

CBOE's New Weapon to Hedge Interest Rate Volatility Exposure

By Vance Harwood for CBOE

First introduced in 2013, the **CBOE/CBOT 10-Year U.S. Treasury Note Volatility Index (TYVIXSM Index)** filled a gap in the exchange's volatility-index offerings, but it lacked any investable securities attached directly to it. That is, until recently...

Now, with the advent of TYVIX futures (Ticker symbol: VXTY) contracts based on the index, fixed-income traders have a straightforward and effective set of tools to manage interest rate volatility exposure. Alternative methods, like delta-hedged OZN option straddles, for example, require dynamic position management techniques that are most problematic just when you need them the most — when the market has discontinuous jumps. TYVIX futures are much more attractive and low-maintenance in comparison.

But, as is often the case with relatively new financial indexes and investment vehicles, market participants are spread out all over the learning curve, and the TYVIX Index and its futures are no different.

Why futures on TYVIX?

While all markets can be roiled by geopolitical/economic events, interest rate markets have a special abundance of potentially disruptive scheduled news releases. Predictably, TYVIX Index values tend to climb before scheduled Federal Open Market Committee (FOMC) policy announcements, non-farm payroll figures, and Treasury auctions — reflecting the uncertainty and macroeconomic impact of these events. By using TYVIX futures, traders have the ability to protect portfolios against disruptive events, as well as to easily remove those hedges once the uncertainty levels have dropped.

TYVIX Futures Details

The TYVIX Index measures expected percentage changes in the underlying 10 yr. futures prices over a one-month period, relying on the same model-free volatility calculation as the well-known CBOE Volatility Index[®] (VIX[®] Index), but utilizing options on 10-year Treasury note futures (OZN) instead of S&P 500[®] Index (SPX) options. Traders and fund managers familiar with the VIX Index should understand TYVIX's construction very quickly.

TYVIX futures expire monthly on a schedule that is driven by the OZN expiration calendar. So rather than the equity-style third Friday of the month expiration, OZN options expire on the last Friday of the month, as long as there are two or more business days in the month after that Friday. If that condition is not satisfied, then the next to last Friday is used. TYVIX future's expiration is 30 days prior to the OZN option series' expiration date.

TYVIX Futures Hedging and Trading Examined

TYVIX futures are insensitive to absolute levels of interest rates; this characteristic eliminates one of the toughest problems encountered when trying to use interest rate futures or options to manage interest-rate risk. For example, if a trader believes that interest rates will jump after an FOMC meeting in early September and they want to use 10-year Treasury options to implement that trade, they need to be right on two accounts: the behavior of interest rates and the expectations of future interest rate



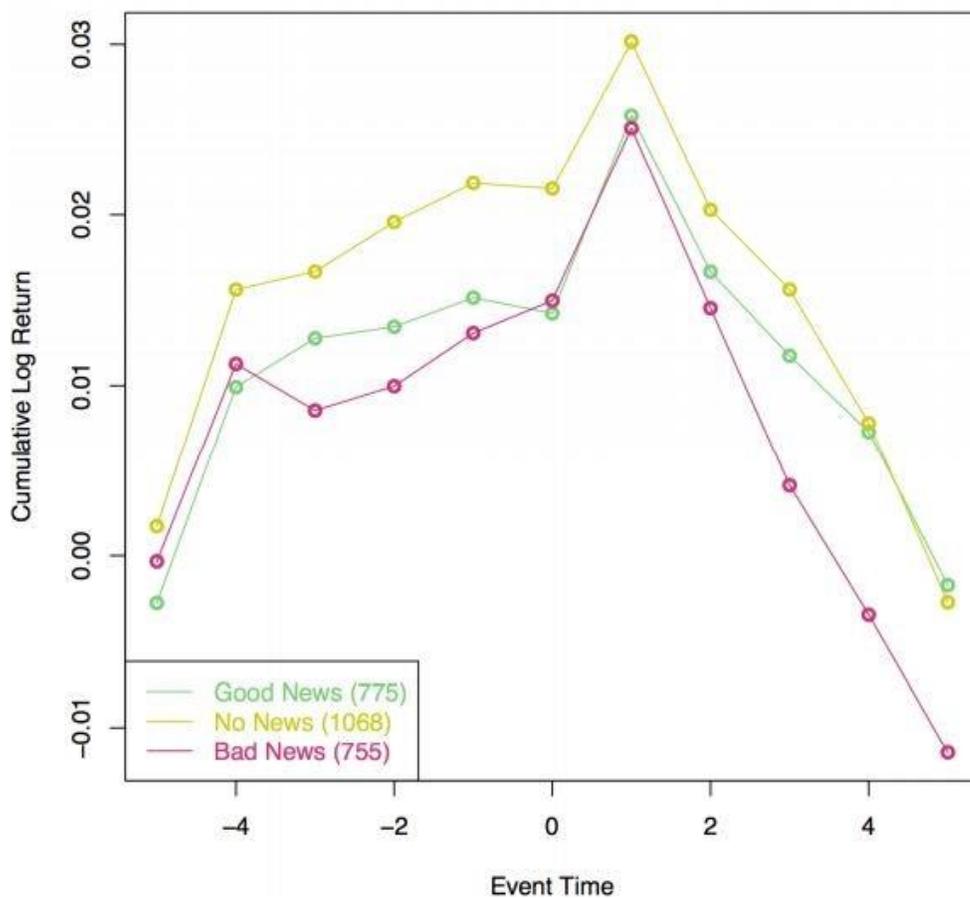
First introduced in 2013, the CBOE/CBOT 10-Year U.S. Treasury Note Volatility Index (TYVIX Index) filled an offering gap...

