Dorman/BarclayHedge User Manual

Appendix E:

Formulas for Barclay MAP Statistics

(Annotated for optimal readings)

Returns:

Total Return:

When measuring performance, the actual rate of return of an investment or a pool of investments over a given evaluation period.

(Final VAMI / Initial VAMI - 1) (X 100 for %)

Example: Initial VAMI = 1000, Final VAMI = 2000
Total return = ((2000/1000) -1) = 2 - 1 = 1 or 100%

Compound Annual Return:

The rate of return, expressed as a percentage, representing the cumulative effect that a series of gains or losses have on an original amount of capital over a period of time.

((Final VAMI / Initial VAMI) ^ (1 / number of years)) - 1 (X 100 for %)

If you don't have an even number of years, use (12 / number of months) or (4 / number of quarters)
Example: Initial VAMI = 1000, Final VAMI = 4000, No. of years = 2
Cpd. Ann. ROR = ((4000 / 1000) ^ (1/2)) –1
Cpd. Ann. ROR = 4^1/2 -1 = 2 - 1 = 1 or 100%

Note: ^ = raised to the power of "x". (Raising a number to the 1/2 power is the same as taking the square root).

Standard Deviation Formulae:

Standard Deviation of Monthly Returns:

In finance, standard deviation is applied to the annual rate of return of an investment to measure the investment's volatility (risk). A volatile investment would have a high standard deviation

Each monthly rate of return = ((VAMI at end of month / VAMI at beginning of month) - 1)
Standard deviation = SQRT ((Sum (monthly ROR - average monthly ROR) ^ 2)) / # of months)
Note: You are finding the square root of the sum of the squares of the differences.

Annualized Standard Deviation of Monthly / Quarterly Return

(see above).

(Std. Dev. of Monthly ROR) X SQRT (12) or (Std. Dev. of Quarterly ROR) X SQRT (4)
Note: Multiplying monthly Standard Deviation by the SQRT (12) is an industry standard method of approximating annualized Standard Deviations of Monthly Returns.

Ratio Formulae:

Sharpe Ratio:

The Sharpe Ratio is a measure that compares the return on an investment to that investment's risk. The higher the Sharpe Ratio, the better.

(Compound Annual ROR - risk free ROR (calculated from T-bills)) / Annualized Std. Dev. of Mo. ROR or Annualized Std. Dev. of Quarterly ROR

Sharpe ratio:

A ratio developed by Nobel laureate William F. Sharpe to measure risk-adjusted performance. It is calculated by subtracting the risk-free rate - such as that of the 10-year U.S. Treasury bond - from the rate of return for a portfolio and dividing the result by the standard deviation of the portfolio returns.

The Sharpe ratio tells us whether the returns of a portfolio are due to smart investment decisions or a result of excess risk. This measurement is very useful because although one portfolio or fund can reap higher returns than its peers, it is only a good investment if those higher returns do not come with too much additional risk. The greater a portfolio's Sharpe ratio, the better its risk-adjusted performance has been.

A variation of the Sharpe ratio is the Sortino ratio, which removes the effects of upward price movements on standard deviation to instead measure only return against downward price volatility.

$$\text{Sharpe Ratio} = \frac{Rp - Rf}{\grave{o}p}$$

where,

Rp = Expected Return
Rf = Risk-Free RoR
òp = Portfolio Standard Deviation

Sortino ratio:

A ratio developed by Frank A. Sortino to differentiate between good and bad volatility in the Sharpe ratio. This differentiation of upwards and downwards volatility allows the calculation to provide a risk-adjusted measure of a security or fund's performance without penalizing it for upward price changes.

$$\text{Sortino Ratio} = \frac{Rp - Rf}{\grave{o}d}$$

Where,
Rp = Expected Return
Rf = Risk-Free RoR
òd = Portfolio Standard Deviation of negative asset returns

The Sortino ratio is similar to the Sharpe ratio, except it uses downside deviation for the denominator instead of standard deviation, the use of which doesn't discriminate between up and down volatility. This risk-reward measure quantifies the highest returns with the least volatility.

Sterling Ratio:

Generally, a higher Sterling ratio is better because it means that the investment(s) are receiving a higher return relative to risk.

Compound Annual ROR for the past three years / (Average Annual Maximum Drawdown + 10%)

Sterling Ratio:

A ratio used mainly in the context of hedge funds. This risk-reward measure determines which hedge funds have the highest returns while enduring the least mount of volatility. The formula is as follows:

$$= \frac{\text{Compounded Annual Return}}{\text{Average Maximum Drawdown - 10\%}}$$

This formula uses the average for risk (drawdown) and return over the past three years. Drawdown is calculated at the maximum potential loss in the given year.

The Sterling ratio is similar to the Sharpe ratio and the Sortino ratio, as it also produces a risk-adjusted return measurement. The Sterling ratio, along with the Sortino ratio, is primarily used by hedge funds as a way of advertising superior risk management.

Barclay Ratio:

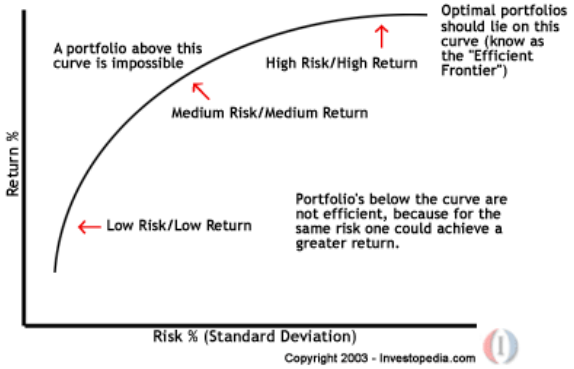
Similar to the Sharpe Ratio. Generally speaking - the higher the Barclay Ratio, the better.

Note: This ratio was developed by Barclay Trading Group, and is equal to the trend of the VAMI divided by the standard deviation of the monthly returns. Though similar to the Sharpe Ratio, it has a much higher correlation with percentage of profitable 12-month time windows.

Example: First calculate the linear regression trend of the VAMI's including the initial point. This is the numerator. Next remove the trend from the VAMI's (detrended VAMI = original VAMI - (slope X month number + intercept)). Take the Standard Deviation of these detrended VAMI's.

Efficiency Ratio:

This calculation attempts to quantify which data sets (CTAs) represent the optimal balance between risk and reward (compound Annual Return ÷ Annualized Standard Deviation of Monthly ROR.)



Note: The optimal portfolios plotted along the curve have the highest expected return possible for the given amount of risk.

Other Calculated Statistics

Worst Drawdown:

Percentage of deepest loss as measured from peak to valley.

Drawdown = (1 - Valley VAMI / Peak VAMI) (X 100 for %)
Example: Peak VAMI = 2000, Valley VAMI = 1500
Drawdown = 1 - 1500/2000 = .25 or 25%

Note: A drawdown is the Peak-to-Valley rate of return and is actually the negative, since in a drawdown the ROR is by definition negative.

Average Recovery:

The average time in a drawdown as measured from the previous peak to a new peak (New high ground).

Average Annual Return:

Average of all annual RoR generated during program life.

(Sum ROR for each calendar year in program history)/ (number of calendar years in program history)
Example: ABC program Start Date: Oct. 1995 End Date: Aug. 1998 (Sum ROR 1996, ROR 1997)/2