A Handy-dandy Reference to the “Master Spreadsheet” (“GEX+ CSV” on the GammaVol page)

The spreadsheet updates around 5:30am every morning after a trading day.

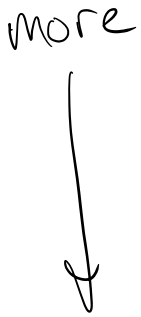
Each column is described below.

DATE
Date
Date is presented in format YYYY-MM-DD.

SPX
S&P 500 closing price
Value of the S&P 500 index at close.

N.B., this is *not* the S&P 500 “Total Return” index.

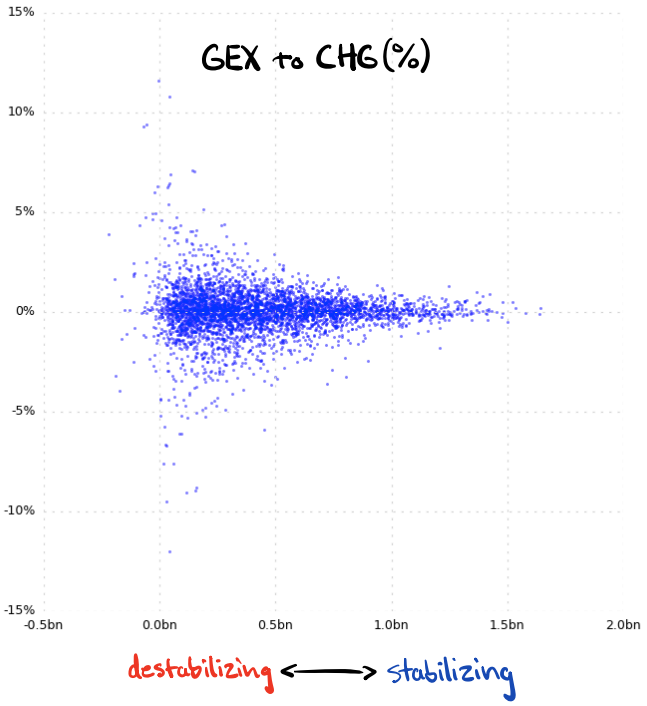
CHG(%)
1-day S&P 500 change
The close-to-close S&P 500 1-day change, in percent.



GEX

Gamma exposure

The gamma exposure of all existing S&P 500 (SPX) options, measured in thousands of dollars per SPX point. This particular GEX implementation uses Dealer Directional Open Interest (see *DDOI* in Appendix) to determine which options are held short or long by dealers. Positive GEX means dealers are providing liquidity to (stabilizing) the market when spot price moves; negative GEX means dealers are taking liquidity from (destabilizing) the market when spot price moves.



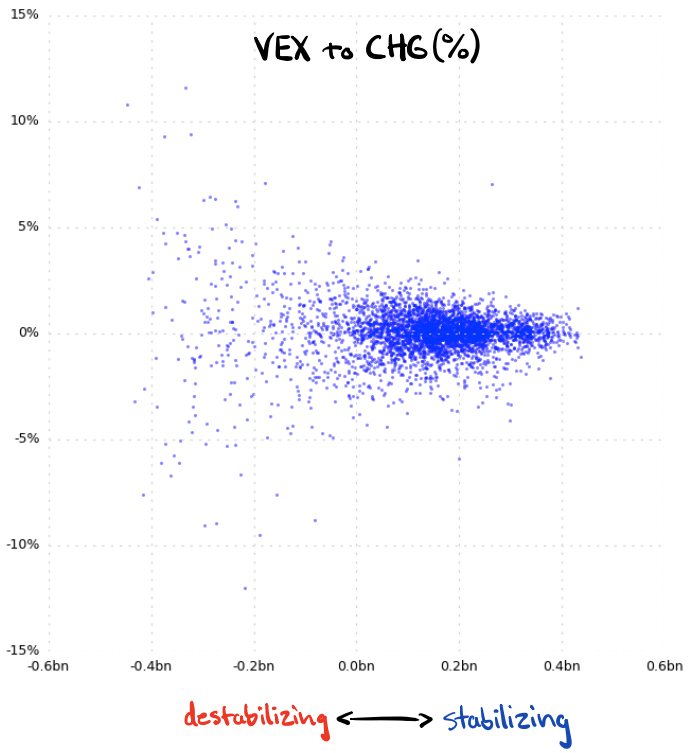
Example:

The GEX value on 2004-01-02 was 64521.235. This means that, for every 1-point down (up) in the S&P 500, option dealers would need to buy (sell) $64,521,235 worth of S&P 500 index exposure. So if the index fell from 1108.48 to 1107.48, dealers would be buying $64,521,235 of the S&P 500 to re-hedge their deltas.

