S&P 500 Weekly Forecast 11/22

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Hey guys,

Right down to business. Let's talk VGR.

The customer vanna-gamma ratio (VGR) is the quantitative relationship between the vanna sensitivity (change in delta per change in IV) and gamma sensitivity (change in delta per change in spot) of all SPX option open interest that we believe to be owned in one or both directions by customers (traders, investors) rather than dealers (market-makers). Thus, these are positions that we expect to *not* be regularly delta-hedged, but rather to be managed at the customer's discretion. There are a lot of these positions.

Specifically, VGR is the vanna, less the gamma, divided by the vanna.

$$VGR = (V - G) / V$$

Being that this is a simple relationship, the exact way you arrive at "vanna" and "gamma" aren't too important as long as you're consistent, but suffice it to say that we're using the same methods as with GEX and VEX.

Anyway, this means that when the vanna of all customer positions is positive, and less than the gamma (a normal state of affairs for the index), VGR is negative. Deep negative means that vanna is small compared to gamma. Shallow negative means that vanna is relatively large compared to gamma. Specifically, if VGR is -20, that means that gamma is 2000% higher than vanna. If it's -2, then gamma is only 200% higher than vanna. This would be a "dangerous" situation, because that's a lot of vanna.

It's a dangerous situation because it means that customers' aggregate exposure (delta) to the market is very much a function of implied volatilities, when normally, it's more a function of current spot price. And since implied volatilities in the S&P 500 can be thought of as measuring liquidity risk, that means that a VGR of -2 tells us option customers are, at that moment, extremely exposed to liquidity risk. I.e., if implied volatilities rise a couple points, the customers who are short those options will be compelled to reduce those short volatility positions, because they suddenly became overexposed to the market (their deltas went up). The customers who are long the same options tend to be holding the options for their gamma (spot relationship), and are not only less interested in changing their exposure, but are less pressured (they are long convexity, not short).

This has the net effect of forcing customers to buy options, and in that way, it's a squeeze. But it's worth understanding that it's specifically a *volatility* squeeze. It's the change in IV that drives the squeeze, not a change in spot. A change in spot alone would not "activate" the vanna risk. But when IVs change, customers, in order to keep their deltas in check, are forced to net buy options (whether cutting or rolling their short vol risk). This sudden demand for options raises implied volatility further, and while it also tends to impact the underlying (through the agency of dealers' delta re-hedging), we hypothesize that this would really best be considered a secondary effect -- the next thing in the causal chain.

Thus, when we're looking at VGR, we're actually looking at something that tells us about the potential for a volatility squeeze. When customer gamma is only 200% more than customer vanna (rather than 2000% more), that means that the sensitivity to IVs is enormous. And that means short vol is a crowded trade simply owing to the way options are positioned across the board.

Nerd note: There are two reasons for VGR to become positive. First, if vanna is negative; and second if vanna is positive, but larger than gamma. Negative vanna simply means that a lot of options are ITM, such that their deltas will actually decrease if implied volatilities go up (usually, most options are OTM, and their deltas increase when vol goes up). In the real world, vanna does get negative fairly often. When vanna gets deeply negative, gamma is usually close to zero, because IVs are high and not a whole lot of options are ATM. This results in a VGR that's positive, but close to zero (e.g., 2, 3, 4, 5). When VGR is in these low positives, that tends to mean that volatility is absurdly high, and is due to un-squeeze. *The most dramatic historical collapses in VIX (from 50+ handles) all occur here.*

How is your brain doing?

Here's what matters: If all of the above is true, then VGR is primarily a lens through which to view implied volatilities (VIX), and only *secondarily* a lens through which to view changes in spot price. Of course these things are inextricably linked -- but the causal chain will inform the way we approach the data, strategically.

