Title: Gamma Hedging, Share Scarcity, Liquidity and GME's unusual affair with all three.
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Hey guys!

I'm back – this time we are going to talk about Gamma Hedging, GME, and some advanced "hand-wavy" techniques in an effort to see where shares are going and coming from. This is made possible by being able to objectively isolate out one of the main parties that purchase and sell shares: the hedgers.

Real quick, some backstory, you might remember me from my recent [DD](https://www.reddit.com/r/FWFBThinkTank/comments/v78ibr/amzn_and_its_stock_split_personality_06062022/) on AMZN outlining the expected near-term draw-down (that happened), or [here](https://www.reddit.com/r/FWFBThinkTank/comments/tzzerb/amd_and_its_return_to_the_norm/) where I described how I outlined AMD's fall to $80 (so far correct, down 13.86% at $87 right now!).

Or (a recommended read), when I outlined the instability on SPY [here](https://www.reddit.com/r/FWFBThinkTank/comments/tbg7cj/market_dive_part_one/) 3 months ago – down 7.38% so far!

More importantly for our conversation today, however, is my review of Gamma Squeezes [here](https://www.reddit.com/r/FWFBThinkTank/comments/tlwbv7/little_primer_on_gamma_squeezes/).

If you haven't I highly recommend checking it out as it will preface the information we are going to go over and look at here.

I was asked to take a look at the Gamma Hedging on GME and thought there were some interesting findings to share! I am not all that versed in GME and the various influences it finds itself associated with, so I'll leave the extension and analysis of the data in your hands; I'm just here to present it!

Assuming you have read the Primer on Gamma Squeezes (really recommended), let's take the jump to reviewing the Gamma Hedging Heatmaps themselves. Let's start by looking at a proto-typical Gamma Hedging Heatmap for a stock.

[BABA's Gamma Hedging Heatmap from 03\/31\/2022 showing the \\"prototypical\\" and stable Hedging Heatmap with selling pressure \(red\) above the cross hairs and purchasing support \(blue\) below.](https://preview.redd.it/uc9igwfit1891.png?width=595&format;=png&auto;=webp&s;=9a158695effd4f2fc749bd01ada49ee0400607a8)

Above we see an early rendition of the Heatmaps, but the principals are the same. There are a few items to keep tabs of:

\- The Gamma Hedging Heatmaps are calculated at EoD, and the cross hairs indicate the current Price (Y-axis), and IV (X-axis).

* Blue represents when Gamma Hedging is aimed at purchasing (purchasing support),
* Represents when Gamma Hedging is aimed at selling (selling pressure),
* Red is above spot,
* Blue is blow spot,
* The numbered squares are considered "significant" for their respective support or pressure,
* The White is the Gamma Neutral zone, where most stocks "want" to be.

This is the "ideal" heatmap for several reasons:

* If the stock falls and experiences an increase in IV, the Purchasing Support provided by the gamma will come in and provide “passive bid” to help support the stock.
* If the stock rises and experiences a decrease in IV, the Selling Pressure provided by gamma will come in and provide “passive ask” to help support the stock.
* The Purchasing Support is greater than the Selling Pressure.

So, although at first it might seem counter-intuitive to *want* selling pressure above the current spot, keep in mind that a stock could be said to need the affects of gamma hedging the most when a stock is in free-fall, there are no “organic bids” and the only brakes being applied is the gamma hedging.

In fact, we can see the results of a stock whose polarities are switched (e.g.: in a gamma squeeze!).

[Gamma Hedging Heatmap for SPY produced 06\/10\/2022 demonstrating the risk associated with having selling pressure \(red\) below spot \(cross hairs\).](https://preview.redd.it/8uf4nnpst1891.png?width=624&format;=png&auto;=webp&s;=ea58e52fc9764f5a6580ed44f6624d13aacdb2c8)

Above is the Gamma Hedging Heatmap for SPY printed on 06/10/2022 showing the next day’s price action (a glimpse of it, rather). We can see from SPY dropping 6.16 over the next 5 days, that when a stock (or even an ETF!) gets stuck inside of selling pressure, it can be quite disastrous and dangerous.

Conversely, we can see from the Gamma Hedging Heatmap from AAPL on 05/20/2022, that when a stock is in a gamma squeeze and migrates into the purchasing support, significant price appreciation can be experienced (+\~9% over the next 5 days).

