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Systematic Approaches to Shorting

VSTOXX

Using Options

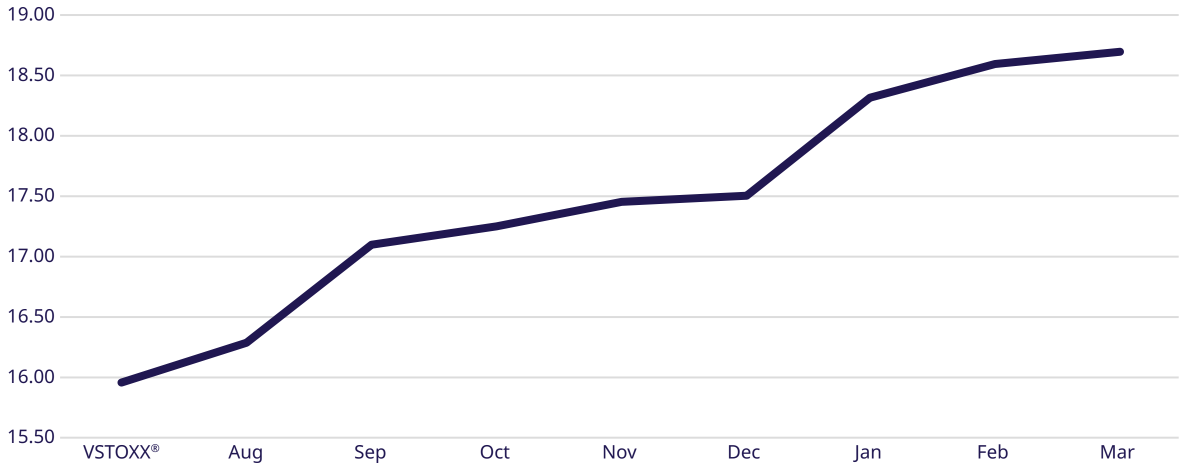
Introduction

Where our first paper explored short exposure to VSTOXX® by using the front two monthly futures contracts, this second paper looks at systematic approaches to trading VSTOXX®. The approach in the futures-only paper used the relationship between the futures contract and spot VSTOXX® as a trade signal combined with the number of days remaining to expiration. Short trades between two and ten days to expiration would be tracked and exited the day before expiration.

VSTOXX® Futures are unique in that there is no tradable fair value relationship between the index and futures prices. Typically, the spot index is at a discount to the front month futures, and as the expiration date moves further out, the futures price rises. An example of this is the VSTOXX® term structure from 1 September 2023 that shows up in Figure 1.

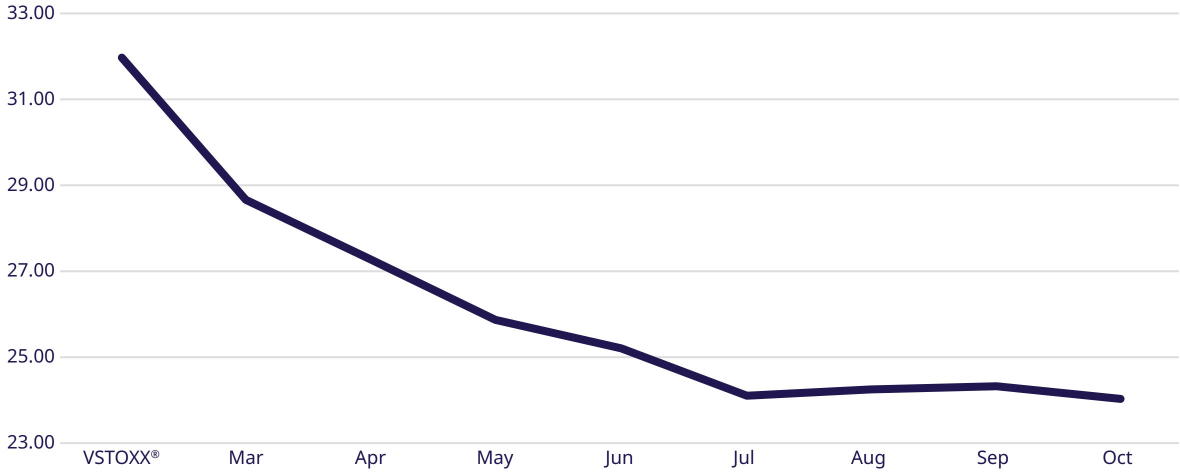
This VSTOXX® curve is in contango. If the index does not move, over time, futures prices drift toward the spot index. This drift is a major factor when considering trading VSTOXX® Futures regardless of direction. Since this drift is a key component of shorting VSTOXX® Futures, a screen is in place to eliminate short trades when the curve is not in contango but in backwardation. A quick look at backwardation is shown in Figure 2.

