Advanced Options Strategies

Part 2 – Spreads – revised and finalized for April 22, 2019

ib_lev1_quote.ipynb

A basic program designed to extract a level 1 quote only, then save or log it. Used in part to debug the quote extraction process.

In [7]:
```
import math
import numpy as np
import datetime
from datetime import date
import sys
sys.path.append('c:/Users/Prof Gary Evans/Dropbox/PyGo/PyFi')
import finutil as fu
import timeutil as tu
sys.path.append('d:/TWS API/source/pythonclient/')
import ib_insync
from ib_insync import *
```

Start the loop and do the handshake

In [8]:
```
util.startLoop()
ib = IB()
ib.connect('127.0.0.1', 7496, clientId=19)
```

Out[8]:
```
<IB connected to 127.0.0.1:7496 clientId=19>
```

In [9]:
```
stosym = "FB"
```

Identify the contract and set up the quote mechanism

In [10]:
```
stock = Stock(stosym, 'SMART', 'USD')
ib.qualifyContracts(stock)
l1_quote = ib.reqMktData(stock,"",True,False)
l1_quote
```

Out[10]:
```
Ticker(contract=Stock(conId=107113386, symbol='FB', exchange='SMART', primaryExchange='NASDAQ', currency='USD', localSymbol
='FB', tradingClass='NMS'))
```

Grab the quotes (this is where the process sometimes must be repeated):

In [11]:
```
s_last = l1_quote.last
s_bid = l1_quote.bid
s_ask = l1_quote.ask
s_peg = (s_ask+s_bid)/2.0
s_peg = round(s_peg,2)
print("Last:",s_last," Bid: ",s_bid," Ask: ",s_ask,"Peg: ",s_peg)
print(type(s_bid))
```

```
Last: 177.2  Bid:  177.17  Ask:  177.2 Peg:  177.19
<class 'float'>
```

In [12]:
```
ib.disconnect()
```

```
# ib_lev1_quote.py
# April 15, 2018 Version 1.0
# This is the primary example program of how you convert a IB Jupyter Notebook
# program into a straight Python program. To see the difference, compare this
# to the Jupyter Notebook ib_lev1_quote.ipynb. Leave this and that program
# untouched.
#
# Many thanks to Avi Thaker for telling me about the role played by the
# util.patchAsyncio() and ib.sleep(0.2) commands. They made the difference.
#
# TWS MUST BE RUNNING FOR THIS TO WORK
#
# Begin by importing the libraries that work with Interactive brokers.
#
import math
import time
import sys
sys.path.append('d:/TWS API/source/pythonclient/')
import ib_insync
from ib_insync import *
#
# Do the handshake with a clean clientID
#
# In Jupyter, the util.startLoop() command goes here, but is replaced by the
# util.patchAsyncio() command below.
#
ib = IB()
ib.connect('127.0.0.1', 7496, clientId=6)
print(ib.connect)
#
# This command below seems to replace the util.startLoop() command in JN!
util.patchAsyncio()
#
# Use IB for what you want, as below
#
stosym = "NFLX"
stock = Stock(stosym, 'SMART', 'USD')
ib.qualifyContracts(stock)
l1_quote = ib.reqMktData(stock,"",True,False)
#
# This asyncio command below prevents the quotes from sending "nan"s instead of
# data.
#
ib.sleep(0.1)
s_last = l1_quote.last
s_bid = l1_quote.bid
s_ask = l1_quote.ask
s_peg = (s_ask+s_bid)/2.0
s_peg = round(s_peg,2)
print("Last:",s_last," Bid: ",s_bid," Ask: ",s_ask,"Peg: ",s_peg)

#
# Close the client (terminate client ID) by running ib_disconnect.
#
ib.disconnect()
```

Spreads – strategies 5 and 6

A spread is typically a two-legged bet consisting of the primary bet, which usually involves writing a naked call or put, and a hedge, which involves buying a call or put of the same underlying at a different strike price (usually the case) or a different expiry.

A naked call or put exposes the writer to a potentially huge liability, even if improbable, for a relatively small gain. By critics this is called "picking up dimes in front of a steamroller." Placing a hedge on the original bet by making a smaller opposite bet reduces the maximum gain possible from the original bet, but also eliminates the risk of a huge loss.

If you trade two options (whether buying or selling) with the same expiration date, that is called a **VERTICAL SPREAD**. If the two options have different expiries, that is called a **CALENDAR SPREAD**.

If you write one option and buy another in a vertical spread, if the option that you write is more expensive than the option you buy, this is called a **CREDIT SPREAD.** If, on the other hand, the option that you buy is more expensive than the option you write, this is called a **DEBIT SPREAD**, because your account is debited with the difference.

If you profit if a stock goes up, then you have a **BULL SPREAD**, otherwise you have a **BEAR SPREAD**.

Candidates for our example:

May 17 expiry: 32 days on April 15

SPY ▾ Calls and Puts — 290.06 -0.10 (-0.03%)

MAY 13 '19 (28 DAYS) | MAY 15 '19 (30 DAYS) | MAY 17 '19 (32 DAYS) | MAY 20 '19 (35 DAYS) | MORE ▾

TABBED VIEW ▾ All STRIKES ▾ SMART ▾ SPY ▾ 100 IV: 0.7%

CALLS										STRIKE	PUTS									
CHANGE %	VOLUME	OPTN OP...	HIGH	LOW	LAST	ASK SIZE	BID SIZE	ASK	BID		BID	ASK	BID SIZE	ASK SIZE	LAST	LOW	HIGH	OPTN OP...	VOLUME	CHANGE %
-2.73%	281	7.22K	13.58	13.15	13.54	244	737	13.72	13.62	278	0.93	0.94	4,265	16,401	0.96	0.96	1.16	30.6K	1.98K	-2.04%
-2.23%	291	11.3K	12.72	12.12	12.72	51	1,228	12.80	12.71	279	1.01	1.02	18,898	359	1.03	1.03	1.25	23.6K	6.79K	-3.74%
-2.64%	65	30.5K	12.10	11.17	11.80	32	792	11.91	11.81	280	1.11	1.12	8,318	3,034	1.12	1.11	1.39	81.3K	2.12K	-4.27%
-3.83%	1.02K	15.3K	10.96	10.35	10.80	392	765	11.01	10.93	281	1.22	1.23	3,666	7,108	1.23	1.23	1.53	21.1K	2.34K	-3.91%
-3.67%	7.35K	17.7K	10.32	9.53	9.97	12	121	10.11	10.08	282	1.34	1.35	7,835	681	1.38	1.34	1.64	20.3K	4.27K	-1.43%
-3.16%	167	16.1K	9.50	8.71	9.19	40	285	9.25	9.22	283	1.48	1.49	3,301	3,279	1.50	1.50	1.76	25.4K	802	-2.60%
-3.70%	499	24.2K	8.63	7.89	8.33	61	112	8.41	8.38	284	1.64	1.65	363	5,503	1.65	1.65	2.02	31.0K	11.5K	-3.51%
-3.70%	679	39.0K	7.81	7.04	7.55	3	126	7.58	7.56	285	1.81	1.82	8,310	2	1.85	1.82	2.23	68.2K	2.90K	-2.12%
-5.54%	590	21.8K	7.00	6.32	6.65	228	433	6.79	6.76	286	2.02	2.03	217	3,450	2.03	2.02	2.45	19.6K	5.87K	-3.33%
-5.10%	871	31.5K	6.26	5.57	5.96	33	487	6.01	5.99	287	2.24	2.26	9,354	1,422	2.40	2.26	2.74	27.7K	5.87K	3.00%
-5.60%	6.96K	40.1K	5.44	4.85	5.23	499	1,119	5.28	5.25	288	2.51	2.53	3,384	3,658	2.55	2.54	3.06	29.2K	8.14K	-2.30%
-7.64%	2.22K	17.5K	4.66	4.19	4.47	36	1,536	4.57	4.55	289	2.82	2.83	10	942	2.83	2.83	3.43	12.6K	10.3K	-2.75%
-6.70%	12.3K	114K	4.15	3.55	3.90	1,242	298	3.92	3.90	290	3.16	3.18	2,229	1,887	3.21	3.14	3.80	76.9K	11.2K	-1.23%
-9.83%	2.54K	17.8K	3.55	3.00	3.21	289	3,225	3.30	3.28	291	3.56	3.57	371	28	3.59	3.59	4.25	6.02K	2.46K	-1.64%
-9.40%	1.90K	21.2K	2.93	2.49	2.70	369	144	2.74	2.73	292	4.01	4.03	556	472	4.04	4.02	4.75	6.80K	1.10K	-1.22%
-10.93%	1.98K	29.5K	2.43	2.06	2.20	10	3,743	2.23	2.22	293	4.52	4.55	596	940	4.65	4.58	5.25	3.39K	295	1.31%
-13.43%	1.21K	33.4K	2.00	1.64	1.74	4,488	3,899	1.80	1.78	294	5.10	5.13	184	828	5.28	5.06	5.90	1.20K	356	2.52%
-14.29%	43.9K	63.6K	1.60	1.29	1.38	6,237	4,920	1.42	1.40	295	5.75	5.78	58	403	5.77	5.77	6.48	2.09K	367	-0.17%
-15.08%	1.03K	46.0K	1.27	1.02	1.07	534	9,561	1.09	1.08	296	6.46	6.49	24	87	6.55	6.55	7.17	438	591	1.08%
-18.18%	2.06K	20.2K	0.96	0.78	0.81	4,142	15,560	0.83	0.82	297	7.21	7.29	357	1,204	7.42	7.42	7.75	237	179	2.34%
-21.05%	7.76K	30.4K	0.74	0.60	0.60	17,259	10,111	0.63	0.62	298	8.05	8.17	400	1,142	8.35	8.35	8.35	39	50	3.47%
-22.41%	160	20.1K	0.54	0.45	0.45	13,154	19,468	0.47	0.46	299	8.94	9.03	447	176	9.17	9.17	9.17	212	2	2.46%

SPY ▾ Calls and Puts — 290.03 -0.13 (-0.04%)

