

## The new power of the options market

The options market has become significantly more relevant in recent years. Options on individual stocks have experienced exceptional growth. In 2021, the volume of traded US options by notional exceeded the value of the traded volume of the underlying equities for the first time. Accordingly, options markets are increasingly influencing equity market movements, particularly in the US and especially in terms of market volatility and event risks. It is therefore essential to understand what this means for markets, who the major players in the options market are and how they are positioned. From these insights, the “state of health” of the equity markets can be derived to eventually make forecasts about volatility and the extent of potential sell-offs, but also rallies. Furthermore, 2022 has taught us that it can make sense to hedge with derivative instruments because correlations between different asset classes are not stable. This is especially true in times of increased inflation volatility – a scenario we consider likely for the next decade.<sup>1</sup>

### Importance of options markets has risen sharply since the pandemic

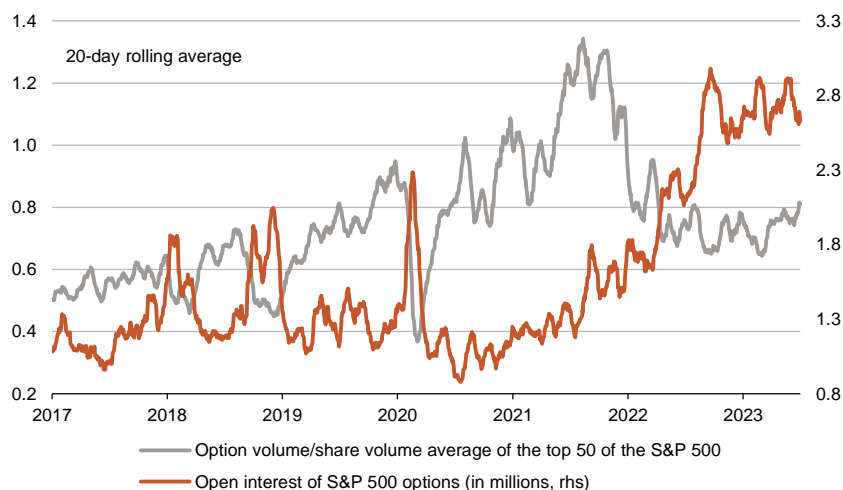
The options market has experienced massive growth since the COVID-19 crisis (Fig. 1). Its popularity has increased not only among institutional investors, but especially among retail investors. This was also due to the fact that many retail investors had time during the pandemic to delve deeper into complex topics.

Within *Focus* we comment on extraordinary market events and analyse capital market related special topics.

*Retail investors discovered the options market during the pandemic – options volumes exploded subsequently.*

**Fig. 1: Derivatives markets have gained strongly in relevance**

Option volume exceeded the volume of the underlying equities for the first time in 2021



Time period: 01/01/2017 - 31/07/2023  
Source: Bloomberg, own calculations

In addition, options make it possible to generate high profits with little investment and to hedge accurately both on the downside and on the upside. Meanwhile, there is a large number of learning offers, some of which are made available to the masses free of charge on social media platforms. Furthermore, online brokers now provide

<sup>1</sup> See Berenberg Markets – Focus “What comes after the inflation hump? Implications for investors“, 03 November 2022



easy, low-cost access to options. The barriers for retail investors in the options market are thus lower than ever before in every respect.

What the heavy use of options by retail investors can lead to was shown by the “meme stock mania”. During the COVID-19 pandemic, many retail investors invested in heavily shorted meme stocks, which went viral on social media platforms such as Reddit and quickly skyrocketed in price. The rapid price increase was often achieved through high leverage using call options. Dealers who had sold the call options needed to buy the underlying stocks to minimise their market risk, driving prices up even further (the exact mechanism of this so-called “delta hedging” is explained in detail in the following sections). This, in combination with the short covering by some hedge funds, then led to extreme movements of the underlying upwards and downwards – often without fundamental justification. A well-known example is the GameStop stock.

*“Meme stock mania” has impressively shown the influence of options markets on equity markets.*

Another reason for the explosion of the traded option volume is the introduction in 2022 of so-called 0DTE options on the S&P 500. These are options for every trading day of the week. “0DTE” stands for “zero days to expiry” (ie an option that expires on the same day). At times, 0DTE options now account for more than 50% of the traded volume in S&P 500 options. According to Bank of America, the average traded notional, the equivalent value of the underlying shares of these options, in 0DTE options was USD630 billion in August 2023, a new record! The success has led to the first imitators. Since 28 August 2023, it has also been possible to trade 0DTE options on the EURO STOXX 50. However, it remains to be seen whether this will lead to a strong increase in the volume of options traded in Europe, as the options market enjoys a much lower status among retail investors here.

