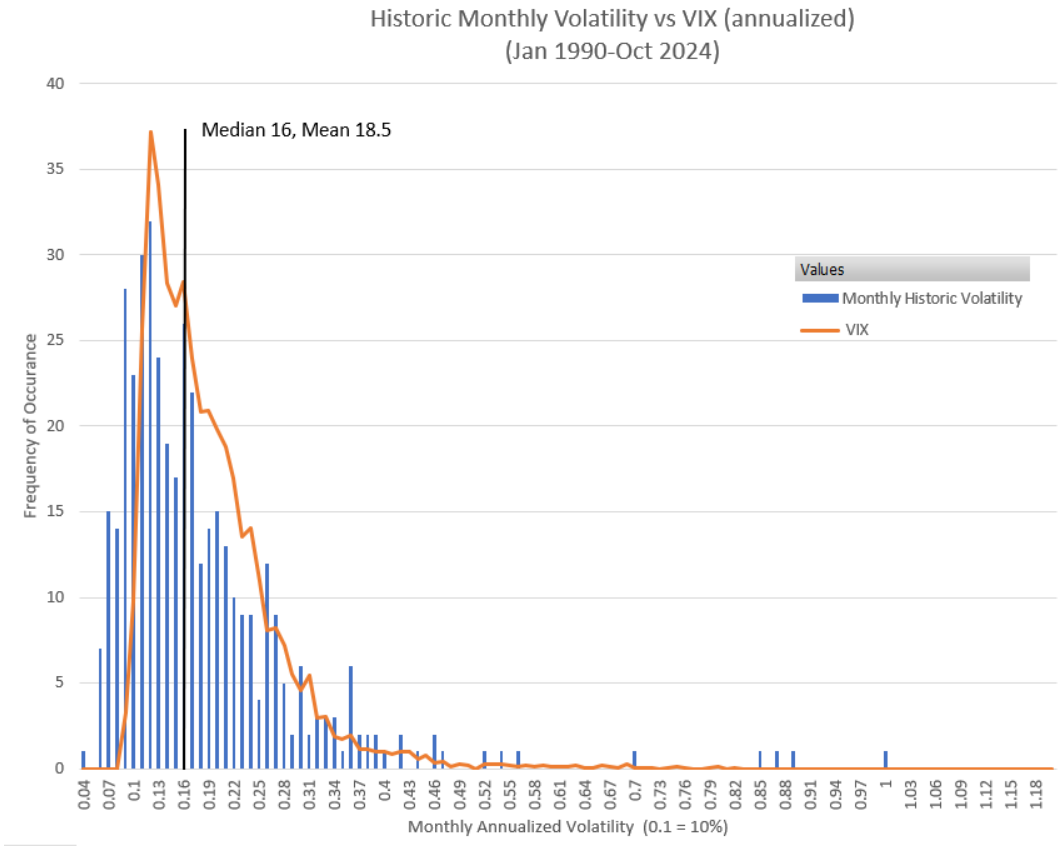
Volatility Based Trading: Overview

- Some Characteristics of Volatility Trading
- Measuring Volatility
- Flavors of Volatility Trading
- Signals: What Doesn't Work, What Might Work
- Interpreting Volatility Term Structures
- The VIX Based Toolbox
- Profiting From Volatility Spikes
- The XIV/SVXY 5-Feb-2018 "Volmageddon"
- Volatility Based Trading Dos & Don'ts

Characteristics of Volatility Trading Part 1

- Reliably goes up when equity markets go down (attractive for diversification)
- Not tied to fundamentals like earnings, sales, debt
- Volatility is mean (or really median) reverting, mostly constrained within a range, Chart HV of SP 500.



