

The Risks Of Volatility Futures

Monty Python once ran a sketch entitled "How To Do It," in which was found the following exchange:

John Cleese: *"And this week on 'How To Do It' we're going to show you how to play the flute, how to split an atom, how to construct a box girder bridge, how to irrigate the Sahara Desert and make vast new areas of land cultivable, but first, here's Jackie to tell you how to rid the world of all known diseases."*

Eric Idle: *"Well, first of all become a doctor and discover a marvelous cure for something, and then when the medical profession really starts to take notice of you, you can jolly well tell them what to do and make sure they get everything right so there'll never be any diseases again."*

The New VIX Futures

The financial services industry long has taken an approach to product development similar to the skit above. We have thousands of mutual funds, tens of thousands of indices, hundreds of futures and options. Some of these were launched to satisfy investor demand, but it is safe to say most were launched in hope of creating subsequent investor demand in a sort of "if you list it, they will trade" fashion.

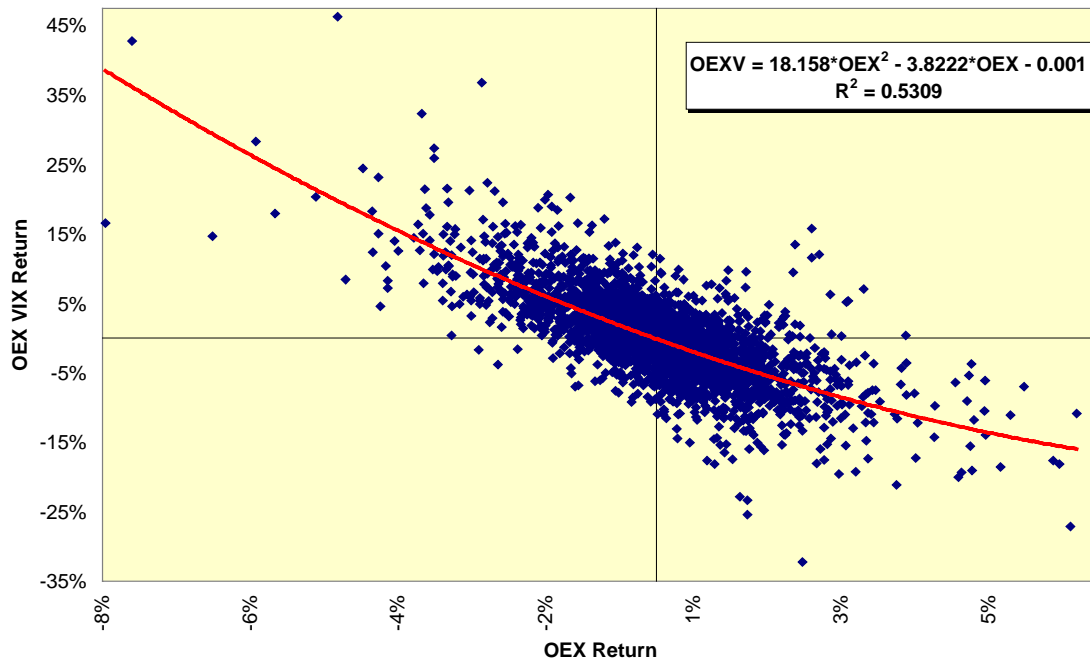
The Chicago Board of Options Exchange (CBOE) may be moving into a new category in trying to create a tradable instrument, specifically a futures contract on its new futures exchange, out of its widely followed Volatility Index (VIX). On the surface, a VIX future has several of the attributes of any successful futures contract: A body of commercial traders exposed to two-way volatility risk, speculative interest, volatility -volatility is volatile - and visible pricing.

However, a VIX future lacks several other key attributes of a successful futures contract, including a hedgeable underlying asset that the future converges to at expiration, a basis that is monotonic in its decay function, a cost of carry to the underlying asset, and the possibility of a forward curve. Each of these will be discussed below.

