

VIX Short-Term Futures ETPs: Do They Live Up To Expectations?

Jan. 25, 2016 5:07 PM ET19 comments

by: David Easter

Summary

- Five popular volatility ETPs are designed to track short-term VIX futures, not the spot VIX.
- Over extended periods, price movements of the ETPs follow their tracking indexes quite well.
- On a day-by-day basis, discrepancies between tracking index changes and ETF price changes can be substantial.
- Historical performance of five ETPs over more than four years is analyzed and the outcomes are compared.
- Additional factors relevant to choosing a specific ETP are summarized.

Introduction

On Seeking Alpha's *StockTalks*, it is not uncommon to read a comment that expresses the following general sentiment. "The VIX is down 20% today, but the VelocityShares Daily Inverse VIX Short-Term ETN (NASDAQ:XIV) is only up 10%. It has a lot of catching up to do!" Or, "it is a broken ETN!"

The most common response points out that these ETPs do not track the spot VIX, but are instead designed to track short-term VIX futures. A comment by one reader went on to assert that the ETPs follow their tracking index "perfectly."

Anyone who has done their due diligence knows that the five short-term volatility ETPs discussed in this article are not intended to track the spot VIX. But do these ETPs truly follow their tracking indexes perfectly?

To address the question, this article takes a close look at five popular ETPs that are linked to short-term VIX futures: the iPath S&P 500 VIX Short-Term Futures ETN (NYSEARCA:VXX), XIV, the VelocityShares Daily 2x VIX Short-Term ETN (NASDAQ:TVIX), the ProShares Ultra VIX Short-Term Futures ETF (NYSEARCA:UVXY), and the ProShares Short VIX Short-Term Futures ETF (NYSEARCA:SVXY). We evaluate

both their long-term performance over more than four years, and their typical daily performance over the same timeframe.

Sources of Data and Information

This study analyzes historical data from October 4, 2011 (the inception date of both UVXY and SVXY) through January 15, 2016, inclusive. The results provide a head-to-head comparison over the entire timeframe when all five ETPs have been simultaneously available for trading. Historical settlement prices of VIX Futures (monthlies) were downloaded from the CBOE website. The historical closing prices of the five ETPs were downloaded from Yahoo! Finance.

The prospectus of each ETP can be accessed via one of the following links: UVXY and SVXY, XIV and TVIX, VXX. The methodology that underlies the calculation of S&P VIX Futures Indices is documented on the S&P Dow Jones Indices site. Four of the futures indices are related to this article: SPVXSPID, SPVXSP, SPVIXSTR, and SPVXSTR. SPVXSPID and SPVIXSTR are real-time indices, whereas SPVXSP and SPVXSTR are end-of-day indices. SPVXSPID and SPVXSP are "excess return," ER, indices, whereas SPVIXSTR and SPVXSTR are "total return," TR, indices. The daily change in a TR index is equal to the daily change in the corresponding ER index *plus* a daily three-month U.S. Treasury bill return.

Officially, the daily performances of VXX, XIV, and TVIX should track the appropriate relationship to SPVXSTR, whereas the daily performances of UVXY and SVXY should track the appropriate multiple of SPVXSP. Because two different indices are referenced, the gross annual fees, as published in the prospectuses, are not directly comparable.

On the other hand, when each of the ETP's published *net* fees are used, direct comparisons of the five ETPs are possible when the ER index (SPVXSP) is used to track the end-of-day performance.

Method of Evaluation

Because intraday ETP and Futures prices are not readily available, this analysis is based on closing prices. SPVXSP is used as the reference index, and each ETP's *net* fees, as published in its prospectus, are used without modification.

The following six paragraphs summarize the strategy used to analyze the performance of the ETPs. Readers who are not interested in the details should skip to the results in the next section.

