



Interactive Brokers
in conjunction with
Volaris Capital Management
present:

Volatility as an Asset Class: Challenges & Opportunities

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Volatility as an Asset Class *Challenges & Opportunities*

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Presentation Overview

BUY AND HOLD CHARACTERISTICS



SUSTAINABLE YIELD AND TAIL-RISK OPPORTUNITIES



ANALYTICAL APPROACH TO UNDERSTANDING OPTIONS



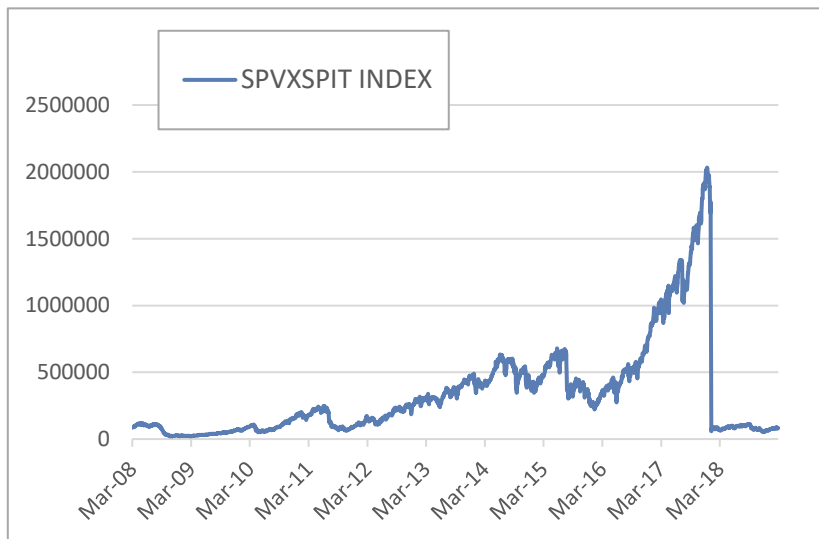
CARDINAL CHARACTERISTICS OF SPX INDEX OPTIONS

Buy and Hold Approach to Volatility

SHORT VOLATILITY

Going broke selling Volatility

SPVXSPIT Index (S&P 500 VIX Short-Term Futures Inverse Index Total Return): Represents short exposure to one-month maturity VIX futures contracts.

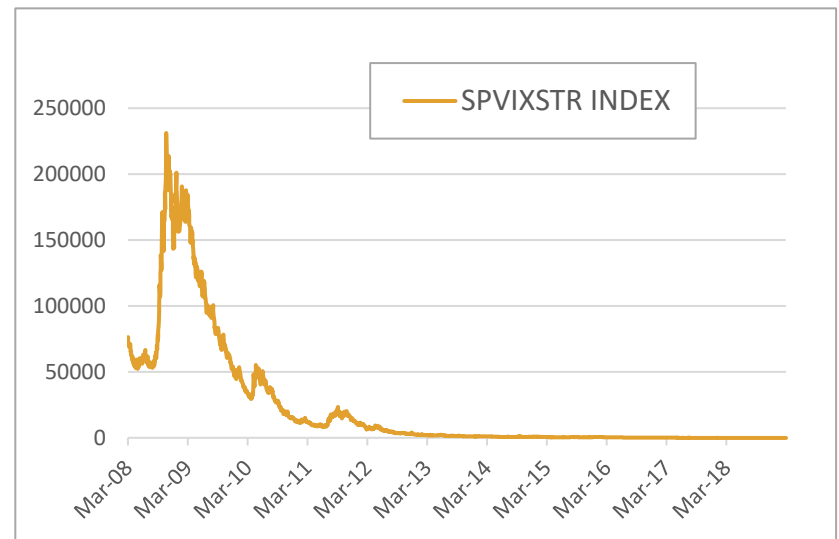


- Particularly bumpy ride with a downside volatility of 171%
- The SPVXSPIT Index suffered a 96% loss in one day
 - Overreaction by VIX Index (SPTR Index down ~10% below prior month's peak.
- Short Volatility strategies are notorious for catastrophic blowups

LONG VOLATILITY

Going broke buying Volatility

SPVIXSTR Index (S&P 500 VIX Short-Term Futures Index Total Return): Represents long exposure to one-month maturity VIX futures contracts.

