SHORT PREMIUM OPTION STRATEGIES

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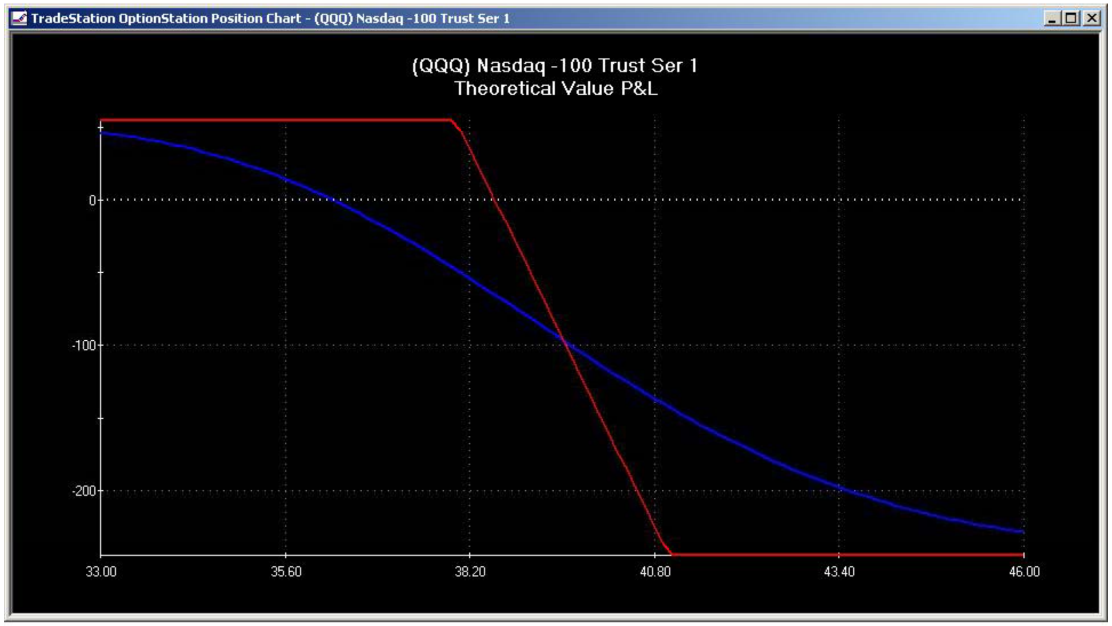
Types of Option Strategies

- In an interview published on his website www.dailyspeculations.com, Victor Niederhoffer said he always tell his investors at the outset that "he doesn't know how to make money without taking extreme risk".
- I wish to state too at the outset that short premium (short volatility, short gamma, short vega) strategies are by design *penny wise and dollar foolish* and therefore exposed to "extreme risk" of rare but very large losses.
- The following example of a popular option strategy (a bear call credit spread initiated on a view that the underlying is overbought) illustrates what I mean:



This position consists of 1 short Mar '04 QQQ 38 call and 1 long Mar '04 QQQ 41 call. The price of QQQ when the position is initiated is 36.75. The position is considered "low risk" because the maximum loss is bounded.

Bounded the loss may be but it is still $245 – almost 5 times as much as the maximum profit of $55 which is the initial net premium received.

Types of Option Strategies

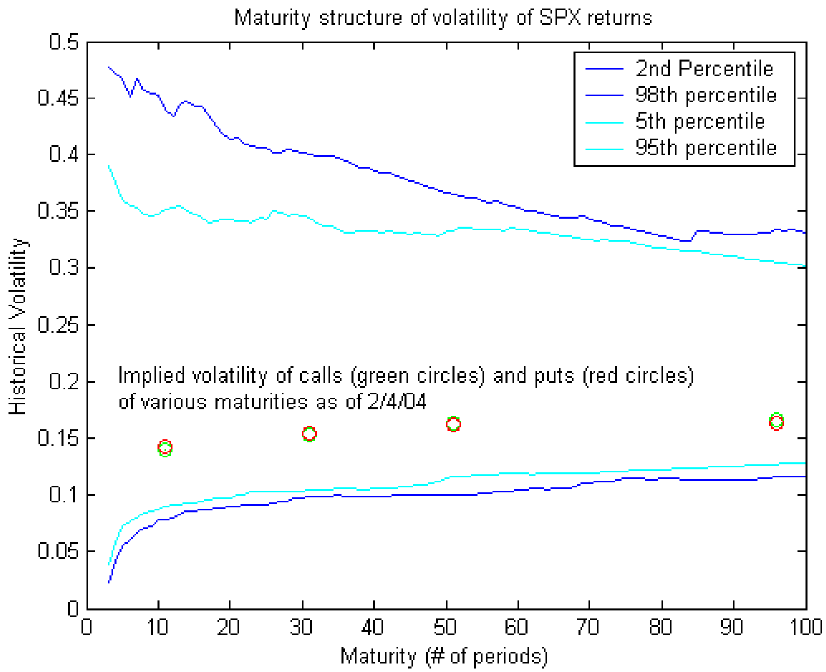
- Option strategies can be classified into the following types according to the bet that they are making:
  - Leveraged bets on the direction of the underlying asset.
  - Bets on volatility.
  - Bets on correlation.
- Since we are focusing on selling options, we note the obvious (but far-reaching) fact that *the maximum profit of a net short option position is always bounded.*
- Therefore runaway profits are impossible for such strategies.
- Since large price moves are statistically rarer than small price moves, short option strategies will always have a high *success rate* (ratio of profitable to unprofitable trades) which is the reason for their consistent return profiles. This is true regardless of the merit of the strategy and does not imply long-run profitability for the strategy.
- This memo will present research on short option strategies that are principally bets on the direction of the underlying asset.

