

## S&P 500 Weekly Forecast 4/18

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Hey guys,

For the last month, we've been talking about the relationship between S&P 500 implied volatility and realized volatility. We hypothesized that, if we could find a way to reflect the "tension" between them, we would be able to find moments when index liquidity is suddenly withdrawn or overwhelmed -- and thus volatility *itself* becomes volatile.

From 3/14 where it all began:

Consider an alternative question: "Did people who bought (sold) 30-day volatility 30 days ago win (lose) between then and now?" This question introduces *observers* to the problem set, and considers realized volatility as a factor in whether option prices could actually, in the recent past, be considered "right" or "wrong." *I.e., instead of looking at the volatility cone, it looks at the people who were looking at the volatility cone (observers). Very meta.*

Furthermore, we can deduce exactly what magnitude move in the S&P 500 would bring 30-day realized volatility in line with past implied. E.g., if the S&P 500 has moved 1.00% on average, every day for the past month, and ATM implied volatility one month ago was 18.25 (implying ~1.15% average daily moves), then we can say that "short vol is winning" over the past month, because realized has been lower than implied. But we can *also* say that short vol over the past month *would stop winning* all of a sudden if there was a 1-day 4.15% move -- because a 4.15% move would bring the *average* 1-month realized move up to 1.15%, and this would shake up everyone's positioning from the prior month.

Is there any magic that occurs when these volatility stars align? When winners suddenly become losers and vice versa? We're keen on finding this out, because one of the things we're always looking for is "vol-of-vol." Whenever people start suddenly shifting their volatility positioning, volatility *itself* becomes volatile (and liquidity in the underlying becomes thin). This would be one very simple, intuitive reason to expect that sudden shift.

And so what we did is we envisioned the relationship between RV, IV, and the "observer" (past implied volatility) as the *sides of a triangle*, since they always relate to each other, and we envisioned the *angles* of that triangle as the *description* of their dynamic relationship with each other.

E.g., if RV was higher than both PIV and IV, then the angle that describes RV ("Angle C") was going to be big. Or if IV was small compared to both PIV and RV, then its angle ("Angle B") would be small. The remaining angle ("Angle A") would describe how large PIV was, related to the other two.

Our hunch was that when these angles "aligned" (i.e., a 60-60-60 equilateral triangle), that's when "vol-of-vol" might commence, because that's when everyone would simultaneously be prompted to re-evaluate their

volatility positioning, and that would bring many traders' positions on the cusp of losses -- or at least prompt new trading activity to effect re-positioning.

To see if that's true, let's find a way to quantify the whole vol triangle and its impacts in a single chart, to see -- once-and-for-all -- if our intuition was correct.

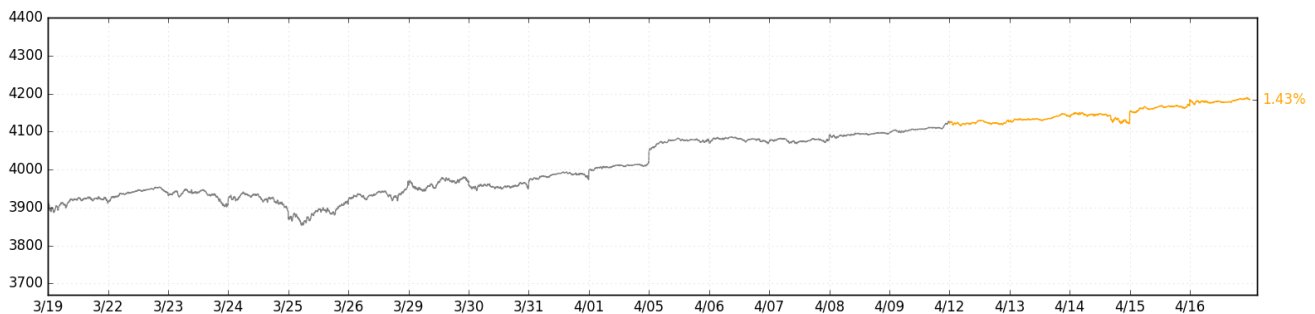
But first...