*Option volumes have gone through the roof since the introduction of 0DTEs.*

### **Why it is good to have options**

Options offer the possibility of high profits with limited loss potential (convexity). With the purchase of an option, an investor acquires (premium) the right, but not the obligation, to purchase (call) or sell (put) a certain quantity of an underlying asset (eg shares) at an agreed price (strike price) on a certain date (expiry date). The use of options is thus often found in the benefit of convexity and the leverage effect (high nominal exposure with low stake).

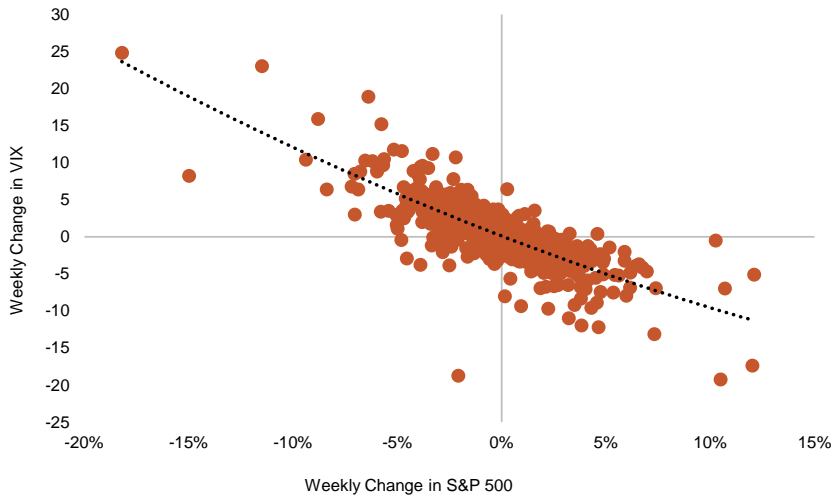
*Buying options offers convexity and leverage with limited downside risk (premium use).*

In addition, options – unlike bonds or gold – have stable correlations to equity markets. Thus, by construction, a put option is negatively correlated to the stock price. If the stock falls, the right to sell it at a higher price increases in value. So, with options, one knows in advance what one will get in various scenarios at maturity. In addition, volatility also tends to show a stable, negative correlation to the equity market. As volatility increases, so does the probability that the strike price of the put will be reached, and the option gains additional value during its term. Therefore, stock options are particularly suitable for hedging (Fig. 2).

*Put options, unlike bonds and gold, have stable negative correlations to equities.*

**Fig. 2: Volatility tends to rise when equities fall and vice versa**

Weekly changes in the S&P 500 (%) vs VIX (pp)



Time period: 01/01/2008 - 18/08/2023  
Source: Bloomberg, own calculations

**Professional traders who do not want to have market exposure are the counterparty in options trading, ...**

Unlike traditional stock exchanges, where investors mostly trade directly with each other, the counterparty in options trading is in the vast majority of cases a market maker or dealer, ie professional traders. Their goal is usually not to make a profit by making correct investment decisions. Instead, market makers and dealers make their profit primarily on the bid-ask spread.

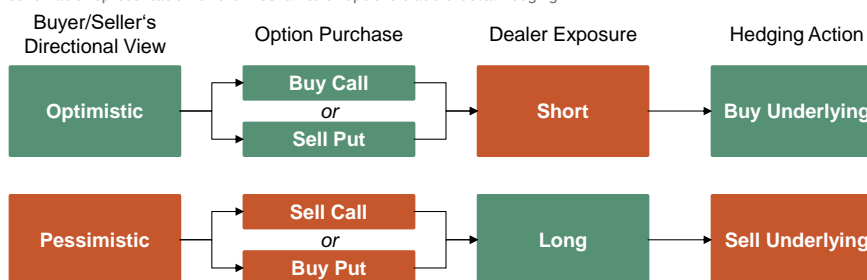
*Counterparties in options trading are usually professional traders ...*

So, in order not to take market risks, they hedge their positions – also called "delta hedging". For example, if an investor buys a call option from a dealer, the latter is short the call. This means that if the price of the underlying asset rises above the strike of the option at expiration, the dealer would have to pay out the difference to the investor. The dealer would therefore be exposed to market risks. However, the dealer now hedges these risks by simultaneously buying the underlying asset or a future on it (Fig. 3). If the underlying asset rises (falls), the dealer loses (wins) on the option, but gains (loses) on the purchase of the underlying asset. Now it is necessary to buy enough of the underlying asset for profit and loss to balance each other out, so that the market maker is not exposed to any market risk. The market maker is