Figure 1: VSTOXX® Term Structure in Contango (1 September 2023)



Data Source: Bloomberg

Figure 2: VSTOXX® Term Structure in Backwardation (15 March 2023)



Data Source: Bloomberg

Table 1: Short Front Month Futures only when in Contango

Days to Exp	Total P/L	Average P/L	Max Profit	Max Loss	Trades	Wins	Win %
10	+10.10	+0.24	+6.25	–9.75	42	27	64.3%
9	+30.90	+0.74	+4.95	–7.50	42	28	66.7%
8	+31.15	+0.72	+5.15	–7.00	43	32	74.4%
7	+24.40	+0.74	+4.95	–8.15	33	24	72.7%
6	+20.25	+0.55	+4.55	–7.80	37	25	67.6%
5	+5.40	+0.16	+3.95	–8.45	34	22	64.7%
4	–0.80	–0.02	+5.20	–7.60	42	24	57.1%
3	+14.10	+0.28	+3.65	–4.90	51	28	54.9%
2	+0.85	+0.03	+2.40	–3.60	30	16	53.3%

Data Source: Bloomberg

Note that the term structure chart from 15 March 2023 shows prices moving lower as expiration is farther out in the future. Also, VSTOXX® closed at 32.00 on this day, while the front month March future was 28.65. There was a week left until March VSTOXX® expiration. A short position in that future would require the index to drop 3.35 points just to break even at expiration. Therefore, in this study, short-into-expiration trades are only executed if the futures contract is at a price higher than the index.

The study in this paper uses VSTOXX® expirations from January 2018 through July 2023. This spans sixty-seven contracts over the course of both bullish and bearish market environments. All pricing was obtained from Bloomberg.

Table 1 shows the results if a trader shorted the front month future a certain number of days before expiration (2 through 10) when the future is at a premium to the index. The short is covered the day before expiration.

Note that the number of trades is much lower than the number of contract observations. This is due to instances where the future price was lower than the index and, by rule, no trade would be executed. Note that the max loss column figures tend to be relatively large when considered within the context of the max profit and total profit. For example, consistently executing a short position with ten days remaining to expiration and covering before expiration offers a profit of 10.10, but a single trade loss of –9.75.

To reduce the maximum loss for each futures trading approach, we explored four different methods of getting short VSTOXX® exposure using options. Options allow for risk control that is not as certain as a short futures position, and VSTOXX® Futures can move higher by a significant amount in a very short period of time.

