – 0.25

long 0.25 Delta call + short 0.05 Delta call



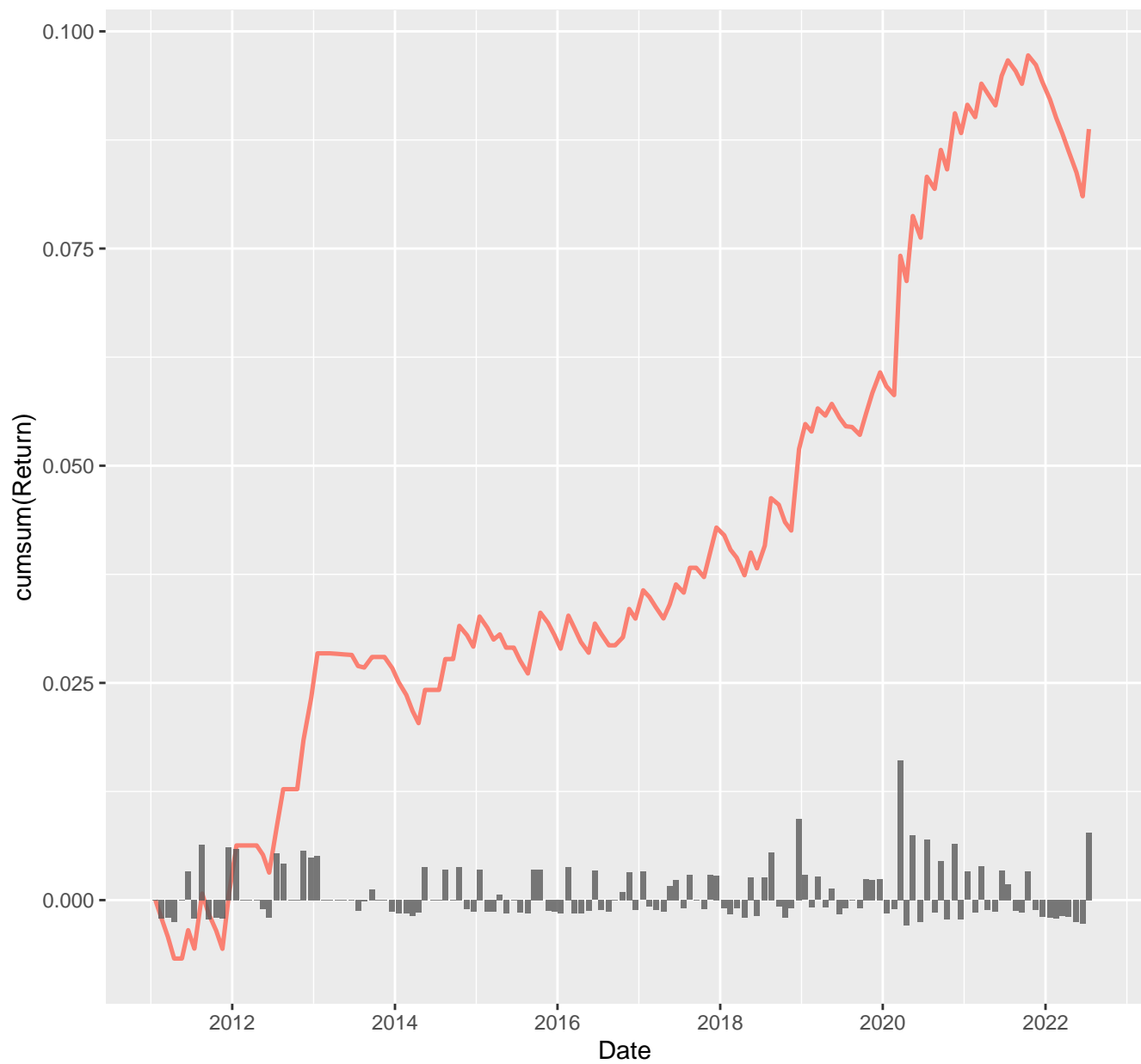
Bull Call Spread 0.1 – 0.25

long 0.25 Delta call + short 0.1 Delta call



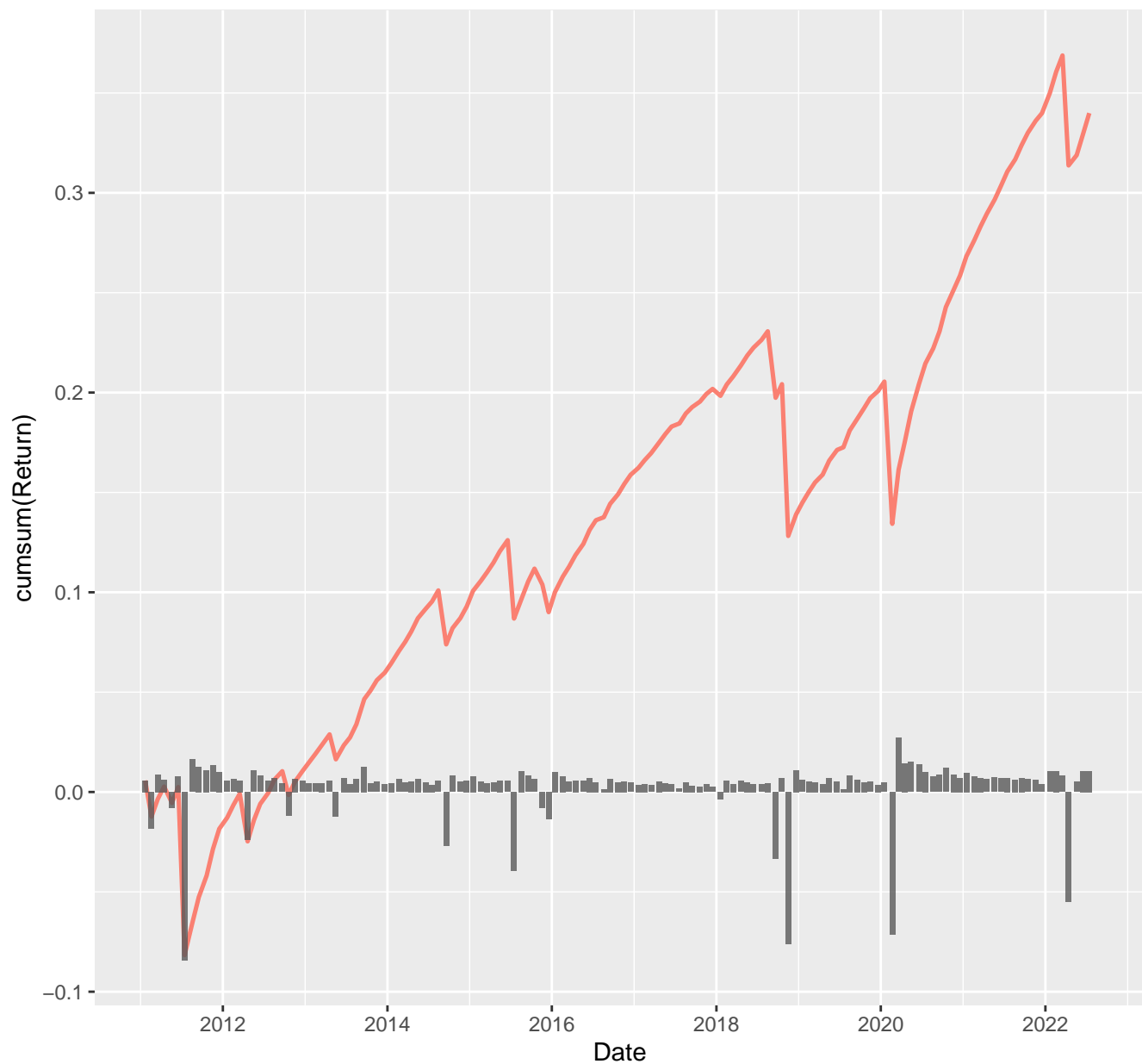
