JAN 28 2021 MATH 134B

CHAO-MING LIN

1. Some option strategies

The interested reader is referred to "Trade Options with an Edge" [1] by R. Richards or website Tastytrade for further understanding. They have done some researches and will provide you statistical evidences that support their claims. Let's list some famous option strategies here:

-Strangle: A strangle is an options strategy in which the investor holds a position in both a call and a put option with different strike prices, but with the same expiration date and underlying asset.

-Straddle: A straddle is a neutral options strategy that involves simultaneously buying both a put option and a call option for the underlying security with the same strike price and the same expiration date.

Example (Strangles with different Delta)**.** *Take Apple's options for example, we have*

Figure 1. 30 Delta

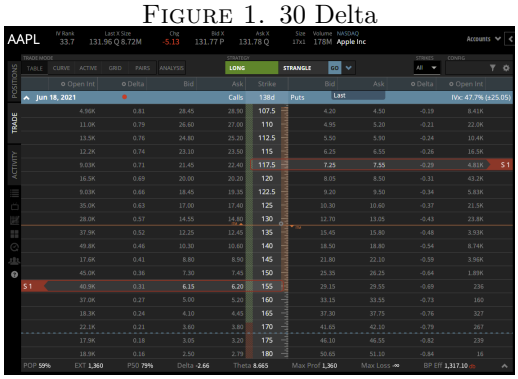
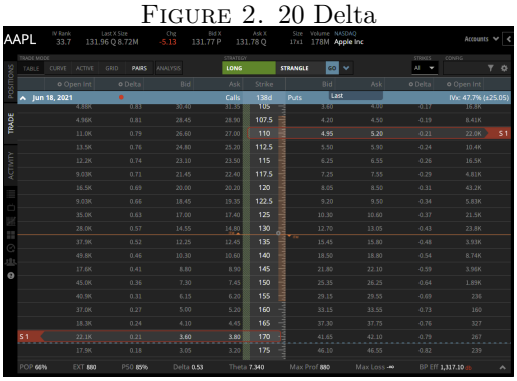


Figure 2. 20 Delta



On figure 1, if we sell 30-Delta call and put option using market order, the premium will be \$6.15 *(call)* + \$7.25 *(put)* = \$13.40*, the PoP based on Black-Scholes model is* 59%*. On the other hand, on figure 2, if we sell 20-Delta call and put option using market order, the premium will be* \$3.60 *(call)* + \$4.95 *(put)* = \$8.55*, the PoP based on Black-Scholes model is* 66%*.*

As you can see, if your strangle is wider, than your PoP will be higher, but one of the trade-off is your maximum profit will be lower. Conversely, if you have the same strike price, which is straddle, then your maximum profit will be higher but your PoP will be lower.

Remark (Strangles with different Delta)**.** *An interesting remark here will be the following study by Tastytrade:*

- *S&P 500 ETF (SPY)*
- *2005-2017*
- *45 DTE (days to expiration)*

- *Simulated:*
  16 Delta Pall and Put
  30 Delta Pall and Put
- *Managed winners at 50% of maximum profit*
- *Calculated Return on Capital and ROC per Day*

Strangle Return on Capital				
Spy Strangles 2005-2017	*16-Delta*		*30-Delta*	
	Managed at 50%	*Held to Expiration*	*Managed at 50%*	*Held to Expiration*
Success Rate	91%	83%	82%	70%
Average P/L	$36.45	$61.47	$68.10	$80.25
Average Days	*23*	*43*	*30*	*43*
Average P/L Per Day	$1.56	$1.42	$2.26	$1.85
Average ROC	1.6%	3.1%	2.4%	3.0%
Average Days	*23*	*43*	*30*	*43*
Average ROC Per Day	0.07%	0.07%	0.08%	0.07%

Example (Straddle at the money)**.** *The following is an at-the-money straddle, which means that you sell 50-Delta call and put option.*

FIGURE 3. Straddle

2. QUESTION SOLVING

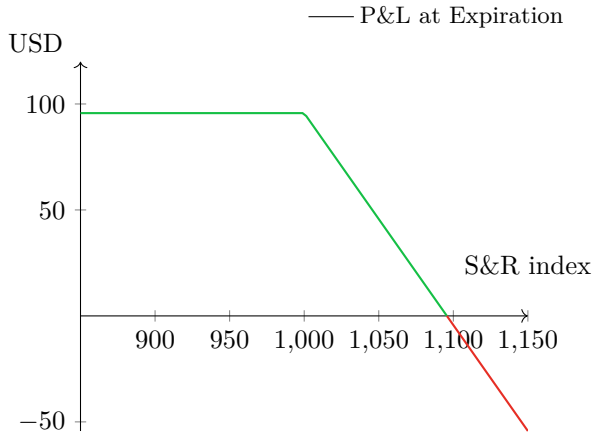
Question (3.2)**.** *Suppose that you short the S&R index for $1000 and sell a 1000-strike put. Construct a table mimicking Table 3.1 that summarizes the payoff and profit of this position. Verify that your table matches Figure 3.5.*

Solution. Since you short the S&R index and sell a put, so this will be a **covered put**. The premium of the put is $74.201, so the future value of borrowing and premium will be

$$\text{Future Value} = (\$74.201 + \$1,000) \times 1.02 = \$1,095.685.$$

The table below shows payoffs and profits for this position depending on various values of the S&R index after 6 months.