System 1: Long Put

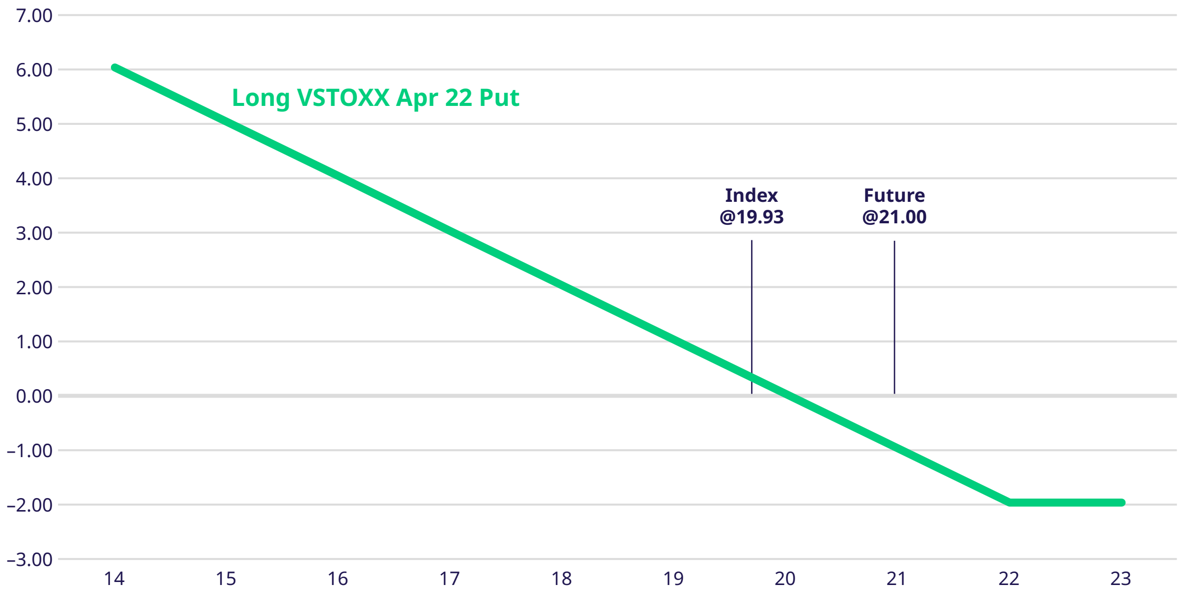
The first approach that uses options for a short VSTOXX® trade as expiration approaches uses the following rules.

- Only Trade If Future > Spot
- ITM Put Strike Minus Premium > VSTOXX
- Lowest ITM Put Strike ≤ 30
- Buy Put XX Days Before Expiration
- Sell Day Before Expiration

The first rule is the same across all systems: the front month future should be at a premium to spot VSTOXX®. A put is purchased if the premium paid for the put subtracted from the strike price is greater than spot VSTOXX® and the strike price of that put is 30 or lower. Trades open anywhere from two to ten days until expiration and close the day before settlement.

For example, on 5 April 2023, VSTOXX® stood at 19.93, and the April futures (with eight trading days remaining to expiration) closed at 21.00. Based on subtracting the premium from the put strike, the lowest strike put that could be purchased was the VSTOXX® Apr 22 Put, trading at 1.95. Figure 3 is a payoff diagram showing the potential outcome for this put purchase.

Figure 3: Long Put Example Payoff Diagram



Data Source: Bloomberg

In addition to the profit and loss for this long put trade, the spot VSTOXX® and the April futures prices are also highlighted. The index level when the trade was executed is on the payoff diagram section where a buyer of this put would realize a profit. If no put with a strike of 30 or lower offers a positive result if VSTOXX® is unchanged, then no trade would be executed.

For each approach in this paper, there is a comparison of a short futures trade when the circumstances are in place for an option trade.

For example, the trading example used data on 7 March 2019, the futures trade on that day would sell short the March VSTOXX® Futures at 14.80 and exit the trade the day before expiration at 13.45. Table 2 has statistics for shorting VSTOXX® Futures when the signals indicate a long put would be executed. This allows for a comparison between selling VSTOXX® Futures and purchasing a put.

