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EXPIRING MONTHLY

THE OPTION TRADERS JOURNAL

CORRELATION RISK
as a Tradable Factor and Return Predictor

The Evolution of the Holiday Effect in VIX Futures

Does the Position Fit the Trade?

THE PREDICTIVE VALUE OF SKEW

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CONTACT INFORMATION
Editorial comments: editor@expiringmonthly.com
Advertising and Sales
Expiring Monthly President
Mark Sebastian: marks@expiringmonthly.com
Phone: 773.661.6620

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About the Expiring Monthly Team

Bill Luby

Bill is a private investor whose research and trading interests focus on volatility, market sentiment, technical analysis, and ETFs. His work has been has been quoted in the Wall Street Journal, Financial Times, Barron's and other publications. A contributor to Barron's and Minyanville, Bill also authors the VIX and More blog and an investment newsletter from just north of San Francisco. He has been trading options since 1998.

Prior to becoming a full-time investor, Bill was a business strategy consultant for two decades and advised clients across a broad range of industries on issues such as strategy formulation, strategy implementation, and metrics. When not trading or blogging, he can often be found running, hiking, and kayaking in Northern California.

Bill has a BA from Stanford University and an MBA from Carnegie-Mellon University.

Jared Woodard

Jared is the principal of Condor Options. With over a decade of experience trading options, equities, and futures, he publishes the Condor Options newsletter (iron condors) and associated blog.

Jared has been quoted in various media outlets including The Wall Street Journal, Bloomberg, Financial Times Alphaville, and The Chicago Sun-Times. He is also a contributor to TheStreet's Options Profits service.

In 2008, he was profiled as a top options mentor in Stocks, Futures, and Options Magazine. He is also an associate member of the National Futures Association and registered principal of Clinamen Financial Group LLC, a commodity trading advisor.

Jared has master's degrees from Fordham University and the University of Edinburgh.

Mark Sebastian

Mark is a professional option trader and option mentor. He graduated from Villanova University in 2001 with a degree in finance. He was hired into an option trader training program by Group 1 Trading. He spent two years in New York trading options on the American Stock Exchange before moving back to Chicago to trade SPX and DJX options For the next five years, he traded a variety of option products successfully, both on and off the CBOE floor.

In December 2008 he started working as a mentor at Sheridan Option Mentoring. Currently, Mark writes a daily blog on all things option trading at Option911.com and works part time as risk manager for a hedge fund. In March 2010 he became Director of Education for a new education firm OptionPit.com.

Andrew Giovinazzi

Andrew Giovinazzi started his career in the financial markets after graduating from the University of California, Santa Cruz with a B.A. in Economics in 1989. He joined Group One, Ltd. and quickly became a member of the Pacific Stock Exchange (and later the CBOE), where he traded both equity and index options over a 15 year span. During that period he never had a down year.

At the same time, Andrew started and ran the Designated Primary Market Marker post for GroupOne on the floor of the CBOE. It became one of the highest-grossing posts for the company in 1992 and 1993. While actively trading, Andrew was instrumental in creating and managing an option trader training program for Group One.

He left Group One, Ltd. to co-found Henry Capital Management in 2001. Andrew then joined Aqumin LLC (2008–2011) to help bring 3D quoting and analysis to financial data. He is Chief Options Strategist at Option Pit.

Editor's Notes

Bill Luby

IT HAS BEEN an exciting month for options traders, with the never-ending Greek drama keeping the euro zone on edge, elections in the United States, a leadership transition in China and of course the seemingly inexorable march toward the fiscal cliff. Yet with all the drama, the November expiration cycle was another relatively quiet one for volatility, with the VIX now unable to rise above the teens for four months and counting.

In the November issue, Expiring Monthly tackles a number of timely issues. Mark Sebastian offers up some pioneering research and analysis of the CBOE SKEW Index and its suitability as a tool for helping to predict the direction of the VIX.

Elsewhere, Andrew Giovinazzi takes a hard look at realized volatility and the "range of motion" in the underlying as a determinant in structuring positions that are best suited for specific volatility regimes.

Jared Woodard extends his recent work on volatility risk premium with a look at correlation risk premium and in the process analyzes some of the findings presented in "Option-Implied Correlations and the Price of Correlation Risk," a recent paper by Driessen, Maenhout, and Vilkov.

