GLADIUS

“Understand what the VIX index means to fully capture its usefulness and avoid misunderstanding”
– Robert Whaley

May 2017

US Volatility Research

# A lot of VIX Noise

*There has been a lot of noise out there on VIX at 10. Is it ominous for equities? Is it ominous for the VIX? Let’s look at the data.*

### VIX sub 11

Looking at the entire VIX history since 1990 there were 146 times of 6,892 observations (Jan 2, 1990 to May 12, 2017) the VIX closed below 11. That is only 2.12%. These 146 times tend to be clustered or in other words sub 11 typically doesn’t happen just once. Looking at the average of 146 times, with available forward looking data, 10d, 20d, 30d, 40d, 50d and 100 days out the VIX is +11.8%, +17.4%, +22.4%, +23.3%, +26.0% and +22.9% higher. This does not consider the cost of carry to be long volatility.

### VIX sub 10.5

Does a lower start level lead to a sustained VIX spike? Sub 11 analysis above also captures sub 10.5 of course. The number of daily closes below 10.5 drops to 52 or 0.75% of all daily closes. Forward looking 10d, 20d, 30d, 40d, 50d and 100 days out the VIX is +19.8%, +25.2%, +31.4%, +24.0%, +33.4% and +38.7% higher. This again does not consider the cost of carry.

### VIX sub 10

Does an even lower start level lead to an immediate or sustained VIX spike? Sub 10 frequency drops to 11 observations only, which includes recently May 8th and May 9th of 2017. Forward looking 10d, 20d, 30d, 40d, 50d and 100 days out the VIX is +11.6%, +4.3%, +23.4%, +12.6%, +33.3% and +30.7% higher. Overall, a slight downtick in the level of increase relative to the above.

### Forward Looking VIX Curve

The closing VIX curve as of May 12$^{th}$, shows the cost of carry about matching or exceeding average point to point VIX moves based on prior historical experiences. In other words, one could say the market is pricing a similar level of risk based on prior historical moves.

**Exhibit 1: VIX curve as of May 12th, 2017**

| | | Cost of Carry | Days |
|---|---|---|---|
| **VIX** | **10.40** | | |
| May | 11.225 | 7.93% | 8 days |
| June | 12.425 | 19.47% | 43 days |
| July | 13.625 | 31.01% | 71 days |
| August | 14.425 | 38.70% | 99 days |
| September | 15.325 | 47.36% | 134 days |

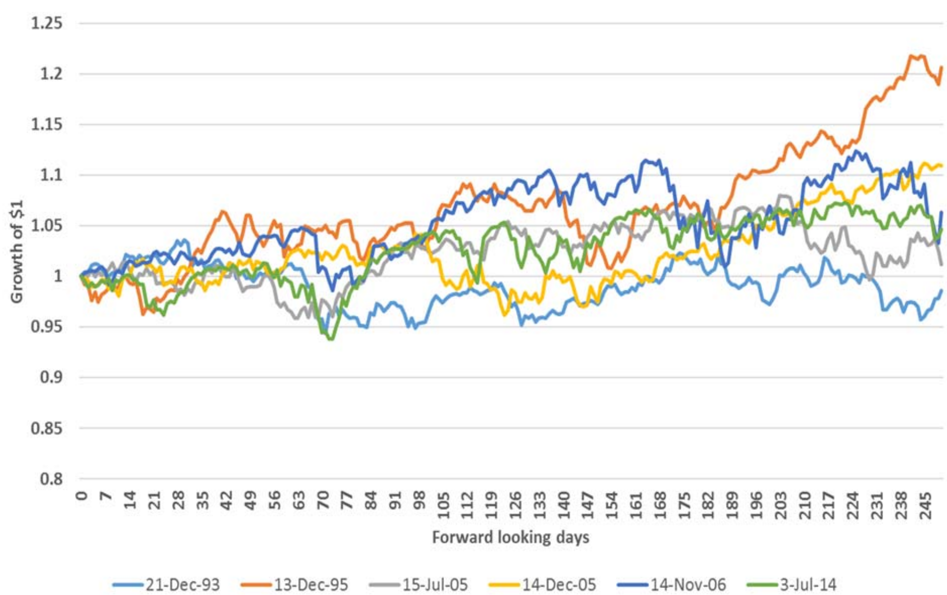
Source: Bloomberg. As of May 12, 2017. Notes: This information is not intended as a recommendation to invest in any particular asset class or strategy or as a promise of future performance. Indexes are unmanaged and used for illustrative purposes only. They are not intended to be indicative of any fund or strategy's performance.

