Market Sentiment and Non-Directional Options Strategies

Insights from an Options Trader
Research description and summary

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Volatility as a Proxy for Risk – What do we know?

- Volatility is an incomplete risk metric - cannot be observed, must be estimated
- Unknown (binary) outcomes for event/externality with known dates (Brexit, Earnings)
- Volatility regimes can shifts with sharp, abrupt price changes
- Market movements to either side -> non-directional strategies

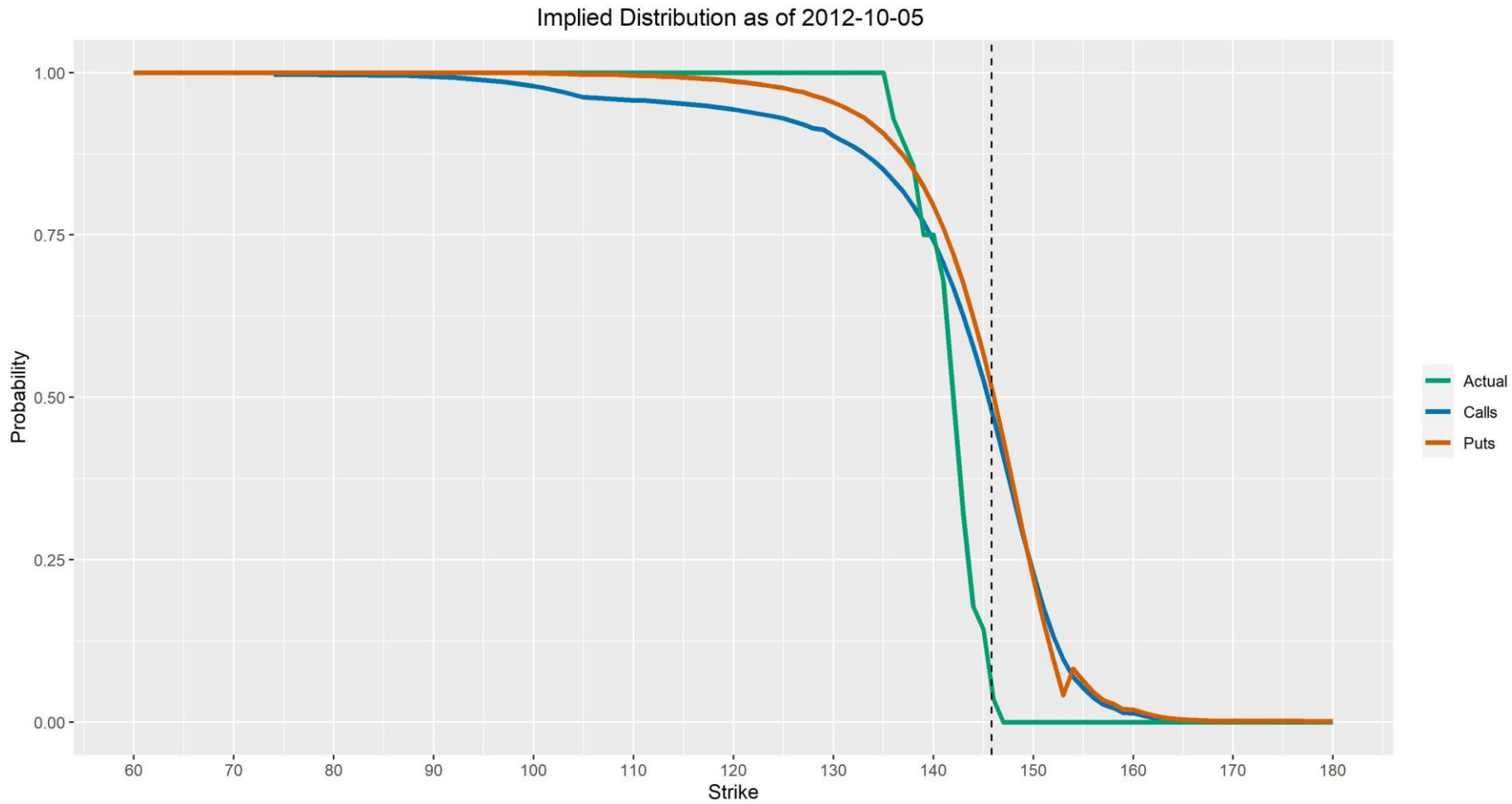
What do option traders know/experience?