Instead of thinking of my gift list this holiday season, I find myself contemplating some seasonal quirks in volatility in "The Evolution of the Holiday Effect in VIX Futures."

Whether your wish list includes higher volatility or lower volatility, all of us at Expiring Monthly wish you a happy, healthy and profitable holiday season.

As always, readers are encouraged to send questions, comments or guest article contribution ideas to editor@expiringmonthly.com.

Have a good expiration cycle,

Bill Luby
Contributing Editor

The Predictive Value of Skew

Mark Sebastian

SKEW IS A TERM used in several different ways. The two most common ways I hear is the spread between months (although generally that is referred to as term structure). The other and more common use of the term has to do with the relation of the level of implied volatility of puts relative to the ATM options or OTM calls. Shops use several different methods to measure skew. Many use the 25 delta call relative to the 25 delta put at either 30, 60 or 90 days to expiration. Others measure puts and calls relative to ATM option (my preferred method). The CBOE SKEW Index uses the relation of far out-of-the-money puts (sometimes called tail risk puts, swan puts, or units) relative to more standard OTM puts.

This is a much different approach to skew, instead of telling traders how expensive OTM puts that could conceivably come into play are relative to ATM options, the CBOE has chosen to measure how expensive a put is that would really only come into play in the event of the a black swan. Furthermore, it's measuring them 30 days to expiration, a somewhat near term trade (my first criticism of the index is that it might make more sense to run a black swan index using the VXV calculation rather than VIX).

This begs the question, why does this index exist? The trader who is not well versed in options might answer that when the index is super-expensive, a sell-off might be imminent. The versed option trader might make an opposite assumption. When the SKEW Index is steep, the market has hedged against a sell-off, and thus there are serious head winds to a major sell-off. My goal was to determine whether the SKEW Index could be a leading indicator for the VIX. Will the VIX go up or down if the SKEW Index is overly flat or steep?

Let's start with overly steep. Since 2004, when the VIX switched its calculating methodology, the average price of skew has been 119.54, with a median number of 119.42. I ran several tests, if the SKEW Index was above the mean for the previous 5 days, did the VIX over the next day increase? The answer was yes, but only as often as it decreased. If the VIX was up and the SKEW Index was up, did that lead to anything? Again the answer was no. Every test I ran came back with non-tradable results. Basically, no matter where the VIX is, or where the VIX has been, a steep skew in and of itself is not a good determinant of VIX direction and produces results that are consistently a coin flip.

To be honest, the results did not surprise me, the purchase of insurance happens in times when we are in panic and when we are in calm. I then began to study whether flat skewness was more predictive than its cousin. I fully expected to find something; however, I have to admit, I was surprised by the results. Across many iterations, the first real piece of useful data was that when skew was below its mean, falling, and the VIX decreased. Over