What is TYVIX?

The TYVIX Index is designed to reflect investor's consensus view of the expected volatility of CBOT 10-Year Treasury note futures (TY futures) over the next 30 calendar days.

movements after the announcement relative to the level of the expected volatility before the announcement. If they buy the September 125 call options and the market proceeds to rally to 130 after the FOMC announcement it would stand to reason that the value of the options would have increased. However what can happen (and in many instances, does) is that volatility collapses after a significant macroeconomic release (illustrated in the chart below) causing the option value to decrease. So, an investor can be correct regarding the direction of interest rates but incorrect on the execution of the strategy if the volatility component of the option premium isn't hedged correctly.

Event risk trading for scheduled macroeconomic announcements is an especially intriguing application for TYVIX futures. The chart below shows the result of a CBOE study that charted changes in the TYVIX Index relative to the announcement dates for 26 macroeconomic indicators — more than 2500 data points in all.



Source: CBOE [Compendium of Empirical Findings](#)

By selecting the nearest TYVIX future that expires after a scheduled event, the trader can go long a few days before an announcement, benefit from the bump in volatility that anticipates the event, and then sell when the news is announced. A similar strategy is utilized prior to earnings announcements of corporations, where options are used to capture the implied volatility climb before the event, but TYVIX futures may have an advantage because the VIX methodology renders the futures insensitive to drift in the underlying before the announcement.

