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Restriction of selling capacity by a retailer

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Abstract

We consider two symmetric upstream firms producing independent goods that sell to consumers through a common retailer. The distinguishing feature of the retailer is that she has a selling capacity, in the sense, that there is an upper limit in the total units of the two goods she can sell. We obtain that the retailer has incentives to reduce her selling capacity in order to increase the pay-off she obtains in the vertical structure.

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1 Introduction

Gabrielsen and Sorgard (1999) study the case where two upstream firms, producing a different good each, sells them through a common retailer.¹ If the retailer commits to sell only one good, she will obtain better supply contracts. The fact that by accepting to stock only a good, a retailer gives up the possibility of stocking another good increases her outside option. With the accepted good, the retailer has to obtain at least the profits she would obtain with the rejected good. The authors find cases where the gains obtained through better supply contracts outweighs the losses due to less variety offered to consumers. Therefore, in these cases, the retailer decides to carry only one good.

In this note, the retailer has no commitment power to limit the number of goods she sells. However she can put a limit to the number of units of the goods she can sell, by choosing the dimension of the available shelf space, what we will call as selling capacity. The same logic as before applies at the margin. An upstream firm to increase marginally its sales should compensate the retailer for the marginal reduction in sales of the other good. Then the retailer will obtain better deals from suppliers. So the choice of selling capacity involves a trade-off for the retailer. On the one hand, a low capacity implies better supply contracts but on the other hand implies a lower level of sales. This trade-off is resolved such that the chosen selling capacity is lower than the level that maximizes total industry profits.

2 Model

Assume we have two producers (1 and 2). Producer 1 (2) produces good 1 (2). Goods 1 and 2 are independent. Demand of good i ($i=1,2$) is given by $P_i = a - Q_i$, where P_i and Q_i are

¹Inderst and Shaffer (2007) and Dana (2012) also study the advantage of retailers to commit to be supplied by one upstream firm.

respectively the price and the quantity sold of good i . Upstream firms sell the goods through a common retailer. The distinguishing characteristic of the retailer is that it has a limited shelf space. In particular, we assume that the total units of the two goods that she can sell is not greater than X . In particular, if x_i denotes the quantity that the retailer sells of good i ($i = 1, 2$), we must have that $0 \leq x_1 + x_2 \leq X$. Assume that there are neither production nor retailing costs.

We consider that selling capacity is $X < a$ and study the following contracting game. In the first stage, producers (1 and 2) offer supply contracts $P_i(x_i)$ ($i = 1, 2$). Each contract is a function that maps the sales of good i x_i to a monetary payment. In the second stage, the retailer decides whether to accept the contract or not. In the third stage, the retailer chooses the level of sales. This contracting game has been previously studied by Bernheim and Whinston (1998).

Before stating the equilibrium, we introduce the following definitions. Given sales (x_1, x_2) , total industry profits are given by:

$$R(x_1, x_2) = (a - x_1)x_1 + (a - x_2)x_2.$$

We have that

$$(x^*, x^*) = \underset{x_1, x_2}{\arg \max} \{R(x_1, x_2) \text{ s.t. } x_1 + x_2 \leq X\} = \left(\frac{X}{2}, \frac{X}{2}\right)$$

$$y^* = \underset{x_1}{\arg \max} \{R(x_1, 0) \text{ s.t. } x_1 \leq X\} = \begin{cases} X & \text{if } X \leq \frac{a}{2} \\ \frac{a}{2} & \text{otherwise} \end{cases}$$

$$z^* = \underset{x_2}{\arg \max} \{R(0, x_2) \text{ s.t. } x_2 \leq X\} = \begin{cases} X & \text{if } X \leq \frac{a}{2} \\ \frac{a}{2} & \text{otherwise} \end{cases}$$

Observe that symmetry implies that $y^* = z^*$.

Then the maximal profits at the industry level are $\Pi = R(x^*, x^*)$. The maximal profits if the retailer can only trade with producer 1 is $\Pi^1 = R(y^*, 0)$ and the maximal profits if the retailer can only trade with producer 2 is $\Pi^2 = R(0, z^*)$. Observe that $X < a$ implies that

$$\Pi < \Pi^1 + \Pi^2$$

that is Assumption B2 in Bernheim and Whinston (1998)². Then, we rewrite Proposition 2 in Bernheim and Whinston (1998).

Proposition 1 (*Proposition 2 Bernheim and Whinston (1998)*) *There is an equilibrium of the contracting game in which the retailer accepts both manufacturer's contracts and chooses (x^*, x^*) . The pay-off of the retailer is $\Pi^1 + \Pi^2 - \Pi$. Furthermore, this equilibrium weakly dominates (for the manufacturers) any other equilibrium of this game.*

In our case, the pay-off of the retailer is given by:

$$\Pi^1 + \Pi^2 - \Pi = \begin{cases} X(a - \frac{3X}{2}) & \text{if } X \leq \frac{a}{2}. \\ \frac{a^2}{2} - (a - \frac{X}{2})X & \text{otherwise.} \end{cases}$$

The important thing is that this pay-off is quasi-concave with a maximum at $X = \frac{a}{3}$. Therefore, it holds that by making shelf space scarce, the retailer can increase the rents obtained from the vertical structure. Next proposition summarizes.

Proposition 2 *Assume that the retailer can choose the selling capacity before the contracting game and its equilibrium is the one in Proposition 1. Then she would restrict capacity to $X = \frac{a}{3}$.*

²Observe that in our case Assumption B1 in Bernheim and Whinston (1998) holds with equality. Footnote 10 in the paper clarifies that in this case all the results still hold.

3 Conclusion

In the present note, we have explicitly modelled the dimension of retailers. This has shed light on its possible strategic use vis-à-vis manufacturers. We have showed that by restricting capacity the retailer increases the competition of suppliers for the scarce shelf space and increases her pay-off. From the countervailing power theory (Galbraith (1952)), one expects that buyer power to be good because it reduces the monopolistic power of manufacturers. However, in the present note we show that buyer power can be obtained in ways that are detrimental to welfare. In particular, the retailer reduces her selling capacity and therefore she reduces the sales to final consumers.

4 References

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