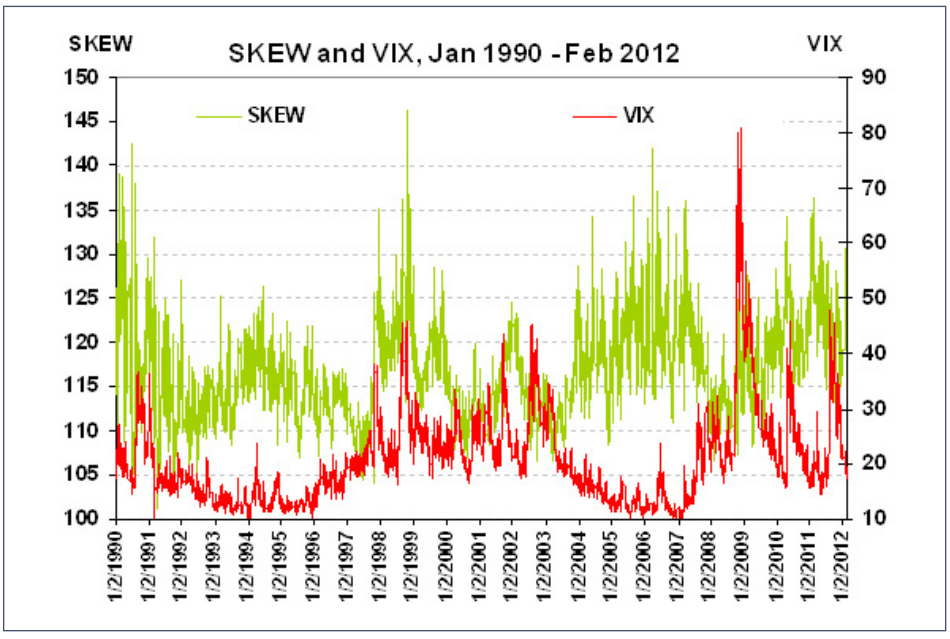


FIGURE 1 *SKEW and VIX, Jan 1990–Feb 2012*

an 8-year period there were 365 days where that happened, on 226 of those days, the VIX decreased the next day. A hit of over 60%, certainly a significant result. I then moved to see how many VIX points I could collect being short vol when VIX was down and skew was below its mean and falling. This is where I got my surprise. Despite fewer days when the VIX went up, the net gain in VIX points over the 365 occurrences was over about 44 points. An average increase of .12 points.

I now had something and began to dig. If we knew that skew falling and below the mean and a falling VIX produced positive VIX expectations, our goal was to find enough vol to trade. The one thing I always tell my students is that vol begets volatility.

Now we all know that the long term mean of the VIX is just over 20; however, because of the upper and lower limits of volatility, the VIX has many more occurrences below 20 than above. I consider the true 'mid point' of VIX to be between 18–19 over the long haul. This is why using 18 as a low VIX filter outperformed using 20 for a filter. From 2004 the VIX was above 18, falling and had a skew index below its long term mean and falling 217 times. On those days the VIX went up the next day 119 times, a win ratio of just below 55%. We managed, however, to capture almost *all* of our VIX points from our previous filter. On those 217 days, the VIX picked up just under 40 total points. A significant return of just under .50.

While I am sure there are other ways the index can be used, we have found that a low SKEW is much more predictive, especially when the VIX is elevated and falling. It might be a leading indicator when VIX is already elevated, that the index is going to go higher. EM

Does the Position Fit the Trade?

Andrew Giovinazzi

ONE OF THE FIRST things we teach Option Pit clients in our Gold Classes is how the option pricing model works. The simple reason we do this is before traders put on a position they should know how that position should perform best. The position will work when the changes in model inputs during the trade lifespan are in line with the original intent of the trade. Where the educational process starts to turn on light bulbs early on is right here. Certain positions "act" better under certain circumstances and that is totally teachable. It is a concept called **conditional trading**.

Conditional Trading

First off all positions are going to fall into two different camps. I discuss the two separately below but will only spend a few sentences on the first. The reason being is that most of the ink in finance today is dedicated to #1 so the balance of my article will be devoted to #2.

1. Use the options to trade the stock. This is where most technical and fundamental investors go. For example when Warren Buffet wants to buy KO, he will sell puts below his target price and not give a fig about the volatility. Another example would be a trader relying on a short term buy signal to buy deeper calls and avoid the risk from a change in volatility. Once the underlying hits the sell signal the position is unwound. In these cases the options are just a vehicle to accomplish goals with the underlying. The idea is to take the variable of forward volatility out of the equation. From an option model input point of view most of the reliance for success is on price of the underlying, strike and time to expiration. At least it should be.

2. Use the stock to trade the options. Here is where the unique properties of options come into play. Option values are one of the few financial instruments that have a variable in forward pricing that is not known for certain. The option market uses the next best thing which is the implied volatility of the options on the trading day. If a trader thinks the current implied volatility is too expensive between now and expiration for a given underlying, they can create a position to sell it, regardless of whether they have a bullish or bearish opinion on the underlying. It is the speed of the movement in the underlying they care about. The name they are trading is a secondary consideration, not the first. The thought process is not the closing price of AAPL today but more like is the implied volatility priced right for the next 3 weeks for the range of motion expected. From an option model point of view the forward volatility used to generate the value is the most important with price, time to expiration and strike secondary. If the relative value of the volatility component does not look interesting, there is no trade in the name.

Using Realized Volatility as a Condition

My simple definition of realized (historical) volatility is close to close movement in the underlying over some previous period of time. Most normally the intervals are a 10-day, 20-day and 30-day moving average of the past trading days. The idea here is to establish what I call a **range of motion** for the underlying. Can the underlying move enough for the position that I have chosen for it? Is the underlying moving too much for the position that I have chosen for it? If beginning traders thought about a position in this light what they would start to realize is that a poorly constructed position is doomed from the start because the realized volatility will not support (or overwhelm) the trade set up.