[Gamma Hedging Heatmap for AAPL on 05\/20\/2022 demonstrating the orientation and profound impact of a gamma squeeze on a stock.](https://preview.redd.it/1c8863wvt1891.png?width=624&format;=png&auto;=webp&s;=120566a8eca88497045431ddcdc0db24e6de7bc3)

Now that we are relatively comfortable with the Hedging Heatmaps, let’s take a peek at this week’s GME’s heatmaps.

There are several interesting findings that I think some of you will find interesting!

Each Gamma Hedging Heatmap will have certain points from the next day pointed out.

Let’s start with last Friday (06/17/2022).

[GME's Hedging Heatmap from 06\/17\/2022 with various time-stamps plotted.](https://preview.redd.it/cr8vazqzt1891.png?width=624&format;=png&auto;=webp&s;=28d22ce3d1763403eb4d72d0dfcd670023b39aa3)

An interesting finding on GME is that it has a relatively stable Hedging Heatmap! (A rare sight in these markets).

Another interesting finding is that as the price appreciated throughout the day, *volatilty increased*. This is

rather atypical and a theme that we will see throughout the week.

Tuesday 06/21/2022's Heatmap with Wednesday's (06/22/2022) data prints:

[GME's Gamma Hedging Heatmap from 06\/21\/2022 with various timestamps plotted.](https://preview.redd.it/9xc09iz1u1891.png?width=624&format;=png&auto;=webp&s;=138372937bc1c5595dbe4ddf56defc8451db118a)

We see that the day started out with persistent selling pressure immediately present (the cross hairs are touching the red).

Again, early in the day, liquidity dried up *as* the price appreciated until around 1130 when liquidity started to return and GME started to return towards gamma neutrality. Also note the rather large drop in IV as compared to the price-action (important for later!).

The next day, Wednesday 06/22/202 (with 06/23's data prints):

[GME's Hedging Heatmap from 06\/22\/2022 with various timestamps plotted.](https://preview.redd.it/p9n619w3u1891.png?width=624&format;=png&auto;=webp&s;=28862ebc1f4dc69cdd26fce82a5327b73bc5d8f0)

We see the full effect of Gamma Hedging in action. As the price fell, liquidity returned and actually pushed GME into purchasing support by 230.

Seeing a stock's price drop while IV returns isn't the most unusual event, but here it is very obvious just how *fortunate* GME is to have such purchasing support with a spot down, IV down.

From 2PM to 230PM, GME quickly moved past gamma neutrality and struck purchasing support, after which it rose back towards selling pressure where it ended the day.

Take note of the sudden removal of liquidity at 230PM as GME's hedging began turning towards purchasing.

The next day (06/23/2022) with the 24th's data prints shows just how profound the purchasing support was/is on GME and the affect it has:

[GME's Gamma Hedging Heatmap from 06\/23\/2022 with various timestamps plotted.](https://preview.redd.it/p2zmjpp5u1891.png?width=624&format;=png&auto;=webp&s;=624bca664641705cd2a6ac4f086343c6572ea3c3)

The day started with liquidity returning to GME (IV was dropping) as the price depreciated – up until it met *very significant* purchasing support at 3PM, after which the sell off was halted (thank you passive bid!) and started to bring GME back up.

\[Note: notice, too, how much more *significant* the purchasing and selling pressures are on GME! (More numbered boxes).\]

But again – note that the price depreciation was met with *returning* liquidity (IV dropped), and price appreciations were met with *diminishing* liquidity (IV rose).

So not only do the Heatmaps give us day-to-day assistance in understanding what a stock's price-action is going to be in various IV and Price pairs, it also tells us a very, and a fact, about GME:

Liquidity shows us where the market wants to go…. Usually.

What does that mean?

\[Note: Now would be a good time to review the Tier I ([First Dip](https://deepdivestocks.com/getting-started/)) material that goes over liquidity from my website or watch the YT [video](https://www.youtube.com/watch?v=2XTnWgmE9NU&t;=21s) I did on liquidity!\].

It means that when liquidity is said to be *returning* (i.e.: IV is dropping), it means that the market is running "smoothly" in that direction.

This means that if a stock's price is appreciating and IV is dropping, that the bid is constantly, and happy to, meet at the ask to perform the sale. As buyers continuously, and eagerly, move towards the ask (which will be set higher and higher), the price appreciates, and since things are running smoothly, IV drops! The price sensitive buyers are happy to continue moving up to the ask because they are value-driven – if they think the value is present, they will buy at higher prices.

Conversely, suppose the price is dropping and IV is rising; what does that tell us?

