The Story of the Collar

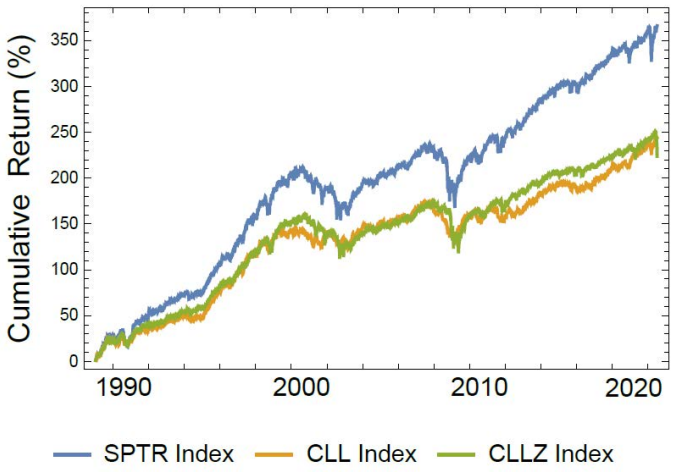
Margaret Sundberg
*Quantitative Trader & Portfolio Manager; Volaris Capital Management**

Jake Freeman
Dept of Economics; University of Southern California

This year has been a bumpy ride for equity investors as the S&P 500 Index lost over a third of its value between February 19 and March 23, only to meteorically recover over the subsequent quarter. With continued pandemic and election fueled uncertainty playing out in the backdrop, many investors, retail and professional alike, are considering how to protect their assets. An interest in equity collars and other protective strategies is reemerging as investors look to access equity opportunities with less risk. The equity collar[1] is constructed by purchasing a protective put for downside protection and writing a call to finance the protective put. The collar strategy is potentially offering investors a way to reduce downside risk while limiting upside potential by selling a call option.

An equity collar, in its efforts to provide downside protection, significantly eats into the body of the return distribution; the Collar Index[2] and the Zero-Cost Collar Index[3] exhibit this substantial drag on returns. The Collar Index owns S&P 500 Index stocks, purchases a three-month 95% moneyness put and sells a one-month 110% moneyness call. *Figure 1* illustrates the Collar Index's destruction of equity returns over time. The Collar Index chews into a third of the annualized return[4] of the S&P 500 Total Return Index[5] while offering only a slightly improved ratio of annualized returns to volatility.

The Zero-Cost Collar Index owns the S&P 500 Index stocks, purchases a 97.5-95% protective put spread, and sells a call to finance the put spread. *Figure 1* shows its lack of participation in significant upside gains and negligible protection against large downside moves. The Zero-Cost Collar Index worsens the underlying's ratio of annualized returns to volatility while also eating into a third of the annualized returns, just like the Collar Index.



	SPTR Index	*CLL Index*	*CLLZ Index*
CAGR	10.6%	7.5%	7.0%
Volatility	18.2%	11.3%	14.1%
CAGR / Volatility	0.58	0.66	0.5

Figure 1. *The S&P 500 Total Return Index, the Collar Index, & the Zero-Cost Collar Index cumulative return and daily return statistics shown from 1/2/1989-7/19/2020.*

A simple shift from solely U.S. Large Cap exposure to a classical diversification would have decreased volatility while holding on to the body of returns. Figure 2 shows a 60-40 portfolio constructed of 60% S&P 500 Total Return Index and 40% LBUSTRUU Index in contrast with the Collar Index and the Zero-Cost Collar Index.

[1] Historically, the collar was created with the purpose of allowing investors to avoid selling their stock consequently not triggering tax consequences.

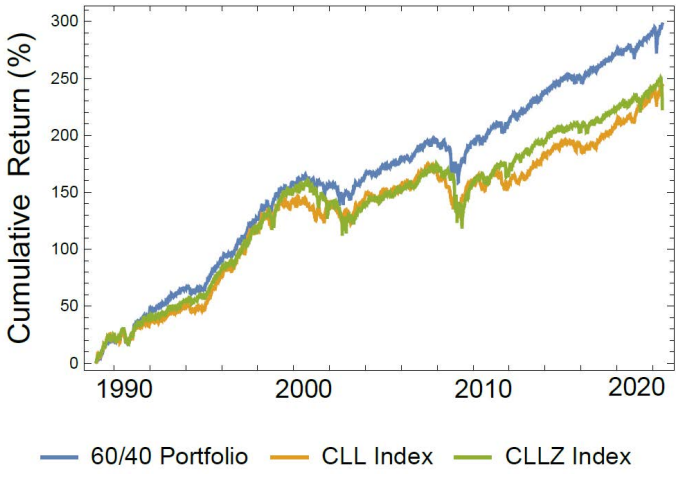
[2] *CLL Index:* CBOE S&P 500 95-110 Collar Index: Entails holding the stocks in the S&P 500 Index; buying three-month S&P 500 put options to protect this S&P 500 portfolio from market decreases; and selling one-month S&P 500 call options to help finance the cost of the puts.