Table 2: System 1 – Short Futures Results

Days to Exp	Total P/L	Average P/L	Max Profit	Max Loss	Trades	Wins	Win %
10	+5.25	+0.21	+3.35	(6.35)	25	16	64.0%
9	+20.35	+0.70	+4.00	(7.50)	29	17	58.6%
8	+18.10	+0.55	+4.50	(7.00)	33	20	60.6%
7	+14.55	+0.56	+4.05	(8.15)	26	19	73.1%
6	+28.40	+0.98	+4.55	(4.35)	29	18	62.1%
5	+6.05	+0.22	+3.95	(6.50)	28	17	60.7%
4	+3.30	+0.09	+2.65	(4.50)	35	16	45.7%
3	+3.25	+0.09	+2.35	(4.25)	37	10	27.0%
2	+0.70	+0.03	+1.35	(3.60)	26	14	53.8%

Data Source: Bloomberg

Selling short futures and covering the day before expiration on days that pass the screens laid out for System 1 is a viable method of trading. Any period on the table results in a profit, and the winning percentage is mostly over 50%. The maximum loss for each run is probably the most concerning figure in the table. A primary goal behind testing option strategies is to reduce these drawdowns, and the first strategy is buying a put based on the shape of the VSTOXX® term structure. Table 3 shows the results from purchasing a put instead of shorting a futures.

The first figures that stand out are the two and ten days to expiration rows, which both have losses. The maximum loss column improved for all observations, but not enough to justify the drop in overall results. One positive is the run testing six days until expiration, which stands out as the most profitable approach to purchasing a put.

Table 3: System 1 – Long Put Results

Days to Exp	Total P/L	Average P/L	Max Profit	Max Loss	Trades	Wins	Win %
10	(5.05)	(0.20)	+2.85	(5.95)	25	14	56.0%
9	+12.08	+0.42	+4.25	(4.43)	29	18	62.1%
8	+8.75	+0.27	+4.15	(6.25)	33	19	57.6%
7	+8.73	+0.34	+3.70	(4.03)	26	18	69.2%
6	+19.83	+0.68	+4.25	(4.35)	29	20	69.0%
5	+0.90	+0.03	+3.43	(6.15)	28	18	64.3%
4	+1.40	+0.04	+2.55	(3.95)	35	21	60.0%
3	+0.25	+0.01	+2.10	(1.73)	37	15	40.5%
2	(2.65)	(0.10)	+1.25	(3.20)	26	12	46.2%

Data Source: Bloomberg

System 2: Bear Put Spreads

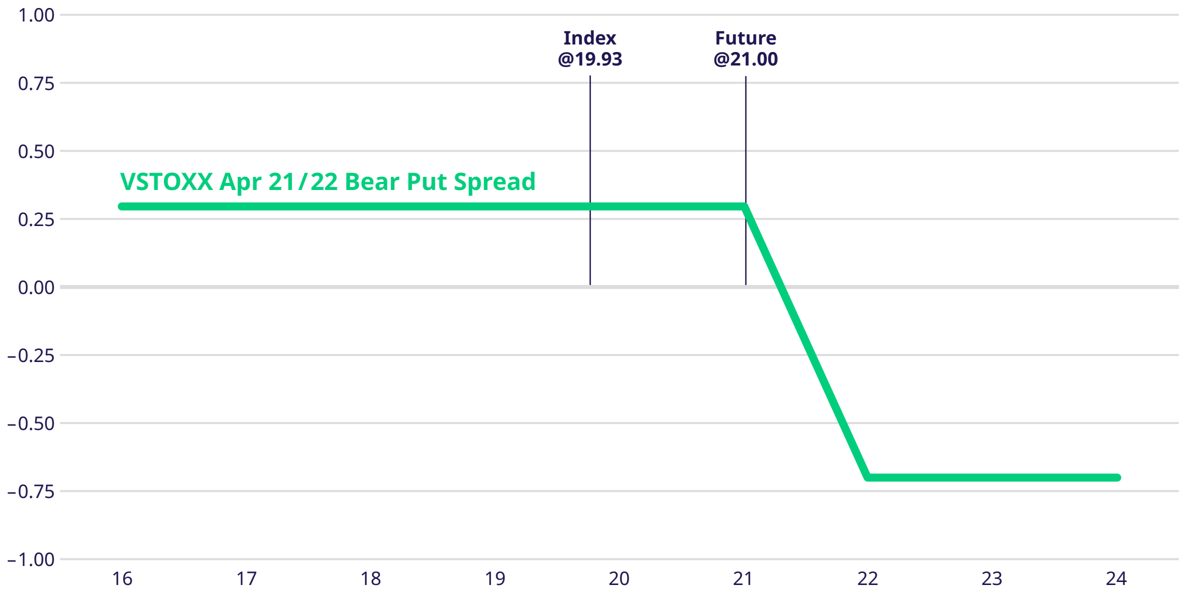
The next run uses the same screen as System 1 but involves selling a slightly out-of-the-money put by selling the strike that is the same as the handle of the VSTOXX® Futures. In trader speak, 'handle' means the whole number at the beginning of a price. For example, if a market is quoted at 21.25, a trader may say the handle is 21.

