Tail Risk Protection Strategies - A Pairs Approach

FINM 33150: Quantitative Trading Strategies (Winter 2023)

Krishna Diggavi (ID: 12370601), Anvita Panandikar (ID: 12372196), Mani Sawhney (ID: 12372173), Riya Sheth (ID: 12356103)

Table of Contents

I. Introduction to Trading Strategy
II. Back-Testing the Trading Strategy
III. Analysis of the Results
IV. Pros of the Trading Strategy
V. Cons of the Trading Strategy
VI. Reasons
VII. Conclusion

INTRODUCTION

Trading Strategy: Overview

- The trading strategy has 3 main concepts:

Momentum-based Signals

Long-Short Pairwise Trading

Risk-Hedging with Options

We capitalize on momentum

Trend-Following or Momentum Strategies work on the basic premise of buying what has been going up recently and selling what has been going down.

Figure 1: Demonstrating existence of momentum that will be capitalized on in the strategy.

We capitalize on correlation between assets

We incorporate the momentum signal into pairwise trading, a risk-hedging technique which takes into account the high correlation between two assets to create a long and short position.

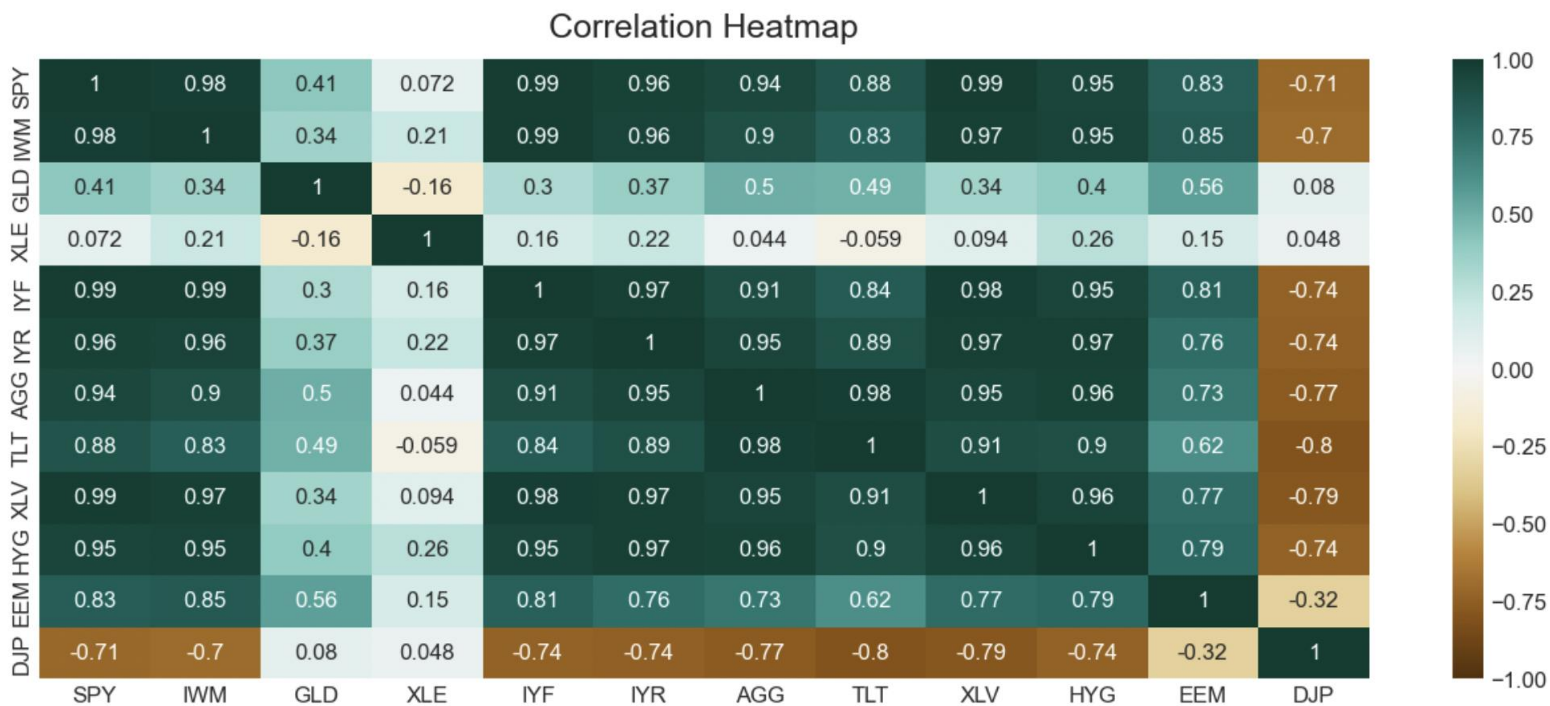


Figure 2: Demonstrating existence of high correlation between assets which will be capitalized on.

We exercise tail-risk protection

For additional tail-risk hedging, put and call options are exercised to put a floor under potential losses if asset prices fall/rise significantly.

