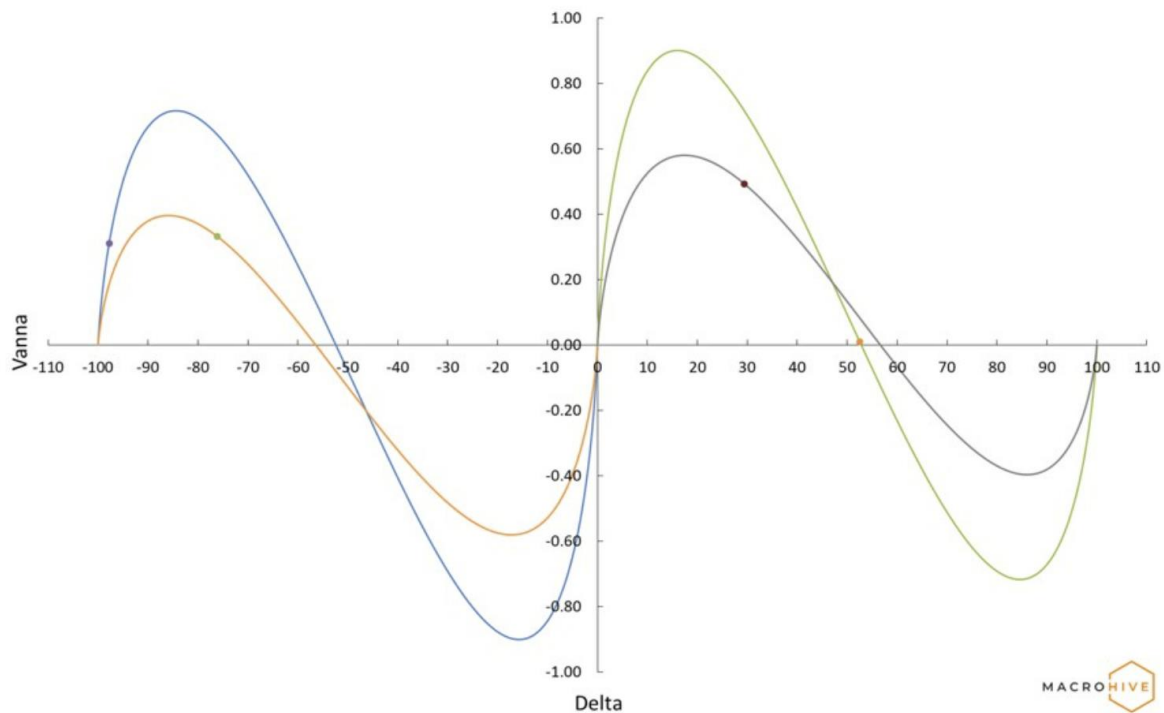


Deep Dive: Vanna Rally, Vanna Crash – Now You’re Just Making Stuff Up, Right?!

(Thorsten Wegener, 18 March 2020)

Chart 1: Vanna Start All Options vs. Delta



Source: Yahoo Finance, Macro Hive

My wife is an ardent fan of the Macro Hive WhatsApp group. It’s got some very bright minds exchanging ideas and analysing the daily happenings in the marvellous world of high finance and petty viruses. The other day she was following a thread discussing the almost-miraculous day end rally after the currently *en vogue* 1000-point downside gaps...

Of course, possible explanations are plentiful: the rather mundane usual end of day short covering, the frantic reaction to the latest comments of some central baker, and even the manifestation of hopeful revaluation of first movers and the associated end of the correction. That was when a man of my liking, a derivatives trader, dropped the V-word, leaving a super-smart investor scratching her head. His question to the chatroom was whether the rally in the last hour of trading might have been a Vanna Rally. And it caused a spirited discussion among those in the know.

At this point the phone was handed to me with instructions to read the thread, and then came a request: explain! I did, and my wife’s response has become the title of this article.

The Situation

The market had gapped again to the downside and was trading under huge volatility in a wide range, never quite sure whether to open pandora's box or blow cotton candy towards frantically trading speculators. An hour or so before closing, the S&P took another dive, testing intraday lows, and volatility spiked. At this point in time the frantic attack to the downside lost steam and the bear attack (for now) was silenced. In conjunction with a fall in volatility that was at first timid but soon accelerating, the S&P started to climb again, gathering speed on its way to greener pastures apparently with no other reason than the commonly mustered explanation (which actually explains nothing) of short coverings before closing.

But the ever-clueless retail client covering their ill-gotten shorts is just a small part of the dynamics prevailing under these very special conditions. Of course, the guys who were foaming at their mouths to buy at new highs were now busy selling the lows needed to get out, but they most likely were not the instigators of the recovery – merely the unfortunate bystanders, painfully witnessing a process that professional dealers must follow to hedge their risks.