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Characteristics of Volatility Trading Part 2

- Things are relatively quiet ~80-85% of the time, the rest of the time watch out!
- Strategies that profit when volatility goes up (long volatility) tend to lose value rapidly over time
- The volatility landscape is not static, premiums/interactions between various products shift over time. For example, the sensitivity of VIX/VIX futures to equity moves is increasing.
- There are effectively an infinite set of choices/combinations (strikes, expirations, short, long)

Measuring Volatility– 3 Flavors

- Volatility is typically expressed as an annualized percentage, it represents the plus/minus one standard deviation of log returns (e.g., S&P 500 ~16% volatility).
  - Interpretation: based solely on historical levels of volatility, there is a 68% chance that the market will trade within approximately ±16% of the current value over the next 365 days

- Historic Volatility (backward looking)
  - Most common measure: standard deviation of gross log returns: std dev$\left(\ln\left(\frac{P_{day}}{P_{day-1}}\right)\right)$
  - Historic volatility varies depending on the lookback period
  - Issues: Too sticky, doesn't handle trends well
  - Other measures: Mean Absolute Deviation, Average True Range
  - Difficult to trade directly (OTC Variance swaps, CBOE Variance Futures)

Measuring Volatility– 3 Flavors (continued)

- Implied Volatility (option prices)
  - Based on price premium of options over their intrinsic value
  - Typically the Black & Scholes (B&S) calculation is used to generate normalized values
  - Issue: B&S does not capture the true dynamics of the option market (e.g., volatility smile)

- VIX® Style Volatility
  - Cboe®'s methodology uses the prices of "strips" of put & calls which will expire approximately at the target horizon (e.g., 30 days for the standard VIX)
  - Does not use the B&S model
  - Issues: very sensitive to out-of-the money puts, not directly investable
  - Other measures: VIX9D (9 day) , VIX3M (3 month) , VIX6M (6 month), VIX1Y, constant maturity VIX Future calcs (e.g. VX30)

Volatility Trading: Basic

- Insurance / Constrained Outcomes
  - Protective Puts (has significant advantages over stop loss limit order)
  - Collars (buy puts, sell calls to offset costs)
- “Income”
  - Standard option strategies e.g., covered calls, iron condors
  - Contango harvesters (short volatility)
  - Income positions are effectively short volatility, beware!

An Example: Simple Insurance

We Insure our other big-ticket valuables, so why not our portfolios?

- Long puts, alternate to stop loss orders
  - Not taken out by glitches, flash crashes, market makers
  - Strike price is a given, no market order funnies at the worst possible time
  - Eliminates the urgency, close out when you want
- No dependencies on complex hedging schemes that have uncertain hedge ratios, provides “Black Swan” protection
- In real market crashes, the premium of the puts increases dramatically, protection is better than just the strike price

An Example: Simple Insurance (continued)

- Example: Buy S&P 500 90% ATM SPY puts with 6 weeks to go in a relatively quiet market
  - Approx. $140 to protect ~$55K value (0.2%), annualized ~3.5%
  - Roll with around 2 weeks before expiration to 6-week-out options
- Worked great during Covid Crash, but not much help in slowly declining bear market (e.g., 2022 -26% Jan-Oct)
- If you're interested, an additional twist
  - If willing to give up Black Swan-style protection, then…
  - Reduce cost by selling short term (e.g. < 10 day) puts at the same strike
  - No margin requirements (covered by long put)
  - Roll out to next week when value drops to $1 or $2
  - Market downturn?
    - Unless drop is very fast these short term puts will expire before becoming ITM
    - Can buy back if you're nervous

Volatility Trading: Straight Volatility Plays

(none of these are buy & hold strategies, they need signals)

- Long Volatility
  - Trying to catch the next volatility spike
  - Very high carry costs (50%+ per year)
- Inverse Volatility
  - Harvesting contango losses
  - Defined maximum loss
- Short Volatility
  - Shorting long volatility instruments
  - Avoids volatility drag/beta slippage of inverse funds
  - Potentially unconstrained losses during vol spike

