

## S&P 500 Weekly Forecast 12/20

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Hey everyone,

The end of 2020 approaches, and it's time for some housekeeping. This week is going to be a quick *retrospective*, thinking about what we've learned in 2020. Next week, a *prospective*, looking toward 2021 and all of the unanswered questions that we still have on the table.

Story time:

At this time *last year* (meaning, 2019), we were starting to seriously think about *vanna* exposure (VEX). We hadn't told anyone, but we'd run some preliminary tests, and we were planning to have some numbers available by mid-2020. We knew that VEX was going to be an important complement to GEX (which, by nature, loses its explanatory power in extreme volatility), and we thought it would be important to have around in the next few months -- especially as the bull market became long in the tooth.

By March 12th, we abruptly realized we'd have to speed up that process, and we sent out this impromptu note. Our "proto-VEX" was predicting 99% *volatility* (GEX alone couldn't predict higher than 30%), and we couldn't exactly ignore that anymore. Thus began a research blitz on vanna. For those readers who joined us after those harrowing days, we've compiled all of our Sunday notes since the beginning of the year. You can review them here.

In the following months, we not only introduced vanna as an analytical complement to gamma, but we also revealed that we'd been able to isolate the *trade direction* of most SPX option volume since 2004 -- knowing whether customers were actually buying or selling. Initially, this was able to improve our monitoring of option dealers' positioning, from which we derived our combined dealer gamma and vanna (GEX+) and 1-day "gamma-implied volatility" (GIV), which guides our volatility forecasts and tells us about market *crash* risk (>10% declines). This all culminated in this paper, published in early July.

Subsequently, though, we began building on that trade direction data, and we focused on *customer* positioning. What have customers bought or sold? What are their current positions? What impact does this have on the market? So far what we've found here is still confusing, but profound. Here, the *interplay* between customer gamma and vanna is paramount. Whereas with *dealer* positioning, we needed to know the combined, *additive* effect of position vanna and gamma to forecast volatility; with *customer* positioning, what ended up mattering was the *subtractive* effect of vanna and gamma. Which are customers *more* sensitive to right now? This became the vanna-gamma ratio (VGR), and it ended up telling us a whole lot about market direction and *correction* risk (<10% declines).

Each of these bits of data has a history back to 2004, and updates every day to a spreadsheet available on the GammaVol page. Next week, we'll be writing up a "data dictionary" reference page for that spreadsheet in an effort to begin drawing together these loose threads.

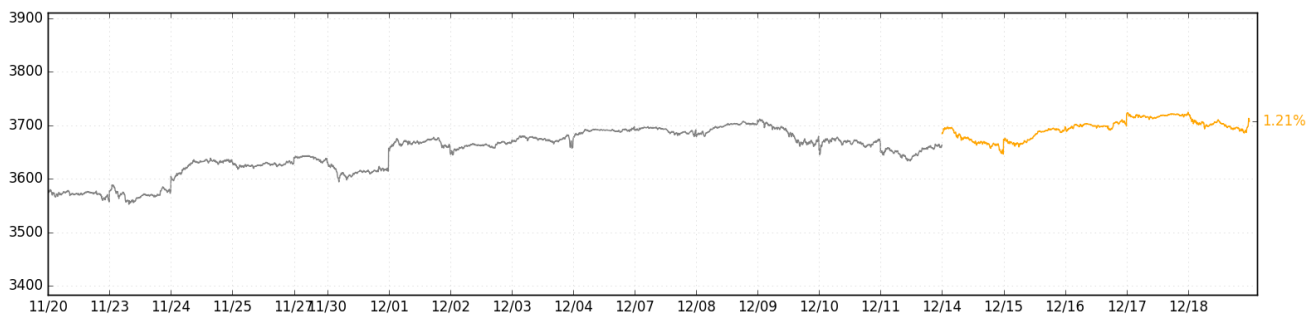
Beginning that process, let's try to briefly summarize what we know about net put delta (NPD) and the vanna-gamma ratio (VGR) so far.

But first...