To see what we mean, see below how the relationship between VGR and *1-week* SPX change (1.0 = 1 mean absolute deviation) compared to the relationship between VGR and 1-week *VIX* change (0.2 = +20%). Green line is mean, orange is median, and red is standard deviation. Rainbow colors are net put delta, which you can ignore for this comparison. Anyhow, see how tidy those green and orange lines are in the right plot? Median weekly change in VIX is around +5% to the far right, and -5% below -10. And such a smooth line! (It's sampled just as frequently as the SPX plot to the left, so it's *actually* smoother.)
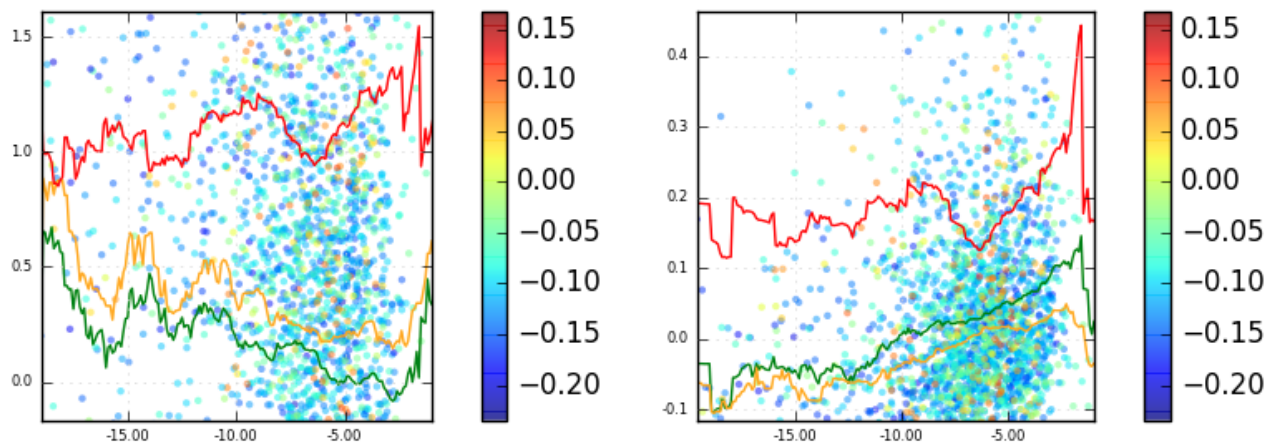

We did mention how much neater the VIX relationship seemed a few weeks ago, but at the time we had no basis for understanding *why* it might be. Having now come to terms with the likelihood that VGR is indeed primarily a volatility indicator (owing to what it means about customers' IV sensitivity), we naturally became interested in how it could be exploited in the dumbest, easiest way. So we did what everyone else does -- a backtest on a short VXX strategy. Except we made our rules really simple and only pressed the 'run' button once. No extra data mining (running a test with lookahead bias like this is bad enough).

Based on those VGR scatterplots above, we thought that a VXX strategy based on VGR should be all-in

