Task 2 Background Reading

Quantifying Asset Risk – Standard Deviation and Variance

- Two of the most common ways to measure risk in investing are standard deviation and variance.
- The standard deviation and variance of a data set measures the dispersion of returns from their average return (i.e. the spread of annual returns from their average return).
- Consider this example:
    - Facebook has generated returns over the last 5 years of:
        - Y1: 12%
        - Y2: 5%
        - Y3: (2%)
        - Y4: 10%
        - Y5: 20%
    - The average (mean) return is 9%.
    - The deviations from the mean for each year are:
        - Y1: 3%
        - Y2: (4%)
        - Y3: (11%)
        - Y4: 1%
        - Y5: 11%
    - The sum of the deviations always equals to zero (by virtue of how the mean is calculated).
- Therefore, a useful measure of dispersion is to calculate variance.
- Variance is the sum of squared deviations divided by the one less than the number of observations (sample method):
    - Y1: $3\%^2 = 0.09\%$
    - Y1: $(4\%)^2 = 0.16\%$
    - Y1: $(11\%)^2 = 1.21\%$
    - Y1: $1\%^2 = 0.01\%$
    - Y5: $11\%^2 = 1.21\%$
    - Sum = 2.68%
    - Divided by Number of Observations less 1 = 2.68% / 4
    - Variance = 0.67%
- To calculate the standard deviation, take the square root of the variance:
    - SQRT (0.67%) = 8.19%
- High standard deviations and variances indicate high volatility in returns, and hence a riskier investment. Conversely, lower standard deviations and variances indicate low volatility in returns, and hence represent a less risky investment.