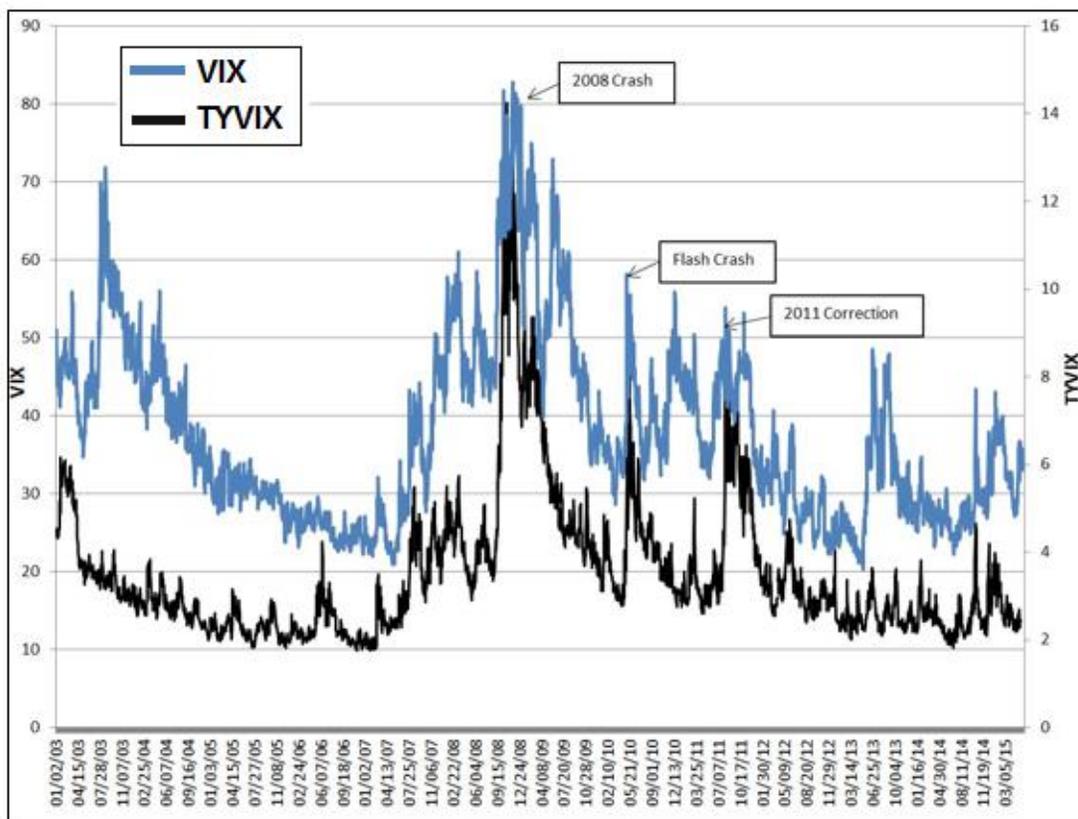
When implementing this volatility bump strategy with options, typically an ATM straddle, the trader has a delta neutral position initially, but if the underlying shifts, the deltas of the call / put positions can change rapidly, creating directional risk for the trader unless they frequently neutralize the delta with futures and likely add options to cancel out the gamma imbalance. It's not hard to see that buying and holding TYVIX futures for event-based trading can be a very attractive strategy.

There are some additional similarities and differences that need to be discussed to avoid inappropriately transposing too much of the VIX Index's behavior on to the TYVIX Index.

Comparison of the TYVIX and VIX Indexes

Lower Volatility than VIX, More Spikes

The absolute value of the TYVIX Index tends to trend quite a bit lower than the VIX Index, but the former's annualized volatility is surprisingly high. In fact, TYVIX's annualized volatility is only 31% lower than VIX. Zooming in on the chart below shows that TYVIX (blue line) has had more major volatility spikes than VIX – something the average market participant might find counterintuitive. The additional spikes are correlated to interest rate events that didn't perturb the equity market.



Data source: CBOE

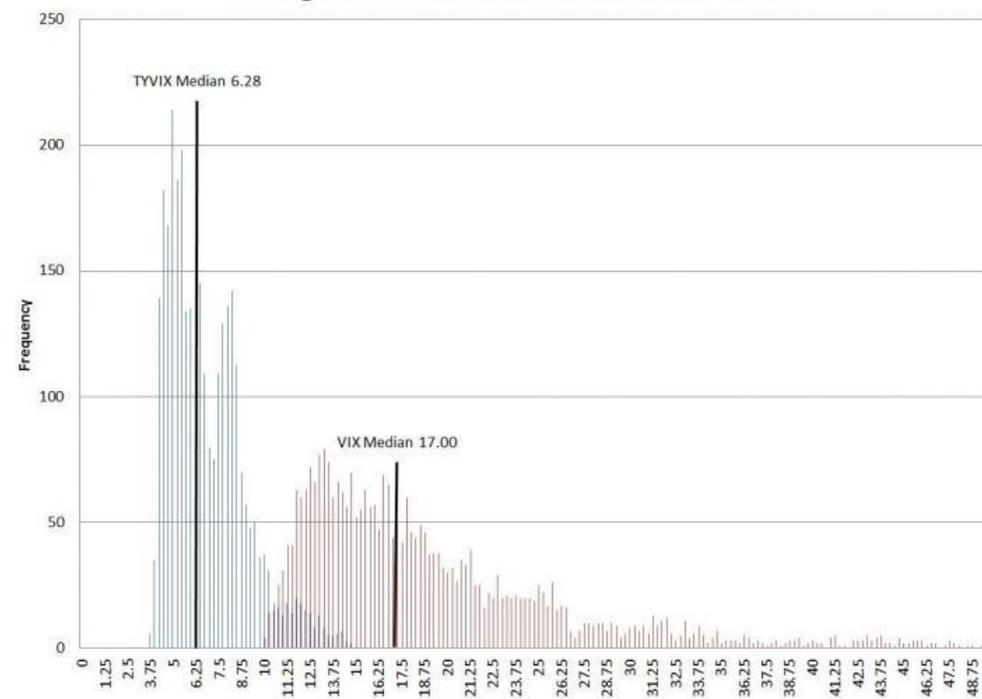
I've annotated where TYVIX spiked coincident with VIX. The additional interest-rate events boost TYVIX's overall volatility.