> The idea here is to establish what I call a **range of motion** for the underlying.

Figure 1 is an example of the most recent activity in AAPL as of the week of 11/23/2012. I have drawn a horizontal green line to illustrate the highs of 30-day implied volatility over the last 6 months. For many traders looking at implied volatility, AAPL trading at a near 6 month high in an off earnings

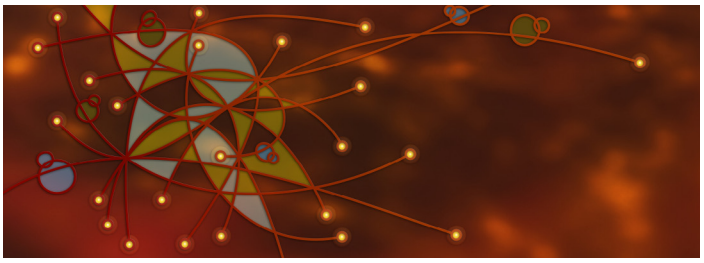
FIGURE 1

cycle would be a reason to sell options. Normally I would be with them. The problem is that the 10-day realized volatility (white line) is making a new 6 month high too. It is very difficult to make money selling options when the implied volatility is trading at such a huge discount to the recent realized volatility.

At the minimum this would change the position type a trader would use. Selling near term gamma in a butterfly type setup is doomed to failure because the *range of motion* in the underlying is too great right now. In this case it would be better to wait until the realized volatility starts to soften, like it has, and sell a less gamma-intensive position like an iron condor or some out-of-the-money put spreads. Whether AAPL is a $500 stock or a $700 stock the volatility disparities are generating the trade idea, not necessarily the direction AAPL is going. The more traders look at realized volatility, the better the position structure will start off in the first place and improved results should follow. Waiting for conditions to improve for better entry points will help the results as well. **EM**

Correlation Risk as a Tradable Factor and Return Predictor

Jared Woodard



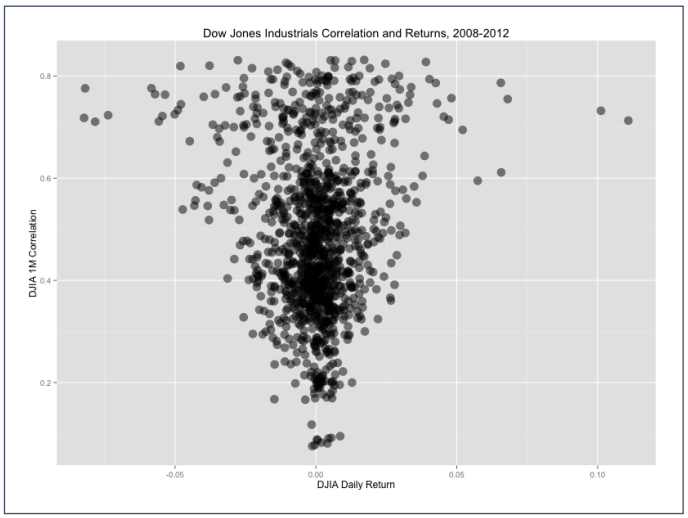
THE PROMISE of modern portfolio theory was that a basket of uncorrelated assets would provide better risk-adjusted returns, over time, than a portfolio whose constituents move together. The problem that confronted many investors in 2008 and in the years since was that, in a crisis, even traditionally dissimilar assets had the potential to become highly correlated, making diversification efforts fruitless. Investors concerned that a portfolio of stocks might become increasingly correlated in a crisis have turned to equity index options to protect against that risk.

In "Option-Implied Correlations and the Price of Correlation Risk," Driessen, Maenhout, and Vilkov argue that correlation risk is a priced factor that can be measured from equity option prices. They estimate the premium paid for correlation risk (abbreviated below as CRP) as the difference between the implied correlation in an option's price and the subsequent realized correlation of the underlying index constituents. This method should be familiar to our readers, since it is similar to the method of subtracting realized volatility from option implied volatility to estimate the volatility risk premium (VRP).

To analyze the properties of the CRP, the authors look at the time series of this premium for the S&P 500 and Dow Jones Industrials over the last fifteen years. As with the VRP, they find that the CRP is negative, meaning that option buyers have tended to pay a higher price to hedge against correlation than has actually occurred in the underlying assets.