APR 15 '19 (0 DAYS) | APR 17 '19 (2 DAYS) | APR 18 '19 (3 DAYS) | APR 22 '19 (7 DAYS) | MORE ▾

TABBED VIEW ▾ All STRIKES ▾ SMART ▾ SPY ▾ 100 IV: 0.7%

CALLS										STRIKE	PUTS									
CHANGE %	VOLUME	OPTN OP...	HIGH	LOW	LAST	ASK SIZE	BID SIZE	ASK	BID		BID	ASK	BID SIZE	ASK SIZE	LAST	LOW	HIGH	OPTN OP...	VOLUME	CHANGE %
-23.58%	750	9.27K	2.43	1.61	1.88	167	81	2.11	2.08	288.5	0.46	0.47	3,384	2,737	0.51	0.51	0.90	6.36K	2.36K	-13.56%
-18.18%	16.6K	34.8K	2.08	1.29	1.71	518	50	1.73	1.71	289	0.59	0.60	1	5,774	0.59	0.61	1.12	11.8K	9.59K	-19.18%
-22.86%	6.25K	7.76K	1.73	1.01	1.35	968	206	1.39	1.37	289.5	0.74	0.75	2,412	21	0.75	0.75	1.34	6.35K	7.22K	-13.79%
-25.17%	35.2K	71.2K	1.39	0.77	1.07	52	310	1.08	1.07	290	0.94	0.95	812	113	0.95	0.93	1.61	36.9K	20.1K	-11.21%
-32.76%	3.98K	4.10K	1.09	0.62	0.78	5	3,657	0.82	0.81	290.5	1.18	1.20	1,034	69	1.20	1.15	1.88	1.49K	1.62K	-7.69%
-34.78%	11.4K	48.9K	0.86	0.43	0.60	6,147	4,179	0.62	0.60	291	1.48	1.50	108	856	1.50	1.42	2.24	6.89K	1.46K	-3.23%
-42.25%	11.9K	3.12K	0.66	0.32	0.41	10,116	6,301	0.45	0.43	291.5	1.81	1.84	66	780	1.92	1.75	2.60	766	205	3.23%
-44.44%	22.9K	51.8K	0.48	0.22	0.30	7,356	3,028	0.31	0.30	292	2.18	2.21	29	822	2.23	2.05	3.00	2.86K	1.36K	1.83%
-52.50%	896	16.6K	0.35	0.17	0.19	10,451	10,434	0.21	0.20	292.5	2.58	2.62	15	21	2.77	2.46	3.31	1.32K	131	8.20%

Might have also considered a closer expiry ...

Strategy 5 – The Bear Credit Spread – OTM options

The options trader doing a Bear Credit Spread essentially writes a call, typically near the money but out of the money,* to a counter-party who is buying the call.

Because she is writing a call, her account is credited for the value of the call** (less fees).

But, as we will see in our example, the call-writer has a huge potential liability because she has written a naked call.

Therefore she has to hedge her written call. To do that, she caps her liability by also buying a less expensive call that is further out of the money. On net, the hedge will reduce her credit and her profit, put prevent catastrophic loss in case the underlying stock has a positive 4-sigma surge.

Often the person writing the bear credit spread will choose deltas that enhance the policy, such as "write a call with an approximate 0.45 delta, buy a hedge call with an approximate 0.25 delta.

*This is not a hard and fast rule. There may be a reason to write an ITM call.
**Although this cash is credited to the account, it is committed and cannot be used until the trade is offset.

Some examples - gathering some useful information about the calls ... especially the deltas.

SPY ▾ Calls and Puts

MAY 13 '19[W] 28 DAYS | MAY 15 '19[W] 30 DAYS | **MAY 17 '19 32 DAYS** | MAY 20 '19[W] 35 DAYS | MORE ▾

SPY: 290.06

CALLS

CHANGE %	VOLUME	OPTN OP...	HIGH	LOW	LAST	ASK SIZE	BID SIZE	ASK	BID	STRIKE
-4.46%	919	31.5K	6.26	5.57	6.00	90	48	5.99	5.96	287
-5.60%	6.92K	40.1K	5.44	4.85	5.23	108	24	5.25	5.23	288
-5.37%	2.28K	17.5K	4.66	4.19	4.58	32	634	4.55	4.53	289
-6.70%	12.3K	114K	4.15	3.55	3.90	832	42	3.90	3.88	290
-7.58%	2.54K	17.8K	3.55	3.00	3.29	2,235	52	3.29	3.27	291
-8.05%	1.91K	21.2K	2.93	2.49	2.74	413	100	2.73	2.71	292
-10.93%	1.99K	29.5K	2.43	2.06	2.20	36	100	2.22	2.21	293
-10.45%	1.22K	33.4K	2.00	1.64	1.80	5,597	2,492	1.79	1.77	294
-14.29%	43.9K	63.6K	1.60	1.29	1.38	5,824	6,015	1.41	1.39	295
-15.08%	1.03K	46.0K	1.27	1.02	1.07	6,878	10,721	1.09	1.07	296
-16.16%	2.07K	20.2K	0.96	0.78	0.83	3,911	449	0.83	0.82	297
-21.05%	8.05K	30.4K	0.74	0.60	0.60	20,820	19,691	0.63	0.61	298
-22.41%	165	20.1K	0.54	0.45	0.45	12,981	13,978	0.47	0.46	299
-20.93%	4.35K	70.5K	0.44	0.34	0.34	428	17,527	0.35	0.34	300
-21.21%	10.1K	3.47K	0.32	0.26	0.26	34,082	6,729	0.27	0.26	301
-16.00%	55	4.29K	0.24	0.20	0.21	49,764	2,861	0.21	0.20	302
-25.00%	121	16.5K	0.19	0.15	0.15	28,231	26,274	0.16	0.15	303
-18.75%	154	2.16K	0.13	0.13	0.13	48,857	16,373	0.13	0.12	304
-8.33%	153	12.4K	0.11	0.10	0.11	5,789	57,038	0.10	0.09	305
-10.00%	126	20.3K	0.10	0.08	0.09	63,376	11,668	0.09	0.08	306
-12.50%	11	804	0.08	0.07	0.07	14,968	60,586	0.07	0.06	307
-14.29%	1.71K	57	0.07	0.06	0.06	88,332	271	0.07	0.06	308

```
Date:  Mon Apr 15 2019
Strike price:  292.00
Days to expiry:  32
Call ASK:  2.730
Call BID:  2.700
Call price (PEG):  2.718
The Delta: 0.4280
One day time decay: 0.057
The call's implied probability:  0.00532
```

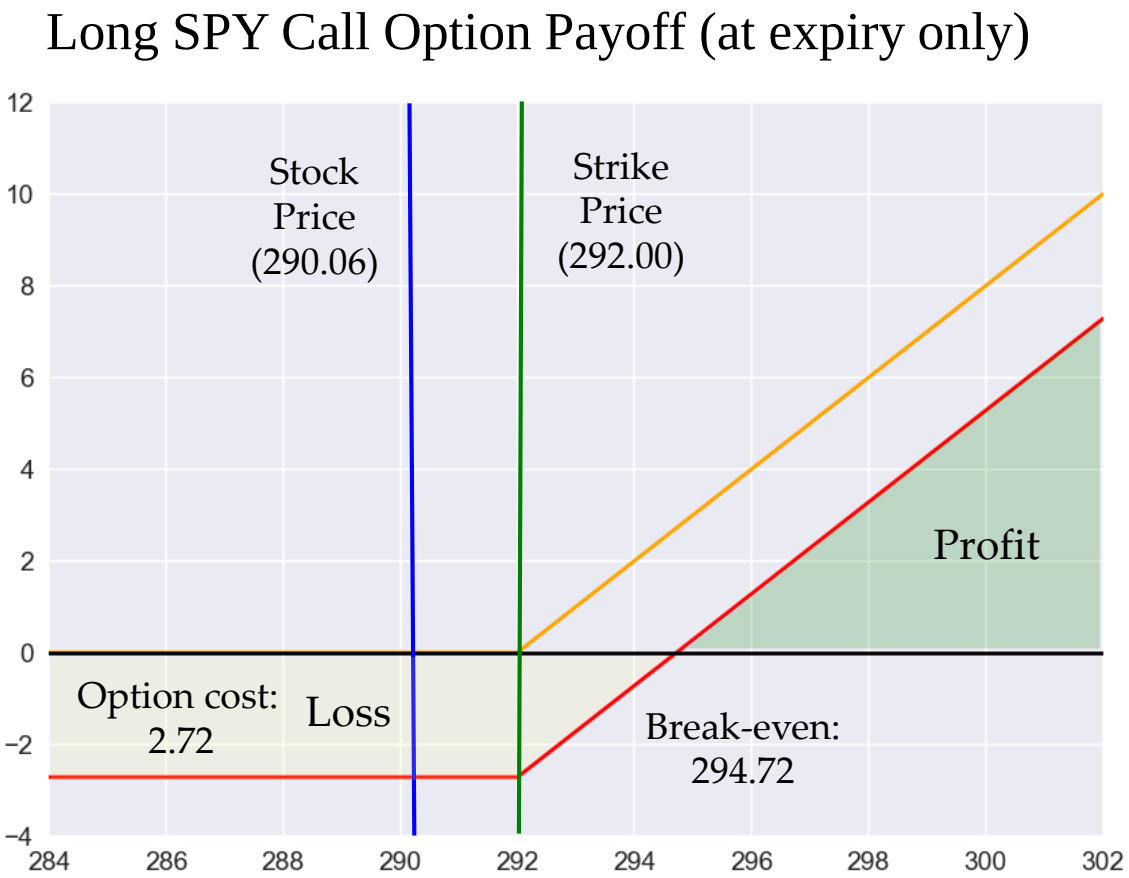
```
Date:  Mon Apr 15 2019
Strike price:  295.00
Days to expiry:  32
Call ASK:  1.410
Call BID:  1.390
Call price (PEG):  1.402
The Delta: 0.2818
One day time decay: 0.045
The call's implied probability:  0.00487
```

```
Date:  Mon Apr 15 2019
Strike price:  296.00
Days to expiry:  32
Call ASK:  1.090
Call BID:  1.070
Call price (PEG):  1.082
The Delta: 0.2353
One day time decay: 0.040
The call's implied probability:  0.00475
```

```
Date:  Mon Apr 15 2019
Strike price:  297.00
Days to expiry:  32
Call ASK:  0.830
Call BID:  0.820
Call price (PEG):  0.826
The Delta: 0.1929
One day time decay: 0.035
The call's implied probability:  0.00465
```

Why? Because many spread traders who trade credit spreads in calls, for example, like to follow rules like (1) write (short) a 0.45 delta call and (2) buy (as a hedge) a 0.30 or 0.25 call. Such a strategy will always produce a credit (as we will see).

