US Rates Viewpoint

Short vol not fazed by the Fed

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Expect selling vol to be profitable despite Fed hikes

Despite the sooner perceived timing of Fed hikes and the low levels of implied vol, selling gamma should continue to be a profitable trade, on average, in our view. In fact, the short gamma trade has delivered the highest returns during tightening cycles in the past. Although implieds are already close to historical lows, we expect the equilibrium level of vols to be below historical norms in the coming hiking cycle given the gradual and predictable nature of this cycle.

A hawkish surprise is the main risk to the trade

The main risk to the short gamma trade is a more hawkish transition to hikes, which could cause a selloff in rates and underperformance of the short gamma trade. However, in our view, any Fed surprise at this time is unlikely to cause a market reaction of the magnitude seen in past transitions to hikes.

Fed policy expectations predict future gamma returns

Investors can get clues to future gamma returns from expectations of Fed hikes measured by the front end of the curve. A steeper front end predicts higher returns on selling gamma, on average. From this point of view, the recent selloff in the front end predicts positive average returns on the short gamma trade in the next few months.

Refer to important disclosures on page 7 to 9. Analyst Certification on Page 6. Link to Definitions on page 6.

Short vol not fazed by the Fed

Selling gamma has been a highly successful trade this year. But selling vol at this time may seem questionable because we are now closer to the perceived start of Fed hikes, and implied vols already are close to historical lows.

In analyzing the performance of the short gamma trade in past Fed cycles, we find that the trade, in fact, delivered greater returns in tightening cycles. As a result, the trade should continue to deliver positive average returns in the coming hiking cycle, in our view. The main risk to the trade is a temporary spike in vols, which could occur during the transition to hikes if the Fed surprises the market on the hawkish side.

We also find that the short gamma trade tended to deliver greater returns when the market was pricing sooner and faster Fed hikes, likely because the magnitude of a potential hawkish surprise is smaller when investors already are focused on hikes. This indicates the short gamma trade is likely to continue to be profitable in the next few months.

The short gamma trade

In a typical short gamma trade, investors sell delta-hedged 1m10y straddles on a regular basis. This variation of the trade has been popular because it delivered attractive risk-adjusted returns. Table 1 compares average returns and Sharpe ratios for three types of short gamma trades on different underlying tails: selling delta-hedged straddles, unhedged straddles and unhedged strangles. For each trade, we assume the sale of 1m options on a weekly basis starting in mid 1994 when our vol data became available. Selling 1m10y delta-hedged straddles delivered the best Sharpe ratio among all the trades.

The reason selling gamma worked on average is the presence of volatility risk premium, i.e. extra compensation that sellers of options require to take the risk of large market moves (and therefore face a trade-off between average returns and infrequent large drawdowns). The fact that selling gamma on the 10y delivered greatest returns is likely due to mortgage-related demand for convexity and the fact that this sector of the curve is less prone to monetary policy shocks.

Table 1: Selling delta-hedged 1m10y straddles delivered attractive risk-adjusted returns

	Delta-hedged straddles			Unhedged straddles			Unhedged 25D strangles		
Option	**1m2y**	**1m5y**	**1m10y**	**1m2y**	**1m5y**	**1m10y**	**1m2y**	**1m5y**	**1m10y**
Avg return on option, cents	-0.2	4.2	10.9	0.1	5.4	15.8	-0.3	3.8	10.0
Sharpe ratio	-0.06	0.56	**0.86**	0.01	0.30	0.49	-0.06	0.27	0.39

Note: The table reports average returns and Sharpe ratios for three types of short gamma trades. The first trade reflects the sale of delta-hedged straddles. We delta-hedge (to neutral) if the delta of an option is equal or greater than 20% by absolute value. The second trade reflects the sale of unhedged straddles. The third trade reflects the sale of unhedged 25%-delta strangles. Each strategy reflects the sale of 1m options on a weekly basis that are held until expiration. We assumed 0.5bp bid-offer transaction cost for delta hedging. We also assumed bid-offer costs of 3, 4 and 8 cents for 1m2y, 1m5y and 1m10y straddles, respectively. Sample: 4/1994-6/2014.
Source: BofA Merrill Lynch Global Research

