Edgefolio Calculation Guide

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This document summarises the formulas for all quantities we compute on Edgefolio. All calculations are based on monthly returns time series[1] of share classes of funds. For risk-adjusted statistics and correlation measures, we additionally use monthly returns of a benchmark index and a risk-free index that are selected in the user interface. Before performing the following calculations, the time series for each of these is aligned to the time frame selected in the user interface. Calculations are only performed when the required series are complete, and values shown in the user interface are generally rounded to two decimal places.

In what follows, we first establish some preliminary notation, and then proceed to use this to define the quantities computed on Edgefolio. These definitions are grouped into sections that mirror how they're presented on the website. The final formula in every section corresponds to the value displayed in the user interface.

[1] Appendix A details how we convert NAV data into a monthly returns time series used in our calculation engine.

Preliminary Notation

R	Share class monthly returns time series[2]
R_i	Share class return for month i
B	Benchmark monthly returns time series
B_i	Benchmark return for month i
RF	Risk-free monthly returns time series
RF_i	Risk-free return for month i
N	Number of values in a monthly returns time series
MAR	The minimum acceptable rate of monthly return, see 1.2.4
MAR_{annual}	The minimum acceptable rate of annual return
X	An arbitrary monthly returns time series
Y	An arbitrary monthly returns time series
$\text{argmax}_i(X)$	The month i that corresponds to the maximum value of X
$\text{argmin}_i(X)$	The month i that corresponds to the minimum value of X
$X\|_{\text{condition}}$	The subset of X that satisfies a given condition
$\text{count}(X)$	The number of values in X
$\mu(X)$	Arithmetic mean of $X = \frac{1}{N}\sum_{i=1}^{N} X_i$
$\sigma(X)$	Standard deviation of $X = \sqrt{\frac{1}{N-1}\sum_{i=1}^{N}(X_i - \mu(X))^2}$
$r(X,Y)$	The correlation between X and $Y = \frac{\sum_{i=1}^{N}(X_i-\mu(X))(Y_i-\mu(Y))}{\sqrt{\sum_{i=1}^{N}(X_i-\mu(X))^2}\sqrt{\sum_{i=1}^{N}(Y_i-\mu(Y))^2}}$

[2]Generally, all the returns values used by our calculation engine are assumed to be percentage changes.

1 Absolute Risk and Return

The quantities defined in this section are only based on the share class returns time series.

1.1 Absolute Return Statistics

1.1.1 Annualised Return

$$G(R) = \prod_{i=1}^{N} \left(1 + \frac{R_i}{100}\right)$$
$$N_{\text{annual}} = \frac{N}{12}$$
$$\text{Annualised Return}(R) = \left(G(R)^{1/N_{\text{annual}}} - 1\right) \times 100$$

In the user interface, we explicitly calculate and present this quantity for four different periods, $N = 12$, $N = 36$, $N = 60$ and the complete track record of the share class.

1.1.2 Best Month

$$\text{Best Month}(R) = \underset{i}{\operatorname{argmax}}(R)$$

1.1.3 Worst Month

$$\text{Worst Month}(R) = \underset{i}{\operatorname{argmin}}(R)$$

1.2 Volatility and Tail Risk

1.2.1 Annualised Volatility

$$\text{Annualised Volatility}(R) = \sqrt{12}\ \sigma(R)$$

1.2.2 Annualised Gain Volatility

$$\text{Annualised Gain Volatility}(R) = \sqrt{12}\ \sigma\left(R|_{R_i>0}\right)$$

1.2.3 Annualised Loss Volatility

$$\text{Annualised Loss Volatility}(R) = \sqrt{12}\ \sigma\left(R|_{R_i<0}\right)$$

1.2.4 Annualised Downside Volatility

$$MAR = \left(\left(1 + \frac{MAR_{\text{annual}}}{100} \right)^{1/12} - 1 \right) \times 100$$

$$\text{Downside Volatility}(R, MAR) = \sigma \left(R|_{R_i < MAR} - MAR \right)$$

$$\text{Annualised Downside Volatility}(R, MAR) = \sqrt{12}\ \text{Downside Volatility}(R, MAR)$$

In the user interface, we calculate and present this quantity for a specific value of minimum acceptable return of $MAR_{\text{annual}} = 5\%$.

1.2.5 Skewness

Unbiased skew of R normalised by $N - 1$.

1.2.6 Kurtosis

Unbiased kurtosis of R using Fishers definition of the quantity normalized by $N - 1$.

1.3 Efficiency and Drawdown

1.3.1 Average Monthly Gain

$$\text{Average Monthly Gain}(R) = \mu(R|_{R_i > 0})$$

1.3.2 Average Monthly Loss

$$\text{Average Monthly Loss}(R) = \mu(R|_{R_i < 0})$$

1.3.3 Gain/Loss Ratio

$$\text{Gain/Loss Ratio}(R) = -\frac{\sum_i R|_{R_i > 0}}{\sum_i R|_{R_i < 0}}$$

1.3.4 Positive Months Fraction

$$\text{Positive Months Fraction}(R) = \frac{\text{count}(R|_{R_i > 0})}{N} \times 100$$

1.3.5 Negative Months Fraction

$$\text{Negative Months Fraction}(R) = \frac{\text{count}(R|_{R_i < 0})}{N} \times 100$$

1.3.6 Maximum Drawdown

$$\tilde{G}(R) = \coprod_{i=1}^{N} \left(1 + \frac{R_i}{100}\right)$$

$$\text{Maximum Drawdown}(R) = \max_{j \in (1,N)} \left[\max_{i \in (1,j)} \tilde{G}(R)_i - \tilde{G}(R)_j\right]$$

Here, $\coprod$ denotes cumulative product.