Bets on Volatility and Correlation

- Before I discuss the option strategies that I like, which are those involving bets on the direction of the underlying, I shall present a brief review of the complicated strategies I don't like such as those involving bets on volatility and correlation.
- This will provide a context for the simpler strategies to highlight their advantage of being clear about the bet that is made.
- It is easy to know what went wrong when one has a simple and clear bet.
- Many trading shops that operated complicated option strategies have shut down after the stock market bubble burst in mid-2001 because price fluctuations driven by short-term liquidity needs that were the source of their profits became scarce.
- These price fluctuations have provided extra "gamma" for option buyers to offset the implied volatility premium that they paid when they bought the options. They have created "dispersion" (offsetting changes in the prices of the components of a stock index that leave the index unchanged) for "volatility dispersion" traders to capture profits from changes in the correlation matrix.

Volatility Arbitrage

- Selling (buying) an option when its implied volatility is rich (cheap) and dynamically hedging it until expiration is the standard volatility strategy.
- If the implied volatility is truly rich (cheap) relative to delivered volatility, then we would lose less (made more) in the hedging than made (lost) in the option premium.
- In fact, since the hedging usually loses money for short option positions, many short option traders hedge only sparingly, or not at all, hoping that the underlying asset's price would stay the same or mean revert before the option expires.
- Conversely, long option traders tend to over-hedge their option positions (a practice called "gamma shooting") to try recover more from price swings and reversals than they lost in the time decay of their options.



The standard technique for comparing implied volatility to delivered volatility is to plot the implied volatility on the "volatility cone" which is a graph of the extreme quantiles of historical volatility as a function of the "maturity" (the number of days used to compute the return volatility). For example, the edges of the cone for a 30-day maturity is obtained by computing the standard deviations of daily returns for all 30-day periods in the price series and determining the 2nd and 98th percentiles of this set of standard deviations.

It is seen from the graph that on 2/4/04, the implied volatility of SPX options is generally low relative to historical volatility actually experienced. The implied volatility lies at about the 20th percentile – probably not low enough to trade with high probability of success.

Volatility Dispersion Trading

- An option strategy that used to be popular with many quantitative trading desks is the "volatility dispersion" strategy.

- This is theoretically a bet on the correlations among stocks comprising a stock index. Consider a stock index that has only two stocks in it. The volatility of the index σ_p is related to the volatilities of the components via:

$$\sigma_p^2 = \sum_{i=1}^{N} w_i^2 \sigma_i^2 + \sum_{i \neq j}^{N} \rho_{ij} w_i w_j \sigma_i \sigma_j$$

where $N = 2$ and w_i, w_j and σ_i, σ_i are the weights and volatilities of the i^{th} and j^{th} component stocks respectively. Assuming that a market exists for options on the stock index, we can regard σ_p, σ_I, σ_j as *implied volatilities.* Then ρ_{ij} is the *implied correlation* given by:

$$\rho_{12} = \frac{\sigma_p^2 - w_1^2 \sigma_1^2 - w_2^2 \sigma_2^2}{w_1 w_2 \sigma_1 \sigma_2}$$

(formula is written for the case of 2 stocks)

If ρ_{ij} is viewed as high (by comparing it to the historical correlation between the two component stocks or by other forecasting means), then we should sell index volatility and buy individual stock volatility. To do this, we short at-the-money straddles on the index and buy at-the-money straddles on the individual stocks. The trade would *theoretically* be profitable if one or more of the following conditions occur:

(1) The implied volatility of the index decreases

(2) The implied volatilities of the components increase

(3) Large offsetting price changes occur in the component stocks leaving the index unchanged

Volatility Dispersion Trading

- However, even if the above conditions occur, the trade may not be profitable if
  - (1) The options expire before the implied volatilities have a chance to converge.
  - (2) The underlying assets move so much that the options are no longer at-the-money or near-the-money and their implied volatilities change because of the volatility skew.
  - (3) Bid-ask spreads and delta-hedging costs degrade gross profits to nothing or worse.
- There are simply too many factors that must be just right for the trade to work out.
- Moreover, bid-ask spreads for options may be as much as a third to a half of their value. Thus the trade has from the outset a formidable profit hurdle to surmount before it can be profitable.
- This type of strategy is therefore viable only in a "market bubble" type of environment where large price changes constantly occur in the component stocks, giving rise to a lot of "price dispersion". The delta-neutrality of the strategy is then perceived to be a plus because any large systematic move in the market (caused for example by the bursting of the bubble) should not affect the strategy.
- However, once the bubble burst, the strategy started to slowly bleed money. This is actually the only way it would die, since it would not "blow up" because of its delta-neutrality.

Simplified Model for Simulating Option Strategies

- In my opinion, it is far more important to gain insight into how the various interplaying factors affect an option strategy than to produce a historically accurate simulation using an exhaustive database of option prices.