Review: In order to understand the logic of the OTM Bear Credit Spread



Here we are looking at the trade from the perspective of the counter-party.

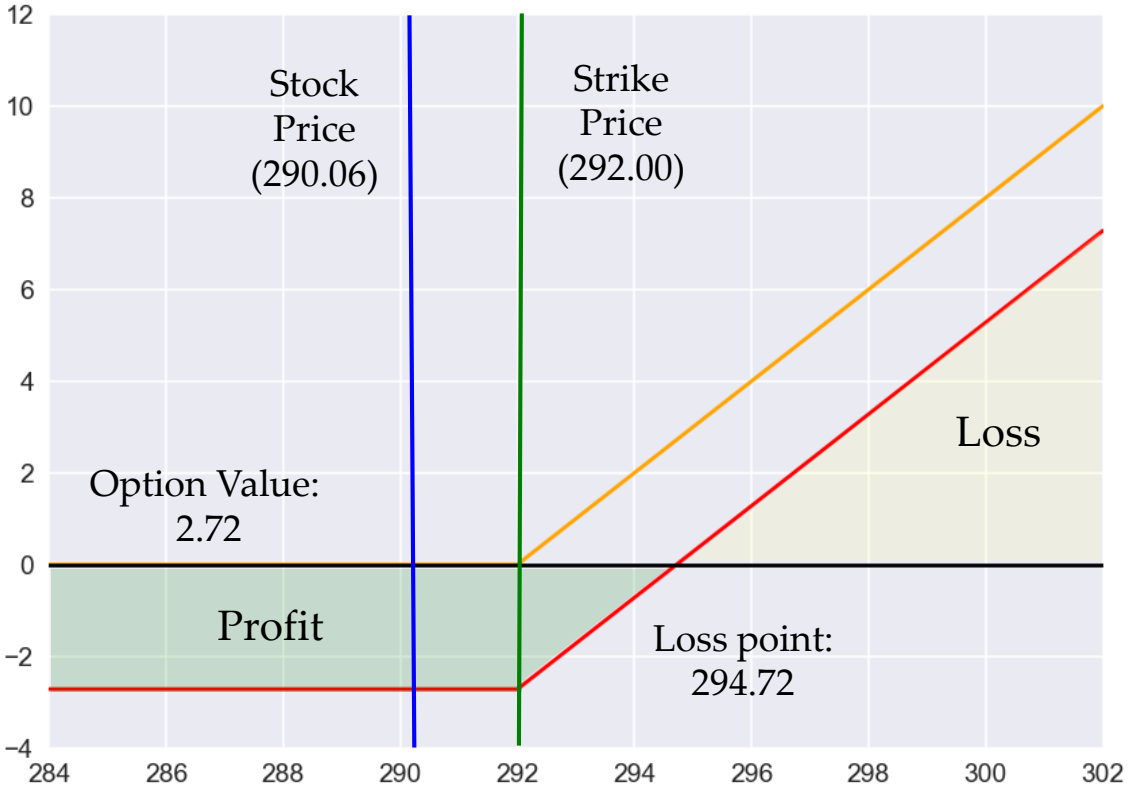
When you do a bear credit spread, the strategy is the opposite of buying a call ... in fact, someone must buy your call for the strategy to work.

Shown here is the payoff for the person on the other side of the trade (for the first leg).

Your counter-party's trade (your first leg): Buy the 292 Call for 2.72. His option will have intrinsic value if the stock rises above 292, and he will have a profit if the stock goes above 294.72.

The position for the writer of that same call ...

Short (written) SPY Call Option Payoff (at expiry only)



The call-writer's trade is the mirror-image of the counter-party trade. His loss is her gain, his gain is her loss

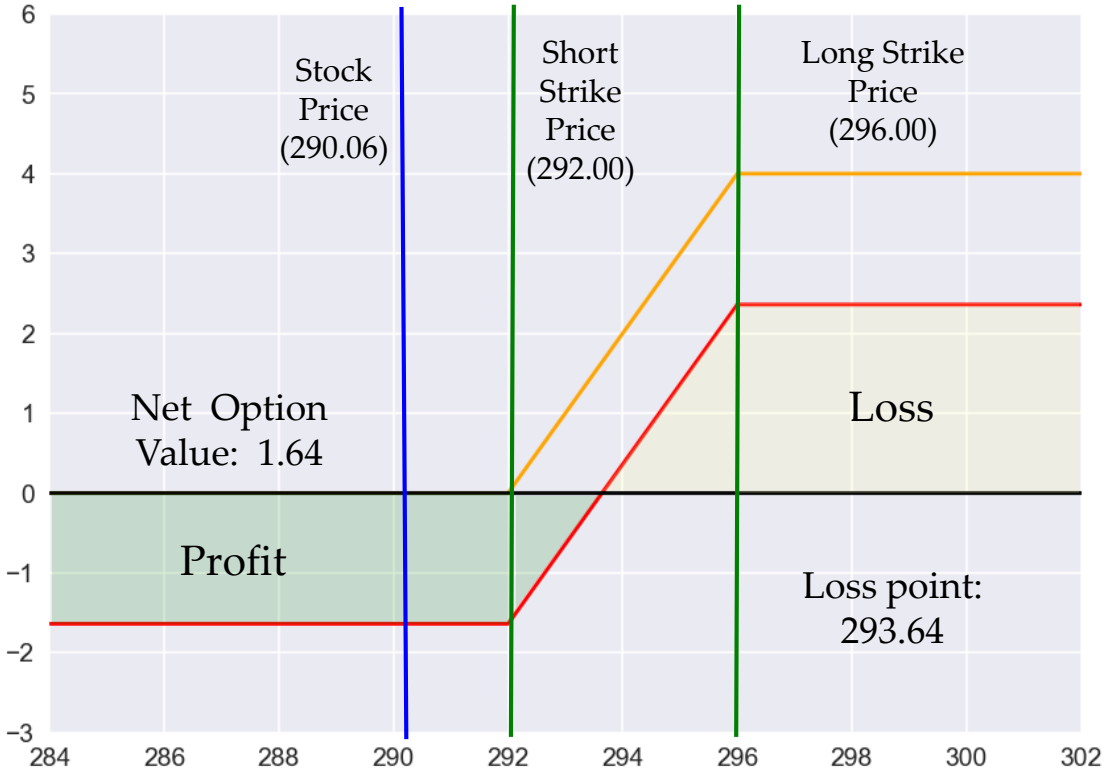
The writer pockets the 2.72 per share (so this is a **credit** trade), but may have to give it back and more if the stock rises above 294.72.

Note the potential for a huge loss in the event of a sharp rise in the price of the stock. Therefore the smart trader will hedge by buying a low-delta call. But how much of a hedge?

So far, this is just a naked call with unacceptable exposure. When the hedge is added, this is called a **bear credit spread**.

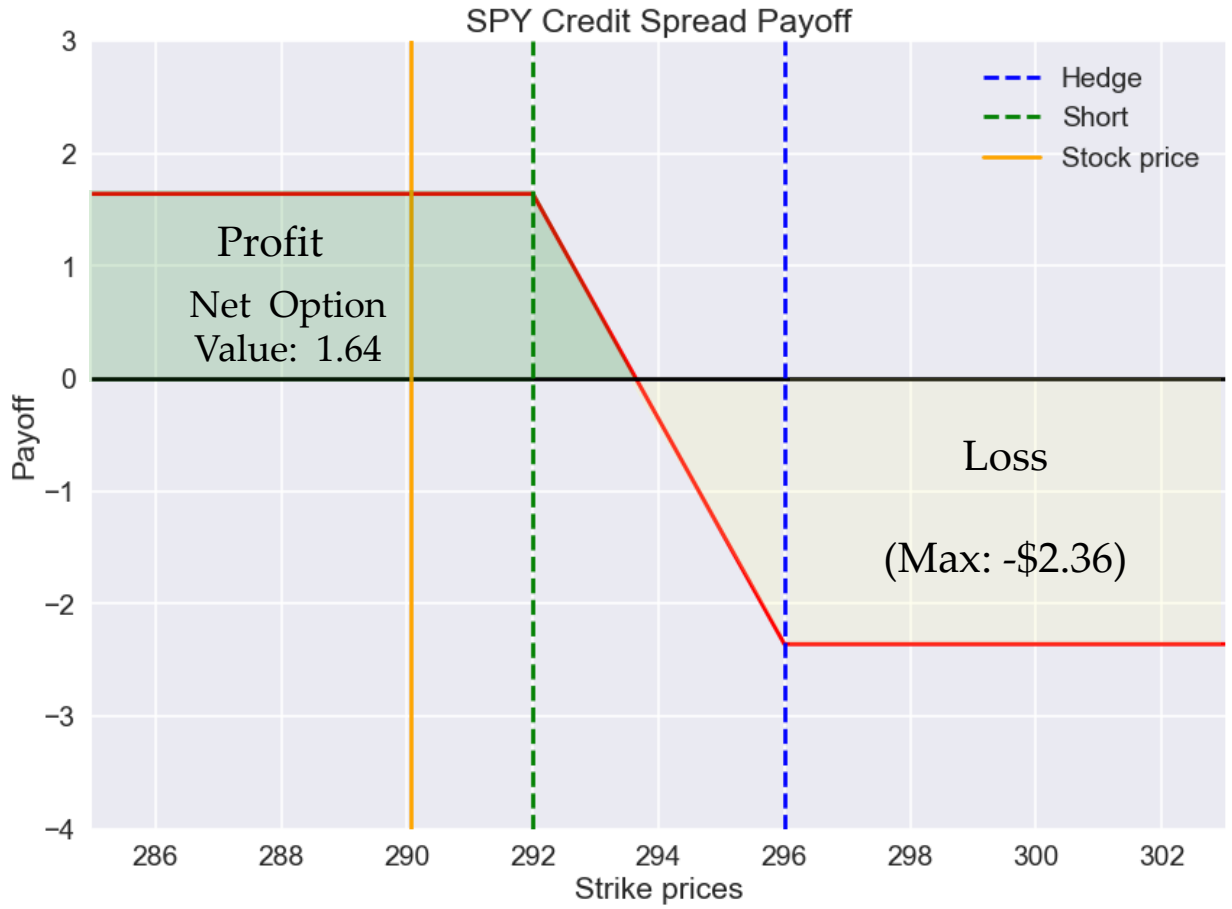
The hedged position ...

