Sharpe Ratio

History of sharpe ratio and scale

https://web.stanford.edu/~wfsharpe/art/sr/sr.htm

The sharpe ratio is a ratio to properly measure investments of a portfolio. It gets the excess return an investment and gives for the amount of risk it takes basically, reward per unit of volatility.It is compared to a risk free rate i.e T bill

It prioritizes steady investment returns rather than super volatile higher return investments

It was created by William F. Sharpe to distinguish an investments return to a risk free return

("If you do insist on using a single number it must capture aspects of ***both risk and return****.* ***This is the purpose of the Sharpe ratio.*** *It is the ratio of* ***reward to variability****; and shows the* ***excess returns over a T-bill rate****, divided by the variability.")*

When calculating sharpe ratios there is two specific ways to use it

One post return one before investment
Ex-ante = **predictive**, the version you *should* use when choosing investments.

Ex-post = **descriptive**, the one you usually see in reports or funds' fact sheets.

For ex ante you can use historical models to predict future returns, analytics forecasts or other prediction models.

It is suggested as this ratio is mainly for building portfolios to use the Ex-Ante model

Stated here, ""With the exception of this section, we focus on the use of the ratio for making decisions, and hence are concerned with the **ex-ante version**."

Both are mathematically both calculated the same rather if its post or predicted formula

Ex-ante equations

$S = E[Rp - Rf] / \sigma$

Ex post equation
$S = [Rp - Rf] / \sigma$□

Very simple.