Covered Put at Expiration					
S&R index	\$900	\$950	\$1000	\$1050	\$1100
Short S&R	−\$900	−\$950	−\$1000	−\$1050	−\$1100
Put	−\$100	−\$50	\$0	\$0	\$0
Payoff	−\$1000	−\$1000	−\$1000	−\$1050	−\$1100
Future Value	\$1,095.685	\$1,095.685	\$1,095.685	\$1,095.685	\$1,095.685
Profit	\$95.685	\$95.685	\$95.685	\$45.685	−\$4.315



Here, we assume a 2% effective 6-month interest rate, so the initial revenue of \$1000 from shorting the stock increases in value to \$1020.

□

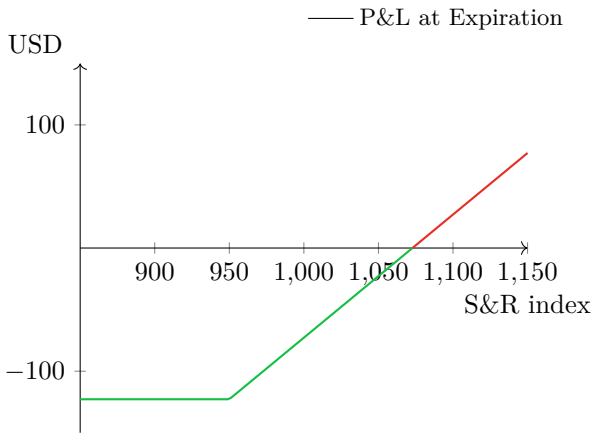
Question (3.3)**.** *Suppose you buy the S&R index for \$1000 and buy a 950-strike put. Construct payoff and profit diagrams for this position. Verify that you obtain the same payoff and profit diagram by investing \$931.37 in zero-coupon bonds and buying a 950-strike call.*

Solution. Since you buy the S&R index and buy a put, so this will be a **floor**. The premium of the put is \$51.777, so the future value of cost and premium will be

$$\text{Future Value} = -(\$51.777 + \$1,000) \times 1.02 = -\$1,072.81.$$

The table below shows payoffs and profits for this position depending on various values of the S&R index after 6 months.

Floor at Expiration					
S&R index	\$900	\$950	\$1000	\$1050	\$1100
Long S&R	\$900	\$950	\$1000	\$1050	\$1100
Put	\$50	\$0	\$0	\$0	\$0
Payoff	\$950	\$950	\$1000	\$1050	\$1100
Future Value	−\$1,072.81	−\$1,072.81	−\$1,072.81	−\$1,072.81	−\$1,072.81
Profit	−\$122.81	−\$122.81	−\$72.81	−\$22.81	\$27.19



On the other hand, if we invest \$931.37 in zero-coupon bonds and buy a 950-strike call, the premium of the call is \$120.405, so the future value of your cost will be

$$\text{Future Value} = -(\$931.37 + \$120.405) \times 1.02 = -\$1072.81.$$

Bond + Buy Call at Expiration					
S&R index	\$900	\$950	\$1000	\$1050	\$1100
Bond	\$950	\$950	\$950	\$950	\$950
Call	\$0	\$0	\$50	\$100	\$150
Payoff	\$950	\$950	\$1000	\$1050	\$1100
Future Value	$-\$1,072.81$	$-\$1,072.81$	$-\$1,072.81$	$-\$1,072.81$	$-\$1,072.81$
Profit	$-\$122.81$	$-\$122.81$	$-\$72.81$	$-\$22.81$	\$27.19

So, we have verified that we have the same payoff and profit diagram by investing \$931.37 in zero-coupon bonds and buying a 950-strike call.

□

References

[1] R. Richards, *Trade Options with an Edge*.

[2] Tastytrade . https://www.tastytrade.com

[3] Investopedia, *Strangle*.
https://www.investopedia.com/terms/s/strangle.asp

[4] Investopedia, *Straddle*.
https://www.investopedia.com/terms/s/straddle.asp

[5] Tastytrade , *Strangle Return on Capital: 16 Delta vs. 30 Delta*
https://www.tastytrade.com/shows/market-measures/episodes/strangle-return-on-capital-16-delta-vs-30-delta-09-07-2017