OTM Bear Credit Spread Payoff (at expiry only)



1. Why "credit?"
   - Because the transaction starts cash positive, given that you are selling an asset more valuable that the hedge.
2. Why "spread?"
   - This is the standard term for two-legged positions where one is long and the other short.
3. Why "bear?"
   - This is a bet that the market will not rise. It doesn't have to go down, but it can't rise.
4. When would you do this?
   - When you think call options are over-valued or when you think there is a genuine bear market.
5. Typical delta strategy?
   - Sell at 0.48 – 0.40
   - Buy at 0.20 – 0.25

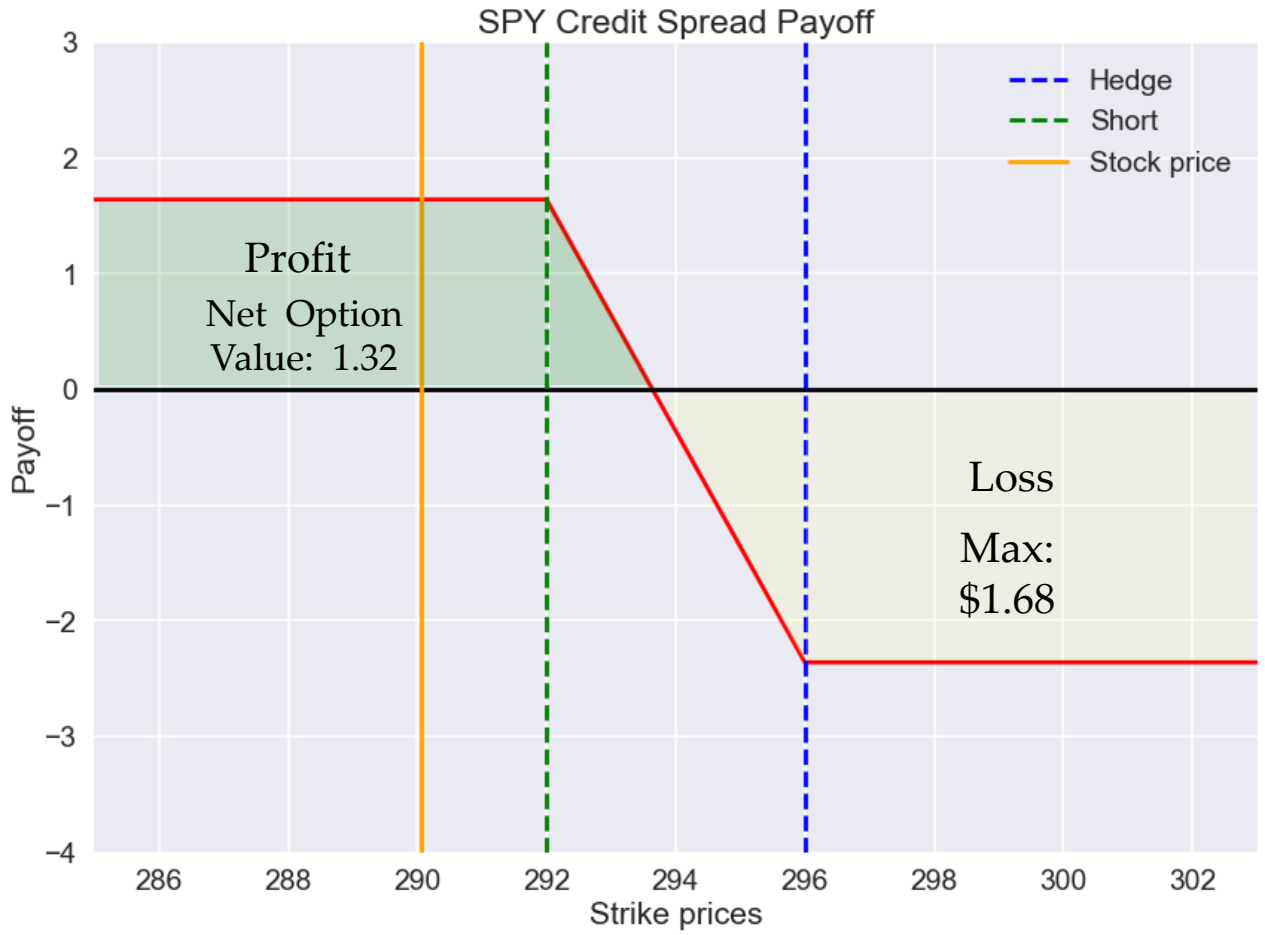
How the OTM Bear Credit Spread payoff is normally shown ...



Underlying	
SPY	
290.06	
Short	
SPY Call	292
days	32
Credit:	$2.92
Delta:	0.42
Long	
SPY Call	296
days	32
Debit:	$1.08
Delta:	0.23
Specs	
Max gain:	$1.64
Max Loss:	-$2.36

The OTM Bear Credit Spread trader also must face **assignment risk**! If the original call option that was written goes into the money (if the underlying goes above 292), then the call ***at any point*** can be assigned, which will require to trader to buy the stock to cover the assignment. This further implies that the amount of cash required to cover a Bear Credit Spread is, with a margin account, 50% of the value of 100 shares at the strike, which in this example is $14,600!

More insurance ... using a higher delta hedge

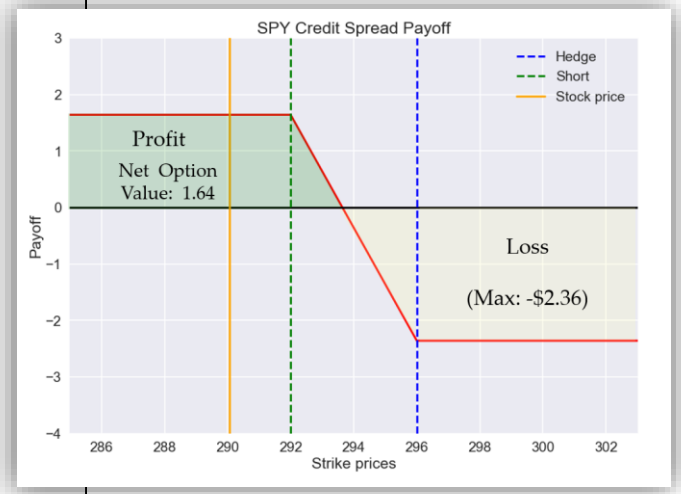


Underlying	
SPY	
290.06	
Short	
SPY Call	292
days	32
Credit:	$2.92
Delta:	0.42
Long	
SPY Call	295
days	32
Debit:	$1.40
Delta:	0.28
Specs	
Max gain:	$1.32
Max Loss:	-$1.68

Obviously the maximum gain and loss and general risk exposure depends upon your choice of hedge. Here we are considering a hedge (295) with a higher delta, which, when compared to the previous hedge, offers a smaller maximum gain but also a smaller loss. Hence the selection of legs based upon deltas.

Common features of Bear Credit Spreads (so we can program them):

1. The credit will equal the value of the shorted option minus the the value of the hedge option.
   - $1.64 = 2.92 – 1.08
2. The credit will also be the maximum gain!
   - $1.64
3. The maximum loss will always equal the spread between the short strike and the hedge strike minus the credit.
   - -$2.36 = (292 – 296) + 1.64
4. The maximum gain will always apply to all final stock prices below the short strike.
5. The maximum loss will always apply to all final stock prices above the hedge strike.
6. The probability of maximum game is always equal to one minus the delta of the short strike option.
7. The probability of maximum loss is always equal to the delta of the hedge strike option.
8. The probability of an outcome between the maximums is equal to one minus the sum of the maximum's individual probabilities.



Our Python program -

Credit Spread mappings - Master

credit_spread_v1_1_master April 20, 2019. This is the master. Do not alter. Copy to revise!

Designed by Prof Evans for use by students in Econ 136.

In [15]:
```
%matplotlib inline
```

In [16]:
```
import numpy as np
import math
import matplotlib.pyplot as plt
import seaborn as sns
```

Later versions of this allow it to be used with puts. Call = True is a marker for that only and not used here. The delta for the two strikes likewise is not used in this but is used in the student HW problem, so those markers are set here as well. The short-strike refers to the option that we are writing, which will be more expensive than the hedge. The hedge refers to the option that we are buying as a hedge. The short_delta will be higher than the hedge_delta, like 0.45 compared to 0.25.

In [17]:
```
call = True
stosym = "SPY"
expiry = "20190517"
days = int(17)
stock_price = 290.06
short_strike = 292.00
short_price = 2.72
hedge_strike = 295.0
hedge_price = 1.40
short_delta = "Nan"
hedge_delta = "Nan"
```

These elementary formulas below work for all credit spreads.