- “Fear is overpriced” and manifests itself in expensive option premiums
- Natural position of an investor is “long stocks” => buying options for insurance
- Long options: Time is your enemy. Short options: Time is your friend -> Theta decay
- Implied volatility is typically higher than realized volatility except when it matters
- Professional option traders exploit overpriced fear by shorting strangles/iron condors etc.
- Basic “Short Vol” strategy works until it doesn’t; see LTCM 1998

Motivation to embark on these extremely risky strategies

- Hypothesis: (Fear) implied volatility is overpriced
- Underlying most option pricing models is an assumption of normality/lognormal distribution
- Can we test this by comparing implied versus actual distributions?
- Testing the proportion of similarity between the implied BSM distribution and the actual distribution from 60/90/120/180 days to expiration.
- Underlying instrument SPY time period 2005 – 2020
- Using K-S test and A-D test to verify our hypothesis
- K-S test is more appropriate to assess the center of the distributions
- A-D test is more appropriate to test the wings

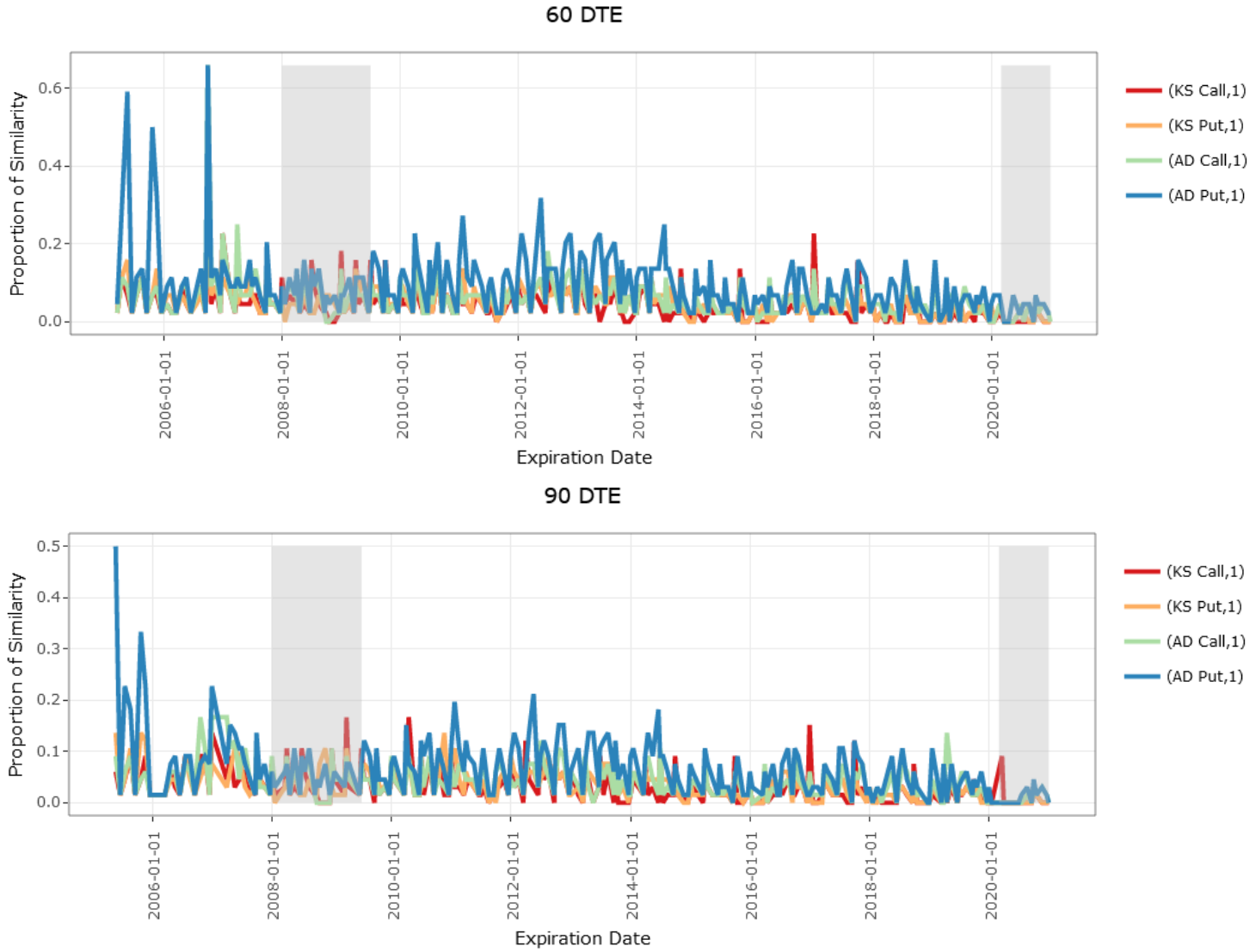
A sample of Implied versus Actual Distributions



Notes: The red line is the empirical CDF of the price path for put options and the blue line is the empirical CDF of the price path for call options. The green line is the actual price path for a randomly sampled options chain which expires on 2012-11-16. Therefore, the red and blue lines are the the predicted risk-adjusted probabilities as of 2012-10-05, 42 days prior to expiration. For each strike price, a corresponding point along the curves denotes the estimated probability as of the time of measurement of the security surpassing the strike price at the time of expiration.

Proportion of Similarity between Implied versus Actual Distributions

Note: The x-axis includes all unique option expiration dates. The y-xis depicts the proportion of similarity of distributions. The red(orange) line is the proportion of similarity for all call(put) option contracts under the K-S test. The green(blue) line is the proportion of similarity for all call(put) option contracts under the A-D test. NBER recessionary periods are highlighted in the gray scale of the plot, and do not include the full recessionary period of the COVID-19 period.



