**Paradigm Insights | The Art of Options Market Making: What do Market Makers do?**



[Back to Blogs](https://www.paradigm.co/blog)

Published On

December 29, 2022

Options market making is often shrouded in complexity, but with a deep dive into the process comes greater insights and understanding. This post delves beneath the surface of simple options buying and selling to gain an appreciation for the techniques employed by experts who make sure that prices are fair while managing risk across large portfolios of options. In this article we explore what it means to be "delta-neutral", how to think about the risk of a portfolio of options, and more.

Trading can evoke a vast spectrum of images – from complicated graphs to impassioned outbursts at a monitor. Additionally, most retail traders（散户交易员） focus on trading with a directional bias - which is only one of a few different methods. One specific method of trading relies less on guesswork than many may think; this alternative approach involves probability and mathematics rather than speculation. Enter, market making.

‍

**What does an options market maker do?**

Market makers are like croupiers in a casino – collecting and paying out bets on the table. Their trades are reaction-based and initiated by catering to the desires of other traders. They don't act; they react. Market makers don't typically seek profits from positional trading, but instead, they efficiently and effectively manage the underlying risk of a portfolio given to them with an expectation that, over time, they will profit from a theoretical edge driven by statistics and probability.

This theoretical edge lies between the bid and the ask spread, where a market maker will buy on the bid and sell on the ask. With the theoretical value somewhere in the middle, they’re essentially buying below and selling above where the market values these contracts. It's important to note, however, the word "theoretical" is significant; actual profit depends on proper positional management or immediate offsetting (which is rare) of the initial trade.

Skillful management of positions accumulated in the options markets requires a deep comprehension of how different strikes and expiries impact underlying risks. These risks can take various forms – from the obvious delta risk to less apparent, higher-order risks such as Vanna or Volga that are beyond this article's scope. Nevertheless, before they’re able to analyze a portfolio of options and convert this complex set of risks into a couple of numbers and symbols representing our positions, one should acknowledge a key concept all options market makers must understand thoroughly: delta neutrality.

‍



**What does delta-neutral trading mean?**

To be delta-neutral means *to have an underlying positional delta of zero*. In other words, there is a theoretical indifference to the market at that specific price. One shouldn’t care if the underlying asset moves incrementally higher or lower if they continuously adjust our deltas to be zero. Of course, continuously adjusting deltas to zero and incurring transaction fees (hedging costs) will eat into profits, and thus deltas are typically adjusted systematically or at the discretion of the trader. A delta-neutral position can be created from any options position by trading stock or the equivalent underlying to flatten out the delta.

As a simple example, the buyer of a long ATM call (typically +0.50 delta for simplicity) could sell 0.5 BTC and have an overall delta of 0. This hedging has eliminated some of the immediate directional exposure, but due to the convexity of options, there are other opportunities for profit or loss with this trade. The simplest way to adjust the portfolio delta is by buying or selling the underlying. This is done to prevent the impact on the other Greeks that may come through trying to offset deltas with other options positions such as purchasing an ATM put, which although under the most straightforward conditions may also result in a delta of zero, will impact your overall Greek position significantly (doubling your Vega, Theta, and Gamma risks).

Modifying your overall Greek position through offsetting risk with other options as opposed to flattening your deltas through the underlying asset is a much riskier way of managing your portfolio. This way of hedging deltas typically adds further convexity to your positions and may change your initial view from something simple to something a bit more complex.

Volatility trading is a prevalent strategy most sophisticated institutional traders are interested in putting on. They don’t care about the underlying directional move; they are more interested in betting on whether it will move more or less than the market implies. One way to purely trade volatility without getting involved in swaps and more complex products is to trade in the options market and frequently flattening deltas to prevent a directional bias. This flattening of deltas attempts to keep your view as closely connected to volatility as possible and disconnected from any directional bias (although due to the second order effects of gamma, occasionally you will be slightly biased long or short as the market moves).

‍



**Position Management**

Although market makers hold positions that may appear contrary to their underlying views of the markets, with a deeper dive into risk analysis through a specific view of strike and tenor they can gain insight into crucial points where view alignment is possible. Option trading even when delta-neutral inherently involves taking a stance based on volatility – meaning complete impartiality cannot be achieved while also focusing on generating profits unless arbitrage opportunities arise, which are typically quite rare. Traders who can effectively analyze and manage options-specific risks defined by the Greeks are given access to an opportunity realm spanning further than that of trivial single-options positions or simple stock purchases.

Market makers typically tend to trade flat – profiting from the bid-ask spread and attempting to lower their exposure to direction, volatility, time, and interest rates – as much as they can. However, most market makers are at the mercy of customer flow. If someone wants to sell, say, the January $1,200 ETH calls to a market maker at the bid, the best-case scenario would be moments later someone else buys the same number of the same exact calls from that same exact market maker at the offer and immediately allows the market maker to lock in their spread profit. However, this rarely happens. Additionally, market makers face the risk of the options liquidity drying up and becoming more and more illiquid in a position they’re holding, forcing them to hold the position until expiry since they have little chance to close out at a reasonable price.

