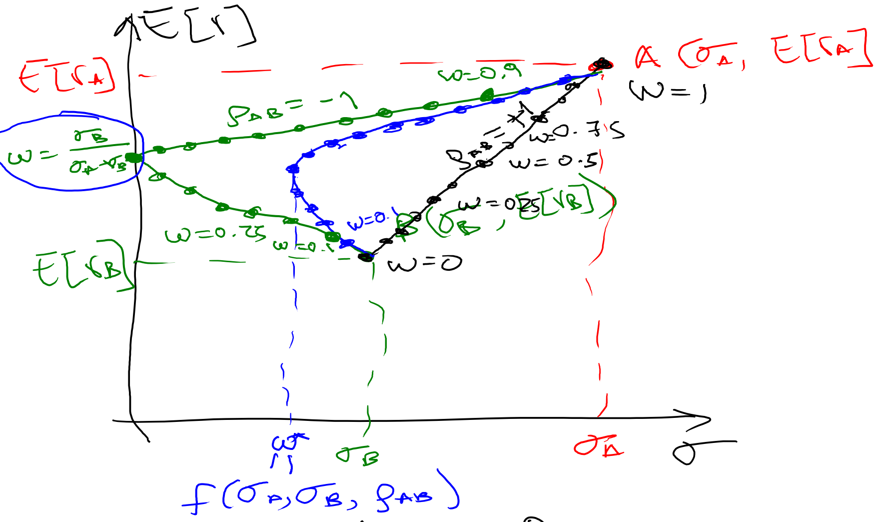


Activos	A	y B
rend. (v.A.)	r_A	y r_B
rend. Esp.	$E[r_A]$	$E[r_B]$
vol.	σ_A	σ_B
pond.	$\underset{\geq 0}{w_A}$ +	$\underset{\geq 0}{w_B} = 1$;

$w := w_A \geq 0$

$\underbrace{1-w}_{0 \leq w \leq 1} = w_B \geq 0$

$$\begin{cases} E[r_P] = w\,E[r_A] + (1-w)E[r_B] \\ \qquad = w\left(E[r_A]-E[r_B]\right) + E[r_B] . \\ \sigma_P^2 = \underbrace{w^2\sigma_A^2 + (1-w)^2\sigma_B^2} + 2w(1-w)\underbrace{\sigma_{AB}}_{\sigma_A\sigma_B\rho_{AB}} \end{cases}$$

Queremos analizar el efecto de ρ_{AB}.

$\boxed{\rho_{AB} = 1}$

$$\sigma_P^2 = w^2\sigma_A^2 + (1-w)^2\sigma_B + 2w(1-w)\sigma_A\sigma_B$$
$$= \left[w\sigma_A + (1-w)\sigma_B\right]^2$$

$$\boxed{\sigma_P = w(\sigma_A - \sigma_B) + \sigma_B .}$$

$$\begin{bmatrix} E[r_P] \\ \sigma_P \end{bmatrix} = \begin{bmatrix} E[r_A] - E[r_B] \\ \sigma_A - \sigma_B \end{bmatrix} w + \begin{bmatrix} E[r_B] \\ \sigma_B \end{bmatrix}$$

$$0 \leq w \leq 1$$

$$\boxed{\rho_{AB} = -1}$$

$$\sigma_P^2 = w^2\sigma_A^2 + (1-w)^2\sigma_B^2 - 2w(1-w)\sigma_A\sigma_B$$

$$= \left[w\sigma_A - (1-w)\sigma_B\right]^2$$

$$\boxed{\begin{aligned}\sigma_P &= \left|w\sigma_A - (1-w)\sigma_B\right| \\ &= \left|w(\sigma_A+\sigma_B) - \sigma_B\right| \\ &= \begin{cases} w(\sigma_A+\sigma_B) - \sigma_B & \text{si } w \geq \dfrac{\sigma_B}{\sigma_A+\sigma_B} \\ \sigma_B - w(\sigma_A+\sigma_B) & \text{si } w < \dfrac{\sigma_B}{\sigma_A+\sigma_B} \end{cases}\end{aligned}}$$