- Since there are many factors affecting option prices (e.g. underlying asset price, volatility skew, time to expiration, interest rate, etc), relying too much on historical simulations can lead to excessive data-mining.

- A simplified model that captures all the relevant risk factors can be constructed with just the price history of the underlying asset and historical values of the associated implied volatility index. In the case of the S&P 500, these would be the history of the prices and the values of the VIX index. Some simplified (but conservative) assumptions about bid-ask spreads are also needed.

- The simplified model uses the Black model to price options on futures:

$$C = S \cdot N(d_1) - X \cdot N(d_2)$$

$$P = -S \cdot N(-d_1) + X \cdot N(d_2)$$

$$d_1 \equiv \frac{X}{\omega} + \frac{\omega}{2}$$

$$d_2 \equiv \frac{X}{\omega} - \frac{\omega}{2}$$

$$\omega \equiv \sigma\sqrt{T}$$

where

C = price of call option
P = price of put option
S = price of underlying
X = strike price of option
T = time to expiration of option
σ = volatility of underlying
$N(\ldots)$ = cumulative normal distribution function

Simplified Model for Simulating Option Strategies

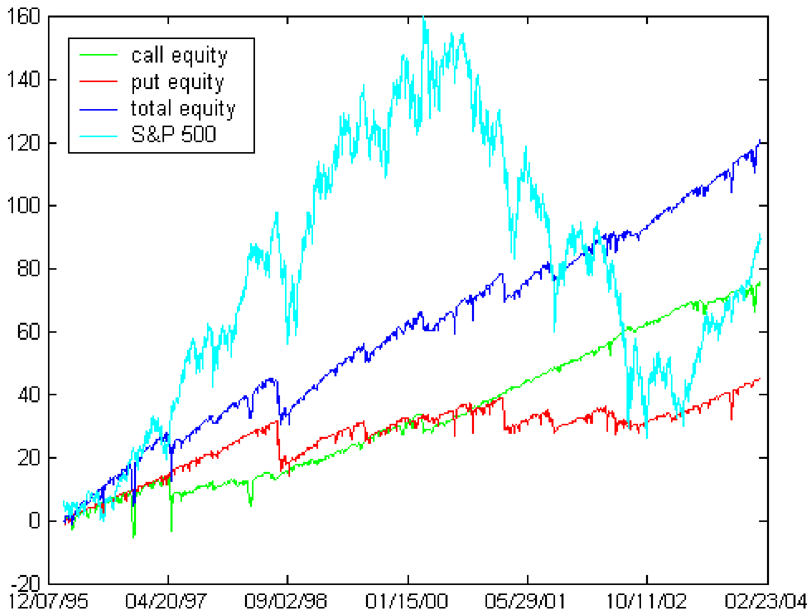
- Given the price S of the S&P 500 Index, the volatility σ obtained from the VIX index and the time to expiration T on a given historical date, the Black model will give prices for calls and puts of any specified strike.

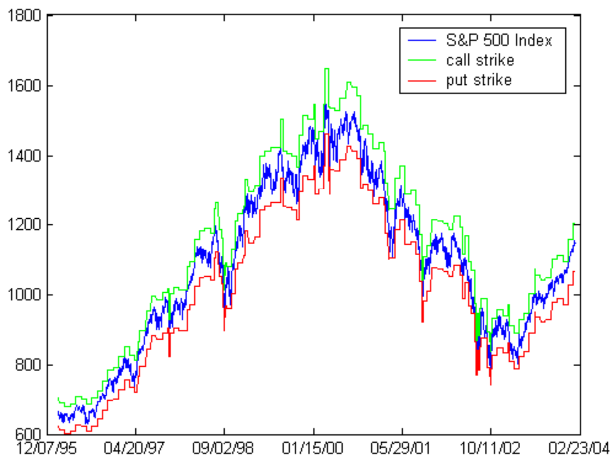
- These call and put prices can then be used to simulate historical trading P/L given entry and exit points.

- The gross features of the simulation will be correct because the option prices are backed out from the VIX.

Selling Strangles with Strikes that Bracket the Index Price

- This is a very simple strategy that sells a strangle with strikes that forms a ±6% bracket around the current S&P 500 Index price. Only the front month contracts with at least 5 trading days to expiration are sold. Each strangle is held until expiration or until the index penetrates one of the strikes. When the latter happens, the strangle is liquidated and a new strangle established with strikes equal to the then current bracket.
- The strangles are priced using the Black model with implied volatilities equal to the VIX index value minus an adjustment for the volatility skew and bid-ask spread. The adjustment for calls is 3 “vol points” and that for puts is 4 “vol points”.





The graph on the left shows the equity curve from selling a $2 strangle ($1 worth of OTM calls and $1 worth of OTM puts, where 1 point in the S&P 500 = $1) with bracketing strikes as described. A maximum of 5 calls and 5 puts can be sold. The graph on the right shows the S&P 500 Index price and the bracketing strikes.

