Trading Strategy based on Spread between Implied Volatility and Realized Volatility using Classification Tree

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Abstract

This study demonstrates that VIX could be used to generate indicator, since it is known as the ‘fear gauge’. The study tries to build the simple indicator based on the spread between the implied volatility and the realized volatility. It is a well-known phenomenon that the implied volatility is most of the time higher than the historical volatility. However, it is possible that the spread tightens or even becomes negative. This signals a stress and timing to short equity position. The study then analyzes the source of performances and demonstrates the weakness of this strategy. The result indicates that simple strategy doesn’t outperform because of correctness. Therefore, there are much more space to improve the strategy and keep the advantage by increasing the correctness. The study applies the Classification Tree in the spread between implied volatility and realized volatility to achieve better projection of recession. Overall, the analysis supports that spread between the implied volatility and realized volatility could be used to avoid biggest drawdown for portfolio.

Keyword: VIX, implied volatility, realized volatility, trading signal, classification tree

1. Introduction

VIX is a trademarked ticker symbol for the CBOE Volatility Index, a popular measure of the implied volatility of S&P 500 index options; the VIX is calculated by the Chicago Board Options Exchange (CBOE). VIX is often referred to as the fear index or the fear gauge. the VIX represents one measure of the market's expectation of stock market volatility over the next 30-day period. The way to calculate this index is calculated using many out of money European Call or Put Options with 1-month tenor. Since VIX comes from the market price, so that it contains the views of investor toward the future market. When VIX increases, the level of fear in the market bumps up and people are buying protection. When VIX decreases, Market is more optimistic about the future. VIX is regarded as the implied volatility of the market, while realized volatility is calculated using the stock prices. One well known phenomenon is that implied volatility tends to be higher than realized volatility consistently. One possible reason is that option sellers are requiring more premium from the naked options. Buyers of options have limitation in the loss because they can lose no more than the premium they pay. While sellers take all the risk if the market go to the wrong directions, especially for call sellers. The loss caused from call option could be infinite. This means that there is an insurance premium involved, so that sellers of the option want to be compensated for their additional risk. The second reason is model misspecification. Implied volatility comes from model and market price. If the model is different, the implied volatility will be different as well. For example, Black Scholes Merton Model has an assumption that volatility is constant which is not true. So there is a bias between implied volatility and realized volatility.

If we look deeper into the relationship between the VIX and realized volatility, we can find that it is possible that implied volatility is lower than realized volatility. This event usually happened when the market is very stress. So a generic idea is that we could use the VIX and realized volatility to build a signal for trading equity. Specially, positive equity returns tend to follow the positive spread between the implied volatility, while negative equity returns tend to follow the negative spread. It is developed from the seminal research from (Giot 2006). Giot (2006) suggests that there is a positive relationship between forward looking returns and extremely high level of the implied volatility and negative relationship between the return and extremely low level of the implied volatility. This means that an increase in the VIX level could coincide with a market moving downward. This is suggested by Whaley (2009) as well. This means that high volatility levels may suggest an over-sold market. This study combines the implied volatility and realized volatility to calculate technical trading rule which can outperform the VIX only strategy and buy-and-hold strategy.

Figure 1: Spread between VIX and Realized Volatility

This study also analyzes the source of the performance of VIX trading strategy. It turns out that the spread between the implied volatility and realized volatility doesn’t give better correctness than we just think it is always bull market.

Figure 2: Correctness of Simple Spread Indicator

This study applies the Classification Tree into the spread indicator to explore better correctness and maintain the performance this strategy got before. Classification Trees is one of the algorithm trading methodologies. Algorithmic trading is a method where a computer is conducting a specific investment instead of a human. As described in the literature, these trading systems implement historical data with respect to well-defined rules, whereas traditional trading only implements a specific strategy. Classification tree will provide a better perspective. It has several advantages compared to other methodologies.

1. Classification Tree is easy to understand and straightforward for market.
2. Equally appropriate for both ordered data and for categorical data or a mixture of them
3. Good at handling nonhomogeneous relationships with respect to conditional information.

This study will show how we could

1. Data Sets

The Data that we use in this study comes from VIX, SPX,