Consumer Economics and Pricing Strategies Vertical relation (Part II)- Buyer Power

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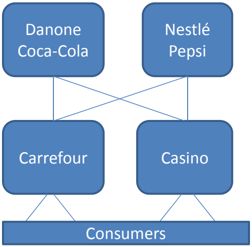
Buying power of retailers

The high concentration on the retail market $\Rightarrow$ buying power towards suppliers: heterogenous balance of power!!

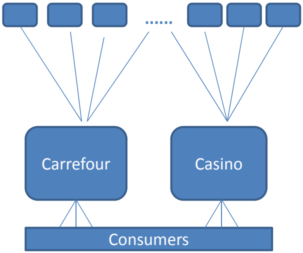
It is a hot topic -Etats généraux de l'alimentation lancés le 20/07/2017.

Big manufacturers
vs
Big retailers



*Famous national brands
*High concentration among manufacturers

Small producers
vs
Big retailers



*Small manufacturers
*Farmers (fruits and vegetables,meat,...)

Sources of buyer power

- Buyer size (larger discount?...)
- Gatekeeper positions (local monopoly on a market)
- Constrained capacity shelves space
- Outside option
  - Number of alternative suppliers vs alternative retailers. OECD (1998): "*Retailer A has buyer power over supplier B if a decision to delist B's product could cause A's profit to decline by 0.1% and B's to decline by 10%.*"
  - How differentiated ? Loyalty to the brand vs loyalty to the store; A survey by INSEE, 1997: When the favorite brand is not in its favorite store's shelves: 56% of consumers choose another brand, 24% will buy it later and 20% buy it in another store.
- Private labels (since 70s): products sold under retailer's own brand
  - Retailers integrate backward and compete with manufacturers through the sale of their own brands.
  - The sales of private label globally has reached in 2008 $\simeq$ 25% of total supermarket sales (15% in 2003)

Consequences of Buyer Power: Benefits

Countervailing power (Galbraith, 1952)

- Retailers may obtain lower input prices from their suppliers
- If retail competition is strong enough, the cost savings are likely to be passed through to consumers.
- Difficult to find empirical evidence on countervailing power effect!
- Conflict about the pass-through:
  - Milk crisis (07/2009) and right now!!
    - Farmers Unions (FNSEA) were claiming that the retailers were setting too high margins.
    - Michel-Edouard Leclerc: "'*Sur la crise du lait [...] la marge des industriels a augmenté de 18%, celle des éleveurs a baissé de 6,2% tandis que celle des distributeurs a diminué de 11,4%*" (07/08/2009)

Consequences of Buyer Power: Potential harms

- Exit of small producers in a situation of economic dependence (reduction of variety,...)
  - Commission evaluation in Carrefour/Promodès: situation of economic dependence for suppliers in 4 out of 23 markets (suppliers realize more than 22% of their total sales with the group).
- Hold-up => discourage innovation in the upstream sector
- Waterbed effects and the "spiral effect" approach

Methodological tool:Bargaining

- Bargaining: situation in which at least two players have a common interest to cooperate, but have conflicting interests over exactly how to co-operate.
- How to share a pie? Depends on:
  - The number of negotiators;
  - Each negotiator's "ability to negotiate", or "bargaining power";
  - Each negotiator's "outside option".
- "Bargaining theory with Applications", Muthoo (2004).

The Nash program (1950,1953)

- A bargaining problem with two players
- A vector $x = (x_1, x_2) \in \mathbb{R}^2$; x_i is the allocation of player i.
- A threat point $\underline{x} = (\underline{x}_1, \underline{x}_2) \in \mathbb{R}^2$;
- Players utility function $U_i(x)$.
- F is the set of feasible allocations;
  $F \bigcap \{(x_1, x_2) \in \mathbb{R}^2 : x_1 \geq \underline{x}_1, x_2 \geq \underline{x}_2\}$ is nonempty and bounded.

Theorem

The Nash Bargaining Solution x^* satisfies:

$$x^* \in \underset{x \in F}{argmax} (U_1(x_1) - U_1(\underline{x}_1))(U_2(x_2) - U_2(\underline{x}_2))$$

Five axioms

- Strong Pareto Optimality: the solution has to be realizable and Pareto optimal.
- Individual rationality: No player can have less than his outside option, otherwise he will not accept the "agreement".
- Invariance by an affine transformation: The result does not depend on the representation of (Von Neumann Morgenstern) utility functions.
- Independence of Irrelevant Alternatives: Eliminating alternatives that would not have been chosen, without changing the outside option, will not change the solution.
- Symmetry: Symmetric players receive symmetric payoffs.