Similar Mean-Reverting Characteristics

Both the VIX and TYVIX Indexes are mean reverting. The overall histogram of TYVIX values has a somewhat similar distribution as VIX, just shifted 11 points lower.

The lower bound of volatility on both interest-rate securities and equities shows up as the clipped left shoulder of the distributions. On the right side of the distributions, the fat tail of fear stretches out—relics of past crashes, shocks, and cliffs.

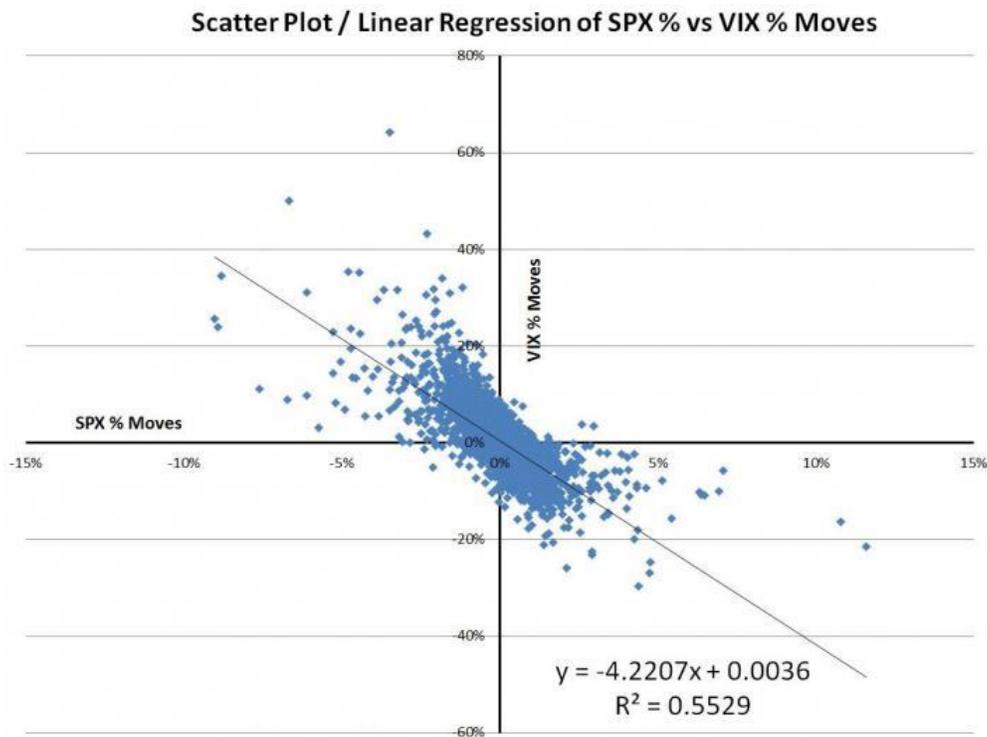
Histogram of TYVIX & VIX Values 2003 - 2015