short VXX *only* when VGR is below -5 (a nice, pretty number). The rest of the time, it's out of the trade, as the risks are unacceptable. This is compared to a strategy that's *always* all-in short VXX (in gray). Both portfolios begin at $1mm. Our expectation was that the VGR-based strategy would have slightly inferior returns, but much lower variance (thus, a far superior strategy that could be "safely" leveraged). Turns out that it had superior returns *and* much lower variance.
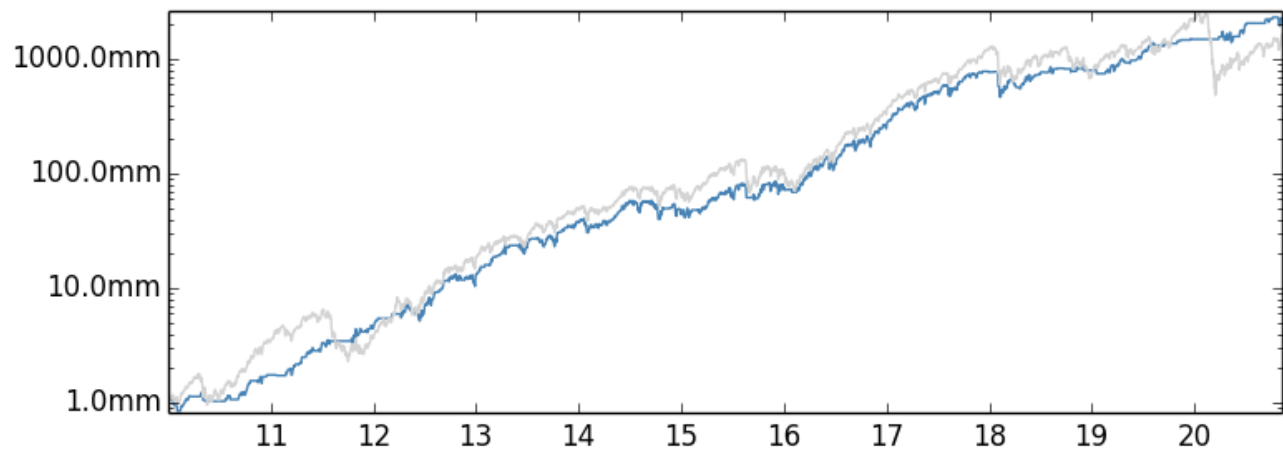
And since this is a logarithmic y-axis, let's zoom in on some of the recent performance so you can get a sense for what the 2020 drawdown actually looks like ($2bn became $500mm with a "normal" short VXX strategy, while the simple VGR strategy took no loss at all).
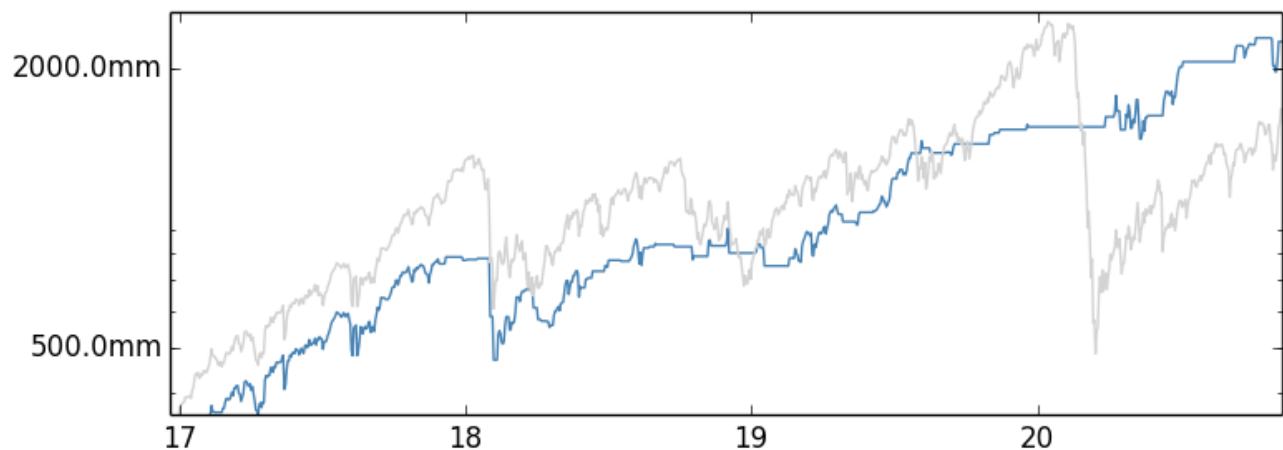

Pretty neat.

This makes us think that the customer vanna-gamma ratio is a good lens through which to view index volatility. To that end, *historical VGR and NPD are now on the downloadable master spreadsheet*, and should be available every morning.

Cool? Cool. Now that we've gotten that out of the way, let's step back and talk about the week prior and the week to come.

The week prior
It would've been a good week for iron flies! And if you'd trusted last weekend's Probability Page, which is based on historical patterns at given levels of GEX+, you would have probably taken a small short iron fly

