

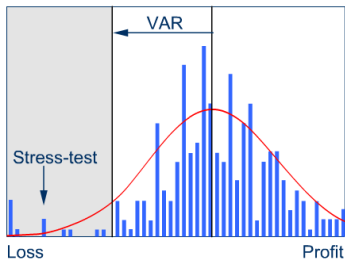
Risk Management Philosophy

By Daniel HERLEMONT, YATS Finances & Technologies

Risk Model: Implementing Safety First Principle

Risk Management may be the most important element of an investment process. Risk Management is the key to surviving during inevitable, dramatic market moves.

Market risk is the risk of losses due to the financial market variables (such as interest rates, foreign currency, equities, and commodities) adverse prices fluctuations. It is primarily measured with Value at Risk or VaR. VaR is a statistical measure of downside risk that is simple to implement. VaR measures the maximum



loss for a given confidence interval.

VaR model is primarily based on Risk Management Standards such as RiskMetrics and Risk Management Guides (from JP Morgan) as well as Basle II recommendations.

VaR, however, is not the only risk measure that YATS uses. VaR is complemented by Stress Testing which identifies potential losses under extreme market conditions. YATS Market Risk model also implements Extreme Values theory to provide more robust estimates of VaR. Other risk measures are extensively used such as Maximum Drawdown analysis, Conditional VaR, Risk Adjusted Performance Measures such as Omega measures, and Stutzer Index. The Stutzer Index is a consistent generalization of the Sharpe Ratio for fat tails returns and prudent investor, implementing a Safety First Principle. The Stutzer Index has been recently adopted by Morningstar.

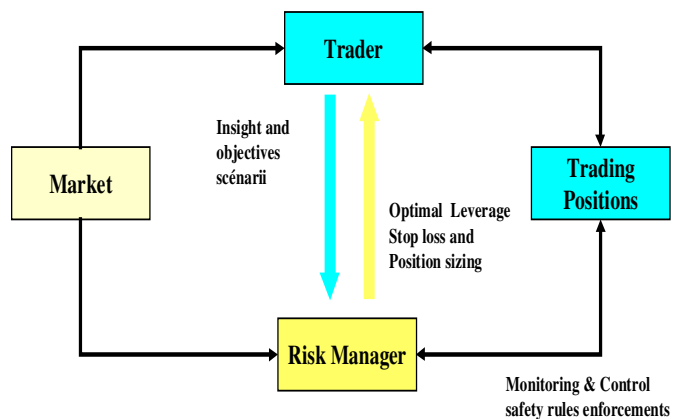
Risk measures and preferences will be used to determine trading limits, position sizing and stop losses as well as optimal leverage to meet risk management constraints such as VaR and Maximum Drawdown objectives while maximizing the expected growth rate. More precisely, the leverage is adjusted to maximize the expected growth rates under the constraints that a VaR or Maximum Drawdown objective will be satisfied with a predefined high probability level. When this probability is set to 1, then the policy is the same as implementing strict portfolio insurance. However, strict guarantee may be too restrictive. In a more general setting, with a probability, of say 95%, the trader will have more flexibility to capture opportunities in specific market states.

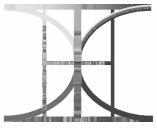
YATS Risk Model: the actual implementation

YATS Risk Management duties generally include:

- Modeling traded assets, historical distributions, extreme events and, most importantly, the dynamic strategy
- Defining the most suited Volatility models to implement a dynamic VaR that may depend on the different market regimes; typically, this model will dictate to reduce positions when volatility increases dramatically
- Back testing the monthly VaR to meet a typical objective of a 95% VaR not exceeding 4% of the capital
- Implementing Conditional VaR to avoid some VaR shortcomings (see hereafter)
- Implementing a Safety First Principle at strategy level by optimizing the Stutzer Index,
- Implementing overall optimal allocation and leverage under the VaR and Drawdown constraints
- Performing extensive scenario and stress testing

The positions are monitored on a daily basis and mark to market VaR is provided as well as other parameters computed such as VaR exceptions. Regular and comprehensive Risk reports are directly sent to clients.