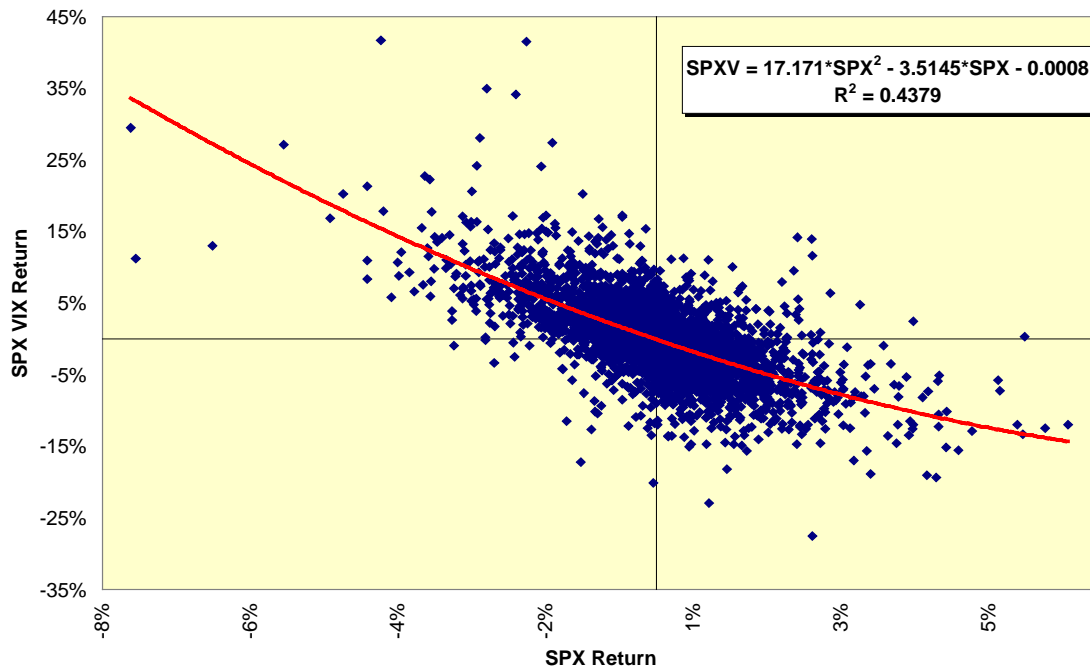
First, we should note the new calculation methodology, described on the CBOE's Web site. In deference to the very sound advice I received from my first boss more than a quarter-century ago, "Howard, when you have to start explaining your methodology, start updating your resume," no further discussion on the mechanics will be offered. The new VIX will be based on the European exercise S&P 500 (SPX) options, not on the American exercise S&P 100 (OEX) options, and it will weight all of the out-of-the-money options based on the degree to which they are OTM.

As a result of these changes, the new VIX will not be as responsive to large moves in the underlying index. Both the original VIX and the new VIX have a bias toward the short side; as daily OEX or SPX returns rise, both VIX indices fall, but at a less than unitary rate. As daily returns on the OEX or SPX fall, both VIX indices rise at a greater than unitary rate.

