

AgentSDH

An Agent for SCML2023 Standard/Collusion Track

Atsunaga Sadahiro

Tokyo University of Agriculture and Technology, Katsuhide Fujita Lab.

Concepts

Not greedy

- The contracts of selling over the inventory are refused.
- It don't buy the quantities that cannot be sold

Utility Function

Selling:

■Weights of Linear Utility Function

◆Quantity : Delivery time : Unit price = 3 : 0 : 2

■Change the acceptable price based on the previous trades

$$p_{i,output}^{accept} = \begin{cases} p_{i-1,output}^{accept} * 0.95 & \text{if no signed sales contracts} \\ p_{i-1,output}^{accept} * 1.1 & \text{else if } p_{i,output}^{average} / p_{i-1,output}^{accept} > 1.1 \\ p_{i,output}^{average} * 0.9 & \text{otherwise} \end{cases}$$

i : current step
 $p_{i,output}^{accept}$: acceptable unit price of output products

■Target quantity is one-third of the number of lines in the factory

Buying:

■Weight of Linear Utility Function

◆Quantity : Delivery time : Unit price = 1 : 0 : -2

■Change of the acceptable price based on the previous trades

$$p_{i,input}^{accept} = \begin{cases} p_{i-1,input}^{accept} * 1.1 & \text{if no signed buy contracts} \\ p_{i-1,input}^{accept} * 1.05 & \text{else if } p_{i,input}^{average} / p_{i-1,input}^{accept} > 0.9 \\ p_{i-1,input}^{accept} * 0.95 & \text{otherwise} \end{cases}$$

i : current step
 $p_{i,input}^{accept}$: acceptable unit price of input products

■Target quantity to be one-third of the current inventory

Risk Management

Selling:

■Signing contracts within the order of the unit price

■Refusing to sign the contract in the following cases:

- ◆Cannot keep the inventory needed to fulfill the contract by the delivery date
- ◆Not enough price to make a profit

$$p_{a,input} > p_{i,input}^{average} + p^{cost}$$

$p_{i,input}^{average}$: average unit price of input products in previously executed buy contracts
 p^{cost} : cost of processing an input product into an output product
 $p_{a,input}$: unit price of input product in contract 'a'

Buying:

■Signing the contracts within the order of the lowest unit price

■Signing the contract in the following cases :

- ◆When the quantity does not exceed the average daily sales' quantity
if $q_{a,output} \leq q_{i,output}^{average} - \text{inventory}[t] : p_{a,input} < p_{i,output}^{average} - p^{cost}$
- ◆If the average daily sales' quantity is exceeded

$$p_{a,input} < \max((p_{i,output}^{average} - p^{cost}) * 0.8, p_{i,input}^{average} * 0.8)$$

t : delivery date of the contract
 $\text{inventory}[t]$: Inventory at step t
 $p_{a,output}$: unit price of output product in contract 'a'
 $q_{a,output}$: quantity of output product in contract 'a'
 $q_{i,output}^{average}$: average number of sales per day in past contracts
 $p_{i,output}^{average}$: average unit price of output products in previously executed sales contracts
 $p_{i,input}^{average}$: average unit price of input products in previously executed buy contracts

How to Manage the Inventory

■A list whose length is the number of steps

◆List[N] : N-step output of the product inventory

■Buyer's contract

- ◆Adding to the inventory after the date it becomes available for sale
- ◆Calculating the processing dates based on the plant line usage

■Seller's contract

- ◆Keeping the output products produced at a time near the delivery date and reducing them from the inventory

Collusion Strategy

■Same as Standard track except for the target quantity at the time of the selling contract.

■The target quantity at the time of the selling contract is as follows:

$$q^{target} = n_{lines} / 3$$