M339D: September 23rd, 2022.

16) You are given the following information about Stock X and ~~the market~~ P:

(i) The annual effective risk-free rate is 5%. $\boxed{r_f = 0.05}$

(ii) The expected return and volatility for Stock X and ~~the market~~ P are shown in the table below:

	Expected Return	Volatility
Stock X	$\boxed{5\%}$	40%
~~Market~~ P	8%	25%

(iii) The correlation between the returns of stock X and ~~the market~~ P is –0.25. $\boxed{\rho_{X,P} = -0.25}$ ✓

~~Assume the Capital Asset Pricing Model holds~~. Calculate the required return for Stock X and determine if the investor should invest in Stock X.

(A) The required return is 1.8%, and the investor should invest in Stock X.

(B) The required return is 3.8%, and the investor should NOT invest in stock X.

(C) The required return is 3.8%, and the investor should invest in stock X.

(D) The required return is 6.2%, and the investor should NOT invest in Stock X.

(E) The required return is 6.2%, and the investor should invest in stock X.

$$\beta_X^P = \frac{\sigma_X}{\sigma_P}\cdot\rho_{P,X} = \frac{0.4}{\cancel{0.25}}(-\cancel{0.25}) = -0.4$$

$$r_X = r_f + \beta_X^P\left(\mathbb{E}[R_P]-r_f\right) = 0.05 + (-0.4)(0.08-0.05)$$

$$r_X = 0.05 - 0.012 = 0.038 < 0.05 = \mathbb{E}[R_X]$$

14) You are given the following information about Stock X, Stock Y, and ~~the market~~ P:

(i) The annual effective risk-free rate is 4%. $\boxed{r_f = 0.04}$

(ii) The expected return and volatility for Stock X, Stock Y, and ~~the market~~ P are shown in the table below:

	Expected Return	Volatility
Stock X	$\boxed{5.5\%}$	40%
Stock Y	$\boxed{4.5\%}$	35%
~~Market~~ P	6.0%	25%

(iii) The correlation between the returns of stock X and ~~the market~~ P is –0.25. $\boxed{\rho_{X,P} = -0.25}$

(iv) The correlation between the returns of stock Y and ~~the market~~ P is 0.30. $\boxed{\rho_{Y,P} = 0.30}$

~~Assume the Capital Asset Pricing Model holds~~. Calculate the required returns for Stock X and Stock Y, and determine which of the two stocks an investor should choose.

(A) The required return for Stock X is 3.20%, the required return for Stock Y is 4.84%, and the investor should choose Stock X.

(B) The required return for Stock X is 3.20%, the required return for Stock Y is 4.84%, and the investor should choose Stock Y.

X (C) The required return for Stock X is 4.80%, the required return for Stock Y is 4.84%, and the investor should choose Stock X.

X (D) The required return for Stock X is 6.40%, the required return for Stock Y is 3.16%, and the investor should choose Stock Y.

X (E) The required return for Stock X is 3.50%, the required return for Stock Y is 3.16%, and the investor should choose both Stock X and Stock Y.

$\rightarrow$: $\beta_X^P = \frac{\sigma_X}{\sigma_P}\rho_{P,X} = \frac{0.4}{0.25}(-0.25) = -0.40$

$r_X = 0.04 + (-0.4)(0.06 - 0.04) = 0.04 - 0.008 = \underline{0.032}$

$0.032 < 0.05 = E[R_X]$

We should invest in X.

$$\beta_Y^P = \frac{\sigma_Y}{\sigma_P} \cdot \rho_{P,Y} = \frac{0.35}{0.25} \cdot (0.3) = 0.42$$

$$r_Y = 0.04 + 0.42\,(0.06 - 0.04) = 0.04 + 0.0084 = 0.0484 > 0.045 = E[R_Y]$$

We should not invest in Y.

$\square$

The Capital Asset Pricing Model (CAPM).

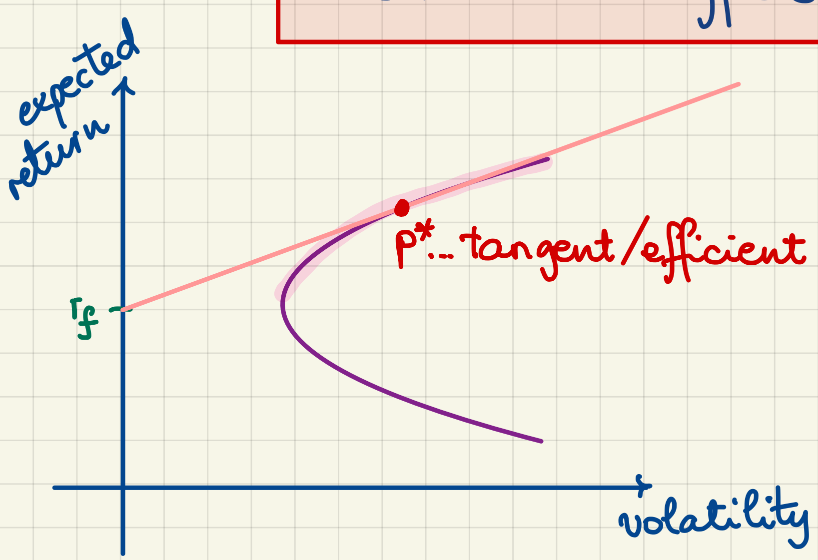
1. **No friction:** The investors buy/sell all the securities @ competitive market prices w/ no transaction costs. Both borrowing and lending are @ the same risk-free interest rate.

2. **Rationality:** Investors hold only efficient portfolios, i.e., the portfolios that give the highest possible expected return @ a particular volatility.

3. **Homogeneous Expectations:**

All the investors have homogeneous beliefs about:

- expected returns
- volatilities
- correlation coefficients



P^*... tangent/efficient portfolio = MARKET PORTFOLIO

All the assets i in the market:

$MV_i \quad \times \begin{cases} \bullet\ \text{\# of shares of } i; \\ \bullet\ \text{market value per share} \end{cases}$

In the market portfolio: $w_i = \frac{MV_i}{\sum_i MV_i}$

In CAPM :

$$\underline{\mathbb{E}[R_I]} \equiv \underline{r_I} = \underline{r_f} + \overset{\overset{Mkt}{\beta_I} :=}{\beta_I} \left(\underline{\mathbb{E}[R_{Mkt}] - r_f}\right)$$

$$w/ \quad \beta_I = \underline{\frac{\sigma_I}{\sigma_{Mkt}} \rho_{I,Mkt}} = \underline{\frac{Cov[R_I, R_{Mkt}]}{Var[R_{Mkt}]}}$$