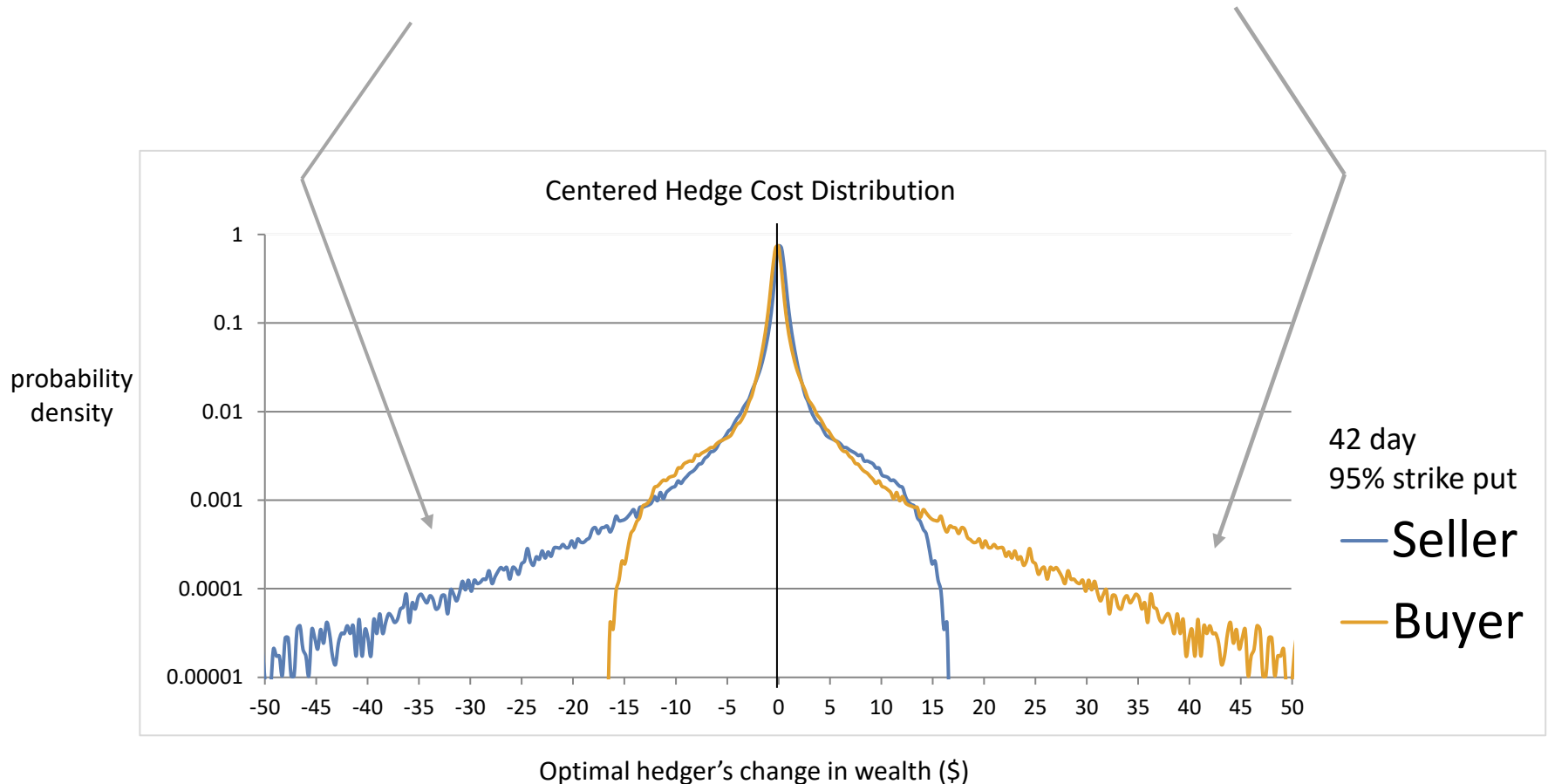


- The overall negative drift of the SPVIXSTR Index, a long volatility exposure, is 5 to 6 times the positive drift experienced by the SPTR Index
- A breathtaking long-term average rate of decline.
- The long VIX futures when used as hedge eliminates returns – yet leaves significant portfolio volatility.

ASYMMETRY OF RESIDUAL RISK

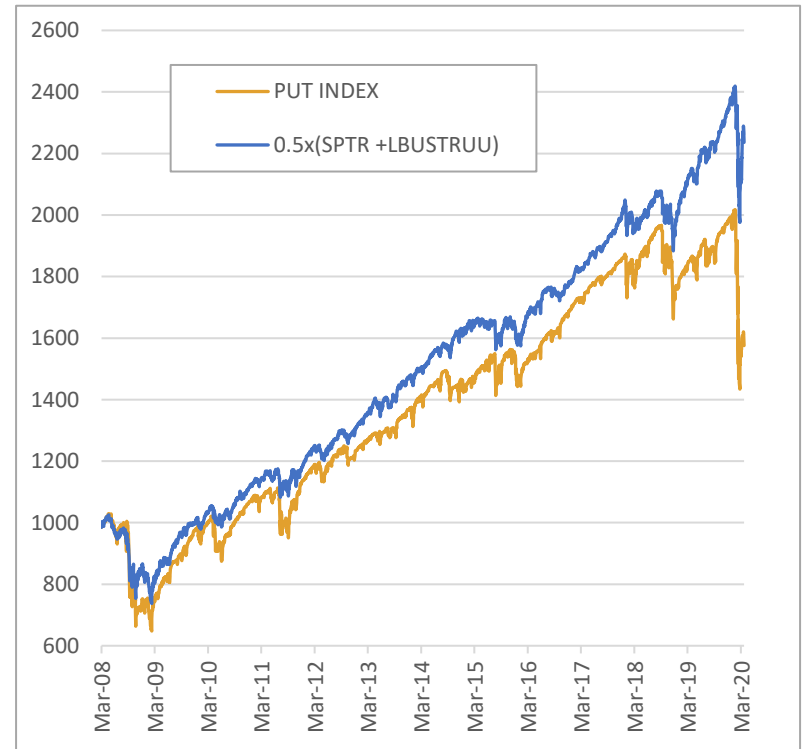
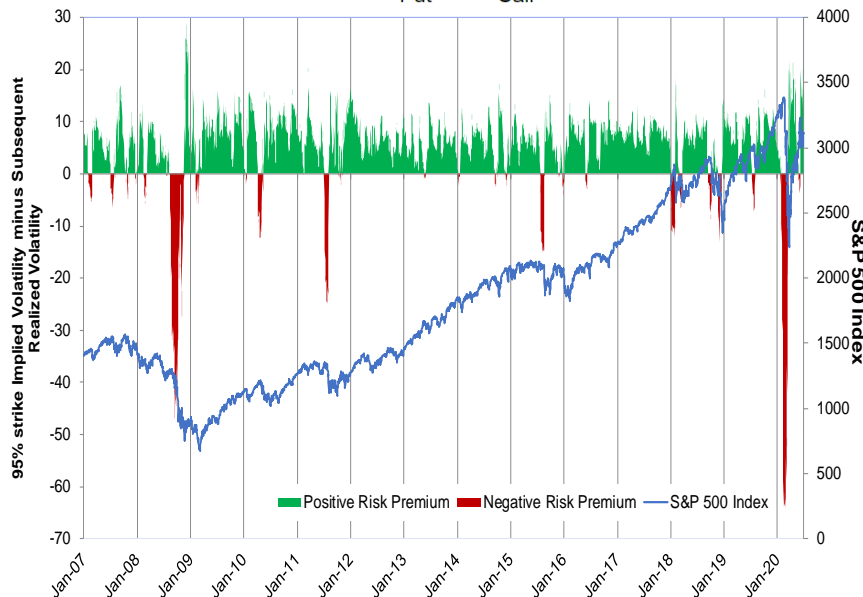
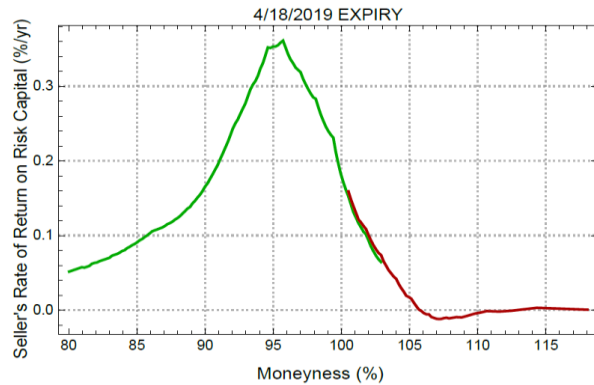
Opportunity: Own Positive Carry
Challenge: Adverse Negative Surprise

Challenge: Negative Carry Costs
Opportunity: Own Positive Surprise



Short Equity Volatility

Opportunity: Put Risk Premium
Challenge: Prone to Negative Events



- Nature of the put risk premium is such that just selling an at the money put and taking it to expiry is not a sustainable way to harvest the risk premium.
- Too prone to negative events and does not account for the harmful nature of the asymmetric P&L distribution endemic to selling options.