VEX

Vanna exposure

The vanna exposure of all existing S&P 500 (SPX) options, measured in thousands of dollars per SPX point, *where each 0.10% move in SPX is assumed, for simplicity, to result in an anti-correlated 1.00% move (10x) in option implied volatility.* This seeks to measure the impact of dealers' delta re-hedging activity with respect to changes in implied volatility (vanna) rather than with respect to changes in spot price (gamma). As with GEX above, this VEX implementation uses Dealer Directional Open Interest (see DDOI in Appendix). When VEX is positive, dealers are providing liquidity to (stabilizing) the market when implied volatility rises; when VEX is negative, dealers are taking liquidity from (destabilizing) the market when implied volatility rises.



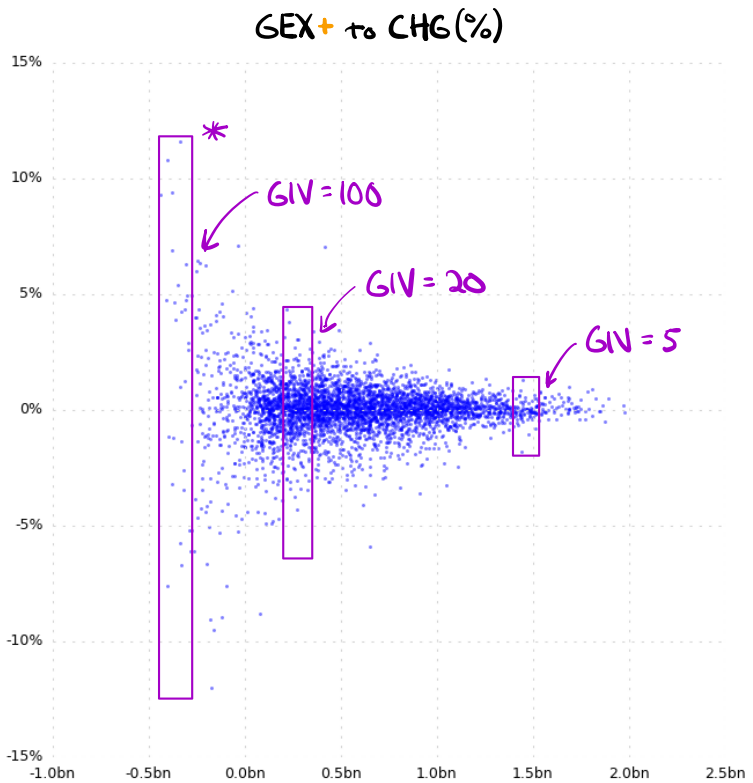
Example:

The VEX value on 2004-01-02 was 72414.74. This means that, for every 1-point down (up) in the S&P 500, option dealers would need to buy (sell) $72,414,740 worth of S&P 500 index exposure, *assuming that a 1-point move down (up) in SPX results in -10x the percentage change in vols.* So if the index fell from 1108.48 to 1107.48 (-0.000902136%), we would assume that implied volatility would rise 0.0902136% (-0.000902136% * -10) across the board, and that dealers would as a result be buying $72,414,740 of the S&P 500 to re-hedge their deltas.

GEX+

Gamma exposure + vanna exposure

The straight sum of GEX and VEX. Since GEX and VEX are the two dealer delta sensitivities that have a large, persistent, and immediate impact on current S&P 500 liquidity, we want to be able to view their *combined* market impact. Because we made the effort to denominate VEX in "dollars per SPX point" -- the same units as GEX -- we are able to simply sum GEX and VEX to achieve this result (GEX+).



GIV *

Gamma-implied volatility

The 1-day historical volatility associated with the current GEX+ value. When GEX+ is high, GIV will be low; when GEX+ is low, GIV will be high.