2 Relative and Risk-Adjusted Statistics

2.1 Relative Return Statistics

2.1.1 Excess Return

$$\text{Excess Return}(R, B) = \text{Annualised Return}(R - B)$$

2.1.2 Up Capture Ratio

$$\text{Up Capture Ratio}(R, B) = \frac{G(R|_{B_i > 0})}{G(B|_{B_i > 0})}$$

2.1.3 Down Capture Ratio

$$\text{Down Capture Ratio}(R, B) = \frac{G(R|_{B_i < 0})}{G(B|_{B_i < 0})}$$

2.1.4 Up Number Ratio

$$\text{Up Number Ratio}(R, B) = \frac{\text{count}(R|_{B_i > 0}|_{R_i > 0})}{\text{count}(B|_{B_i > 0})}$$

2.1.5 Down Number Ratio

$$\text{Down Number Ratio}(R, B) = \frac{\text{count}(R|_{B_i < 0}|_{R_i < 0})}{\text{count}(B|_{B_i < 0})}$$

2.1.6 Up Percentage Ratio

$$\text{Up Percentage Ratio}(R, B) = \frac{\text{count}(R|_{B_i > 0}|_{R_i - B_i > 0})}{\text{count}(B|_{B_i > 0})}$$

2.1.7 Down Percentage Ratio

$$\text{Down Percentage Ratio}(R, B) = \frac{\text{count}(R|_{B_i < 0}|_{R_i - B_i < 0})}{\text{count}(B|_{B_i < 0})}$$

2.2 Risk-Adjusted Statistics

The quantities defined in this section examine the performance of a fund by adjusting for its risk.

2.2.1 Annualised Sharpe Ratio

$$S(R, RF) = \frac{\mu(F - RF)}{\sigma(F - RF)}$$
$$\text{Annualised Sharpe Ratio}(R, RF) = \sqrt{12}\ S(R, RF)$$

2.2.2 Annualised Sortino Ratio

$$\tilde{S}(R, RF) = \frac{\mu(F - RF)}{\text{Downside Volatility}(F - RF, 0)}$$
$$\text{Annualised Sortino Ratio}(R, RF) = \sqrt{12}\ \tilde{S}(R, RF)$$

2.2.3 Treynor Ratio

$$\text{Treynor Ratio}(R, B, RF) = \frac{\text{Annualised Return}(R) - \text{Annualised Return}(RF)}{100\ \beta(R, B, RF)}$$

β is defined in Section 3.1.4.

2.2.4 Omega Ratio (5%)

$$R'(R, RF, MAR) = R - RF - MAR$$
$$\text{Omega Ratio}(R, RF, MAR) = -\frac{\sum R'|_{R'_i > 0}}{\sum R'|_{R'_i < 0}}$$

In the user interface, we calculate and present this quantity for a specific value of minimum acceptable return of $MAR_{\text{annual}} = 5\%$.

2.2.5 Calmar Ratio

$$\text{Calmar Ratio}(R) = -\frac{\text{Annualised Return}(R)}{\text{Maximum Drawdown}(R)}$$

3 Correlation and Regression

3.1 Correlation and Regression Analysis

3.1.1 Correlation

$$\text{Correlation}(R, B) = r(R, B)$$

3.1.2 Upside Correlation

$$\text{Upside Correlation}(R, B) = r(R|_{B_i>0}, B|_{B_i>0})$$

3.1.3 Downside Correlation

$$\text{Downside Correlation}(R, B) = r(R|_{B_i<0}, B|_{B_i<0})$$

3.1.4 Beta

$$\beta(R, B, RF) = r(R - RF, B - RF)\,\frac{\sigma(R - RF)}{\sigma(B - RF)}$$

3.1.5 Annualised Alpha

$$\alpha(R, B, RF) = \mu(R - RF) - \beta(R, B, RF)\,\mu(B - RF)$$
$$\text{Annualised Alpha}(R, B, RF) = 12\ \alpha(R, B, RF)$$

3.1.6 R-Squared

$$\text{R-Squared}(R, B) = r(R, B)^2$$

3.1.7 Annualised Tracking Error

$$\text{Annualised Tracking Error}(R, B) = \sqrt{12}\ \sigma(R - B)$$

A Converting daily NAV data into monthly returns time series

As has been expressed in the main body of this document, Edgefolio's internal calculation engine works with monthly returns time series. To convert fund (share class) NAV data to monthly returns, we use the following formula:

$$MR_i = \frac{NAV_i - NAV_{i-1}}{NAV_{i-1}} \times 100,$$

where MR_i is the monthly return for month i and NAV_i is the latest net asset value for month i.

This calculation, as with all other calculations in the platform, is only well-defined when we have complete data.