Short Equity Volatility

IRON CONDOR INDEX

Symmetric Spreads

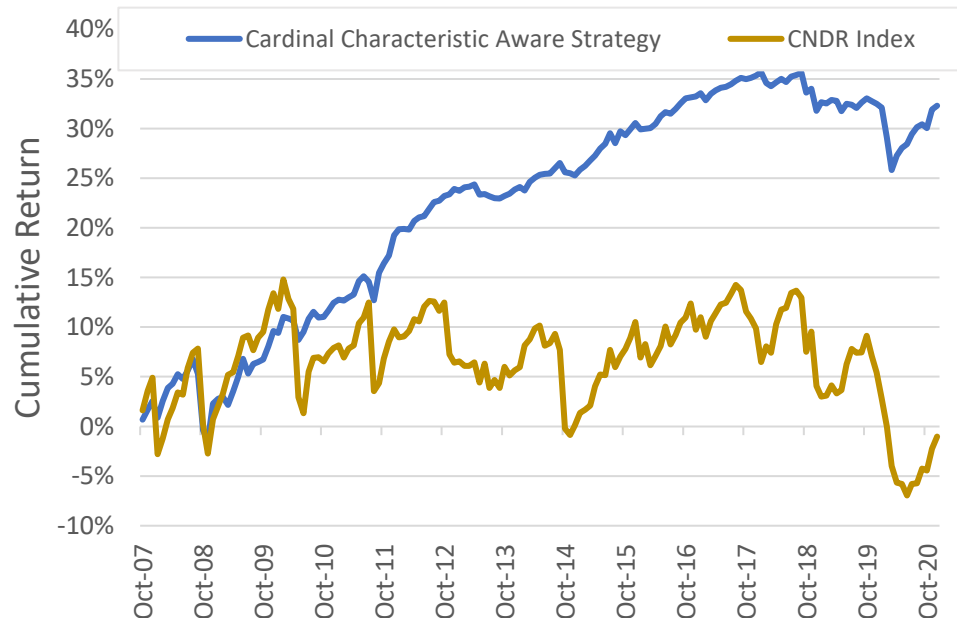
Features:

- Symmetric Put and Call Spreads
- Spreads Taken to Expiry
- Goes Nowhere!

CARDINAL CHARACTERISTIC AWARE SPREAD STRATEGY

Features:

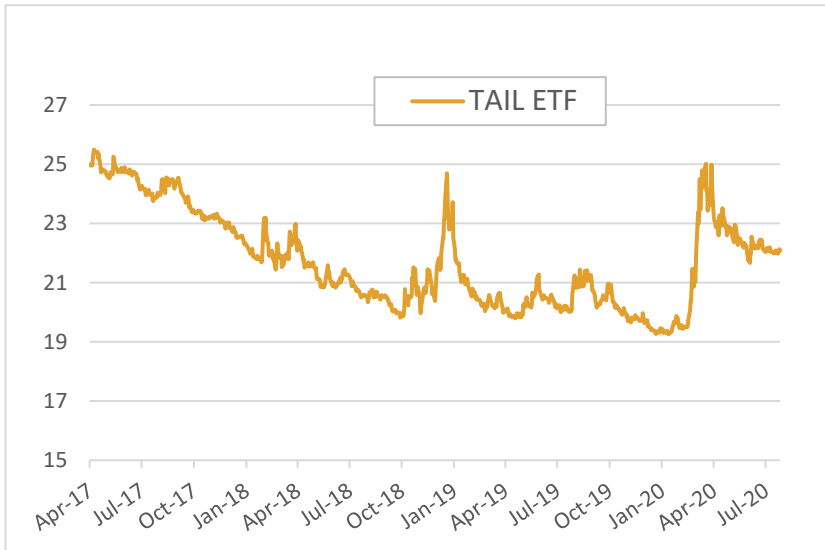
- Recognizes difference in call and put risk premium.
- Owns extra bought optionality.
- Aware of adverse asymmetry as sold option approaches expiry and as strikes become more OTM.
- Timing adjusted for high and low volatility environment.



Long Equity Volatility

TAIL ETF

Purchases OTM Options and US Treasury Bonds

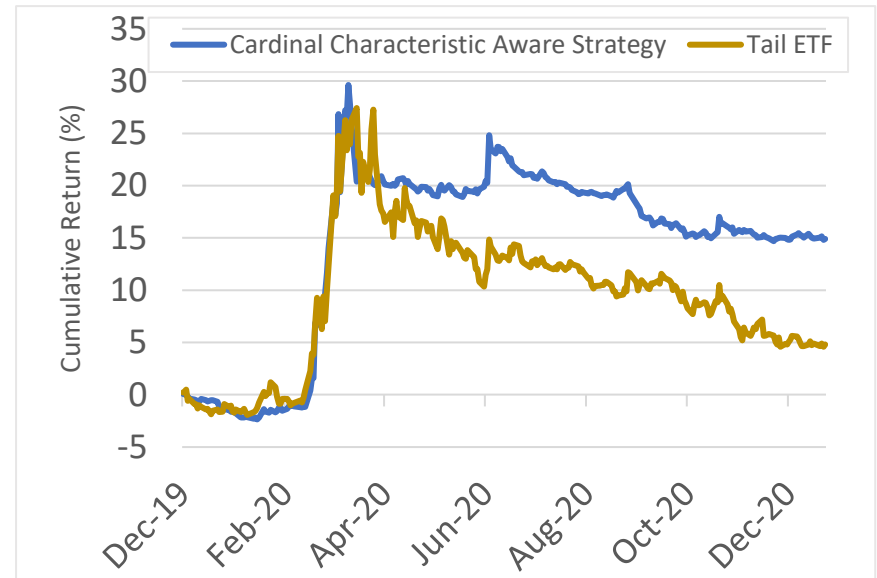


Features:

- Tail ETF purchases OTM SPX Index options and is invested in Treasury Bonds.
- Buying expensive puts is unsustainable.

