UBS

Volatility

What's going on? | 6 February 2018

Chief Investment Office WM
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- Here we review recent market movements and changes in the volatility landscape.
- **Key observations:** (1) The VIX had its largest one-day move on record. (2) The VIX is now pricing the equivalent of a 2% S&P 500 move up / down each day for the next month. (3) The market implied probability of another sell-off in excess of 5% over the next two weeks is about 25%. (4) Retail products that short volatility have been wiped out. (5) The "cost" of buying options on volatility has hit an all-time high.
- **You should read this report if...** you wish to know what is going on in volatility markets.

Key investment conclusions

- Inverse VIX ETPs drove the VIX "explosion." They have incurred large losses and have now delevered. VIX should therefore partially normalize.
- Institutional investors were "under-hedged" pre-event, and this will keep markets vulnerable to set-backs.
- Index volatility, relative to single stock volatility, will normalize at a slower pace as stocks revert from the "super low" correlation regime.
- The (VIX futures) market has increased longer-dated volatility expectations by four volatility points (roughly +/–25bps more movement for the S&P 500 per day).

Source: Getty

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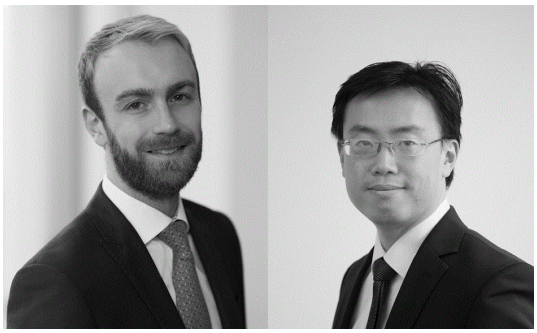
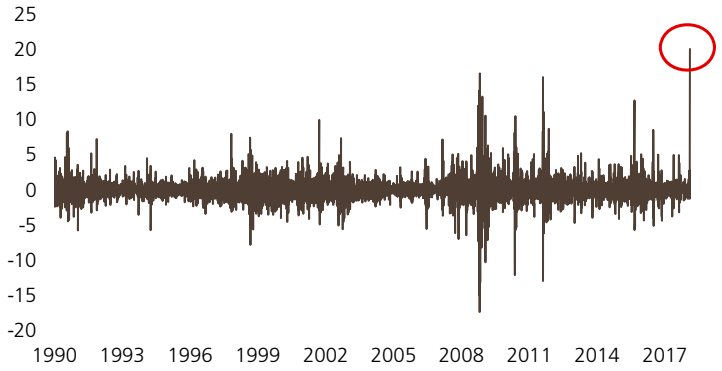


1. VIX had its largest one-day (close to close) move on record.
VIX – Wall Street's so-called "fear gauge" and the most popular measure of implied volatility – jumped 20 points to 37%. In "human" terms, this means that the market is pricing the equivalent of >2% daily move for US equities on every day for the next month.

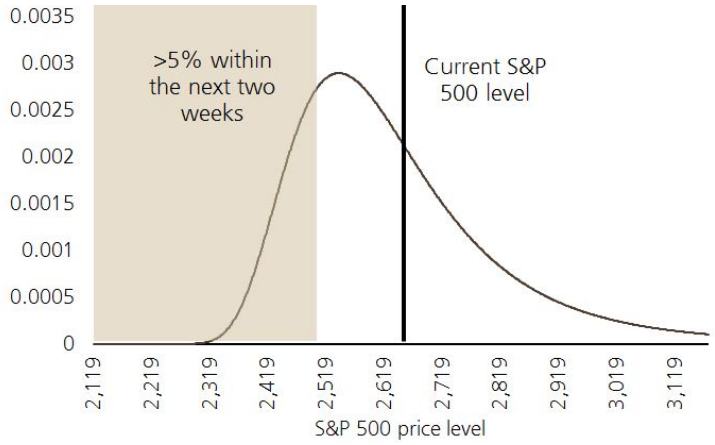
Fig. 1: VIX experienced a record daily increase
One-day change in the VIX index, in volatility points



Source: UBS, Bloomberg as of 06 February 2018

2. The market implied probability of another >5% fall over the next two weeks has jumped to 26%.
We can also translate the market's pricing of volatility (known as the volatility surface) into market-implied stock market moves. (Now there is some math to this, and there is an academic debate as to whether this is the true market participant expectation or a function of financial models, nevertheless...)