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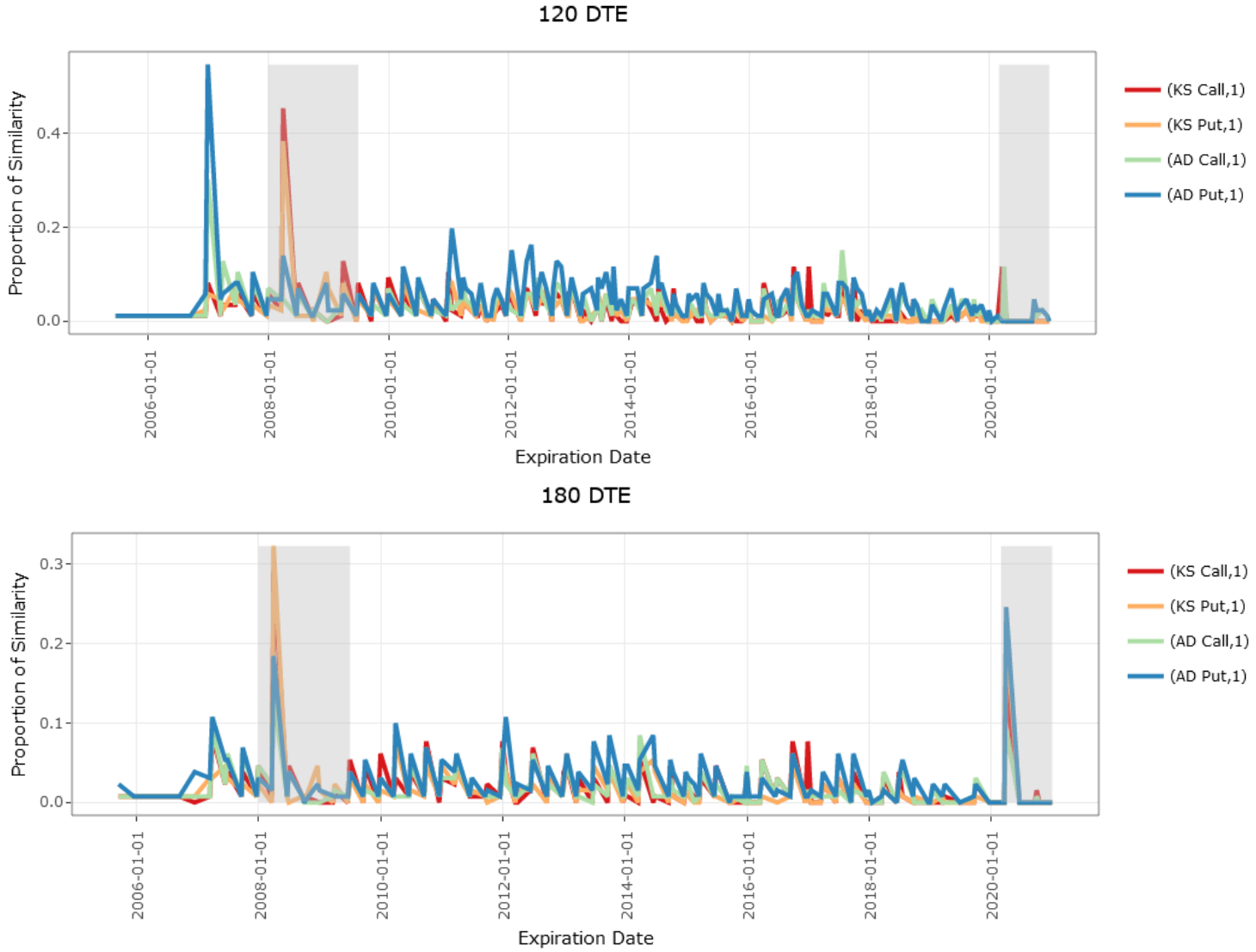

