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THE FEAR INDEX & MARKET TIMING

**A short term timing strategy.
Are high levels of volatility good
opportunities to buy?**

WHITE PAPER

JB MARWOOD.com

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THE FEAR INDEX & MARKET TIMING

INTRODUCTION

Investors and traders have known for a long time that there are great profits to be had by moving away from the herd.

Warren Buffett said it best when he said you must “be fearful when others are greedy and greedy when others are fearful”.

And Lord Rothschild alluded to the same thing when he said “the best time to buy is when there is blood on the streets”.

To put it bluntly, whenever panic selling or climactic buying takes place there are often great opportunities to enter the market.

Why?

One reason for this is that when volatility is high, investors must demand a much higher rate of return, in compensation for the heightened level of risk.

Recent research papers

There have been several research papers that look into this phenomenon.

For example: ‘On the relationships between implied volatility indices and stock index returns¹’ by Glot and ‘Fear Trading²’ by Dinh and Ardia. As well as these, there is also Cipollini’s ‘Can the VIX signal market direction?’³.

1 <http://www.ijournals.com/doi/abs/10.3905/jpm.2005.500363>

2 http://papers.ssrn.com/sol3/papers.cfm?abstract_id=532583

3 http://papers.ssrn.com/sol3/papers.cfm?abstract_id=996384

These papers attempt to correlate stock index returns with volatility and they use the Chicago Board Options Exchange Volatility Index (VIX) as their guide.

Glot showed from analysis that short term returns on stock indices were higher when volatility reached very high levels.

And Cipollini also found a significant correlation between high volatility and stock returns for the S&P 500 Index.

What is the VIX?

The VIX is a trademarked ticker symbol for the Chicago Board Options Exchange Market Volatility Index. It's the most popular measure of the implied volatility of S&P 500 index options. As such it is often referred to as the fear index or the fear gauge. It represents one measure of the market's expectation of stock market volatility over the next 30 day period.

In the rest of this paper I take a look at this recent work and present a similar strategy that may be used to profit from extreme movements in the VIX.

It is well worth reading each of the papers described to see the scientific method behind trading stock indices using the fear index (VIX).

VIX and stock index returns

In the above mentioned papers, Glot favoured short term holding times when entering markets with high volatility. Glot ranked volatility measures into percentiles and tested them over a 16 year period, preferring short holding periods.

Conversely, Cipollini found that strong returns could be found from buying the S&P during periods of high volatility and holding the index for a three month period.

Both methods were shown to be statistically valid.

Test one

For this first test, I loaded up data for the CBOE Volatility Index (VIX) and the S&P 500 Index in Amibroker.

I then told the platform to follow these simple trading rules:

Rules:

When the VIX index is at it's highest in two years buy the S&P 500 Index at the close. Close the position at the following close.

When the VIX index is at it's lowest in two years short the S&P 500 Index at the close. Close the position at the following close.

Settings:

This is a short term strategy so it was necessary to set up the platform for margin trading. Cash could be used but in reality this would produce very low rates of return.

In order to get the best out of the strategy we can use leverage to trade the S&P 500 Index as a future. Fortunately, this is easy with Amibroker.

I set the margin deposit at \$500 and the point value at \$10 (in line with CFD broker IG Markets).

I set my starting capital at \$20,000 and my position size to 4 contracts. This equates to \$2000 risk per trade (\$500 x 4), or 10%.

Commissions were set at \$40 per trade (the bid/ask spread).

What does this mean?

Essentially, this means I am risking \$40 per point.

If I go long the S&P 500 future and the S&P 500 moves from 2,000 to 2,020, I will make \$720. (20 points x \$40-\$80). \$80 is the commission from buying and selling.

This can be achieved using any futures broker like Interactive Brokers or IG Markets.

Note: Futures trading is risky and you can lose all your capital. These risk settings were set in line with my own preferences. In reality, you may find better results with lower or even higher risk.

In this particular situation, a negative move of 500 points would result in a loss of all capital and a margin call. At current prices that represents a one day drop in the S&P 500 of 24%.