Fig. 2: A US equity decline in excess of >5% has risen in probability
Probability density function extracted from the S&P 500 volatility surface



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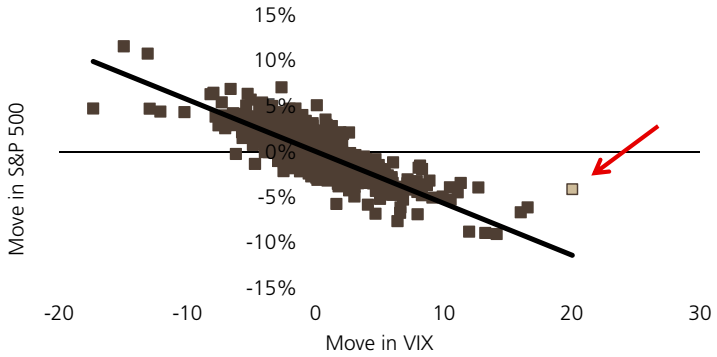
3. The VIX index "should not" have had such a large jump based on historic equity-volatility relationships.
Using a simplified linear regression – VIX's move relative to S&P 500 was quite extraordinary – a 10 standard deviation event. This raises the question, what happened?

Fig. 3: VIX "overreacted" compared to the equity move
Linear regression of daily change in VIX against daily change in S&P 500, red arrow marking Monday's observation



Source: UBS, Bloomberg as of 06 February 2018

4. The answer is, short volatility trades got crushed, and had to short cover their positions.
In recent years, the market for short volatility exchange-traded-products (ETPs) – similar in many ways to ETFs – has exploded in popularity. These ETPs short volatility via the VIX future's market, hoping to capture the volatility risk premium. In recent times, their exposure rose to about 225m USD vega (this means for every 1% volatility rose, investors would lose 225m!). Though there is no direct translation, their investor assets amounted to about 3bn of USD AUM. Like all shorts, when the price rises so does the short exposure, and because the ETPs are mechanical, they are forced to buy back their shorts regardless of price.

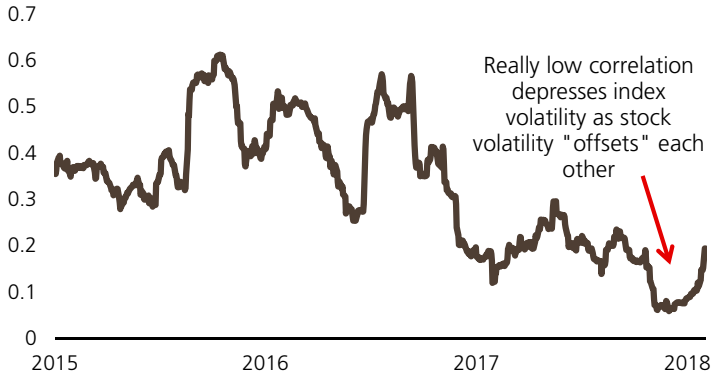
This was the reason for the outsized volatility spike, and has led to popular short volatility ETPs falling roughly 20% in market trading, and in after-hour trading falling significantly further, in excess of 80% in some cases. Their near-bankruptcy means they will no longer influence the VIX market.

It's also worth noting that the hedge fund style "volatility arbitrageurs," who have a clear bias to being short volatility, will also be "hurting," they control about 18–20bn of USD AUM, and if they haven't already, will now likely be stopped out of positions. This could add technical upward pressure on implied volatility levels.

5. Is there a difference between single-stock and index volatility?

Pair-wise stock correlation has been very low of late, close to zero. This meant that even though stocks were still volatile, their moves offset one another, depressing index volatility. Now, as the market starts to move more in sync and stock correlation goes up, index volatility may rise quicker than single stock volatility – putting upward pressure on VIX.

