Economics Letters 120 (2013) 579–582

Contents lists available at SciVerse ScienceDirect

Economics Letters

journal homepage: www.elsevier.com/locate/ecolet

Most-favored-customer pricing, product variety, and welfare☆

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HIGHLIGHTS

- Previous results suggest most-favored-customer (MFC) clauses as anticompetitive.
- The welfare impact of MFC clauses is examined under endogenous product-line assortment.
- It is shown that MFC clauses can reduce welfare, but they can increase it sometimes.

ARTICLE INFO

Article history:
Received 21 May 2013
Accepted 21 June 2013
Available online 29 June 2013

Keywords:
Most-favored-customer clause
Product variety
Multi-product firms
Antitrust policy

ABSTRACT

Most-favored-customer (MFC) clauses are usually seen as anticompetitive co-ordination devices that firms adopt for the purpose of higher prices. Here, I examine the welfare impact of MFC clauses under endogenous product variety. Product variety is relevant because prospective higher prices from MFC clauses can be anticipated by multi-product firms in their provision of product lines. Under such circumstances, I find that these clauses can be socially harmful, but this is not always the case: they tend to be socially neutral for relatively large fixed costs of product-line assortment, harmful for intermediate costs, and beneficial for relatively small costs.

1. Introduction

The previous literature has shown that most-favored-customer (MFC) clauses usually become anticompetitive co-ordination devices that firms can use for the purpose of higher equilibrium prices (e.g., see Cooper, 1986, Salop, 1986, Neilson and Winter, 1992, 1993, Hviid and Shaffer, 2010). Here, I examine the welfare impact of MFC clauses under endogenous product variety. Product variety is relevant because prospective higher prices that are to arise from MFC clauses can be anticipated by multi-product firms in their provision of product variety. I find that MFC clauses can be socially harmful, but sometimes they can be beneficial. In particular, those clauses tend to be socially neutral for relatively large fixed costs of product-line assortment, harmful for intermediate costs, and beneficial for relatively small costs.[1]

I conduct the analysis in the model by Caminal and Granero (2012), which is a variant of the spokes model by Chen and Riordan (2007). One of the merits of this model is that it provides a tractable and intuitive framework to study competition and product variety when neighboring effects are absent, which is becoming the prevailing case in many sectors, while other effects such as business stealing still take place. Without MFC clauses, a multi-product firm anticipates that introducing a higher number of varieties beyond a threshold triggers lower equilibrium prices. The inefficiencies from this strategic price effect lead to the ground for a relevant impact of the MFC clause on welfare because firms can have an incentive to increase product-line assortment in anticipating higher prices from the collusive effect of the clause. Based on that, for relatively small fixed costs of product-line assortment, the equilibrium product variety is still insufficient (from a social point of view), but it is closer to the socially optimal level than in the absence of the clause. Hence, in those circumstances the MFC clause ends up contributing to total surplus. However, for intermediate values of the fixed costs of product-line assortment, the equilibrium product variety is excessive in the absence of the MFC clause, and it becomes even more excessive under the clause, which means that MFC pricing ends up reducing total surplus. Finally, for high values of those fixed costs, the MFC clause has no relevant effects on total surplus under endogenous product variety.

2. Model and benchmark

2.1. Model

Consider a multi-product duopoly along the lines of Caminal and Granero (2012), who build on the spokes model by Chen

☆ I would like to thank Ramon Caminal for helpful conversations on related work. I am grateful to the Spanish Ministry of Science and Innovation for financial support (grant ECO2009-13669). The usual disclaimer applies.

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[1] Zhang (1995), and Coughlan and Shaffer (2009) are perhaps the closest contributions to the current analysis. The focus on the welfare consequences of MFC pricing in the presence of important strategic price effects with multi-product firms differentiates my analysis.

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http://dx.doi.org/10.1016/j.econlet.2013.06.028

and Riordan (2007). In the product market there are N potential varieties, indexed by $i = 1, \ldots, N$. A particular variety may or may not be supplied. Supplying a variety involves a fixed cost f, and the marginal cost is zero for simplicity. There are N spokes of length $\frac{1}{2}$, also indexed by $i = 1, \ldots, N$, which start from the same central point. Variety i is located in the extreme end of spoke i. Demand is perfectly symmetric, and there is a continuum of consumers with mass $\frac{N}{2}$ uniformly distributed over the N spokes. Each consumer has a taste for two varieties and the pair of selected varieties differs across consumers. Consumers are uniformly distributed over the $\frac{N(N-1)}{2}$ possible pairs. The mass of consumers with a taste for an arbitrary pair is $\frac{1}{N-1}$, and since there are $N-1$ pairs that contain a particular variety, the mass of consumers with a taste for variety i is 1. Consumers with a taste for varieties i and j ($i, j = 1, \ldots, N$, $j \neq i$) are uniformly distributed over the union of spokes i and j. Each consumer demands one unit of the good. As is standard, consumer location represents the relative valuation of the two varieties. Specifically, for a consumer who has a taste for varieties i and j and is located at a distance $x \in \left[0, \frac{1}{2}\right]$ from the extreme of the ith spoke, if she chooses to consume one unit of variety i then she obtains a utility equal to $v - x$ (unit transportation cost is normalized to 1), and if she chooses to consume one unit of variety j then she obtains $v - (1 - x)$. A maintained hypothesis is $v > 3$, so that for any given number of active varieties, full market coverage takes place, which simplifies the presentation.