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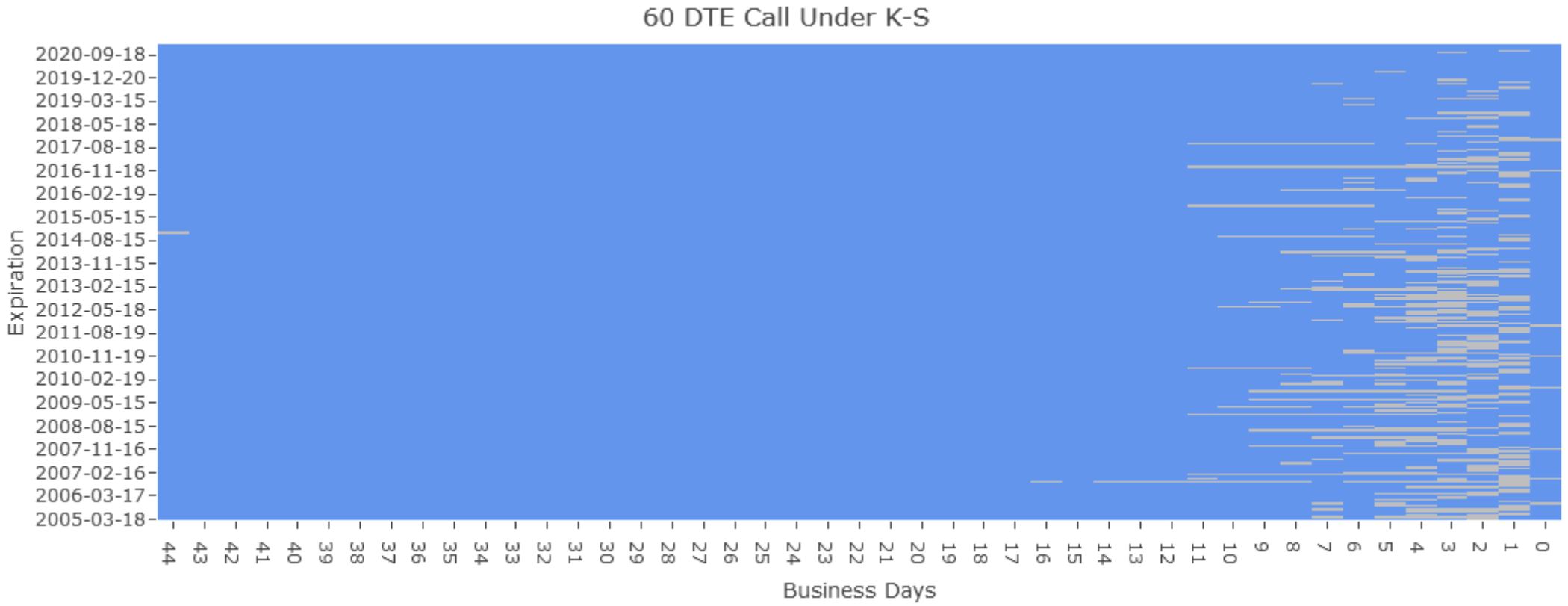

Note: Implied BSM distributions and actual distributions tested under the K-S test for each unique expiration date across 60/90/120/180 days to expiration on SPY call options. The figures display a heat map of our sampled data, with the y-axis representing a unique expiration and the x-axis the trading days prior to expiration. The gray highlighted periods represent a failure to reject the null hypothesis in the K-s and A-D tests, suggesting the two distributions are similar. Hence, a major result of our tests suggest similarity occurring a few days prior to expiration.

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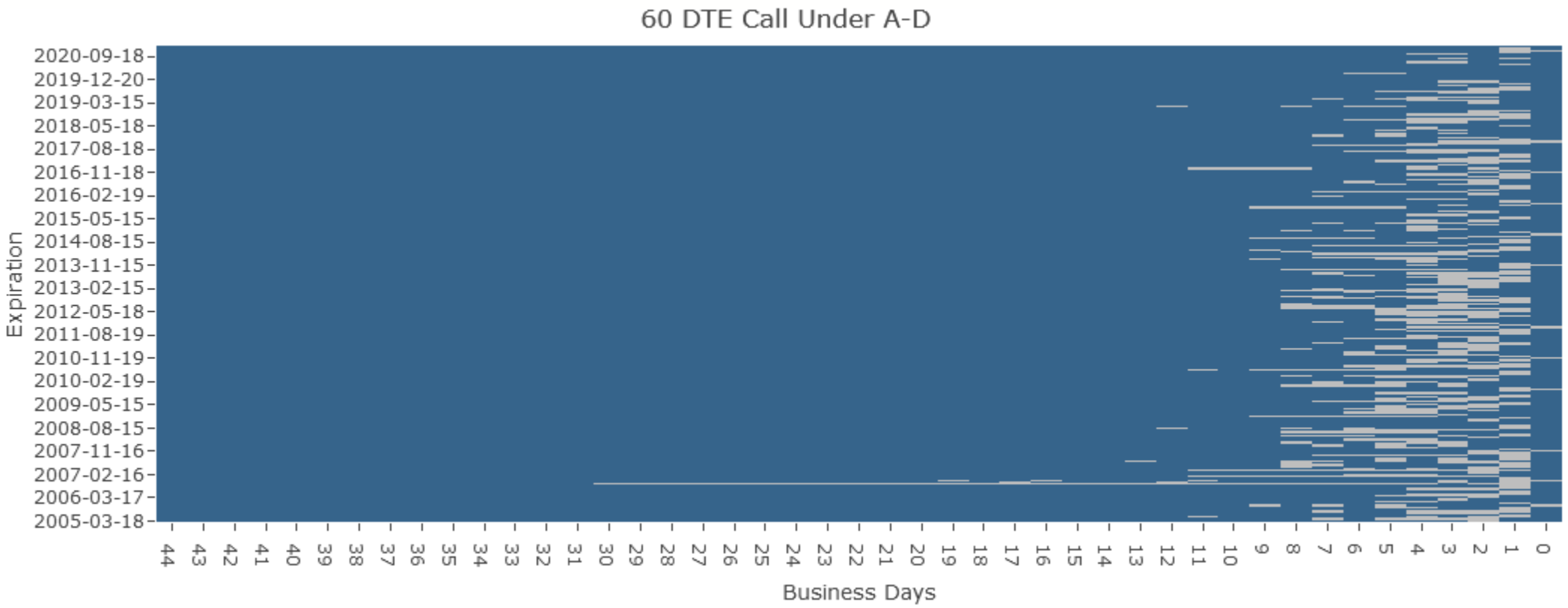