GIV(MAD%)

Gamma-implied volatility (MAD)

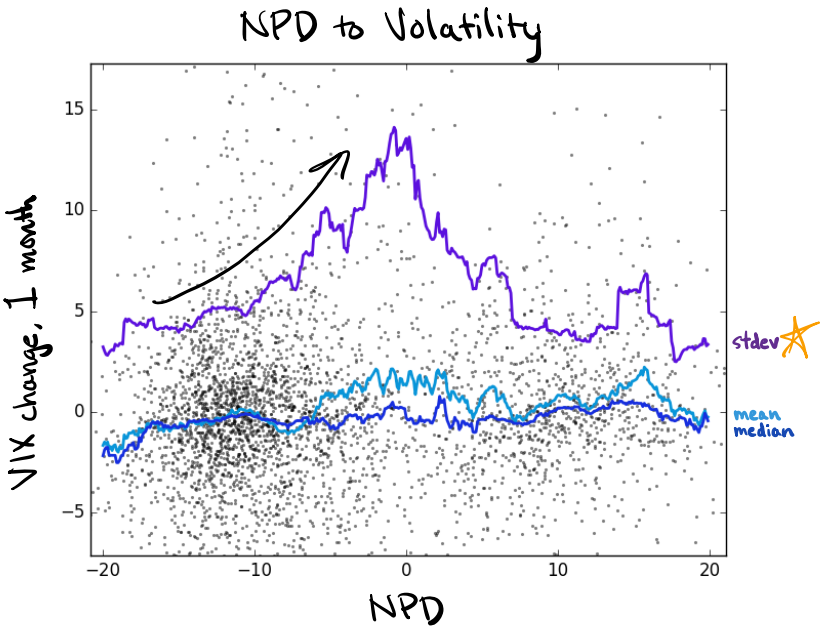
The mean absolute deviation (see *MAD* in Appendix) equivalent of GIV. I.e., the 1-day average S&P 500 move associated with the current level of GEX+.

$$GIV(MAD\%) = GIV \times \sqrt{\frac{1}{252}} \times \sqrt{\frac{2}{\pi}}$$

NPD

Net put delta

The combined net customer delta of all of the day's SPX put option trades. E.g., a -20.00 NPD means that the combined daily put activity netted out to customers *buying* 20 deltas of puts from dealers; and a 20.00 NPD means that it netted out to customers *selling* 20 deltas of puts to dealers. When NPD is in the "shallow negatives" (-5.00, 0.00), that means that customers are mostly swapping deltas with each other, and more new option positions are held *without* dealers as an intermediary. Since option customers, in aggregate, hedge less frequently than dealers, this increases aggregate market risk and fragility, and large moves in market volatility are likelier to occur (high vol of vol).



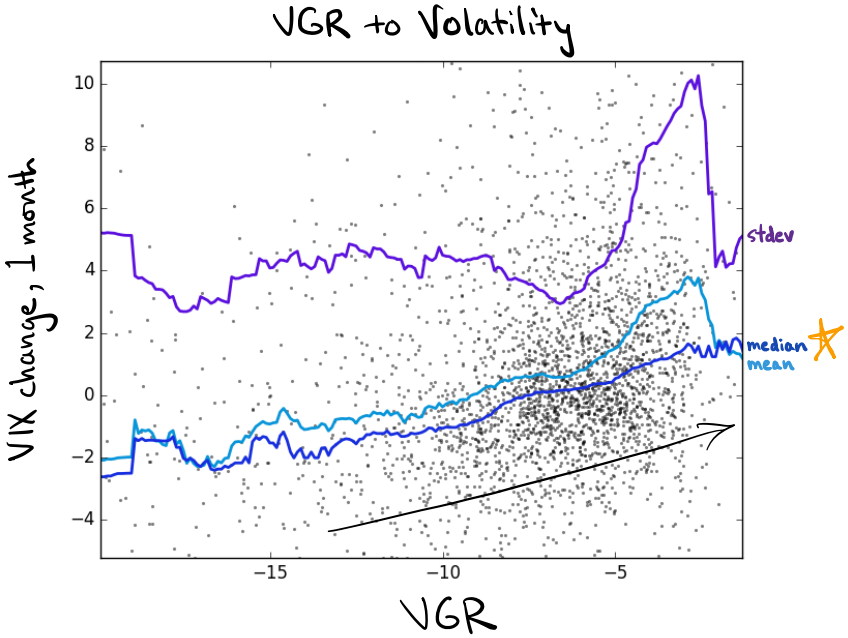
Example:

When NPD is -10, that means people are buying lots of puts, which tends to stabilize the market: Investors are more "insured" (sentiment bullish) option customers will "monetize" their puts if SPX falls (technical bullish), and if SPX doesn't fall, the put positions will decay and push the index up (flows bullish). When NPD is 0, neither dealers nor customers will be stabilizing the market, and volatility (VIX) can expand dramatically.

VGR

Vanna-gamma ratio

The ratio of SPX option customers' vanna exposure to their gamma exposure, where "customer" exposure is any option exposure that is *not* held by dealers. E.g., for every dealer position (every contract in *DDOI*), there is one customer exposure, and for every position held between two customers (every contract in OI that is *not* in *DDOI*), there are *two* customer exposures. When vanna becomes larger relative to gamma, (-5.00, 0.00), customers have more exposure to changes in market volatility, and volatility is more likely to increase.



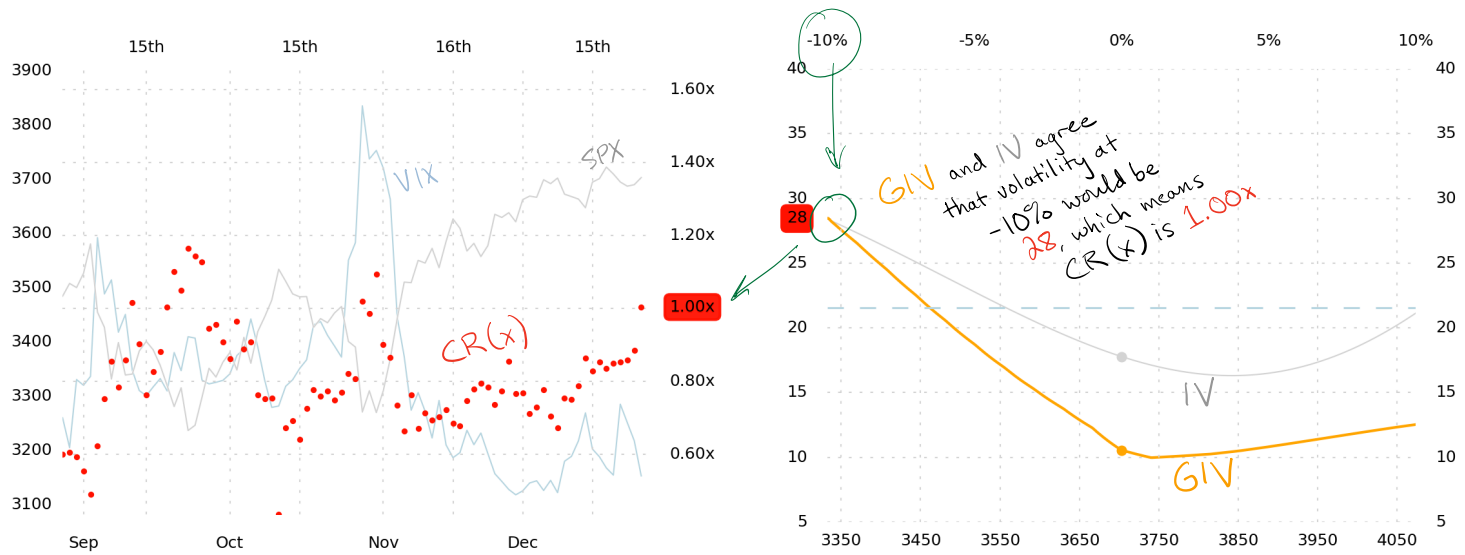
Example:

When VGR is -10, that means customers' exposure to gamma is 1000% higher than vanna (stable). When VGR is -2, customers' exposure to gamma is just 200% higher than vanna (unstable). In the former case, VIX will tend to fall, and in the latter case, VIX will tend to rise. When VGR is *positive*, that invariably means customers' exposure to gamma is low, and market volatility tends to already be high. In these situations, *NPD* (a measure of current put flows) becomes more important.