CARDINAL CHARACTERISTIC AWARE TAIL RISK OPPORTUNITY

Self-Financed, Carry-Controlled Positive Surprise



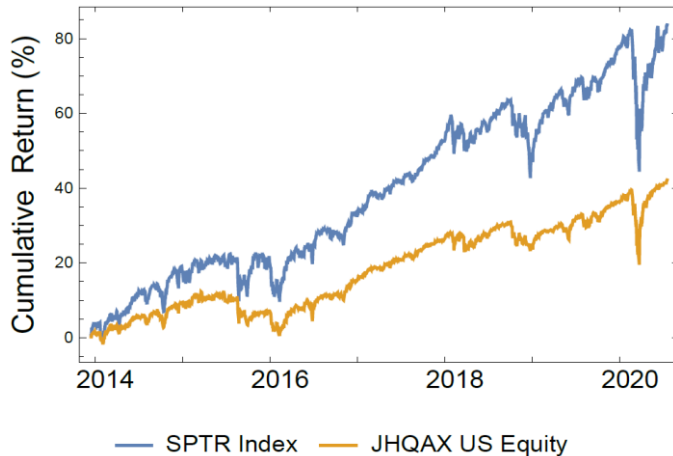
Features:

- Sells near money put and call options *and buying at least twice as many* out of the money options– tail positive convexity.
- Pursues risk-controlled and cash-efficient exposure to bought out-of-the-money options.

Long Equity Volatility

COLLAR HEDGING STRATEGY

Selling an OTM Call to finance a Protective Put



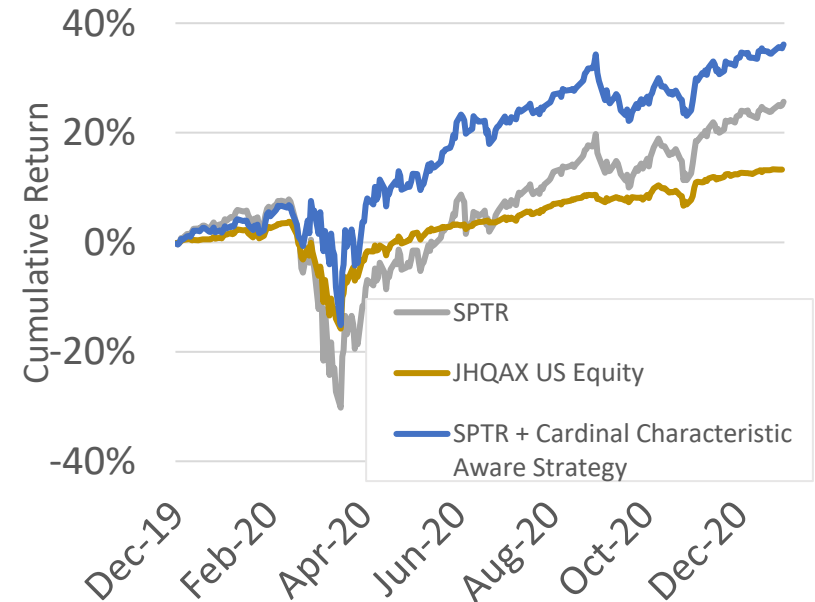
	SPTR Index	JHQAX US Equity
CAGR	11.7%	6.1%
Volatility	17.8%	9.7%
CAGR / Volatility	0.66	0.63

Features:

- Sell OTM Call to finance the Put.
- Purchasing a put without any monetization strategy is costly.
- The collar's call writing is not strategic.
- The collar-hedging strategy simply gives up too much upside potential for the downside protection it is providing.

CARDINAL CHARACTERISTIC AWARE TAIL RISK OPPORTUNITY

Self-Financed, Carry-Controlled Positive Surprise



Features:

- Sells near money put and call options *and buying at least twice as many* out of the money options— tail positive convexity.
- Pursues risk-controlled and cash-efficient exposure to bought out-of-the-money options.

What is Tail Risk?

Returns associated with significant fear (**downside**) and euphoria (**upside**) in the market are Tail Risk.

- The band of uncertainty of returns increases with investment holding horizon (i.e., Term).

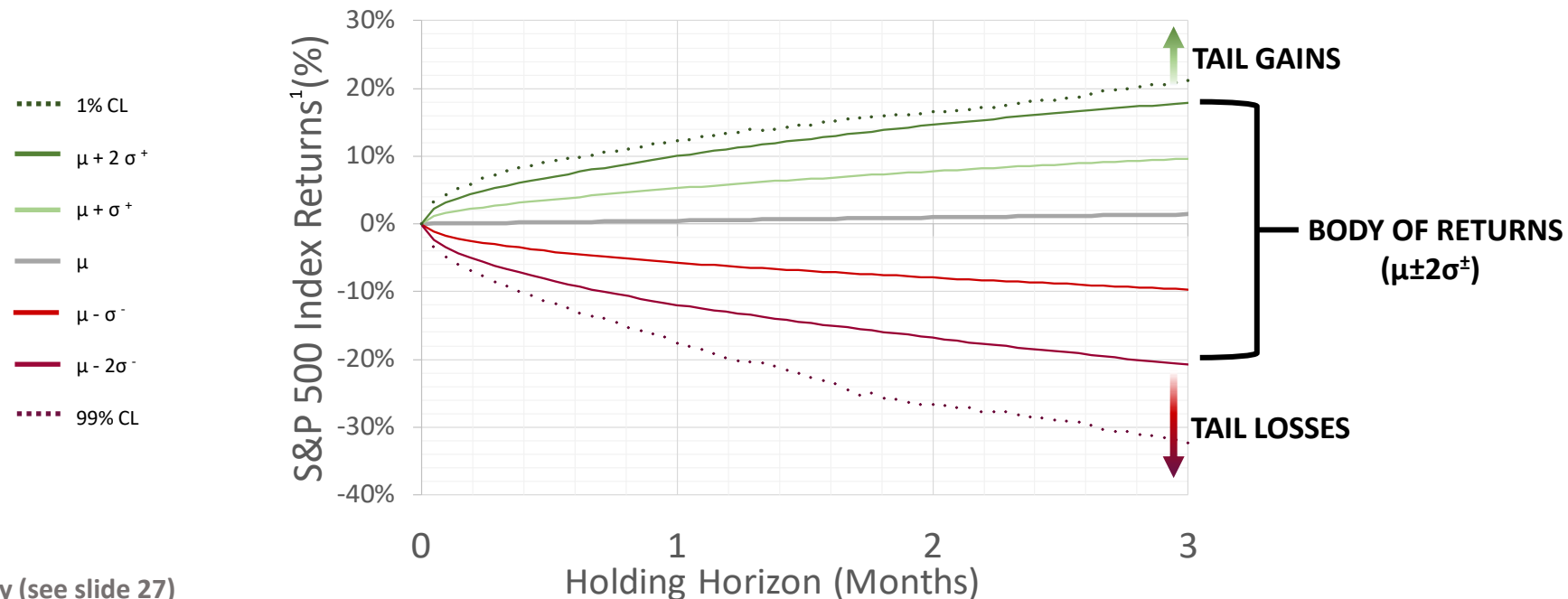
At one-month holding horizon, the two-upside standard deviation return is **+10%** and the two-downside standard deviation return is **-12%**.