[3] *CLLZ Index:* CBOE S&P 500 Zero-Cost Put Spread Collar Index: The option strategy holds a long position S&P 500 Index; on a monthly basis buys a 2.5%-5% S&P 500 put option spread; and sells a monthly out-of-the-money S&P 500 call option to cover the cost of the put spread.

[4] *CAGR*: Compound Annualized Geometric Return.

[5] *SPTR Index*: S&P 500 Total Return Index: SPTR Index reflects the effects of reinvested dividends on the SPX Index.

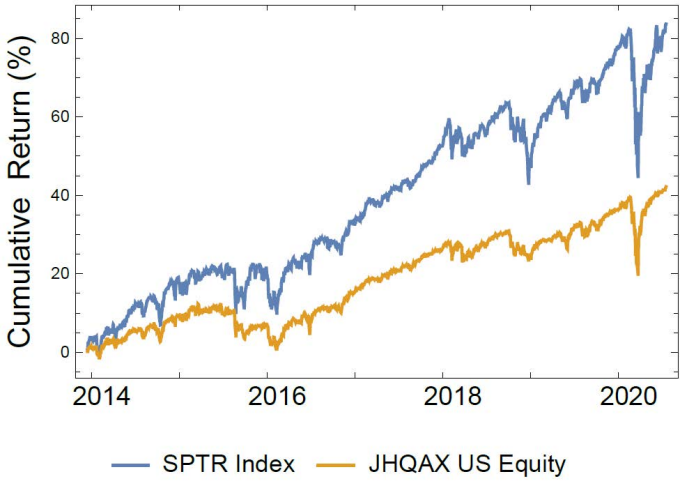
[6] *LBUSTRUU Index:* Barclays US Aggregate Bond Index: Measures the total return of investment grade, US dollar-denominated, fixed-rate taxable bond market (incl. Treasuries), government-related and corporate securities, MBS, ABS, and CMBS.



	60/40 Portfolio	*CLL Index*	*CLLZ Index*
CAGR	8.9%	7.5%	7.0
Volatility	10.9%	11.3%	14.1%
CAGR / Volatility	0.81	0.66	0.5

Figure 2. *Portfolio of 60% S&P 500 Total Return Index and 40% LBUSTRUU Index, the Collar Index, & the Zero-Cost Collar Index cumulative return and daily return statistics shown from 1/2/1989-7/19/2020.*

In this example, diversification yields a better profile as measured by return, volatility, and ratio of returns to volatility. The collar strategy is not just a theoretical index, as large firms have created funds following the collar proposition (see *Figure 3*). Simple diversification would have helped an investor achieve the objective of the collar without added complexity and management fees. The collar-hedging strategy simply gives up too much upside potential for the downside protection it is providing. Admittedly, the contrasting 60-40 portfolio has benefited from a declining rate environment, but this does not take away from the non-strategic construction of the collar indexes; **(1)** the collar is passively buying a put at a level within the body of the return distribution and, **(2)** selling a call with a potentially negative risk premium.



	SPTR Index	*JHQAX US Equity*
CAGR	11.7%	6.1%
Volatility	17.8%	9.7%
CAGR / Volatility	0.66	0.63

Figure 3. *The S&P 500 Index Total Return Index & the JP Morgan Hedged Equity Fund[7] cumulative return and daily return statistics shown from 12/13/2013-7/19/2020.*

Purchasing a put without any monetization strategy is costly. The purchased put strike level, which is roughly 5% below the market level, falls within a monthly return standard deviation, rendering those puts expensive to buy. Furthermore, without any active strategy to monetize the gains incurred in downturns, the expensive purchased puts drive the collar's long-term value destruction.

Intrinsically, a 95% strike bought put targets truncating the downside body of the underlying return distribution. A more nuanced approach would be to truncate the downside tail-risk. If such a downside tail-risk protection could be implemented, with a more modest drag compared to a passive 95% bought put, this would yield a more sustainable product.

The collar's call writing is not strategic. The sold call option caps the upside potential of the underlying while collecting minimal premium in return. There is a ready supply of out-of-the-money call options sellers, both by institutional hedging programs as part of their collar programs and by retail call writes; this supply and demand dynamic has left its footprint on call option risk premium. For a sample expiry, in *Figure 4*, we show the estimated rate of expected return on risk capital for S&P 500 Index

[7] *JHQAX US Equity*: JP Morgan Hedged Equity fund is an open-end fund that seeks capital appreciation. The Fund participates in the broad equity markets while hedging overall market exposure relative to traditional long-only equity strategies. The Fund uses an enhanced index strategy to invest in these equities, which consist of common stocks of large capitalization U.S. companies.

calls and puts and see a distinct maximum for out-of-the-money puts and distinct minimum for out-of-the-money calls. The out-of-the-money call risk premium can be decidedly negative, especially in comparison to the noticeably out-of-the-money positive put risk premium. The disparity between calls and puts and these distinct opportunities to buy and sell are also shown by looking at the deviations of implied volatility from subsequent realized volatility. Selling an inexpensive option with a negative risk premium and buying an expensive option leaves the collar destined for lackluster performance.