*... who do not want to take market risk and therefore hedge it.*

**Fig. 3: An option trader always hedges his market risks analogously to the positioning of the investor**

Schematic representation of the mechanics of options traders' delta hedging



If an investor is **optimistic**, the dealer must **buy** the underlying  
If an investor is **pessimistic**, the dealer must **sell** the underlying

Source: own illustration

positioned "delta-neutral". As the term suggests, the amount purchased of the underlying asset depends on the delta of the option. The delta indicates how much the option price changes per unit of change in the underlying. Let us say a trader sells out-of-the-money call options (C) on stock (A) with a current delta of 0.4. If (A) rises by one point, then (C) rises by 0.4 points. If the trader sells 10 (C), he would therefore have to buy 4 (A) to be delta-neutral.

**... must constantly adjust their hedges ...**

The delta of an option is not constant but depends on how far out of the money the option's strike is. The further away, the lower the absolute delta. It therefore changes with every price movement of the underlying. This change in the delta is called gamma. The following applies: the closer the strike to the price of the underlying, the greater the gamma.

As soon as the underlying asset moves, the trader is no longer delta-neutral, but has market exposure. Let us assume that the price of (A) rises in the direction of the strike of (C) and its delta then rises to 0.5, then the trader should actually hold 5 (A), but he has only bought 4 so far. In order to make their position delta-neutral again, the trader must therefore buy 1 more (A). If, on the other hand, the price of (A) were to fall and the delta of (C) were to fall to 0.3, then the trader would hold 1 (A) too many and would have to sell it.

*Because the delta of an option is not constant, professional traders have to continuously adjust their hedges.*

This example illustrates a very important insight: with sold options, both calls and puts, option traders have the effect of reinforcing trends and thus increasing volatility (Fig. 4). If equity markets fall, they must sell; if the markets rise, they must buy. The traders are "short gamma". Conversely, they have a counter-cyclical and thus volatility-dampening effect when they buy options. The traders are "long gamma".

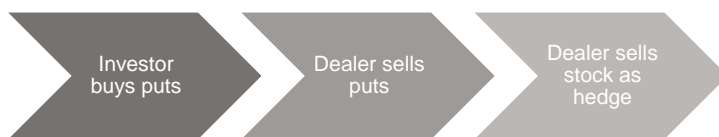
*For short options, the option traders' delta-hedging has the effect of reinforcing trends; for long options, it has the effect of dampening volatility.*

**... and thus have an influence on volatility**

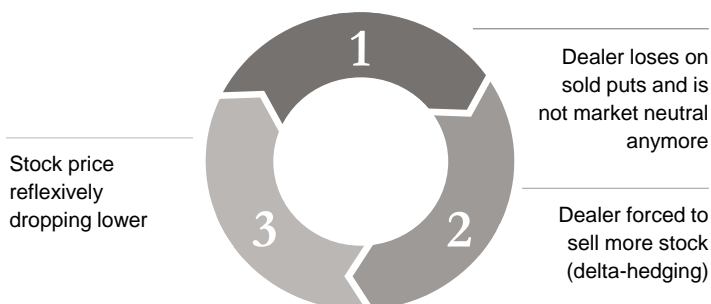
If one can make statements about whether and how strongly option traders are net long or net short in the aggregate, then one can deduce how susceptible the markets are to fluctuations (see Fig. 5). The stronger the short-gamma positioning of the traders, the more likely larger price movements are. If, on the other hand, there is a