Volatility Trading: Advanced

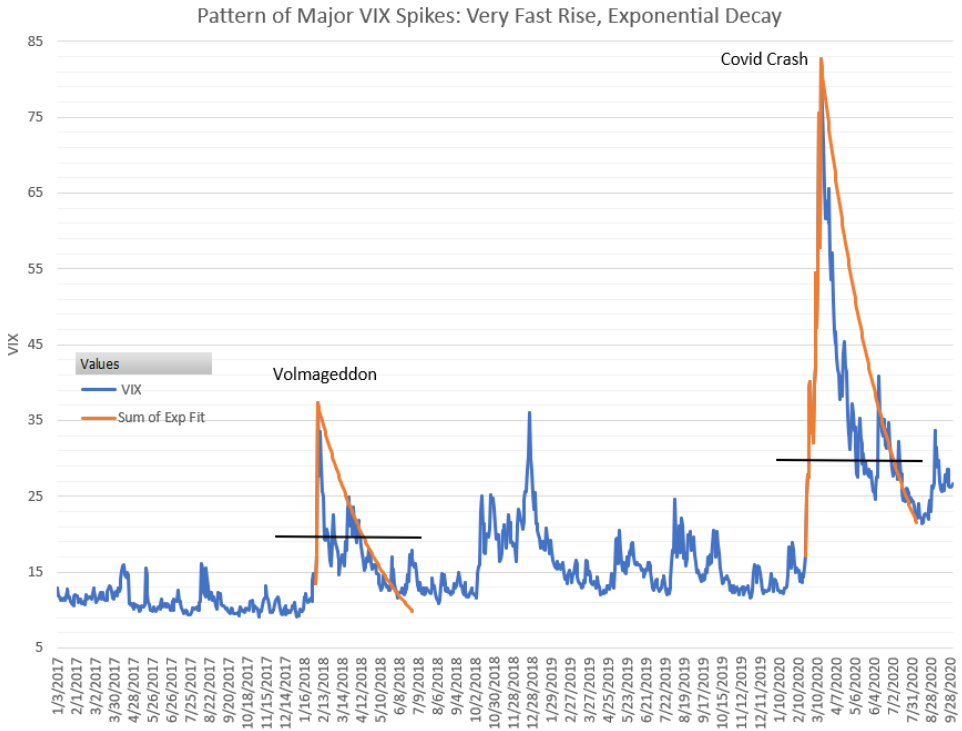
- Tail risk hedge/speculation on market crash
  - Hedge equity positions
  - PermaBear Xmas
- Institutional
  - Event risk (e.g., earnings, Fed announcements)
  - Higher-order greeks (e.g. Vanna, Volga)
  - Volatility surface bets (market maker style)
  - Dispersion trade (IV of indexes vs components)

Tail Risk Hedges/ Market Crash Speculation

- You're long volatility
  - No free lunches, carry costs tend to be high
  - Wait till indicators go yellow?
- You need leverage—lots of it
  - How much capital must you tie up?
  - Need significant moves, otherwise why bother?
  - If a portfolio hedge, you need scale and sophisticated trades (no market orders!)
- Often a challenge to monetize effectively
  - Profit opportunities tend to collapse rapidly once the market starts to stabilize
- Path dependency
  - Fast market declines supercharge volatility, slower declines to the same absolute level don't pay off as well e.g., 2022/2023 SPX decline from 4750 to 3500 (-26% drop), VIX max'd out at 36.5

What Doesn't Work for Signal-based Volatility Trades

- Fundamental analysis (e.g., PE ratios, assets, debt)
- Technical analysis (option supply/demand usually minor impact on price, volumes low)
- Backfitting, what would have worked in the past
- Levels (e.g., VIX at 20) are not predictive (e.g., signals based on the absolute levels of volatility measures like the VIX, HV)