Well, a stock's price drops because the buyers aren't meeting the sellers at the ask; but rather are forcing the sellers to come to the bid. This makes intuitive sense: if you want to sell a product, you want to do so at the highest price possible, and if you want to purchase it, you want to do so at the lowest price possible.

But suppose there we are in an environment of more sellers than buyers – the sellers will not be able to offload their shares efficiently (as they will want to maintain their higher-than-bid price to ensure profits) and the buyers will maintain their lower-than-ask purchase price in order to ensure their value. Thus, things aren't running smoothly and one side will have to capitulate!

This rises IV as the "smoothness" of operations is no longer smooth, and the price-sensitive sellers have to capitulate.

But what does it mean if liquidity is returning to a stock *while the price drops*?

It means something is off!

So, let's review one more concept before we dig up some theories.

There are two main parties that transact shares (or any instruments, I suppose) in the market: those that are price insensitive, and those that are price sensitive.

What does it mean to be price insensitive? It means that you are more interested in completing a given transaction than you are about the value of that transaction.

A classic and the most prominent group of price insensitive traders are hedgers (be it delta, gamma, volatility, you name it). They aren't concerned with the price of the stock they have to either buy or sell because the value of the underlying isn't their priority – purchasing or selling the underlying to fulfill their hedging requirements are.

This means that price insensitive traders (hedgers) are apt to simply go to the bid (if they are selling) or go to the ask (if they are purchasing) in order to complete their transaction. At times, this can promote *artificial liquidity* which is something that can be seen in gamma squeezes.

The other group, price sensitive traders, are like me and you (retail traders, large institutions, or any other value-driven bodies). We want the best value for our transaction because it is value that we are searching for. We are less inclined to sell at the bid (that would be selling for less than we think the stock is worth) or to purchase at the ask (that would be paying too much as compared to how much we think the asset is worth).

What does this piece of the puzzle tell us about GME?

The overall trend we saw from above was:

* When the price went down, IV dropped (liquidity returned)
* When the price went up, IV rose (liquidity was diminished)
* This happened when hedging was both selling (GME was in the red) and purchasing (GME was in the blue) \[This is the abnormal part!\].

We noted this pattern mostly when GME was *inside of selling pressure*. This means that the price insensitive lot was simply selling at bid – this drops the price and adds artificial liquidity so long as there are sufficient purchasers.

But when that selling pressure became purchasing support, *the same trend occurred.*.

Notice the almost complete curtail in liquidity returning during the price drop from the 23rd: no more was liquidity returning to GME on price depreciations, but rather, the hefty bulk of purchasing support caused the *removal* of liquidity even though we would expect the price insensitive lot to come in (and with such significant purchasing requirements) simply purchase at the ask, and thus, improve liquidity (drop IV).

What does this hint at?

Brain storm it for a second before moving on.

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The theory?

The share availability is very low as well as share demand.

At least that’s my theory. Admittedly this second half of the theory is a little handwavy, so take it with a grain of salt and includes as lot of assumptions and deductions. But it is an interesting thought experiment,

nonetheless, and highlights some important aspects of the market and hedging.

So - GME's hedging stumped me for a while as I couldn't understand why, when hedging was switched to purchasing, that IV *still* rose in greater proportions than the price did, and why it took so much purchasing support to stall GME's descent.

Why was this confusing to me? Because I would have anticipated liquidity would have behaved like how SPY (and most stocks) behaves during significant purchasing support:

[Hedging Heatmap for SPY from 06\/17\/2022 demonstrating what typically occurs during Hedging pointed towards Purchasing on a stock \(IV drops drastically, i.e.: artificial liquidity\).](https://preview.redd.it/vegfmxfru1891.png?width=624&format;=png&auto;=webp&s;=e4c477aeda89a41bd92d93b64052edacc667a0ea)

But its didn't' - so let's play out the scenario again with a bit more detail and highlight the stages of GME's movement through the gamma hedging environment throughout the week based on if it was aimed at selling (in red) or purchasing (in blue).

First let's take an inventory of all of the actors in this play and what they are doing when hedging is pointed towards selling (red on the Hedging Heatmaps), or purchasing (blue on the Hedging Heatmaps), when price is rising/falling, and IV as well.