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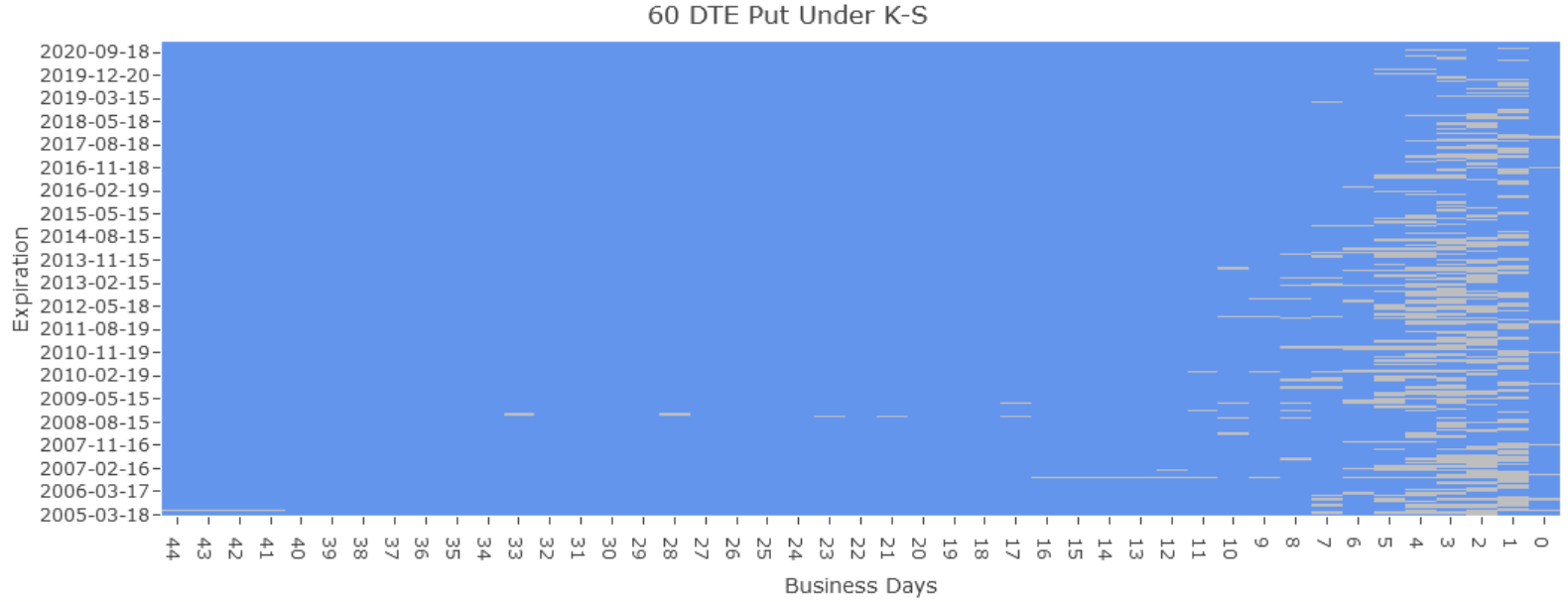
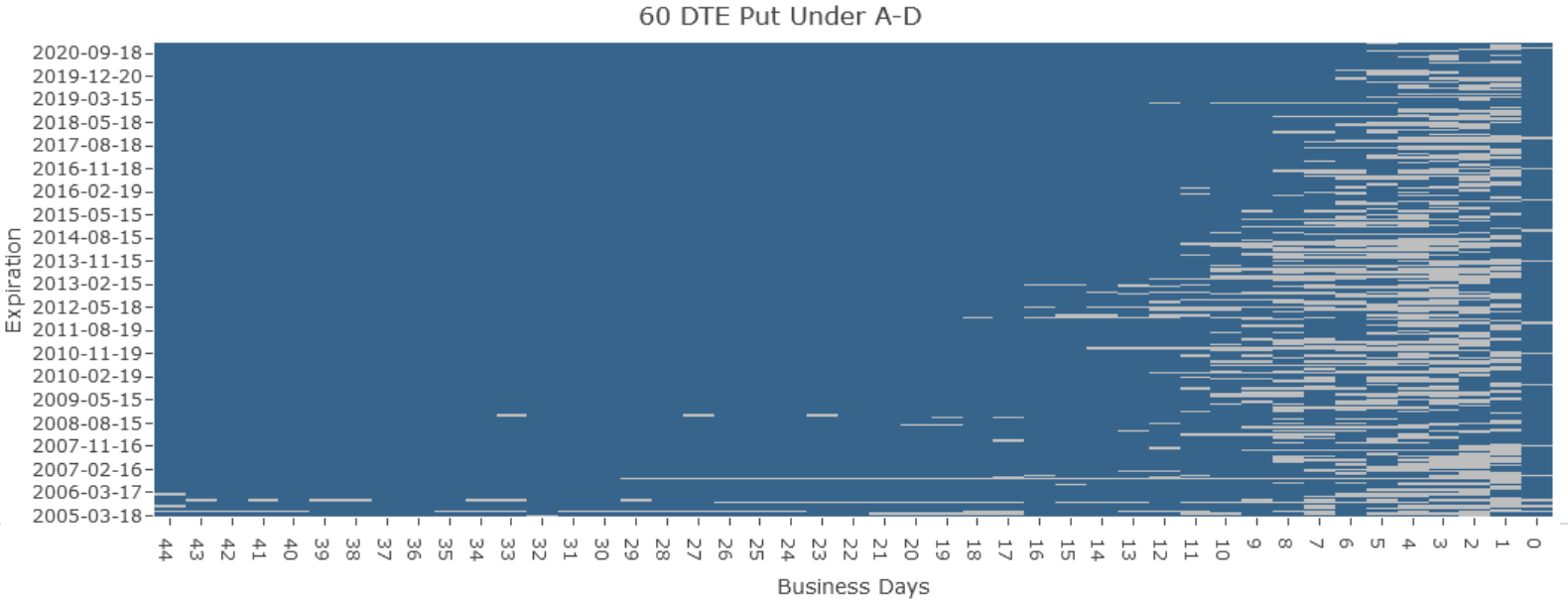
Proportion of Similarity for Put Options