At two-month holding horizon, the two-upside standard deviation return is **+14%** and the two-downside standard deviation return is **-17%**.

- Depicted below is the term structure of tail risks.

At one-month holding horizon, the 1% confidence level of return is **+12%** and the 99% confidence level return is **-18%**.

At two-month holding horizon, the 1% confidence level of return is **+16%** and the 99% confidence level return is **-27%**.



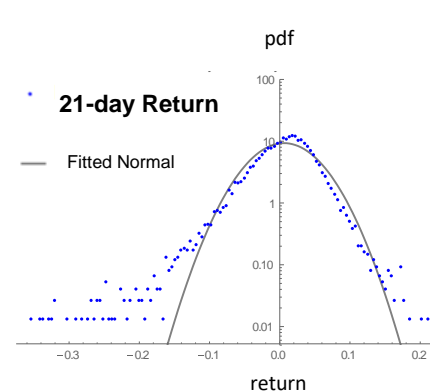
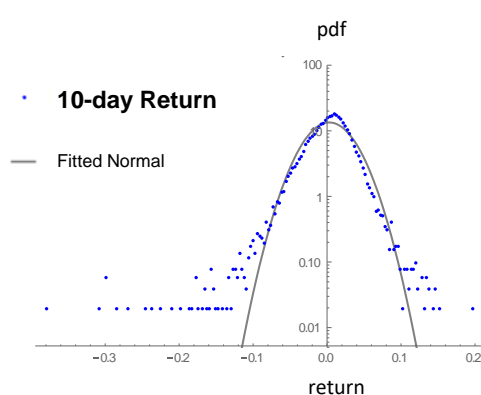
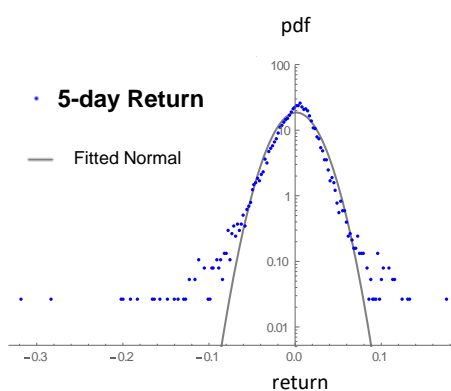
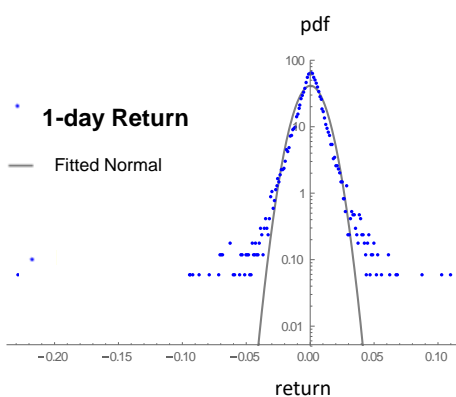
Glossary (see slide 27)

- μ Mean
- σ^+ Upside Standard Deviation
- σ^- Downside Standard Deviation
- CL Confidence Level

Probability Density of the 1-day, 5-day, 10-day, and 21-day S&P 500 Index Returns

Buildup of asymmetry and persistence of kurtosis

Holding horizon (i.e., term)



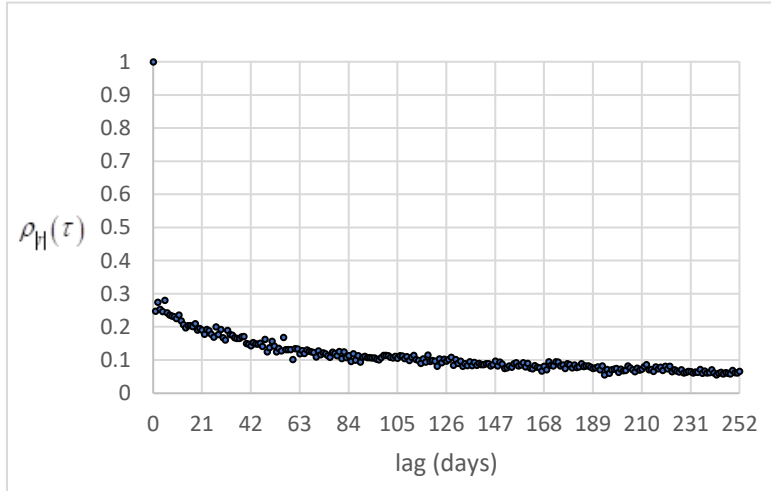
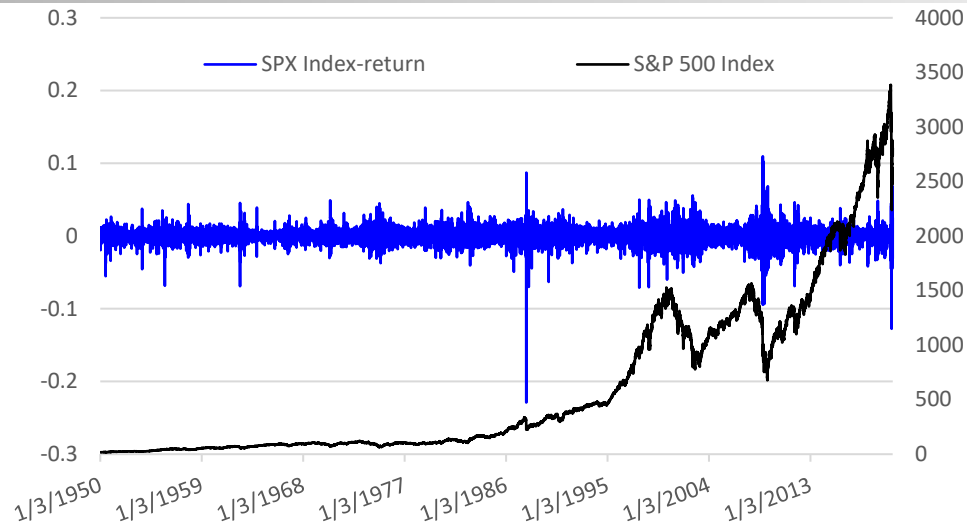
Confidence Level (%)	S&P 500 One-Day Return	Return of Fitted Normal
99.9	-0.06	-0.03
99	-0.03	-0.02
95	-0.01	-0.02
90	-0.01	-0.01