Two other claims in the paper are of particular interest. The authors find that the CRP is a key driver of the VRP. In fact, the model they give for pricing correlation risk "attributes the entire index variance risk premium to priced correlation risk." (p. 9) This is an important claim because it is not initially obvious, conceptually, whether an increase in the volatility of a basket of assets would be a cause of higher basket correlation or vice versa. For example, while the range of daily Dow Jones returns has been wider at higher levels of correlation, a scatter plot of that relationship does not suggest a relationship (Figure 1).

The argument for the claim that correlation risk drives the index-level variance risk premium is not clear. Positing a model and finding that the data fits the model is not the same thing as an argument or an explanation. I think the idea is that, without priced correlation risk, there would be no way to explain why index options tend to be overpriced. The authors explain that the VRP for index options is negative, as has been widely observed, and they also note that for individual equity options, we cannot reject the null hypothesis that options are fairly priced, i.e. that the VRP on individual stock options is zero. Presumably the inference the authors are making is that index options have a negative VRP because stock investors are using those options to hedge against correlation; and that individual equity options have zero VRP because, if the worry is that individual stocks will become



Yahoo!, Condor Options

FIGURE 1 *1-Month DJIA Realized Correlation and Daily Stock Returns*

more correlated, options on those individual stocks will not provide the desired protection.

As a description of investor behavior, this all sounds fair and plausible. But assuming the above explanation is right, a strategy suggests itself. Investors worried about increasing correlations during a crisis could hedge with the options of historically low beta assets instead of using index puts. If stocks originally intended to diversify failed to do so in a market decline, buyers of puts on those stocks would benefit from being short deltas and long vegas in those stocks, and at a lower cost than they would be expected to pay using equity index options. And since the equity option VRP is not negative, option buyers would not incur the same hedging costs in bull markets.

Driessen et al. 2012

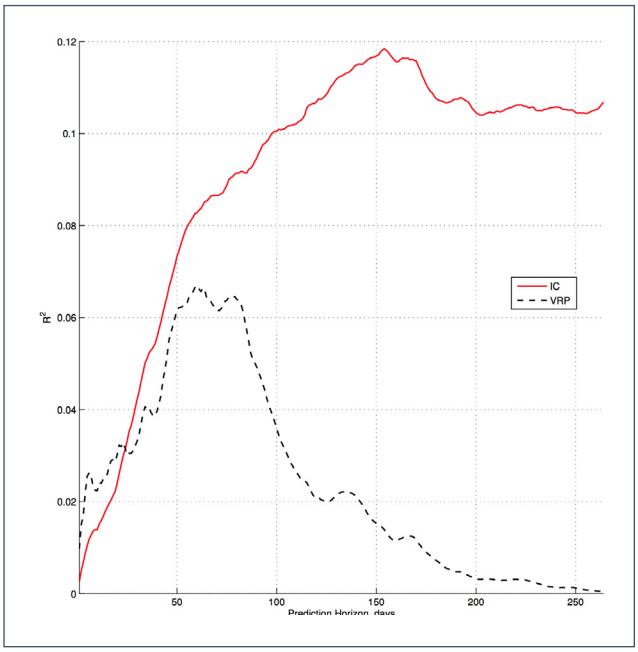


FIGURE 2 *R^2 Predictive Value for S&P 500 Returns of Implied Correlation and Variance Risk Premium*

I am still a bit skeptical of the strength of the claim that correlation risk entirely explains the index VRP. Other studies have found other priced factors to be determinants of index VRP, like daily jump risk and the volatility of volatility. We can also ask why, given the increased CRP in recent years (higher spread between implied and realized correlation), the index VRP is not also higher than its historical average.

Finally, the authors claim that implied correlations explain future market returns, with high predictive power even out to 6 and 12 months. The surprise here (Figure 2) is that, while VRP has a higher predictive value at a one-month horizon, the r-squared value for implied correlation estimates for both the Dow Jones Industrials and the S&P 500 were higher for 100 days forward, and increased to 0.10 even as far out as one year. The authors mention some possible explanations for these relationships including the effects of high correlation on future dividend and consumption growth volatility. EM

References

Driessen, Joost, Maenhout, Pascal J. and Vilkov, Grigory, *Option-Implied Correlations and the Price of Correlation Risk* (October 25, 2012). Advanced Risk & Portfolio Management Paper. Available at SSRN: http://ssrn.com/abstract=2166829

The Evolution of the Holiday Effect in VIX Futures

Bill Luby

WITH FEWER trading days and a historical record that favors an uptick in stocks and a downtick in volatility, the end of the year never fails to present an intriguing set of trading opportunities.

