Project Two : Portfolio Optimization (EVaR Risk Measure)

Creating the system :

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Maximize m.T \* x - p \* (x1 + x2) - delta \* (evar\_term)

subject to

Z - t \* log(1 - alpha) <= gamma

P \* U <= t

( U, t, -R.T \* X - Z) belongs to K exponential Cone

t >= 0

1.T \* X + a.T \* K + f1 \* y1 + f2 \* y2 + V1 \* y1 + V2 \* y2 + xf = 1

x = x1 - x2

y1 + y2 <= 1 ( y is a binary variable)

(K, 1, X) belongs to Power Cone (beta)

x1 + x2 <= 2.0 (gross exposure)

x1 <= M \* y1

x2 <= M \* y2

where :

x = array of weights allocated to each scrip

m = array of mean returns over the time period (h)

p = transaction Cost penalty coeficient

xp = positive fraction of holdings

xm = short selling fraction of holdings

xf = risk free asset allocation

rf = risk free return

delta = risk coeficient

a = Market Impact cost coeficient

K = Market Impact cost auxiliary variable (Height of our cone)

f (p,m) = fixed transaction cost

y (p,m) = Binary variable (signalling transaction) (1 for buy or sell and 0 otherwise)

v (p,m) = Variable transaction cost

t = auxiliary variable

U = auxiliary variable

Z = auxiliary variable

R = return scenarios

M = Exposure (Leverage Index)

P = Probability of each scenario taking place

gamma = Pre-Decided level of EVaR risk

alpha = significance level (0.05)

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