Extension: The Nash bargaining solution with asymmetry

Assume that the players have different bargaining powers, say α and $1-\alpha$.

The Nash bargaining solution can be extended to that situation. It is the unique Pareto-optimal vector that satisfies:

$$x^* \in \underset{x \in F}{argmax} (U_1(x_1) - U_1(\underline{x}_1))^{\alpha} (U_2(x_2) - U_2(\underline{x}_2))^{1-\alpha}$$

Split-The-Difference-Rule

- Let V denote the cake to be shared such that $x_1 = V - x_2$,
- $U_i(x_i) = x_i$ (Risk neutral); $(\alpha, 1-\alpha)$ the bargaining powers.

The Nash bargaining solution (x_1^N, x_2^N) is:

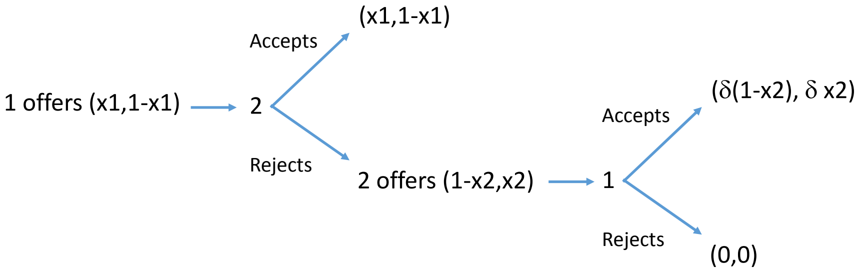
$$x_1^N = \underline{x}_1 + \alpha(V - \underline{x}_1 - \underline{x}_2)$$

$$x_2^N = \underline{x}_2 + (1-\alpha)(V - \underline{x}_1 - \underline{x}_2)$$

The Rubinstein (1982) bargaining model

- Two players, 1 and 2, have to reach an agreement on the partition of a pie of size 1.
- Each of them has to make in turn a proposal as to how it should be divided:
  - At each period, one offer is made;
  - They alternate making offers.
  - Player 1 makes the first offer.
- Finite number T of periods.
- There is a discount factor δ by period.

The Rubinstein (1982) game for $T = 2$



Resolution of the Rubinstein game

- Assume $T = 2$; in the second period, there is an equilibrium where 1 accepts any nonnegative offer by 2; 2 thus offers $(0, 1)$ (or $(\varepsilon, 1 - \varepsilon)$ to select equilibria); in period 1, 1 offers $(1 - \delta, \delta)$ and 2 accepts.
- Assume $T = 3$; in the third period, 1 makes the last offer and 2 accepts any nonnegative offer; 1 thus offers $(1, 0)$; in period 2, 2 offers $(\delta, 1 - \delta)$ and 1 accepts; in period 1, 1 offers $(1 - \delta(1 - \delta), \delta(1 - \delta))$ and 2 accepts.
- By iteration, there is an equilibrium where 1 offers in the first period $(x_1 = 1 - \delta + ... + (-1)^{T-1}\delta^{T-1}, 1 - x_1)$.