1. Calculate the Historical Daily Changes in the SPVXSP Index, based on historical settlement prices of the VIX Futures. In a recent Seeking Alpha article, I outlined two seemingly-different pathways for calculating the daily change in the index, and demonstrated that both pathways yield identical results. To ensure accuracy in this report, the daily changes were calculated separately by both methods, and the results were verified to be precisely equal.
2. Calculate the Predicted Daily Changes Separately for each ETP. To do this, multiply the daily index change by the appropriate leverage factor, then subtract the ETP's daily net fee. The leverage factors are: +2 for UVXY and TVIX, -1 for XIV and SVXY, and +1 for VXX. The daily net fees were estimated as being the fee which, if compounded over 252 consecutive market days, would be equal to the ETP's net annual fee.
3. Calculate the Actual Daily Changes of each ETP Separately. Note that this and the daily changes described in the preceding two paragraphs are fractional, and are relative to the previous day's closing price. The fractional change is found by subtracting yesterday's closing price from today's closing price, and then dividing the difference by yesterday's closing price.
4. Calculate Running Prices for each ETP. Do this separately for each ETP, based first on predicted daily changes, and then based on actual daily changes. To enhance direct comparisons, all initial ETP closing prices for October 4, 2011 were set to a value of 100. The running price for a given day is found by multiplying the running price of the previous day times 1 plus the daily fractional change.
5. Determine the Coefficient of Determination for Running Actual vs. Predicted Prices. Do this separately for each ETP. The coefficient of determination, also known as *r-squared*, is interpreted as representing the proportion of the variance in the dependent variable that is predictable from the independent variable. In the present context, an r-squared value of 0.98 indicates that 98% of the total variation in actual running prices can be explained in terms of the predicted prices. The remaining 2% of the total variation in running prices is unexplained. This result is used to assess how well the ETPs track expectations overall in the long run (Result 1).
6. Determine the Coefficient of Determination for Predicted Daily Changes vs. Actual Daily Changes. Do this separately for each ETP. This result is used to assess how well the ETPs track expectations on a day-to-day basis (Result 2).

Result 1: Long-Term Tracking is Quite Good for All Five ETPs

Results for long-term tracking, over 4.28 years since October 4, 2011, are summarized in Table 1. The r-squared coefficients range from 0.9983 to 0.9999, indicating that in the long

term, actual ETP prices can be reliably predicted from predicted prices that are based on the rules defined in the ETP's prospectus.

Four of the five ETPs had closing prices on January 15, 2016, that were better than the prediction. These are green-shaded in the table. Head-to-head, the actual compound annual growth rate, CAGR, of TVIX is the same that of UVXY, -87.81%. Based on the data, the actual CAGR of SVXY (33.29%) appears to be slightly better than that of XIV (32.87%), by a slim margin of 0.42%.

TABLE 1. Overall Price Action from 10/4/2011 - 1/15/2016					
10/4/2011 to 1/15/2016	VXX	TVIX	UVXY	XIV	SVXY
Time Duration	1078 market days, 4.28 calendar years				
Leverage Factor vs. SPVXSP Index	1x	2x	2x	-1x	-1x
% of Original 10/4/11 Price on 1/15/16 (Actual)	3.158%	0.01219%	0.01219%	337.7%	342.3%
% of Original 10/4/11 Price on 1/15/16 (Predicted)	3.133%	0.01206%	0.01213%	338.9%	339.2%
Overall Cumulative Price Error as of 1/15/16	0.768%	1.090%	0.454%	-0.356%	0.913%
r ² for Predicted vs. Actual Running Price	0.9999	0.9983	0.9996	0.9994	0.9994
Overall CAGR on 1/15/16 (Actual net after fees)	-55.38%	-87.81%	-87.81%	32.87%	33.29%
Overall CAGR on 1/15/16 (Predicted net after fees)	-55.46%	-87.84%	-87.83%	32.98%	33.01%
Net Annual Fees (Prospectus)	0.89%	1.65%	1.51%	1.35%	1.33%

Overall, the historical vs. predicted performance has been strong for all five of the ETPs. The difference between XIV and SVXY may or may not be meaningful, given the high level of daily fluctuation, discussed in the next section.

Do the ETPs follow their tracking index perfectly? Based on an extended timeframe of more than four years, their overall long-term tracking has been quite good. Score a plus for the ETPs. Long-term holders of the ETPs can anticipate gains or losses fairly accurately. That said, no prudent investor would intentionally hold a long position in VXX, TVIX, or UVXY over any extended period of time, given that these ETPs have averaged annual losses of 55.4% to 87.8% (TVIX and UVXY) since October 4, 2011.

Result 2: Day-to-Day Tracking: Not So Good

Results for day-to-day tracking, assessed over 4.28 years since October 4, 2011, are summarized in Table 2. I offer comments on four of the entries (rows) in the table.