Selling Strangles with Strikes that Bracket the Index Price

- Features of the strategy that are immediately apparent from the graph:
  - The return profile is the classic “up the escalator, down the chute” profile, i.e. many small gains punctuated by occasional large losses.
  - For the S&P 500 index, selling calls appear to be more profitable overall (and also more *consistently* profitable) than selling puts.
  - If one only observes the strategy for a few months, its consistent profile can belie the possibility of extremely large losses.
  - However, these large losses are also merely *mark-to-market* losses that were recouped within days after they occurred.
- **Therefore, the strategy is really about surviving the large mark-to-market losses.**
- Performance capsules for this strategy is shown on the next page.

Selling Strangles with Strikes that Bracket the Index Price

Selling $1 worth of puts and $1 worth of calls with a capital base of $50:

	1M	3M	6M	9M	12M	24M	36M
min	-23.96	-19.93	-10.91	-0.29	7.58	36.44	62.17
max	28.86	35.8	38.15	45.96	53.83	74.39	102.75
std	6.91	8.31	9.17	9.18	9.09	9.54	8.16
r/r	0.34	1.51	3.77	6.91	10.54	27.45	58.78
%pos	0.82	0.84	0.91	0.99	1	1	1
%neg	0.18	0.16	0.09	0.01	0	0	0
avg+	4.68	10.01	16.03	21.42	27.68	53.43	79.9
avg-	-7.91	-6.87	-5.2	-0.29			
avg	2.38	7.23	14.1	21.16	27.68	53.43	79.9
Annual:							
1997	29.96						
1998	12.68						
1999	34.79						
2000	31.74						
2001	16.11						
2002	30.57						
2003	28.71						
2004	15.64						
CARR	28.71						
R/R	1.21						
skew	-0.52						
STD	23.81						
5 worst drawdowns:							
	DD	Begin	End	Dur(M)	Recovery		
1	-30.43	19980701	19990204	11	9		
2	-30.05	19970418	19970725	5	4		
3	-27.17	19961115	19961206	1	1		
4	-18.44	20010216	20010628	7	5		
5	-16.11	20001006	20001102	2	1		
Avg DD:	-24.44						

Selling $1 worth of calls with a capital base of $50:

	1M	3M	6M	9M	12M	24M	36M
min	-24.42	-21.19	-14.79	-3.08	-11.98	13.88	30.27
max	28.15	31.95	24.48	28.76	29.85	55.99	80.66
std	5.06	5.76	6.24	7.13	8.51	11.94	13.68
r/r	0.29	1.38	3.6	5.92	7.62	15.83	25.85
%pos	0.82	0.9	0.91	0.94	0.98	1	1
%neg	0.18	0.1	0.09	0.06	0.02	0	0
avg+	2.87	5.98	10.62	15.09	19.35	38.6	58.91
avg-	-4.78	-8.28	-5.34	-2.18	-6.56		
avg	1.47	4.57	9.17	14.07	18.71	38.6	58.91
Annual:							
1997	2.95						
1998	13.15						
1999	17.05						
2000	22.35						
2001	25.92						
2002	28.16						
2003	7.12						
2004	13.7						
CARR	17.31						
R/R	0.99						
skew	-0.28						
STD	17.46						
5 worst drawdowns:							
	DD	Begin	End	Dur(M)	Recovery		
1	-33.51	19970418	19980424	18	17		
2	-28.95	19961115	19961210	2	1		
3	-16.09	20031219	20040109	1	0		
4	-12.41	20000317	20000907	9	6		
5	-8.39	20030527	20030724	3	2		
Avg DD:	-19.87						

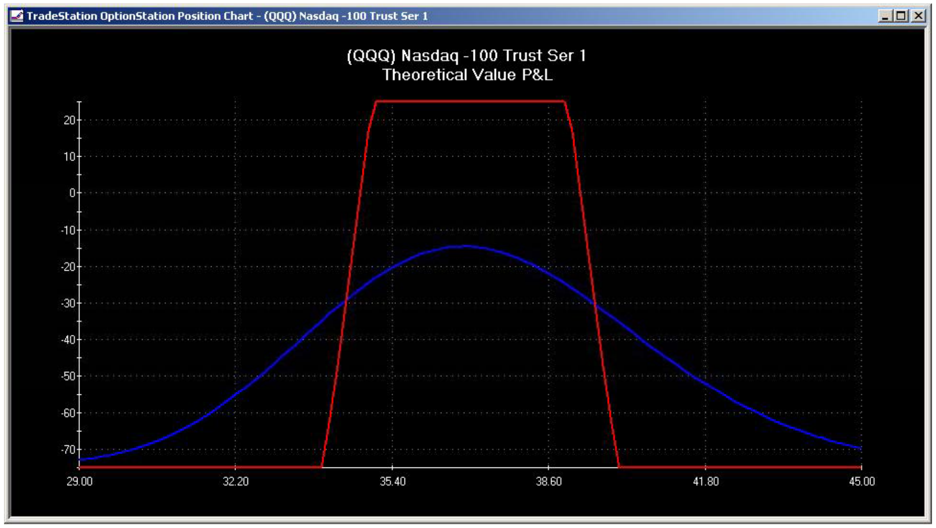
Selling Strangles with Strikes that Bracket the Index Price

Selling $1 worth of puts with a capital base of $50:

	1M	3M	6M	9M	12M	24M	36M
min	-22.74	-22.41	-18.55	-17.25	-14.93	-13.29	-6.76
max	18.94	23.06	20.72	24.37	31.25	51.5	52
std	5.5	7.5	9.38	10.61	11.63	14.69	15.81
r/r	0.17	0.61	1.29	2	2.67	4.95	7.96
%pos	0.73	0.77	0.73	0.71	0.72	0.86	0.98
%neg	0.27	0.23	0.27	0.29	0.28	0.14	0.02
avg+	3.09	6.04	9.71	12.65	14.22	18.32	21.47
avg-	-5.03	-8.62	-7.79	-6.25	-4.52	-6.1	-6.76
avg	0.91	2.66	4.94	7.09	8.96	14.83	20.98
Annual:							
1997	27.01						
1998	-0.47						
1999	17.74						
2000	9.39						
2001	-9.81						
2002	2.41						
2003	21.59						
2004	1.94						
CARR	11.4						
R/R	0.6						
skew	-1.3						
STD	19.01						
5 worst drawdowns:							
	DD	Begin	End	Dur(M)	Recovery		
1	-34.48	19980720	19990716	18	15		
2	-22.72	20010216	20030718	42	20		
3	-18.57	20000929	20001227	5	4		
4	-16.97	20030919	20031003	1	0		
5	-16.1	20000721	20000807	1	0		
Avg DD:	-21.77						

Selling Bear Call Credit Spreads and Bull Put Credit Spreads

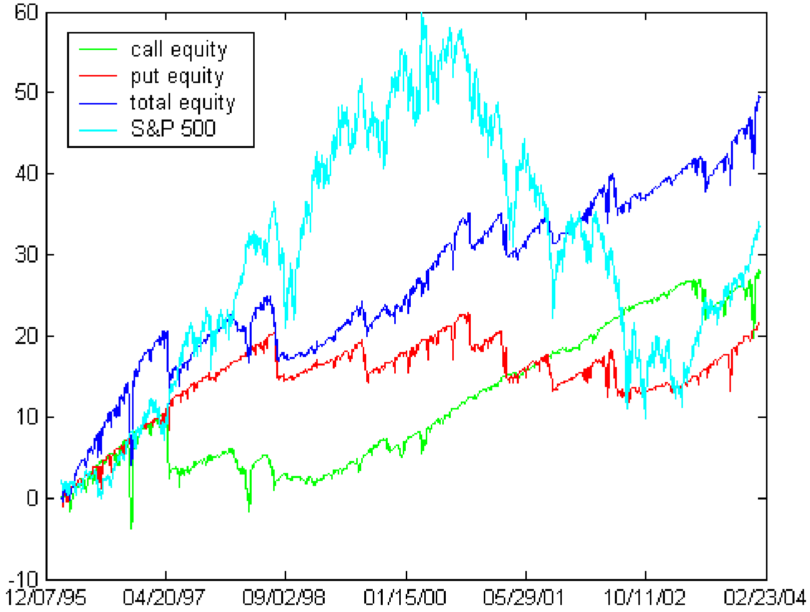
- A naked short strangle is exposed to the risk of runaway moves in the underlying. To protect against this theoretically unbounded risk, a strangle with an even wider strike bracket is bought against the one that is sold.
- The position is equivalent to simultaneously selling a bear call spread (call credit spread) and a bull put spread (put credit spread). This combination is called a “jelly roll”.
- A simple variation of the strategy that simply sells strangles is to sell call and put credit spreads with a pair of strikes that forms ±6% and ±8% brackets around the current S&P 500 Index price.
- Again, only the front month contracts with at least 5 trading days to expiration are traded. Each strangle is held until expiration or until the index penetrates one of the outer strikes. When the latter happens, the strangles are liquidated and a new pair of strangles established with strikes equal to the current bracket.

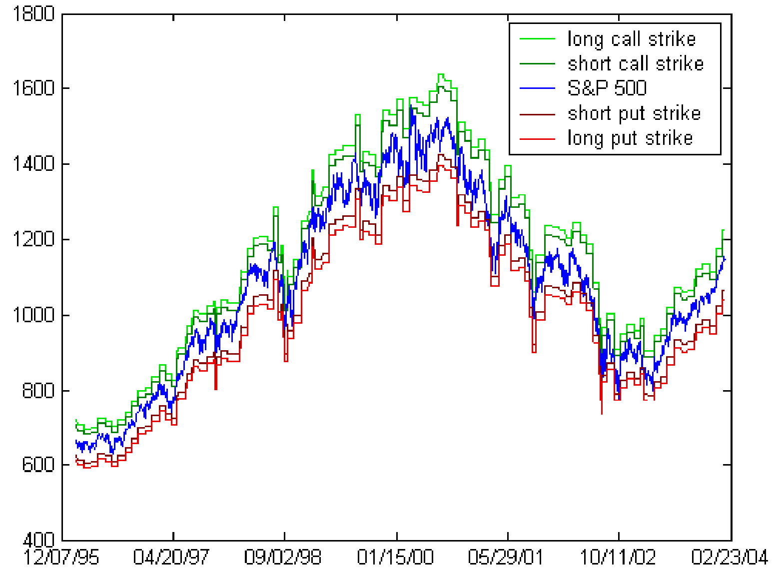


Payout diagram for a “jelly roll” consisting of short 1 Mar 2004 39 call, long 1 Mar 2004 40 call, short 1 Mar 2004 35 put, and long 1 Mar 2004 34 put initiated Feb 12, 2004. The price of QQQ is 37.42 at the initiation of the position.