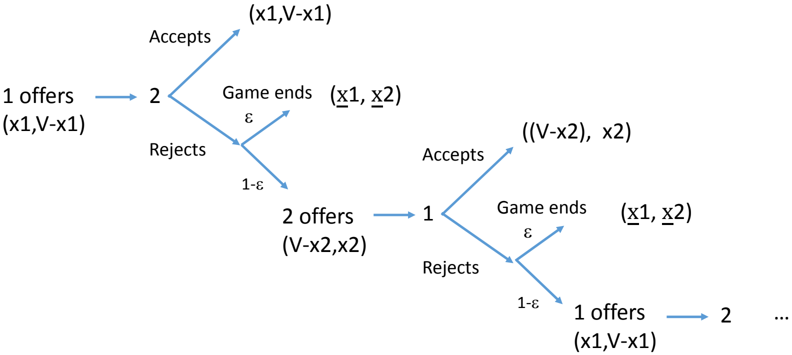
Solution of the Rubinstein game

- At the limit, when $T \to +\infty$, the sharing of the pie is $(x_1 = \frac{1}{1+\delta}, 1 - x_1)$;
- Impatience is the driving force that leads to an agreement, and it increases the power of the first player:
  - When the two players are infinitely patient, their situations become symmetric: when $T \to +\infty$ and $\delta = 1$, the sharing of the pie is $(\frac{1}{2}, \frac{1}{2})$;
  - When the two players are infinitely impatient, player 1 gets the whole pie: when $T \to +\infty$ and $\delta = 0$, the sharing of the pie is $(1, 0)$.

The Binmore-Rubinstein-Wolinsky (1986) bargaining model

- Two players 1 and 2 want to share a “pie" of value V
- Outside option: player i has a utility $\underline{x}_i$ if negotiation breaks, where $\underline{x}_1 + \underline{x}_2 < V$;
- Players alternate making the same offers 1 offers $(x_1, V - x_1)$ and 2 offers $(V - x_2, x_2)$;
- Infinite horizon; each time an offer is rejected, there is an exogenous risk of breakdown (end of the game) with a probability ε (no discounting).

Binmore-Rubinstein-Wolinsky (1986) game



Binmore-Rubinstein-Wolinsky (1986): results

- Any subgame perfect equilibrium involves player i indifferent between accepting or rejecting the offer of player j.

$$V - x_1^* = \epsilon \underline{x}_1 + (1-\epsilon) x_2^*$$

$$V - x_2^* = \epsilon \underline{x}_2 + (1-\epsilon) x_1^*$$

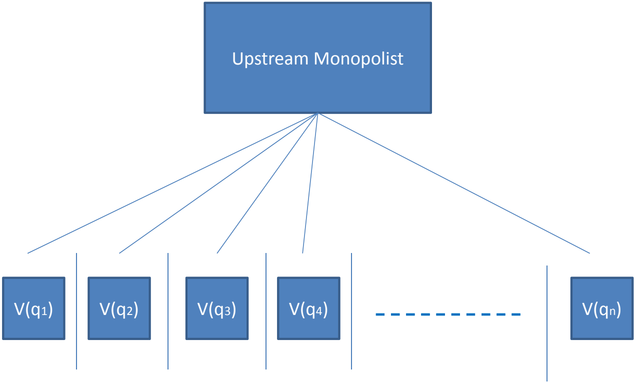
- The solution satisfies:

$$x_i^* = \underline{x}_i + \frac{1}{2-\epsilon}(V - \underline{x}_1 - \underline{x}_2)$$

- If both firms have the same bargaining power ($\epsilon \to 0, \alpha = 1/2$), in equilibrium, equal sharing of the surplus: $(\underline{x}_1 + \frac{V-\underline{x}_1-\underline{x}_2}{2}; \underline{x}_2 + \frac{V-\underline{x}_1-\underline{x}_2}{2})$.
  This is the symmetric Nash bargaining solution.
- If $\epsilon \to 1$, the player that plays first has all the power and the other player gets its disagreement payoff.

Buyer size -Chipty & Snyder(1999)

- n firms on n separated markets, each realizing $v(q_i)$ where q_i denote the quantity.
- 1 upstream monopolist P, realizing $C(Q)$ where $Q = \sum_i q_i$.



Bargaining assumptions

- Simultaneous bargaining with each of the buyers separately.
  -> Contract equilibrium (Secret contracts, passive beliefs).
- Each negotiation determines the quantity to be traded, q_i, and the tariff for the bundle, T_i.
- Exogenous bargaining powers $(\frac{1}{2}, \frac{1}{2})$
- Bargaining between the supplier and each retailer i (Nash programme):

$$\underset{q_i, T_i}{Max}[\sum_{i=1}^{n} T_i - C(Q) - \sum_{j \neq i}^{n} T_j + C(Q_{-i})][v(q_i) - T_i]$$

where $Q = Q_{-i} + q_i$ and $\sum_{i=1}^{n} T_i = \sum_{j \neq i}^{n} T_j + T_i$. Simplifying :

$$\underset{q_i, T_i}{Max}[T_i - C(Q) + C(Q_{-i})][v(q_i) - T_i]$$

Benchmark

$$\underset{q_i, T_i}{Max}[T_i - C(Q) + C(Q_{-i})][v(q_i) - T_i]$$

The FOCS are:

$$\begin{aligned} C'(Q)[v(q_i) - T_i] + [T_i - C(Q) + C(Q_{-i})]v'(q_i) &= 0 \quad (1) \\ v(q_i) - T_i - [T_i - C(Q) + C(Q_{-i})] &= 0 \quad (2) \end{aligned}$$