You have to bear in mind how likely that is. When the VIX Index is already at a two-year high the S&P 500 will already have fallen heavily. But as they say, anything is possible.

Results:

Running this system between 1995 and 2010 produced the following results:

	All trades	Long trades	Short trades
Initial capital	20000.00	20000.00	20000.00
Ending capital	30244.00	34855.60	15388.40
Net Profit	10244.00	14855.60	-4611.60
Net Profit %	51.22 %	74.28 %	-23.06 %
Exposure %	0.25 %	0.15 %	0.10 %
Net Risk Adjusted Return %	20087.88 %	48099.62 %	-22930.90 %
Annual Return %	2.79 %	3.77 %	-1.73 %
Risk Adjusted Return %	1096.14 %	2442.56 %	-1722.42 %
Total transaction costs	7280.00	3840.00	3440.00

Max. system drawdown	-4835.20	-2864.80	-4888.80
Max. system % drawdown	-18.98 %	-8.92 %	-24.11 %
Recovery Factor	2.12	5.19	-0.94
CAR/MaxDD	0.15	0.42	-0.07
RAR/MaxDD	57.76	273.94	-71.44
Profit Factor	1.82	3.13	0.15
Payoff Ratio	2.92	2.43	0.68
Standard Error	2163.91	1837.44	1044.94
Risk-Reward Ratio	0.17	0.41	-0.38
Ulcer Index	7.44	0.60	13.09
Ulcer Performance Index	-0.35	-2.70	-0.54
Sharpe Ratio of trades	2.75	5.89	-11.07
K-Ratio	0.0118	0.0292	-0.0269

CAR was 2.79% and the maximum drawdown was -19%.

The important thing to note here is not necessarily the annual return since this system trades very infrequently. Better statistics are the risk adjusted return values, the drawdowns, and the Sharpe ratio. In this light, the system looks good.

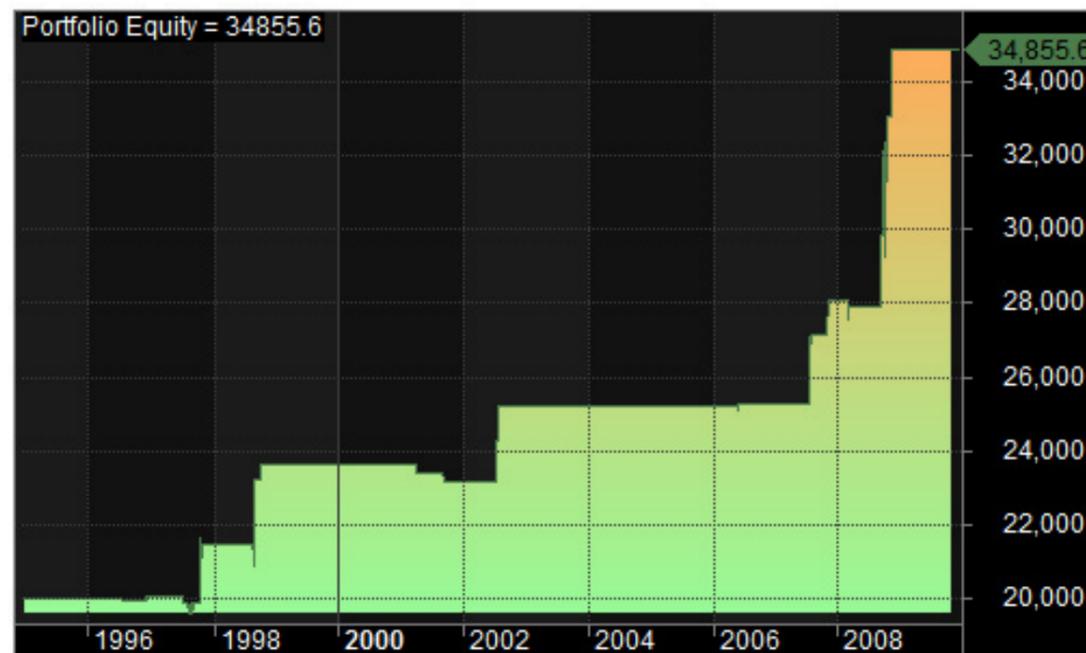
However, short trades do not perform well so the next test omits these:

Test Two

Keeping everything the same but omitting short trades sees a much better result:

	All trades	Long trades	Short trades
Initial capital	20000.00	20000.00	20000.00
Ending capital	34855.60	34855.60	20000.00
Net Profit	14855.60	14855.60	0.00
Net Profit %	74.28 %	74.28 %	0.00 %
Exposure %	0.14 %	0.14 %	0.00 %
Net Risk Adjusted Return %	51716.56 %	51716.56 %	N/A
Annual Return %	3.77 %	3.77 %	0.00 %
Risk Adjusted Return %	2626.23 %	2626.23 %	N/A
Total transaction costs	3840.00	3840.00	0.00

Max. trade drawdown	-2036.80
Max. trade % drawdown	-99.84 %
Max. system drawdown	-2864.80
Max. system % drawdown	-8.92 %
Recovery Factor	5.19
CAR/MaxDD	0.42
RAR/MaxDD	294.54
Profit Factor	3.13
Payoff Ratio	2.43
Standard Error	1837.44
Risk-Reward Ratio	0.41
Ulcer Index	0.60
Ulcer Performance Index	-2.70
Sharpe Ratio of trades	5.89
K-Ratio	0.0292



Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr%
1995	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0%
1996	N/A	N/A	N/A	N/A	N/A	N/A	-0.4%	N/A	N/A	N/A	N/A	N/A	0.2%
1997	N/A	N/A	0.1%	N/A	N/A	N/A	-0.8%	-0.3%	0.3%	8.0%	N/A	N/A	7.3%
1998	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.6%	4.3%	1.6%	N/A	N/A	9.8%
1999	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0%
2000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0%
2001	N/A	N/A	N/A	-0.9%	N/A	N/A	N/A	N/A	-0.9%	N/A	N/A	N/A	-1.8%
2002	N/A	N/A	N/A	N/A	N/A	N/A	4.8%	3.8%	N/A	N/A	N/A	N/A	8.7%
2003	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0%
2004	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0%
2005	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0%
2006	N/A	N/A	N/A	N/A	N/A	0.2%	N/A	N/A	N/A	N/A	N/A	N/A	0.2%
2007	N/A	N/A	N/A	N/A	N/A	N/A	2.1%	5.2%	N/A	N/A	3.5%	N/A	11.2%
2008	N/A	N/A	-0.7%	N/A	N/A	N/A	N/A	15.2%	2.8%	5.5%	N/A	N/A	24.2%
2009	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0%
Avg	0.0%	0.0%	-0.0%	-0.1%	0.0%	0.0%	0.4%	0.8%	1.3%	0.8%	0.6%	0.0%	

As can be seen, risk adjusted return and Sharpe ratio both increase and the drawdown falls. The equity curve reveals an upward slope and the yearly performance breakdown shows just one negative year (though many inactive years).

Test Three

Next, I move the test forward and run the system over the out-of-sample period, between 2010 and 2015.

Again, the results are good with a very small drawdown and a Sharpe ratio of 10.96.