Takeaways from this research

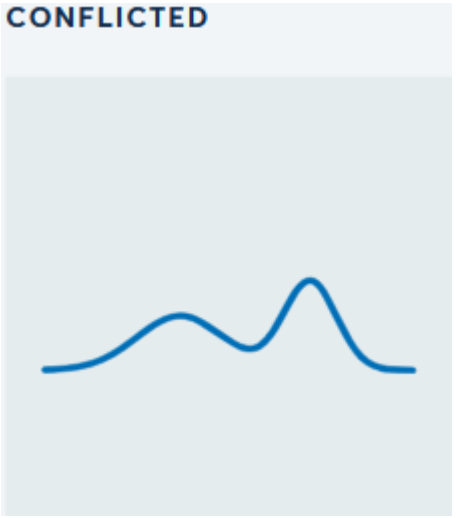
- On first glance, the intuition of option traders is confirmed
- The implied distributions from BSM are much wider than empirically observed
- This would suggest that implied volatility derived from option prices may be too rich
- The lack of similarity between implied and actual distributions for large portions of the expiration cycle suggests inefficiencies that could be exploited
- Caveat: This study does not provide any insights into potential drawdowns when actual distributions are far wider than those implied by BSM
- This led us to consider a refinement from a pure non-directional approach of just shorting strangles and investigate sentiment indicators that could help identify when distributions are far from normality and when the resulting implied volatility may be too cheap

Reminder: Market Sentiment Meter – States

Common
Normal level of market anxiety

Rare
Low level of market anxiety

Rare
High level of market anxiety



Extremely Rare
Price gap anxiety (Event risk)

Our Strategy Design

- Non-directional strategy: Short/Long
- Adequate volume / open interest.
- Flexibility to trade in either direction.
- Short close-to-money option strangles expiring close to 45 days.
- Take advantage of IV smile & theta decay during balanced/complacent states
- Reverse strategies to limit risk and exploit sharp/abrupt price changes during anxious states