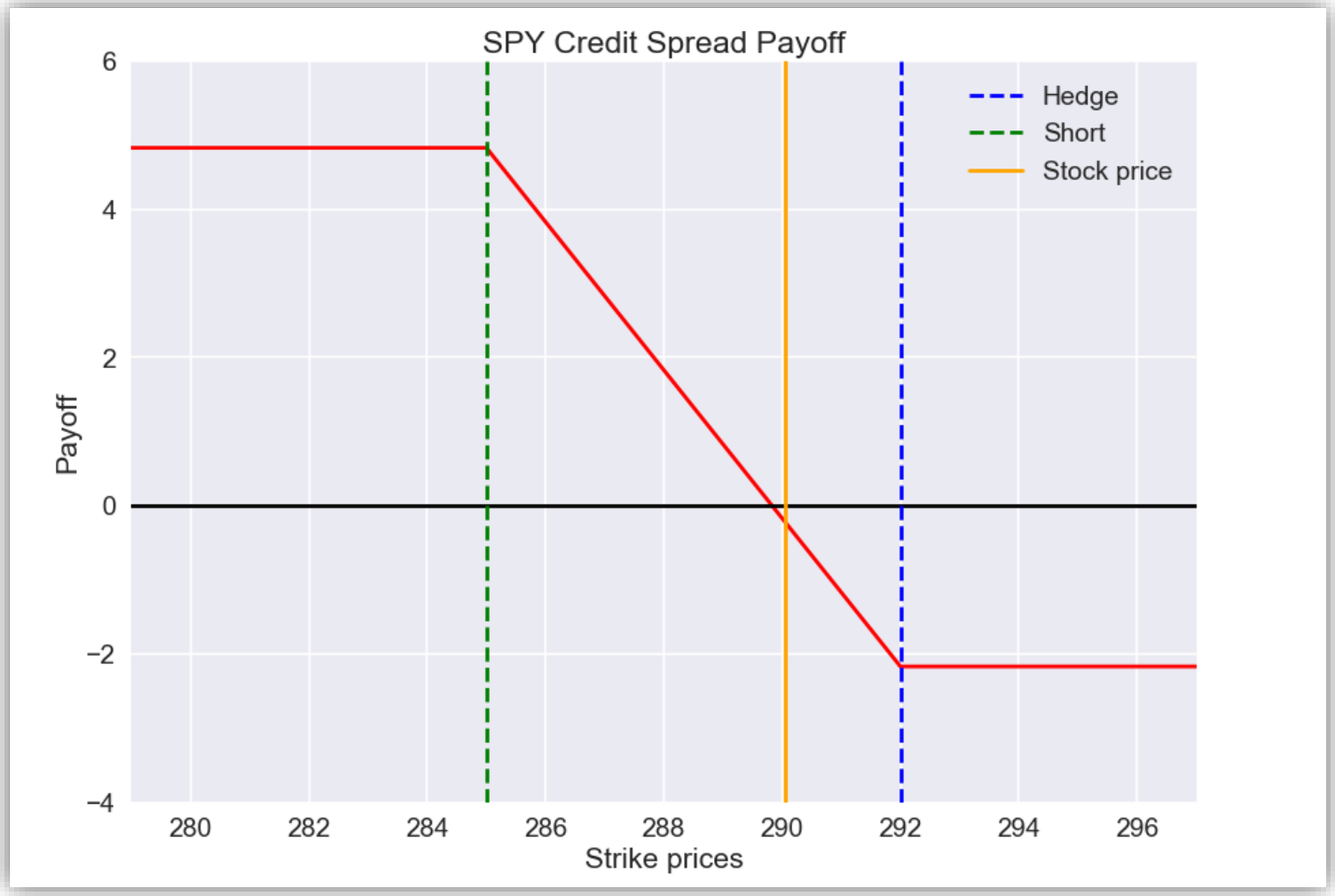
In [18]:
```
spread = hedge_strike - short_strike
max_gain = short_price - hedge_price
max_loss = max_gain - spread
print ("Spread: {:.2f}, Maximum gain: {:.3f}, and Maximum Loss: {:.3f}.".format(spread,max_gain,max_loss))
```

```
Spread: 3.00, Maximum gain: 1.320, and Maximum Loss: -1.680.
```

For the mapping, we center allow 19 strikes by default, and then center that on either the center of the spread or on the stock price. We then allow an offset for the sake of appearance. The user can experiment with the appearance by over-riding the defaults. Then we set the strikes and print (for debugging).

In [19]:
```
num_strikes = 19  #default 19 - must be an odd number
sides = (num_strikes - 1)/2
#  center = int(stock_price)
center = int(short_strike + (spread/2))
left_offset = 0  # this shifts the center of the mapping left (pos) or right (neg)
low_str = center - sides + left_offset
hi_str = center + sides + left_offset
```

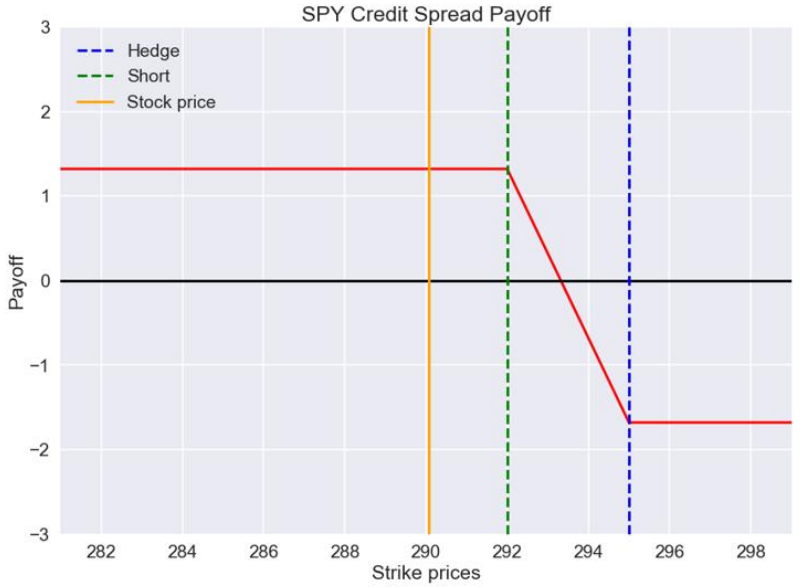
An example of a deep bear spread (of the kind used in the CBOE educational examples):

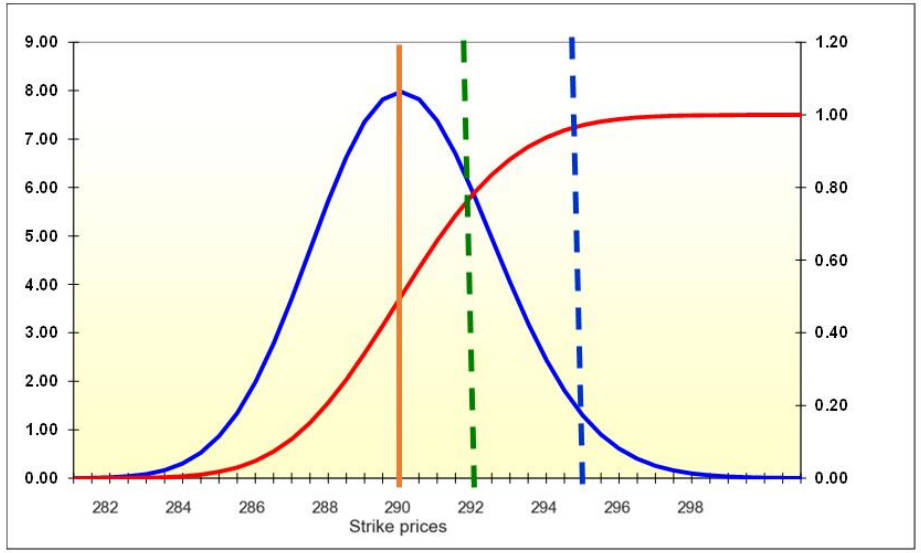



```
Underlying:  SPY
Stock price: 290.06.
Expiry:  20190517
Days:  17
Short strike: 285.00.
Short strike price: 7.57.
Hedge strike: 292.00.
Hedge strike price: 2.74.
Spread: 7.00.
Max gain: 4.83.
Max loss: -2.17.
```

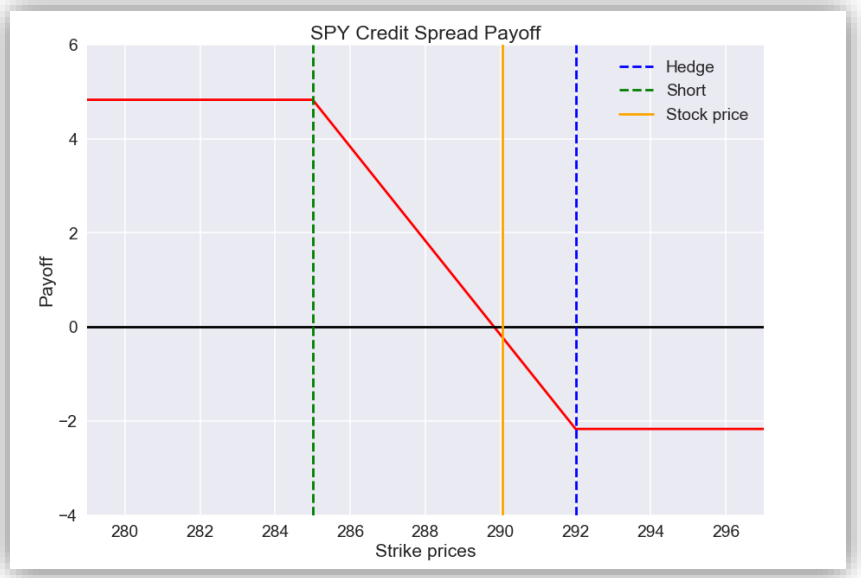
The problem with this?? Assignment and the cash requirements associated with assignment!

But what about assignment risk???





versus ..



The amount of cash needed to secure a spread equals 50% of a 100 share long position because of assigment risk. This lowers the projected ROI!

Strategy 6 – The OTM Bull Credit Spread

The options trader doing a Bull Credit Spread essentially writes a put, typically near the money but out of the money,* to a counter-party who is buying the put.

Because he is writing a put, his account is credited for the value of the call** (less fees).

The put-writer has a huge potential liability because she has written a naked put.

Therefore he has to hedge his written put. To do that, he caps his liability by also buying a less expensive put that is further out of the money. On net, the hedge will reduce his credit and his profit, put prevent catastrophic loss in case the underlying stock has a 4-sigma plunge.

Often the person writing the bull credit spread will choose deltas that enhance the policy, such as "write a put with an approximate 0.45 delta, buy a hedge put with an approximate 0.25 delta.

*This is not a hard and fast rule. There may be a reason to write an ITM put.
**Although this cash is credited to the account, it is committed and cannot be used until the trade is offset.