**Fig. 4: The vicious circle of delta-hedging**

If the stock price falls too much, a vicious circle can be set in motion



**If price of stock goes down further**

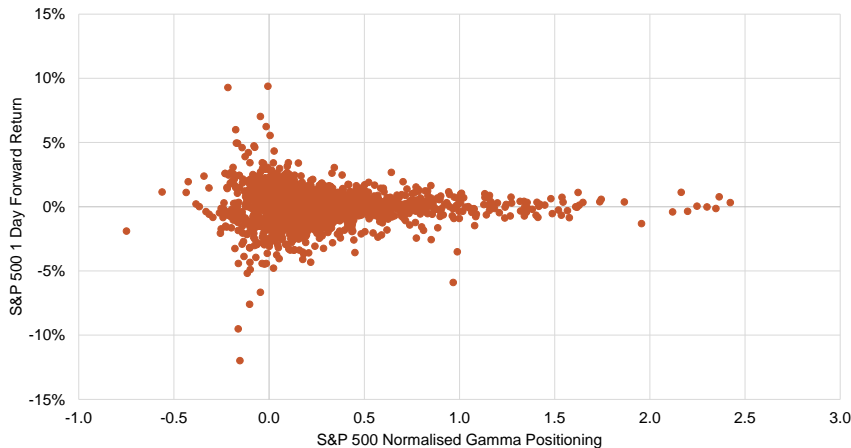


Source: own illustration

pronounced long gamma positioning, the market is often "pinned", ie movements at the index level are very limited.

**Fig. 5: If the gamma positioning of the market makers is negative, the volatility in the S&P 500 tends to increase.**

Gamma positioning of option traders influences volatility



Time period: 01/01/2010 - 30/09/2022  
Source: Bloomberg, own calculations

In addition to the level, turning points of the gamma, so-called "gamma flips", whether the gamma decreases or increases, and large option expiries are also relevant. Often, the gamma positioning decreases significantly after large quarterly option expiries, so that it is not uncommon for large turning points to occur in the market at the end of a quarter (eg December 2018, March 2020, June and September 2022). The market can then often "breathe more freely" because the market makers neither strongly reinforce the trend nor act in a particularly volatility-dampening way. With the strong increase in option volumes over the past years, these effects have probably become more important, ceteris paribus. Opportunistic investors can take advantage of the knowledge about them and position themselves accordingly. A simple assumption would be that investors buy all puts and sell all calls at the index level, because typically investors are willing to pay for hedging and give up some upside participation in return, in order to reduce costs. This phenomenon is also evident in the skew, ie the more expensive volatility of puts compared to calls.

*Opportunistic investors can take advantage of the knowledge of the gamma positioning.*

### Conclusio – relevant points for investors

Options markets have become even more relevant since the COVID-19 crisis. In some cases, the volume of options traded now exceeds the volume of the cash markets in the US. When buying options, one knows one's risk in advance and knows when they will work and when they will not. And especially in times of increased inflation, when bonds do not always provide reliable portfolio protection, it makes sense to have options – not least because you can achieve convex results with a small investment.

Options traders effectively operate in a predictable buying and selling regime due to their delta hedges. When traders hold long gamma positions, they tend to dampen volatility. This is the case when they are predominantly long options. If traders are short gamma, they withdraw liquidity and exacerbate upward and downward price movements. In the vast majority of cases, investors sell upside potential (calls) at the index level to finance hedges (puts). Traders are accordingly short puts in the aggre-



gate and long calls at the index level. The significance of these positions varies depending on open interest (quarterly declines tend to have greater relevance), time to expiry and whether their delta hedging activity is driven by the deltas of their short puts or long calls.

A common effect of high positive gamma exposure in a bull market is the sustaining of a slow uptrend in the equity markets ("grinding higher"), which is further reinforced by systematic investment strategies that are often pulled into the market when realised volatility is falling. This is exactly what happened in the first half of 2023. The steady decline in realised volatility, fuelled by market makers' long gamma positioning, led to mechanical buying of stocks in CTAs, vol targeting and risk parity strategies. Conversely, when dealers are short gamma and amplify volatility enough, systematic strategies have to sell stocks, volatility rises further and a vicious cycle is set in motion. This often comes to an end with large option expiries when the gamma positioning is closed out. Like systematic strategies and ETF savings plans, market makers are non-fundamental investors. They trade stocks solely to hedge their delta. They have no market view. This can lead to these players amplifying upward or downward movements.

In the future, we expect more periods of "grinding higher/lower" on the equity markets due to these correlations, which are succeeded by external shocks and volatility peaks. The gamma positioning of market makers then changes from long to short and volatility quickly rises massively. In order to hedge properly as an investor with options, it is therefore advantageous to know how the net position of options traders is. Should one hedge a small correction? Or is trouble looming because the gamma positioning is turning negative – thus reinforcing the trend – and the systematic strategies are fully invested, so that the probability of a major sell-off is increased? In any case, the massive increase in the volume of options traded in recent years has probably made the market even less fundamental.<sup>2</sup>

*The influence of non-fundamental investors has increased due to the increased option volume.*

*We expect an increased occurrence of prolonged periods of low volatility followed by short, violent market swings.*

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<sup>2</sup> See Berenberg Markets – Focus "Passive investments change market structure and market behaviour", 05 May 2021.

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