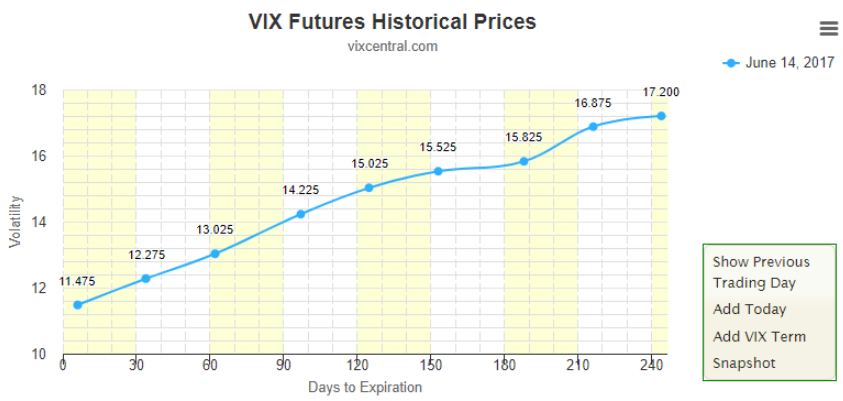


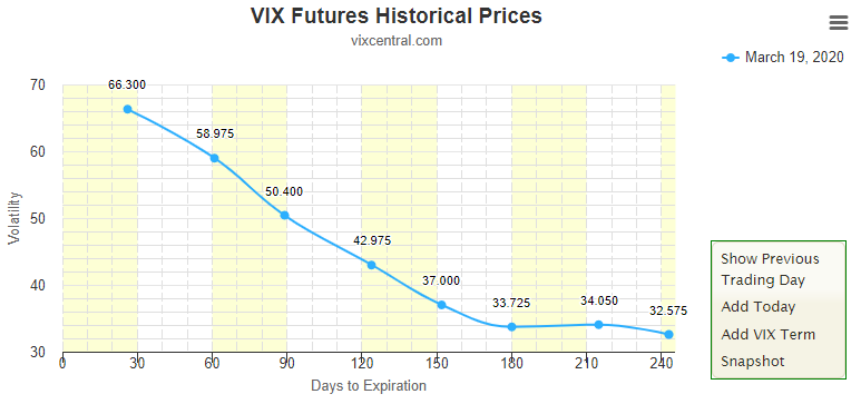
What Does Work (sort of) For Managing Volatility Trades

- Monitoring the volatility term structures
  - Options, VIX futures, VIX index horizons
- Awareness of “known unknown” events
  - For example, earnings reports, Fed meetings, Elections
  - These events “contaminate” the term structure
    - Normal decay-based analyses don’t work, normal contango/backwardation effects are distorted

Reading the Term Structure: Part 1

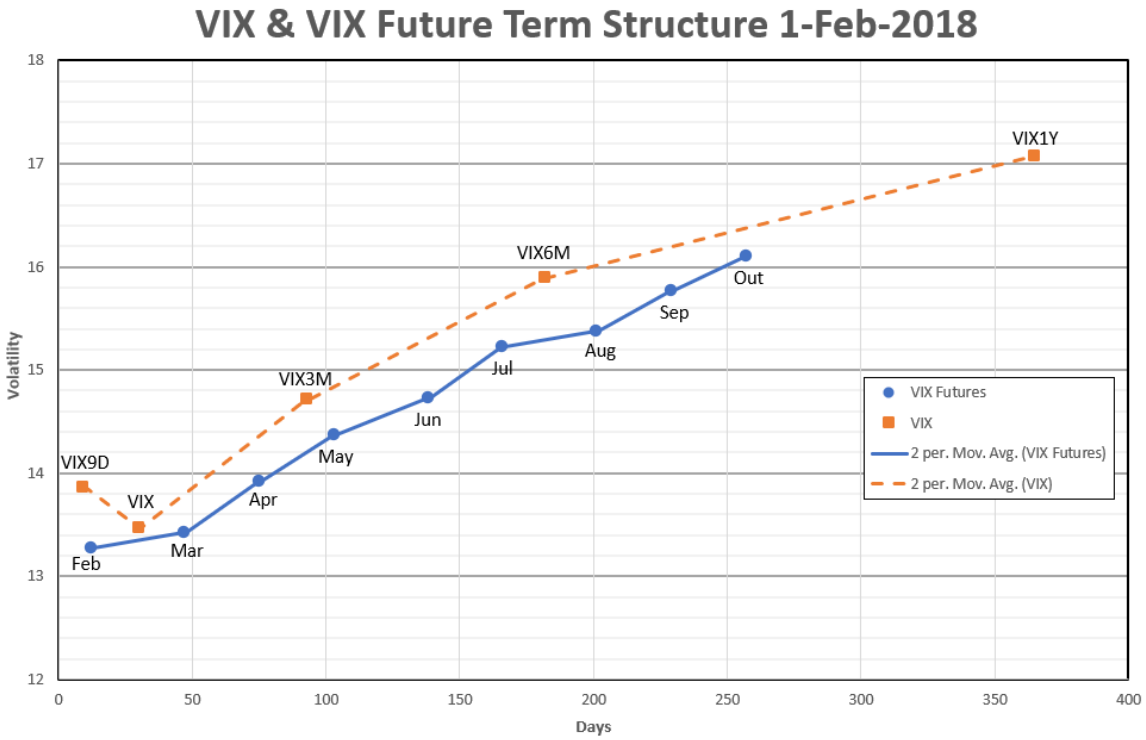
- What is it? Computed/traded volatility levels for different time horizons
- For the VIX methodologies fixed durations
  - VIX1D, VIX9D, VIX, VIX3M, etc.
- For futures & options, expiration dates
- Contango (upward sloping) & backwardation





