Buyer Power through Producers' Differentiation

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The motivation of the paper

- The origins and consequences of buyer power (BP)
  - Large retail groups : Wal-Mart, Carrefour
  - Their BP is denounced by industry participants, medias ...
- BP is of growing concern for Competition authorities
  - Countervailing power effects/ Upstream mergers
  - Downstream mergers
    - Efficiency defense
    - Threat to competition (REWE/MEINL (1999) and Carrefour/ Promodes (2000))
- Recent empirical and theoretical IO literature - Inderst & Mazzarotto (2006)
  - Measurement
  - Origins
  - Welfare consequences of the exercise of BP (Price,**Non-price effects**)
- This paper focuses on the implications of retailer's BP on the assortment of products on their shelves.

Main Results

Results

Result 1: Producers' differentiation may be a source of buyer power for a retailer.
Result 2: Such a differentiation strategy may hurt consumers surplus: a retailer may offer a too low quality product to consumers.

- These results are shown first in a simple framework where retailers do not compete to highlight that the choice to differentiate is not the classic attempt to relax downstream competition.
- These results are robust in a framework with downstream competition.
- Related papers: Shaffer (2005), Avenel and Caprice (2006), Inderst and Shaffer (2005).

Assumptions

- Two manufacturers offer vertically differentiated products $K = \{H, L\}$ of respective qualities $k = \{h, l\}$ and $l < h$;
- Their cost functions are identical and independent of the quality level $C(q)$, $C'(q) > 0$.
- Two retailers $i = 1, 2$ each a monopoly in its market;
- Each retailer can stock only one product in its shelves.
- Mussa & Rosen (1978): Consumers have a WTP for quality θ distributed according to a density $f(\theta)$ on $[0, \overline{\theta}]$; The consumer surplus is: $S(\theta) = \theta k - p_i^K$.
- We consider successively two games (I) and (II).

The simple game (I)

- Stage 1: Each retailer chooses which product K to stock in its shelves;
- Stage 2: Each pair of retailer and its chosen manufacturer bargains sequentially on a two-part tariff contract (w_i^K, T_i^K).
- Stage 3: Retailers choose their final quantity q_i^K and sell the good to consumers.

The ability of retailers to commit in stage 1 to the product listing choice is here crucial and will be relaxed in game (II). The Game II is a "free" bargaining game which allows to reinforce our results.

Stage 3

- $P_i^K(q_i^K)$ is retailer i's inverse demand function if she carries the good K.
- $\Upsilon_i^K\left(q_i^K\right) = P_i^K(q_i^K)q_i^K - C(q_i^K)$ denote the vertical bilateral joint profits for the sales by retailer i of good K.
- We assume that $\Upsilon_i^L\left(q_i^L\right)$ strictly increases in l.
- We assume that the retailer's profit, π_i^K, is concave in q_i^K. Let $q_i^{Km}(.)$ denote the monopoly quantity maximizing the profit of retailer i given the contract negotiated in stage 2: $\pi_i^K = (P_i^K\left(q_i^K\right) - w_i^K)q_i^K - T_i^K$

Stage 2: The bargaining assumptions

- We consider a sequential Nash bargaining by pair (Stole and Zwiebel (1996)).
- We first define a sequence of pairs (order of negotiation).
- In case of a breakdown in the negotiation between a pair (K, i), it becomes common knowledge from parties that this pair has failed, and all the sequence of negotiations restarts following the same order but without that pair.
- Retailers (resp. manufacturers) have an exogenous bargaining power α (resp. $1 - \alpha$).
- The equilibrium payoffs are independent on the initial sequence of the bargaining. Equilibrium payoffs are always efficient.

Stage 2: Bargaining in the case (H, L)

The equilibrium contract $(\widehat{w}_i^K, \widehat{T}_i^K)$ solves the Nash program:

$$\underset{w_i^K, T_i^K}{Max} (\Pi_i^K)^{1-\alpha}(\pi_i^K)^{\alpha}$$

- The equilibrium contract is efficient: Υ_i^K is maximum, $\widehat{w}_i^K = C'(q_i^{Km})$
- $q_i^{Km}(\widehat{w}_i^K) = \widehat{q}_i^K$. The equilibrium tariff $\widehat{T}_i^K = (1-\alpha)P(\widehat{q}_i^K)\widehat{q}_i^K - \widehat{w}_i^K\widehat{q}_i^K + \alpha C(\widehat{q}_i^K)$

Lemma

Whatever the cost function, when retailers carry differentiated products, each retailer i (resp. the manufacturer K) captures a share $\alpha\widehat{\Upsilon}_i^K$ (resp. $1-\alpha$).

