Calculation Example: CAPM Equation

Question: Find μ_A, the expected return of stock A, given:

Stock A has a correlation with the market of 0.5.

The standard deviation of A's returns is 0.3.

The market standard deviation of returns is 0.2.

The market return is 0.1 and

The risk free rate is 0.05.

Answer: There are 3 steps. First find $\sigma_{A,M}$ also called $cov(r_A, r_M)$, then B_A, and finally μ_A.

For the covariance between r_A and r_M,

$$\sigma_{A,M} = \rho_{A,M} . \sigma_A . \sigma_M$$

$$= 0.5 \times 0.3 \times 0.2$$

$$\sigma_{A,M} = 0.03$$

For the beta of stock A:

$$\beta_A = \frac{\sigma_{A,M}}{{\sigma_M}^2}$$

$$= \frac{0.03}{0.2^2}$$

$$= 0.75$$

For the expected return of stock A:

$$\mu_A = r_f + \beta_A(\mu_M - r_f)$$

$$= 0.05 + 0.75 \times (0.1 - 0.05)$$

$$= 0.0875$$

In conclusion, stock A has a lower expected return than the market since it has lower systematic risk with a beta of only 0.75 compared to the market's beta of 1.