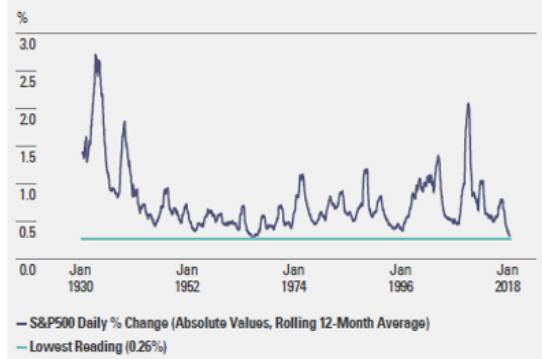
A Discussion on the February 2018 Volatility Spike with Colin Ireland of State Street Global Advisors

Joseph Hosler: Hello. This is Joe Hosler from Auour Investments, one of the managing principals. I want to thank you all for joining us today for this call with our guest, Colin Ireland from State Street Global Advisors. Before I turn it over to Colin, I would like to just set the stage a little bit about what we saw over the last few weeks and then will open it up to Colin to give us his perspective.

Figure 3: Daily Market Volatility Has Only Been Lower in One Other Period, Over 50 Years Ago

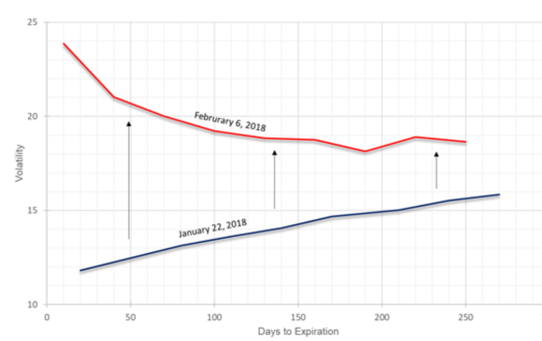


Source: Bloomberg Finance L.P., FT Research as of January 17, 2018.

First, one of the things that we found interesting, and we've been writing about for a while now, is the low volatility environment that we've been experiencing for the last number of years. And, specifically in the last year, when it has become extremely low, rivaling the lowest period over the last fifty years.

We've been discussing how we thought this was going to have to change for 2018 and it did. This is an example, in this slide, we have the volatility term structure for options that look at the VIX, and if you look at the January 22nd line which would be considered a normal period for the last year. It was understandably pricing out higher levels of uncertainty in the longer term. This makes sense to most of us, but what happened on February 6th was a dramatic reversal. The short-term volatility spiked dramatically but especially in the short-term contracts, causing the significant dislocation in the market.

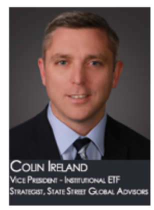
Rapid Volatility Term Structure Shift



Source: Vixcentral.com, Auour Analytics

This is another way to look at it, looking at the percentage of what's known as contango or that forward positive curve. Notice how it switches to a negative curve and how extreme it was over the last five or six years. The result of that move, of course, we all felt it was in the stock market, but predominantly it was felt in the inverse VIX market, where, in one day, when that jump happened in the curve, the inverse VIX ETF (XIV) was down over 90%. It has yet to recover from this period. That brings up the following question of how much this played into the correction that we all experienced.

With that, I'd like to introduce our guest Colin Ireland. Colin is a senior research strategist at State Street Global Advisors and is very kind to come onto the phone with us today and discuss his thoughts and perspectives on what we went through. So, Colin, again thank you very much and I'm going to ask you to just answer a few questions. If you could just give us, from your perspective, could you explain what we saw a leading up to the event and the positioning that people were taking?



Colin Ireland

Vice President - Institutional ETF Strategist, State Street Global Advisors (SSGA)

Colin is a Vice President at State Street Global Advisors within the SPDR and SSGA Funds Research Group. As a Research Strategist, he is responsible for publishing market and product related research content and generating tactical and strategic investment themes on behalf of SPDR ETF products. Colin also serves as the primary investment contact and product expert for SPDR institutional ETF sales teams.

Before joining SSGA, Colin worked as an International Equity Trader at BGC Partners and Guggenheim Securities. Prior to that, Colin worked as Product Specialist for ETFs and derivatives at UBS Financial Services.

Colin graduated from SUNY Geneseo with a BS in Accounting and earned his MBA at St. John's University. He has earned the Chartered Financial Analyst designation and holds FINRA Series 7, 63, and 55 licenses.