* \- If the Hedging is pointed towards SELLING, and
* The Price is falling, and IV is falling:
* The price insensitive party is selling at bid,
* A part of the price sensitive party is purchasing at bid,
* A part of the price sensitive party is selling at ask,
* A party of the price sensitive party is purchasing at ask,
* The selling at bid > selling at ask
* Price sensitive Sellers are capitulating because sellers > buyers
* The price is rising, and IV is rising:
* The price insensitive party is selling at bid,
* A part of the price sensitive party is purchasing at bid,
* A part of the price sensitive party is selling at ask,
* A part of the price sensitive party is purchasing at ask,
* Selling at ask > selling at bid
* Price sensitive Buyers are capitulating because buyers > sellers
* If the Hedging is pointed towards PURCHASING, and:
* The price is falling, and IV is falling:
* The price insensitive party is purchasing at ask,
* A part of the price insensitive party is selling at ask,
* A part of the price insensitive party is selling at bid,
* A part of the price insensitive party is purchasing at bid,
* Selling at bid > Selling at ask
* Price sensitive Sellers are capitulating because sellers > buyers
* The price is rising, and IV is rising:
* The price insensitive party is purchasing at ask,
* A part of the price insensitive party is selling at ask,
* A part of the price insensitive party is selling at bid,
* A part of the price insensitive party is purchasing at bid,
* Selling at the ask > selling at bid
* Price sensitive Buyers are capitulating buyers > sellers

So, we see, in this configuration, we can deduce which side of the order book is fuller and which side is capitulating!

But an astute reader should start to be perplexed! Let's go over some numbers to hammer this oddity home.

The points on the Gamma Hedging Heatmap were mostly chosen at random – I simply look at point throughout the week that had large price and IV movements, and wanted a few points of them per day. Let's look at the relationship between the price and IV movements from those points:

[Table outlining the various timestamps from the Gamma Hedging Heatmaps from above with the respective ratio of price and volatility changes.](https://preview.redd.it/kj3prilov1891.png?width=639&format;=png&auto;=webp&s;=a1d353155aad900c2151725daf2405aaa2cc9c7c)

Summarizing a little bit:

[The summary statistics outlining the change in volatility per change in price with respect to the hedging direction.](https://preview.redd.it/qr1rw7mtv1891.png?width=668&format;=png&auto;=webp&s;=854a884570cb2341812e3e20f4a221c04e10e31c)

Notice that an increase in the change per IV per change in $ from when the prince insensitive party was selling versus purchasing changed quite drastically (0.1528 from when selling versus 0.013 from when selling). This indicates that there was a return of liquidity *when the price insensitive agents were purchasing shares*. But this increase in liquidity (a 91.49% increase in liquidity).

If we also look at the liquidity, simply as a per price direction per type of hedging we get:

[The overall ratios of the change in IV per change in price for GME throughout the week as compared to the hedging direction and price action.](https://preview.redd.it/tcw8nziyv1891.png?width=681&format;=png&auto;=webp&s;=2bb3155dfac9226fd0b16986fe9732038229971d)

The problem should be clear now!

Note the change in behaviors. The change in liquidity-status (dIV/dSP) did not change much from when the price was increasing as compared to the two states of the price insensitive trader (when hedging was purchasing or selling).

Yet, when the price insensitive trader was selling shares, and the price was declining, liquidity returned over 10x more than when the price insensitive trader was purchasing shares.

What does this mean?

Hedging was one of the only source of shares to purchase (or at least, a noticeably large chunk of it) and the demand for shares is low.

\[Note: because the value 0.005 is positive and the price is negative, that means the change in IV was also negative, but it was less negative than 0.058 which means IV decreased less\].

This explains why even though the price insensitive actor was selling shares into the market, when the price was rising in value, the selling was insufficient to "cover" the demand – as such IV rose because there were few other suppliers.

This also explains why liquidity returned so abundantly on GME when the Gamma Hedging started to actively sell off – the price insensitive lot was joined with more sellers who were fine with emptying their shares at the bid (which dropped the price and brought liquidity to the stock).

But, why can we say the demand for shares is low? When hedging was pointed towards selling, the overall IV per $ movement was 0.041, whereas when the hedging was purchasing, it was 0.015! This means IV, on average, moved *more* when hedging was selling and less when it was purchasing.

In other words, not only was the price insensitive lot the main *supplier* of shares when they were selling, they were the main source of *demand* when they were purchasing (by orders of magnitude).

\[In other words, when the price insensitive lot was selling shares, things were less smooth overall as compared to when they were purchasing shares indicating that there was a demand-side deficiency all along!\].

No wonder my brain hurt when I first reviewed the hedging heatmaps!

This may be old news to some, but I thought it was very interesting to see this objectively in the data (and it highlights some, I think, cool ways to use hedging information!).

Happy trading!