Table 2: Selling gamma worked best in hiking cycles

Fed cycle	Avg return on short 1m10y, cents
easing	8.9
on hold	11.5
hikes	14.2

Note: The table reports average returns on a short 1m10y vol trade in different Fed cycles. We assumed the sale of 1m10y delta-hedge straddles on a weekly basis and held until expiration to compute returns on the trade. We identified hiking (easing) episodes by whether the Fed funds rate was increasing (decreasing) in those episodes. On-hold episodes are those where the Fed funds rate was unchanged. Sample: 4/1994-6/2014.
Source: BofA Merrill Lynch Global Research

Short gamma in Fed hiking cycles

Because the Fed expects to transition from a prolonged on-hold regime to rate hikes next year, investors may worry that the short gamma trade may underperform going forward. However, historically, the trade delivered greater average returns in hiking cycles than in episodes where the Fed was on hold, and significantly greater than in easing cycles. Average returns on selling delta-hedged 1m10y straddles were highest in tightening and lowest in easing Fed cycles (Table 2). We identified hiking (easing) episodes by whether the Fed funds rate was increasing (decreasing) in those episodes. On-hold episodes are those where the Fed funds rate was unchanged.

Table 3: The pace of employment increase exceeds the pace of decline

Phase	Avg pace, %/year
Peak to trough	-0.6
Trough to peak	1.4

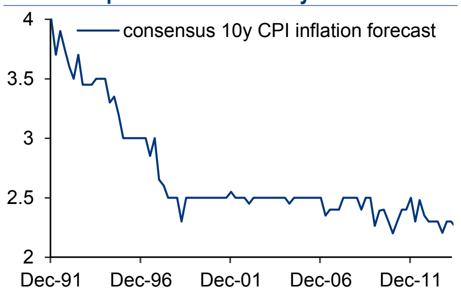
Sample: 1/1/1990-6/1/2014.
Source: BofA Merrill Lynch Global Research

The reason for this, in our view, is that hiking cycles characterize an economy in later stage recovery, which is inherently more predictable than recessions or early stage recovery. Recessions typically develop quickly, but subsequent recoveries are much slower, on average. This is evident, for example, from that fact that the unemployment rate tends to rise much faster relative to the pace of subsequent decline (Table 3). In addition, the Fed is typically more focused on inflation than growth during a hiking regime. Because inflation is more persistent than growth, normally the Fed can afford to raise rates at a relatively predictable pace. In contrast, the Fed is more focused on growth during easing and on-hold episodes.

What about 1994?

Our analysis of gamma returns may be somewhat biased because we excluded the initial stage of the 1994 hiking cycle when the Fed surprised the market by engineering aggressive hikes. Although we cannot quantify the performance of the short gamma trade in that episode for data availability reasons, an increase in realized volatility in the first few months after the first hike in January 1994 suggests that selling gamma most likely lost money in that period (Chart 2).

Chart 1: Improved Fed credibility



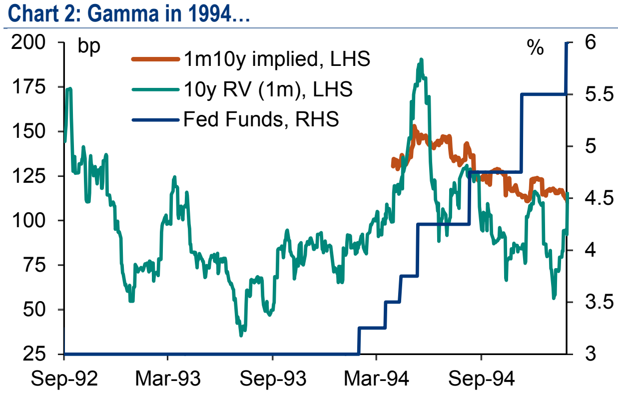
Source: Survey of Professional Forecasters, BofA Merrill Lynch Global Research

However, we do not think this 1994 experience is relevant for the coming hiking cycle. FOMC communication was much less transparent in 1994, which likely contributed to the rise in vol during the transition period to hikes. More importantly, we believe the reaction function of the Fed to inflation shocks has changed since then due to structural changes in inflation dynamics.