Stage 2: The bargaining in the case (H, H)

- Consider the following sequence : $(H, 1)$, $(H, 2)$.
  - In case of a breakdown in the negotiation $(H, 1)$, the Nash bargaining between H and 2 gives: $\overline{\Pi_2^H} = (1-\alpha)\widehat{\Upsilon}_2^H$
  - The Nash bargaining between H and 1 when both anticipates that H will succeed also with 2 is : $\underset{w_1^H, T_1^H}{Max}(\Pi_{1+2}^H - \overline{\Pi_2^H})^{1-\alpha}(\pi_1^H)^\alpha$
- The equilibrium contract is such that Υ_i^H is maximum, $w_1^{H*} = w_2^{H*} = C'(q_1^{Hm} + q_2^{Hm})$
- Retailers equilibrium profit are: $\pi_1^{H*} = \pi_2^{H*} = \alpha\Upsilon_1^{H*} + \frac{\alpha(1-\alpha)}{1+\alpha}(\Upsilon_1^{H*} - \widehat{\Upsilon}_1^H)$

Lemma

If $C''(q) = 0$, each retailer captures respectively a share $\alpha\Upsilon_i^{H*}$.
If $C''(q) \leq 0$, the retailer captures a share $\gamma \geq \alpha$ of Υ_i^{H*}.
If $C''(q) > 0$, the retailer captures a share $\delta < \alpha$ of the Υ_i^{H*}.

Proposition

Proposition

If costs are convex, a retailer increases its buyer power in carrying a differentiated product.

- When $C''(q) > 0$, the producer's cost is reduced in case of a breakdown with one retailer, which reinforces the producer's status-quo profit and thus the share of joint profits the producer may capture from each of the two retailers.
- The insight is exactly the other hand of the result highlighted by Inderst and Wey (2003) who show that convex production cost explains why larger retailers obtain greater discounts from their suppliers.
- The convexity of cost here implies that the greater the number of retailers he bargains with, the greater the supplier's bargaining power.

Stage 1: Optimal listing choice

It is always optimal for at least one retailer to sell H. What is the best response for the retailer 2?

- Linear or concave cost function:
  - Supplying from H implies a bigger pie ($\Upsilon_2^{H*} > \widehat{\Upsilon}_2^L$) and 2 gets a bigger share of it $(\gamma \geq \alpha)$=> Unique equilibrium (H, H).
- Convex cost function:
  - Comparing joint profits: There is a unique threshold $\bar{l} \in]0, h[$ such that: $\widehat{\Upsilon}_2^L(\bar{l}) = \Upsilon_2^{H*}$. Supplying from L may now increase joint profits when $l \in [\bar{l}, h[$.
  - Comparing the sharing of profits: 2 gets a lower share $(\delta < \alpha)$ of joint profits if it chooses H. There is a threshold $\widetilde{l} < \bar{l}$ such that: $\alpha\widehat{\Upsilon}_2^L = \delta\Upsilon_2^{H*}$ and when $l > \widetilde{l}$, the unique equilibrium is (H, L).

Main result

Proposition

When costs are convex, non competing retailers may choose producers' differentiation only with the purpose to increase their buyer power.

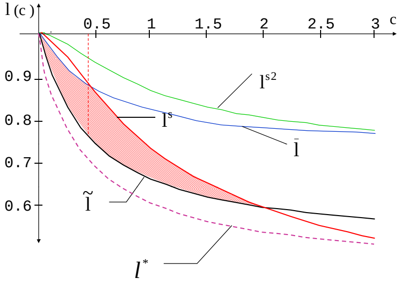
- There are two reasons for 2 to choose a differentiated producer when cost are convex: (1) To reduce the marginal cost of production(2) to raise his buyer power.
- In the interval $[\widetilde{l}, \bar{l}]$, supplying from L implies a smaller pie but a bigger share of it! it is only the buyer power purpose that explains suppliers' differentiation.