Fig. 4: Stocks have been showing very little correlation to one another
S&P 500 realized pairwise correlation



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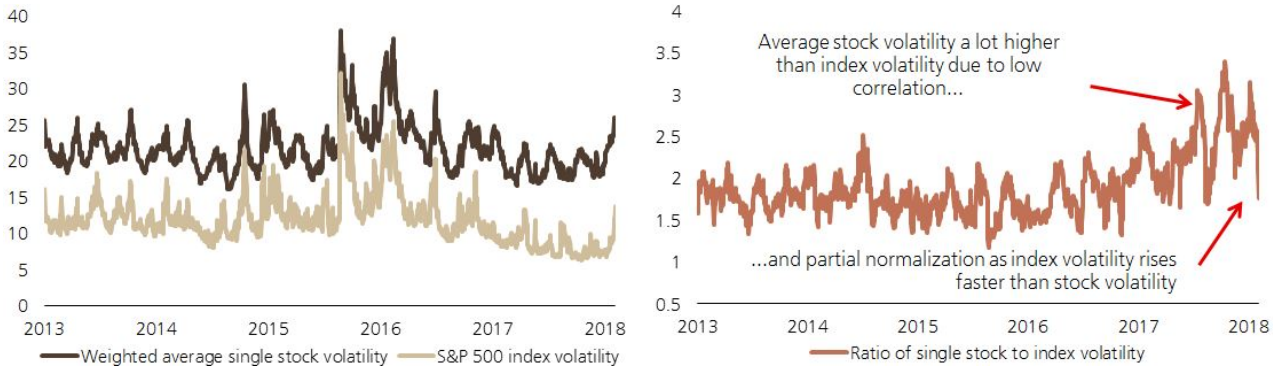
We can observe this dynamic by considering the (weighted) average of single-stock volatility for S&P 500 companies and the index volatility of the S&P 500. Recently low correlation has driven the ratio to record highs. The reversion in stock correlation has decreased this ratio as index volatility has risen faster than the underlying stock volatility.

Fig. 5: Index volatility has risen faster than single-stock volatility
S&P 500 weighted average stock one-month implied volatility (using current weights), and S&P 500 one-month implied volatility as time series in percent, and as a ratio



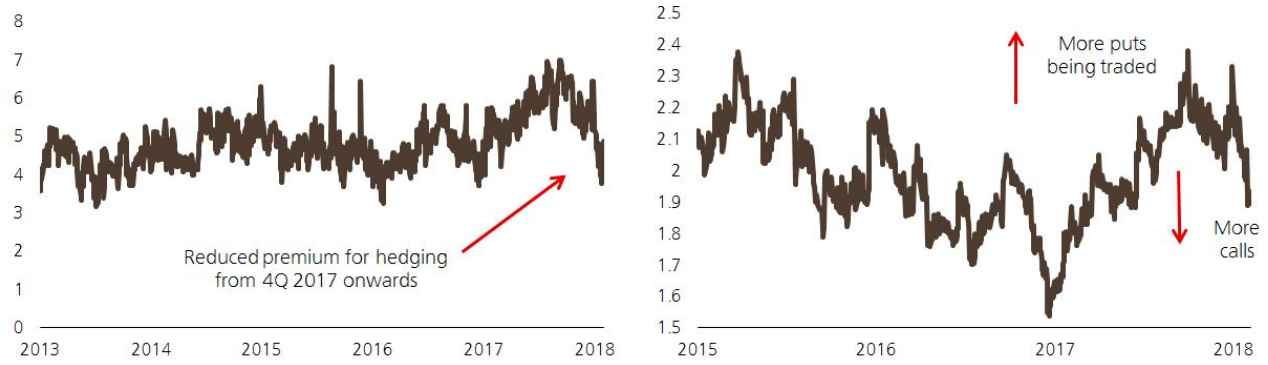
Source: UBS, Bloomberg as of 06 February 2018

6. Were institutional investors well hedged?

We don't believe they were. This could accelerate market sell-offs as managers are unable to tolerate equity drawdowns. Skew, a measure of the relative expensiveness of puts relative to calls (essentially the market output of supply and demand), was not indicating large put demand in the market. This may make the market more fragile. The put/call ratio which shows whether more puts or calls are currently present in the market was also not elevated prior to the crash, and is also indicative of the market being "under hedged." This may make the market more fragile.