TABLE 2. Daily Prediction Performance from 10/4/2011 - 1/15/2016					
10/4/2011 to 1/15/2016	VXX	TVIX	UVXY	XIV	SVXY
Average Daily Change Prediction Error	-0.016%	-0.101%	-0.066%	-0.018%	-0.016%
Median Daily Change Prediction Error	0.012%	0.015%	0.024%	-0.021%	-0.036%
SEM of the Daily Change Prediction	1.377%	3.396%	2.761%	1.448%	1.454%

Average Daily Change (Actual)	-0.239%	-0.548%	-0.512%	0.197%	0.199%
Median Daily Change (Actual)	-0.522%	-1.083%	-1.087%	0.499%	0.531%
StDev of Daily Change (Actual)	4.051%	7.609%	8.082%	4.056%	4.070%
Average Magnitude of Daily Change (Actual)	2.975%	5.457%	5.926%	2.981%	2.987%
Median Magnitude of Daily Change (Actual)	2.198%	3.811%	4.304%	2.139%	2.162%
StDev for Magnitude of Daily Change (Actual)	2.757%	5.329%	5.516%	2.756%	2.771%
SEM as a Percentage of the Daily Change Prediction	62.65%	89.10%	64.15%	67.68%	67.23%
r² for Predicted vs. Actual Daily Change	0.884	0.801	0.883	0.873	0.872

1. SEM (Standard Error of Measurement) of the Daily Change Prediction. 70% of actual daily changes are expected to differ from the predicted change by this amount or less. For example, VXX has an SEM of 1.377%, indicating that the daily change in the price of VXX can be expected to differ from the predicted change by as much as 1.377% of the previous day's closing price. The smaller the SEM, the more reliable the prediction. While the SEMs of XIV and SVXY are comparable (1.45%), the SEM of TVIX (3.40%) is 23% larger than that of UVXY (2.76%), indicating lower confidence in the day-to-day prediction of TVIX price changes.
2. Median Magnitude of Daily Change. Half of daily changes will be greater than this value (in either the positive or negative direction), and half will be less. The values for XIV and SVXY are comparable (2.14-2.16%). The median magnitude of UVXY (4.30%) is 13% larger than that of TVIX (3.81%), suggesting somewhat higher volatility in the daily price action of UVXY.
3. SEM as a Percentage of Daily Change Prediction. This represents the SEM in (1), expressed as a percentage of the median magnitude of daily change in (2). To illustrate, for TVIX, the value is 89.10%. This implies that on a typical day, when the daily predicted change is a loss of 3.81%, the actual daily change can be expected to fall anywhere between a loss of 0.41% and a loss of 7.20%. The larger the value, the greater the daily tracking error, and the less reliably the ETP will act on any given day. On this basis, UVXY's daily tracking (64.2%) is more reliable than that of TVIX (89.1%), whereas XIV and SVXY are similar (67.2-67.7%). In all five cases, the typical error represents a large fraction of the predicted daily change percent!
4. R-Squared for Predicted vs. Actual Daily Change. In this context, the r-squared value indicates the percentage of actual daily price changes that can be explained in terms of the predicted daily price changes. The r-squared value of UVXY (0.883) is 8.2% better than that of TVIX (0.801). The values of XIV and SVXY are comparable (0.872-0.873).

One issue potentially makes *all* of the tracking errors appear larger than they actually are. The equity markets normally close at 4 pm ET, whereas the futures markets close at 4:15

pm. This means that the futures settlement data actually predict hypothetical ETP results, as if the equity markets also closed at 4:15 pm. The 15-minute offset will degrade, at least to some extent, the correlation between actual and predicted ETP closing prices. We expect, however, that there should be no long-term directional bias in the price changes of VIX futures between 4:00-4:15 pm. As a result, long-term *differences* between the overall ETP averages are meaningful.

According to the prospectuses, fees accumulate every day, including weekends and market holidays. Our calculation assumed a 252 market-day year, and compounded the annual fee over 252 trading days. The long-term error introduced by our approximation is expected to be negligible.

Do the ETPs follow their tracking indexes perfectly? Based on day-to-day tracking errors evaluated over more than four years, the day-to-day tracking records are not very good. Score a minus for the five ETPs. This conclusion is consistent with comments to the effect that a given ETP is not living up to expectations. A high degree of uncertainty is associated with short-term trading - even when you can correctly guess the direction of volatility change.

Other Factors to Consider When Choosing a Short-Term Volatility ETF

To summarize the discussion so far, two key factors to consider when selecting a short-term volatility ETP are the accuracy of long-term tracking (Result 1), and the typically large day-to-day tracking errors (Result 2).

Additional characteristics that should be considered when choosing an ETP are summarized in Table 3.

ETF or ETN? An exchange traded fund, ETF, is a fund that holds the asset it tracks. An exchange traded note, ETN, is an unsecured debt note issued by an institution. To describe their legal structures, Morningstar uses the terms, "collateralized debt instrument" and "uncollateralized debt instrument" for the ETFs and ETNs respectively. The credit rating of the underwriter is an important consideration when trading ETNs, because in principle, if the underwriter were to go bankrupt, the investor could risk a total default.