Colin Ireland: So, throughout November and December and through January there were a couple of things that we looked at that became more pronounced as they went on. And, I think to a certain extent it becomes very difficult to call a near-term top, but there are some signals and sentiment indicators that would indicate that we were a little bit ahead of our skis.

In particular, the S&P 500 Futures contract, which is the most actively traded futures contract in the world, had positioning at two-year highs. The CFTC disseminates information which allows you to kind of dissect and say who's holding futures position, are they long or short, and how is overall positioning look. And if you if you look at the buy side community, which is your asset managers and your hedge fund communities, they were very long to an extent that we haven't seen in a long period of time. At least going back two years, and that's really relevant because you know 2017 was a relatively risk-on market. On top of that, momentum was our friend.

We went 511 days without a two percent move. Technical indicators were at levels we hadn't seen in a really long period of time. The S&P500 had eighteen days above a 70 RSI in 2018. The reason that's relevant is that that's more than the last thirty years combined. Huge, huge momentum being positioned in the market and then, in a similar vein, 80% of the underlying constituents in the S&P500 were trading about their 50 and 200 day moving average. That's historic territory. Finally, SPY if you look at short interest, the short interest levels for SPY was in the in the bottom ten percent, which is extremely low. A level we haven't seen since probably the turn of the century.

> *"We went 511 days without a 2% correction… That's historical territory"*

Joseph Hosler: I do have the slide from UBS which looks at what you were just talking about, the long contract versus the short contract on the volatility index. I'm curious this is what you're talking about. Where the buildup seemed to be slightly abnormal for shorting volatility. Is that what you were talking about as the extended positioning on the long side?

Colin Ireland: This is inherently taking a short position in volatility. When you're talking about buying the S&P500 futures contract, you are inherently short volatility so anybody who's long the market is short volatility. Whether you are looking at the VIX futures or S&P500 futures, the main thing, from my perspective, is understanding who's playing in this market and what goes into it. Futures and options are a zero-sum game. It’s different than the equity markets in that there is a winner and a loser for every trade that goes on in the futures markets. For every long, there's a short and that's really relevant when you think about positioning in volatility, positioning in the S&P500 contract even because of how big that contract has become and how actively it is traded.

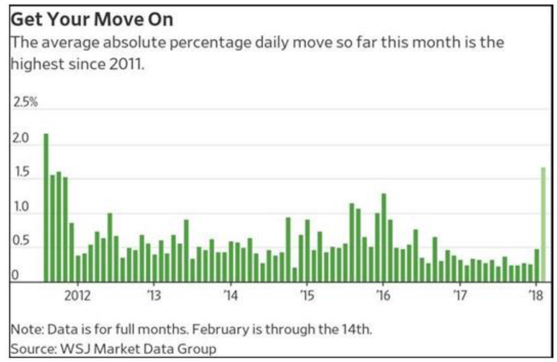
Because there has to be a short, somebody is taking the other side of that trade. When you think about how much leverage goes into this contract, that's really what sticks out. Not only is this, inherently, a big position, but we're doing it with another person's money. It's the same thing as if you went out and bought a car using borrowed money from the bank, you are speculating on the cost of the car. That's essentially what a futures contract is. The initial margin that you post with a futures contract is dictated by the exchange but it's really just it's a performance bond. It’s a show of good faith that you'll make good on the performance of that particular contract.

Joseph Hosler: As an example, if we enter into a contract right now between the two of us. The market moves one percent, I only have to pony up one percent of the notional amount if I am the loser on that move?

Colin Ireland: That’s correct. Obviously, it's a little bit more complicated than that because there's a lot of different types of uses and people using these contracts. It is not a single capacity and it's not all speculators. There are a lot of hedgers out there. There's a lot of different types of investors using these contracts to reposition a portfolio preventing a taxable event, etc. But it does speak volumes when you think about how much leverage you can control with these contracts.

Joseph Hosler: This next slide is one that caught my eye too. Looking at the absolute percentage changes of the market on a monthly basis, we saw in 2017 it was abnormally low. Did that build in a complacency or maybe the way people were using these contacts might have been stretched, so when we saw this dramatic increase in volatility, it may have led to more margin calls?