Data source: CBOE

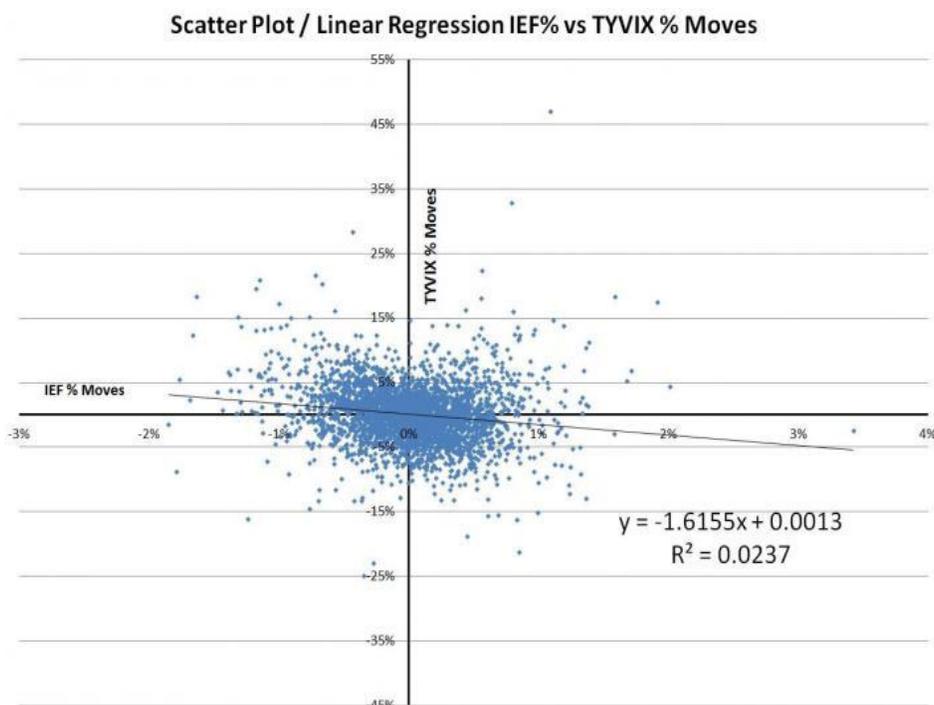
TYVIX and Interest-Rate Changes are Not a Linear Relationship

When using volatility futures to hedge big moves in interest rates, determining correlation is important. This is an area where the TYVIX Index differs significantly from the VIX Index. A linear regression of VIX percentage moves compared to S&P 500® Index (SPX) shows a clear and statistically significant relationship.



Data source: CBOE

However, running the same analysis on TYVIX percentage moves vs. the IEF 7-10 Year Treasury Bond ETF returns a statistically insignificant blob.



Data source: CBOE

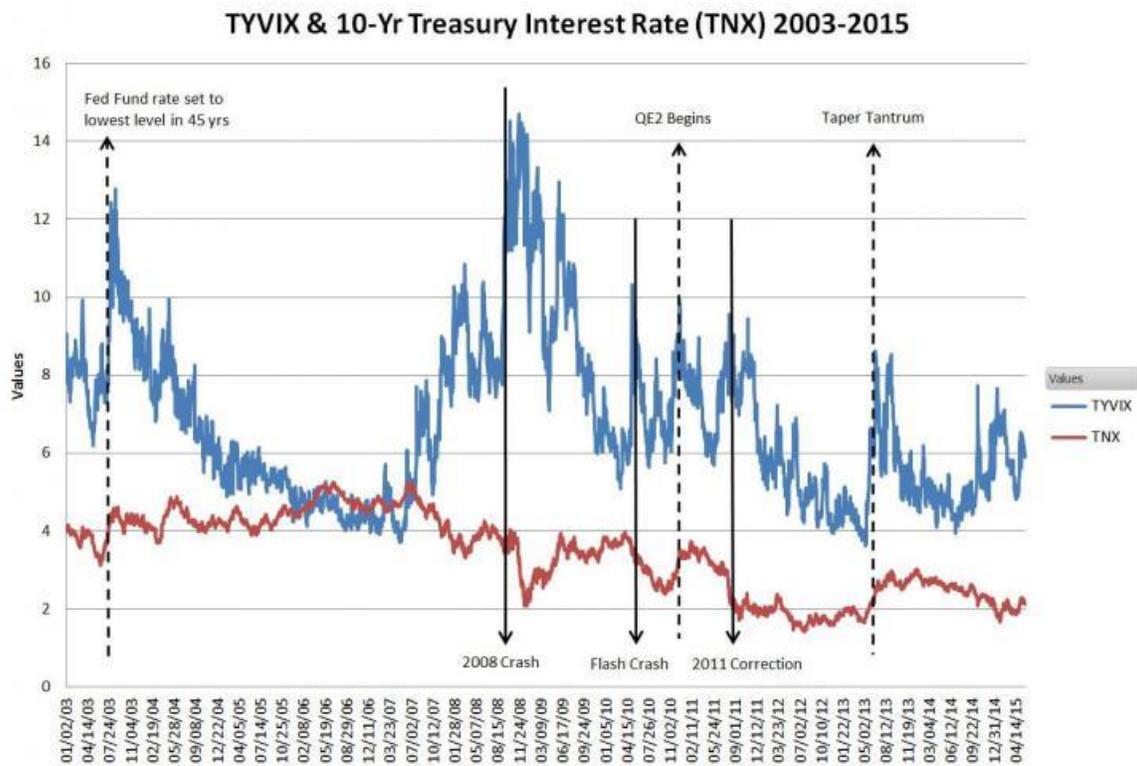
Linear regression is the wrong approach to use with TYVIX, because its relationship to interest rate changes is *not* linear.

