

## NOMENCLATURE

ms... major supplier (with market power)

as... ancillary supplier

$p$ ... price /  $\tilde{p}^{ms}$ ... price offered by the ms

$q$ ... quantity /  $\tilde{q}^{ms}$ ... quantity offered by the ms

$\bar{c}$ ... production capacity

$d$ ... demand

$\kappa$ ... Parameter of the production capacity increase as a reaction to the current market price

$i \in \{1, 2, 3\}$  (Timesteps)

### LEADER (profit maximization)

$$\max_{p_i^{ms}, \tilde{q}_i^{ms}} \sum_{i=1}^3 q_i^{ms} \cdot \lambda_i$$

$$\text{s.t.: } 0 \leq \tilde{p}_i^{ms} \leq \bar{c}^{ms}$$

$$\min p_i^{ms} \cdot q_i^{ms} + p_i^{as} \cdot q_i^{as}$$

$$0 \leq q_i^{ms} \leq \tilde{q}_i^{ms}$$

$$0 \leq q_i^{as} \leq \bar{c}^{as}$$

$$q_i^{as} + q_i^{ms} \geq d_i : \lambda_i$$

### FOLLOWER (market clearing)

$$\text{State Variable: } \bar{c}_{i+1}^{as} = \bar{c}_i^{as} + \kappa \cdot (-p_i^{as} + \lambda_i)$$