A Schedule K-1 Tax Filing is required for both UVXY and SVXY. On the surface, this is a nuisance. In practice, it takes some amount of effort to figure out. However, if you were to hold SVXY for an extended period of time and you realized *short-term* capital gains, the K-1 filing could be worth your while. The reason is that a portion of the short-term gains

reported by your broker are converted into long-term gains on the Schedule K-1, and are actually taxed by the IRS at the lower long-term capital gains rate. On the other hand, if the instrument were held more than one year, the tax advantage might be reversed. Be advised that the preceding comments do *not* constitute tax advice. Each reader should consult a certified tax advisor for information regarding their personal tax situation.

TABLE 3. Other Characteristics of the Five ETPs					
	VXX	TVIX	UVXY	XIV	SVXY
ETF or ETN?	ETN	ETN	ETF	ETN	ETF
Leveraged?	no	yes (2x)	yes (2x)	no	no
Inverse?	no	no	no	yes	yes
K1 Tax Filing Required?	no	no	yes	no	yes
Average Volume, Shares (last 3 months, 1/19/16)	67.9 M	28.6 M	28.2 M	30.3 M	5.47 M
Average Price (last 3 months, 1/19/16)	\$20.08	\$6.69	\$30.31	\$27.81	\$54.43
Average Volume, Dollars (last 3 months, <i>calculated</i>)	\$1360 M	\$190 M	\$855 M	\$840 M	\$295 M
Options offered?	yes	no	yes	no	yes

Average Volume, Dollars is the metric I like to use to evaluate liquidity. The greater the daily average, the easier it should be to buy or sell the instrument at, or very close to, the prevailing market price. On this basis, VXX is the most liquid ETP among the five.

Options are an important component of many trading strategies. Three of the ETPs currently offer options, whereas two do not.

The Ease of Shorting: Are shares available to short? If so, is there an additional fee? This is not included in Table 3, because the answer differs from broker to broker.

The head-to-head comparisons in this article provide a starting point for deciding which volatility ETP is best suited for a given investing/trading strategy. Happy hunting to all!

Disclaimers

The information and analysis in this article are believed to be accurate. Any alleged error(s) will be examined, and will be corrected if confirmed to be valid.

ETP performance was analyzed on the basis of historical prices over a period of 4.28 years. Historical outcomes are dependent on the beginning and end dates chosen, and provide no guarantees of future performance.

All five ETPs involve a high level of investment risk! Know the product, and trade carefully.

Disclosure: I/we have no positions in any stocks mentioned, and no plans to initiate any

positions within the next 72 hours.

I wrote this article myself, and it expresses my own opinions. I am not receiving compensation for it (other than from Seeking Alpha). I have no business relationship with any company whose stock is mentioned in this article.

 Like this article

Comments (19)

itscalledcommonsense

Tax advantages of SVXY/UVXY are major. You get to report them as futures, Sec 1256 contracts. 60/40 LT/ST cap gains no matter the holding period. Can carry back losses, as well as carry forward. No lot level detail required.

Additional benefit: you aren't short a CDS to the issuer.

25 Jan 2016, 05:50 PM

amis1

@itscalledcommonsense

You wrote: "Can carry back losses, as well as carry forward."

Do the Wash Sale rules apply to SVXY?

Ex. If I have a Losing Sale and then within 30 days Before or After this sale I Buy SVXY, does the previous loss affect my new buy price?

There are 3 consequences for a Wash Sale: the Loss is disallowed, the Basis of the new buy and the Holding Period are modified.

Do all those apply to SVXY?

Thanks for your help

amis

25 Jan 2016, 10:46 PM

VTH

The answer to your question is yes. I have fidelity as broker.

26 Jan 2016, 10:01 AM

itscalledcommonsense

I think there is a gray area here, but this is my personal opinion:

No wash sale does not apply.

With respect to SVXY/UVXY you ignore everything on 1099 from your broker and report what is on K-1 from ProShares.

Your broker is playing it safe and reporting on the ETF as if they are not Sec 1256 contracts. ProShares reports as if they are. The WORST possible thing you can do is report both what is on the 1099 and the K-1, as you will be double taxed.

26 Jan 2016, 02:57 PM

VTH

@itscalledcommonsense, yes, wash sale applies for svxy. I have personal experience of it (when sold on loss and bought back with in 30days, the loss is not registered, system bumps up the cost basis.)