Wary of overextending their position, market makers may look for opportunities to reduce positional risk. For instance, say a maker acquired 500 lots of the $1,200 January ETH call previously and found themselves overly exposed in terms of Vega. They could opt to offset this exposure by looking to sell some of the same tenor at a lower strike price, such as the $1,100 strike, outright as a taker. Or, more commonly, they could look to sell with a resting ask closer to mid-market, as they might be able to sell to a buyer on the other side. An unfavorable but equally likely outcome (if there’s no bias in a market maker's two-way market) may be the market maker getting their bid hit by another customer, which would simply exacerbate said Vega risk as they are forced to buy more of the $1,100 strike from the customer.

As market makers start to accumulate large positions, they will typically start skewing their quotes as hinted above. Traders will typically lower bids and offers on options when they are long gamma and/or Vega and raise bids and offers on options when they are short gamma and/or Vega. This makes sense – if you are long Vega and have a lower bid and lower offer than the market, you will be less likely to be hit on your bid and forced to accumulate more Vega, and more likely to be lifted on your offer and offload some of your position.

The image below shows a portfolio of options consisting of a variety of strikes and expiries similar to what a market maker may be working with. Highlighted are the Greek risks of the overall portfolio, while individual positions are also shown below.

‍

Positions Table

**What’s going through your head?**

Most typically the series of actions an options market maker will tend to follow are:

1) Eliminate directional risk through delta hedging quickly. Options market makers are in the business of buying options bids and selling options offers, not taking a view of the market.

2) Reduce or attempt to trade out of the options-centric risk. In its simplest form: if they’re long gamma, they want to sell options, if they’re short gamma, they want to buy some. Following a similar thought process for vega/theta.

3) Adjust quotes to avoid taking down excessive options-centric risk. If they’re long gamma and/or Vega, lower bids and offers on options, if they’re short gamma and/or vega, raise bids and offers.

4) Actively monitor and manage the portfolio through delta hedging and monitoring the Greeks.

‍

**[Sign up to our Newsletter](https://www.paradigm.co/sign-up-newsletter" \t "_blank)**

[Be the first in the know of what’s  
happening in Paradigm](https://www.paradigm.co/sign-up-newsletter" \t "_blank)

[Subscribe](https://www.paradigm.co/sign-up-newsletter" \t "_blank)

‍

**Volatility Experts**

As market-makers become attuned to their product's underlying market structure, they gain insights into how volatility trades for this product, which allows them to expertly balance both profit margins and risk exposure through smart hedging or offsetting flow.

Hedge fund managers overseeing equity funds strive to become well-versed in the technicalities of stock trading. On the other hand, options market makers hone their expertise by regularly monitoring volatility trends associated with options products; adjusting their bids and offers in implied volatility terms to adjust quotes. This hands-on experience with pricing using volatility leads options market-makers to become very familiar with even the most subtle changes in volatility trends.

Options market makers have long developed a specialty in trading the volatility surface. Our prior [article](https://www.paradigm.co/blog/calendar-spread-options-strategy) demonstrated how to structure term-structure trades via calendar spreads, and we will delve deeper into volatility skew with ratio spreads and risk reversals for our upcoming installment. However, it tends to be institutions and/or well-capitalized traders that take advantage of these strategies, as they are capable of effectively hedging underlying deltas to speculate on pure volatility.

‍

Example Term Structure Chart

‍

Example ETH Skew Chart

‍

It’s easy to overlook the indispensable part that market makers play in keeping our options markets running smoothly. Whether a retail trader wants to open or close a small position, or an institution seeks liquidity for large trades, having knowledgeable and competitive market makers in the space creates the opportunity for investors of all sizes to carry out their trading strategies with ease.

The bulk of the larger option trades continue to trade via Paradigm - with approximately 30% of all crypto options volume being dealt via the platform. Paradigm plays a key role as a non-custodial institutional liquidity network allowing market-makers and takers across the world to connect and trade crypto derivatives OTC style but cleared via a partner exchange or on-chain. The platform provides traders and crypto protocols unified access to multi-asset, multi-protocol liquidity on demand without compromising on execution preferences, costs and immediacy. The firm’s mission is to create a platform where traders can trade anything, with anyone and settle it anywhere.

Market makers are an important part of the Paradigm ecosystem and pricing consistently regardless of market conditions has been key in allowing the market to grow for both makers and takers. We are very much at the beginning of the growth of the options market and increased liquidity will aid the market to evolve towards more complex products.

‍