The second approach uses the following rules:

- Only Trade If Future > Spot
- ITM Put Strike Minus Premium > VSTOXX
- Lowest ITM Put Strike ≤ 30
- XX Days Before Expiration Buy Put
- XX Days Before Expiration Sell Put With Strike = Handle Future Contract
- Exit Bear Put Spread Day Before Expiration

As an example of this trade structure, we again look at the 5 April 2023 data. The VSTOXX® index is 19.93, and the April future is 21.00. The April 15 Put trades at 1.95 and is the contract purchased based on the rules for this test. The future is trading at 21.00, so the put that is sold is the April 21 Put. This trade purchases the April 22 Put for 1.95 and sells the April 21 Put for 1.25, resulting in a cost of 0.70. The payoff diagram in Figure 4 shows the potential outcome of this trade.

Figure 4: Bear Put Example Payoff Diagram



Data Source: Bloomberg

Table 4 is a repeat of Table 2, as the signals for System 2 are the same as the signals for System 1. This is placed here to offer an easy comparison to the bear put spread run.

Table 4: System 2 – Short Futures Results

Days to Exp	Total P/L	Average P/L	Max Profit	Max Loss	Trades	Wins	Win %
10	+5.25	+0.21	+3.35	(6.35)	25	16	64.0%
9	+20.35	+0.70	+4.00	(7.50)	29	17	58.6%
8	+18.10	+0.55	+4.50	(7.00)	33	20	60.6%
7	+14.55	+0.56	+4.05	(8.15)	26	19	73.1%
6	+28.40	+0.98	+4.55	(4.35)	29	18	62.1%
5	+6.05	+0.22	+3.95	(6.50)	28	17	60.7%
4	+3.30	+0.09	+2.65	(4.50)	35	16	45.7%
3	+3.25	+0.09	+2.35	(4.25)	37	10	27.0%
2	+0.70	+0.03	+1.35	(3.60)	26	14	53.8%

Data Source: Bloomberg

Table 5: System 2 – Bear Put Spead Results

Days to Exp	Total P/L	Average P/L	Max Profit	Max Loss	Trades	Wins	Win %
10	(6.18)	(0.25)	+1.65	(5.05)	25	17	68.0%
9	+4.13	+0.14	+2.10	(3.13)	29	20	69.0%
8	(1.83)	(0.06)	+1.70	(5.13)	33	22	66.7%
7	(1.35)	(0.05)	+1.05	(3.08)	26	20	76.9%
6	+4.54	+0.16	+1.60	(3.43)	29	21	72.4%
5	(7.53)	(0.27)	+2.28	(5.75)	28	19	67.9%
4	(0.68)	(0.02)	+1.30	(2.95)	35	18	51.4%
3	(0.15)	(0.00)	+0.85	(1.50)	37	19	51.4%
2	(1.78)	(0.07)	+0.78	(2.78)	26	12	46.2%

Data Source: Bloomberg

The bear put spread results, shown in Table 5, are the worst of any results discussed in this paper. Selling the slightly OTM reduces the cost of each trade but also limits the profit if VSTOXX® moves dramatically lower. The lack of potential profit per trade is the main reason this approach did not work well.

As noted, this approach performs poorly. Actually, so poorly that strategies selling downside puts were not explored further. To lower some costs and hopefully find an attractive risk-controlled approach, we explored selling an out-of-the-money call spread and combining that with a long put.