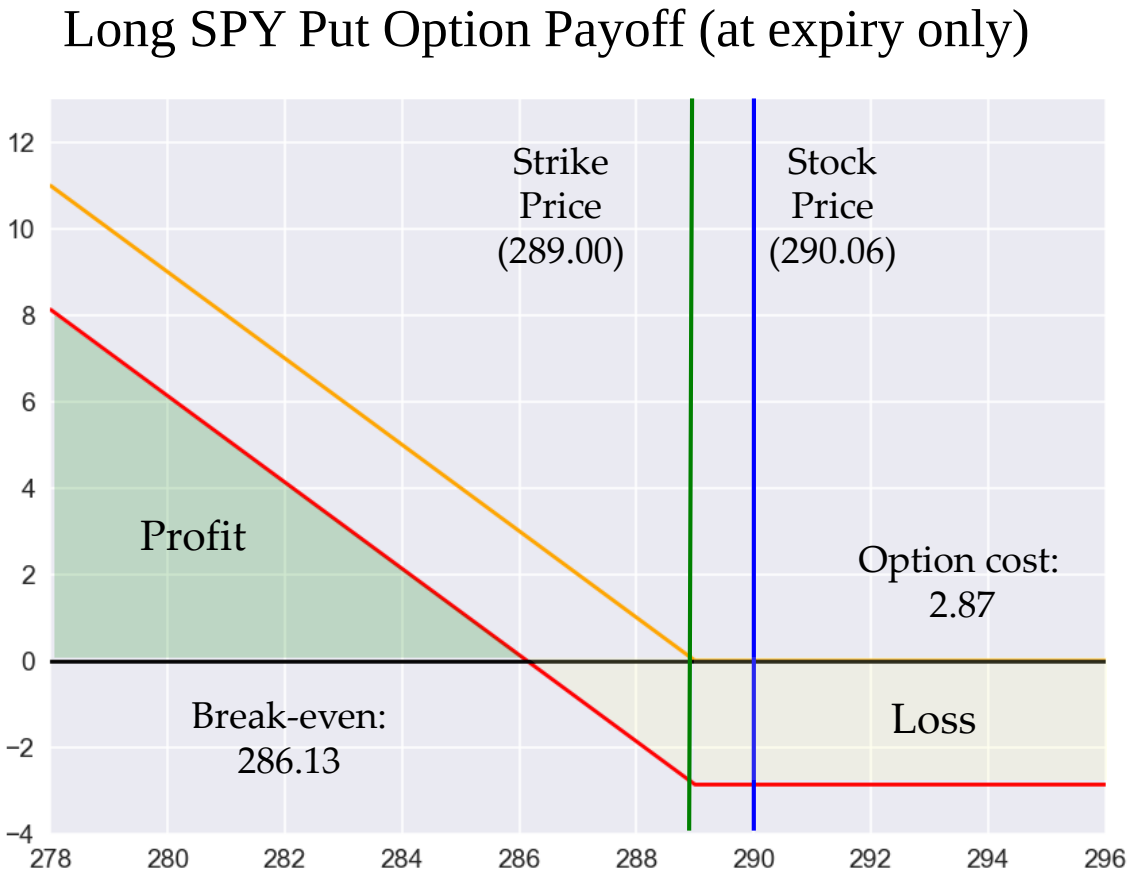
May 17 32 days on April 15, 2019 SPY: 290.06

Mudd (Palm Island Traders) finance

PUTS SPY: 290.06 IV: 0.7%

STRIKE	BID	ASK	BID SIZE	ASK SIZE	LAST	LOW	HIGH	OPTN OP...	VOLUME	CHANGE %
273	0.62	0.63	15,023	6,838	0.62	0.62	0.77	10.9K	3.47K	-4.62%
274	0.67	0.68	20,427	1,507	0.67	0.67	0.83	25.5K	359	-4.29%
275	0.73	0.74	16,077	6,248	0.73	0.72	0.92	57.2K	5.10K	-3.95%
276	0.79	0.80	18,505	430	0.81	0.80	0.98	24.0K	814	-1.22%
277	0.86	0.87	17,216	2	0.93	0.86	1.06	23.8K	532	3.33%
278	0.94	0.95	13,993	303	0.96	0.96	1.16	30.6K	1.98K	-2.04%
279	1.03	1.04	7,813	7,301	1.02	1.02	1.25	23.6K	6.80K	-4.67%
280	1.13	1.14	3,338	11,375	1.13	1.11	1.39	81.3K	2.02K	-3.42%
281	1.24	1.25	3,144	10,668	1.23	1.23	1.53	21.1K	2.46K	-3.91%
282	1.36	1.37	9,798	33	1.35	1.34	1.64	20.3K	4.31K	-3.57%
283	1.50	1.51	10,152	33	1.49	1.49	1.76	25.4K	801	-3.25%
284	1.66	1.67	4,863	227	1.65	1.65	2.02	31.0K	11.5K	-3.51%
285	1.84	1.85	4,565	82	1.83	1.82	2.23	68.2K	2.91K	-3.17%
286	2.05	2.06	658	1,958	2.03	2.02	2.45	19.6K	5.88K	-3.33%
287	2.28	2.30	3,242	4,495	2.26	2.26	2.74	27.7K	5.92K	-3.00%
288	2.55	2.57	1,640	4,336	2.55	2.54	3.06	29.2K	8.14K	-2.30%
289	2.86	2.88	403	5,187	2.84	2.83	3.43	12.6K	10.4K	-2.41%
290	3.21	3.23	437	3,195	3.22	3.14	3.80	76.9K	11.6K	-0.92%
291	3.61	3.63	355	1,422	3.60	3.59	4.25	6.02K	2.48K	-1.37%
292	4.07	4.09	148	1,862	4.05	4.02	4.75	6.80K	1.28K	-0.98%
293	4.58	4.61	306	1,332	4.65	4.55	5.25	3.39K	296	1.31%
294	5.17	5.19	68	1,488	5.28	5.06	5.90	1.20K	353	2.52%

Review: In order to understand the logic of the Bull Credit Spread



Your counter-party's trade (your first leg): Buy the 289 Put for 2.72 for 2.87. Her option will have intrinsic value if the stock falls below 289, and she will have a profit if the stock goes below 286.13.

When you do a bull credit spread, the strategy is the opposite of buying a put ... in fact, someone must buy your put for the strategy to work.

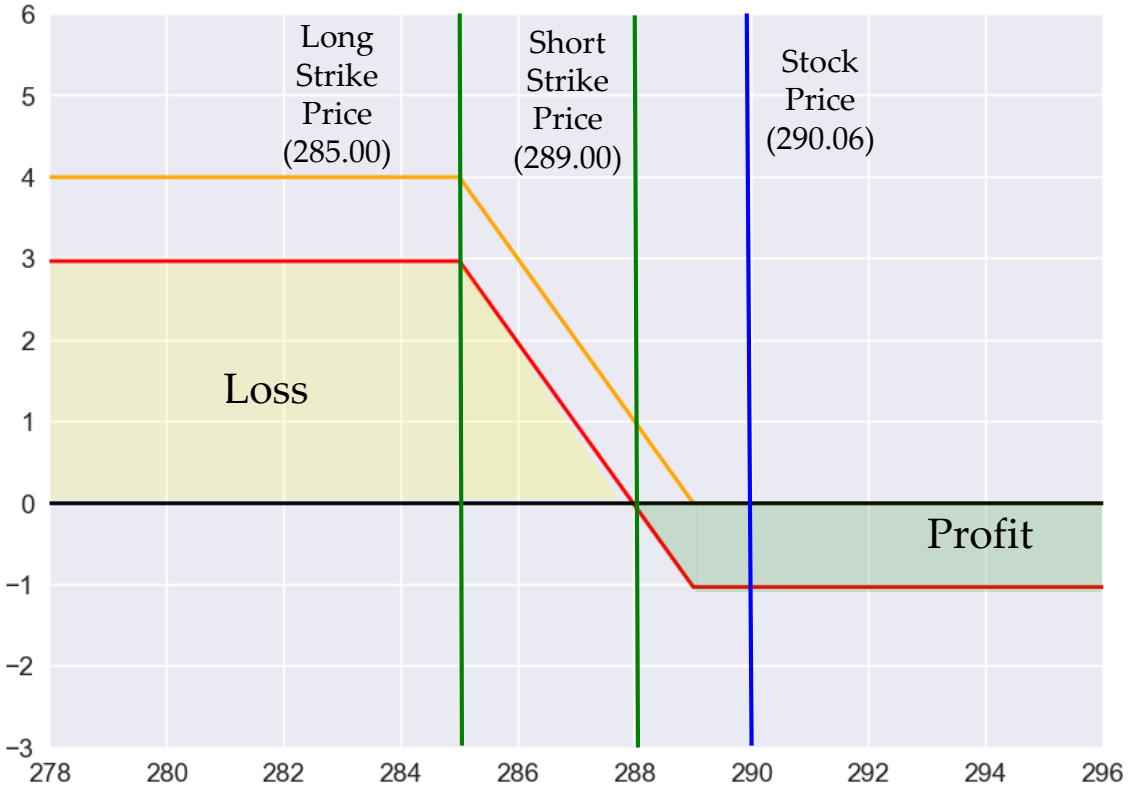
As before, we start by reminding ourselves of the payoff for your counterparty?

The counterparty's gain is our loss and loss is our gain.

Likewise, it is clear that we will have to hedge by buying a cheaper put, like the 285 (not shown).

