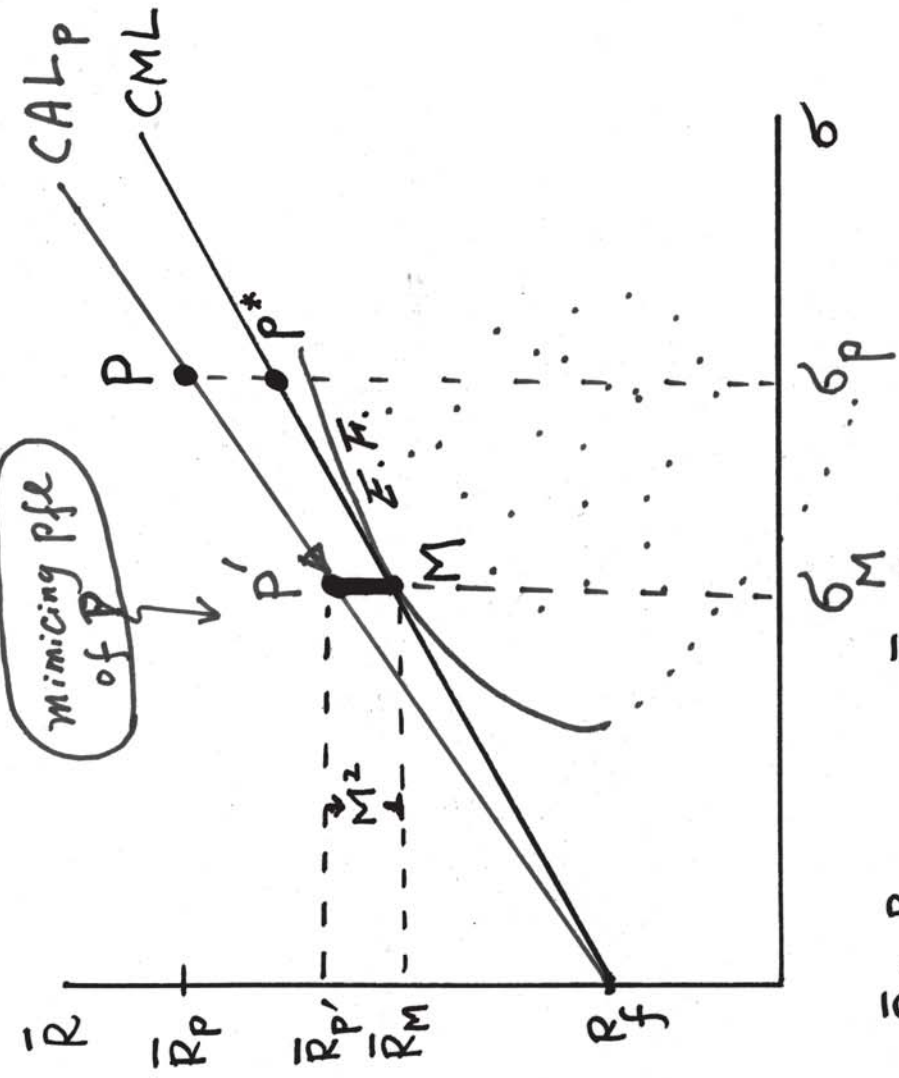


Portfolio Performance measures:

Fund P outperforms the market,



① if slope of CALP > slope of CML
 ⇒ Sharp Ratio_P > Sharp Ratio_M

$$\frac{\bar{R}_P - R_f}{\sigma_P} > \frac{\bar{R}_M - R_f}{\sigma_M}$$

$$\bar{R}_P > R_f + \frac{\sigma_P}{\sigma_M} (\bar{R}_M - R_f)$$

② if $\bar{P}M = M^2 > 0$.