OEX VIX: The Original Short Bias

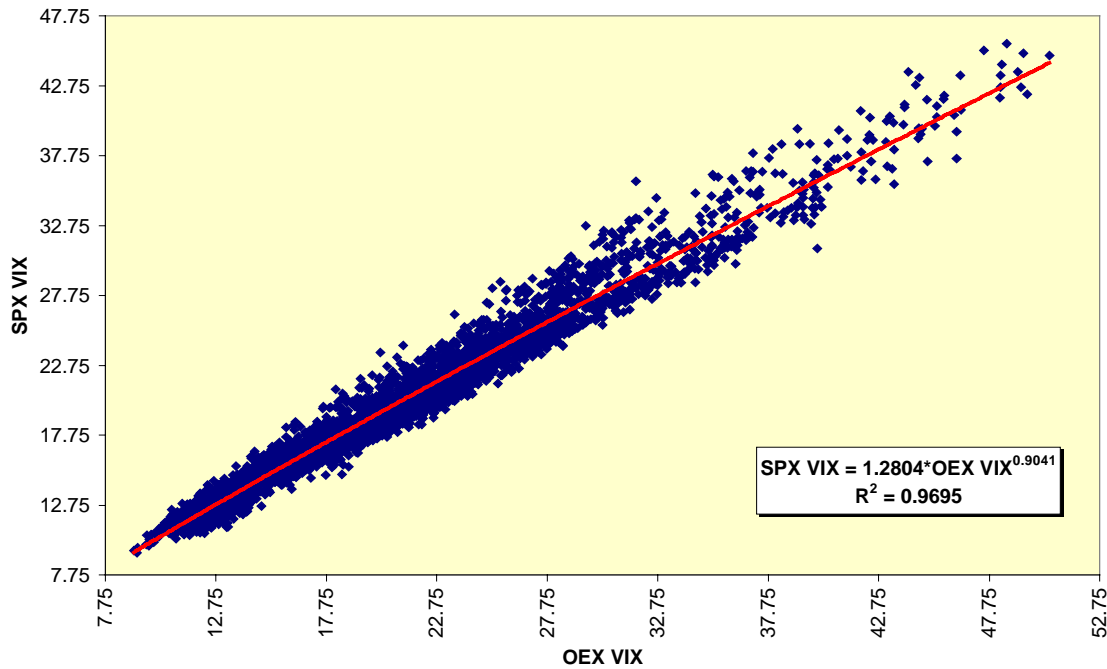


SPX VIX: Not Quite As Responsive At Extremes



The narrower base of the OEX increases the relative contribution of each stock in the index compared to its weight in the SPX. For example, Microsoft is 5.725% of the OEX but only 3.236% of the SPX; comparable figures for General Electric are 5.930% and 3.351%, respectively. The two indices obviously are closely related, with the OEX accounting for 56.5% of the SPX' market capitalization, but it would be incorrect to conclude their correlation is linear and stable. The same holds true for the relationship between the old VIX and the constructed history of the new index.

Not Quite An Identical Match



Trading And Hedging

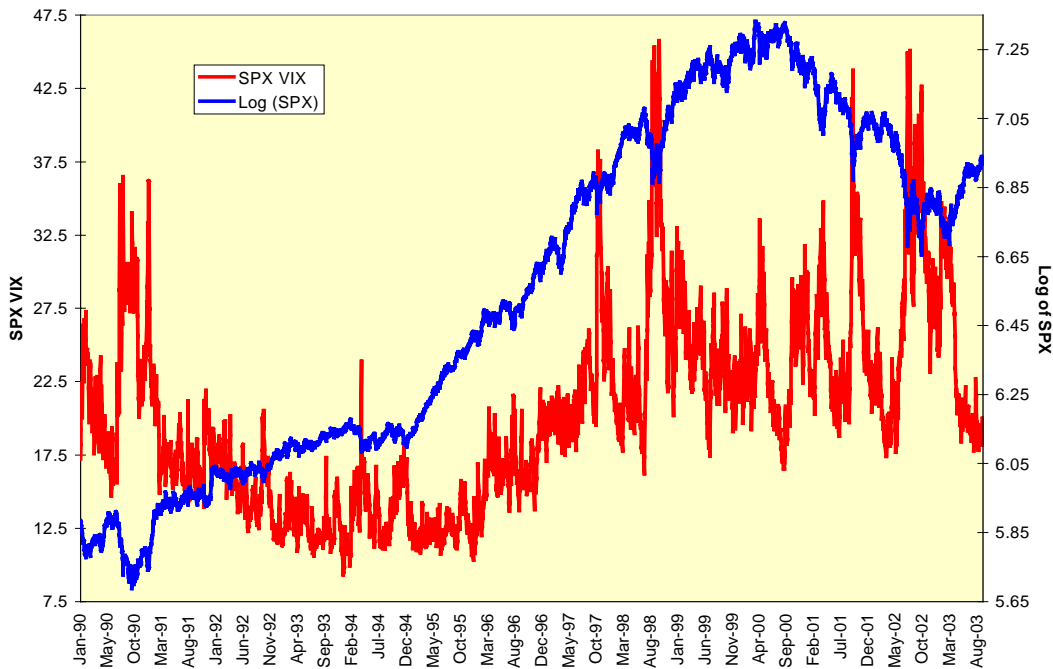
A VIX future in concept meets a need extant since the first days of options trading, a way to hedge volatility. The Black-Scholes model has five variables, four of which - strike price, underlying asset price, risk-free interest rate and time to expiration - are known at all times. Only volatility is unknown, and volatility itself is one of the more volatile assets around. While there is no observable shortage of people selling software nostrums on "how to forecast volatility," Python-style, run the other way as fast as possible. They all are based on a variation of time-series analyses such as GARCH or ARIMA, all are countertrending in nature, and all will guarantee your departure in a large plastic bag the first time they are wrong. So, yes, you better believe there is a demand to hedge volatility, the derivative of uncertainty.