The Fed saw policy tightening as a necessary measure to prevent the risk of a run-up in inflation given that some measures of excess capacity were approaching full capacity at that time, according to FOMC minutes from 1994. But the risk of high inflation is much lower this time. Longer-term inflation expectations have become well anchored (Chart 1). Also, numerous academic studies find that the Phillips curve has flattened in the recent years, so that inflation has become less sensitive to excess capacity[1] (see also The world is flat). As a result, we do not expect the Fed to hike aggressively on inflation news even if inflation surprises on the upside.

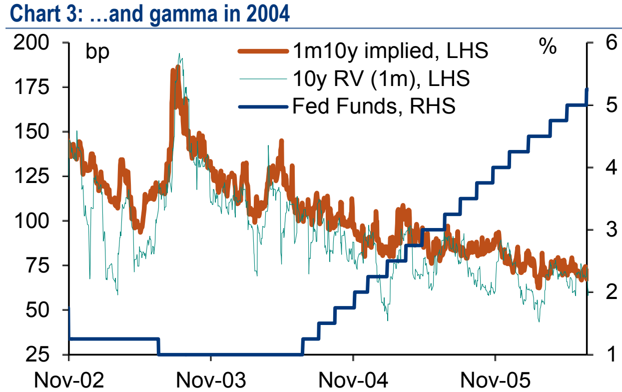
Further, because long-term inflation expectations are well anchored, we should expect a different curve reaction to positive inflation surprises. Assuming unchanged long-term growth expectations, positive inflation surprises and a hawkish Fed reaction would imply lower growth expectations in the longer term, so long-dated forward rates should decline despite the selloff in the front end in this scenario. We therefore do not expect the belly of the curve to move significantly even if inflation surprises on the upside.

Chart 2: Gamma in 1994…



Source: BofA Merrill Lynch Global Research

Chart 3: …and gamma in 2004



Source: BofA Merrill Lynch Global Research

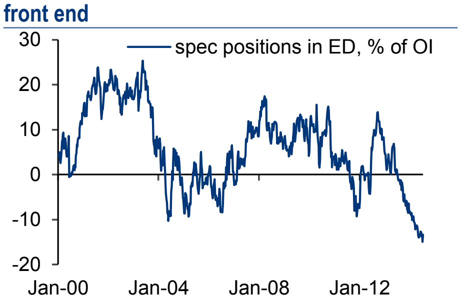
[1] See, for example, *IMF World Economic Outlook*, Chapter 3, April 2013.

Table 4: Short gamma returns around the first hike in June 2004

Period before/after first hike in June 2004	Avg return on short 1m10y, cents
12m before	13.13
6m before	14.26
3m before	-2.38
3m after	-6.48
6m after	11.41
12m after	13.74

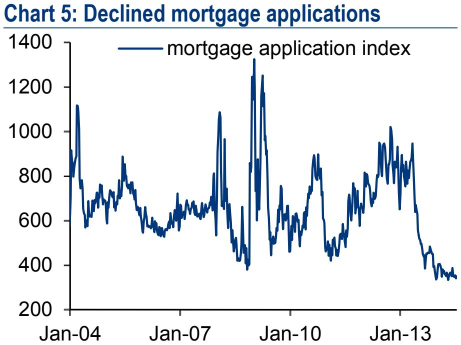
Note: The table reports average returns on a short 1m10y vol trade over 3m and 6m periods before and after the first Fed hike in June 2004. We assume the sale 1m10y delta-hedge straddles on a weekly basis and held until expiration to compute returns on the trade.
Source: BofA Merrill Lynch Global Research