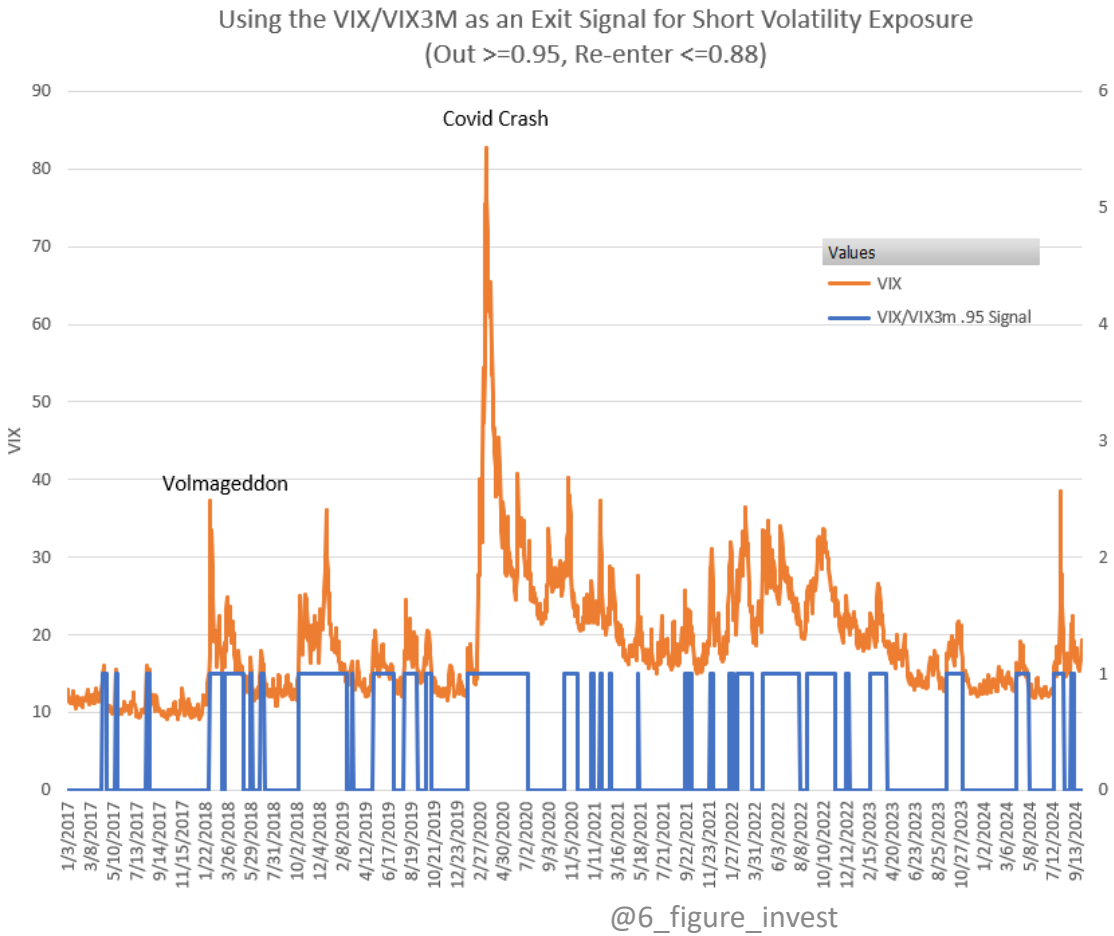
The Term Structure: Part 2

- Volatility in contango 80-85% of the time
- 15-20% of the time in backwardation
  - It's when the market is very nervous
- The shorter-term portion of the term structure can change quickly
  - Acts as a warning, but many "head fakes"