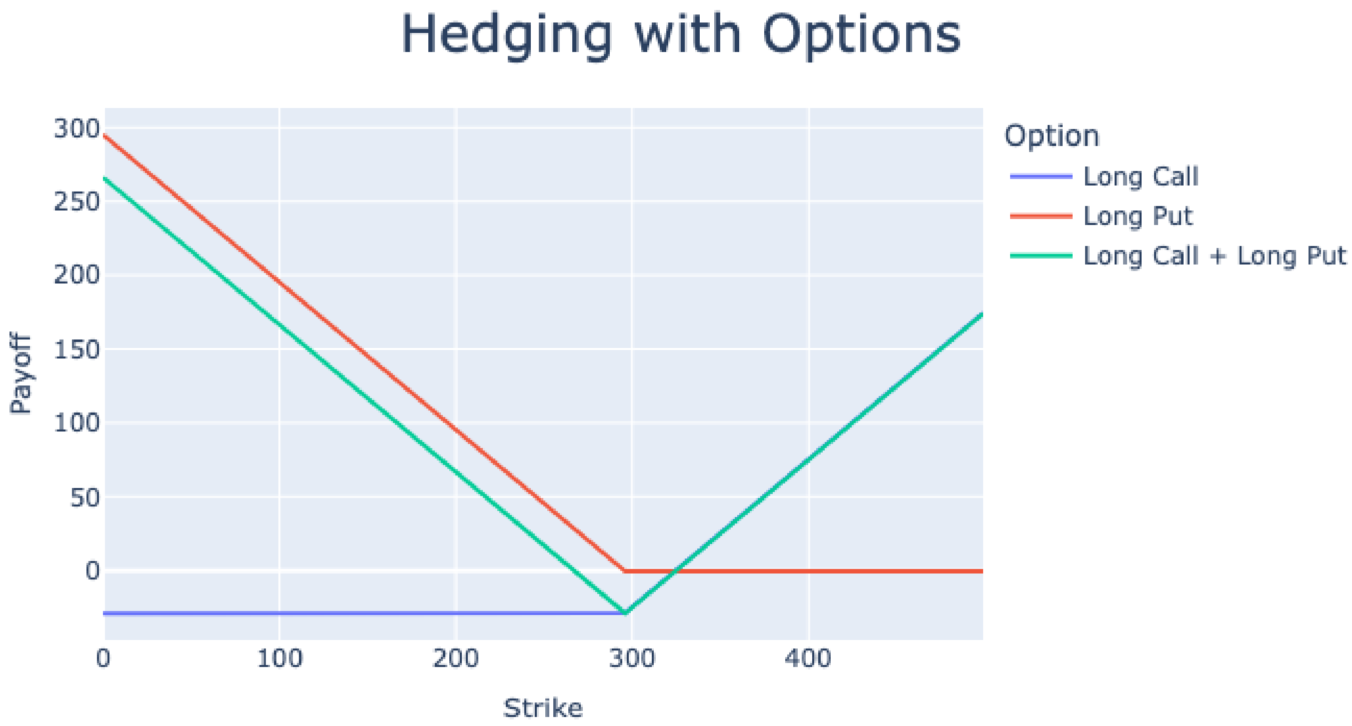


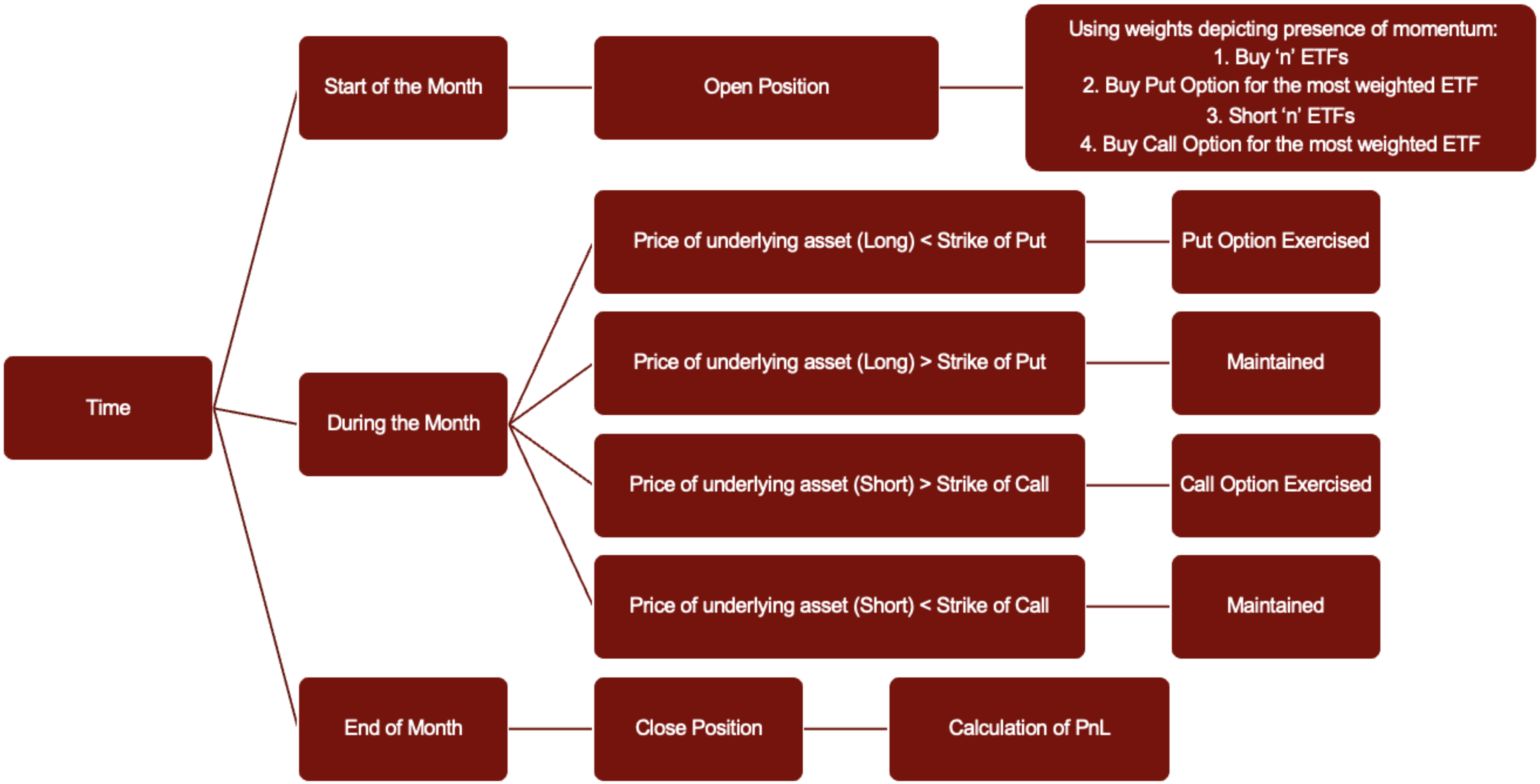
Figure 3: Demonstrating an example pay-off of a put/call combination which will be utilized in this strategy to hedge the risk.