The reversed (written) hedged position:

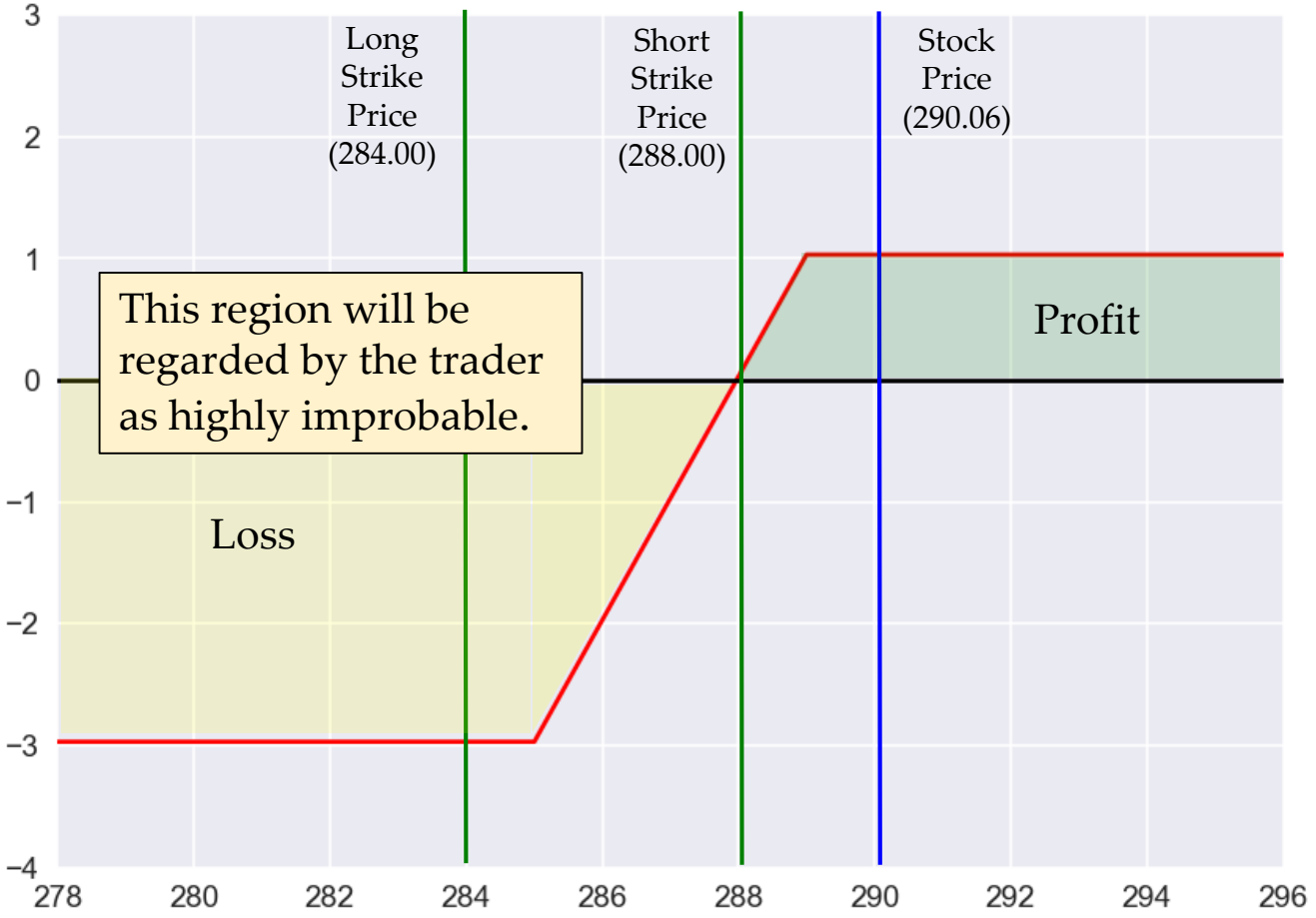
Bull Credit SPY Put Payoff (at expiry only)



Here we are still looking at it from the perspective of the counter-party (although it is not the original counter-party who sold you the hedge

1. Why "credit?"
   - Because the transaction starts cash positive, given that you are selling an asset more valuable that the hedge.
2. Why "spread?"
   - This is the standard term for two-legged positions where one is long and the other short.
3. Why "bull?"
   - This is a bet that the market will rise, or at least that it will not go down.
4. When would you do this?
   - When you think options are being priced without drift parameters and/or during a genuine momentum market.
5. Typical delta strategy?
   - Sell at 0.48 – 0.40
   - Buy at 0.20 – 0.25

How the Bull Credit Spread payoff is normally shown ...



Underlying	
SPY	
290.06	
Short	
SPY Put	289
days	32
Credit:	$2.87
Delta:	unk
Long	
SPY Put	285
days	32
Debit:	$1.84
Delta:	unk
Specs	
Max gain:	$1.03
Max Loss:	-$2.97

Once again, The Bull Credit Spread trader also must face **assignment risk**! If the original put option that was written goes into the money (if the underlying goes above 288), then the put ***at any point*** can be assigned. This implies that the amount of cash required to cover a Bear Credit Spread is, with a margin account, 50% of the value of 100 shares at the strike, which in this example is $14,600!

Strategy ... [some of these are alternatives]

- Use your scanners to find anomalous short-term prices, where IV is considerably above short-term (30-day or 90-day) HV.
- Find stocks (like AMD) that have consistently expensive options (IV consistently above short-term HV.
- If using index ETFs (and stocks that are correlated with index ETFs) jump into these when the VIX shoots up, avoid when the VIX falls (and here we are referring to very-short-term)

... and specifically Bull (Put) Credit Spreads

- In a strong bull market, and especially a momentum market, models using BSM-style calculators that do not include drift are overestimating put values and puts are trading at a consistent premium. In a momentum market, symmetric puts should be less expensive than their call counterparts and they are not!!
- There may be a large insurance premium built into put hedge positions, especially in the index ETF puts (including SPX).
- **Write puts when this is true**

... and ignore Reddit recommendations to do this with cash-secured puts.

Models and preparation ..

Unlike what is often implied on Reddit, writing options does not guarantee gains and you are not merely harvesting premium. The standard is not to merely make a profit, it is, at a minimum, to outperform SPX. (If writing covered calls, the goal is not to make a profit, it is to beat the gain that you would have made by holding a mere long position in the underlying)! Therefore, this will not likely work unless you use a computer-assisted approach. At a minimum, you must have programs that will ...

- Evaluate the full range of HVs for the underlying.
- Either a good options pricing model that makes a reasonable delta estimate or a direct ITM probability estimator (like our first model).
- A variation of the model used in this lecture, that will turn payoffs into expected values (your final HW), preferably in automated form.
- Scanning model(s) similar to the ib-strangle model that we have that will automate the search of you are searching for anomalies.

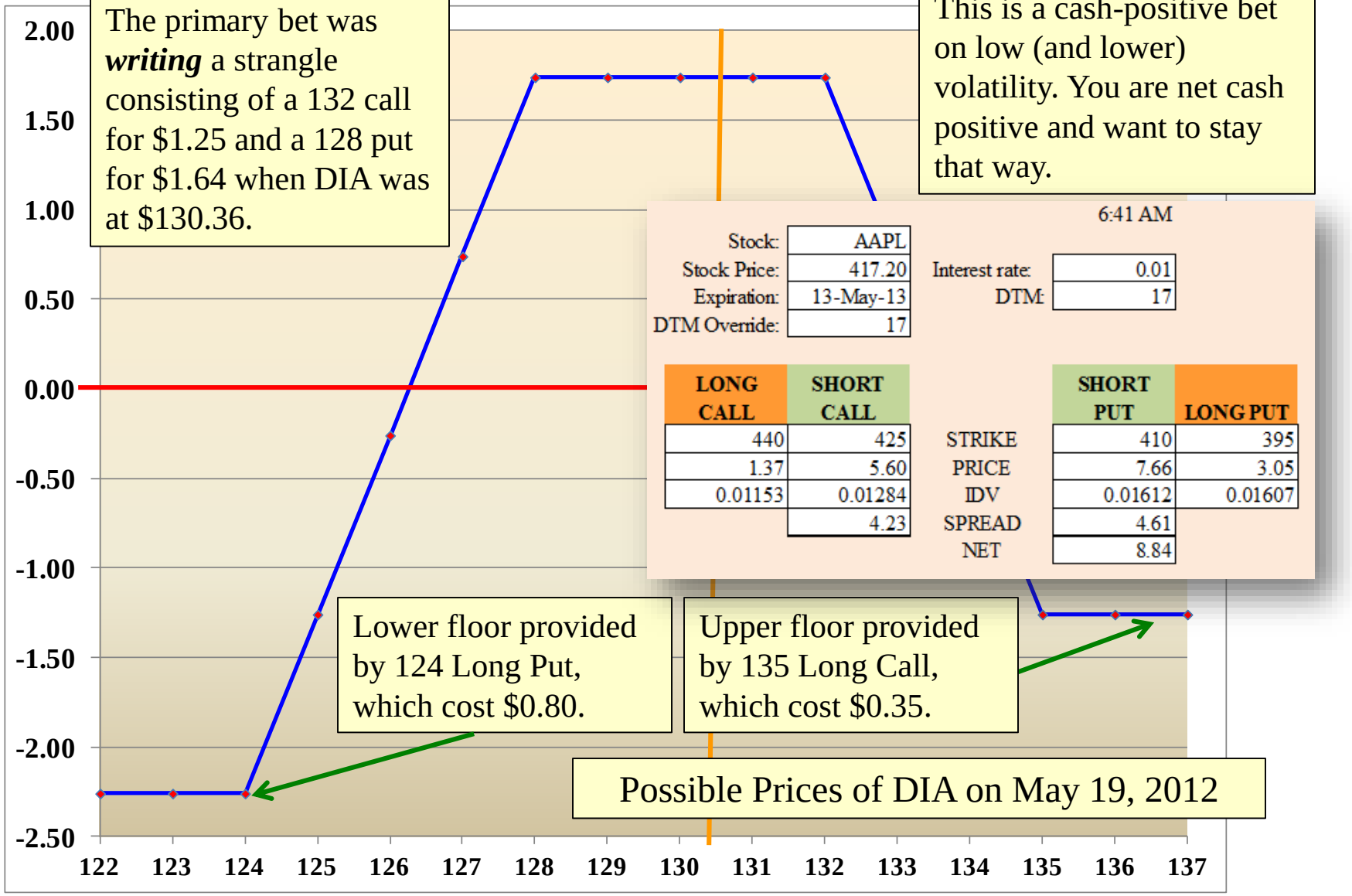
... and this leads into our final Homework.

You are not accountable for anything past this point in 2019, but I include older slides about more esoteric strategies in case you care to review them. In addition, if curious about this, make sure you review the Aruba slides about writing covered calls, which was actually Prof E's specialty (but we never got to it).

Strategy 7: The Iron Condor

The primary bet was ***writing*** a strangle consisting of a 132 call for $1.25 and a 128 put for $1.64 when DIA was at $130.36.

This is a cash-positive bet on low (and lower) volatility. You are net cash positive and want to stay that way.



6:41 AM

Stock:	AAPL		
Stock Price:	417.20	Interest rate:	0.01
Expiration:	13-May-13	DTM:	17
DTM Override:	17		

	LONG CALL	SHORT CALL		SHORT PUT	LONG PUT
STRIKE	440	425	STRIKE	410	395
PRICE	1.37	5.60	PRICE	7.66	3.05
IDV	0.01153	0.01284	IDV	0.01612	0.01607
		4.23	SPREAD	4.61	
			NET	8.84	

Lower floor provided by 124 Long Put, which cost $0.80.