Fig. 6: "Skew" does not indicate large put buying, nor does put/call volume data

S&P 500 one month 95% minus 100% implied volatility, in volatility points and S&P 500 puts outstanding / S&P 500 calls outstanding



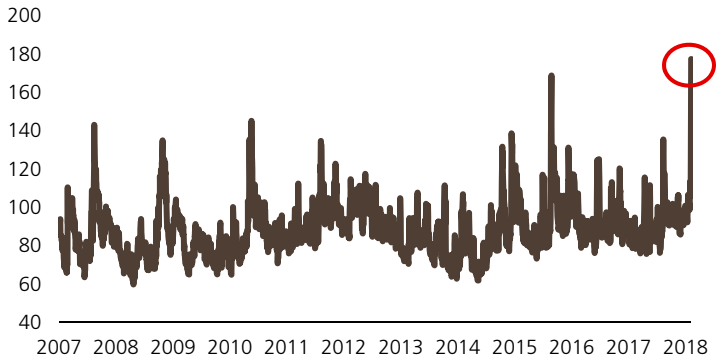
Source: UBS, Bloomberg as of 06 February 2018

7. What happened to options?

There was a rush to buy (and close) option positions. VVIX – the index that measures the volatility of options on the VIX (yep! that's a thing) hit 177% – an all time high. Furthermore, trading volumes for options also increased significantly – option volumes traded on S&P 500 Index contracted and SPY (the 280bn ETF giant) was the highest since 2015, and one of the busiest trading days on record – this is indicative that investors were "caught off side" by the market moves.

Fig. 7: The "cost" of options has increased significantly

Implied volatility of options on VIX index futures, volatility points

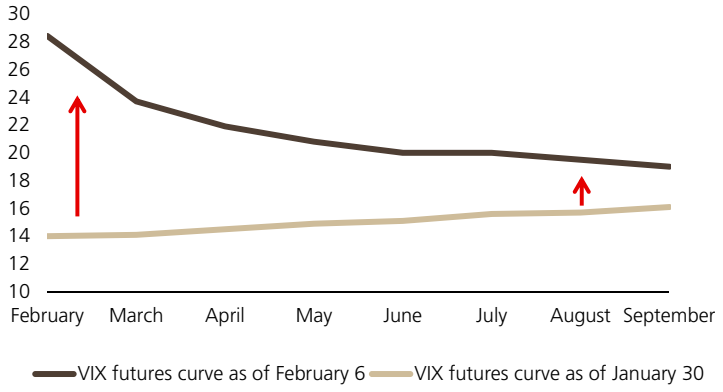


Source: UBS, Bloomberg as of 06 February 2018

8. What to look at now?

- With VIX ETPs now delevered and out of the market, we would expect a "normal" S&P 500 / VIX index relationship to resume.
- Index volatility, relative to single-stock volatility, should be higher, and could normalize slower, as a stocks revert from their "super low" correlation regime.
- A lack of institutional hedging pre-market sell-off will keep markets vulnerable to set-backs. This may keep "skews" elevated as investors take a more prudent approach to hedging.
- Those wanting to track volatility markets should use VIX futures that trade outside of US trading hours as well as during US trading hours. The ticker is UX1 Index on Bloomberg.
- It is also worth noting that the VIX curve has gone into "backwardation," as long-dated futures haven't moved up as much as short-dated futures. This is typical in risk-off events as the market expects long-term normalization.
- Still, the four point increase in long-dated VIX indicates the market is – at this point in time – pricing a "permanent" higher volatility regime.

Fig. 8: The entire VIX futures curve has moved upwards, with near-dated futures rising more
VIX index futures curve, both present and one week prior



Source: UBS, Bloomberg as of 06 February 2018

Appendix

Terms and Abbreviations

Term / Abbreviation	Description / Definition	Term / Abbreviation	Description / Definition
A	actual i.e. 2010A	AUM	Assets under management = total value of own and third-party assets managed
COM	Common shares	E	expected i.e. 2011E
Shares o/s	Shares outstanding	UP	Underperform: The stock is expected to underperform the sector benchmark
CIO	UBS WM Chief Investment Office		

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