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Formulas and figures in this presentation refer to the book Risk and Asset Allocation, Springer.

The notation, say, (5.24) refers to Formula 24 in Chapter 5 of the book

The notation, say, (T4.12) refers to Formula 12 in the Technical Appendices for Chapter 4, which can be downloaded from www.symmys.com

 $\begin{array}{c} \mathbf{p}_{T} \\ \mathbf{P}_{T+\tau} \sim ? \\ \mathbf{P}_{T+\tau} \sim \mathrm{N}\left(\boldsymbol{\xi}, \boldsymbol{\Phi}\right) \end{array} \tag{6.13} \\ \mathcal{T}\left(\widetilde{\boldsymbol{\alpha}}, \boldsymbol{\alpha}\right) \\ \mathcal{T}\left(\widetilde{\boldsymbol{\alpha}}, \boldsymbol{\alpha}\right) \equiv \mathbf{k}' \left|\widetilde{\boldsymbol{\alpha}} - \boldsymbol{\alpha}\right| \tag{6.14} \end{array}$

 \mathbf{p}_{T} $\mathbf{p}_{T+ au} \sim \mathbf{?}$ $\mathbf{p}_{T+ au} \sim \mathbf{N}\left(oldsymbol{\xi}, \Phi\right) \quad \text{(6.13)}$ $\mathcal{T}\left(\widetilde{oldsymbol{lpha}}, oldsymbol{lpha}
ight)$ $\mathcal{T}\left(\widetilde{oldsymbol{lpha}}, oldsymbol{lpha}
ight) \equiv \mathbf{k}' \left|\widetilde{oldsymbol{lpha}} - oldsymbol{lpha}
ight| \quad \text{(6.14)}$ $w_T \equiv \mathbf{p}_T' oldsymbol{lpha}^{(0)} \quad \text{(6.1)}$

 \mathbf{p}_T $P_{T+\tau} \sim ?$ $\mathbf{P}_{T+ au} \sim \mathrm{N}\left(\boldsymbol{\xi}, \boldsymbol{\Phi}\right)$ (6.13) $T(\widetilde{\alpha}, \alpha)$ $T(\widetilde{\alpha}, \alpha) \equiv \mathbf{k}' |\widetilde{\alpha} - \alpha|$ (6.14) $w_T \equiv \mathbf{p}_T' \boldsymbol{\alpha}^{(0)}$ (6.1) primary $\Psi_{\alpha} \equiv \alpha' \mathbf{P}_{T+\tau}$ (6.4) **objective** $\alpha \mapsto S(\alpha)$ (5.48) $CE(\alpha) = -\zeta \ln \left(\phi_{\Psi_{\alpha}} \left(\frac{i}{\zeta}\right)\right)$ (6.8) evaluation

$$\begin{array}{l} \text{PT} \\ \text{P}_{T+\tau} \sim ? \\ \text{P}_{T+\tau} \sim \text{N}\left(\xi,\Phi\right) \ \, (6.13) \\ \\ \mathcal{T}\left(\widetilde{\alpha},\alpha\right) \equiv \mathbf{k}' \left|\widetilde{\alpha}-\alpha\right| \ \, (6.14) \\ \\ w_T \equiv \mathbf{p}_T'\alpha^{(0)} \quad \, (6.1) \\ \\ w_T \equiv \mathbf{p}_T'\alpha^{(0)} \quad \, (6.1) \\ \\ \text{primary objective } \\ \mathbf{a} \\ \text{evaluation} \end{array} \qquad \begin{array}{l} \Psi_{\alpha} \equiv \alpha' \mathbf{M} \quad \, (6.2) \\ \\ \Psi_{\alpha} \equiv \alpha' \mathbf{P}_{T+\tau} \quad \, (6.4) \\ \\ \mathbf{CE}\left(\alpha\right) = -\zeta \ln \left(\phi_{\Psi_{\alpha}}\left(\frac{i}{\zeta}\right)\right) \\ \\ \text{CE}\left(\alpha\right) = -\zeta \ln \left(\phi_{\Psi_{\alpha}}\left(\frac{i}{\zeta}\right)\right) \\ \\ \mathbf{e} \\ \text{evaluation} \end{array} \qquad \begin{array}{l} \widetilde{\Psi}_{\alpha} \equiv \alpha' \widetilde{\mathbf{M}}. \quad \, (6.9) \\ \\ \widetilde{\Psi}_{\alpha} \equiv \alpha' \left(\mathbf{P}_{T+\tau} - \mathbf{p}_{T}\right) \\ \\ \widetilde{\mathcal{S}}\left(\alpha\right) \equiv -\mathrm{Var}_{c}\left(\alpha\right) \equiv Q_{\overline{\Psi}_{\alpha}} \left(1-c\right) \end{array} \qquad (6.12) \end{array}$$