Colin Ireland: Yes, it's really hard to argue against that. If you look at the areas of the market that were most impacted, it was in the areas where there were likely the most crowded trades. The same sectors that really built in a lot of the performance last year, particularly tech and health care, which were some of the hardest hit. The biggest outflows of any fund were the QQQs as of today. We saw massive selling in areas that, from a momentum perspective, were extremely strong. Granted, a lot of the momentum was driven by earnings outperformance in those areas, so it was justification for those moves. But they did become inherently crowded trades as optimism got built in, particularly around tax reform.



If you look at what happened last week, UBS had a note that went out, and I thought it was a really interesting way of looking at it. The S&P500 went down 10% in ten days which was a four-standard deviation event. It has happened 19 times since World War II and eight of those times were outside a recessionary environment. February 2018 was one of those eight times.

"The S&P500 went down 10% in 10 days, which is a four-standard deviation event. It has happened 19 times since WWII."

If you look at those other times, they do draw on similar storylines. The one that jumped out at me was the October 1987 crash and I'll talk a little bit about that in a minute about why I think ETFs helped in this environment rather than hurt. But the other two are the August 2011 [US debt] downgrade and the August 2015 which was perceived to be Black Monday from China's perspective. There were some subtle market structure implications on that day, in particular. All of those events were driven by excessive technical drivers more so than fundamentals.

Joseph Hosler: That brings the biggest question that we've been asked 'Is this a precursor to what we have fresh in our mind which is 2008. My perspective and I would love your thoughts on, is we don't think it is. The areas of the market that were hit aren't those heavily weighted into the financial industry. If there were steep losses as we saw in 2007 and

2008, the banks would typically experience losses and they would contract their balance sheets. Have you seen anything or is there any reason to think that this is a precursor to something larger?

Colin Ireland: You know I think a lot of the issues that stem from 2008 were driven by collateral requirements and excessive leverage in terms of collateral which is a bit different from positioning. The euphoric levels that we recently saw differ in that they were driven by really strong economic fundamentals that, from a macro backdrop, remain positive. So, I don't think we are in waters anywhere near 2008 right here. But I really have to point out recent earnings growth and tax reform.

The main driver of what might have triggered this event is rising real rates and inflation expectations and the market's reaction to the fact that maybe we're overheating. That's a different message, at least over the short term, then was in 2008 which was much more ominous anticipation that the mortgage market was not well regulated.

Joseph Hosler: To add to that, given what we saw recently we made a move the week before this happened, thankfully, to be a little more conservative. We saw a lot of our short-term factors becoming more cautious, meaning that volatility was low. The recent increase in interest rates and the fears of inflation were picking up caused us to think that I mean reverting event was in front of us. When you're looking at this, are there reasons to think there's another shoe to drop in the case of volatility? I mean I would assume that now I have the 10-year Treasury rates at 2.9% and core CPI came in larger than expected, I would think that because that brought about Monday and Tuesday of last week could happen again.

Given a change in short-term factors, Auour was able to move to a more conservative stance in front of the spike in volatility.

Colin Ireland: It's hard to argue that an increase in rates and inflation expectations would not trigger higher volatility in the market. A lot of this is relative. We just went 511 days without a two percent move. So, do I think we're going to get another 10% down move over a ten-day period? Probably not.

But I do think that the market is resetting. There are a couple of other things that are positive. One is that we just reset expected volatility. I don't think we're going to have as big a shock in terms of a change in volatility which is the driver to a lot of different things from hedging to some of those products we saw a lot in the headlines.

Joseph Hosler: The relatively quick step back into the market we've seen in the last week or so, do you think that is people putting on the positions that they got squeezed out of the week before? Is there anything to glean from the way the market has come back?

Colin Ireland: I think if you were to look at what happened in January, it was unique in that it was one of the only months I can remember where volatility increased as the market continued higher in a tight trading range. So, the reason for that is because we kept hitting new highs and the expected potential move stock returns expanded. If you think about how some of these institutional quantitative managers positioned and how they will change on a monthly or quarterly basis, depending on their rebalance schedule, volatility is a big piece. Some of the most obvious managers are those focused on targeting volatility. A good example of that is maintaining a certain level of expected volatility and rebalance monthly. As volatility increases, you would reduce your more volatile or risky investments and are now selling equity markets and investing potentially more in fixed income markets.

"January was one of the only months I can remember where volatility increased as the market continued higher."

Another example would be the CTAs or trend following strategies will inherently shift their positioning because of some of the events in the market. These things are difficult to really pinpoint, but I do think some of those events led to continued volatility over the course of the week.