Term Structure-Based Indicators

- Simple ratios, e.g., VIX9D/VIX or VIX/VIX3M are sensitive market mood indicators
  - Before a VIX spike the overall term structure will likely be in contango, but front end will rise
- Example signal: exit >=0.95 for VIX/VIX3M, re-enter when drops below 0.88
  - Many false positives, but no false negatives (not calling a real volatility spike)



VIX Based Volatility Trading

- The VIX is not directly investable, but a host of investable products are tied to VIX futures
- In general, the VIX is not predictive!
  - The standard VIX is calculated from SPX options that are approx. 30 days from expiration, but that generally *doesn't* mean it is predicting the volatility 30 days in the future. Usually, it's today's volatility + cost of carry
  - Distinction: prediction markets vs hedgeable futures markets
- A small exception, Christmas seasonality
- SPX options are the dog, VIX futures are the tail
- 0 DTE options are not affecting the VIX, but may be reducing the premium on VIX Futures

VIX Future Based Products

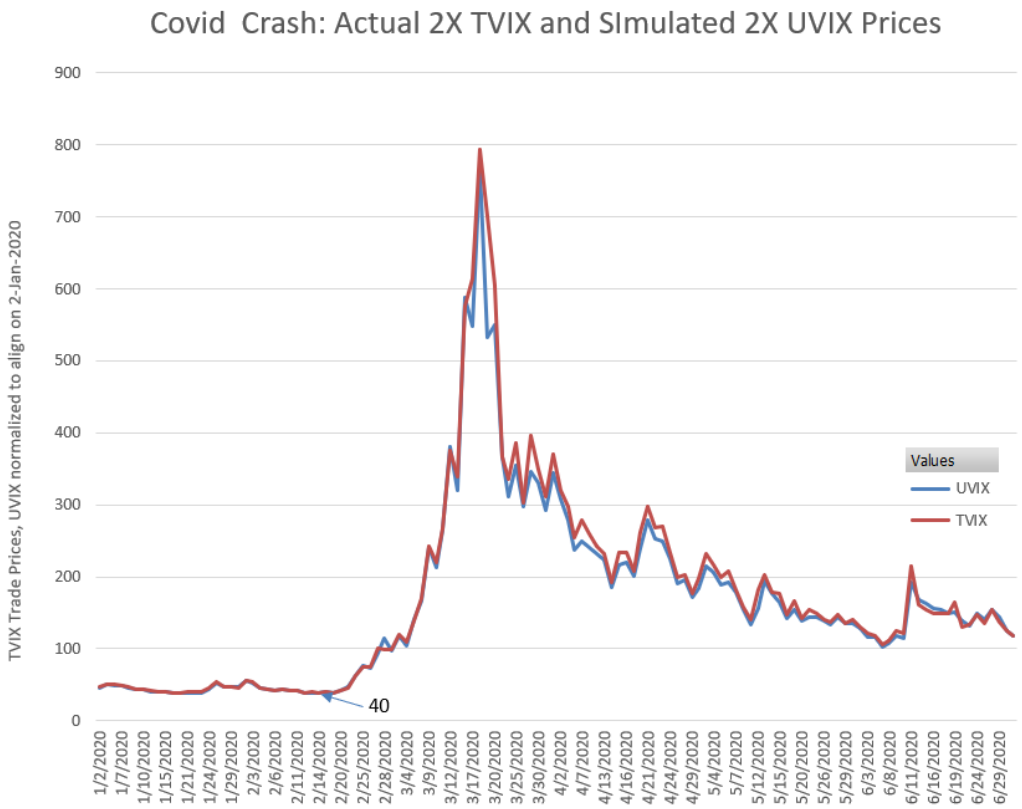
- VIX Options (effectively options on VIX futures *not* spot VIX)
  - VIX Option greeks will be nonsense if you treat the spot VIX as the underlying
- Exchange Traded Products (ETP)
  - Short term (mix of 1st and 2nd month VIX futures)
    - Long: VXX, VIXY
    - Leveraged: 1.5X UVXY, 2X UVIX, -0.5X SVXY, -1X SVIX
  - Medium-term (mix of 4th -7th month VIX futures)
    - Long: VXZ, VIXM
    - Inverse ZIVB
  - Income: SVOL, ZIVB (will switch ticker to ZVOL 22-Nov)
    - Big monthly dividends
    - Options are available on most Volatility ETPs