26 Jan 2016, 07:15 PM

itscalledcommonsense

I know your broker says it is a wash a sale, but it isn't a wash sale per US tax code, if it can be treated as Sec 1256 contract. If you use the K-1 and report as Sec 1256 contract then you ignore the 1099.

<http://tinyurl.com/hcz...>

<http://tinyurl.com/qj6...>

27 Jan 2016, 06:01 AM

sheepdip

I recently closed out all my VIX trades and luckily at a small profit . Too risky for me.

26 Jan 2016, 02:54 PM

amis1

@itscalledcommonsense

wow, that was a big surprize.

Last year I spent weeks compiling a 43 page doc about Wash Sales and planning strategies how to overcome the potential Wash Sale of SVXY holdings in different accounts (taxable and IRA), some of them being losing positions, before Dec. 31.

I didn't know that SVXY can be treated as Section 1256, i.e. like a future contract.

Indeed, looking at the K-1 Graphic Guide from 2014, I see Item 11 in K-1 [Other income (loss)] that contains the real number, to be used in Form 6781 (Gain/Loss from Section 1256).

The item 8 (Net Short -term capital gain/loss) that needs to be copied into Schedule D (Cap. Gain/Loss) is blank.

Apropos the K-1, I don't know why people are so afraid of this form.
It's very well explained by ProShares and simple to handle.

I'm really grateful for you sharing your valuable knowledge.
amis

26 Jan 2016, 10:55 PM

itscalledcommonsense

You are welcome. It is complicated. I understand why the brokers report the SVXY/UVXY transactions on the 1099, it is CYA. I also understand why ProShares reports as Sec 1256, since the funds are long or short registered futures, which are Sec 1256 contracts. But, I would imagine that most tax returns are incorrect with respect to this issue, the biggest problem is probably double payment of tax by reporting the K-1 and the 1099.

27 Jan 2016, 06:11 AM

Alan248

Is there a year-end mark to market that occurs with these funds, where a gain or a loss is associated with positions that have not been sold (and there is an off-setting adjustment to basis) ?

Or is that a grey area ?

03 Sep 2016, 06:12 AM

David Easter, Contributor

Author's reply » No. Not for long positions.

For short positions, they will mark to market at the end of each market day, but the daily mark to markets won't affect your taxes. Only the total gain/loss when you actually cover the short.

03 Sep 2016, 12:37 PM

Alan248

Right, I did mean open positions at year end (I was thinking of longs but it could be shorts as well) for tax purposes only. Hence the change in basis as well. It seems the IRS offers an exemption from that MTM treatment under certain situations but I'm unsure as to just why in this case.

Thanks.

03 Sep 2016, 05:28 PM

amis1
David

You wrote that XIV is based on SPVXSTR but Vance Harwood mentiond XIV following SPVXSP, see his article:

Volatility Related Indexes and Tickers

Updated: Oct 28th, 2015 | Vance Harwood

<http://tinyurl.com/jsa...>

According to you, XIV and SVXY are based on two different indices, so they are "Not Substantial Identical" for the purpose of Wash Sale rule, but according to Vance that is not so.

Thanks

amis

27 Jan 2016, 04:34 PM

David Easter, Contributor

Author's reply » Amis,

The "truth" is a little subtle. The XIV prospectus actually says SPVXSP (as Harwood reports), but then goes on to describe how the daily investment yield is added, based on a 90-day treasury note, making it functionally identical to SPVXSTR. Ultimately, that is why I chose to use SPVXSP for all of the comparisons. As long as you use net (not gross fees), setting SPVXSP as the common reference puts them all on a level playing field.

I don't claim to be a tax expert. But I can tell you that I know someone who sold an SVXY position at a loss in December, and then opened a new position in XIV within the 30-day time frame. The brokerage did not report it as a wash sale, nor did the IRS kick it back.

27 Jan 2016, 05:12 PM

David Easter, Contributor

Author's reply » Upon further review, it would more accurate to reword the first sentence of the third paragraph under Summary of Data and Information. XIV and TVIX should both follow SPVXSP (not SPVXSTR, as written). Note that this correction has no effect on anything else in the article.

20 Feb 2016, 01:18 PM

amis1

David

Thanks for the clarification and for your honesty.

21 Feb 2016, 05:36 PM

29741

well written.

02 Feb 2016, 02:02 AM

optionpro

It is something of a different subject, but options are available on SVXY and currently possess some very generous premiums. I keep my contract lengths at 2 to 5 weeks so as to minimize the chance for bad outcomes. Love to hear about others using this strategy.

05 Feb 2016, 06:38 PM

Learner16

Thank you for the article, Mr Easter.

04 Sep 2016, 03:28 AM