This position is a bet that the price of QQQ stays within the range 34 to 40 until the options expire. Both the maximum gain and the maximum loss are bounded at $25 and -$75 respectively.

Selling Bear Call Credit Spreads and Bull Put Credit Spreads





The graph on the left shows the equity curve from selling a jelly roll with $1 worth of short OTM calls and $1 worth of short OTM puts with strikes at the ±6% bracket and long OTM calls and long OTM puts with strikes at the ±8% bracket. The *numbers* (not dollar value) of the ±8% bracket calls and puts bought are equal to the numbers respectively of ±6% bracket calls and puts sold.

The graph on the right shows the S&P 500 Index price and the bracketing strikes.

Performance capsules for this strategy is shown on the next two pages.

Selling Bear Call Credit Spreads and Bull Put Credit Spreads

Selling jelly rolls:

	1M	3M	6M	9M	12M	24M	36M
min	-15.99	-15.26	-13.41	-9.43	-7.68	1.79	8.62
max	22.09	26.26	21.49	29.14	34.54	38.43	37.41
std	4.67	6.03	7.23	8.35	8.6	9.22	6.88
r/r	0.19	0.77	1.68	2.63	3.71	9.06	22.6
%pos	0.75	0.7	0.74	0.82	0.84	1	1
%neg	0.25	0.3	0.26	0.18	0.16	0	0
avg+	2.68	5.61	8.09	10.04	11.7	17.05	25.92
avg-	-4.58	-4.25	-3.87	-5.38	-3.93		
avg	0.89	2.69	4.97	7.32	9.22	17.05	25.92
Annual:							
1997	11.06						
1998	-7.44						
1999	9.73						
2000	20.47						
2001	1.01						
2002	10.91						
2003	7.6						
2004	13.25						
CARR	10.91						
R/R	0.68						
skew	0.1						
STD	16.1						
5 worst drawdowns:							
	DD	Begin	End	Dur(M)	Recovery		
1	-20.41	19961115	19961206	1	1		
2	-18.28	19970418	19971128	11	10		
3	-16.1	19980624	20000119	28	25		
4	-12.38	20031219	20040109	1	0		
5	-12.2	19980128	19980423	5	1		
Avg DD:	-15.87						

Selling bear call spreads:

	1M	3M	6M	9M	12M	24M	36M
min	-18.44	-15.77	-11.27	-9.17	-19.1	-13.35	-6.65
max	21.59	23.69	11.96	15.96	19.42	27.74	40.36
std	3.74	4.93	5.45	6.53	7.73	11.93	13.76
r/r	0.13	0.53	1.31	2.11	2.7	5.38	9.39
%pos	0.73	0.77	0.69	0.72	0.74	0.86	0.91
%neg	0.27	0.23	0.31	0.28	0.26	0.14	0.09
avg+	1.74	3.57	6.05	8.1	9.77	16.67	23.95
avg-	-2.98	-5.34	-4.12	-4.34	-4.85	-8.2	-4.02
avg	0.47	1.52	2.93	4.59	6.03	13.12	21.54
Annual:							
1997	-5.71						
1998	-7.51						
1999	6.57						
2000	17.15						
2001	9.88						
2002	13.33						
2003	-5.96						
2004	11.72						
CARR	5.48						
R/R	0.42						
skew	0.27						
STD	12.89						
5 worst drawdowns:							
	DD	Begin	End	Dur(M)	Recovery		
1	-23.77	19970418	20000629	56	39		
2	-21.91	19961115	19961210	2	1		
3	-14.13	20031219	20040109	1	0		
4	-9.68	20030527	20031217	10	9		
5	-4.97	19960315	19960408	2	1		
Avg DD:	-14.89						

Selling Bear Call Credit Spreads and Bull Put Credit Spreads

Selling bull put spreads:

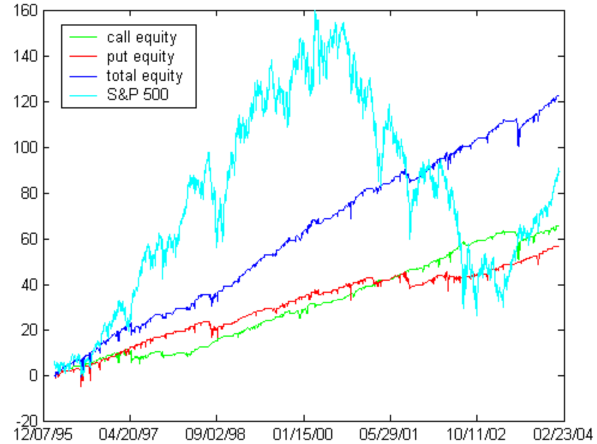
	1M	3M	6M	9M	12M	24M	36M
min	-10.01	-10.65	-14.8	-14.71	-17.66	-19.26	-17.7
max	11.25	14.56	11.79	16.87	19.82	33.06	31.33
std	3.26	4.57	6.17	7.7	8.9	11.71	12.84
r/r	0.13	0.44	0.81	1.06	1.24	1.64	2.05
%pos	0.72	0.74	0.61	0.6	0.6	0.59	0.5
%neg	0.28	0.26	0.39	0.4	0.4	0.41	0.5
avg+	1.83	3.48	6.29	7.72	8.7	11.1	14.88
avg-	-3.22	-5.27	-4.72	-4.78	-5	-6.21	-6.12
avg	0.42	1.17	2.04	2.72	3.19	3.93	4.38
Annual:							
1997	16.77						
1998	0.07						
1999	3.15						
2000	3.32						
2001	-8.87						
2002	-2.42						
2003	13.55						
2004	1.53						
CARR	5.43						
R/R	0.48						
skew	-0.69						
STD	11.31						
5 worst drawdowns:							
	DD	Begin	End	Dur(M)	Recovery		
1	-22.34	20000929	20020805	33	0		
2	-12.16	19980720	20000601	33	14		
3	-8.29	20000721	20000807	1	0		
4	-5.86	19970506	19970509	1	0		
5	-5.82	19960702	19960731	2	1		
Avg DD:	-10.89						

