

## Preliminary Note

Total return takes into account not only the capital gains of an investment but also the income yield from dividends or interest payments. The calculation of total return is based on the assumption that interest payments or dividends are immediately reinvested.

## Notation

- $y$  monthly fund total return (performance), based on net asset values and dividends.
- $x$  benchmark return.
- $r$  risk free rate return.
- $y - x$  relative return.
- $y - r$  fund's excess return.
- $x - r$  benchmark's excess return.
- $n$  number of observations.
- $t$  time, 12 for monthly data.

### 1. Arithmetic Mean [Factsheets]

This figure is the simple arithmetic mean (often referred to as the “average”) of a fund's performance during the period of investment.

$$\frac{1}{n} \sum_{i=1}^n y_i$$

### 2. Annualized Performance [Interactive Website + Factsheets]

Annualized Performance is the cumulative investment performance presented on an annualized basis. It is the annual return that would result in the same cumulative return if compounded annually. Annualized return makes possible to compare cumulative returns over different horizons. Cumulative returns less than one year are usually not annualized.

$$\text{Annualized Return} = \left(1 + \text{Cumulative Return}\right)^{\frac{\text{Number of Periods per Year}}{\text{Total Number of Periods}}} - 1$$

### 3. Positive Months [Factsheets]

This figure is the percentage of months with positive returns among all months over a given time period.

### 4. Gain/Loss Ratio [Factsheets]

Gain/Loss Ratio is the ratio between sub-periods with positive returns and sub-periods with negative returns.

### 5. Worst Month [Factsheets]

This figure represents the highest negative performance in any single monthly period over the entire period of investment for which the figure is being calculated.

$$\min(y_1, y_2, \dots, y_{n-1}, y_n)$$

### 6. Maximum Drawdown [Interactive Website + Factsheets]

Maximum Drawdown is the most negative cumulative return over a given time period. In other terms, it is the maximum percentage loss that occurred in a return data series, measured as the worst period of “peak to valley” performance for the fund, regardless of whether or not the drawdown consisted of consecutive months of negative performance.

### 7. Standard Deviation [Interactive Website + Factsheets]

Standard deviation is a measure of risk. Specifically, it measures the variability of actual returns around their expected (average) values and the dispersion of these variations over time. A higher value for standard deviation indicates a wider dispersion of these variations from their mean (average) value and hence would be associated with a higher degree of risk because the predictability of returns is much less certain. Standard deviation is the square root of variance.

$$\sigma_y = \sqrt{\frac{\sum_{i=1}^n (y_i - \bar{y})^2}{n - 1}}$$

8. Volatility [Interactive Website + Factsheets]

This figure is the annualized standard deviation.

$$\sigma_y * \sqrt{t}$$

9. Annualized Sharpe Ratio [Interactive Website + Factsheets]

Sharpe ratio is a risk-adjusted measure of performance. It is calculated as the average sub-period excess return divided by the standard deviation of sub-period excess returns over a given period. Sub-period excess return is the difference between the investment return and the risk-free return for a sub-period.

$$\frac{\bar{y} - \bar{r}}{TE_{(y,r)}} * \sqrt{t}$$

10. Covariance [Interactive Website + Factsheets]

Covariance describes the co-movement in the variance between two variables.

$$Cov_{(x,y)} = \frac{\sum_{i=1}^n (x_i - \bar{x}) * (y_i - \bar{y})}{n}$$

11. Correlation [Interactive Website + Factsheets]

Correlation, measured by the correlation coefficient, is the strength of the linear relationship between two quantities such as the excess returns of a fund and its benchmark. The range of values for the correlation coefficient is -1 to +1 inclusive.

$$\rho_{(x-r,y-r)} = \frac{Cov_{(x-r,y-r)}}{\sigma_{x-r} * \sigma_{y-r}}$$

12. R<sup>2</sup> [Interactive Website + Factsheets]

R<sup>2</sup> is a measure of the strength of linear relationship between fund performance and benchmark performance. It is the percentage of variability in fund performance explained by benchmark performance. R<sup>2</sup> ranges from 0 to 1, where 0 means no linear relation and 1 means perfect linear relationship. Higher R<sup>2</sup> indicates more reliable regression estimates such as alpha and beta.

$$\left(\rho_{(x-r,y-r)}\right)^2$$

13. Annualized (Jensen's) Alpha [Interactive Website + Factsheets]

Alpha is a measure of fund performance adjusted for the risk associated with a benchmark over a given period. Alpha is the average return on the fund portfolio over and above that predicted by the Capital Asset Pricing Model (CAPM), given the fund portfolio's beta and the average market return. Alpha is usually used to evaluate the contribution to performance by active management. Higher alpha means better fund performance after adjusting for the risk associated with the benchmark.

$$\left[ (\bar{y} - \bar{r}) - \beta * (\bar{x} - \bar{r}) \right] * t * 100$$

14. Beta [Interactive Website + Factsheets]

Beta is a measure of sensitivity of fund performance relative to changes in benchmark performance. A fund with a beta of 1.0 has tended to experience up and down movements of roughly the same magnitude as the benchmark and a beta of 1.5 suggest that the movement of the fund is 1.5 times that of the benchmark. Higher beta means higher risk associated with the benchmark. Confidence in beta must be qualified by an R<sup>2</sup> that approaches one.

$$\beta = \frac{\sum_{i=1}^n ((y_i - r_i) - (\bar{y} - \bar{r})) * ((x_i - r_i) - (\bar{x} - \bar{r}))}{\sum_{i=1}^n ((y_i - r_i) - (\bar{y} - \bar{r}))^2}$$

15. Annualized Tracking Error [Interactive Website + Factsheets]

Also referred to as active risk, the tracking error measures the standard deviation of the excess returns of a fund from those of its benchmark. It is the standard deviation of the difference between the returns of the fund and benchmark (excess returns).

$$TE_{(y,x)} = \sqrt{\frac{\sum_{i=1}^n ((y_i - x_i) - (\bar{y} - \bar{x}))^2}{n - 1}} * \sqrt{t}$$

**16. Annualized Information Ratio [Interactive Website + Factsheets]**

The Information Ratio is a measure of excess return over a determined benchmark realized for each unit of active risk assumed (measured by the tracking error). A higher information ratio indicates a higher rate of excess return for a given level of risk assumed.

$$\frac{\bar{y} - \bar{x}}{TE_{(y,x)}} * \sqrt{t} * 10,000$$