“Income” ETFs/Contango Harvesters

- These ETFs (SVOL, ZIVB) distribute significant dividends every month
- Payouts reduce the ETF’s Assets Under Management
- Will contango gains compensate for the payouts?
- Can be viewed as incremental profit-taking
- Inherently offers the opportunity to buy back in
- SVOL is actively managed, div. ~1.5%/month, AUM $1.26B
- ZIVB/ZVOL uses a passive index, div. ~2.5% per month, AUM $15M
  - uses mid-term futures (in contango a higher percentage of the time)

Profiting From Volatility Spikes

- Leveraged Long Volatility ETPs are very attractive
  - When volatility is trending up strongly, their multiday leverage often exceeds their stated leverage
  - For example, if a non-leveraged ETP, e.g., VXX, is up 20% a day for 3 days 1.2^3 = 1.78 a 78% gain, but a 2X leveraged fund would be 1.4^3 = 2.74, a 174% gain. More than 2X the 78% unleveraged gain.



Profiting From Volatility Spikes

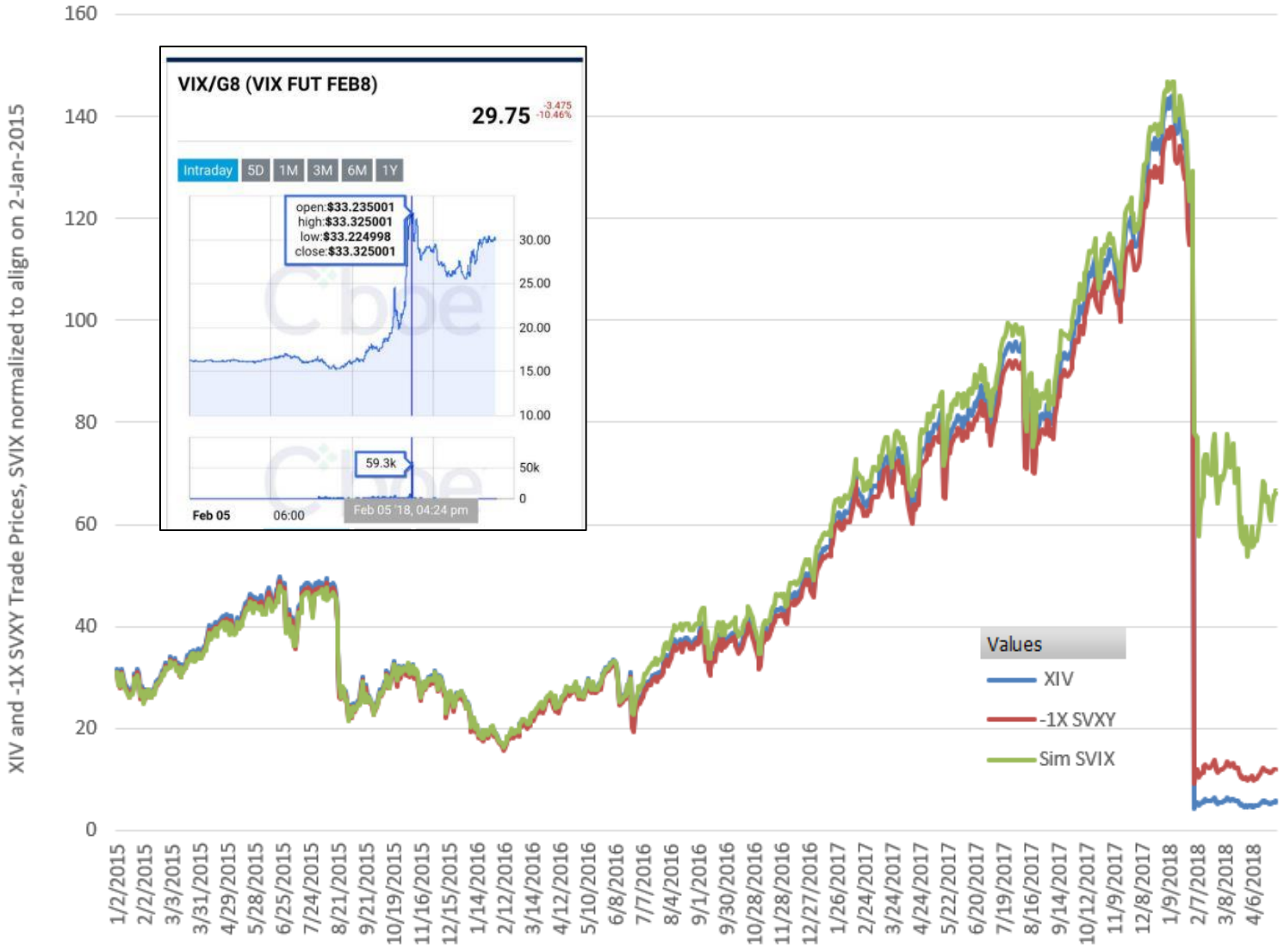
- Options on Leveraged Volatility ETPs are even more attractive
  - On top of the price increase of the ETPs, the implied volatility of the options increases dramatically during volatility spikes
  - Calling the top is very difficult. Things are chaotic. Better to start taking profits when they are there, e.g., 20% per week.