position. And it would have gone swimmingly, the index having fallen just **0.76%** over the week.
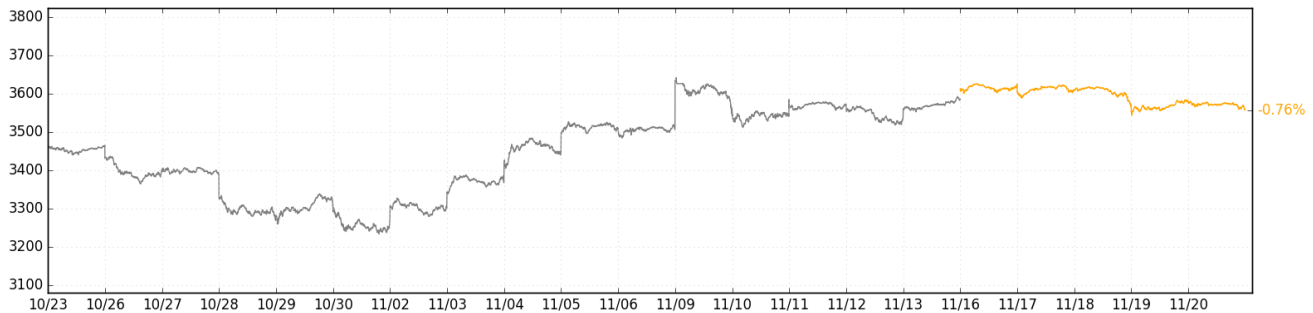
Plenty of you guys have been razzing us about this. It is deserved. We spent the week long volatility, bleeding chips. At the very least, we could have been collecting some gamma rent from an iron fly position while holding long VIX based on the VGR data.

Part of the point of today's conclusions re: VGR is that these things are not mutually exclusive. Indeed, now that we're beginning to think of VGR as primarily a vol signal, we can segregate these ideas. Perhaps last week was a good week to be both short an iron fly *and* long VXX.

What about the coming week?

The week to come
Short week incoming. Thursday's a holiday, and Friday's an early close. We still have some Nov30 SPX puts, and we still have long front-month VIX. The last reading of VGR was -2.67. This predicts an increase in IVs/VIX. The last reading of NPD was -6.62. This takes the edge off -- it suggests that some customers are hedging, and it makes a *large* vol spike unlikely.