One phenomenon related to the above is something I have labeled the "holiday effect," which is the tendency of the CBOE Volatility Index (VIX) December futures to trade at a discount to the midpoint of the VIX November and January futures.

This article provides some historical analysis of the holiday effect and analyzes how the holiday effect has been manifest and evolved over the course of the past few years.

Background and Context on the Holiday Effect on the VIX Index

Part of the explanation for the holiday effect is embedded in the historical record. For instance, in eight of the last twenty years, the VIX index has made its annual low during the month of December. In fact, the VIX has demonstrated a marked tendency to decline steadily for the first 17 trading days of the month, as shown below in Figure 1, which uses normalized VIX December data to compare all VIX values for each trading day dating back to 1990. Not surprisingly, those 17 trading days neatly coincide with the typical number of December trading days in advance of the Christmas holiday.

Readers should also note that, on average, the steepest decline in the VIX usually occurs from the middle of the month right up to the Christmas holiday.

The December VIX Futures Angle

Most VIX traders are aware of the tendency of implied volatility in general and the VIX in particular to decline in December. As a result, since the launch of VIX futures in 2004, there has usually been a noticeable dip in the VIX futures term structure curve for the month of December. Figure 2 below is a snapshot of the VIX futures curve from September 12, 2012. Here I have added a dotted black line to show what a linear interpolation of the December VIX futures would look like, with the green line showing the 0.50 point differential between the actual December VIX futures settlement value of 20.40 on that date and the 20.90 interpolated value, which is derived from the November and January VIX futures contracts. (Apart from the distortions present in the December VIX futures, a linear interpolation utilizing the first and third month VIX futures normally provides an excellent estimate of the value of the second month VIX futures.)

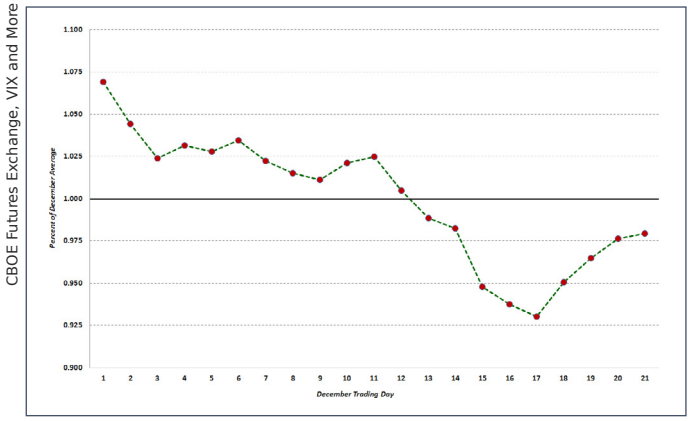


FIGURE 1 *The Composite December VIX Index, 1990–2011*

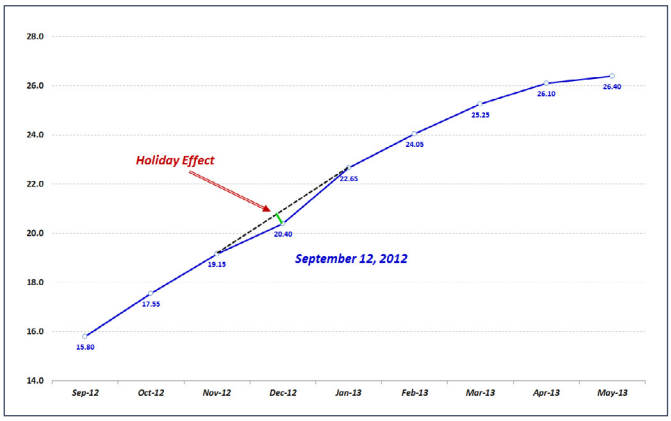


FIGURE 2 *VIX Futures Curve from September 12, 2012, Showing Holiday Effect*

Looking at the full record of historical data, the mean holiday effect for all days in which the November, December and January futures traded is 1.87%, which means that the December VIX futures have been, on average, 1.87% lower than the value predicted by a linear interpolation of the November and January VIX futures.

