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Vertical Restraints and Producers' Competition

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Abstract

This paper examines the rationale for vertical restraints. It shows that there are important circumstances under which these restrictions have significant anti-competitive effects. The paper focuses on the consequences of exclusive territorial arrangements among the retailers of two products which are imperfect substitutes. Such arrangements are shown to increase consumer prices; under plausible conditions the increase in consumer prices is sufficiently large to more than offset the deleterious effects from "double marginalization" resulting from reduced competition among retailers. The imposition of exclusivity provisions is may be part of a Nash equilibrium among producers. These results hold whether there are or are not franchise fees.

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I. INTRODUCTION

Vertical relationships between producers and retailers or wholesalers often involve more or less complex contracting arrangements, broadly named vertical restraints. These arrangements can simply consist in non-linear tariffs, such as franchise fees, quantity forcing or pricing requirements (quotas, Resale Price Maintenance), but they may also include the assignment of exclusive territories or exclusive dealing, tie-ins, etc.¹ This paper is concerned with investigating the rationale for these restrictions and showing that there are important circumstances under which these restrictions and showing that there are important circumstances under which these restrictions have significant anti-competitive effects.

The legal status of these restraints differs among countries and has changed over times.² From the economic point of view, two main streams of ideas have emerged: on one side is the argument that since markets' are competitive and since arrangements would be adopted only if they increase joint profits, they must necessarily be efficiency enhancing; on the

¹ See Blair-Kaserman [1983] and Caves [1984] for a general presentation of vertical restraints, as well as a comprehensive discussion of their economic incidence.

² For instance, RMP is generally considered to be illegal; however, some States in the U.S. had for a while adopted "fair trade" laws, which partially authorized RMP. Thus, even looking only at the case of the U.S., RPM, which was originally viewed as a per se violation of the Sherman act, had been accepted in some States, till 1975; it is now again illegal in all States. In the same way, assigning exclusive territories, after having been considered as per se illegal, is now subject to a rule of reason standard.

other side is the contention that these restraints have anti-competitive effects at the lower (retailers' or wholesalers') level.

There have been several recent attempts to formalize the efficiency argument (see for example Mathewson-Winter [1983], [1984]), viewing the vertical relationship as a principal-agent(s) relationship; the emphasis is placed on control problems: a monopolistic producer deals with a set of more or less competitive retailers, whose actions (retail prices, selling efforts, etc.) affect the total profits; the problem for the producer is thus to design a contract in order to achieve the integrated solution, i.e. to make the retailers choose the right actions and to recover back the generated profits. The main conclusion in this framework is that vertical restraints are always privately desirable, as they allow a better control of the retailers.³ Moreover, as they help in correcting certain problems associated with linear pricing rules, such as the double marginalization problem (Spengler, [1950]) or the free-rider problem (Telser, [1960]), these vertical restraints are usually thought of as increasing social welfare.

This apologetical view has already been shaded by recent

³ For an introduction to this literature on vertical control, see Rey-Tirole [1986a]. Indeed, one of the objectives of this literature is to define the "minimal set of sufficient tools", which lead to a perfect control of the distributors by the producer. (Exclusive territories plus franchise fees) generally constitutes an example of such a minimal set: it amounts in effect to "selling the firm" (or, more exactly, the production technology).

work, which has emphasized, for instance, the divergence between the monopolist's and the consumers' valuations for distributors' services (see Scherer [1983], Comanor [1985] and Caillaud-Rey [1987]) or the role of distributors' private information in uncertain markets (see Rey-Tirole [1986b]). The general framework is, however, the same, and in particular inter-brand competition (i.e., competition among producers) is neglected.

We will argue here that producers' competition is in fact a crucial element for the analysis of vertical arrangements. As we will show, when there is imperfect competition among producers, then vertical restraints may serve to facilitate collusion. The contractual arrangement may indeed increase joint profits but the gains to the producers and distributors are at the expense of consumers. Vertical restraints may thus not be socially desirable.