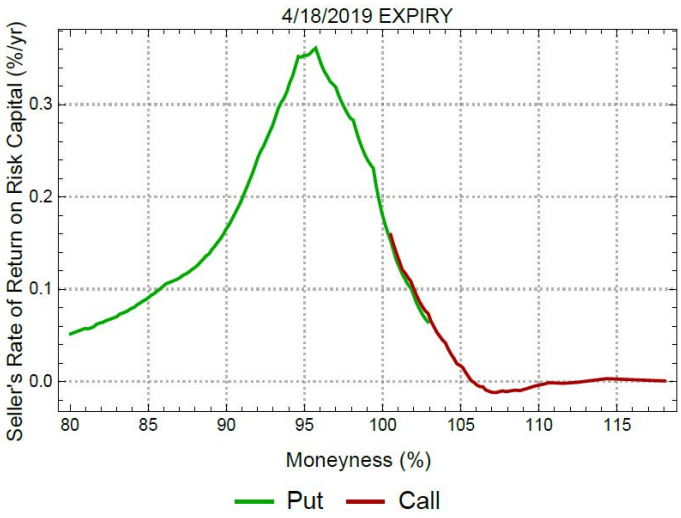


Figure 4. *A snapshot is shown from February '19 of the estimated risk-return profile of an option seller. The approach to discern real-world risk-return profiles of options was described in Kapoor [2010] and Petrelli et al [2010], employing the real-world asset model of Wang et al [2009].The approach simulates the S&P 500 Index with realistic jumpiness and asymmetry over the range of time scales spanning the option expiry. This stochastic description is consistent with the long-term market behavior (unconditional) and is also informed of more recent market outcomes (via conditioning) [Generalized Auto Regressive Asset Model][8] (Wang et al., [2009]). Monte-Carlo paths describe the non-stationarity and non-normality of the returns. Over these Monte-Carlo paths we find the risk minimizing hedging strategy. A comparison of an option bid-price with expected hedging costs provides an estimate of the option-seller's expected P&L. The expected P&L when compared to the hedge-cost distribution reveals the option's risk-return profile from a seller's perspective. This is how employing the approach can discern the return-risk profile of an option seller and can see how the profile varies with strike and tenor, for puts and calls.*

Conclusion: Option-based hedging strategies lacking consideration of the supply and demand driven risk-premium dynamics present for out-of-the-money calls and puts, such as a collar, do not aid in achieving an investor's long-term objective. The Collar Index fails to address the cardinal characteristics of options, enumerated in Sundberg [2019], that need to be considered in assessing option strategies (*Figure 5*).

Five Cardinal Characteristics of SPX Index Options	**CLL Index & CLLZ Index**
1. Disparity Between Out of the Money Puts and Calls	**X**
2. Asymmetry Between Buyer and Seller	**X**
3. Exploding Asymmetry at Expiry	**X**
4. Exploding Asymmetry with Out-of-the-Moneyness	**X**
5. Elements of Timing	**X**

Figure 5. *The cardinal characteristics of options that are recognized by the Collar Index are indicated by a* ✔ *and the properties ignored in the index construction are indicated by* a **X**.

Option-based strategies may add value and play a role in hedging a portfolio if aware of the realities on hand. Option sell positions exhibit adverse asymmetry (i.e. the gains are capped, but the losses can be disproportionately large) and option buy positions exhibit favorable asymmetry (Kapoor [2010]). In principle, composing a portfolio with controlled expected costs and favorable asymmetry allows for sustainable downside protection without limiting upside; this is not accomplished by the collar.

[8] Exploits observed persistence and lead-lag relationships encompassing return magnitude and sign and possibly another *conditioning variable* and employs a *vector auto-regressive* framework to realistically capture the first four moments of return term structure.

REFERENCES

Kapoor, V., *Optimal Dynamic Hedging of Equity Options: Residual-Risks, Transaction-Costs, & Conditioning: Real World Options*, https://www.volariscapital.com/research.html, *Global Derivatives*, 2010.

Petrelli, A., R. Balachandran, O. Siu, R. Chatterjee, J. Zhang, V. Kapoor, Optimal Dynamic Hedging of Equity Options: Residual-Risks, Transaction-Costs, & Conditioning, *ssrn*, 1530046, April 2010.

Sundberg, M., Challenges of Indexation in S&P 500 Index Volatility Investment Strategies, *ssrn*, 3427350, July 2019.

Wang, J., A. Petrelli, R. Balachandran, O. Siu, J. Zhang, R. Chatterjee, V. Kapoor, General Auto-Regressive Asset Model, *ssrn*, 142855, July 2009.