System 3: Short Call Spread Plus Long Put

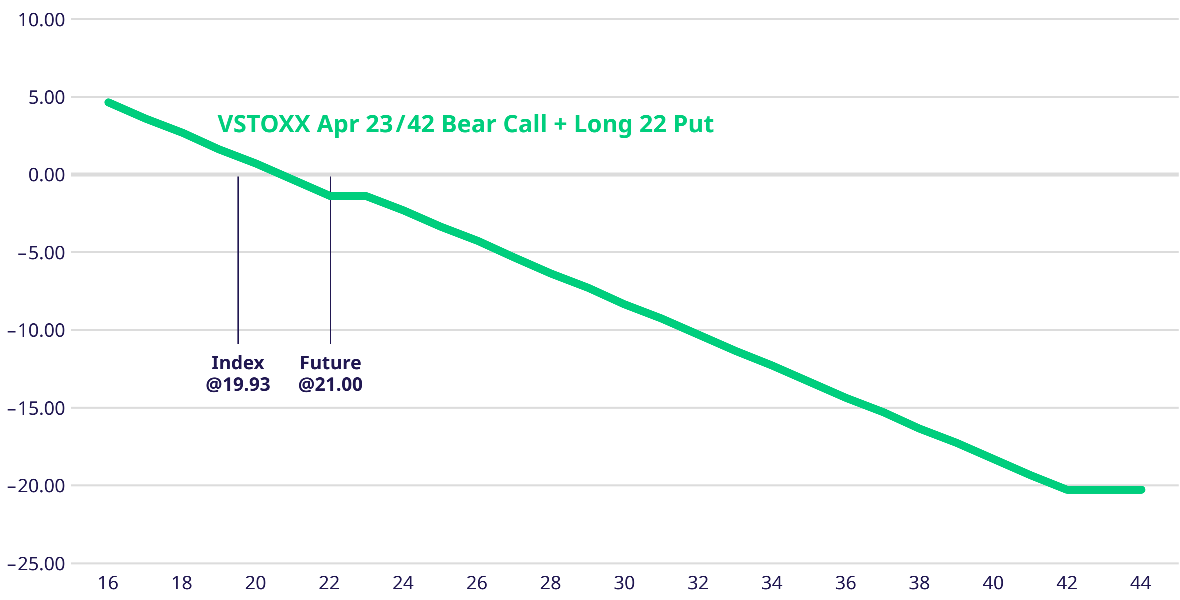
The third approach starts out purchasing the same put as in the first two approaches. A call spread is sold with the short one strike higher than the purchased put. Also, the premium for the short call should be greater than 0.10. Finally, the lowest strike call that is offered at 0.05 is purchased to complete the trade.

The third approach uses the following rules:

- Only Trade If Futures > Spot
- ITM Put Strike Minus Premium > VSTOXX
- Lowest ITM Put Strike ≤ 30
- XX Days Before Expiration Buy Put
- XX Days Before Expiration Sell Call One Strike Higher Than Long Put If Call Premium > 0.10
- XX Days Before Expiration Buy Call With Lowest Strike Offered at 0.05
- Exit Spread Day Before Expiration

As an example of this trade structure, we again look at the 5 April 2023 data. The VSTOXX® index is 19.93, and the April future is 19.93. This trade purchases the April 22 Put for 1.95, sells the April 23 Call for 0.95, and buys the April 42 Call for 0.05, resulting in a cost of 1.05 for the three-leg spread. The payoff diagram in Figure 5 shows the potential outcome for this trade.