We emphasize here the interaction between the design of the internal (producer/retailer) contract and the external competitive situation at the upper (producer) level. A natural framework within which to examine these issues is provided by the multi-principal-multi-agents approach (Fershtman and Judd [1984], [1986]), which has recently been used by Bernheim and Whinston [1986], for the case of common agency, and by Katz [1987], for the case of rivalrous agencies. This approach, following earlier work (Stiglitz (1986)) noting the role of such relationships as entry deterrents, stresses in particular the role of internal principal/agents contracts as a commitment for sustaining

collusion among principals; it also emphasizes the importance of the definition of admissible contracts and the role of each agent's information. This approach has already yielded new insights in the analysis of imperfect competition (see respectively Bernheim-Whinston [1985] and Bonanno-Vickers [1987]). As we will see, it also constitutes a useful tool for the analysis of the rationale and the incidence of vertical restraints.

II - EXCLUSIVE TERRITORIES AS A DEVICE TO REDUCE COMPETITION

We consider here a simple model, borrowed from Rey-Stiglitz [1985], which shows how exclusive territories, which obviously reduce competition at the lower level, may actually be a way of reducing competition at the upper level as well. The basic idea is that when retailers enjoy some kind of monopolistic power, they may put higher mark-ups in the retail price: this price distortion, in turn, induces some change on the cross sensitivity of this demand towards the prices of the manufacturer's competitors. The manufacturers may therefore perceive a less elastic demand than when they directly compete against each other or when they use competitive retailers. This effect in turn may induce both producers to assign exclusive territories to their retailers.

Let us describe this model. There are two manufacturers, each producing a simple good with a constant marginal cost c_1 and distributing it via retailers who have no retail costs. The two products are imperfect substitutes. The final demand for good i , associated with retail prices q_1 and q_2 , is given by $D_i(q_1, q_2)$. For simplicity, we assume symmetry, $c_1 = c_2 = c$, and $\forall x, y \in R^+$, $D_1(x, y) = D_2(y, x)$. Consumers have no search cost and thus buy from the lowest possible price for each product. Lastly, we will suppose in the following that all profit functions are concave, admit a unique--and interior--maximum, and we will thus focus on first-order conditions.

We can define two useful benchmarks, corresponding respectively to perfect collusion and direct competition between producers:

- the collusive outcome is defined by the maximization of the aggregate profits: $(q_1 - c)D_1(q_1, q_2) + (q_2 - c)D_2(q_1, q_2)$, and leads to the monopolistic price q^* :

$$(q^* - c)/q^* = 1/(\epsilon_1(q^*, q^*) + \epsilon_2(q^*, q^*)),$$

where ϵ_1 and ϵ_2 respectively denote the direct and cross price elasticities of the final demands ($\epsilon_1 = -\partial \log D_1 / \partial \log q_1$). The monopolistic mark-up is thus the higher, the lower is the sensitivity of the demand for a product with respect to its own price and the higher is the sensitivity of this demand to the price of the other product.⁴

- the outcome associated with direct competition corresponds

⁴ As the two goods are substitutes, one has: $\epsilon_2 \leq 0$.

to the (Nash) equilibrium of a game where each producer controls the consumer price, q_1 and where his payoff is $(q_1 - c)D_1(q_1, q_2)$. The "competitive" price q^c is characterized by (under standard assumptions on payoff functions):

$$(2) \quad (q^c - c)/q^c = 1/\epsilon_1(q^c, q^c) .$$

Of course the "competitive" profits are lower than those with perfect collusion. When the two products are substitutes, retail prices also are lower; each producer, when he chooses his own price, does not take into account the fact that his rival's gain from an increase in his own price. Note that indeed, it would be in the interest of the producers to convince each other that they would follow up any price increase with a further price increase.

Let us now make precise the imperfectly competitive framework on which we will focus. It is supposed that producers observe the quantity bought by the retailers and possibly whether or not the retailers distribute their products; they do not observe either the quantities sold by the retailers nor their profits or the prices they charge. On the other hand, retailers have perfect information and observe the contracts signed by each producer; in particular, they can engage in arbitrage if a producer tries to discriminate between them. Finally, producers may assign exclusive territories to their retailers (in which case these territories are supposed to be symmetric and thus

representative of the total market.⁵ Given these informational assumptions, the admissible contracts between a producer and his retailers can only include, besides the assignment of exclusive territories, wholesale tariffs based on the quantity bought by the retailers. The possibility of arbitrage from the retailers rules out non-constant marginal prices; producers may however impose franchise fees on the retailers if they effectively observe who sell their products. We have imposed a set of informational assumptions intended to rationalize a particular simple form of contractual relationship. Readers may alternatively take these contractual relationships as given, treating our analysis as simply investigating their consequences.