Replacing (2) into (1), we have:

$$\begin{aligned} C'(Q) &= v'(q_i) \quad (3) \\ v(q_i) - T_i &= T_i - C(Q) + C(Q_{-i}) \quad (4) \end{aligned}$$

(3) Efficiency: q_i maximizes the joint profits of a pair $P - i$ (monopoly):

$$\Pi = v(q_i) - T_i + \sum_{i=1}^{n} T_i - C(Q).$$

(4) Split the difference rule: $\pi_i = \frac{1}{2}[v(q_i) - C(Q) + C(Q_{-i})]$.

The symmetric solution is denoted (q^*, T^*) and a buyer i's profit π_i^*.

Merger between 1 and 2

$$\underset{q_1,q_2,T_m}{Max}\,[T_m - C(Q) + C(Q_{-(1+2)})][v(q_1) + v(q_2) - T_m]$$

Efficiency: q_1 and q_2 maximizes the joint profit of the pair $P-(1,2)$.

$$\Pi = v(q_1) + v(q_2) - T_m + \sum_{i=1}^{n} T_i - C(Q).$$

$$\Rightarrow v'(q_1) = v'(q_2) = C'(Q).$$

Split the difference rule:

$$\pi_m = \frac{1}{2}[v(q_1) + v(q_2) - C(Q) + C(Q_{-(1+2)})]$$

.

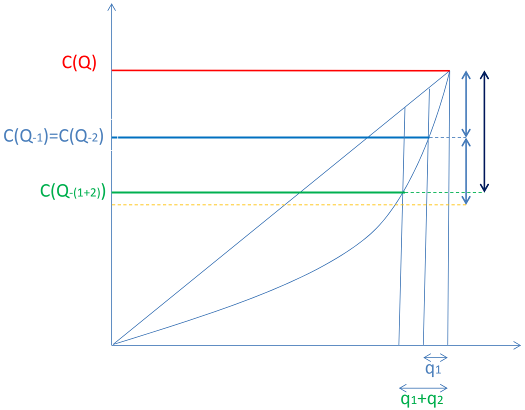
$$\pi_1^* + \pi_2^* = \frac{1}{2}[v(q_1) + v(q_2) - 2C(Q) + C(Q_{-1}) + C(Q_{-2})].$$

$$\pi_m \neq \pi_1^* + \pi_2^* \text{ unless if } C(Q) \text{ is linear.}$$

- With convex production cost $\pi_1^* + \pi_2^* < \pi_m$

Bigger size $\Rightarrow$ Buyer power gain!!!

A big retailer = a marginal retailer+ an infra marginal retailer;
A small retailer = a marginal retailer



Buying group

Assumptions:

- U offers a good at a unit cost 0.
- D_1 and D_2 are two downstream firms that compete à la Cournot.
- Demand is $P = 1 - q_1 - q_2$.
- The game is a follows:
  1. U and each D_i bargain over a linear tariff contract w_i.
  2. Wholesale prices are observed and each D_i chooses its quantity q_i.
- The Nash bargaining takes place simultaneously and secretly. We consider an asymmetric Nash bargaining framework with a parameter $(\alpha, 1-\alpha)$.

Profitability of a buying group?

A buying group consists of bargaining separately but in case of breakdown with one the two members exit. Then, retailers compete on the downstream market.

