Objective Function and Constraints

Objective Function

$\max \sum_{a=1}^{A} \sum_{m=1}^{M} 1^{opt}(a,m) \times OP_{a,m} \times sign_{a,m} \times (M_{a,m}^{init} + M_{a,m}^{delta})$

Metric Calculation for Constraints

Any $\mathbf{M_{a,m}^{total}}$ may have a hard constraint $\mathbf{C_{a,m} < M_{a,m}}$ or $\mathbf{C_{a,m} > M_{a,m}}$ that cannot be breached

Breaking Down Each Component

Symbol/Term	Meaning
$\sum_{a=1}^{A}$	Sum over all accounts *a*, where *a = 1, 2, ..., A*
$\sum_{m=1}^{M}$	Sum over all metrics *m*, where *m = 1, 2, ..., M*
$1^{opt}(a,m)$	Optimization indicator: 1 if metric *m* for account *a* is included in the objective, 0 otherwise
$OP_{a,m}$	Optimization priority weight for metric *m* in account *a*
$sign_{a,m}$	Direction of optimization for metric *m* in account *a*: • +1 if the metric should be maximized • -1 if the metric should be minimized
$M_{a,m}^{init}$	Initial value of metric *m* for account *a*, based on current holdings and positions
$M_{a,m}^{delta}$	Net change in metric *m* for account *a* due to assignment of a **group of trades**: $M_{a,m}^{delta} = \sum_{i=1}^{N} x_{i,a} \times V_i \times \omega_{a,m,s(i)}$ where the sum is over all trades in the batch. This is **not** computed incrementally per trade.

Supplementary Variables

Symbol	Definition
N	Number of trades, indexed by *i = 1, 2, ..., N*
$x_{i,a}$	Binary decision variable: 1 if trade *i* is assigned to account *a*, 0 otherwise
V_i	Value of trade *i* (e.g., price × quantity ± accrued interest)

Symbol	Definition
$\omega_{a,m,s(i)}$	Sensitivity of metric *m* in account *a* to a trade of security type *s(i)*. This includes: • Positive or negative weights for securities • Cash and leverage coefficients (e.g. +1 for cash received, -1 for cash paid, +1 for leverage impact)
s(i)	Security type of trade *i* (e.g., corporate bond, government bond, cash, leverage)