We assume that, in those cases where the producer imposes franchise fees, it can preclude those who do not pay the franchise fee from, for instance, buying the good from some other retailer and selling it. We will consider both situations where there are, and are not franchise fees.

We formalize the competitive framework as a two-stage game: in the first stage, given some vertical contracting arrangement, producers simultaneously choose their wholesale prices, p_1 and

⁵ The following assumptions are more precisely presented and discussed in Rey-Stiglitz [1985]. The two main assumptions are the asymmetry in information between retailers and producers about retail prices and sales, and the fact that all contracts are common knowledge. The first assumption may be justified in several ways, including moral hazard aspects on the retail side (see Rey-Tirole [1986b]). The assumption that the retailers observe all producers' contracts allows producers, as we will see, to use these contracts in order to achieve higher profits: they are therefore strongly interested in making them common knowledge.

p_2 (and eventually the franchise fees); then in the second stage, retailers observe all wholesale tariffs and simultaneously choose their retail prices. We will consider in the following the (subgame) perfect equilibria of this two-stage game, corresponding to two initial situations: in the first one, retailers are pure price competitors whereas in the second one, exclusive territories have been assigned to the retailers.

i) In absence of vertical arrangement, pure (intra-brand) price competition leads the retailers to charge zero mark-ups in the second stage, and thus equilibrium retail prices are equal to the wholesale prices chosen in the first age: $q_1 = p_1$ (this in turn implies that franchise fees, even if they are available, must be equal to zero). The situation is therefore formally identical to the situation of "direct" competition between producers that we already characterized. At the end of this subgame, the wholesale and retail prices are equal to the "competitive" price q^c , retail profits are zero and producers get the "competitive" profits.

ii) Let us now suppose that producers have assigned exclusive territories to their retailers. These arrangements eliminate intra-brand competition and thus each retailer enjoys monopolistic power over some fixed fraction of the final demand for his product. Given the producers' prices p_1 and p_2 at the second stage some retail price equilibrium will emerge, $(q_1^F(p_1, p_2), q_2^F(p_1, p_2))$: each retail price is a function of the two producers' prices; note that franchise fees, which should be

viewed as fixed costs, can alter the retailers' decisions about distributing or not a product, but do not change the price response function. For simplicity, we will again assume symmetry:

$$\forall x, y \in \mathbb{R}_+ , q_1^r(x, y) = q_2^r(y, x) .$$

a) Suppose first that franchise fees are not available.

At the first stage producer i chooses a price p_i to maximize:

$$(3) \quad \pi_1 = (p_1 - c) D_1(q_1^r(p_1, p_2), q_2^r(p_1, p_2)) ,$$

which leads to wholesale and retail prices which satisfy:

$$p_1 = p_2 = p^* , q_1 = q_2 = q^e = \frac{r}{1} q(p^e, p^e) , \text{ and:}$$

$$(4) \quad p(p^e - c)/p^e = 1/[\epsilon_1(q^e, q^e)\rho_1^1(p^e, p^e) + \epsilon_2(q^e, q^e)\rho_2(p^e, p^e)] ,$$

where ρ_1 and ρ_2 respectively denote the elasticities of a given retailer's price with respect to his producer's (for ρ_1) and the rival's (for ρ_2) wholesale prices ($\rho_1 = \partial \log q_1^r / \partial \log p_1$).

b) Suppose now that producers can require franchise fees.