BACK-TESTING THE STRATEGY

So, what will you be investing in?

Asset Class	Sub Asset Class	ETF Name	ETF Symbol
Equities	Large-Cap US Equities	SPDR S&P 500 ETF Trust	SPY
Equities	Small-Cap US Equities	iShares Russell 2000 ETF	IWM
Commodities	Precious Metals	SPDR Gold Shares	GLD
Equities	Energy	Energy Select Sector SPDR Fund	XLE
Equities	Financials	iShares U.S. Financials ETF	IYF
Real Estate	Real Estate Investment Trusts (REITs)	iShares U.S. Real Estate ETF	IYR
Fixed Income	Broad Market	iShares Core U.S. Aggregate Bond ETF	AGG
Fixed Income	US Treasuries	iShares 20+ Year Treasury Bond ETF	TLT
Equities	Healthcare	Health Care Select Sector SPDR Fund	XLV
Fixed Income	High-Yield Bonds	iShares iBoxx High Yield Corporate Bond ETF	HYG
Equities	Emerging Markets	iShares MSCI Emerging Markets ETF	EEM
Commodities	Diversified Commodity Futures	iPath Bloomberg Commodity Index Total Return ETN	DJP

How does our strategy work?



Look at our strategy go!

- We don't believe in staying in a bad position for long.
- We got a solution for both: when the price rises and the price falls.
- If it falls, we exercise a put, if it rises, we exercise a call and all is balanced with our capital again.
- As represented in the graphs, as soon as we hit a position that gives us jitters, we exercise the appropriate put and call option and salvage the day.

ANALYSIS OF THE STRATEGY

Overall Comparison for Cumulative PnL

- What is Cumulative PnL?

- Cumulative PnL stands for Cumulative Profit and Loss, which is a financial metric used to measure the total amount of profit or loss generated over a given period of time.

- If it is a profit, Cumulative PnL is positive and vice-versa

How did we do in terms of Cumulative PnL?

- Hedging with both call and put options was more effective in generating returns and mitigating risk than using only one type of option or no hedging at all.
- Overall, the comparison to the benchmark indicates that the hedging strategies were successful in generating higher cumulative PnL than the benchmark. This suggests that the strategies were effective in generating returns, even during periods of market volatility.

Let's talk numbers

Performance Summary Statistics

	Mean	Volatility	Sharpe Ratio
Put + Call Strategy	0.1224	0.0380	3.2208
Put Strategy	-1.7631	1.1590	-1.5213
Call Strategy	0.0455	0.0280	1.6252
No Options Strategy	-0.2783	0.1255	-2.2179
Benchmark Strategy	-0.0128	0.0165	-0.7732

