ResEco - formulas

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1 base formulas

supplier max $\sum_{region} Q_{sell}(supplier, region) * \Big(price(region) - C_{trans}(supplier, region)\Big)$

$\quad - Q_{prod}(supplier) * C_{prod}(region)$

$$\forall supplier$$

s.t.:

$$\sum_{region} Q_{sell}(supplier, region) \leq Q_{prod}(supplier)$$

$$Q_{prod}(supplier) \leq ProdCap(supplier)$$

$$Q_{sell}(supplier, region) \leq transCap(supplier, region)$$

lower bounds:

$$0 \leq \sum_{region} Q_{sell}(supplier, region) \leq Q_{prod}(supplier)$$

$$0 \leq Q_{prod}(supplier) \leq ProdCap(supplier)$$

$$0 \leq Q_{sell}(supplier, region) \leq transCap(supplier, region)$$

for gams:

1. *split*

2. ≤ 0 & *define* μ's

1.

$$0 \leq \sum_{region} Q_{sell}(supplier, region)$$

$$\sum_{region} Q_{sell}(supplier, region) \leq Q_{prod}(supplier)$$

2.

$$-\sum_{region} Q_{sell}(supplier, region) \leq 0 \perp \mu_{sellCapLow}$$

$$\sum_{region} Q_{sell}(supplier, region) - Q_{prod}(supplier) \leq 0 \perp \mu_{sellCapUp}$$

1.

$$0 \leq Q_{prod}(supplier)$$

$$Q_{prod}(supplier) \leq ProdCap(supplier)$$

2.

$$-Q_{prod}(supplier) \leq 0 \perp \mu_{prodCapLow}$$

$$Q_{prod}(supplier) \leq ProdCap(supplier) \perp \mu_{prodCapUp}$$

1.

$$0 \leq Q_{sell}(supplier, region)$$

$$Q_{sell}(supplier, region) \leq transCap(supplier, region)$$

2.

$$-Q_{sell}(supplier, region) \leq 0 \perp \mu_{transCapLow}$$

$$Q_{sell}(supplier, region) - transCap(supplier, region) \leq 0 \perp \mu_{transCapUp}$$

lagrange for gams:

$$max \sum_{region} Q_{sell}(supplier, region) * \Big(price(region) - C_{trans}(supplier, region)\Big)$$

$$-Q_{prod}(supplier) * C_{prod}(region) \; \forall \; supplier$$

$\rightarrow$ **chang max to min:**

$$min \sum_{region} Q_{sell}(supplier, region) * \Big(C_{trans}(supplier, region) - price(region)\Big)$$

$$+Q_{prod}(supplier) * C_{prod}(region) \; \forall \; supplier$$

$\rightarrow$ **add constraints:**

$$-\sum_{region} Q_{sell}(supplier, region) \leq 0 \perp \mu_{sellCapLow}$$

$$\rightarrow -\mu_{sellCapLow} * \sum_{region} Q_{sell}(supplier, region)$$

$$\sum_{region} Q_{sell}(supplier, region) - Q_{prod}(supplier) \leq 0 \perp \mu_{sellCapUp}$$

$$\rightarrow \mu_{sellCapUp} * \sum_{region} Q_{sell}(supplier, region) - Q_{prod}(supplier)$$

$$-Q_{prod}(supplier) \leq 0 \perp \mu_{prodCapLow}$$

$$\rightarrow -\mu_{prodCapLow} * Q_{prod}(supplier)$$

$$Q_{prod}(supplier) - ProdCap(supplier) \leq 0 \perp \mu_{prodCapUp}$$

$$\rightarrow \mu_{prodCapUp} * (Q_{prod}(supplier) - ProdCap(supplier))$$

$$-Q_{sell}(supplier, region) \leq 0 \perp \mu_{transCapLow}$$

$$\rightarrow -\mu_{transCapLow} * Q_{sell}(supplier, region)$$

$Q_{sell}(supplier, region) - transCap(supplier, region) \leq 0 \perp \mu_{transCapUp}$

$\rightarrow \mu_{transCapUp} * Q_{sell}(supplier, region) - transCap(supplier, region)$

gams obj for supplier:

$min \sum_{region} Q_{sell}(supplier, region) * \Big(C_{trans}(supplier, region) - price(region) \Big)$

$+Q_{prod}(supplier) * C_{prod}(region)$

$-\mu_{sellCapLow} * \sum_{region} Q_{sell}(supplier, region)$

$\mu_{sellCapUp} * \sum_{region} Q_{sell}(supplier, region) - Q_{prod}(supplier)$

$-\mu_{prodCapLow} * Q_{prod}(supplier)$

$\mu_{prodCapUp} * (Q_{prod}(supplier) - ProdCap(supplier))$

$-\mu_{transCapLow} * Q_{sell}(supplier, region)$

$\mu_{transCapUp} * Q_{sell}(supplier, region) - transCap(supplier, region)$

$\forall \, supplier$