P' is as efficient as P in that $S_{P'} = S_P$; but P' has the same risk of the market

$$\sigma_{P'} = \sigma_M$$

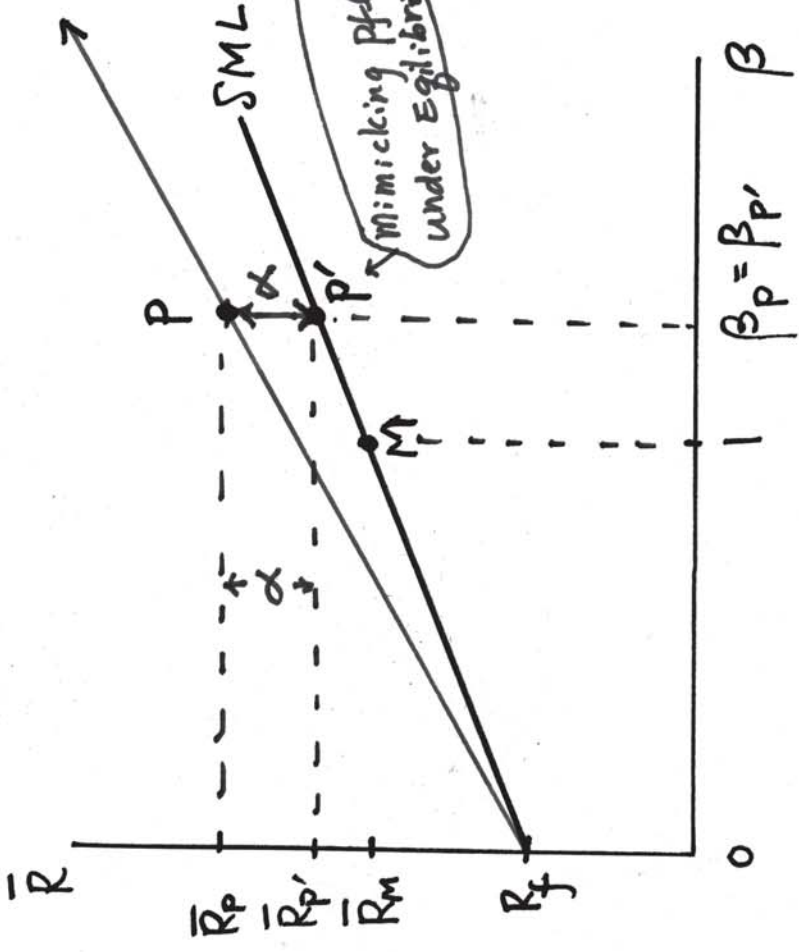
$$M^2 = \bar{P}M = \bar{R}_{P'} - \bar{R}_M = \frac{\sigma_M}{\sigma_P} (\bar{R}_P - R_f) - (\bar{R}_M - R_f)$$

$$S_{P'} = \frac{\bar{R}_{P'} - R_f}{\sigma_{P'}} = S_P = \frac{\bar{R}_P - R_f}{\sigma_P}$$

$$\bar{R}_{P'} = R_f + \frac{\sigma_M}{\sigma_P} (\bar{R}_P - R_f)$$

Excess Return

Fund P outperforms the market, if slope of $\bar{R}_P >$ slope of SML



$$J_P = \frac{\bar{R}_P - R_f}{\beta_P} > [J_M = \frac{\bar{R}_M - R_f}{1}]$$

if $[\overline{PP'} = \alpha] > 0$

$$\begin{aligned} \alpha &= \overline{PP'} = \bar{R}_P - \bar{R}_{P'} \\ &= \bar{R}_P - [R_f + \beta_P (\bar{R}_M - R_f)] \\ &= (\bar{R}_P - R_f) - \beta_P (\bar{R}_M - R_f) \end{aligned}$$

From CAPM (or SML)

$$\bar{R}_{P'} = R_f + \beta_P [\bar{R}_M - R_f]$$

$$\alpha = \text{Risk premium of the Fund} - (\text{Beta of the Fund} \times \text{market Risk premium})$$

Excess Return

Sharp Ratio, M^2 , Treynor Ratio and Jensen's Alpha

CML

SML

Slope,

$$S_p = \frac{\bar{R}_p - R_f}{\sigma_p}$$

Unit Risk premium

$$T_p = \frac{\bar{R}_p - R_f}{\beta_p}$$

Excess
Return

$$M^2 = \frac{\sigma_M}{\sigma_p} (\bar{R}_p - R_f) - (\bar{R}_M - R_f)$$

$$\alpha = (\bar{R}_p - R_f) - \beta_p (\bar{R}_M - R_f)$$

• Total Risk

• Breath (Diversification)

• Systematic Risk

• Depth (skill to Catch additional return)