$$\text{si } w = \frac{\sigma_B}{\sigma_A + \sigma_B} \Rightarrow \sigma_P = 0$$

$$\boxed{-1 < \rho_{AB} < 1}$$

$$-1 < \rho_{AB} < 1$$

multiplicar por $2w(1-w)\sigma_A\sigma_B \geq 0$

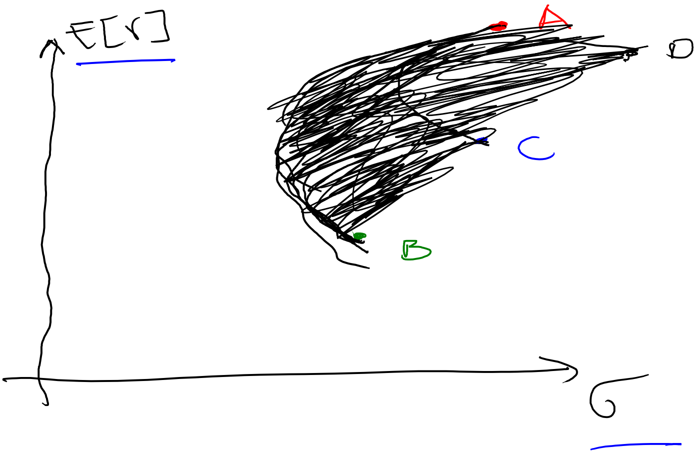
$$-2w(1-w)\sigma_A\sigma_B < 2w(1-w)\sigma_A\sigma_B\rho_{AB} < 2w(1-w)\sigma_A\sigma_B$$

sumar $w^2\sigma_A^2 + (1-w)^2\sigma_B^2$

$$\underbrace{w^2\sigma_A^2 + (1-w)^2\sigma_B^2 - 2w(1-w)\sigma_A\sigma_B}_{\left[w\sigma_A - (1-w)\sigma_B\right]^2} < \underbrace{w^2\sigma_A^2 + (1-w)^2\sigma_B^2 + 2w(1-w)\sigma_A\sigma_B\rho_{AB}}_{\sigma_P^2} < \underbrace{w^2\sigma_A^2 + (1-w)^2\sigma_B^2 + 2w(1-w)\sigma_A\sigma_B}_{\left[w\sigma_A + (1-w)\sigma_B\right]^2}$$

$$\left[w\sigma_A - (1-w)\sigma_B\right]^2 < \sigma_P^2 < \left[w\sigma_A + (1-w)\sigma_B\right]^2$$

$$\underbrace{\left|w\sigma_A - (1-w)\sigma_B\right|}_{\rho = -1} < \sigma_P < \underbrace{w\sigma_A + (1-w)\sigma_B}_{\rho = 1}$$



$$\sigma_p^2 = \sum_{i=1}^{n}\sum_{k=1}^{n} w_i w_k \sigma_{ik}$$

$$= \sum_{i=1}^{n}\left[\sum_{\substack{k=1\\k=i}}^{n} w_i w_k \sigma_{ik} + \sum_{\substack{k=1\\k\neq i}}^{n} w_i w_k \sigma_{ik}\right]$$

$$= \underbrace{\sum_{i=1}^{n} \underbrace{w_i w_i}_{w_i^2} \underbrace{\sigma_{ii}}_{\sigma_i^2}}_{n \text{ términos}} + \underbrace{\sum_{i=1}^{n}\sum_{\substack{k=1\\k\neq i}}^{n} w_i w_k \sigma_{ik}}_{n(n-1) \text{ términos}}$$

n $\qquad\qquad$ $n^2 - n$

- $n = 2$

$$\sigma_p^2 = \underline{w_1^2\sigma_1^2 + w_2^2\sigma_2^2} + \underline{w_1 w_2 \sigma_{12}} \quad i=1$$
$$+ \underline{w_2 w_1 \sigma_{21}} \quad i=2$$

- $\underline{n = 3}$

$$\sigma_p^2 = \underline{w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + w_3^2\sigma_3^2} +$$

$k=2$ $\qquad$ $k=3$

$\underline{i=1}$ $\quad \underline{w_1 w_2 \sigma_{12} + w_1 w_3 \sigma_{13}} +$ $\quad k=1 \qquad k=3$

$\underline{i=2}$ $\quad \underline{w_2 w_1 \sigma_{21} + w_2 w_3 \sigma_{23}} +$ $\quad k=1 \qquad k=2$

$\underline{i=3}$ $\quad \underline{w_3 w_1 \sigma_{31} + w_3 w_2 \sigma_{32}}$

$\sum_{i=1}^{n} a_i$: $\underline{n \text{ términos}}$

$\sum_{i=1}^{n}\sum_{\substack{k=1\\k\neq i}}^{n} a_{ik}$: $n(n-1)$ términos

n		$n(n-1)$
2		2
10		90
100	$\ll$	9900
1000	$\ll$	999000