Upper floor provided by 135 Long Call, which cost $0.35.

Possible Prices of DIA on May 19, 2012

Strategy 8: Butterfly spreads (call)

Betting on no or little price movement: (1) Buy one ITM call, (2) buy one OTM call, (3) write two ATM calls. This is done normally for near-term expiration dates.

5.86		5.94	ITM	182 Mar 22 2014		0.68		0.69
4.95		5.05	ITM	183 Mar 22 2014		0.85		0.86
4.18		4.21	ITM	184 Mar 22 2014		1.05		1.06
3.40		3.41	ITM	185 Mar 22 2014		1.31		1.32
2.67		2.69	ITM	186 Mar 22 2014		1.64		1.65
2.01		2.02	ITM	187 Mar 22 2014		2.05		2.06
1.44		1.45		188 Mar 22 2014	ITM	2.54		2.56
0.98		0.99		189 Mar 22 2014	ITM	3.15		3.17
0.62		0.63		190 Mar 22 2014	ITM	3.85		3.90
0.38		0.39		191 Mar 22 2014	ITM	4.67		4.72
0.23		0.24		192 Mar 22 2014	ITM	5.54		5.61
0.14		0.15		193 Mar 22 2014	ITM	6.46		6.54

SPY: 187.44

W: 2 187 for 2.02

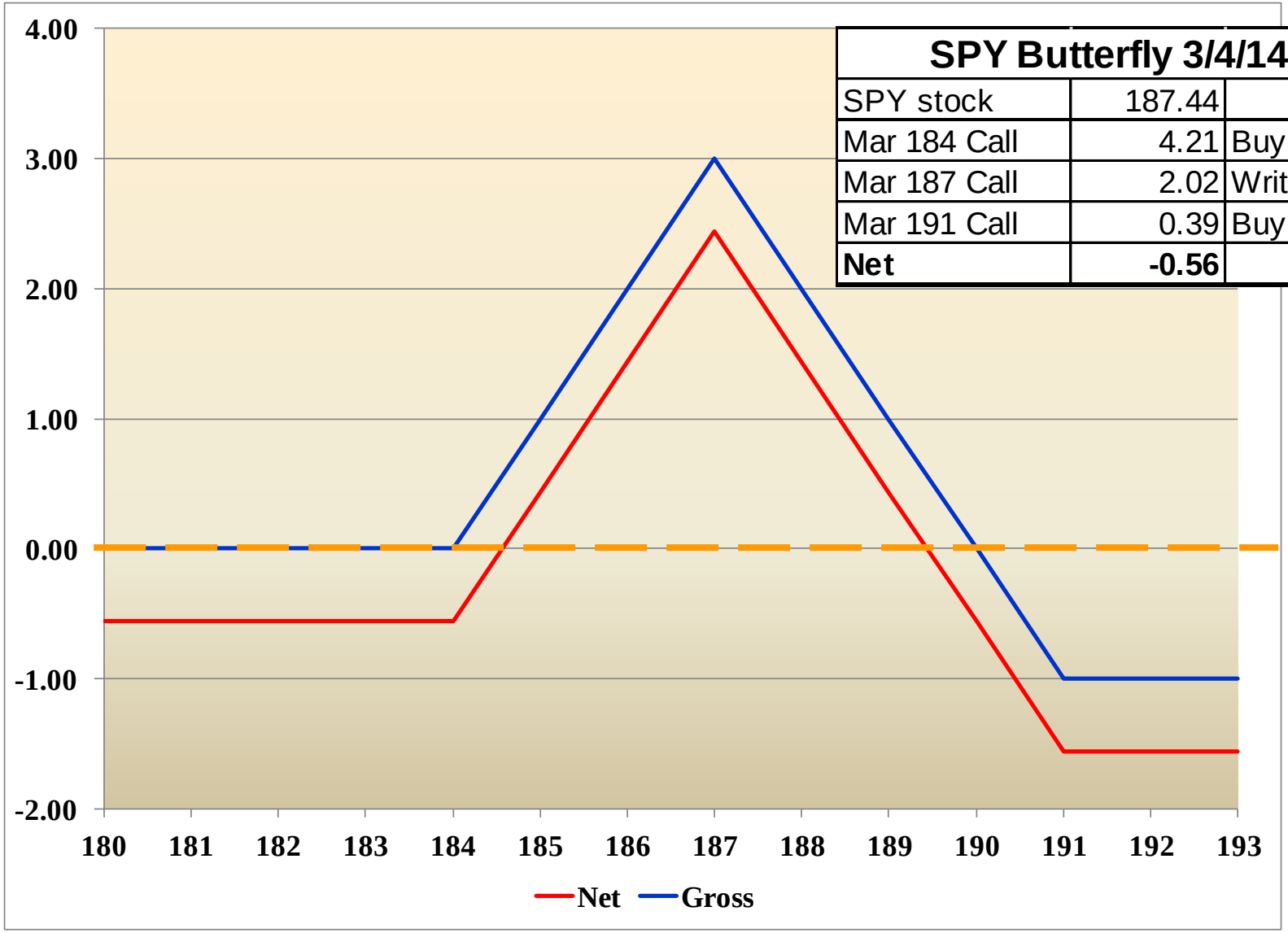
B: 1 184 for 4.21

B: 1 191 for 0.39.

Net: $1.80

Exam 2 question: When would you use this strategy and what role is played by each leg??

Butterfly (Call) payoff grid

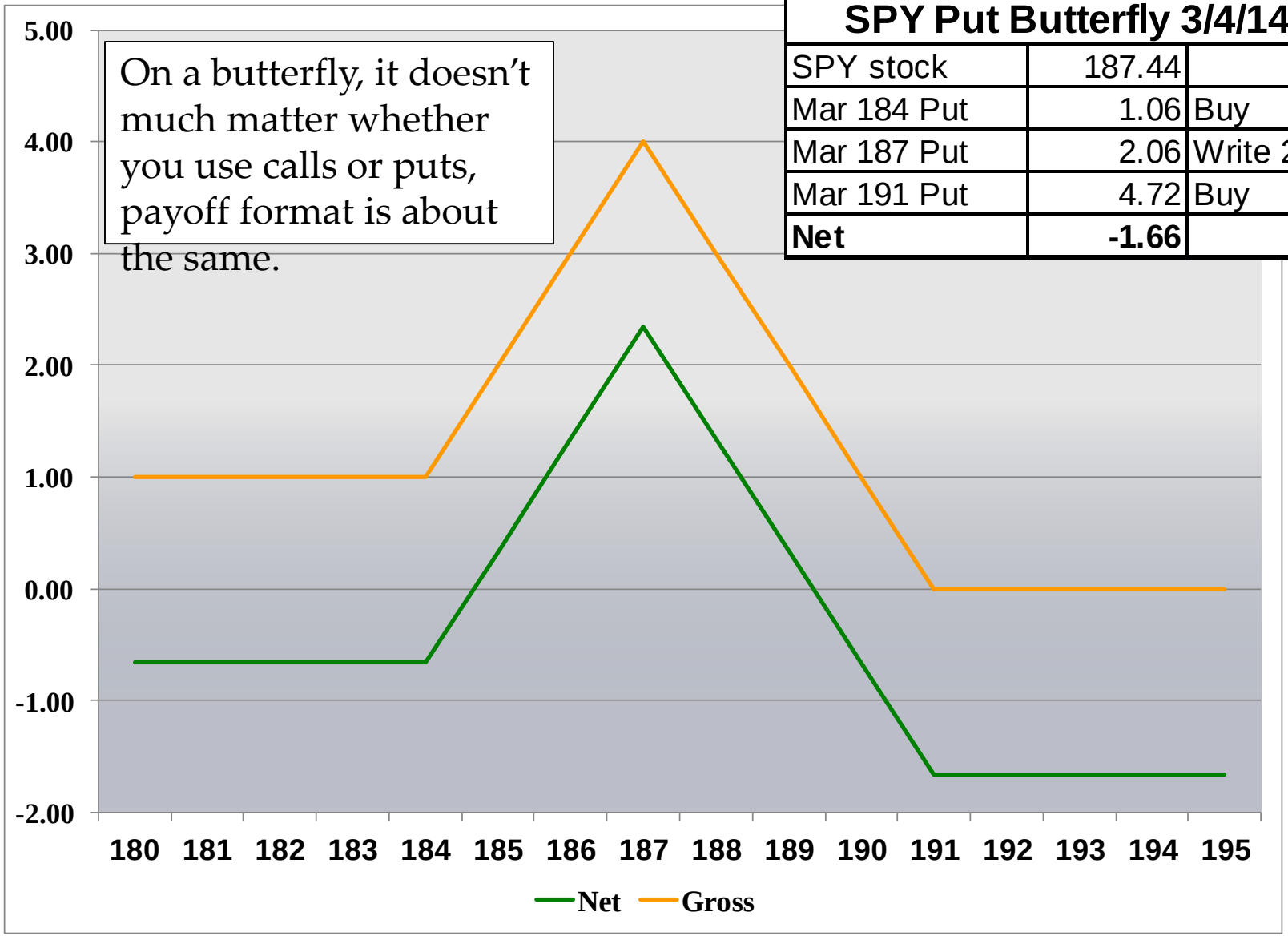


SPY Butterfly 3/4/14		
SPY stock	187.44	
Mar 184 Call	4.21	Buy
Mar 187 Call	2.02	Write 2X
Mar 191 Call	0.39	Buy
Net	**-0.56**	

Butterfly (Put) payoff grid

SPY Put Butterfly 3/4/14		
SPY stock	187.44	
Mar 184 Put	1.06	Buy
Mar 187 Put	2.06	Write 2X
Mar 191 Put	4.72	Buy
Net	**-1.66**	

On a butterfly, it doesn't much matter whether you use calls or puts, payoff format is about the same.



Note: Section 1256 taxes

Added in July 2018 – A section 1256 contract, which includes futures but excludes options but does include SPX options, allows gains in SPX options no matter what duration, to be taxed at 40% short-term and 60% long term. See the Wikipedia entry under “1256 contract.”