1. D - 5
2. D + 3.5
3. NPD / VGR

## D - 5

This past week was Gamma Week. GEX+ made it to over \$800mm, predicting daily average moves of ~0.45%, and mean-reversion ruled the day. A weekly gain of **1.21%**, closing at 3709, won us a profit on our only position -- a 3670 straddle initiated last week.



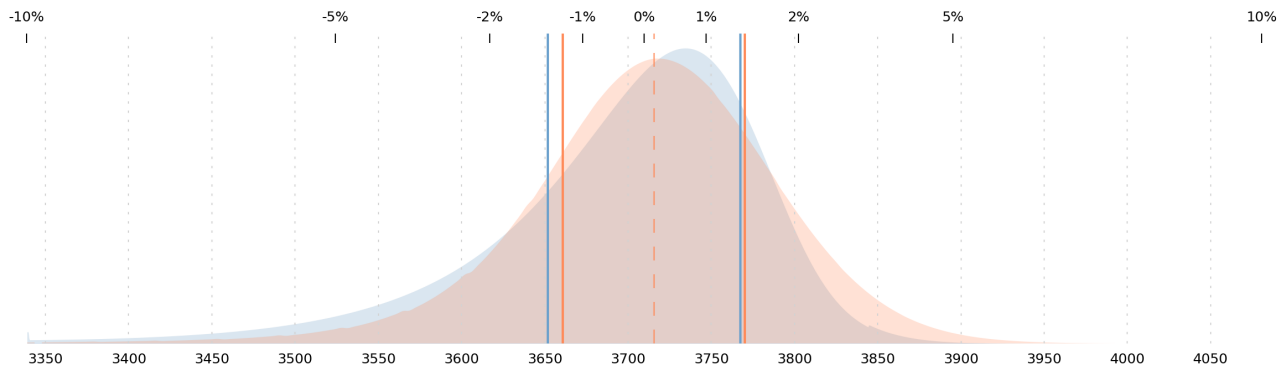
On Friday, we predicted that GEX+ would fall to \$490mm after the PM expiration. According to the Risk Report, it's now at \$480mm. That's quite a big drop from Friday's \$860mm, and with it, we expected to see an increase in weekly volatility.

Which is why, on Friday, we were weighing the idea of buying an SPX strangle for next Thursday (*"Or if you're feeling festive, just buy the call!"*). Well, we felt festive, and we took a small "melt-up" bet: Long Thursday 3800 calls.

With Friday's data now in hand, are we still happy with that decision?

## D + 3.5 (Thursday is a 1pm close)

Yes, yes we are. Take a look at the Probability Page. The 1-day and 1-week probability densities both show the GEX+ density overweighting the right tail, and volatility otherwise being "fairly priced." In other words, the densities *mostly* agree, except that GEX+ says the right tail is more likely (1-week densities pictured below, though bear in mind that a 1-week density is actually comparing options/vol from next Monday, since Friday is a holiday -- not that it makes much difference).



*Nerd note: This is something we haven't quite made a point of expressing in the past, but you know how we get all excited when the GEX+ probability density is really similar to the market-implied density? That's because this is pretty much as close as you ever get to near-term volatility being "underpriced." And in a non-trivial way, it is underpriced. See, when the market shows you its implied density, that density is a function of market-makers' pricing, which always builds in a bit of premium to make up for the fact that an option seller is taking on a convex and theoretically unlimited-loss position, and that when delta-hedged, this position has a payoff more resembling the variance of the stock movement (rather than the linear volatility). What this means is that, relative to the actual likely distribution of returns at expiration, the market tends to add a meaty premium (up to 20% or so!) to a "fair" straddle price. (This is why selling options makes money in the long run.) But the GEX+ derived probability density is using actual historical returns, so in a way it's not directly comparable, because those historical returns will generally be, oh, 20% lower. So when you see these densities agreeing with each other, as you see above, the implication is that realized volatility will be similar to what implied volatility is predicting, but implied volatility always "predicts" a bit more volatility than is likely to occur, 'cause that's just the way it works.*

Anyhow, that's why we're pleased with being long volatility, and specifically long calls.

But wait, there's more.