But all we've been saying for the last week is that we were gunning for something like a 3% dip in the index, because that would bring VGR back to -5, where it's neutral. That hasn't changed. Indeed, owing to the Friday option expiration, that "neutral" level even shifted down a bit, to something like SPX 3475.
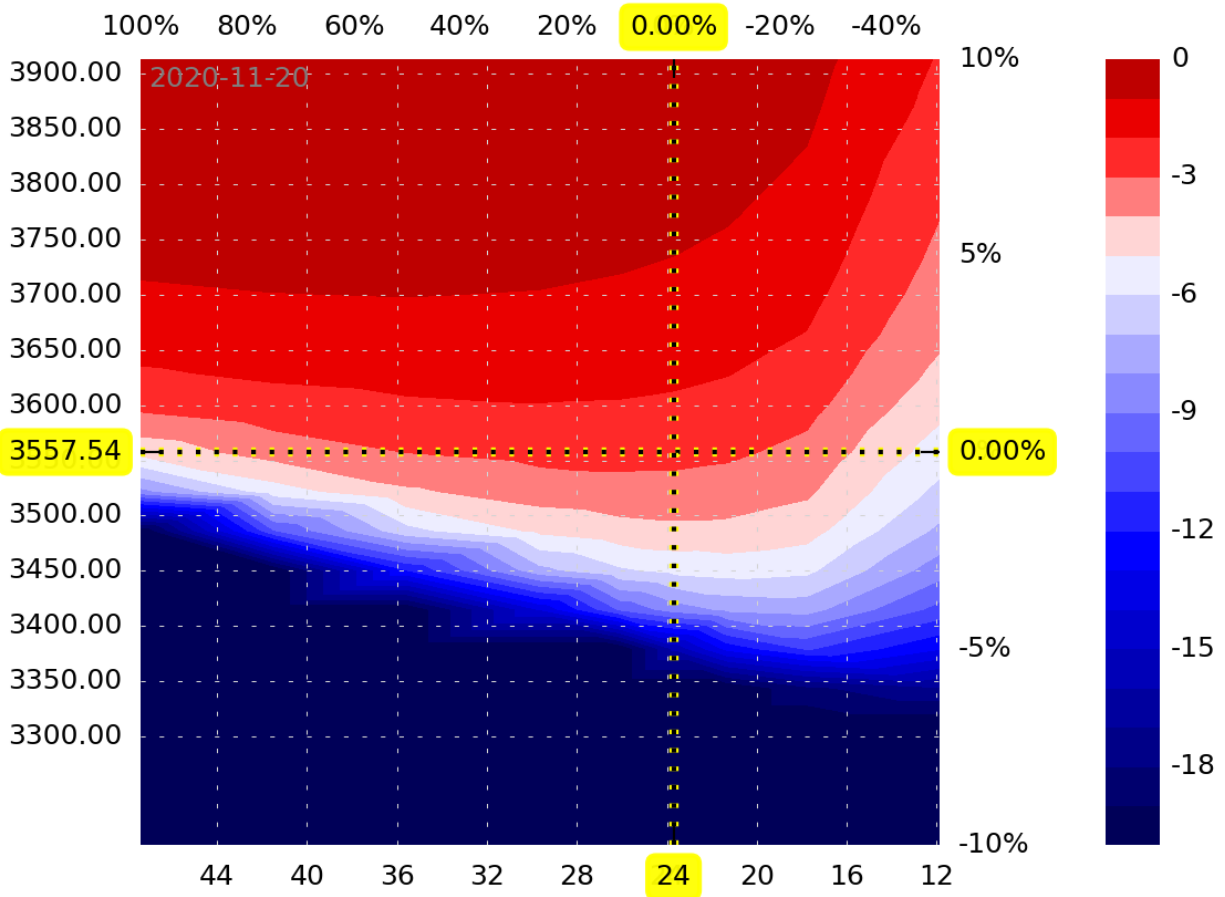
What we'd like to be able to do here is to hang on to those long vol positions and to acquire some short gamma by selling an iron fly. I.e., what we wish we'd done last week. But if you look at the 1-week density comparison on the Probability Page, you see this:
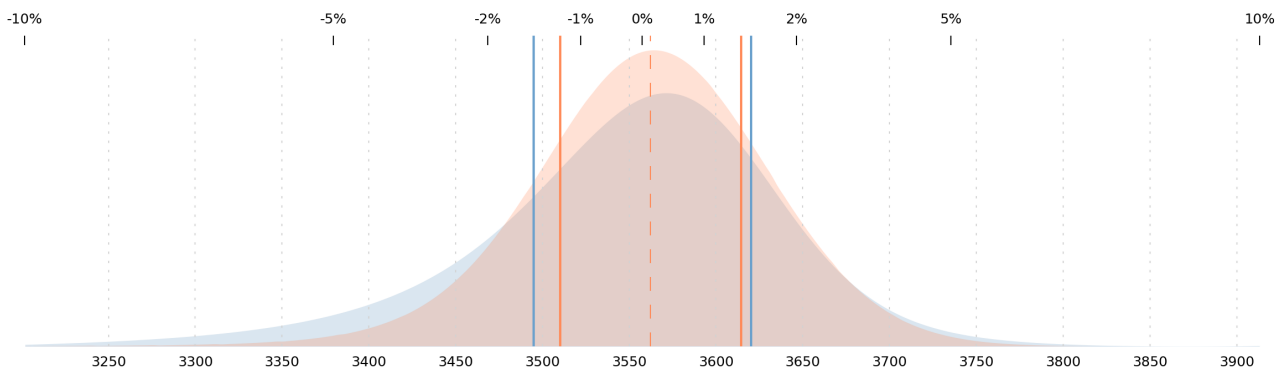
There's very little advantage to be had here. The GEX+ (orange) density is only slightly different from the market's. For instance, we ran Friday's options through our Juice algo and found that a 100-wide iron fly (our usual fare) centered at 3560 is expected to return an average of 0.21% if the "optimal" 19 spreads are sold. If you recall, we've seen 1-week average rates of return around 10% in the past. An average gain of 0.21% with full Kelly sizing is probably not worth pursuing.

The reason the densities are so similar is primarily because of Friday's option expiration, which ultimately

brought GEX+ down from $736mm to $508mm, thus reducing liquidity and pushing gamma-implied vol (GIV) up a tad, more in line with IVs.

And so here we are again: Long some VIX and SPX puts, with no intention of adding to that position or initiating anything new. If we were a bit more patient, we'd probably just spend the week whittling or smoking a pipe on the porch, completely market-neutral. Were the returns from that mostly-passive VXX strategy not good enough for us?

Oh well, everyone needs a hobby.

Have a wonderful holiday week!

The SqueezeMetrics Team