The Players

As I've covered in other columns extensively ([What's a gamma flip](#); [What gamma isn't](#)), the typical exposure for derivatives traders employed by large trading houses is fundamentally always the same. Clients (read large funds and asset managers) are sitting on substantial equity positions, trying to squeeze out some extra returns while spending (a bit, but not too much) on downside protection. To achieve this aim they tend to sell call options above the current value of their holding, receiving premium while still being able to enjoy a modest increase in their holdings. The funds received are partially invested into downside protection (put options) below current market levels. So, they own put options and are short call options. The dealers hold the opposite, long calls and short puts, while Joe Retail is busy punting the future.

The Dynamics

While the institutional investor is quite content eventually being exercised on the short calls if markets continue their uptrend, they are equally docile collecting their profits, better insurance pay-out, if markets take a dive. Generally speaking, they do not actively trade their option positions. For this type of investor, the option positions they hold are literally a derivative of their investment process.

On the other side of this transaction sit well-groomed, highly trained millennials, savvy in the dark art of managing risk (in my time it was slightly overweight, middle-aged guys with receding hairlines who were still familiar with the open outcry system). And this group is actively managing their long calls and short puts. They have no reason to divine market direction, neither are they paid to have an opinion, so the default position is to be 'Delta Neutral', a term describing the aim to protect one's position against initial moves to the upside, as well as to the downside. This is achieved by either buying or selling an equivalent position in the underlying stock, future or bond to compensate for the opposing price development of their derivatives book.

The Logic

As options are basically a wager on the future, their prices rise and fall with the expectations the marketplace relays through future expected volatility, better known as implied volatility (an indicator of which is the VIX Index). With a change in this expectation the prices of options change, messing up the hedge relationship the dealers initially set up to keep their positions 'Delta Neutral'.

Here we have to look at three possible scenarios: those options 'at the money', which have the same exercise price as the underlying security, will increase in price with an increase in volatility and decrease in price with a fall in expected volatility. This change in price can hurt or please, but it does not change the hedge ratio of the combined options/underlying position. The chance for an option with an exercise price stuck at the underlying's price will have a 50:50 chance to eventually be worth something or nothing. Nobody knows the future; the model assumes a so-called random walk.

However, options which are 'out of the money', those pesky puts below and calls above current prices, react quite differently when focusing on the hedge ratio in relation to expected volatility. True, an increase in volatility will make them more expensive just as a decrease in volatility will lead to a decrease in prices. But the impact on the hedge ratio or delta neutrality can be severe.

We have already established that the typical option dealer will be long a ton of calls above current price and short a ton of puts below current price. To hedge this position, they will have sold the underlying in accordance with their delta (a long call has a positive delta as you benefit if markets go up; so does a short put). If volatility takes a dive these options now get less likely to have holding value at expiration. This means, apart from a price decline, the hedge ratio changes. As the dealer is long one option and short the other, the price decline is not what draws urgent attention to this situation. You lose a bit; you win a bit. What changes is the risk to the next move in market direction – the delta of the position, representing the equivalent of underlying shares or contracts. The actual initial hedge in the underlying does not change. A future is a future, a share is a share, a bond is a bond. As the dealer necessarily had to be short these cash instruments in a ratio to compensate for his equivalent option position, the option position was the long component, which just got less long. The cash position stayed at the original short level. To get back to a neutral position the dealer has to become less short. This they do by buying the underlying, reducing their short position. Markets tick to the upside, panicked investors relax a bit, volatility falls further and again the dealer is too short, resulting in more buying.

Now it is easy to see what happens if volatility increases. A rise in volatility turns the relationship around. The dealer will have to sell more underlying to stay neutral. The necessary hedge ratio flips from being too short to too long. A virtuous or a vicious cycle is kickstarted depending on your market predisposition. This sensitivity of the delta to a change in implied volatility is the illusive Vanna. And as you can see, the implications can be dramatic.

The Rational

Dealers have risk limits and they (should) know that there are some second or third derivatives lurking in the dark corner of the Black-Scholes formula. Being perfectly hedged might be true one moment and ancient history the next. And these variables will give a dealer an insight that even if markets have not moved at all, a change in expectations of volatility, while the underlying is a sitting duck, might blow up your perfectly hedged position the next moment. Especially in a high-volatility market, it is advisable to pay special attention to volatility expectations around opening and closing times. That's the time a Vanna rally or a Vanna crash might be in the making, because dealers need to adjust their hedges. So, I wasn't making stuff up...

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