Risk free rate would be the monthly fixed risk free return over timeframe

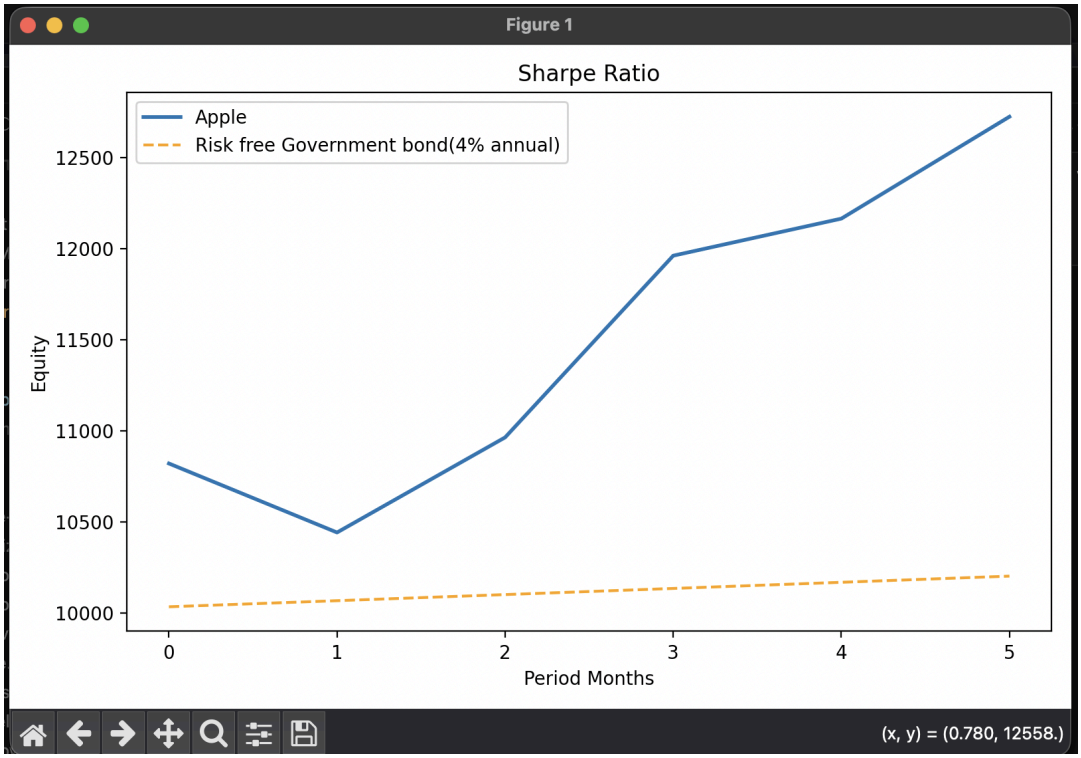
Return on portfolio mean

Then calculate sample standard deviation

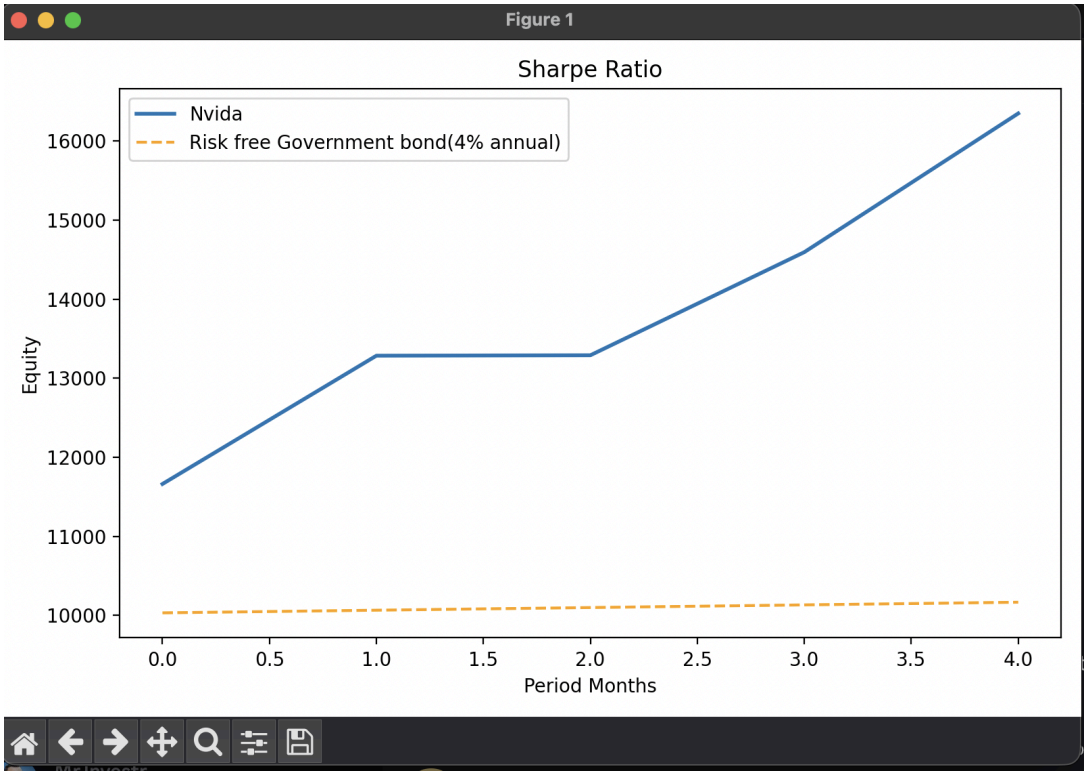
Calculating Standard deviation

- Get the monthly returns per month
- Find the mean
- Find the differences of each monthly return by subtracting it from the mean
- Square the values
- Average the values out again of squared values
- Square root that average

Examples
Apples Return



Nvidia Returns



Example Problem GOOG:

Month	COMP %	T-bill %
Jan	2.4	0.35
Feb	1.1	0.35
Mar	−0.8	0.35
Apr	3.2	0.35
May	0.9	0.35
Jun	2.0	0.35
Jul	−1.5	0.35
Aug	4.1	0.35
Sep	−0.4	0.35
Oct	1.7	0.35
Nov	2.3	0.35
Dec	0.5	0.35

ADSAS
Average Differences Square Average Square Root

[2.4, 1.1, -0.8, 3.2, 0.9, 2.0, -1.5, 4.1, -0.4, 1.7, 2.3, 0.5]/12 = 1.29 Return on portfolio

[1.29 - 2.4. 1.29 - 1.1, 1.29 - - 0.8, 1.29 - 3.2, 1.29 - 0.9, 1.29 - 2.0, 1.29 - - 1.5, 1.29 - 4.1, 1.29 - - 0.4, 1.29 - 1.7, 1.29 - 2.3, 1.29 - 0.5]

[-1.11^2, 0.19^2, 2.09^2, -1.91^2, 0.39^2, -0.71^2, 2.79^2, -2.81^2, 1.69^2, -0.41^2, -1.01^2, 0.79^2]

[1.2321, 0.0361, 4.3681, 3.6481, 0.1521, 0.5041, 7.7841, 7.8961, 2.8561, 0.1681, 1.0201, 0.6241]/12

$\sqrt{}$ 2.5241 = 1.5887

1.59 Standard Deviation

1.29 - 0.35 / 1.59 = **0.94 excess return rate**

0.94 excess return rate / 1.59 Standard Deviation = 0.59119497

Sharpe Ratio Rate = 0.59119497

Performance Scale
<1 being poor, 1-1.99 good, 2-2.99 very good, and >3 excellent,