

File Note

The Cambridge Strategy (Asset Management) Limited

Risk Management – Ruin Strategy

"The Cambridge Strategy's approach to risk management is anchored to our philosophy that downside risk must be mitigated and that the avoidance of unacceptable losses is critical. The approach targets risk at the micro level, and tries to ensure that the level of risk being taken is consistent with both the risk adjusted performance of the model, and the stated performance objectives."

Traditional Risk Management utilising Modern Portfolio Theory (MPT) and the Capital Asset Pricing Model (CAPM) has several deficiencies, two of which are:

- the assumption that returns are normally distributed, and
- the assumption that investors treat downside risk exactly the same as upside risk.

The Cambridge Strategy utilises a risk management framework that does not depend on either of these assumptions. The assumption of normality is overcome through the application of Omega statistics¹ while the use of "Ruin strategy" techniques allows downside risk to be explicitly managed.²

The Cambridge Strategy actively manages downside risk and we target our trading strategy to a fixed probability of reaching a maximum level of acceptable risk. This probability is called the probability of "ruin", and while it does not actually result in ruin it represents an investor's minimum acceptable return over the short term.

Assuming an equal allocation of risk to each portfolio position our estimate of "ruin" implies a maximum risk allocation per position. This level of risk (measured in basis points of Assets Under Management) results in the Risk Adjusted Trade Size (RATS) that lies at the heart of our risk management philosophy. RATS, when combined with a stop loss level determines the size of all positions taken in our portfolios.

How does The Cambridge Strategy determine the appropriate level of risk based on an investor's asymmetrical risk preferences?

Measures of risk adjusted returns such as a Sharpe Ratio measure the expected payoff distribution of a trading strategy. A Sharpe Ratio of 1 implies that if a manager's annualised alpha has a mean of 1 then it has a Standard Deviation of 1. Therefore, the probability of being down on the year for such a manager is the probability that returns come in at 1 Standard Deviation below the mean – about 15% (if returns are normally distributed).

From a risk management perspective, the key question for a trading strategy with a given Sharpe Ratio and a distribution of returns is what is the probability of ruin? (i.e. the probability of reaching a downside stop-loss for an investor).

The Cambridge Strategy undertakes Monte Carlo simulations for different Sharpe Ratios plotted against volatility. From this matrix of probabilities, the appropriate level of volatility corresponding to the predetermined volatility of loss is selected. This allows us to volatility target our risk adjusted returns.

¹ For further information, please refer to "The Standard Dispersion and Its Application to Risk Analysis for Portfolio Management," Ana Cascon, Ph.D., and William F. Shadwick, Ph.D. <http://www.imca.org/main/do/Journal-Vol8No2>.

² For ease of explanation, we have used the Sharpe ratio as our standard measure of risk adjusted returns in this note. In practice, the Cambridge Strategy uses CS Ratios and Omega scores as our standard measures of risk adjusted returns, as the distribution of returns in the real world is non-normal.

Risk Management – Ruin Strategy

For example, The Cambridge Strategy's Asian Markets Alpha Programme³ has the following characteristics:

- Current annualised Sharpe Ratio: 2.1
- Annualised daily volatility: 12.8%
- Target return: 18% per annum
- Potential Acceptable Loss: 5% chance of a 10% loss

That is, the Strategy is managed on the assumption that an investor is willing to assume a 5% chance of losing 10%, while looking to achieve a mean of 18%.

To solve for our appropriate level of RATS we use the following equation:

$$\text{RATS} = \frac{\text{Percentage Acceptable Loss} * \text{Model RATS}^4}{\text{Annualised Daily Volatility} * \text{Unacceptable Loss Measure}^5}$$

Therefore:

- Percentage Acceptable Loss = 10% (with a 5% probability)
- Annualised Daily Volatility = 12.8%
- Unacceptable Loss Measure = 0.58⁶
- Model RATS 35 basis points

$$\text{RATS} = \frac{0.1 * .0035}{0.128 * .58}$$

$$= 0.0047$$

$$\text{RATS} = 47 \text{ basis points}$$

The current level of risk for each trade in the current seven day period is 47 basis points, which is appropriate to the current Annualised Sharpe Ratio (and therefore the expected return) with a 5% chance of a 10% drawdown.

Practical implications of using RATS

Adjusting some of the values in this formula, the following implications of using RATS are observable:

- As the percentage of acceptable loss goes down (the investor becomes more risk averse), the RATS goes down
- As the Sharpe Ratio improves (the Unacceptable Loss Measure goes down), the RATS goes up (i.e. the model is performing well on a Risk-Adjusted Basis)
- As volatility goes up RATS goes down

The Cambridge Strategy uses the RATS number to determine the risk per trade over a 7 day period. In turn, this determines the risk (and leverage) being taken at any one time.

Therefore, The Cambridge Strategy is managing risk at a trade level with the goal of producing the desired level of risk versus return, while also considering that investors have a level of unacceptable return. Our risk strategy targets risk at the micro level, and tries to ensure that the level of risk being taken is consistent with both the risk adjusted performance of the model, and the stated performance objectives of the client.

³ Period: Programme Inception (February 2006 – January 2007)

⁴ Historical RATS that corresponds to the actual performance of the model.

⁵ Percentage of Annualised Volatility corresponding to the percentage of unacceptable loss (derived from Monte Carlo simulation).

⁶ A trading strategy with a Sharpe ratio of 2.1 has a 0.49% chance of being down 5%. To have a 5% chance of being down 5% volatility needs to increase by 1*0.58