MSR Investments Looks to Risk Management for Low Volatility

By Mark Melin

MSR Investments is a short-term systematic managed futures program, trading primarily in the interest rate complex and stock indices with a smaller portfolio exposure to currencies, gold and crude. The commodity trading advisors general trade holding period is a few days to a few weeks, exposing it to a degree of volatility. However, with a reported standard deviation near 3.04, compared to an industry average of trend followers of 5.48, MSR has kept volatility in check with near equal upside and downside volatility levels. With a margin to equity ratio reported in the high single digits, the firm's returns have been in the low single digits but risk measures have also been low as well.

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"We are expecting (overall market volatility) to increase over the near term," said MSR's founder Michael Rulle. "Equity markets, for example, reached close to 12 year lows in the recent four month rally, which is to be expected. But beneath the recent measured historical volatility, the volatility index (VIX) has maintained a 30% to 50% premium. When volatility drops below a defined level, we place a floor on volatility when vol-adjusting our positions. We limit daily VAR and discount the historical measured correlation when sizing positions."

"We have found that using a variety of sizing techniques is the most efficient way to risk manage a systematic portfolio," Mr. Rulle disclosed. "As previously mentioned, we put a floor on volatility when vol-adjusting positions as well as discounting the portfolio benefits of correlation. We also use daily VAR limits to size positions and we will decrease equity positions intraday if the drawdown is above a pre-set size."

What is interesting about MSR is their multi-algorithmic approach to systematic trading. MSR utilizes hundreds of individual trading models that basically fall into two categories: momentum (trend following) and reversal (counter-trend). Thus, one set of momentum formulas might determine when a definitive price trend is in place and a buy or sell order would then follow that trend. One set of reversal formulas would attempt to determine when a price trend was ending and buy or sell based on that trade signal.

"The Program's algorithms were ultimately derived from the observation that financial markets have a slight but statistically significant tendency to counter-trend at certain times and trend at other times. We have created a series of identically structured algorithms for each market with different sets of parameters (48 for "reversal" and 12 for "momentum"). These algorithms were derived from one market and applied identically (vol-adjusted) to all markets we trade. Directional, low volatility markets are generally least favorable for the Program if they persist for long periods of time. Markets with medium or high volatility, which are relatively directionless, are typically most favorable. This is a generalization as we can also be impacted by "path dependency". The reason we use so many variations of the same algorithms (one each for "reversal" and "momentum") is to maximize the probability of capturing the path

dependency we perceive in markets, but which are also stochastic in nature."

In order to determine the appropriate strategy weighting, MSR utilizes a probability formula that identifies the market environment and makes strategy adjustments. For instance, if the mathematical formula determined that certain markets had a propensity to continue a trend in a singular direction, the strategy would weight heavier towards the momentum strategy.
To keep its volatility low, MSR utilizes a low margin to equity ratio, reported at 7%. The industry average for trend following programs is nearly double that. The higher the margin usage the more potential volatility a CTA might experience.

With just over $16 million under management, and $13.2 million being acquired in the last year, the CTA will approach their third year in business this September, a critical milestone for emerging CTAs.

Trader Background

Mr. Rulle was President of Graham Capital Management from 2002 to 2007. While at Graham, Mr. Rulle chaired the Investment and Risk Committee and was directly responsible for the firm's discretionary portfolio managers. "Graham Capital is a unique and great firm. It is one of the few true CTAs which was able to expand successfully in the discretionary macro space. I really enjoyed my six years at Graham and learned a great deal from the experience."

From 1999–2002, Mr Rulle was President and CIO of Hamilton Partners, an internal "hedge fund" for the Bermuda reinsurance company, Stockton Inc., where he managed convertible arbitrage, merger arbitrage, volatility arbitrage, bond arbitrage and equity market neutral portfolios. From 1994-1999, Mr. Rulle was CEO of CIBC World Markets Inc. where he was primarily responsible for global derivatives, securitization, asset management and the U.S. loan business. He co-chaired CIBC World Market's Global Risk Committee and was a member of the global bank's Credit Committee. Prior to joining CIBC, Michael ran the derivatives business at Lehman Brothers and rose to become a member of the Executive Committee.