Anticipating the retail price equilibrium (which, as already noticed, is not modified by the introduction of franchise fees), the producer can recover via the franchise fees the associated retail profits. Thus producer i 's profits are given by:

$$(5) \quad \pi_1 = q_1^r(p_1, p_2) - c) D_1(q_1^r(p_1, p_2), q_2^r(p_1, p_2)) .$$

The equilibrium condition becomes:

$$(6) \quad (q^f - c)/q^f = 1/(\epsilon_1(q^f, q^f) + \epsilon_2(q^f, q^f)\rho_1(q^f, q^f))$$

Let us briefly comment on this analysis. If, as one might normally expect, competitive pressures result in ρ_1 being positive but less than one, and ρ_2 being positive but less than

ρ_1^6 then one obtains:

$$(7) \quad q^e \geq p^e \geq p^c = q^c \quad \text{and} \quad q^m \geq q^f \geq q^c .$$

Thus, when exclusive territories are assigned, equilibrium retail prices are increased whether or not franchise fees are required.

In the case where franchise fees are not allowed, wholesale prices are also higher when exclusive territories are assigned. This comes from a change in the elasticity of the perceived demand; we can decompose this change into two effects: first, the reduction of demand from a price increase is altered by the fact that the retail price of a product only partially responds to the corresponding wholesale price; secondly, the loss of sales is also decreased because the rival's retailers, who then face higher competing retail prices, find it optimal to increase their own prices. This decrease in the sensitivity of demand to price increases leads to higher wholesale price response functions and, thus to higher wholesale prices in the equilibrium. If double marginalization problems are not too important, (that is if the mark-up of retail price over wholesale price is not too large)

⁶ Retailers that find that their wholesale prices have increased while their competitors have not, do not simply pass on the increase with the usual mark-up, but rather absorb some of the cost increase themselves (i.e. $0 \leq \rho_1 \leq 1$). This in turn induces the competitors to increase their own retail prices ($\rho_2 \geq 0$); it seems, however, reasonable to suppose that the direct effect, measured by ρ_1 , is higher than the indirect one: $\rho_2 \leq \rho_1$.

then producer's profits also are higher when exclusive territories are assigned to retailers.

In the case where franchise fees are allowed, then the above analysis shows that under reasonable assumptions, producers' profits are higher when exclusive territories are assigned. This comes not only from a decrease of the elasticity of the perceived demand, but also from the fact that, by assigning exclusive territories to their retailers, producers generate higher retail prices.⁷

Diagrammatic Analysis

Our two stage analysis can be represented diagrammatically as in Figures 1 and 2. Given wholesale prices (p_1, p_2) , Figure 1 depicts the retailer reaction functions, given q_1 as a function for q_2 , and conversely. The intersection of the two is the retailer equilibrium, which we have denoted by $q_1^r(p_1, p_2)$. We can easily trace out how the retail price changes as the wholesale price changes, simply by seeing how the reaction functions shift.

Producers take these reactions into account in calculating their optimal price, for a given wholesale price of their rival.

⁷ Similar effects are present in the context analyzed by Bonannon-Vickers [1987]. Two situations are there compared: the first one corresponds to what we called "direct competition" between producers; in the second one, each producer delegates to a single agent the distribution of his good. Formally, the first situation is similar to the situation where each product is distributed via perfectly competitive retailers, while the second situation (delegation) corresponds to exclusive territories in our framework.

Thus, in figure 2 we have plotted the wholesale price reaction function. The market equilibrium is the intersection of the reaction function. The market equilibrium is the intersection of the reaction functions.

We can see the effects of the alternative contractual arrangements in Figure 2. The solid line represents the reaction function without exclusive territories, the dotted line represents the reaction function with exclusive territories, but without franchise fees, and the dashed line the reaction function with exclusive territories and franchise fees. Our previous calculations verify that exclusive territories increase wholesale prices, by shifting the response functions upwards.⁸

IV. COMMENTS

In the model just analyzed, the producers are presumably better off when exclusive territories are assigned to the distributors. It does not a priori imply that producers will indeed assign exclusive territories to their retailers (unless they can cooperatively agree to do so). A possible way for analyzing the producers' choices of vertical arrangements consists in introducing a new stage at the beginning of the game, where each producer chooses between competition and exclusive territories for his retailers. Rey-Stiglitz [1985] provides an example where assigning exclusive territories and requiring