Selling Strangles only when the VIX is overbought

- We backtest a strategy in which strangles with strikes at the ±6% bracket are sold only when a 14-day "fast K" stochastic of the VIX is higher than 50.

Selling $1 worth of puts and $1 worth of calls with a capital base of $50 when fast K stochastic of VIX is greater than 50:

	1M	3M	6M	9M	12M	24M	36M
min	-5.66	-4.36	1.08	8.53	15.85	45.02	73.44
max	11.42	16.35	25.92	34.62	43.29	79.57	109.93
std	3.02	4.54	5.3	5.91	6.61	8.24	7.54
r/r	0.83	2.88	6.94	11.38	15.73	36.18	74.27
%pos	0.82	0.95	1	1	1	1	1
%neg	0.15	0.05	0	0	0	0	0
avg+	3.52	8.15	14.99	22.43	30.03	60.86	93.34
avg-	-2.45	-2.75					
avg	2.51	7.55	14.99	22.43	30.03	60.86	93.34
Annual:							
1997	24.42						
1998	26.35						
1999	36.28						
2000	43.29						
2001	15.85						
2002	35.82						
2003	26.07						
2004	4.5						
CARR	30.53						
R/R	2.92						
skew	-0.14						
STD	10.46						
5 worst drawdowns:							
	DD	Begin	End	Dur(M)	Recovery		
1	-23.39	20030527	20030807	4	3		
2	-15.4	19960711	19960719	1	0		
3	-14.22	20020422	20020531	2	2		
4	-13.21	20001006	20001016	1	0		
5	-12.82	19960829	19960906	1	0		
Avg DD:	-15.81						



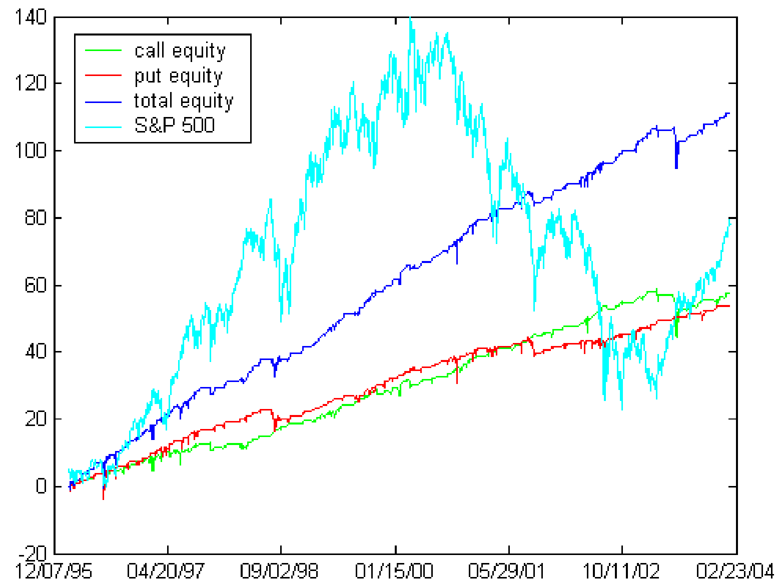
The green line in the top graph is the VIX index. The light blue line in the bottom graph is the 14-day fast K stochastic of the VIX. The red line in the bottom graph is the 14-day slow K stochastic of the VIX

Selling Strangles only when the VIX is overbought

- The previous page shows that the results are much better if the options are sold only when their implied volatility is relatively high.
- If the options are sold only when the fast K stochastic of the VIX is greater than 70 (instead of 50), we obtain:

Selling $1 worth of puts and $1 worth of calls with a capital base of $50 when fast K stochastic of VIX is greater than 70:

	1M	3M	6M	9M	12M	24M	36M
min	-5.62	-6.34	-2.98	4.16	13.19	35.11	62.48
max	7.27	15.47	22.61	31.1	40.64	74.1	100.41
std	2.41	4.02	5.58	6.6	7.11	8.75	8.64
r/r	0.96	2.98	6.04	9.43	13.66	31.59	60.44
%pos	0.82	0.93	0.95	1	1	1	1
%neg	0.12	0.07	0.05	0	0	0	0
avg+	3.14	7.61	14.5	20.75	28.05	56.44	87
avg-	-2.1	-2.79	-1.61				
avg	2.32	6.92	13.76	20.75	28.05	56.44	87
Annual:							
1997	31.29						
1998	22.43						
1999	36.13						
2000	37.53						
2001	19.2						
2002	30.1						
2003	13.19						
2004	2.94						
CARR	27.93						
R/R	3.36						
skew	-0.67						
STD	8.32						
5 worst drawdowns:							
	DD	Begin	End	Dur(M)	Recovery		
1	-26.01	20030317	20031003	10	5		
2	-15.4	19960711	19960725	1	0		
3	-13.21	20001006	20001016	1	0		
4	-10.41	19980723	19980819	2	1		
5	-8.64	20010828	20011217	6	4		
Avg DD:	-14.74						



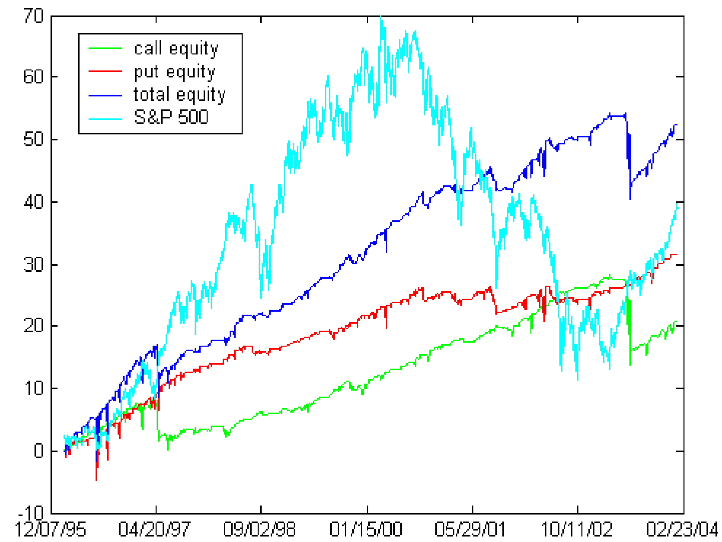
The return of this strategy is only slightly lower than the strategy that sells options when the VIX stochastic is greater than 50. This means (unsurprisingly) that most of the money is made when we sold options when their implied volatility is relatively high. This also means that high implied volatility levels tend to revert quickly to lower levels.

Selling Jelly Rolls when the VIX is overbought

- Applying the same stochastic VIX filter to the strategy that sells call and put credit spreads, we obtain the following results:

Selling jelly rolls when the fast K stochastic of the VIX is greater than 50:

	1M	3M	6M	9M	12M	24M	36M
min	-18.73	-21.03	-17.46	-13.73	-11.6	-0.9	8
max	7.28	11.97	19.69	21.56	25.88	39.43	50.44
std	2.91	5.07	6.77	7.34	7.61	8.31	10.39
r/r	0.36	1.04	2.13	3.64	5.51	15.1	22.83
%pos	0.77	0.86	0.92	0.91	0.91	0.99	1
%neg	0.19	0.14	0.08	0.09	0.09	0.01	0
avg+	1.98	4.55	7.39	10.73	13.87	26	39.54
avg-	-2.57	-5.89	-11.63	-8.73	-6.74	-0.9	
avg	1.03	3.06	5.88	8.9	12.11	25.62	39.54
Annual:							
1997	8.78						
1998	12.66						
1999	14.26						
2000	22.55						
2001	2.39						
2002	17.46						
2003	-2.76						
2004	3.76						
CARR	12.82						
R/R	1.27						
skew	-3.32						
STD	10.09						
5 worst drawdowns:							
	DD	Begin	End	Dur(M)	Recovery		
1	-27.52	20030317	20030616	5	0		
2	-16.72	19970428	19971229	12	11		
3	-14.12	19960711	19960719	1	0		
4	-9.41	19960829	19960906	1	0		
5	-9.18	20020422	20020508	1	0		
Avg DD:	-15.39						



The drawdowns in this strategy are similar to those in the strategy that sells strangles. However, the return of this strategy is much lower because the net premiums collected from selling spreads are lower than those collected from selling naked options. The lower return makes the drawdowns appear relatively larger.

The extra protection from the long outer bracket strangle appear superfluous and merely reduces the overall profitability.

Conclusion

- Even with a simplified model that uses only historical S&P 500 Index prices and historical values of the VIX Index, much insight can be gained into short option strategies.

- Some of the insights are:

  1. The return profiles of short option strategies are typically “up the escalator, down the chute” profiles, i.e. strings of small gains punctuated by occasional large losses.

  2. Many of the large losses are mark-to-market losses that are recouped within a short period of time after they occurred.

  3. Selling calls on the S&P 500 is more consistently profitable than selling puts.

  4. Selling strangles when the VIX is “overbought” is more profitable than merely selling strangles with strikes that bracket the S&P 500 Index.

  5. A return of 20% per year with a drawdown of 20% appear to be possible on a capital base that is about 10 times the net premium received for each trade.

- The model does not account for the possibility that in reality there may be few bids or offers (or none at all) at strikes at which we wish to trade. Therefore whether the strategy can be executed in practice can only be discovered by executing it!

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