Joseph Hosler: One of the things we previously discussed was the impact of new regulations. We've had some changes in the market granted 1987 was a long time ago and even 2011 was before some of the changes. Do you think the new regulations removed some of the stabilizers we had prior in the market, leaving the market and, therefore leaving us, more susceptible to these reactions?

Colin Ireland: A couple of things. You know I think we are in a territory, with some of these volatility products, that is relatively uncharted. They have gained a lot of traction and they are relatively large. I don't think that they're very easy to understand and how they're structured. So, I think there's that and the other piece is something that we refer to as funding.

This is something that we tracked back through December. If you look at how investment banks historically have been participants in the futures market, they've been market makers. So, when people say futures are rich or futures are cheap, it's not necessarily about the cash market. The contract price, in the pre-market, is used as an indication of where the equity markets will open. But if you look at it over the course of the day you're looking at relative funding. Funding is essentially the borrowing cost for you to use that futures contract. As an example, you go to the investment bank, you borrow money and you purchase the securities. It's standardized in the futures contract. Because they, the investment banks, are traditionally the dealer market, they will take the other side of the trade and that is inherently them selling the futures contract, buying the underlying securities, and charging you a bit of interest. That's called funding.

Since 2012, and this is relatively well documented, the availability of balance sheet capacity has been constrained. One of the things that has happened is that positioning in the futures market has become more of a precursor to relative funding rates - what it costs to borrow to buy the S&P500 in the futures market. We saw it get very extended and I think when you have that type of event [regulations] happen it becomes pretty obvious that the availability of balance sheet across the main dealer banks will become constrained. Those types of events bring in new market participants and they create a level of complexity that potentially we haven't seen before.

When you think about the volatility products, those are a little bit different. I think the inverse products are the best example. Those products do not invest in the VIX index itself as the VIX index is not investable. They track the index which invests in futures contracts tied to the VIX. And when you invest in those contracts, there are certain implications of contract performance and as they expire, depending on the slope of the futures curve, you could be in a normal market which is a contango market or a backwardated market. This implies shorter term contracts at a higher level than latter term contracts and the slide that you showed of the VIX futures curve spiking on the front end is a good example of being in a backwardated market after the recent spike in volatility.

Joseph Hosler: Has that been one of the benefits of a very low-interest-rate environment, that the cost of playing in this market was low? Now that we are starting to see a 3% percent 10-year Treasury, it is becoming costlier?

Colin Ireland: So, when you when you think about funding that it's really a reflection of the availability of balance sheet at the banks. It's really hard for a lot of institutional investors to gain access to short-term credit facilities. So, what happens is you have constraints in the market and I think the most obvious one is funding in the S&P futures market - that's the one that gets the most attention. But I also think it restricts market makers and it restricts a lot of different types of participants from potentially arbitraging opportunities because they don't have the availability of capital.

Joseph Hosler: I saw this chart that you presented, and it shocked me. It makes me think of the times we hear people say the large number of dollars that are going into ETFs will swaying the market. It seems, to me, it pales in comparison to the options and futures markets that have the potential to swing around the cash markets. Could you talk a little bit about that?

S&P 500 Comparable Vehicles

Description	Structure	10D Average Notional Value Traded
SPDR S&P 500 ETF (SPY)	Exchange-Traded Fund	$20.7B
SPDR S&P 500 ETF (SPY)	ETF Options	$58.7B
E-Mini S&P 500 Futures (ESA)	Futures	$110.2B
E-Mini S&P 500 Futures (ESA)*	Futures Options	$4.4B
SPX Index	Index Options	$302.6B

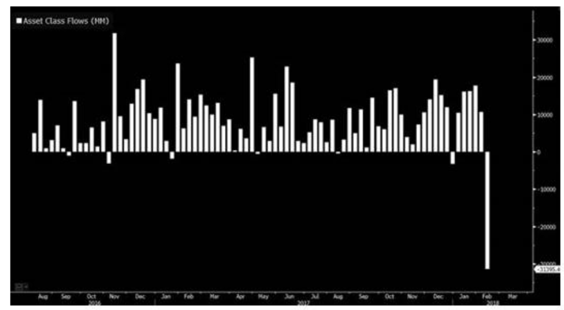
Source: Bloomberg Finance L.P., State Street Global Advisors. As of December 29, 2017
*March series.