Mathematical Modeling for Quantitative Trading Strategies

By Michael S Rulle, Jr.

There is only one history in financial markets. But there are almost an infinite number of time series one can analyze. Think of all the combinations of markets, units of time (for example, one second, one minute, one hour, etc.) and periods of time within which these units reside (for example, one day, one week, one month, etc). We have characterized this framework of viewing time series' as analysis of "the distribution of distributions" and is a key component of our model building process.

> *"No model building method can assure success. However, the lack of a proper scientific methodology will almost certainly guarantee failure."* – Michael Rulle, MSR

In a randomized log normal world, such a framework for analysis would be redundant. By mathematical definition, one could not outperform the market's risk adjusted return in the long run except by pure luck. The alpha of such models would be zero (worse, counting transaction costs). Model development would be as fruitful as attempting to make money flipping fair coins. Therefore, all developers of trading models explicitly or implicitly believe markets are not unpredictably random. This is an assumption which should cause some humility. The challenge for modelers in trying to discover patterns which repeat themselves is daunting.

No model building method can assure success. However, the lack of a proper scientific methodology will almost certainly guarantee failure. There are many hurdles model builders need to overcome. In MSR's experience, the "data mining" bias is one of the most difficult problems to solve. At its most basic level, the data mining bias is a form of self-deception that "discovers" spurious correlations in historical simulations, which are fundamentally random in nature. This is the primary reason most models fail "out of sample" in real trading. As obvious as this may seem as a general statement, in practice the elimination of the data mining bias is a very complex and detailed process.

There are an unlimited number of ways to combine historical data into formulas and regressions that perfectly fit history but which lack any predictive value. The challenge for model builders is to distinguish between that which may be predictive and that which is not. Professor David Leinweber of Caltech created one of the best examples of data mining bias in a paper known by its famous satirical "butter in Bangladesh" method of predicting stock market prices. Leinweber demonstrated how easy it is to find a meaningless correlation if one scours enough data and uses enough polynomials.

Leinweber literally regressed thousands of data series from 140 countries against the price of the S&P 500 over a 10-year period. He "discovered" that butter production in Bangladesh "explained" 75% of the return in the stock market. When he combined butter in Bangladesh with US cheese production and the sheep population in both countries he created an almost perfect fit (an R-squared of .99).

This may seem obviously absurd, but Leinweber's point is that if instead of butter in Bangladesh one had a model predicting stock prices using GDP and interest rates with an R-squared of .70, it might not seem so ridiculous. A data miner can create non-predictive meaningless models using "sensible" data just as easily as with "butter in Bangladesh".

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What does MSR do to try to avoid this pitfall? One cannot avoid using historical data to "mine" for statistically significant patterns, nor should one want to. We have only one history, as multifaceted as it is. It is also unlikely that one's first attempt at a hypothesis will yield the results one desires. It is inevitable that one will use the same data multiple times in the search for a successful predictive hypothesis. In statistics this is often referred to as the multiple comparison problem. However, if one uses hypothesis testing and other techniques on models without taking into account the number of different variables or parameters that were tested, one is almost certain to fall victim to the dating mining bias. One has to account for the number of tests done on the data to arrive at meaningful statistical inferences. It is extremely difficult to build successful models without using methods which "discount" these effects. In doing so, one improves the odds that the output of one's models will not be fallacious.

The above model building prescription is neither straightforward nor mechanical, and in practice it is very difficult. Judgment is always required at every step. "Researcher bias" (i.e., the tendency of researchers to interpret data, or make judgments, toward their desired conclusion) is a risk for MSR as it is with all financial model builders. However, we try to keep this risk at the forefront of our thinking and methodology in order to minimize its likelihood.

Read David Leinweber's "Stupid Data Miner Tricks: Overfitting the S&P 500"