Further analysis reveals that on 91% of all trading days, the December VIX futures are lower than their November-January interpolated value. The holiday effect, therefore, is persistent and substantial.

The History of the Holiday Effect in the December VIX Futures

Determining whether the holiday effect is statistically significant is a more daunting task, as there are only six holiday seasons from which one can derive meaningful VIX futures data. Figure 3 shows the monthly average VIX December futures (solid blue line) as well as the midpoint of the November and the January VIX futures (dotted red line) for each month since the VIX futures consecutive contracts were launched in October 2006. Here the green bars represent the magnitude of the holiday effect expressed in percentage terms, with the sign inverted (i.e., a +2% holiday effect means that the VIX December futures would be 2% below the interpolated value derived from November and January futures.)

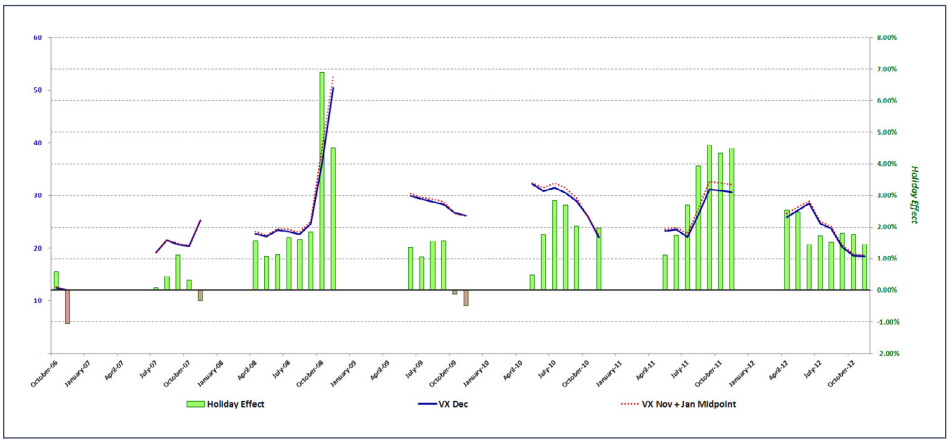
Conclusions

With limited data from which to draw conclusions, it is tempting to eyeball the data and look for emerging patterns which may repeat in the future. Clearly one pattern is that an elevated or rising VIX appears to coincide with a larger magnitude holiday effect, whereas a depressed or falling VIX is consistent with a smaller holiday effect. The data is much less compelling when one tries to determine whether the time remaining until the holiday season has an influence on the magnitude of the holiday effect. While one might expect the holiday effect to become magnified later in the season, the evidence to support this hypothesis is scant at this stage.

To sum up, investors have readily accepted that a lower VIX is warranted for December and the downward blip in December for the VIX futures term structure reflects this thinking. As far as whether this seasonal anomaly is tradable, there is still a limited amount of data—not to mention some highly unusual volatility years—from which to develop and back test a robust VIX futures strategy designed to capture the holiday effect.

In terms of trading the holiday effect for the remainder of the year, the coming holiday season is also complicated by matters such as the fiscal cliff deadline and various euro zone milestones that are set for early 2013. In fact, there may not be a reasonable equivalent since the Y2K fears in late 1999 that turned out to be a volatility non-event when the calendar flipped to 2000.

While the opportunities to capitalize on the 2012 holiday effect may be difficult to pinpoint and fleeting, all investors should be attuned to seasonal volatility cycles as 2013 unfolds and volatility expectations ebb and flow with the news cycle as well as the calendar. EM



CBOE Futures Exchange, VIX and More

FIGURE 3 *VIX December Futures Holiday Effect, 2006–2012*

Further Reading

"Exploring the VIX Futures Term Structure, Part I" *Expiring Monthly,* August 2010

"An Interpretive Framework for VIX Futures (Second in a Series)" *Expiring Monthly,* September 2010

"VIX Futures: Putting Ideas into Action (Third in a Series)" *Expiring Monthly,* October 2010

"A History of VIX Futures Roll Yields" *Expiring Monthly,* September 2011

"Investing Implications of the VIX Term Structure" *Expiring Monthly,* October 2011

"Calculating the Future Range of the VIX" *Expiring Monthly,* February 2012

"The VIX Term Structure as a Predictor of Future Returns" *Expiring Monthly,* March 2012