## Intra-life Moves of SPX and VIX when VIX is Low

Given the above was point to point, we should look and see if there were any opportunities to monetize a large percentage move in SPX. There is not enough data when viewing only VIX sub 10 for the first time in a group of readings, so let's look at VIX sub 10.5 and performance of SPX and VIX 1 year out. The dates when VIX first closed under 10.5 are Dec '93, Dec '95, Jul'05, Dec'05, Jan'07 and Jul'14. The average of these 6 occurrences, 1 year later is SPX price return of +7.04% and S&P 500 total return of 9.30%.

There are 6 occurrences when VIX first closed under 10.5, the average return 1 year later was +7.05% for SPX price return and S&P 500 total return of +9.30%.

**Exhibit 2: SPX price return performance after first day VIX falls below 10.5**




Source: Bloomberg. Notes: This information is not intended as a recommendation to invest in any particular asset class or strategy or as a promise of future performance. Indexes are unmanaged and used for illustrative purposes only. They are not intended to be indicative of any fund or strategy's performance.

There is room in the near term for well-structured VIX upside trades to mid-teen's.

Other additional asset performance one calendar year out after first day VIX falls below 10.5 is below. The S&P 500 gains one year leading up to VIX low were an impressive +16.2% on average. Gains of this magnitude clearly set a high bar subsequently not met in next twelve months. But the point is, asset performance was not as dire and imminently in danger as some may have you believe based on this limited history set.

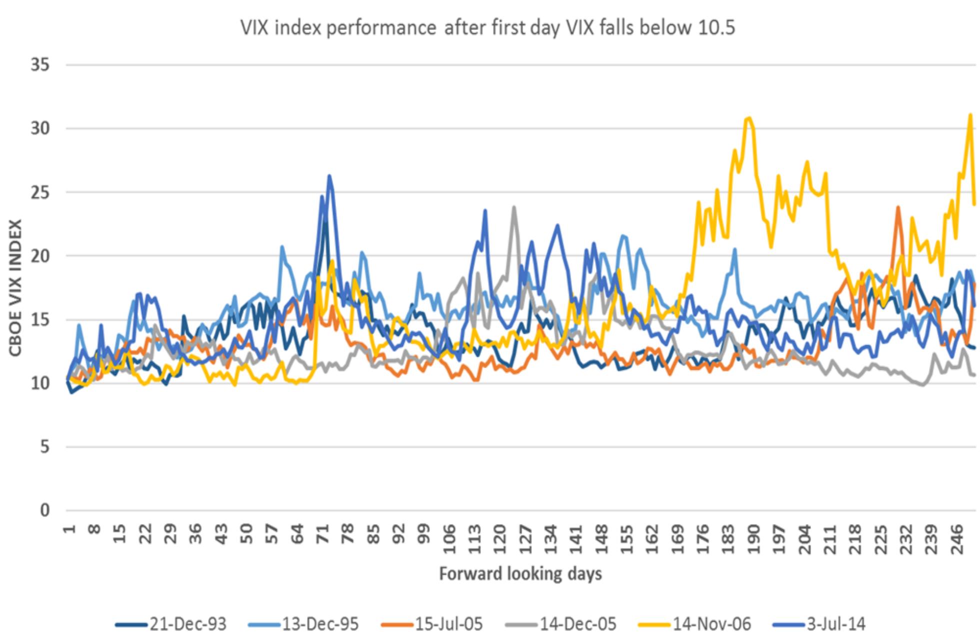
**Exhibit 3: 250 days' performance after first day VIX falls below 10.5**

| Start | End | SPX | SPXTR | BXM | PUT |
|---|---|---|---|---|---|
| **21-Dec-93** | 16-Dec-94 | -1.40% | 1.42% | 4.21% | 6.77% |
| **13-Dec-95** | 9-Dec-96 | 20.61% | 23.21% | 16.78% | 15.87% |
| **15-Jul-05** | 13-Jul-06 | 1.17% | 3.08% | 5.14% | 7.99% |
| **14-Dec-05** | 12-Dec-06 | 10.91% | 12.99% | 12.02% | 14.22% |
| **14-Nov-06** | 13-Nov-07 | 6.30% | 8.29% | 6.50% | 8.86% |
| **3-Jul-14** | 1-Jul-15 | 4.63% | 6.79% | 3.66% | 3.68% |