primary
objective
&
evaluation

$$\Psi_{\alpha} \equiv \alpha' \mathbf{M} \qquad (6.2)$$

$$\Psi_{\alpha} \equiv \alpha' \mathbf{P}_{T+\tau} \qquad (6.4)$$

$$\alpha \mapsto \mathcal{S}(\alpha) \qquad (5.48)$$

$$\mathbf{CE}(\alpha) = -\zeta \ln \left(\phi_{\Psi_{\alpha}} \left(\frac{i}{\zeta}\right)\right) \qquad (6.8)$$

$$oldsymbol{lpha}^* \equiv \operatorname{argmax} \left\{ \mathcal{S} \left(oldsymbol{lpha}
ight) \right\}_{(6.33)}$$

$$oldsymbol{lpha}^* \equiv \operatorname{argmax}_{} \left\{ \operatorname{CE} \left(oldsymbol{lpha}
ight) \right\}_{(6.34)}$$

MARKET

 \mathbf{p}_T

$$\mathbf{P}_{T+ au} \sim \mathrm{N}\left(\boldsymbol{\xi}, \boldsymbol{\Phi}\right)$$
 (6.13)

$$T\left(\widetilde{\boldsymbol{lpha}}, \boldsymbol{lpha}\right)$$

$$T(\widetilde{\alpha}, \alpha) \equiv \mathbf{k}' |\widetilde{\alpha} - \alpha|$$
 (6.14)

$$w_T \equiv \mathbf{p}_T' \boldsymbol{\alpha}^{(0)}$$
 (6.1)

primary
objective
&
evaluation

$$\Psi_{\alpha} \equiv \alpha' \mathbf{M} \qquad ^{(6.2)}$$

$$\Psi_{\alpha} \equiv \alpha' \mathbf{P}_{T+\tau} \qquad ^{(6.4)}$$

$$\alpha \mapsto \mathcal{S}(\alpha) \qquad ^{(5.48)}$$

$$\mathrm{CE}(\alpha) = -\zeta \ln \left(\phi_{\Psi_{\alpha}} \left(\frac{i}{\zeta}\right)\right) \qquad ^{(6.8)}$$

$$C_1: \mathbf{p}_T' \boldsymbol{\alpha} + \mathcal{T}\left(\boldsymbol{\alpha}^{(0)}, \boldsymbol{\alpha}\right) - b \le 0, \quad (6.23)$$

$$C_1: \mathbf{p}_T' \boldsymbol{\alpha} = w_T \equiv \mathbf{p}_T' \boldsymbol{\alpha}^{(0)} \quad (6.24)$$

$$\alpha^* \equiv \operatorname{argmax} \left\{ \mathcal{S} \left(\alpha \right) \right\}_{(6.33)}$$

$$\alpha^* \equiv \operatorname{argmax}_{\left\{ \text{CE} \left(\alpha \right) \right\}}^{\left(6.34 \right)}$$