But what are you going to deliver on the contract? This is unrelated to whether the contract is cash-settled or delivered physically, it is related as to how the contract will be priced and how traders will hedge their risk. All futures contracts are based on the cost of carry model and the principle of indifference: If short-term interest rates are 5% (sorry, I'm old) and a holding cost such as a dividend yield is 3%, the a one-year future should trade at 2% over the current cash price. That relationship should make you indifferent between holding the asset today and a claim on the asset to be delivered one year from now.

The VIX future constitutes a forward claim on an asset that cannot be held perfectly today. In a variation on the Heisenberg Uncertainty Principle, the VIX itself can be observed but cannot be traded directly. It can be traded very imperfectly in the form of straddles and strangles on SPX options, but the degree of imperfection is such that anyone recommending these as a hedge should lose their licenses immediately.

First, we already have seen how the relationship between the SPX and the new VIX is non-linear. No surprise; in fact, this is all part of the VIX-as-a-negative-indicator cult. But the VIX and the SPX have two very different underlying processes and distributions. The SPX, as we have discovered alternatively to our joy and chagrin, trends. The VIX, mathematically, can be described as a non-mean reverting heteroscedastic process, which is a polite way of saying it jumps all over the place.

Stocks Trend, Volatility Is Shock-And-Regress



A trader who goes long the VIX and short a SPX straddle could easily lose on both sides of the trade, and should not in fact have any expectation that one position will offset the other.

A second drawback to the VIX future is its mismatch in time decay. The SPX options stop trading on the Thursday before the third Friday of the month, and then are settled on a special AM settlement based on the opening price of each of the 500 stocks in the index. The VIX is based on the first two months of the SPX options, and the months are rolled forward with eight days left to expiration of the first month. So while the SPX options are undergoing their most rapid time decay, the time premium of the VIX is getting refreshed. This should mean that the basis of the VIX future will have to shift from the original first two months, say October and November, to the next two months, November and December, eight days prior to October's expiration. This shift in the underlying asset will change the convergence pattern, or monotonic decay function, of the future.

Finally, the shifting of the underlying asset and the inability to carry the VIX itself will preclude an active forward curve; positions in one month will be quite difficult or impossible to offset in another month. Given the CBOE's inclusion of the over-the-counter market in volatility swaps as a market for VIX futures, and given the reliance of swaps traders on multiple-month strips of futures, the contract may not be designed well for the this target market.

The VIX futures, when they start to trade, will be watched closely, and everyone should wish for their success given the importance of volatility and the obvious demand for protection against its adverse effects. This will be another one of those cases where the market will have to decide whether the financial services industry has passed its "how-to" test.