What Happened to XIV/SVXY on 5-Feb-2018?

- ETP Assets drove a significant part of the VIX future market
- End-of-day rebalancing of long and inverse leveraged ETPs is always in the same direction (e.g., all buying or all selling)
- End-of-day trade timing, direction, and approximate size was public knowledge
  - 5-Feb-2018: 4% down day on S&P 500, Vol ETPs needed to buy ~$800M of VIX futures at 4:15PM ET.
- Right before close sellers played hard to get. VIX future liquidity essentially evaporated for 25 minutes, and prices spiked.
- The end-of-day rebalancing process that leveraged ETPs use essentially locked in losses

Volmageddon 5-Feb-2018

Actual XIV & -1X SVXY Prices, Simulated -1X SVIX



Could a 5-Feb-2018 Style Event Happen Again?

- The short answer is yes, but improvements have been made
- Cboe changes:
  - Settlement time shifted to 4PM ET to align with Equity close
  - Limits on the heavily used “Trade at Settlement” (TAS) order were greatly expanded (stopped trading early on 5-Feb)
  - 30-second volume weighted price averaging added for settlement price
- ETP changes:
  - ProShares dropped leverage of UVXY to 1.5x, SVXY to -.5x
  - Volatility Shares entered the market with 2X UVIX and -1X SVIX. They feature rebalancing starting 15 minutes before close.
  - Overall assets significantly lower
- Not a significant risk until assets levels get large again, simple signaling would likely trigger position exit before things got critical

Volatility Trading: Do

- Monitor the volatility term structures
- Remember, there will be another volatility spike, it's inevitable. It will likely be very hard to predict.
- Hedge exposure with cheap options (buy when it's quiet).
- Expect long-term median revision
- When long positions do pay off, take profits incrementally
  - Have an up-front plan
  - Don't try to pick the top

Volatility Trading: Don't

- Don't just buy and hold straight directional plays
  - Short/Inverse positions will eventually blow up at some point
  - Long positions will decay to nothing
- Don't lean too much on margin
  - Requirements can increase, usually at very bad times
  - Getting closed out because of insufficient margin usually happens at the worst possible time, with horrible fills
  - Do constrain margin requirements with cheap OTM options
- Don't expect volatility to track prices, it's driven more by speed than levels
- Don't expect correlations between derivatives to be consistent unless there are underlying theoretical drivers