There is a fundamental difference in the way volatility measures respond to price changes in the equity market vs. the fixed income market. When equities move up significantly almost everyone (except for the short seller) celebrates — and the VIX Index tends to trend down. On the other hand, sharp downward moves in equities magnify fears and exhibit big upward spikes in volatility. The VIX Index's contrarian response to equity moves is consistent and relatively linear across the entire spectrum of market moves.

However, big increases in 10-year Treasury prices (decreasing rates), rather than being universally appreciated, cause market participants - namely mortgage lenders - to be fearful. Their future income stream is threatened because their prepayment risk increases as refinancing rates decrease. Conversely, when Treasuries drop in value (increasing rates), it's mostly the fixed income investors with longer dated maturities turn to worry since their portfolios are more sensitive, due to the longer duration, to adverse interest rate movements.

So regardless of the direction, many people fear big interest-rate moves due to the symmetrical risk exposures inherent in the fixed income space.

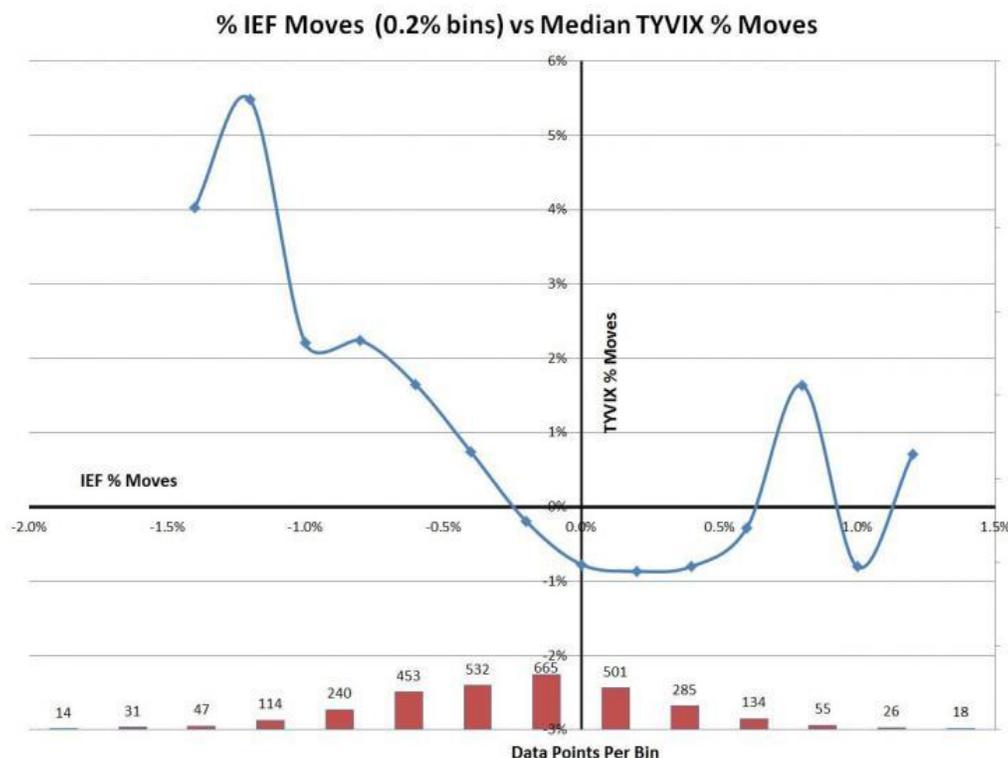
The chart below illustrates how the TYVIX Index has spiked with both positive and negative interest rate moves.