Confidence Level (%)	S&P 500 Five-Day Return	Return of Fitted Normal
99.9	-0.12	-0.07
99	-0.06	-0.05
95	-0.03	-0.04
90	-0.02	-0.03

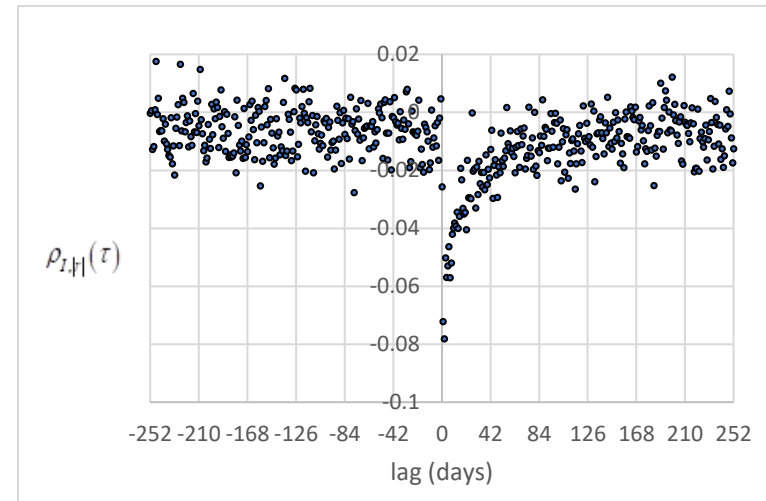
Confidence Level (%)	S&P 500 Ten-Day Return	Return of Fitted Normal
99.9	-0.18	-0.09
99	-0.08	-0.07
95	-0.05	-0.05
90	-0.03	-0.04

Confidence Level (%)	S&P 500 Twenty-One Day Return	Return of Fitted Normal
99.9	-0.26	-0.13
99	-0.12	-0.10
95	-0.07	-0.07
90	-0.04	-0.05