 \mathbf{p}_T $\mathbf{P}_{T+ au} \sim \mathbf{P}_{T+ au} \sim \mathbf{P}$ $T(\widetilde{\boldsymbol{\alpha}}, \boldsymbol{\alpha})$ $T(\widetilde{\alpha}, \alpha) \equiv \mathbf{k}' |\widetilde{\alpha} - \alpha|$ (6.14)

$$w_T \equiv \mathbf{p}_T' \boldsymbol{\alpha}^{(0)}$$
 (6.1)

$$C_1: \mathbf{p}_T' \boldsymbol{\alpha} + \mathcal{T}\left(\boldsymbol{\alpha}^{(0)}, \boldsymbol{\alpha}\right) - b \le 0. \quad (6.23)$$

$$C_1: \mathbf{p}_T' \boldsymbol{\alpha} = w_T \equiv \mathbf{p}_T' \boldsymbol{\alpha}^{(0)} \quad (6.24)$$

 $\alpha^* \equiv \operatorname{argmax} \left\{ \mathcal{S} \left(\alpha \right) \right\}_{(6.33)}$ $\alpha^* \equiv \operatorname{argmax} \{\operatorname{CE}(\alpha)\}$ (6.34)

$$C_2: \widetilde{s} - \widetilde{S}(\alpha) \leq 0$$
 (6.25)
$$C_2: \operatorname{Var}_c(\alpha) \leq \gamma w_T$$
 (6.26)

 $P_{T+\tau} \sim ?$

 \mathbf{p}_T

 $\mathbf{P}_{T+ au} \sim N\left(\boldsymbol{\xi}, \boldsymbol{\Phi}\right)$ (6.13)

 $T(\widetilde{\alpha}, \alpha)$

 $T(\widetilde{\alpha}, \alpha) \equiv \mathbf{k}' |\widetilde{\alpha} - \alpha|$ (6.14)

 $w_T \equiv \mathbf{p}_T' \boldsymbol{\alpha}^{(0)}$ (6.1)

 $C_1: \mathbf{p}_T' \boldsymbol{\alpha} + \mathcal{T}\left(\boldsymbol{\alpha}^{(0)}, \boldsymbol{\alpha}\right) - b \leq 0$ (6.23) $C_1 : \mathbf{p}_T' \boldsymbol{\alpha} = w_T \equiv \mathbf{p}_T' \boldsymbol{\alpha}^{(0)}$ (6.24)

objective / evaluation

 $\Psi_{\alpha} \equiv \alpha' M$ primary $\Psi_{\alpha} \equiv \alpha' \mathbf{P}_{T+\tau}$ (6.4) $CE(\alpha) = -\zeta \ln \left(\phi_{\Psi_{\alpha}} \left(\frac{i}{\zeta} \right) \right)$

 $\alpha^* \equiv \operatorname{argmax} \left\{ \mathcal{S} \left(\alpha \right) \right\}_{(6.33)}$ $\alpha \in C$ $\alpha^* \equiv \operatorname{argmax} \{\operatorname{CE}(\alpha)\} (6.34)$ $\mathbf{p}_{T}'\alpha = w_{T}$ $\operatorname{Var}_{c}(\alpha) \leq \gamma w_{T}$

secondary objective J evaluation

 $\widetilde{\Psi}_{\alpha} \equiv \alpha' \widetilde{\mathbf{M}}. \qquad (6.9)$ $\widetilde{\Psi}_{\alpha} \equiv \alpha' \left(\mathbf{P}_{T+\tau} - \mathbf{p}_{T} \right) \qquad (6.11)$ $\alpha \mapsto \widetilde{\mathcal{S}} \left(\alpha \right)$ $\widetilde{\mathcal{S}}\left(\boldsymbol{\alpha}\right) \equiv -\operatorname{Var}_{c}\left(\boldsymbol{\alpha}\right) \equiv Q_{\overline{\Psi}_{\alpha}}\left(1-c\right)$ (6.12)