Chart 4: The market is positioned short in the front end



Note: The chart shows net positions of non-commercial accounts at the % of open interest.
Source: CFTC, BofA Merrill Lynch Global Research

Chart 5: Declined mortgage applications



Source: Bloomberg, MBA

2004 is a more relevant benchmark

From this point of view, the coming hiking cycle is more likely to resemble 2004 than 1994. Unlike in 1994, the Fed normalized rates at a measured and well communicated pace in 2004, which we expect will be the case in the coming cycle and is similar to the current measured approach to tapering. Because inflation expectations were well anchored at that time, the curve flattened – a market reaction very different from in 1994 when the curve bear-steepened. As a result, volatility did not undergo such dramatic outperformance at the start of Fed hikes as in 1994. Although vol did richen temporally in April 2004 when the market repriced the timing of the first hike from November 2004 to July 2004 and rates sold off, the magnitude of the vol spike was much smaller than in 1994 (Chart 3, previous page).

As a result, selling gamma was a profitable trade in 2004, on average. Although the trade underperformed in the three-month transition period before and after the first hike in June 2004, it was profitable, on average, in the six-month period immediately preceding and following the first hike (Table 4).

A hawkish Fed surprise is a risk to the short gamma trade

Based on the above historical analysis, we believe the short gamma trade is likely to continue to be profitable on average, and may become even more profitable once the Fed starts rate hikes. But an important risk to the trade is a potential Fed surprise during the transition period, which could trigger a significant selloff in rates similar to that observed in April 2004 and cause the trade to underperform.

However, we expect the magnitude of any potential hawkish surprise to be smaller than that of 2004. At that time, the market repriced the timing of the first Fed hike earlier by about four months. Because the OIS curve already is priced for the first hike in July 2015, a surprise of a similar size should bring the expected timing of the first hike to February 2015. As discussed in Watching the dashboard a handful of inflation and labor market indicators are required to collaborate for the Fed to change its view on the appropriate timing of rates hikes in such a significant way. Currently, only 9% of economists in the Bloomberg survey expect the first Fed hike in 1Q 2015. In addition, investors already appear to be positioned short in the front end of the curve, which should limit any selloff in this sector of the curve (Chart 4).

Even if the Fed surprises the market by signaling sooner hikes, we do not expect a selloff in the belly of the curve to be as large as the one in April 2004 when the 10y rate rose by about 130bp. The selloff in the back end was likely exacerbated by convexity paying at that time, which is evident from that fact spreads widened by about 20bp. But convexity risks are much smaller this time because of historically low mortgage origination and smaller presence of GSEs (Chart 5). In fact, combined MBS holdings of FNMA and FHLMC are about 35% smaller than in 2004 and should continue to decline.

One argument against our view is a large market selloff in the summer of 2013 when the 10y rate rose by more than 100bp on tapering signaling. But we do not think such a scenario is likely to repeat. At that time the surprise element was related to QE, which affected 10s directly rather than through Fed Funds expectations. In addition, investors were clearly caught off guard as the timing of QE3 was not very well communicated by the Fed. In contrast, there is little uncertainty about the timing of tapering at this time, while the timing of interest rate policy is communicated through Fed Funds projections and Fedspeak.