Source: Bloomberg. Notes: This information is not intended as a recommendation to invest in any particular asset class or strategy or as a promise of future performance. Representative indexes used are (left to right): S&P 500 Index (SPX); S&P 500 Total Return Index (SPXTR); CBOE S&P 500 BuyWrite Index (BXM); CBOE S&P 500 PutWrite Index (PUT). Indexes are unmanaged and used for illustrative purposes only. They are not intended to be indicative of any fund or strategy's performance.

Replacing SPX with VIX the chart looks like this:

**Exhibit 4: VIX Index performance after first day VIX falls below 10.5**




Source: Bloomberg Notes: This information is not intended as a recommendation to invest in any particular asset class or strategy or as a promise of future performance. Indexes are unmanaged and used for illustrative purposes only. They are not intended to be indicative of any fund or strategy's performance

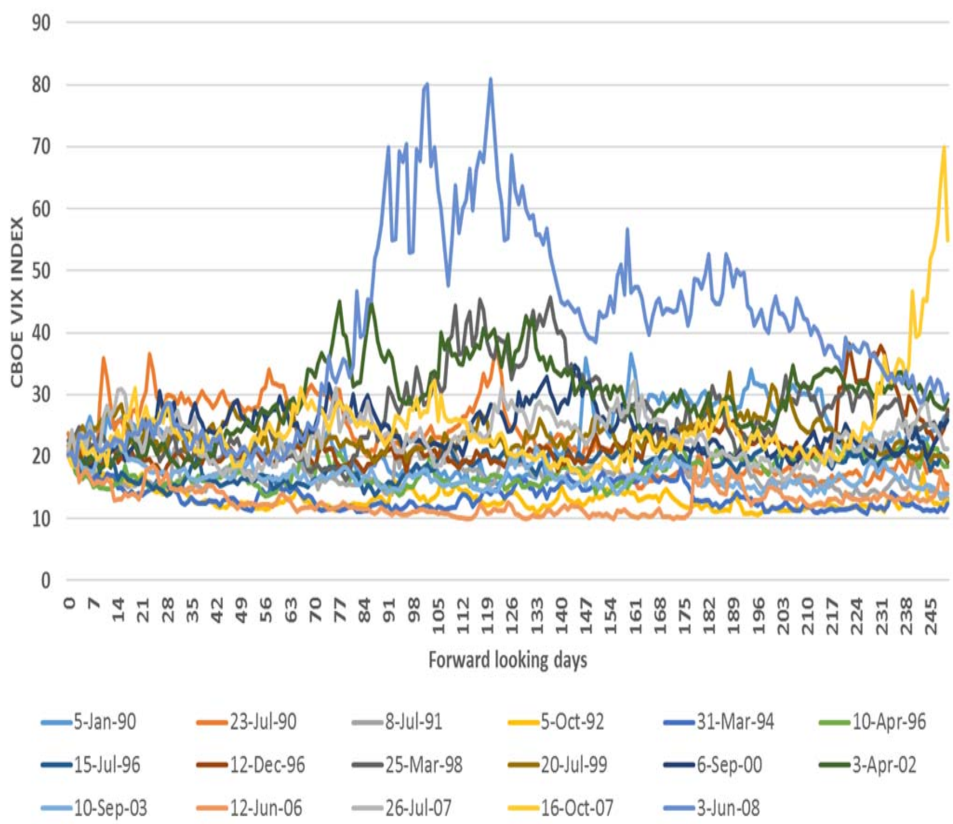
There is room in the near term for some well-structured VIX upside trades to mid-teens. However, a large move in the VIX historically speaking is less likely. One must consider the cost of carry of these types of long volatility positions as noted above.

## Selling VIX at 10 or 20?

The big difference of selling volatility at 10 versus 20 is stability of returns, specifically significant drawdown risk. On average VIX drops after hitting 20 but not as much one would expect. The 10d, 20d, 30d, 40d, 50d and 100d average VIX move is -3.6%, -8.7%, -8.4%, -11.0%, -12.3% and -1.2%. However, in many cases, goes higher and significantly so.