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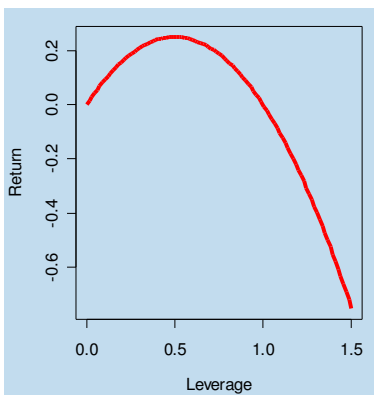
Value at Risk and Beyond

While there is no doubt that VaR is a useful generic measure of risk exposure, VaR has a number of limitations that are particularly problematic for hedge-fund investments. In addition, VaR tells nothing about actual losses... Other Risk measures, such as the Conditional VaR or CVaR, have not the shortcoming of the VaR. The CVaR measures the expected loss conditional on the loss being greater than or equal to the VaR. By using the CVaR, we are able to capture the left-tail risk of those hedge fund strategies that have short put option-like exposures. The VaR might be blind on actual losses. In addition the CVaR can be used in optimization programs, which is not possible with VaR or may lead to risky positions if the investment process is tailored to trade at the VaR boundaries under fat tailed returns.

Nearly all hedge fund strategies show fat tails (negatively skewed return distributions with positive excess kurtosis). The efficient frontier is changed when using modified VaR rather than VaR as the risk constraint. Application of the mean-variance framework in the case of some hedge fund strategies can result in underestimation of tail risk by as much as 50%.

Leverage will determine the ongoing viability of the program.

One can build a business or investment program around positive expected value opportunities, but the particular leverage level and hedging strategy chosen will determine the ongoing viability of the program. There are well known examples of statistically valid strategies resulting in billions of dollars of losses (Metallgesellschaft in 1993, Long Term Capital Management in 1998...). Obviously, the leverage level and hedging strategies chosen were flawed. When choosing too much leverage, an investor sometimes faces the problem of possibly being able to win the "game", but consistently running out of time.



In a multi-periods setting, the typical growth of the wealth does not linearly depend on the leverage. Rather, the dependency can be approximated by the so called Kelly parabola. There exists an optimal leverage that will lead the best growth. Exceeding this optimal leverage may lead to dramatic losses.

Misunderstanding the leverage effects explains the high level of mortality in the Hedge Fund industry (15%-20% default rate per year)

Risk Adjusted Performance Measure: a Safety First Principle

The Sharpe ratio is certainly one of the most popular Risk Adjusted Return Measure. However, several authors have pointed out the shortcomings of using the Sharpe ratio. As a matter of fact, one can define an optimal strategy maximizing the Sharpe ratio in complete and arbitrage-free markets. This strategy mainly consists in selling put options far out of the money. This returns distribution of this strategy has a truncated right tail and an elongated left tail. It is well known that this type of strategy may lead to rare but dramatic losses. Using the Sharpe ratio to evaluate risk premia strategies will create the same type of problems as with option sellers. Hence, by undertaking a maximum Sharpe ratio strategy, an investor may be accepting very risky investments in exchange for improving the mean or variance of the investment. The problem with this trade-off is that investors are risk averse; they most certainly have a preference for upside risk and an aversion to downside risk.

The Stutzer Index does not suffer the Sharpe Ratio shortcomings. The main concern for investors is the probability of underperforming a benchmark on average. The Stutzer index rewards those portfolios that have a lower likelihood of underperforming a specified benchmark on average. This measure penalizes negative skewness and high kurtosis (for given levels of mean returns and variance). The Stutzer index is reduced to the Sharpe Ratio when return distributions are normally distributed. Equivalently, we can use the Hodges Generalized Sharpe Ratio that has the same properties as the Stutzer Index. The higher it is, the better is the portfolio.

Unveiling Dependencies

An important selling point for alternative investments is their typically low correlations with traditional market indexes such as the S&P500. However, correlations are linear measures of association that ignore certain nonlinear relations often present among hedge-fund investments. Nonlinearities should be incorporated into any risk analysis of hedge fund investments. Rather than using conventional linear correlation measures, we are using non linear regressions as well as non conventional measures like relative entropy that is much more robust a measure based on information theory.

Incentive Contracts and Hedge Fund Management

Hedge fund managers typically receive a fraction of the fund's return in excess of the high-water mark. The high-water mark for each investor is the maximum share value since his or her investment in the fund. These performance fees generally range from 15% to 25% of the new profits earned each year. Option-like characteristics of incentive fees clearly could induce risk-taking behavior when the asset value is below the high-water mark. This "option like" payoff is taken into account in overall integrated risk model so that the risk behavior of the investment manager is under control and restricted to meet investors' objective rather than the manager's objective only.