1. Gammaful
2. Gammaless
3. The Geometry of Vol

### Gammaful

Gamma Week played precisely by the rules, forging a path of low-vol upside-drift, just like it used to back in the old days. This didn't *really* turn out in our favor, though, as we were betting on traders frontrunning the OpEx and the likelihood that IVs were underpriced.

And so, while the 1.43% weekly return was precisely in keeping with last weekend's expected average return (+/-1.50%) and it was indeed higher than what the market was implying, we still didn't get the better part of that trade.



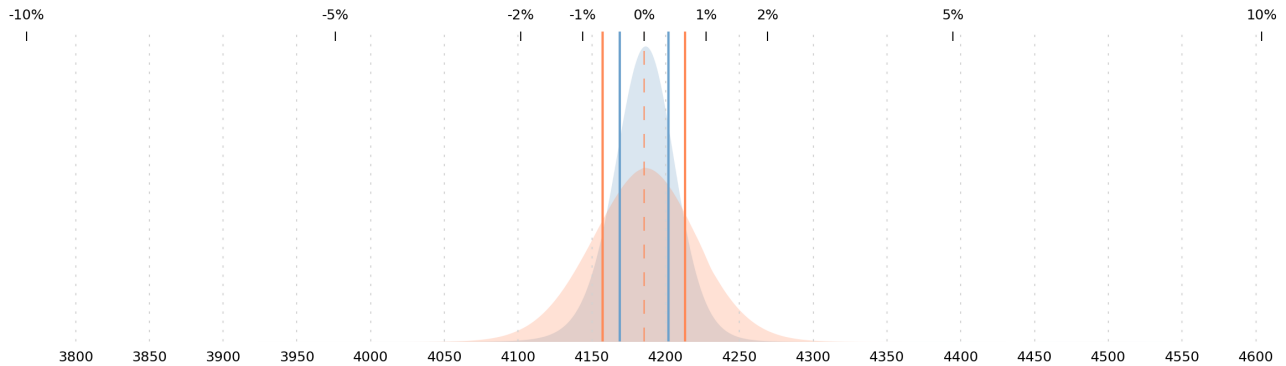
What's more, we got rid of our 4175 calls before Friday (trading it in for a put-spread). They would have at least ended up in the money (and worth more than what we sold 'em for), with SPX closing at 4185.

The weeks prior were *very* kind to us in terms of our OTM call-buying program, so we can't complain. As it stands, we're short delta in the form of a 4100/4030 put spread, and long a teensie amount of gamma on the right wing (4275 calls, just like we said we'd do on Friday).

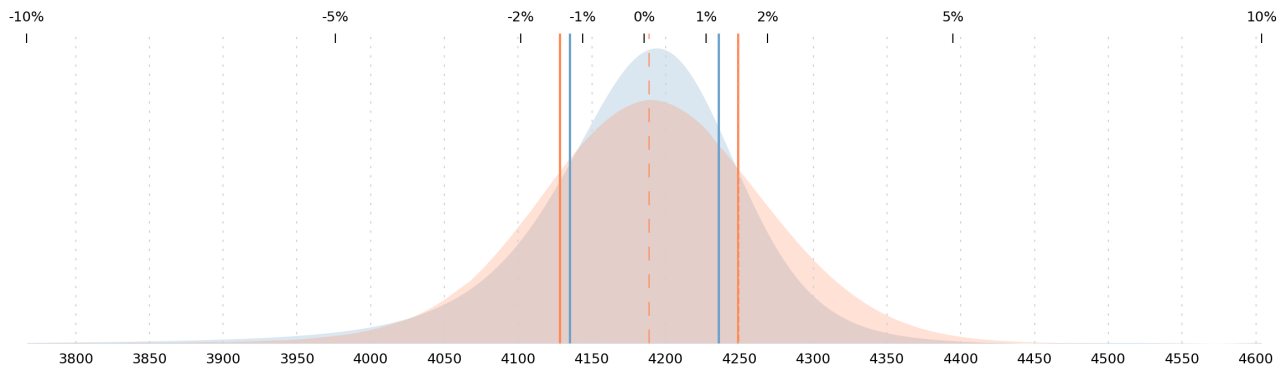
### Gammaless

And with Gamma Week now over, we're still pleased with this positioning, because long gamma is still the way we want to be. With the vanna-gamma ratio now in the very shallow negatives (-2.13), there is a strong case for an increase in volatility -- and the GEX+ probability densities agree.