Without buying group

- If the two firms have accepted their contract. Firm i chooses q_i to maximize $\max_{q_i}(1 - q_i - q_j - w_i)q_i$. Best reaction functions are:

$$q_i(q_j) = \frac{1 - q_j - w_i}{2}$$

for $i = 1, 2$ and in equilibrium we obtain the Cournot quantities $q_i^C(w_i, w_j) = \frac{1+w_j-2w_i}{3}$ for $i = 1, 2$. $\pi_i^C = \frac{(1+w_j-2w_i)^2}{9}$; $\pi_U^C = \sum_{i=1,2} w_i q_i^C(w_i, w_j)$

- If only one firm i has accepted the contract w_i, firm i chooses q_i to maximize $\max_{q_i}(1 - q_i - w_i)q_i$ with respect to q_i and therefore $q_i^M(w_i) = \frac{1-w_i}{2}$ and $\pi_i^M = \frac{(1-w_i)^2}{4}$; $\pi_U^M = w_i q_i^M(w_i)$

Bargaining stage

$$\max_{w_i} \pi_i^C(w_i, w_j)^{(1-\alpha)}(\pi_U^C(w_i, w_j) - \pi_U^M(w_j))^{\alpha}$$

$$\max_{w_i} (1-\alpha) ln(\pi_i^C(w_i, w_j)) + \alpha ln(\pi_U^C(w_i, w_j) - \pi_U^M(w_j))$$

Deriving, we obtain:

$$(1-\alpha)\frac{\frac{\partial \pi_i^C(w_i,w_j)}{\partial w_i}}{\pi_i^C(w_i, w_j)} + \alpha \frac{\frac{\partial \pi_U^C(w_i,w_j)}{\partial w_i}}{\pi_U^C(w_i, w_j) - \pi_U^M(w_j)} = 0 \tag{5}$$

In equilibrium wholesale unit prices are $w_i = w_j = \frac{\alpha}{2}$. Thus equilibrium profits are $\pi_i^C = \frac{(2-\alpha)^2}{36}$ and $\pi_U^C = \frac{\alpha(2-\alpha)}{6}$.

With buying group

The bargaining succeeds either with both firms or none. The bargaining stage is thus rewritten as follows:

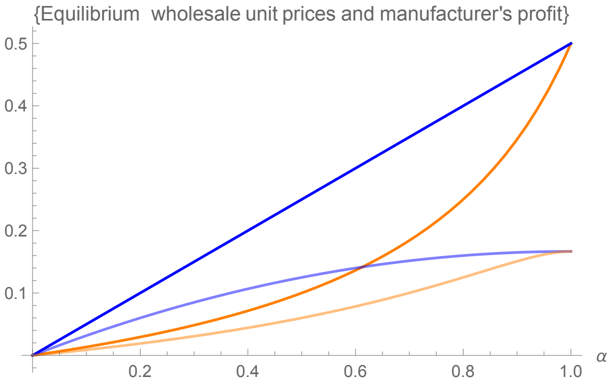
$$\max_w \Big(\sum_{i=1,2} \pi_i^C(w,w)\Big)^{(1-\alpha)} \big(\pi_U^C(w,w)\big)^{\alpha}$$

$$\max_w (1-\alpha) ln\Big(\sum_{i=1,2} \pi_i^C(w,w)\Big) + \alpha ln\big(\pi_U^C(w,w)\big)$$

Deriving, we obtain:

$$(1-\alpha)\frac{\frac{\partial \pi_i^C(w_i,w_j)}{\partial w_i}}{\pi_i^C(w_i,w_j)} + \alpha \frac{\frac{\partial \pi_U^C(w_i,w_j)}{\partial w_i}}{\pi_U^C(w_i,w_j)} = 0 \qquad (6)$$

Comparing (6) with (5) it is immediate that the equilibrium w decreases with the buying group. In equilibrium we find that wholesale unit prices are $w_i = w_j = \frac{\alpha}{8-6\alpha}$. Thus equilibrium profits are $\pi_i^C = \frac{(8-7\alpha)^2}{36(4-3\alpha)^2}$ and $\pi_U^C = \frac{\alpha(8-7\alpha)}{6(4-3\alpha)^2}$.



Legend: Blue - No Buying Group; Orange- Buying Group. Bold: Wholesale prices.

Forming a Buying group enhances retailer's buyer power.

They obtain lower input prices and capture a larger share of profit to the detriment of the manufacturer. Final price decreases (countervailing power effect).

Strategic shelf capacity's restriction-Ho & Lee(2019)

Assumptions:

- Two producers offering products differentiated in quality H and L with $H > L$
- We denote Π^X the maximum profit of a vertically integrated structure when the product sold is X and therefore have $\Pi^H > \Pi^L > 0$.
- Products are imperfect substitutes : $\Pi^H < \Pi^{HL} < \Pi^H + \Pi^L$
- A monopolist retailer D who can either open two slots or restrict its capacity to one single slot.