⁸ Other comparisons (of profits, retail prices, etc) are dependent upon particular parameter values.

franchise fees is actually a dominant strategy for each producer, although the corresponding outcome is Pareto dominated by the outcome associated to the situation where both producers commit themselves to assign exclusive territories and to require no franchise fees (there is thus a standard "prisoners' dilemma"). This example highlights the potential role of vertical restraints for decreasing competition between the producers and also emphasizes the divergence between collective and individual rationality: two phenomena which were ignored in most of the previous analyses of vertical restraints.⁹

Indeed in this analysis, retailers can be considered as "black boxes" or "response machines": by modifying the vertical arrangements proposed to this retailers, a producer simply commits himself to respond in a given way to any change of his rivals' attitudes. Of course if all possible "response machines" were available, complete collusion would then be achievable (see Katz [1987]); the question therefore is to define the admissible "black boxes". In this respect, vertical restraints can be viewed as a natural tool for constructing more efficient response machines, i.e. response machines which enable the producers to decrease competition amongst themselves. (In addition, vertical restraints such as exclusive territories may be more easily

⁹ Telser [1960] and Posner [1977] suggested that RPM could help producers in sustaining collusion by reducing their interest in wholesale price cuts. It has also been suggested that exclusivity requirements (such as exclusive dealing) can serve to deter entry, as they compel the potential entrants to set up their own distribution networks.

enforced then price agreements, and have the further advantage of more easily slipping under the net of anti-trust laws.) Other ways producers may use vertical restraints to reduce competition include, for instance, in the previous model, producers' modifying the design of territories in order to decrease as much as possible the elasticity of the perceived demand. Alternatively, producers could give the right to sell their products to the same retailers (common agency), or distribute their product via wholesalers, who in turn could assign exclusive territories to retailers, etc. In other contexts, depending on observability and enforceability conditions, different vertical restraints might also be introduced to extend the set of available "response machines".

This analysis sheds new lights on the economic effect of the use of vertical restraints on markets performance and social welfare. Till now, two extreme situations were mainly considered: the first one refers to perfectly competitive markets, where only efficiency arguments can explain the use of these restraints; the second situation corresponds to the case of a monopolistic producer and, although private and social interests may conflict, at least from the private point of view efficiency arguments may still, to some extent, be relevant. But if one considers a situation where there is imperfect competition among producers (which is generally true in the widely discussed cases involving the use of vertical restraints), then a new motivation appears: vertical restraints may be used to decrease

competition between producers; this usually has a negative impact on social welfare, the gain in additional profits being overwhelmed by the loss of consumers' surplus. While the above analysis is very partial, it suggests a new approach for the economic theory of vertical restraints, an approach with important policy implications.

REFERENCES

Bernheim, B.D. and Whinston, M.D. [1985]: "Common Marketing Agency as a Device for Facilitating Collusion", Rand Journal of Economics, 16, pp. 269-281.

Bernheim, B.D. and Whinston, M.D. [1986]: "Common Agency", Econometrica, Vol. 54, No. 4, pp. 923-942.°

Blair, R. and Kaserman, D. [1983]: Law and Economics of Vertical Integration and Control, New York Academic Press.

Bonnano, G. and Vickers, J. [1987]: "Vertical Separation", Nuffield College Discussion Paper, forthcoming in Journal of Industrial Economics.

Caillaud, B. and Rey, P. [1987]: "A Note on Vertical Restraints with Provision of Distribution Services", INSEE Discussion Paper No. 8702.

Caves, R. [1984]: "Vertical Restraints in Manufacturer-Distributor Relations: Incidence and Economic Effects", mimeographed, Harvard University.

Comanor, W.S. [1985]: "Vertical Price Fixing and Market Restrictions and the New Antitrust Policy", Harvard Law Review, Vol. 98, No. 5, pp. 983-1002.

Fershtman, C. and Judd, K.L. [1984]: "Incentives Equilibrium in Oligopoly", CSMEMS Working Paper No. 642, Northwestern University.

