Individual Stocks (AKA Also Known as securities) Math

(for "portfolios" AKA group of stocks we use β (beta) to describe stocks)

Div_{t+1} describes the dividend paid on a stock during the year

P_t describes the price of a stock at the beginning of the year.

t describes the particular year.

P_{t+1} describes the year end price.

beg. yr price = $25
year end price = $35
Div. during year = $2

* Dividend yield $= \frac{D_{t+1}}{P_t}$ ex: $\frac{2}{25} = 8\%$

* Capital gain (if stock gains value) $= \frac{(P_{t+1} - P_t)}{P_t}$ ex: $\frac{35-25}{25} = 40\%$

* ~~Total~~ Return (AKA R_{t+1}) $= \frac{Div_{t+1}}{P_t} + \frac{(P_{t+1} - P_t)}{P_t} = \frac{2}{25} + \frac{35-25}{25} = 48\%$

Average (AKA Mean $\bar{R}$) $= \frac{\text{stock price cumulative}}{\text{\# of years}}$

AKA "all of stock prices added together over the time specified"

AKA the amount of time we are evaluating

ex: $\frac{25 + 35 + 20 + 27}{4} = \$26.75$ average stock price over 4 years

T = total

For individual stock "valuation" we also use

Variance (Var) and standard deviation (s^2)

Common measures of stock price "variability or dispersion"

Example of Variance and Standard deviation for individual stocks

Consider a stock over 4 years

1926	1927	1928	1929
$20	$25	$21	$24

① Find the average

$$\bar{R} = \frac{20 + 25 + 21 + 24}{4} = \frac{90}{4} = \$22.5$$

② The formula for variance is

$$Var = \frac{1}{T-1}\left[(R_1 - \bar{R})^2 + (R_2 - \bar{R})^2 + (R_3 - \bar{R})^2 + (R_4 - \bar{R})^2\right]$$

R_1: 1926 stock price; $\bar{R}$: average; R_2: 1927; R_3: 1928; R_4: 1929

$T = 4$ years

$\bar{R}$ remains the same

$$Var = \frac{1}{4-1}\left[(20 - 22.5)^2 + (25 - 22.5)^2 + (21 - 22.5)^2 + (24 - 22.5)^2\right]$$

$$Var = \frac{1}{3}\left[6.25 + 6.25 + 2.25 + 2.25\right]$$

$$Var = \frac{17}{3} = \sqrt{5.667}$$

The standard deviation is the square root of variance.

Var or $S^2 = \sqrt{5.667}$ then | Std dev (SD) or $S = 2.381$ |

Standard deviation is used to explain how far a stock varies (deviates) from the average (mean).

Knowing how a stock price moves can help with decisions.

Often times stock analysts try to determine the "probability" that deviations from the mean will occur.

Knowing this information can help predict stock price movement.

Nothing in stock price valuation for the future (inferential) is certain. As things change in the world ...
Like different country currencies value,
world events and economies ...,
Stock prices change.

We can't forget, money is the root of all evil.

The best things in life are free ...
(or almost)

Doing the best with what we've got.

Trying to lighten up.