Market Rhythms & Rhymes

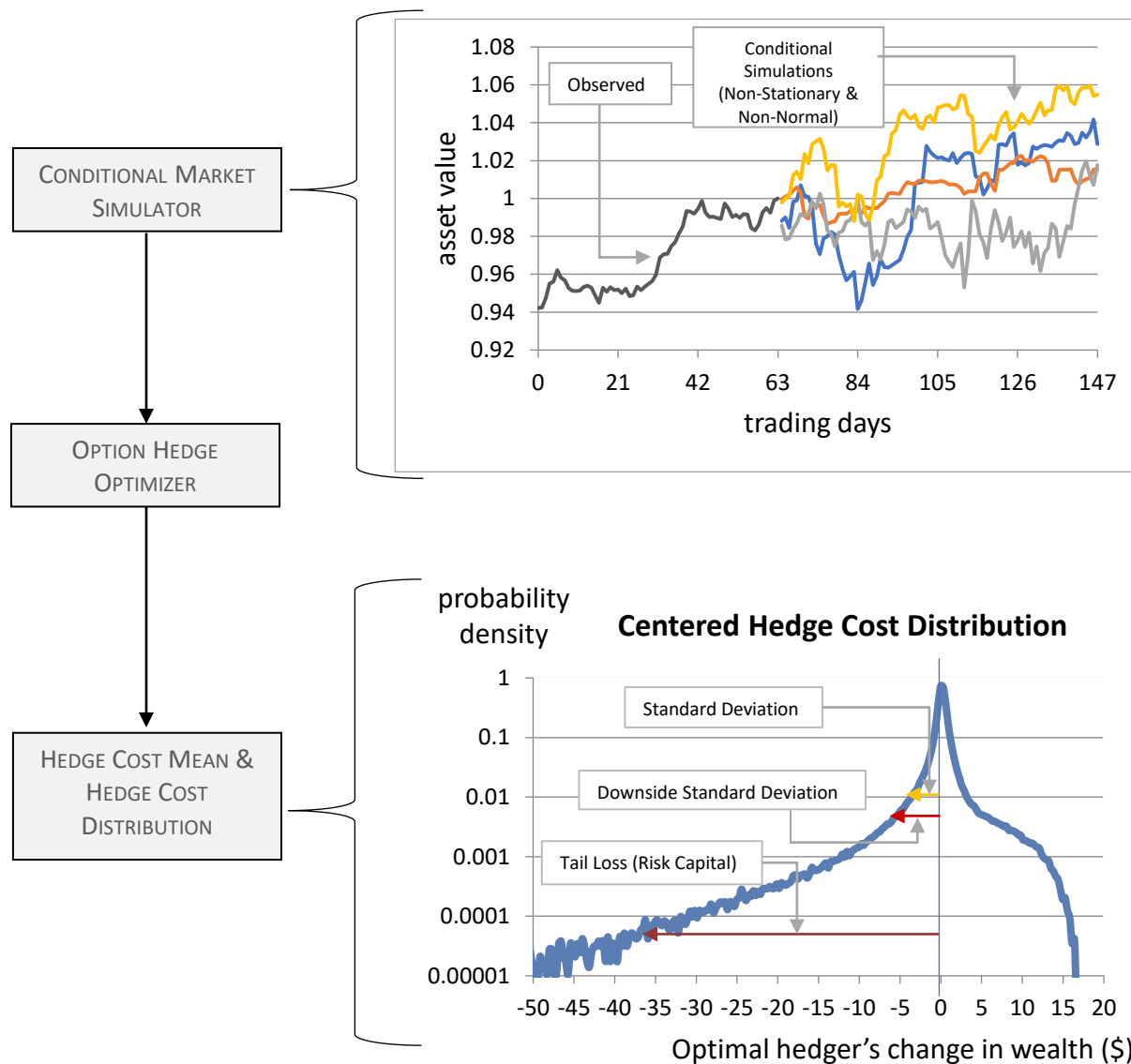


The autocorrelation of magnitude ($|r|$) of S&P 500 Index's daily returns (1/3/1950-3/29/2019).



The cross-correlation of sign (I) and magnitude ($|r|$) of S&P 500 Index daily returns (1/3/1950-3/29/2019).

Analytical Framework



Cardinal Characteristics of S&P 500 Index Options

Five Cardinal Characteristics of SPX Index Options

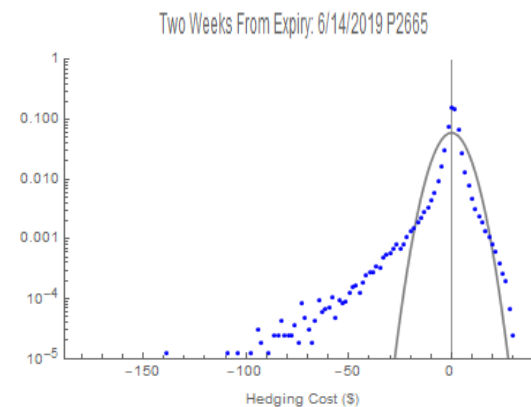
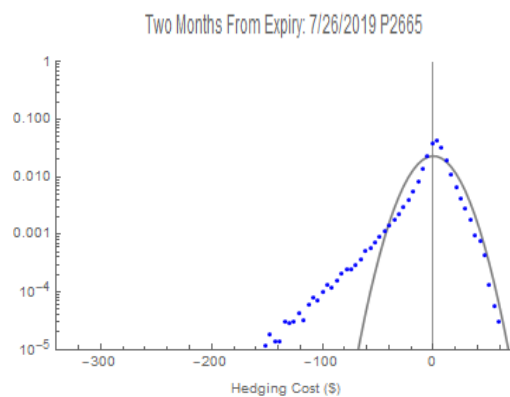
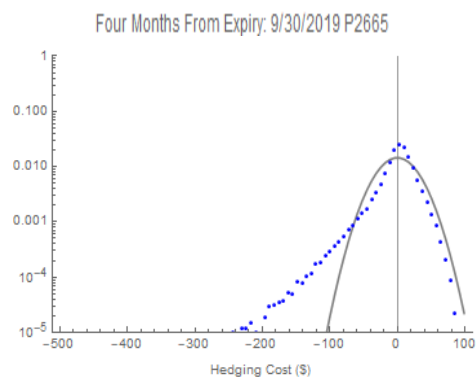
- 1. Disparity Between Out of the Money Puts and Calls*
- 2. Asymmetry Between Buyer and Seller*
- 3. Exploding Asymmetry at Expiry*
- 4. Exploding Asymmetry with Out-of-the-Moneyness*
- 5. Elements of Timing (recognizing Volatility environment)*

Challenges of Indexation in S&P 500 Index Volatility Investment Strategies

<https://ssrn.com/abstract=3427350>

Exploding Asymmetry at Expiry

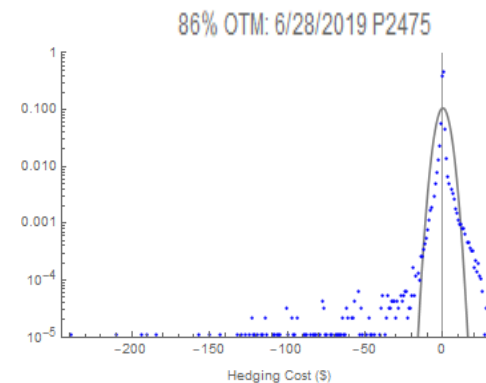
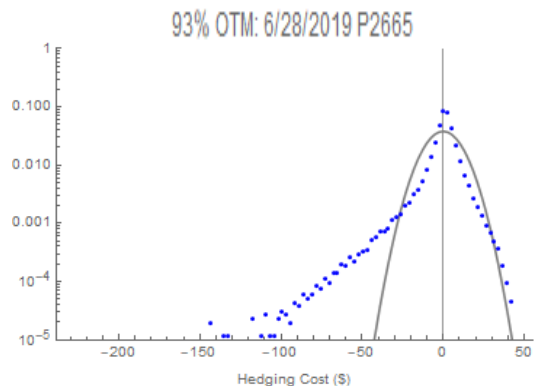
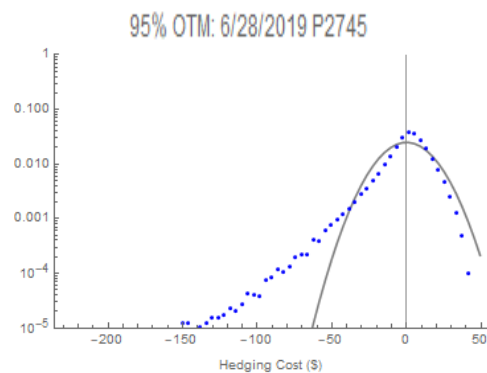
Decreasing Tenor



	Four Months (9/30/2019 P2665)	Two Months (7/26/2019 P2665)	Two Weeks (6/14/2019 P2665)
Average Hedging Cost (\$)	50.65	24.81	4.19
Standard Deviation (\$)	27.48	17.20	6.62
Downside Standard Deviation (\$)	35.01	22.09	9.26
99% Confidence Level Loss (\$)	100.73	64.05	26.94
1% Confidence Level Gain (\$)	55.48	35.76	14.63
Standard Deviation/Average Hedging Cost	0.54	0.69	1.58
Downside Standard Deviation/Average Hedging Cost	0.69	0.89	2.21
99% Confidence Level Loss/Average Hedging Cost	1.99	2.58	6.43