Figure 5: Bear Call Spread Plus Long Put Example Payoff Diagram



Data Source: Bloomberg

Table 6: System 3 – Short Futures Results

Days to Exp	Total P/L	Average P/L	Max Profit	Max Loss	Trades	Wins	Win %
10	+8.60	+0.39	+3.35	(6.35)	22	15	68.2%
9	+20.35	+0.73	+4.00	(7.50)	28	17	60.7%
8	+17.65	+0.55	+4.50	(7.00)	32	19	59.4%
7	+14.90	+0.62	+4.05	(8.15)	24	19	79.2%
6	+24.65	+0.95	+4.55	(4.35)	26	16	61.5%
5	+5.55	+0.21	+3.95	(6.50)	27	16	59.3%
4	+1.60	+0.05	+2.65	(4.50)	31	13	41.9%
3	+2.85	+0.08	+2.35	(4.25)	34	9	26.5%
2	+5.05	+0.30	+1.35	(0.60)	17	11	64.7%

Data Source: Bloomberg

The first System 3 results, in Table 6, shows the results of shorting VSTOXX® Futures when there is a long put plus bear call spread signal. The futures results are attractive across several time frames, especially between six and nine days to expiration. The max losses are concerning, like they were in the previous futures-only runs.

Table 7 shows the results of shorting a call spread plus purchasing a put. Note that the six to nine-day time frames are all attractive approaches. The win percentage for seven days, at 83.3%, is impressive, but seven days also has the biggest trade drawdown. The six-days-to-expiration approach has been attractive with other approaches and appears to be the best approach for System 3.

Comparing the six-day approach to the futures results shows only about 3.00 points in difference between the two Total P/L results. The futures results are slightly better, but the defined losses using the option approach may be worth giving up a little profit.

Table 7: System 3 – Short Call Spread Plus Long Put Results

Days to Exp	Total P/L	Average P/L	Max Profit	Max Loss	Trades	Wins	Win %
10	+6.25	+0.28	+3.10	(5.70)	22	15	68.2%
9	+18.98	+0.68	+4.35	(6.73)	28	20	71.4%
8	+14.15	+0.44	+4.30	(6.33)	32	22	68.8%
7	+12.60	+0.53	+3.90	(7.18)	24	20	83.3%
6	+21.18	+0.81	+4.40	(4.33)	26	20	76.9%
5	+3.25	+0.12	+3.75	(6.40)	27	18	66.7%
4	(0.20)	(0.01)	+2.55	(4.33)	31	18	58.1%
3	+1.33	+0.04	+1.93	(4.28)	34	17	50.0%
2	+3.20	+0.19	+1.25	(0.53)	17	9	52.9%

Data Source: Bloomberg

System 4: Short Call Spread

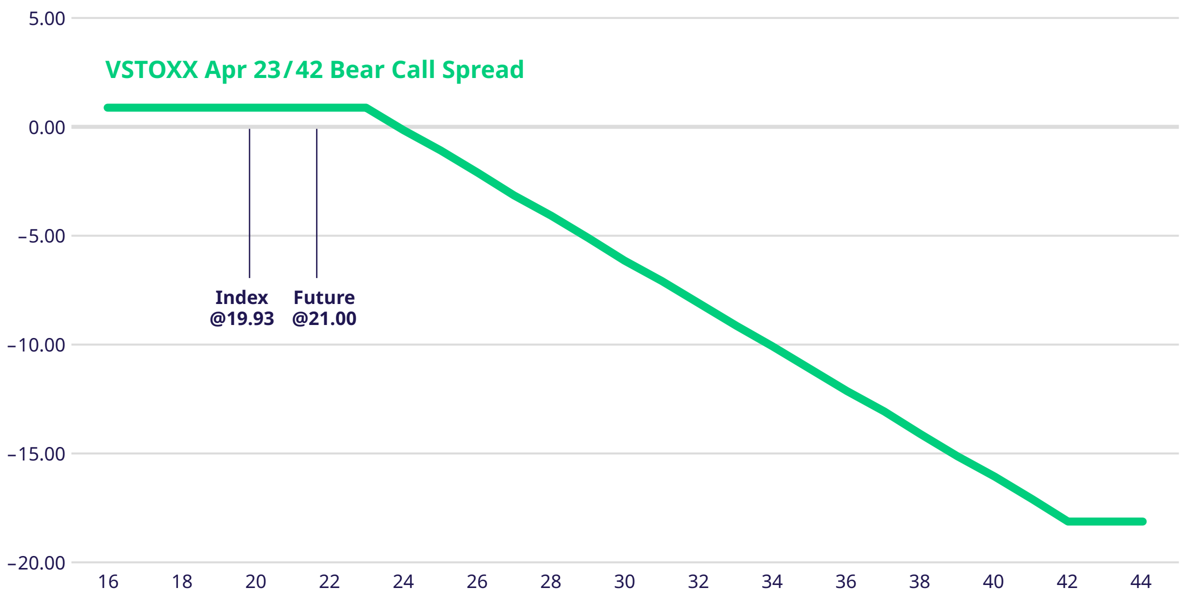
The final testing for this study eliminates the long put portion of the option spread in System 3. This results in an OTM call spread using the short call spread generated by the rules for System 3.