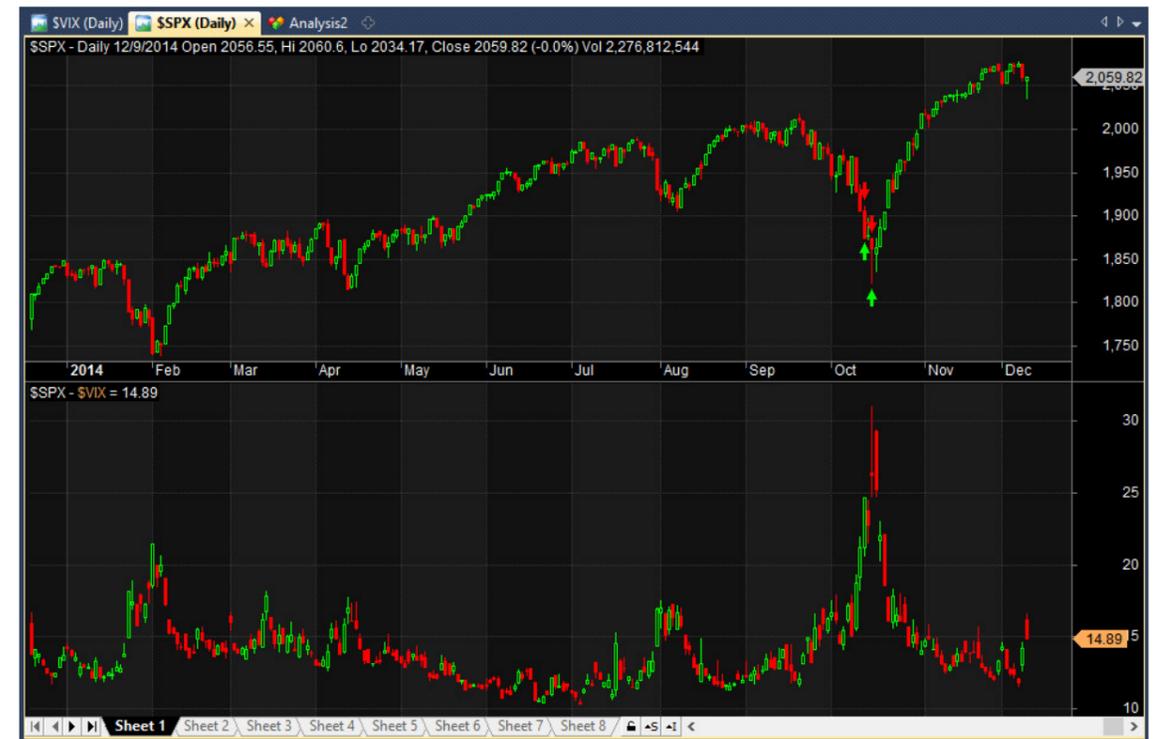
	All trades	Long trades	Short trades
Initial capital	20000.00	20000.00	20000.00
Ending capital	22012.00	22012.00	20000.00
Net Profit	2012.00	2012.00	0.00
Net Profit %	10.06 %	10.06 %	0.00 %
Exposure %	0.04 %	0.04 %	0.00 %
Net Risk Adjusted Return %	26737.02 %	26737.02 %	N/A
Annual Return %	1.96 %	1.96 %	0.00 %
Risk Adjusted Return %	5216.51 %	5216.51 %	N/A
Total transaction costs	240.00	240.00	0.00

Max. trade drawdown	-69.20	-69.20	0.00
Max. trade % drawdown	-3.39 %	-3.39 %	0.00 %
Max. system drawdown	-69.20	-69.20	0.00
Max. system % drawdown	-0.31 %	-0.31 %	0.00 %
Recovery Factor	29.08	29.08	N/A
CAR/MaxDD	6.26	6.26	N/A
RAR/MaxDD	16645.49	16645.49	N/A
Profit Factor	30.08	30.08	N/A
Payoff Ratio	15.04	15.04	N/A
Standard Error	561.61	561.61	0.00
Risk-Reward Ratio	0.97	0.97	N/A
Ulcer Index	0.06	0.06	0.00
Ulcer Performance Index	-61.92	-61.92	N/A
Sharpe Ratio of trades	10.96	10.96	0.00
K-Ratio	0.0390	0.0390	N/A

However, the system only entered into three trades over the period.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr%
2010	N/A	N/A	N/A	N/A	N/A	0.0%							
2011	N/A	10.2%	N/A	N/A	N/A	N/A	10.2%						
2012	N/A	N/A	N/A	N/A	N/A	0.0%							
2013	N/A	N/A	N/A	N/A	N/A	0.0%							
2014	N/A	N/A	-0.1%	N/A	N/A	-0.1%							
Avg	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.0%	0.0%	-0.0%	0.0%	0.0%	

The next chart shows the signals as they arrived in 2014. The S&P 500 Index is shown in the top pane and the VIX Index is shown on the bottom:



Test Four

In test four, all settings are kept the same but positions are held for a longer period, more in line with Cipollini's research.

In this test, trades are closed after 30 trading days, instead of just one day. In this instance, 30 trading days is equivalent to six weeks in real time.