Bull Call Spread 0.2 – 0.25

long 0.25 Delta call + short 0.2 Delta call



Bull Put Spread 0.05 – 0.25

short 0.25 Delta put + long 0.05 Delta put



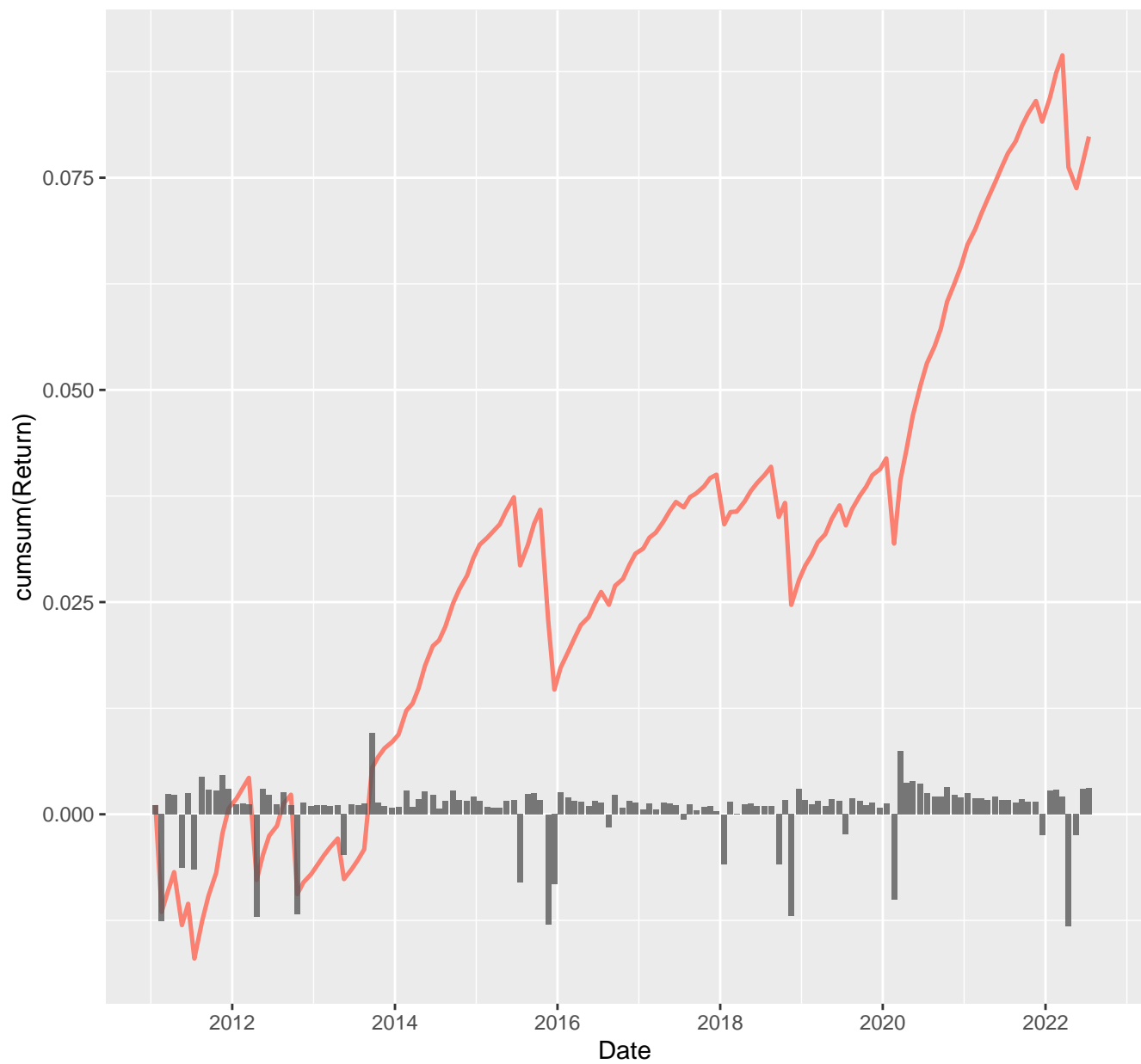
Bull Put Spread 0.1 – 0.25

short 0.25 Delta put + long 0.1 Delta put



Bull Put Spread 0.2 – 0.25

short 0.25 Delta put + long 0.2 Delta put



Put_spread_0.1_0.25_s&p

Long 0.1 put, short 0.25 put, long S&P(long call atm & short put atm)