_____, [1986]: "Strategic Incentive Manipulation in Rivalrous Agency", mimeo.

Katz, M. [1987]: "Game-Playing Agents: Contracts as Precommitments", Princeton University Discussion paper, February.

Mathewson, G.F. and Winter, R. [1985]: "The Economics of Vertical Restraints in Distribution", in I.E.A. Conference Volume, New Developments in the Analysis of Market Structure, New York: Macmillan.

Mathewson, G.F. and Winter, R. [1984]: "An Economic Theory of Vertical Restraints", Rand Journal of Economics, 15 (Spring), pp. 27-38.

Posner, R. [1977]: "The Rule of Reason and the Economic Approach: Reflections on the Sylvania Decision", University of Chicago Law Review, 45, Fall, pp. 1-207.

Rey, P. and Stiglitz, J. [1985]: "The Role of Exclusive Territories on Producers' Competition", mimeographed, revised version July 1987.

Rey, P. and Tirole J. [1986a]: "Vertical Restraints from a Principal-Agent Viewpoint", in Marketing Channels, L. Pellegrini and S.K. Reddy (eds.) Lexington: Lexington Books, pp. 3-30.

_____, [1986b]: "The Logic of Vertical Restraints", American Economic Review, Vol. 76, No. 5, pp. 921-939.

Scherer, F.M. [1983]: "The Economics of Vertical Restraints", Antitrust Law Journal, Vol. 52, No. 3, pp. 687-707.

Spengler, J. [1950]: "Vertical Integration and Anti-trust policy", Journal of Political Economy, 58, August, pp. 347-352.

Stiglitz, J.E., [1986]: "Towards a More General Theory of Monopolistic Competition", in Prices, Competition and Equilibrium, M. Peston and R. Quandt (eds.) Philip Allan Publishers, pp. 22-69.

Telser, L. [1960]: "Why Should Manufacturers Want Fair Trade?", Journal of Law and Economics, 3, October, pp. 86-105.

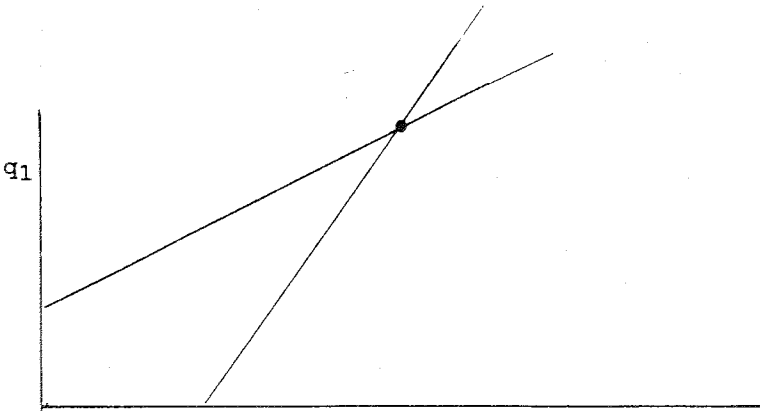


Figure 1
Retailer Equilibrium Q_2

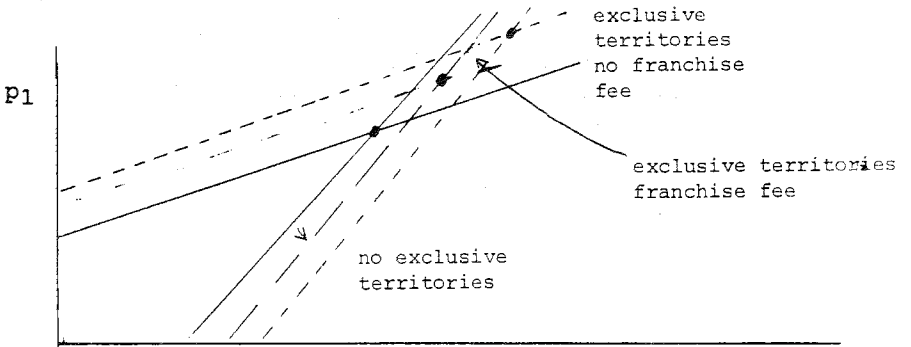


Figure 2
Producer Equilibrium P_2