VIX
Cboe Volatility Index
Closing value of VIX.

VIX(MAD%)
Cboe Volatility Index (1-day MAD)
The 1-day mean absolute deviation (see *MAD* in Appendix) equivalent of VIX. I.e., the 1-day average S&P 500 move associated with the current level of VIX.

CR(x)
Crash-risk multiple
The gamma-implied volatility at 10% below SPX over the 30-day market-implied volatility at 10% below SPX. E.g., if the -10% GIV is 40 and the -10% market IV is 20, then the crash-risk multiple is 2.00x. The higher the multiple, the greater the risk that a market correction (-10%) can spiral out of control and become a liquidity crisis, facilitating a crash. Historically, a CR(x) of 3.00x or higher may be a cause for concern.



Example:
If customers have been selling put options to dealers, and these puts have been accumulating well below the market, there is a chance that, if SPX falls enough, dealers will end up having negative vanna exposure (-VEX), which can precipitate a crash.

See "The Implied Order Book" for more context on how this causes crashes.

SU, MO, MID

Support, Momentum, Midpoint

The "SuMo bands." I.e., the *-0.50* (Support), *+0.25* (Midpoint), and *+1.00* (Momentum) standard deviation bands associated with the implied volatility of the prior SPX close. The Support and Momentum bands are associated with bullish intraday action, and the Midpoint is associated with bearish intraday action.

See the 2/28/21 Sunday note for more on how it works.

RISC

Realized-Implied Spread Calculation

The rolling one-month spread between realized (historical) and implied volatility. Realized volatility is expressed as the average daily move in SPY, and implied volatility is expressed as the implied daily move in SPY, taken from the 1-month straddle price. So if SPY has moved 0.50% on average over the last 21 market days and SPY options imply 0.75% average daily moves over the next 21 market days, RISC, which is expressed in basis points, will be 50 - 75 = -25. Lower RISC is associated with better 1-month forward S&P 500 returns.

VIBE

Volatility-Implied Bullish Expectation

The rolling 1-month spread between change in realized volatility and change in implied volatility, measured relative to expectations. The change in each type of volatility is expressed as a 1-month simple moving average, which demonstrates whether each volatility up is rising or falling, and by how much. When implied volatility is moving more and faster than expected, that's a negative VIBE. When implied volatility is moving less and slower than expected, that's a positive VIBE. Like RISC, VIBE is measured in basis points. For S&P returns, very positive VIBEs are bearish; very negative VIBEs are bullish.

Appendix

MAD

Mean absolute deviation

The average (mean) move implied by an option's price/volatility. I.e., the magnitude for which 50% of occurrences will end less than, and 50% will end greater than. The true mathematical basis for an option's price. For most applications, MAD is preferable to standard deviation (STD)

$$MAD = \underbrace{VOL \times \sqrt{\frac{1}{252}}}_{STD} \times \underbrace{\sqrt{\frac{2}{\pi}}}_{0.7978}$$

OI

Open interest

The number of option contracts that exist, broken down by expiration, strike, and type. Data from the Option Clearing Company (OCC).

DDOI

Dealer directional open interest

The number of option contracts that are held by option dealers, and the direction in which those contracts are held. When dealers are short the option, the DDOI is negative; when dealers are long the option, the DDOI is positive. DDOI is created by assessing trade direction of all option volume throughout the day, then comparing that volume to subsequent change in open interest.

Example:

The 1-year 3000-strike put (OTM) was just listed. OI and DDOI are zero. On the first day of trading, 100 contracts appear to have been bought, and the OCC says that 100 contracts now exist in OI. At the end of the first day, OI is 100 and DDOI is -100 (dealer is short the contracts). On the second day, 1000 contracts were sold, and reported OI changed to 900. We guess that those 100 contracts were sold to the same dealer, and that 100 of those contracts offset the -100 in existing DDOI, leaving the dealer net long 900 contracts. DDOI is now +900. On day three, we see two 500-contract trades occur -- one a sale and one a purchase. OI goes up to 1400 (+500). We don't know if there's a new dealer involved, or if customers traded with each other, but even though OI went up, we don't think dealers' exposures went up any, so DDOI remains at +900.