

SAA formulation with shape constraints

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$$\begin{aligned} \min_{\{h_t, s_t\}_{t=1, \dots, T}} \quad & \mathbb{E}[Y(h_t, s_t)] = \frac{1}{N} \sum_{i=1}^N y_i(h_t, s_t) \\ \text{s.t.} \quad & \{h_t\}_{t=1, \dots, T} \in \Omega_H \\ & \{s_t\}_{t=1, \dots, T} \in \Omega_S \end{aligned}$$

h_t is the number of housing units to be built in year t

s_t is the number of shelter units to be built in year t

T is the decision horizon, in years

$Y(\cdot)$ is the random system response

y_i is the observed system response at the i th iteration

N is the simulation budget for each feasible pair of build functions $\{h_t, s_t\}_{t=1, \dots, T}$

Ω_H and Ω_S capture shape constraints on the build functions.