Strategy - Rules

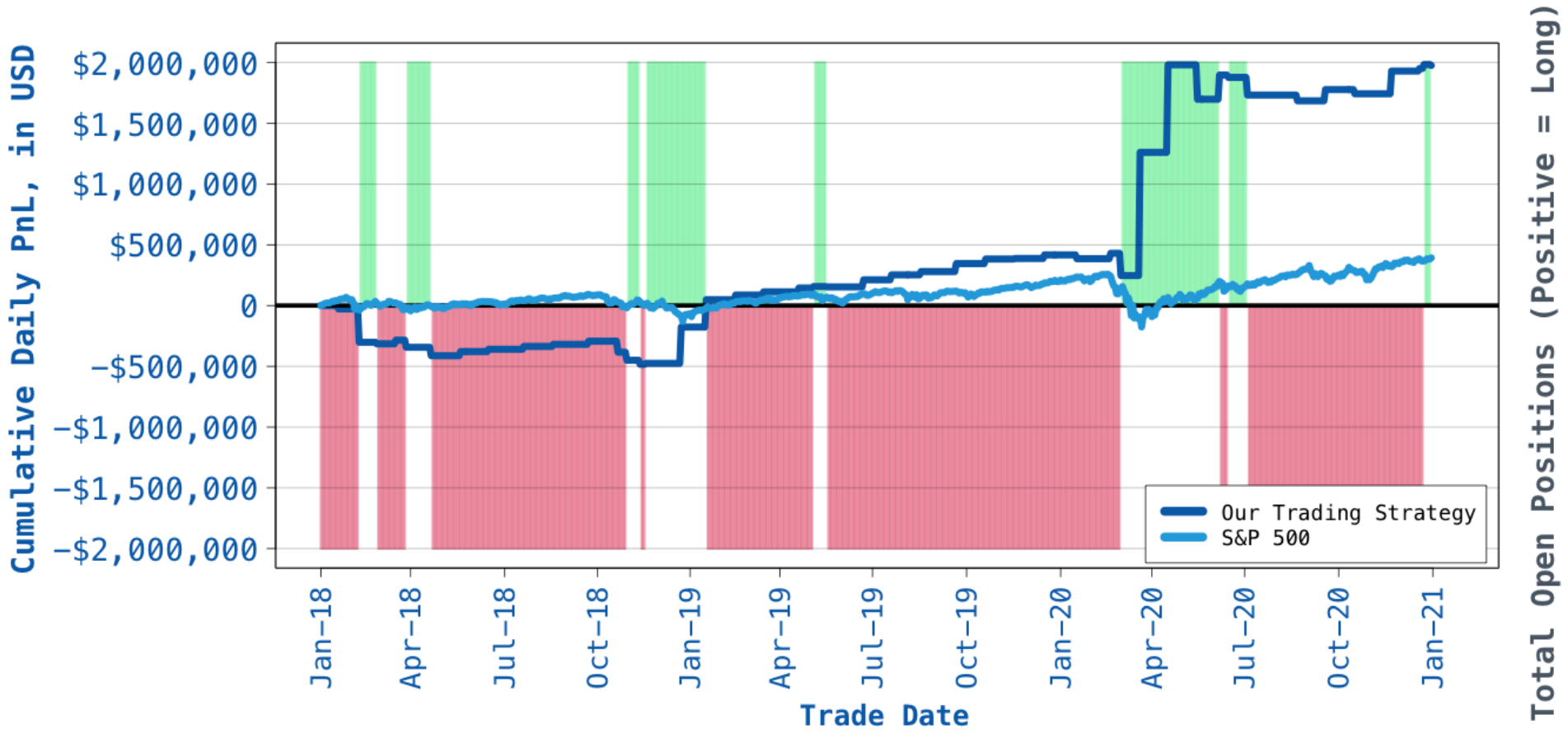
- Short a strangle if previous day is ‘Balanced’ or ‘Complacent’.
- Hold it until expiration or close it after we see 3 consecutive ‘Anxious’ or ‘Conflicted’ states.
- Open a long strangle one day after we close the short position
- Hold the long contract until expiration or close it we see 3 consecutive ‘Balanced’ states*.
- Open a short strangle one day after we close the long position
- Continue this procedure.

* ‘Complacent’ states are treated the same as ‘Balanced’ states.

Strategy – Product and Capital

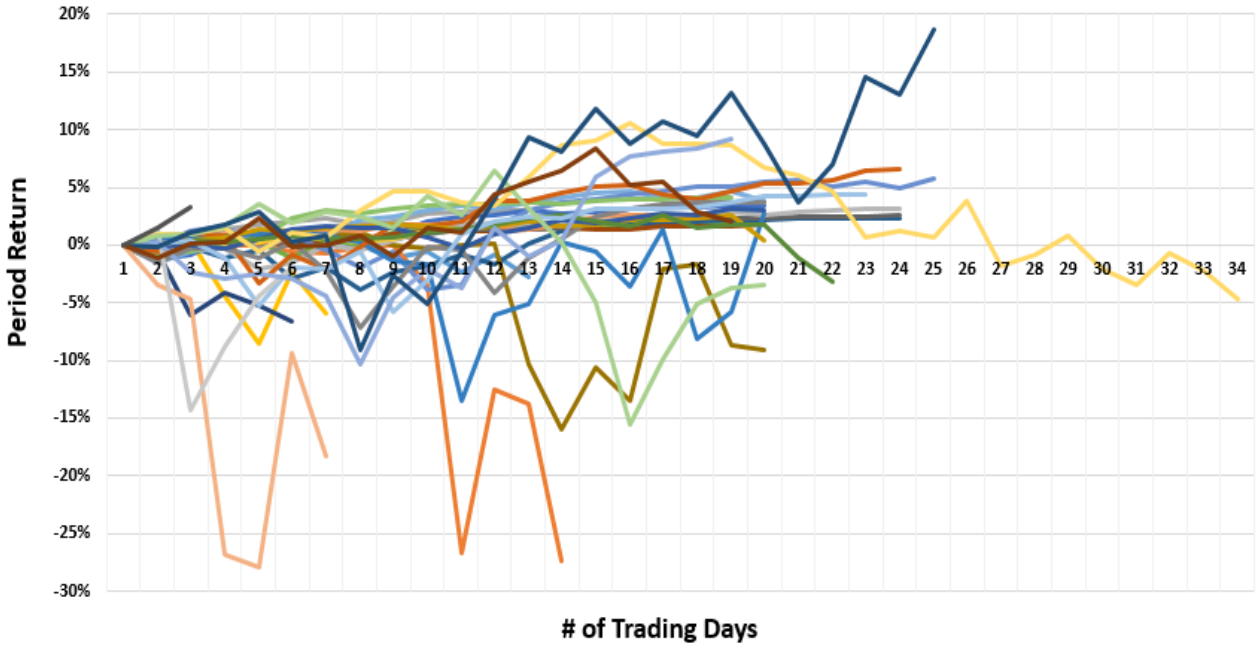
- CME E-Mini S&P 500, with CBOE SPX as reference.
- Simulation period from 2018-01-03 to 2020-12-31.
- $1 Million starting capital.
- Short strangles initial margin requirement set as $10,000
- Trade 40 contracts either long or short

