Comparison between the two approaches

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J_e ... Set of firms $j \setminus \{i\}$ that have $c_j < c_e$

J_e' ... Set of firms $j \setminus \{i\}$ that have $c_j > c_e$

(1) $\lambda = \sum_{e \setminus \{i\}} c_e \times z_e$

(2) $\sum_{e \setminus \{i\}} z_e \leq 1$

(3) $q_e \leq \bar{q}_e \times \left(1 - \sum_{j \in J_e'} z_j\right) : \forall e \setminus \{i\}$

(4) $q_e = \bar{q}_e \times \sum_{j \in J_e} z_j : \forall e \setminus \{i\}$

(5) $q_e \geq \varepsilon \times z_e : \forall e \setminus \{i\}$

(1) $\lambda = \sum_{e \setminus \{i\}} c_e \times z_e$

(2) $\sum_{e \setminus \{i\}} z_e \leq 1$

(3) $\lambda_e' = c_e \times z_e' : \forall e \setminus \{i\}$

(4) $q_e \leq M \times z_e' : \forall e \setminus \{i\}$

(5) $q_e \geq \varepsilon \times z_e' : \forall e \setminus \{i\}$

(6) $z_e \leq z_e' : \forall e \setminus \{i\}$

(7) $\lambda \geq \lambda_e' : \forall e \setminus \{i\}$

Small example:

$\lambda = 20$

$q_1 = 10$

$q_2 = 10$

$q_3 = 5$

e	c_e	z_e	z_e'	q_e	λ_e'
1	5	0	1	10	5
2	10	0	1	10	10
3	20	1	1	5	20
4	30	0	0	0	0