Colin Ireland: If you think about the E-mini futures contract, a $110B is the average daily trading volume. That contract is the most actively traded contract in the in the world. For a long time, it has been the main source of liquidity for institutional managers. SPY, with its 25 years of history, has become the elephant in the room as it has become the de facto cash market, hovering around $300B. The ETF options market has developed dramatically. And then finally the S&P500 index options which trade relative to the futures are an extremely large derivative market that caters to institutional hedging predominantly, as well as, a lot of financing trades done by some of the some of the derivatives desks on the street.

When you think about how big SPY has become, you have to go back to the 1987 crash. The initiation of SPY or the theory behind the creation of an ETF was driven by a former commodities trader. This is a story that we typically tell; the idea of a warehouse receipt being used as a proxy for the S&P500 equities was the initial thought process. The idea was borne out of the report from the SEC about the 1987 crash that concluded program trading and the trading of a basket of stocks, based on changes in the leveraged futures market, was behind 1987 crash. There is a lot of things you could draw from that event over the last two weeks, and you could point to the fact that ETFs were a valve of liquidity. SPY traded over $90B on February 6th. Think about how effective those products have become at becoming a source of liquidity when underlying markets become a little bit more stressed and constrained. We frequently look at the relationship between ETF trading and the VIX, and as the VIX increases ETF trading as a percentage of the market increases dramatically. That speaks volumes to where people are sourcing liquidity.

Joseph Hosler: I pulled a graph on weekly flows for ETFs. And last week was not a great week for ETFs. Do you see that as just an unwinding of one side of the trade?

ETF FLOWS BY WEEK



Source: Bloomberg, Jones Trading

Colin Ireland: As an asset manager, obviously, we want people to buy our funds but it but realistically and more importantly we want them to function correctly. I think last week was a perfect example of them function correctly. A lot of our products were for sale, but they traded at expectations and in line with their underlying markets.

And in cases where the underlying markets became unavailable or constrained, they provided price discovery too. When you think about SPY, in particular, on Monday traded over $70B. Tuesday, trade over $90B. Those are two of the top ten trading days in SPY's history. The number of different types of users using the product, the additive liquidity being provided into the market, I think it's safe to say that ETFs performed as you would expect. Now, on Tuesday, did spreads widen out? Absolutely, but I think that's to be expected because the underlying markets also became constrained in most equity markets. And markets are moving very quickly, and the magnitude of the moves was relatively unprecedented.

Joseph Hosler: We were remarking how the market would be up 1% and then you would turn back to your monitor and the market was down 1%. That didn't feel like the physical selling of securities. It seemed that was, we felt, like the tail wagging the dog?

Colin Ireland: Yes. If you look at Monday, it was really the best example where from 3 pm to 3:15 pm, the Dow traded off 800 hundred points and then bounced back about 600 points in a matter of twenty minutes or so. That type of selling is typically not fundamental selling. There are more technical drivers that are moving the markets very quickly, and as markets have become electronic, there are different signals that act as a trigger. I mentioned rates and inflation expectations as likely the main driver on Monday and Tuesday, particularly Monday.

If you look at what happened during that period, there was retail buying as the market really got hit, particularly in areas of the market that have shown positive revenue growth for the fourth quarter such as materials and energy, on the back of higher inflation expectations. Nowadays when you say retail buying, it constitutes corporate plans, major asset managers, etc. Until we stop seeing market participants come in and looking for buying opportunities, I think you can you can pretty safely draw a conclusion that a lot of this is technically driven. It was quantitatively driven, and again, going back to some of those other strategies that I mentioned - trend following strategies, risk parity strategies - those are the types of managers that are going to quickly shift their portfolios because of events in the market.

Joseph Hosler: We are coming up to the end of the call. I would like you to restate that one stat you had from UBS. Was it a 10% move in 10 days?

Colin Ireland: Yes, a 10% decline in ten days is a four-standard deviation event. It has happened 19 times since World War II. Eight were out of a recession. Since 1987, 1998 was Long Term Capital Management. April 2000 was the tech bubble. August 2011 was the US debt downgrade. August 2015 was the China currency reset. And then this month. I think if you look at a lot of sell-side research out there right now, a lot are pointing to the fact that this is normal.

As long as we remain relatively orderly and things continue to settle down, it's a positive sign because we do have a positive macro backdrop.

Joseph Hosler: Thank you, Colin, very much for taking the time. I don't want to keep you any longer or our listeners, so thank you very much for your thoughts on this area. I hope you and our listeners have a wonderful weekend.

Colin Ireland: My pleasure.

Joseph Hosler: Thank you very much and thank you all for joining us.

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