Comparative static in α

- If $\alpha = 1$, the threshold $\widetilde{I} = \bar{I}$. As retailers have all power, they get all the joint profits they realize with a manufacturer and so they choose their supplier by comparing only the joint profits.
- If $\alpha \to 0$, $\widetilde{I} \to I^*$ and I^* is such that $\Upsilon_1^{H*} + \Upsilon_2^{H*} = \widehat{\Upsilon}_2^L + \widehat{\Upsilon}_1^H$.
  - It corresponds to the optimal listing choice of a fully merged entity, owner of two stores.
  - When retailers have no power, producers capture the entire joint profits. Since H has a quality advantage over L, the latter has to compensate H to take his place in one retailer's shelves from $\Upsilon_1^{H*} + \Upsilon_2^{H*} - \widehat{\Upsilon}_1^H$. This is possible if $\widehat{\Upsilon}_2^L \geq \Upsilon_1^{H*} + \Upsilon_2^{H*} - \widehat{\Upsilon}_1^H$ and thus if $I > I^*$.
- $\widetilde{I}$ strictly increases in α. Producers' differentiation due to buyer power motive is less likely as retailers' power increases.

Illustrative example

- Linear demand
- θ uniformly distributed over $[0, 1]$
- $C(q) = \frac{cq^2}{2}$
- $h = 1,\ l \in [0, 1]$



Welfare Consequences

- Effect of the choice (H, L) on consumer surplus
  - Effect > 0 for consumers located on retailer 1 market (High quality $(+)$, lower price $(+)$).
  - Effect $\lesseqgtr 0$ for consumers located on retailer 2 market (Lower price $(+)$,Lower quality (-)).
- Effect of the choice (H, L) on industry profits
  - Total industry profit is maximized if (H, L) is chosen for all $I > I^*$: fully merged industry optimal decision.
  - The choice to differentiate for buyer power motive always improve total industry profit.
- Total effect on surplus and welfare depends on the definition of both $f(\theta)$ and $C(q) \Rightarrow$ Illustrative example.

Corollary

Producers' differentiation may damage consumer surplus and welfare for low degree of convexity in the cost function.

Game (*II*)

Game II is a sequential bargaining game without commitment on retailers' listing choice in the first stage.

- Stage 1 : Pairs bargain sequentially on a two-part tariff contract (w_i^K, T_i^K). Each retailer chooses the order of its negotiations with suppliers (cf. Raskovich (2007)).
- Stage 2: Retailers choose their final quantity q_i^K.

Bargaining assumptions (II)

- Producers and retailers have full information and a common knowledge of the structure of the game.
- In case a bargaining fails, any further bargaining between these parties is foreclosed.
- Each retailer chooses the order in which he bargains with the suppliers (1 begins).
- This is an ordered bargaining game as suppliers are not symmetric.
- If a retailer succeeds in his first bargaining, the game is over (due to the capacity constraint) and the bargaining with the second manufacturer has only played the role of an outside option.

Sketch of the solving of Game II

- We assume arbitrarily that 1 begins and that he bargains first with H.
- There are two types of sequences to analyze: $(H-1, L-1, H-2, L-2)$ and $(H-1, L-1, L-2, H-2)$. We then endogenize the choice of 2 to bargain either with H or with L first.

Lemma

When $l > l'$, the retailer 2 chooses to bargain first with L.

- We then check that indeed, this is the best response of 1 who anticipates the optimal choice of 2 to bargain first with H.
- Note that on equilibrium, each retailer always succeeds with the supplier he first bargains with.

Main result of Game II

Proposition

Producers' differentiation in order to improve buyer power is even more likely when retailers can use all their outside options in the bargaining ($I' \leq \widetilde{I}$).

- As in the previous case : I' increases in α and goes to $\bar{I}$ when $\alpha \to 1$.
- On the contrary, $I' < I^*$ when $\alpha \to 0$.
- Negative effects on surplus and welfare are reinforced.
- When choosing to differentiate for buyer power motive, the retailer 2 may hurt total industry profit.

Downstream competition

New framework of assumptions:

- Cournot competition
- Bargaining framework (de Fontenay and Gans (2005))

Proposition

With competitive externalities at the downstream level, retailers may choose to differentiate only in purpose of raising their buyer power towards their supplying producer.

Downstream competition vs the separated market case

- Concerning joints profits: two effects are in favor of the differentiation: (1) the reduction of cost thanks to the cost convexity and, (2) a differentiation effect that tends to relax downstream competition. (Still no differentiation if $l < \overline{l^c}$)
- Comparing profit sharing: whatever the cost function, the retailer 2 always gets a smaller share of the pie dealing with H rather than with L (Quantity Effect).
- Producers' differentiation may hurt consumer surplus when the cost convexity is not too strong (The reduction in the marginal cost is partly passed through to consumers).

Conclusion

- This article shows that producers' differentiation may be a source of buyer power.
- This producers' differentiation strategy may harm consumers and welfare: a capacity constrained retailer may not always carry the best product for consumers. (Effect even stronger when the exogenous buyer power is low).
- Results are maintained in a competition framework.