Data source: CBOE

This di-phobic behavior of market participants being fearful with both up and down moves mandates a non-linear analysis of TYVIX's correlation with fixed-income securities.

The analysis I used segregates the price percentage moves of the fixed income securities (the iShares 7-10 Year Treasury Bond ETF (IEF) in this case) into a limited number of bins and then computes the median of TYVIX moves for each bin. For example, on days when IEF dropped between -1.0% and -1.2%, the median TYVIX move was +2.2%. The resulting correlation chart for IEF vs TYVIX is shown below.



Data source: CBOE

The histogram at the bottom of the chart shows the number of data points in each bin. At the plus / minus extremes, the statistical significance of the correlations is reduced.

The chart above demonstrates that the relationship between fixed income moves and the TYVIX Index appears to be decidedly non-linear. This means that if a fixed income trader wants to hedge against big moves in interest rates, he/she doesn't have to forecast the direction of the interest rate moves. TYVIX futures will tend to increase in price with big interest rate moves in either direction.

Conclusion

After a 30-year bull market, the crystal ball for interest rates reveals a couple things clearly—rates won't go much lower, and the path for the next few years will be bumpy. TYVIX futures are available to act as shock absorbers and turbochargers on that path.

NOTE: CBOE has put together an impressive set of documentation for the TYVIX index and TYVIX futures—covering some topics not discussed in their VIX Index documentation. Some key links:

- [CBOE Expiration Calendar](#)
- [Introduction to the TYVIX index](#) (calculation and salient features)
- [TYVIX Futures Primer](#) (settlement, fair value, term structure, hedging strategies)
- [Compendium of Empirical Findings](#) (sensitivity, volatility risk premium, historical event response, non-arbitrage model, intraday volatility management, etc.)

Vance Harwood is a private investor and consultant who is also a featured contributor on [CBOE's Options Hub](#) website. His investment activities include trading index ETFs, volatility related ETPs and their associated options. Harwood also publishes volatility-related articles at his independent website, [sixfigureinvesting.com](#). There he tracks the US based volatility ETPs and has simulated the performance of most of them back to the initiation of VIX Futures in 2004.

Futures trading is not suitable for all investors, and involves risk of loss. Options involve risk and are not suitable for all investors. Prior to buying or selling an option, a person must receive a copy of Characteristics and Risks of Standardized Options. Copies are available from your broker, by calling 1-888-OPTIONS, or from The Options Clearing Corporation at www.theocc.com. The information in this article is provided solely for general education and information purposes. No statement within this article should be construed as a recommendation to buy or sell a security or futures contract or to provide investment advice. Past performance does not guarantee future results. Visit www.cboe.com/TYVIX for more information. This document contains comparisons regarding the performance of indexes based on backtesting, i.e., calculations of how the

indexes might have performed in the past if they had existed. Backtested performance information is purely hypothetical and is provided in this document solely for informational purposes. Backtested performance does not represent actual performance, and should not be interpreted as an indication of actual performance. The VIX® index methodology is the property of Chicago Board Options Exchange, Incorporated (CBOE). CBOE®, Chicago Board Options Exchange®, CBOE Volatility Index® and VIX® are registered trademarks and TYVIX is a service mark of CBOE. CBOT is a trademark of CME Group, Inc. (CME). CBOE has, with the permission of CME, used such trademark in the CBOE/CBOT 10 Year U.S. T-Note Volatility Index. CME makes no representation regarding the advisability of investing in any investment product that is based on such index. Standard & Poor's®, S&P® and S&P 500® are registered trademarks of Standard & Poor's Financial Services, LLC and have been licensed for use by CBOE and CBOE Futures Exchange, LLC (CFE). Financial products based on S&P indices are not sponsored, endorsed, sold or promoted by Standard & Poor's, and Standard & Poor's makes no representation regarding the advisability of investing in such products. All other trademarks and service marks are the property of their respective owners.