



Understanding volatility, rate, and dividend yield risks for long-dated calls

In this section we provide a more in-depth look at how implied vols evolve after a spot rally and also how changes in rates and dividends impact the price of calls.

Vega – implied volatility sensitivity

Buyers of options are long vega, and an increase in implied volatility will result in an increase in the price of a call option. Vega is proportional to time-to-maturity: longer-dated options have higher vega and as time passes the sensitivity of the options to changes in implied volatility declines.

Investors holding outright long calls will benefit from the delta exposure in a SPX rally, but will likely suffer from implied volatilities decreasing in two ways:

- **Term-structure effect:** As time passes, the implied volatility will slide down the typically upwards-sloping implied volatility term-structure, all else equal.
- **Skew effect:** Implied volatility changes are negatively correlated with spot changes (see Figure 24: spot higher, implied volatility lower). Thus, as spot prices move around, the reference implied volatilities will change. However, the most recent six months have seen long-dated fixed-strike (not ATM) implied volatilities rise slightly as the market has rallied (these would correspond to points in the upper right quadrant in Figure 24), a situation that has helped these call positions doubly.

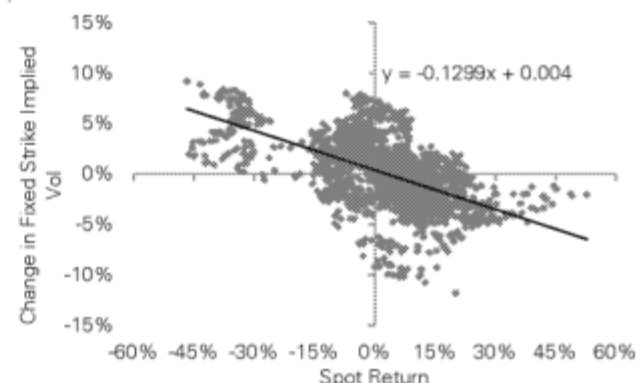
In Figure 23 and Figure 24 we look at the relative magnitude of the decrease in fixed-strike implied volatilities contingent on a market rally. It is notable that the fixed-strike implied volatilities change has been on the order of 1-2 vol points in our table. Not surprisingly, longer-dated options have lower volatility sensitivity to spot price moves, and a bigger move is associated with sharper implied volatility declines.

Figure 23: Median change in fixed-strike implied vol given a minimum spot move over the period (Dec-02 to Sep-13)

Spot Move (Greater Than)	Median Change in Vol After Spot Move Over Period		
	18M Call After 6M	36M Call After 18M	60M Call After 24M
0%	-0.3%	-0.1%	-0.2%
5%	-0.8%	-0.3%	-0.3%
10%	-1.0%	-0.7%	-0.5%
15%	-1.4%	-1.1%	-0.7%
20%	-2.0%	-1.7%	-1.0%

Source: Deutsche Bank

Figure 24: Regressing spot changes and changes in 36M fixed strike implied vols over the subsequent 6M



Source: Deutsche Bank