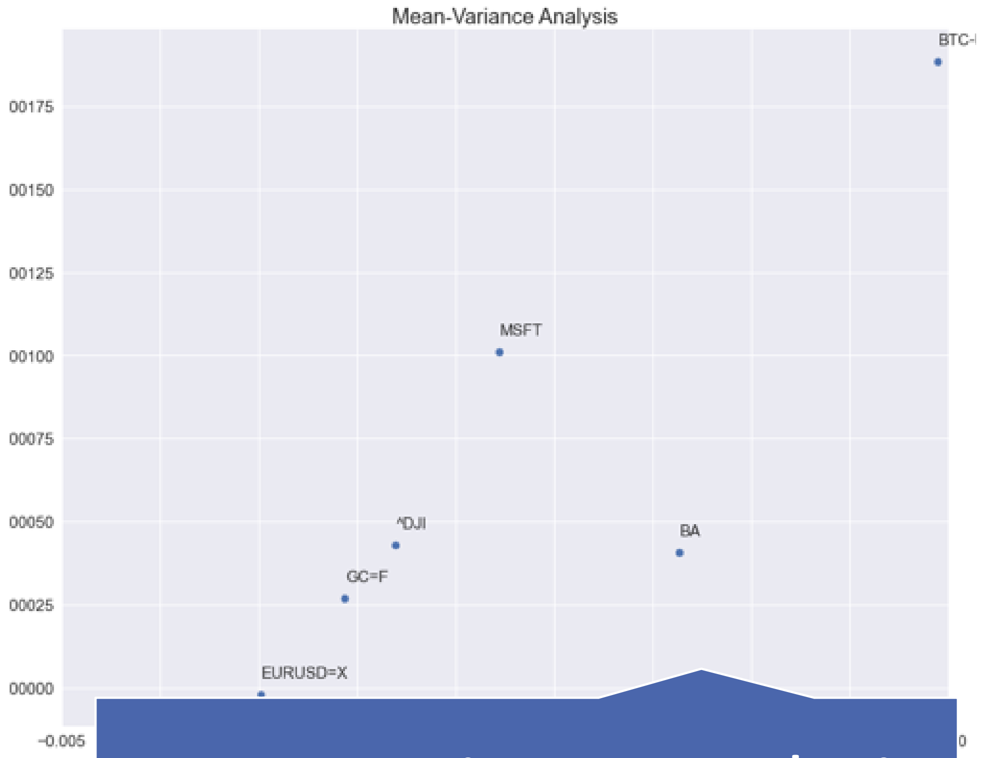
Risk-adjusted Return – Sharpe Ratio

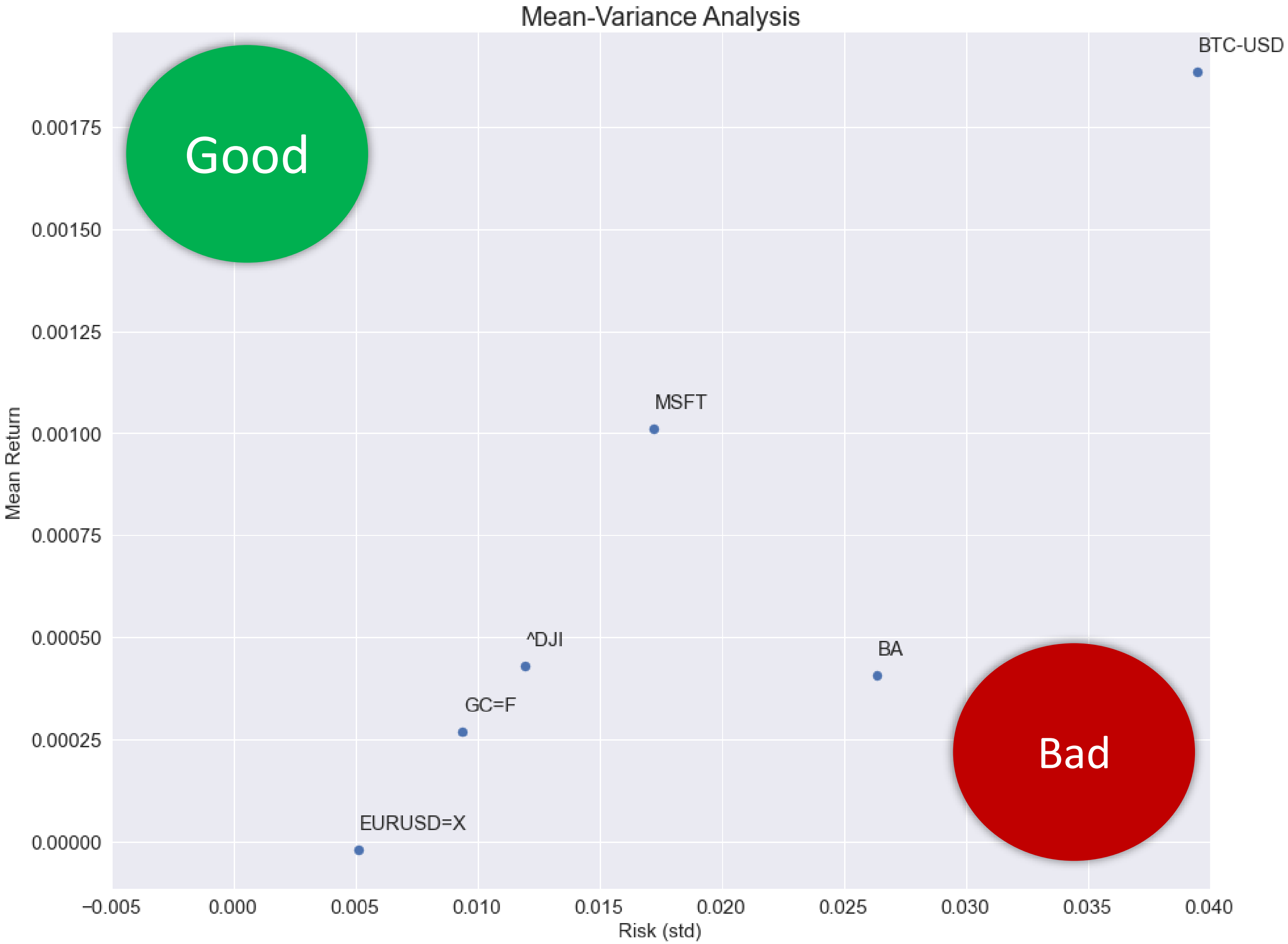


Mean-Variance Analysis and Sharpe Ratio

Trade-off between Reward and Risk – How to measure risk-adjusted Returns?

Trade-off between Reward and Risk

Higher Return goes hand in hand with higher Risk.



Risk-adjusted Return

Very Intuitive:

Reward per Unit of Risk

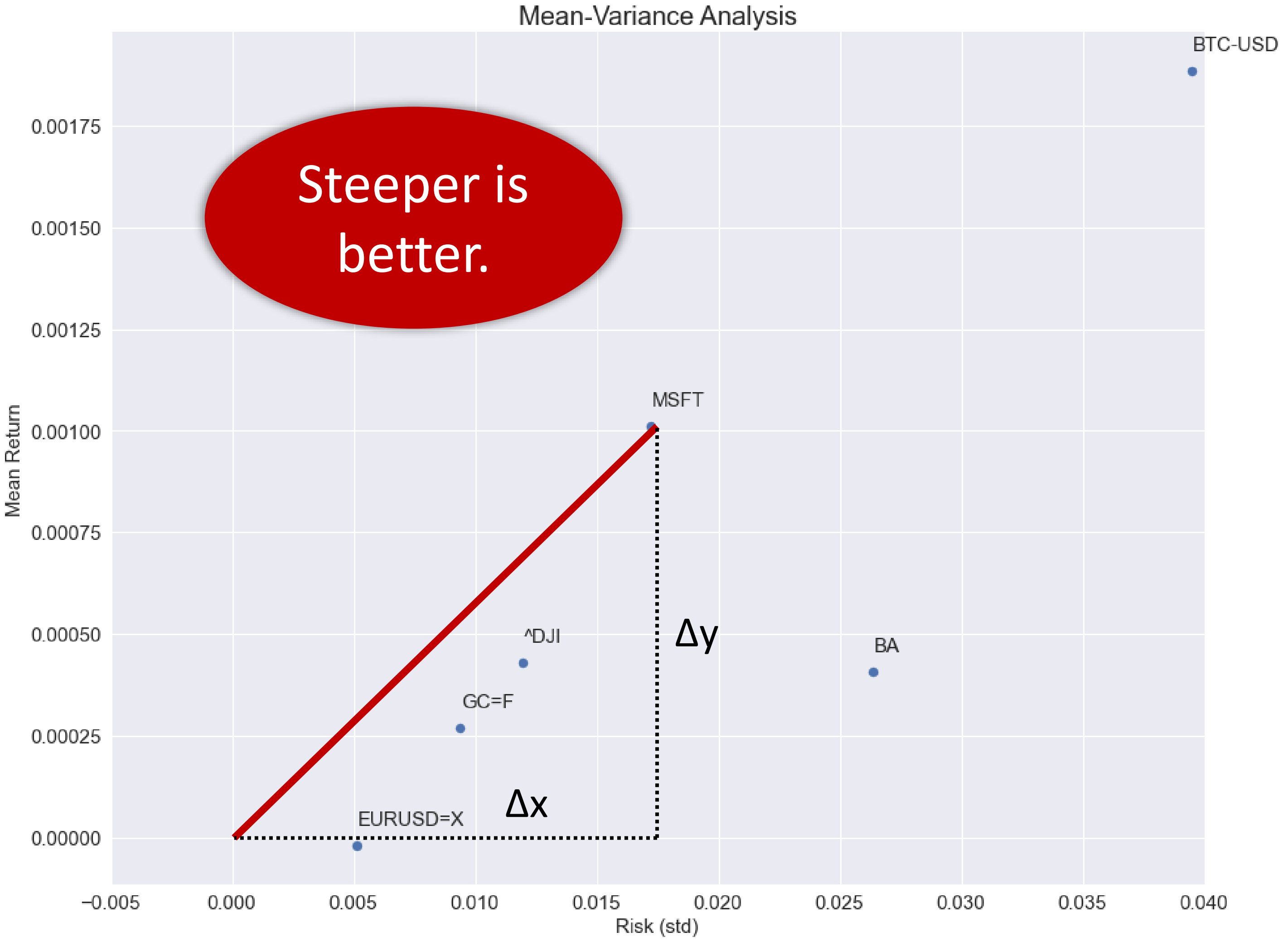
Higher is better.

$$\text{Risk-adjusted Return} = \frac{Reward}{Risk} = \frac{Mean\ Return}{Std\ of\ Returns}$$

Graphical Intuition

Risk-adjusted Return:

Slope of the straight line from origin (0,0) to the datapoint.



Excursus: Sharpe Ratio

Popular in Portfolio Management:

Excess Return over Risk-free Asset (Risk Premium) per Unit of Risk

Sharpe Ratio = $\frac{Excess\ Return}{Risk} = \frac{Mean\ Return - r_f}{Std\ of\ Returns}$

(Example for risk-free Asset: Short-term US Government Bond)

Only if $r_f = 0$: Sharpe Ratio = $\frac{Mean\ Return}{Std\ of\ Returns}$

($r_f = 0$ is not an appropriate simplification/approximation for Portfolio Management Purposes!!!)

Limitations of Sharpe Ratio

Limitations of

"Sharpe Ratio"

- Only takes into account mean & variance (std)
- Assumes normally distributed returns
- Overestimates risk-adjusted returns when fat tails are present
- Can be manipulated with smoothed data (monthly returns)
- Can´t compare/rank instruments with negative Sharpe Ratios
- Penalizes upside and downside volatility equally