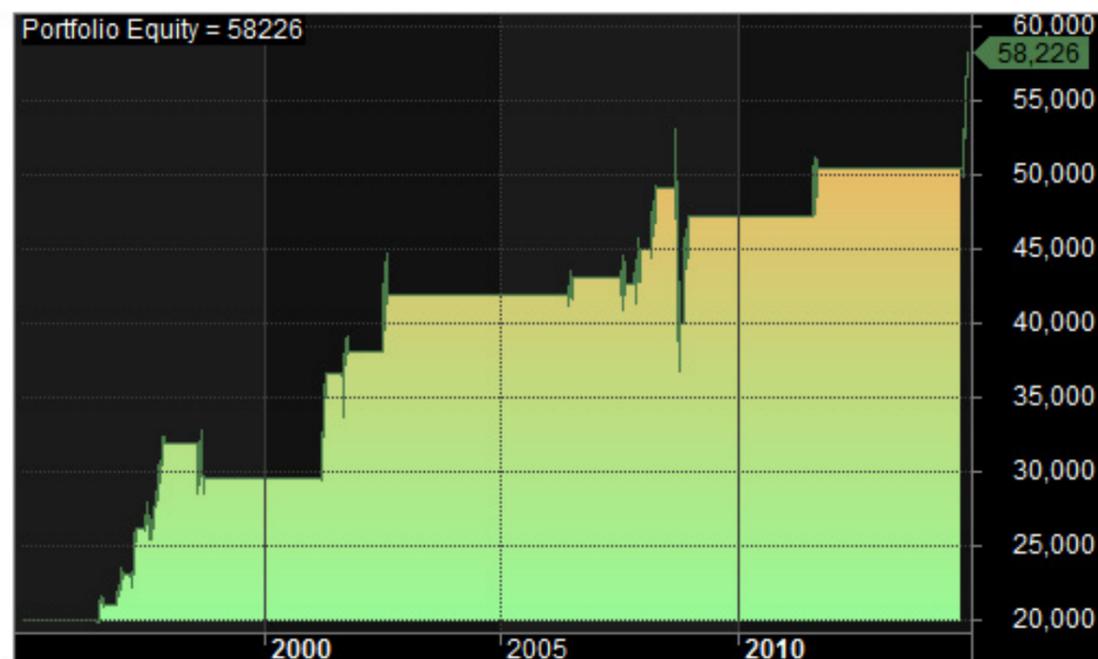
This test was run over the full data period from 1/1/1995 - 1/1/2015.

As shown by the following results this strategy was also profitable. This strategy had a higher win ratio than the others. In fact, 78% of trades were profitable.

	All trades	Long trades	Short trades
Initial capital	20000.00	20000.00	20000.00
Ending capital	58226.00	58226.00	20000.00
Net Profit	38226.00	38226.00	0.00
Net Profit %	191.13 %	191.13 %	0.00 %
Exposure %	1.04 %	1.04 %	0.00 %
Net Risk Adjusted Return %	18326.86 %	18326.86 %	N/A
Annual Return %	5.50 %	5.50 %	0.00 %
Risk Adjusted Return %	527.74 %	527.74 %	N/A
Total transaction costs	1440.00	1440.00	0.00

Max. trade drawdown	-16246.40	-16246.40	0.00
Max. trade % drawdown	-81.25 %	-81.25 %	0.00 %
Max. system drawdown	-16246.40	-16246.40	0.00
Max. system % drawdown	-30.61 %	-30.61 %	0.00 %
Recovery Factor	2.35	2.35	N/A
CAR/MaxDD	0.18	0.18	N/A
RAR/MaxDD	17.24	17.24	N/A
Profit Factor	4.03	4.03	N/A
Payoff Ratio	1.15	1.15	N/A
Standard Error	3001.62	3001.62	0.00
Risk-Reward Ratio	0.54	0.54	N/A
Ulcer Index	6.84	6.84	0.00
Ulcer Performance Index	0.02	0.02	N/A
Sharpe Ratio of trades	1.59	1.59	0.00
K-Ratio	0.0438	0.0438	N/A