The big difference of selling volatility at 10 versus 20 is stability of returns.

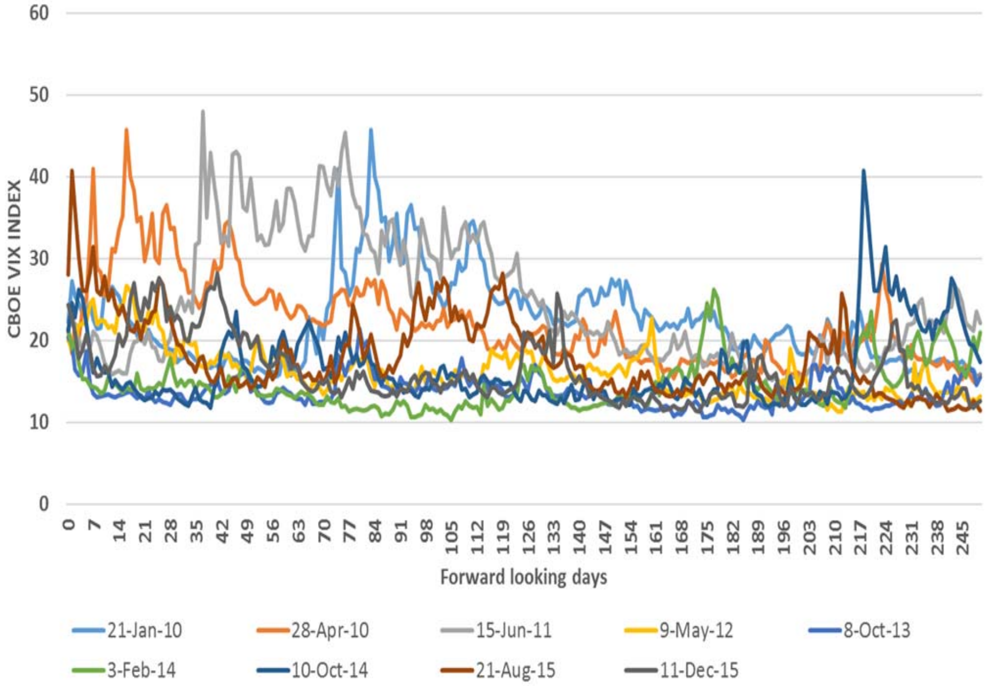
**Exhibit 5: Pre-GFC path of VIX after VIX hits 20 for first time**




Source: Bloomberg. Notes: This information is not intended as a recommendation to invest in any particular asset class or strategy or as a promise of future performance. Indexes are unmanaged and used for illustrative purposes only. They are not intended to be indicative of any fund or strategy's performance.

The number of data points is limited. However, based on the data we can see that the doom and gloom headlines some media will have you believe is unwarranted. And in fact, one month realized volatility on the S&P 500 has been primarily between 6%-8% for 2017 and VIX has averaged just below 12% for 2017 thus maintaining the insurance premium we call volatility risk premium or simply "VRP" for short.

### Exhibit 6: Post-GFC path of VIX after VIX hits 20 for first time




Source: Bloomberg. Notes: This information is not intended as a recommendation to invest in any particular asset class or strategy or as a promise of future performance. Indexes are unmanaged and used for illustrative purposes only. They are not intended to be indicative of any fund or strategy's performance.

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## Final Thoughts

It doesn't feel like realized volatility and thus VIX should be this low. One could make an argument for both persistence of low volatility and an argument for a spike in volatility on selective data points. Taking the enthusiasm for selective data out of the equation and only viewing historical similar experiences shows us this may persist for some time. VIX tends to mean revert from high levels, not low levels of volatility. Typically, from low levels, VIX has shown to revert gradually or revert in fleeting spikes to long term mean-median levels more often by exogenous shocks.

The microstructure of the market and participants, as well as the depth of the options market are completely different from any other period we have seen. Retail structured notes and systematic volatility selling strategies are now the most dominant flow in the front end of the SPX (VIX) curve. One thing is for certain: volatility selling strategies arbitrarily confined to selling options in the very short end, primarily one month space, should suffer relative to those who insist on having a bit more freedom.

Lastly, the VIX hitting 10 isn't an immediate sign of market stress. The better question is, in our opinion, what event could prompt this to change.

## ABOUT GLADIUS CAPITAL MANAGEMENT LP

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