Research issue

Does D have an incentive to restrict its capacity to one slot?

Strategic shelf capacity's restriction

The timing of the game is the following:

1. D chooses the size of its shelves' (one or two slots).
   - i) D selects the product(s) accordingly (H or L for 1 slot and HL for 2 slots).
   - ii) If only one slot, manufacturers may offer slotting fees S to be selected. If D accepts a slotting fee, he must select the product.
2. The retailer bargains simultaneously with the selected supplier(s) over a fixed fee T (α denotes the retailer's buyer power).

We look for the optimal equilibrium assortment of the retailer.

We solve the game backward. Stage 2 bargaining is as follows.

Bargaining for *HL* Two negotiations takes place simultaneously, one between the pair $H-D$ and another between the pair $L-D$. The Nash program are as follows:

$$\max_{T_H}(\Pi^{HL}-T_H-T_L-(\Pi^L-T_L))^{\alpha}T_H^{(1-\alpha)}$$

$$\max_{T_L}(\Pi^{HL}-T_H-T_L-(\Pi^H-T_H))^{\alpha}T_L^{(1-\alpha)}$$

Firms obtain the following profits
$\pi_D^{HL}=(2\alpha-1)\Pi^{HL}+(1-\alpha)(\Pi^H+\Pi^L)$, $\pi_H^{HL}=(1-\alpha)(\Pi^{HL}-\Pi^L)$,
$\pi_L^{HL}=(1-\alpha)(\Pi^{HL}-\Pi^H)$

Bargaining for *X* One negotiation takes place between the pair $X-D$. The Nash program are as follows:

$$\max_{T_X}(\Pi^X-T_X)^{\alpha}T_X^{(1-\alpha)}$$

Firms obtain the following profits $\pi_D^X=\alpha\Pi^X$, $\pi_X^X=(1-\alpha)\Pi^X$.

We solve stage 1 (i).

Comparing the profit of D in all cases, we obtain that $\pi_D^{HL} > \pi_D^H > \pi_D^L$ and therefore D always offers two slots and sells the two products.

(i) No capacity restriction

Without slotting fee, D has no incentive to restrict its capacity to one slot. He always offer the two goods and this is strictly profitable for two reasons:

- D chooses the structure that maximizes the industry profit.
- D can use one producer as a status-quo in its negotiation with the other.

We solve stage 1 (ii).

If D selects one slot A competition between the two producers takes place for the slot.

- At most H would be ready to offer $\bar{S}_H = \pi_H^H$;
- At most L is ready to offer $\bar{S}_L = \pi_L^L$.

Comparing these offers D would obtain $\pi_D^H + \bar{S}_H = \Pi^H > \pi_D^L + \bar{S}_L = \Pi^L$. Therefore H always wins the competition and offers S_H^* such that D is just indifferent between the two options.

In equilibrium H offers S_H^* such that: $S_H^* = \max\{\Pi^L - \pi_D^H, 0\}$. A positive slotting fee is paid by H to D when $\alpha < \frac{\Pi^L}{\Pi^H}$ and in that case the profit of D amounts to $\pi_D^H + \Pi^L - \pi_D^H = \Pi^L$.

(ii) Capacity restriction

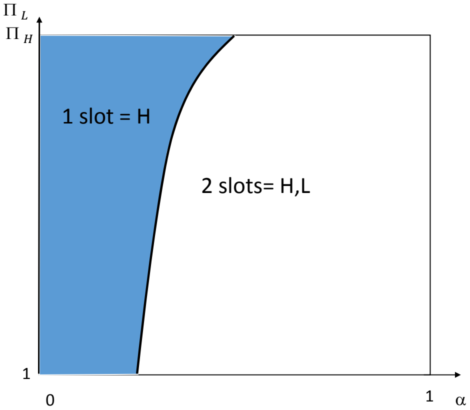
With slotting fees, D may have incentive to restrict its capacity to one slot when $\alpha < \frac{\Pi^{HL} - \Pi^H}{2\Pi^{HL} - \Pi^H - \Pi^L} \in [0, 1]$.

- By creating a competition for slots among suppliers D may obtain a larger share of a smaller pie.

Strategic capacity restriction

$\Pi_{HL} = 4$

$\Pi_H = 3$



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