The fourth approach uses the following rules:

- Only Trade If Future > Spot
- ITM Put Strike Minus Premium > VSTOXX
- Lowest ITM Put Strike ≤ 30
- XX Days Before Expiration Sell Call One Strike Higher Than Put If Call Premium > 0.10
- XX Days Before Expiration Buy Call with Lowest Strike Offered at 0.05
- Exit Spread Day Before Expiration

As an example of this trade structure, we again look at the 5 April 2023 data. The VSTOXX® index is 19.93, and the April future is 21.00. Recall that each previous system example purchased the April 22 Put for 1.95. That option is not sold for this approach, but it does dictate to short the call strike of 23. Specifically, this trade sells the April 23 Call for 0.95 and purchases the April 42 Call for 0.05, resulting in a credit of 0.90. The payoff diagram in Figure 6 shows the potential outcome for this trade.

Figure 6: Bear Call Spread Example Payoff Diagram



Data Source: Bloomberg

Table 8: System 4 – Short Futures Results

Days to Exp	Total P/L	Average P/L	Max Profit	Max Loss	Trades	Wins	Win %
10	+8.60	+0.39	+3.35	(6.35)	22	20	90.9%
9	+20.35	+0.73	+4.00	(7.50)	28	17	60.7%
8	+17.65	+0.55	+4.50	(7.00)	32	19	59.4%
7	+14.90	+0.62	+4.05	(8.15)	24	19	79.2%
6	+24.65	+0.95	+4.55	(4.35)	26	16	61.5%
5	+5.55	+0.21	+3.95	(6.50)	27	16	59.3%
4	+1.60	+0.05	+2.65	(4.50)	31	13	41.9%
3	+2.85	+0.08	+2.35	(4.25)	34	9	26.5%
2	+5.15	+0.32	+1.35	(0.60)	16	11	68.8%

Data Source: Bloomberg

The System 4 short futures results are the same as System 3 as both signals are the same.

The dollar amounts for the short futures results dwarf those of the short call spread results, but there are some positive aspects to the results in Table 9.

Note that the winning percentage for the short call spread systems between six and ten days is mostly around 90%, with only the nine-day results at 85.7%. Despite the relatively low profit for these approaches, the win consistency combined with the manageable losses, especially for the six-day run, makes this approach an attractive alternative to selling futures for short exposure.

Table 9: System 4 – Short Call Spread Results

Days to Exp	Total P/L	Average P/L	Max Profit	Max Loss	Trades	Wins	Win %
10	+8.13	+0.37	+1.18	(1.15)	22	20	90.9%
9	+6.90	+0.25	+1.15	(2.30)	28	24	85.7%
8	+5.75	+0.18	+1.15	(3.08)	32	29	90.6%
7	+3.43	+0.14	+0.83	(3.15)	24	22	91.7%
6	+4.90	+0.19	+0.58	(0.58)	26	24	92.3%
5	+2.75	+0.10	+0.60	(0.68)	27	20	74.1%
4	(0.17)	(0.01)	+0.53	(2.53)	31	24	77.4%
3	+1.43	+0.04	+0.43	(2.55)	34	25	73.5%
2	+1.73	+0.11	+0.90	0.00	16	11	68.8%

Data Source: Bloomberg

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