On the 1-day:



On the 1-week:



The right tail and the left shoulder -- where you see orange poking up above blue -- remain "underrepresented" by market IVs, and that's where we want to bet on things moving toward. We specifically want to be betting *against* a 0% return this week (where blue rises above orange) -- i.e., there ought to be some movement. As such, we want to be betting on either a 2.00% loss or that crazy 3.00% gain for the week.

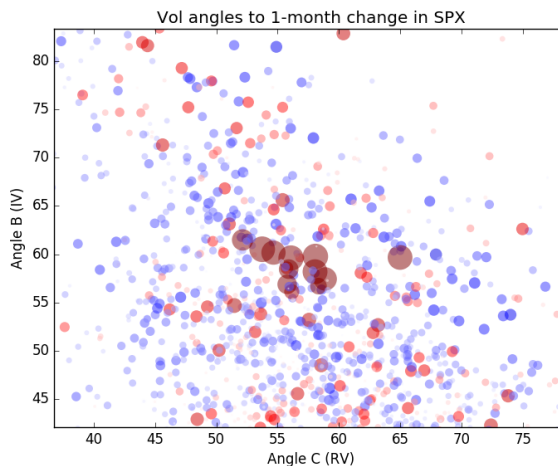
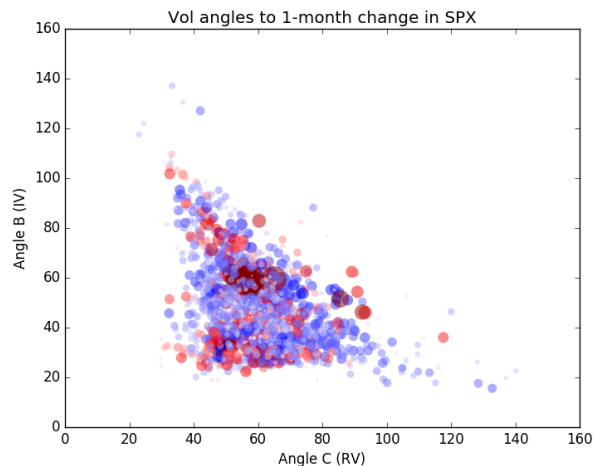
As things change (and they probably will), we'll keep you posted!

New SuMo bands for Monday: 4170.61, 4192.9, 4215.19

### The Geometry of Vol

Last week, we finally got to visualizing the "vol triangle." We perceived a sort of cycle, whereby a left-leaning triangle (a large Angle A, i.e., a relatively high past implied volatility) is generally stable and causes the triangle to shrink (vol to decrease); and a centered or right-leaning triangle would cause the triangle to expand (volatility to increase). A very small, left-leaning triangle seemed coiled and ready to expand; a very large, right-leaning triangle seemed exhausted and ready to lean back left and contract.

This is nothing new or exciting: It's a testament to the mean-reverting nature of volatility. In the plot below, note that when Angles B and C are both small (bottom-left), that implies a small, left-leaning triangle. See how the bottom left has a lot of red?



Red means SPX went down over the next month (vol expansion). Redder, bigger dots mean more dramatic moves. Similarly, blue means SPX went up. It makes sense that vol would expand from that lower-left corner. That's natural. But -- more importantly -- notice where the *biggest* concentration of giant, dark red dots is...

Yup. 60-60-60. Right smack-dab in the middle of the plot. Or maybe it's closer to 65-60-55, but you get the idea. Big drops in SPX commence when Angle B is ~60 and Angle C is ~55. All of them are big moves *down*. This is unique. This has nothing to do with the mean-reverting nature of volatility, and there is no body of research to suggest why this should happen. It really does seem to confirm our suspicions about vol market "tension."

For the umpteenth time -- *there's something here*. But we're still not convinced of what it means (trying to be conservative here!). So let's try playing around with a practical implementation of this concept next weekend. We'd like to make money off of this, after all.

Enjoy the week!

The SqueezeMetrics Team

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