Cumulative PnL

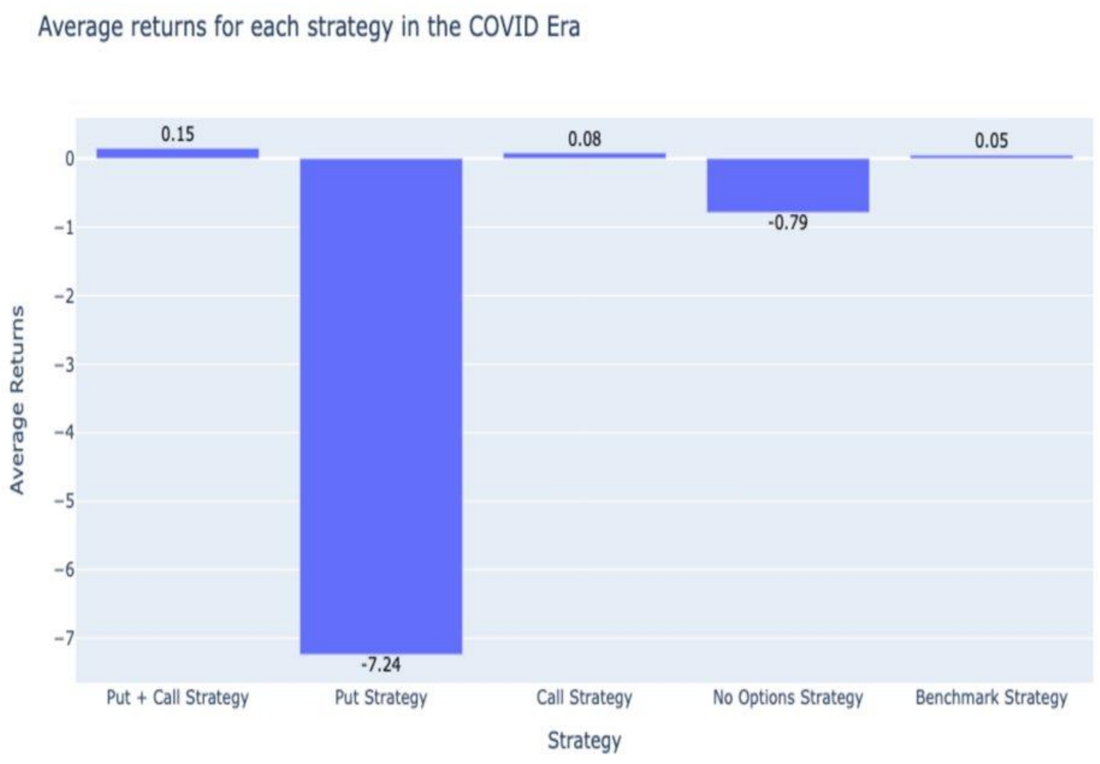
	Put+Call	Put	Call	No Options	Benchmark
2021-12-31	584,246.8185	-485,920.3331	263,949.0436	-806,218.1081	-2,591.4706

Getting Into the COVID Era

- When the pandemic first emerged in early 2020, many stock markets experienced sharp declines, as investors worried about the potential economic impact of widespread lockdowns and travel restrictions.

- Let's see how our strategy with tail-risk hedging performs..

