

M5

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Concept

- Buying low and selling **low** to reduce unsold products
 - M5 weights the unit price in buying contracts
 - M5 weights quantity in selling contracts
- Avoiding conflicts between M5s for collusion track

Buying Strategy

- M5 weights the unit price in buying contracts
 - quantity : delivery time : unit price = 1 : -2 : -4
- Buying price is always lower than the catalog price
- Raise or lower the price depending on trading volumes in the previous step



Risk Management in Buying Contracts

- M5 doesn't sign in the following cases:

- Impossible to manufacture

$$I_t^{input} + \sum_{k=t+1}^{n_{steps}} q_k^{input} + \sum^{sign} q > (n_{steps} - t - 1) \times n_{lines}$$

- Just before the end of the simulation

$$t \geq 0.6 \times n_{steps}$$

- The score becomes too small

$$\frac{b_i - b_0 - \sum^{sign} (p + c) \times q}{b_0} \leq r + s \times \frac{i}{n_{steps}}$$

$$r = -0.25 \times \frac{n_{steps}}{200}, \quad s = 0.55 \times \frac{n_{steps}}{200}$$

i : current step

q : quantity on the contract

t : delivery time step of the contract

n_{steps} : number of simulation steps

n_{lines} : number of production lines

I_t^{input} : estimated number of inputs in inventory at step t

q_i^{input} : arrival quantity at step i

b_i : estimated balance at step i

p : price on the contract

c : production cost

Selling Strategy

- M5 weights quantity in selling contracts
 - quantity : delivery time : unit price = 10 : 2 : 1
- Selling price is always **lower** than the catalog price
- Raise or lower the price depending on trading volumes in the previous step



Risk Management in Selling Contracts

- M5 doesn't sign in the following case:

- M5 won't have the enough inventory

$$I_t^{output} < \sum_{k=t}^{n_{steps}} q_k^{output} + \sum^{sign} q$$

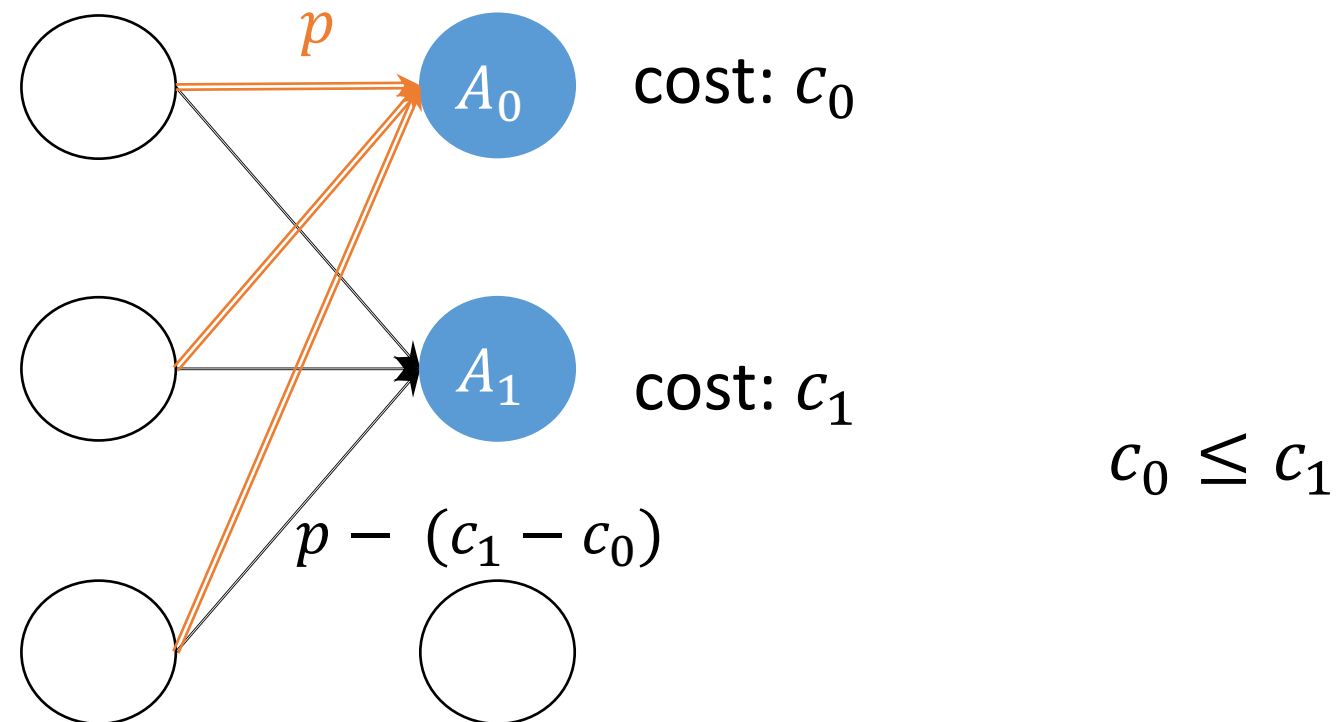
- I_t^{output} doesn't include future arrivals

- M5 doesn't trust all buying contracts that will be executed in the future

I_t^{output}	:	expected output inventory at step t
q_k^{output}	:	shipment quantity at step k
q	:	quantity on the contract
t	:	delivery time step of the contract
n_{steps}	:	number of simulation steps

Collusion Strategy

- M5s in the same layer reduce their buying price by the difference in the production cost



Thank you for listening