Performance

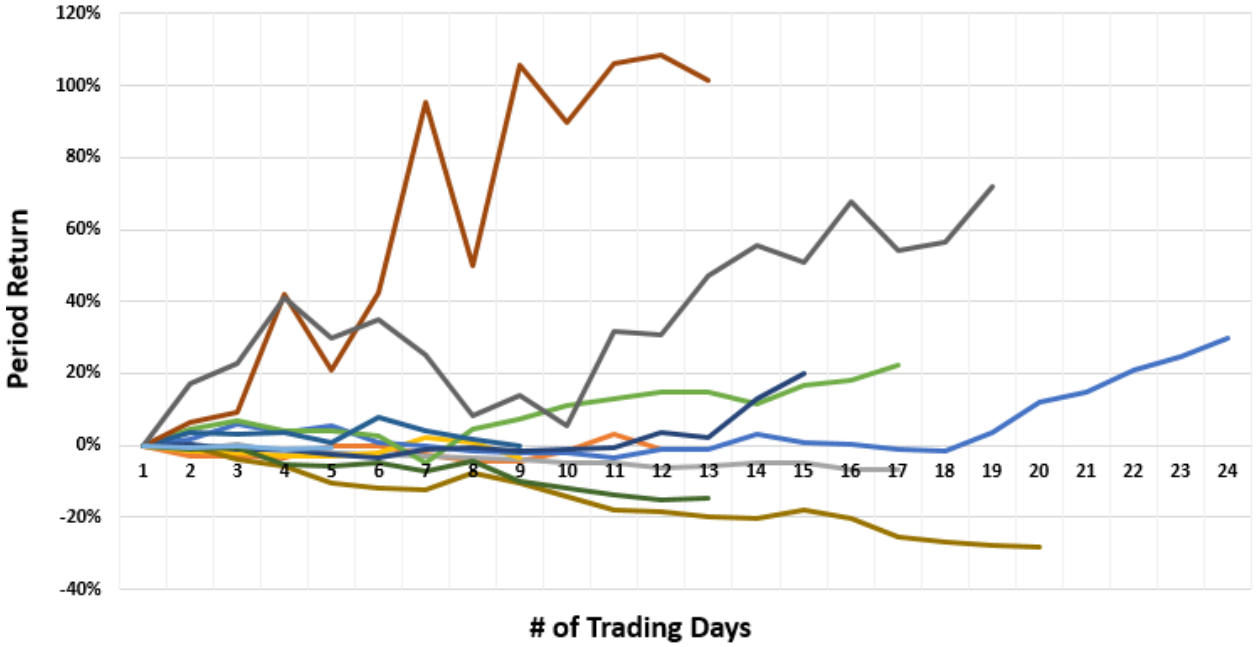


Performance – Cont'd

Trade Progression of all Balanced Transactions



Trade Progression of all Anxious Transactions



Performance – Cont'd

- Total Profit : $2,975,240
- Total percentage return : 197.524% (based on $1 Million capital invested)
- Annualized return : 25.47%
- Maximum drawdown : $508,900
- Strategy is risky but reasonable safety cushion given the capital investment
- Easy risk-adjustments can be made by reducing # contracts to limit exposure

Conclusion

- General strategy of selling options strangles is subject to significant asymmetric risk, with larger downside losses compared to upside gains.
- Our use of Market Sentiment Meter data provides considerable assistance in identifying big price movements and creates a substantial improvement in risk exposure.
- The use of non-directional long options strangles during periods when an elevated probability of price gap risk is present leads to risk reduction.
- More importantly, it allows us to take advantage of sudden price gaps leading to dramatic improvements of profitability in times of market turmoil.

Q&A

Thank you!