 $C_2: \widetilde{s} - \widetilde{\mathcal{S}}(\alpha) \leq 0.$ (6.25) C_2 : $\operatorname{Var}_c(\alpha) \leq \gamma w_T(6.26)$

market information investor's profile
$$\boldsymbol{\alpha}\left[\cdot\right] : \ [i_T,\mathcal{P}] \mapsto \mathbb{R}^N \ _{(6.15)}$$

$$\boldsymbol{\alpha}^* \equiv \zeta \boldsymbol{\Phi}^{-1} \boldsymbol{\xi} + \frac{w_T - \zeta \mathbf{p}_T' \boldsymbol{\Phi}^{-1} \boldsymbol{\xi}}{\mathbf{p}_T' \boldsymbol{\Phi}^{-1} \mathbf{p}_T} \boldsymbol{\Phi}^{-1} \mathbf{p}_T$$

$$C_1: \mathbf{p}_T' \boldsymbol{\alpha} + \mathcal{T}\left(\boldsymbol{\alpha}^{(0)}, \boldsymbol{\alpha}\right) - b \leq 0. \quad (6.23)$$

$$C_1: \mathbf{p}_T' \boldsymbol{\alpha} = w_T \equiv \mathbf{p}_T' \boldsymbol{\alpha}^{(0)} \quad (6.24)$$

$$\boldsymbol{\alpha}^* \equiv \underset{\boldsymbol{\alpha} \in \mathcal{C}}{\operatorname{argmax}} \left\{ \mathcal{S} \left(\boldsymbol{\alpha} \right) \right\}_{(6.33)}$$

$$\boldsymbol{\alpha}^* \equiv \underset{\substack{\mathbf{p}_T' \boldsymbol{\alpha} = w_T \\ \operatorname{Var}_{\boldsymbol{c}}(\boldsymbol{\alpha}) \leq \gamma w_T}}{\operatorname{Var}_{\boldsymbol{c}}(\boldsymbol{\alpha}) \leq \gamma w_T}$$
(6.34)

$$C_2: \widetilde{s} - \widetilde{S}(\alpha) \leq 0$$
 (6.25)
 $C_2: \operatorname{Var}_c(\alpha) \leq \gamma w_T$ (6.26)

market information investor's profile
$$\alpha \left[\cdot\right] \colon \left[i_T, \mathcal{P}\right] \mapsto \mathbb{R}^N \ _{(6.15)}$$

$$\alpha^* \equiv \zeta \Phi^{-1} \xi + \frac{w_T - \zeta \mathbf{p}_T' \Phi^{-1} \xi}{\mathbf{p}_T' \Phi^{-1} \mathbf{p}_T} \Phi^{-1} \mathbf{p}_T$$

$$C_1: \mathbf{p}_T' \boldsymbol{\alpha} + \mathcal{T}\left(\boldsymbol{\alpha}^{(0)}, \boldsymbol{\alpha}\right) - b \leq 0. \quad (6.23)$$

$$C_1: \mathbf{p}_T' \boldsymbol{\alpha} = w_T \equiv \mathbf{p}_T' \boldsymbol{\alpha}^{(0)} \quad (6.24)$$

$$\boldsymbol{\alpha}^* \equiv \underset{\boldsymbol{\alpha} \in \mathcal{C}}{\operatorname{argmax}} \left\{ \mathcal{S} \left(\boldsymbol{\alpha} \right) \right\}_{(6.33)}$$

$$\boldsymbol{\alpha}^* \equiv \underset{\substack{\mathbf{p}_T' \boldsymbol{\alpha} = w_T \\ \operatorname{Var}_{\boldsymbol{c}}(\boldsymbol{\alpha}) \leq \gamma w_T}}{\operatorname{equation}} \left\{ \operatorname{CE} \left(\boldsymbol{\alpha} \right) \right\}_{(6.34)}$$

$$C_2: \widetilde{s} - \widetilde{S}(\alpha) \le 0$$
 (6.25)
 $C_2: \operatorname{Var}_c(\alpha) \le \gamma w_T$ (6.26)