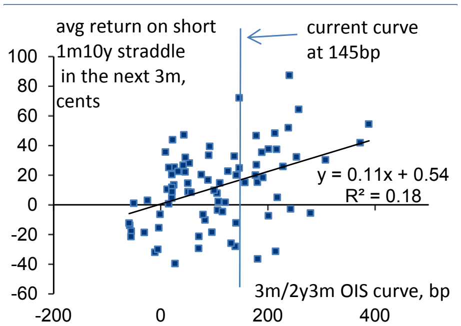
Expect vols to reach new lows when the Fed starts hikes

One risk to our short view on gamma is that implied vols are already close to historical low. Although the short gamma trade does not necessarily require implied volatilities to decline in order to be profitable, the return of volatilities back to historical norms is a risk to the trade. However, there are good reasons to expect the equilibrium level of rate volatility to be lower in the coming hiking cycle as well:

- The pace of Fed hikes is likely to be slower than in 2004. While the Fed delivered about 200bp hikes per year in the previous tightening cycle, the median FOMC participant expects only about 138bp of hikes in 2016. This is because the risks to the Fed are still asymmetric. While the Fed has ample ability to tighten policy, it has only limited room to ease. The risk management approach therefore argues for gradual policy normalization (see also To be continued for a more detailed discussion).
- There is growing evidence that the neutral Fed Funds rate has declined given persistent headwinds from recession and long-term structural factors such as aging population. In fact, the FOMC projects the neutral rate at only 3.75%. As a result, we expect rates to stay below historical averages in this cycle, which should imply lower average vols.
- As explained in Are volatilities too low?, macroeconomic volatility is likely to be lower going forward due to the decline in trend growth and flatter Phillips curve.
- Leverage is unlikely to reach the same levels as in 2004-2006 given tighter regulations resulting in higher cost of balance sheet. This decreases the risk of large-scale positioning rebalancing, the build-up of crowded trades and systemic risk-off events. Although lower dealers' risk capacity may also result in the decline of the market depth and therefore could be a positive factor for local realized volatility, this is likely a second-order effect.
- As discussed above, mortgage-related demand for vol is likely to be much smaller relative to previous hiking cycles given smaller origination and smaller demand for convexity from mortgage portfolios.

As a result, volatility in the belly of the curve has room to decline below historical lows when the Fed starts normalizing rates, in our view.

Chart 6: Selling gamma worked best when the market was focused on Fed hikes



Note: The chart shows 3m/2y3m OIS curve vs average return on the short gamma trade over subsequent 3 months. We assume the sale of 1m10y delta-hedge straddles on a weekly basis and held until expiration to compute returns on the trade. We used quarterly data for this analysis to insure non-overlapping average returns. Sample: 6/1994-3/2014.
Source: BofA Merrill Lynch Global Research

Sell gamma when the market is focused on Fed hikes

The above analysis also shows that investors can get clues about future gamma performance from the current market expectations of Fed policy. Future returns on gamma are likely to be less, on average, when investors expect Fed hikes further out in time than when investors expect sooner and faster Fed hikes. This is because the magnitude of any potential market repricing on a hawkish Fed surprise is likely to be larger in a situation when investors expect a longer Fed on-hold, while the room for surprises is smaller when the market already is focused on hikes. This idea is consistent with Table 2, which shows that selling gamma delivered higher returns, on average, during hiking cycles than during on-hold Fed cycles.

Of course, Fed cycles are only known ex-post, but investors may use the front end of the curve as an indicator of Fed policy expectations. This suggests we should expect higher future returns on selling gamma when the front end steepens, and lower when the front end flattens. Indeed, this appears to be the case empirically. Chart 6 shows the slope of the front-end of the curve, defined as the spread between 2y3m and 3m OIS rates, vs average returns on selling

1m10y delta-hedged straddles in the next three-month period (using quarterly data). A steeper front end curve clearly predicted greater returns on the short gamma trade.

From this point of view, the current level of the 3m/2y3m curve at 145bp implies that selling gamma is likely to continue to be profitable in the near term (Chart 6). More importantly, it suggests that by scaling up the short gamma trade when the front-end curve steepens and by scaling it down when the front end flattens, investors may earn higher risk-adjusted returns on the short gamma trade. In particular, the pace of hikes implied by the curve is still slower than what is implied by the “dot plot”, and we would recommend scaling the short gamma trade up if the front end curve steepens.

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