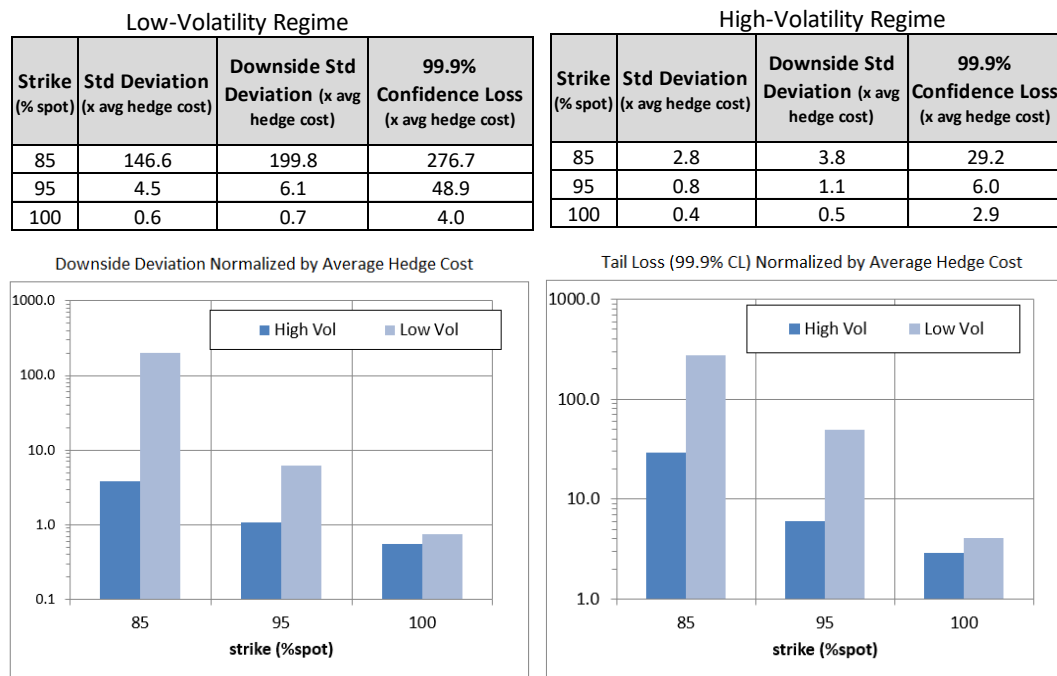
Exploding Asymmetry with Out-of-the-Moneyness

Increasing OTMness →



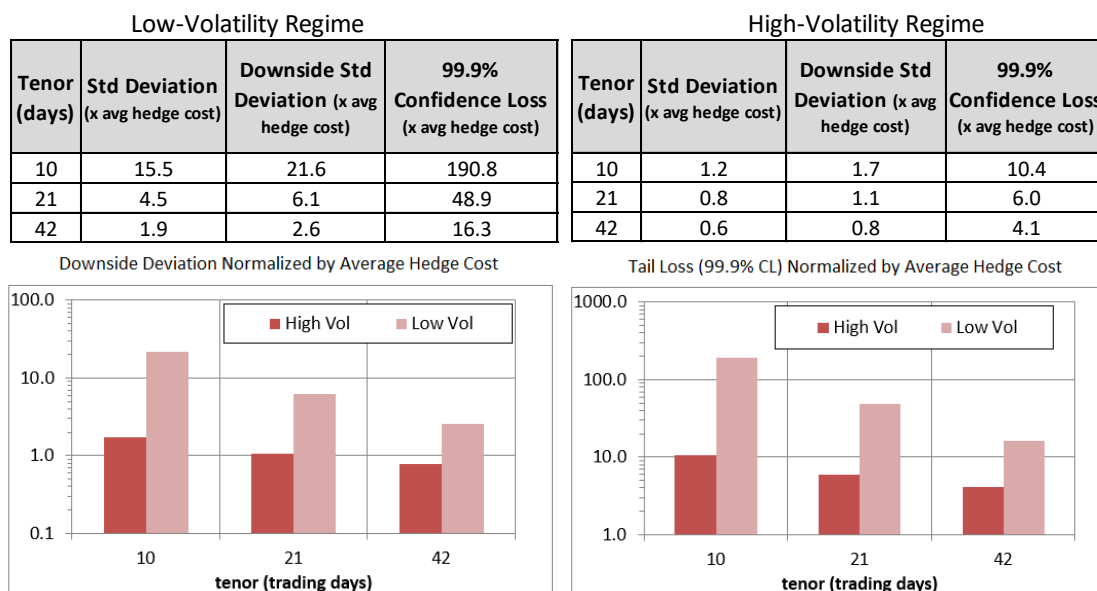
	1 month 95% OTM (6/28/2019 P2745)	1 month 93% OTM (6/28/2019 P2655)	1 month 86% OTM (6/28/2019 P2475)
Average Hedging Cost (\$)	29.59	10.24	0.86
Standard Deviation (\$)	15.96	10.46	3.72
Downside Standard Deviation (\$)	19.87	13.90	5.16
99% Confidence Level Loss (\$)	54.87	41.51	6.17
1% Confidence Level Gain (\$)	30.09	23.00	7.95
Standard Deviation/Average Hedging Cost	0.54	1.02	4.35
Downside Standard Deviation/Average Hedging Cost	0.67	1.36	6.03
99% Confidence Level Loss/Average Hedging Cost	1.85	4.05	7.21

Recognizing volatility environment – strike dependence



Hedge cost statistics of seller-optimal-hedger of a 1-month expiry put shown as a function of out-of-the-moneyness in a low-volatility regime and a high volatility regime.

Recognizing volatility environment – tenor dependence



Hedge cost statistics of seller-optimal-hedger of a 95% put shown with increasing tenor in a low-volatility regime and a high volatility regime.

Sustainable Yield and Tail Risk Opportunities



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- *We provide investors access to yield and tail-risk opportunities in the options market.*
- *Our insights, based on experience and active research, are applied to pursue client's goals.*

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