After the Friday expiration, a whole bundle of gamma disappeared, right? Well, some of that gamma was obviously held by customers, and the expiration took the vanna-gamma ratio (VGR) from -4.01 down to -2.34. That means that customer vanna increased a lot proportionally to customer gamma (makes sense, right?). But that also means that the stabilizing force of gamma is now smaller relative to evil, menacing vanna.

What happened last time VGR was around -2? Well, we remember very clearly: SPX went up 4.4% over the month, but VIX stayed flat. The time before that? VIX went up some 45% in a couple days and SPX went down 5%. In both cases, VIX "outperformed."

We're going to ponder that a little bit more below, but suffice it to say that we're seriously considering the "long SPX, long VIX" pair at this juncture.

### **NPD / VGR**

Seven of the last ten market days had a net put delta (NPD) reading between (-5,0). These are historically associated with average increases in VIX on 1-week and 1-month timeframes. Friday's vanna-gamma ratio, post-expiry, was -2.34, which is also (independently) associated with average increases in VIX on the 1-week and 1-month timeframes.

The former (NPD) data point is potentially telling us two things: The first is that not that many people are buying put protection (readings lower than -5 tend to tell us of ample protective put buying, which is stabilizing to the index), and the second is that customers are more frequently trading with each other, since flows are two-sided. The trouble with people not buying a lot of puts should be obvious -- they end up unwinding their positions more violently when things go wrong since they didn't have insurance. The trouble with customers holding opposite positions (rather than dealers holding the other side) is more subtle. The reason this is dangerous is because customers don't hedge their deltas carefully and incrementally -- they hedge/roll their positions all at once and in big chunks, which tends to have bigger market impacts and increase volatility.

The latter (VGR) data point is telling us something just as interesting: When an option has gamma, the holder of that option is looking for some specific move in spot price before they hedge or roll that option. For instance, a put-buyer with a long OTM put will likely monetize that put when it becomes ATM (when its gamma is highest). I.e., the purpose of buying option convexity is to reduce convexity in a long equity portfolio. This, again, means that something like a bought put has a stabilizing impact on the market. But now imagine a trader's relationship with vanna: Vanna is the change in delta (market exposure) per move in implied volatility. If you've sold an OTM put option (as so many funds do), you've chosen the strike and tenor to provide an exposure to spot and volatility that ideally smooths your portfolio PnL. The problem, though, is that if implied volatility rises (spot doesn't even have to fall), you will have more delta exposure than you want, and you'll have to roll your put down, selling net deltas into the index and actively pushing spot down.

*"But VGR is measuring option open interest where there's a customer on both sides of the trade!"* You object. *"The long put guy will probably roll at the same time as the short put guy, right? Thus negating the impact!"* And that's where we call upon the simple truth that there's a big difference between being short and long an option. Whether you're a dealer or a customer, you're going to re-adjust your short option positions faster than you re-adjust your long option positions, since the short position always represents a "concave," unlimited-loss-potential risk that must be managed more tightly. This is the only reason we need to believe that when customer vanna is relatively large (as with a VGR of -2.34), "volatility squeezes" become more likely.

But we're also suspicious that this phenomenon can contribute to upside, because in the event that that "volatility squeeze" doesn't happen, the put-seller needs to roll his put *up* instead -- contributing to an upside drift for every moment VIX is falling or flat. Hence our interest in the "long SPX, long VIX" trade right now.

One of the big questions we have yet to answer is: How many of these "customers" managing vanna positions in SPX options are actually dealers making a market in VIX futures and options, or other volatility products?

But let's wait until next weekend to talk about those big questions we still have to answer. There's a whole 2021 to worry about that.

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One other housekeeping item: The Yacht Club is now closed to new members. We can't tie together loose ends at the same time that we try to explain things to new folks. In the future, if we re-open the Premium subscription, it will be for discrete time periods so that we aren't interrupting other, more important things. As you are all aware, our "gamma exposure" concept is all grown up now and attracting quite a lot of interest,

and so is this subscription. As it grows beyond the size of a small classroom, we're not sure we can handle that -- nor do we really want to.

And so, to all of the esteemed members of the Yacht Club: *May your holiday week be merry and bright.*

The SqueezeMetrics Team

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