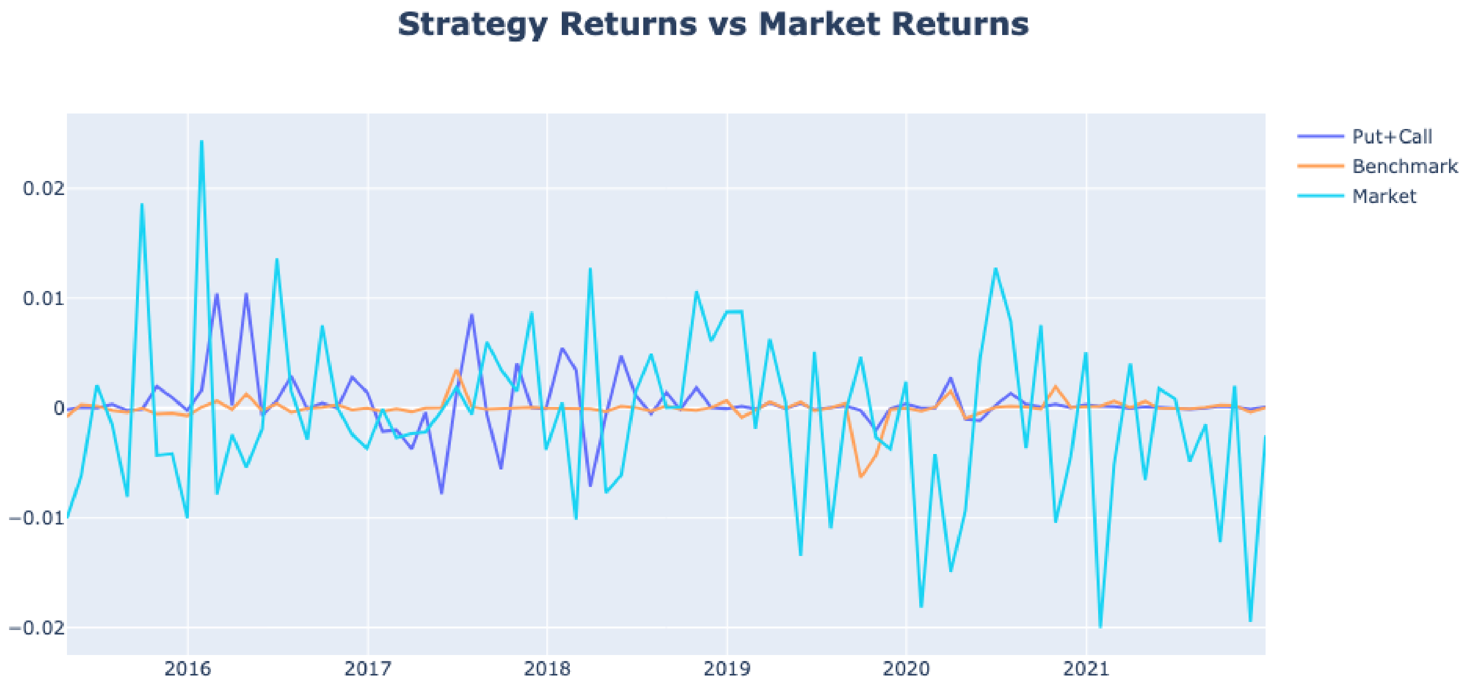
Deep Diving into COVID Era Returns



- As observed from the graph, the average returns are highest when we hedge our risk using call and put options.
- It is almost 0.94 times greater than when we don't use either in a traditional strategy!!
- Convinced Yet?

How did we fare against the market?

Tired of losing sleep over market crashes? During the COVID pandemic, we not only survived, but we came out with slightly positive returns.



PROS OF THE STRATEGY

Why invest in our strategy?

Are you tired of losing money and taking on too much risk? Our strategy has got you covered!

- Reduces Downside Risk: You can protect against losses if the prices of those assets move in an unfavorable direction.
- Cost Effective Protection: Returns generated from the long-short pair strategy can offset the cost of the options.
- Maintains Exposure to Long Short Strategy: Gain the profits by being exposed to returns generated by a long short pair while being protected from risk.

CONS OF THE STRATEGY

What should we caution you against?

- Model is complicated and could be difficult to understand and implement effectively.
- The back-testing of the strategy was done with certain assumptions which may impact it negatively in the real-world scenario.
  a. Transaction Costs
  b. Open and Closing Positions at the Start and End of the month
- The risk hedging on good days of returns may lower the profits.

It's a bit of a balancing act, but we're up for the challenge. Are you?

CONCLUSION

In Retrospection

- We have a back-tested our tail-risk strategy which can generate great profits and protect against severe losses.
- It does so in a cost-effective way.
- However, it also adds complexity and transaction costs to the investment approach and requires careful consideration of the potential risks and benefits involved.

Krishna Diggavi

12356103

krishnadiggavi@uchicago.edu

Anvita Panandikar

12372196

anvitap@uchicago.edu

Mani Sawhney

12372173

msawhn2@uchicago.edu

Riya Sheth

12356103

riyasheth@uchicago.edu