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr%
1995	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0%
1996	N/A	N/A	N/A	N/A	N/A	N/A	4.2%	0.9%	0.2%	N/A	N/A	2.7%	8.2%
1997	6.6%	N/A	0.1%	6.7%	6.4%	N/A	4.6%	-3.1%	4.2%	10.5%	4.7%	0.1%	48.0%
1998	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-6.3%	-1.0%	-0.3%	N/A	N/A	-7.5%
1999	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0%
2000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0%
2001	N/A	N/A	N/A	21.3%	2.1%	N/A	N/A	N/A	-0.2%	4.3%	N/A	N/A	28.9%
2002	N/A	N/A	N/A	N/A	N/A	N/A	8.9%	-0.6%	1.5%	N/A	N/A	N/A	9.8%
2003	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0%
2004	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0%
2005	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0%
2006	N/A	N/A	N/A	N/A	N/A	3.9%	-1.0%	N/A	N/A	N/A	N/A	N/A	2.8%
2007	N/A	N/A	N/A	N/A	N/A	N/A	0.5%	2.2%	-3.4%	N/A	2.9%	2.3%	4.4%
2008	N/A	N/A	7.1%	2.2%	N/A	N/A	N/A	N/A	0.2%	-18.7%	6.2%	10.9%	4.9%
2009	0.2%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.2%
2010	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0%
2011	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7.0%	-0.2%	N/A	N/A	N/A	6.8%
2012	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0%
2013	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0%
2014	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	11.2%	3.7%	N/A	15.3%
Avg	0.3%	0.0%	0.4%	1.5%	0.4%	0.2%	0.9%	0.0%	0.1%	0.4%	0.9%	0.8%	



The results are strong and provide further indication that the VIX Volatility Index is a good indicator to use when timing the market. The Sharpe ratio has dropped and that is partly because of the increase in holding period.

The next chart shows the yearly breakdown and reveals only one year was unprofitable.

Assumptions

It should be noted that the systems here rely on trading at the close, which is theoretically impossible, since when a market is closed trades cannot be placed.

However, traders should be able to make a judgement call and make trades very near the close if it is clear the VIX will close at a two-year high.

In reality, traders may even be able to improve this strategy by fine tuning their entries intraday and not necessarily trading right at the close.

One more chart

This final chart shows the S&P 500 Index (top) and VIX (bottom) and all of the signals from 1995 - 2015 where the VIX hit a two-year high.

Looking at this chart, it seems clear that there is correlation between high levels of volatility and market bottoms. The difficulty for traders is working out when volatility is near a peak. The 2-year rule seems to do an adequate job of finding that.



Improvements

The strategy presented here is basic and could well be improved. As Glot proposed, traders could take percentiles of the VIX and trade whenever the VIX is in its 5% highest percentile.

Traders could also experiment with different holding periods and different entry points. Position size could be better optimised and risk could be calculated as a % amount instead of a fixed number. This could allow better rates of compounding.

Conclusions

The Fear Index system is unlikely to make any trader rich on its own, since the strategy trades infrequently.

However, studies have shown that the VIX is a useful indicator for timing the market. Incorporating this strategy into an overall trading approach could be a good solution for futures traders.

And this could enable traders to make good profits during difficult market conditions.

Whether or not this system will continue to work in the future is unknown.

But what is clear from this analysis is that market bottoms are more often found when volatility is near historical highs. This is worthwhile knowledge when considering whether or not to enter the market.

Credits:

Amibroker

Norgate Premium Data

Ardia, David and Dinh, Julien, Fear Trading (June 2003). Available at SSRN: <http://ssrn.com/abstract=532583>

Cipollini, Alessandro Paolo Luigi and Manzini, Antonio, Can the VIX Signal Market's Direction? An Asymmetric Dynamic Strategy (April 2007). Available at SSRN: <http://ssrn.com/abstract=996384> or <http://dx.doi.org/10.2139/ssrn.996384>

Glot, Pierre. Relationships Between Implied Volatility Indexes and Stock Index Returns The Journal of Portfolio Management. Spring 2005, Vol. 31, No. 3: pp. 92-100

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