With multi-product firms, it is convenient to treat the number of active varieties as a continuous variable as in Caminal and Granero (2012). In particular, the fraction of active varieties is denoted by $\gamma \in [0, 1]$, and it is treated as a continuous variable by considering the limit spokes model as N goes to infinity with all relevant variables relative to the total mass of consumers. If $0 < \gamma < 1$, consumers can be classified into three different groups: in the limit as N goes to infinity, the fraction of consumers with access to two varieties is γ^2, the fraction of consumers with access to neither of the two preferred varieties is $(1-\gamma)^2$, and the fraction of consumers with access to only one variety is $2\gamma(1-\gamma)$. As N goes to infinity, the total amount of fixed costs per consumer is $\frac{\gamma N f}{N/2} = 2\gamma f$. In order to examine the effects of MFC clauses, suppose two periods, $t = 1, 2$. Consumers purchase the product in both periods, and their locations (thus their relative valuation of product varieties) remain the same for the two periods.

2.2. First best

The objective of the social planner is to maximize the sum of (undiscounted) levels of total surplus over the two periods. For any fraction γ of active varieties, in each period it is efficient to allocate consumers to the closest supplier of the selected varieties, which means that the sum of total surplus over the two periods can be written as

$$W(\gamma) = 2\left[\gamma^2\left(v - \frac{1}{4}\right) + 2\gamma(1-\gamma)\left(v - \frac{1}{2}\right)\right] - 2\gamma f. \qquad (1)$$

The maximization of this concave function yields the optimal value of γ : $\gamma^* = 0$ if $f \geq 2v - 1$, $\gamma^* = \frac{2v-1-f}{2v-\frac{3}{2}}$ if $\frac{1}{2} \leq f \leq 2v - 1$, and $\gamma^* = 1$ if $f \leq \frac{1}{2}$.

2.3. Duopoly

The benchmark corresponds to a situation in the absence of MFC clauses. Two firms, A and B, sell their product variants to consumers in each of the two periods. The objective of each firm is to maximize the sum of (undiscounted) profits over the two periods. Firms choose the fraction of active varieties to be supplied, and they set prices for those varieties in each period. In the game without MFC clauses the timing is as follows. First, firms simultaneously choose the fraction of potential varieties they wish to supply, γ_A and γ_B. The duopoly total fraction of active varieties is denoted by $\gamma^D = \gamma_A + \gamma_B$. Then, after observing γ_A and γ_B, firms simultaneously set first-period prices and subsequently second-period prices for all the active varieties. I focus on symmetric subgame perfect equilibria, where $\gamma_A = \gamma_B = \frac{1}{2}\gamma^D$, and all varieties are sold at the same price per period.

Let us denote by π_{At} the level of firm A's gross profits (similarly for B). Then, the sum of profits over the two periods is written as $\Pi_A = \pi_{A1} + \pi_{A2} - 2\gamma_A f$. In computing these profits, the firm faces a demand from three market segments: γ_A^2 is the fraction of consumers with access to their two preferred varieties such that the two varieties are supplied by firm A, $2\gamma_A(1 - \gamma_A - \gamma_B)$ is the fraction of consumers with access to only one of their preferred varieties such that this variety is supplied by firm A, and $2\gamma_A\gamma_B$ is the fraction of consumers with access to their two preferred varieties such that one of these varieties is supplied by firm A and the other variety by firm B. In the latter market segment, consumers choose a supplier exactly as in the Hotelling model. These three market segments lead to the following demand:

$$q_{At} = \gamma_A^2 + 2\gamma_A(1 - \gamma_A - \gamma_B) + 2\gamma_A\gamma_B\left(\frac{1}{2} + \frac{p_{Bt} - p_{At}}{2}\right). \qquad (2)$$

Then, firm A chooses its price p_{it} in each period $t = 1, 2$ in order to maximize Π_A, which in the absence of MFC clauses amounts to maximize $\pi_{At} = q_{At}(p_{At}, p_{Bt})p_{At}$ subject to $p_{At} + 1 \leq v$.[2] If the constraint is not binding, firm A's reaction function is

$$p_{At} = R^U_{At}(p_{Bt}; \cdot) \equiv \frac{2 - \gamma_A - \gamma_B}{2\gamma_B} + \frac{p_{Bt}}{2}. \qquad (3)$$

Firm B's reaction function is symmetric. Hence, as in Caminal and Granero (2012), along a symmetric equilibrium path with $\gamma_A = \gamma_B = \frac{1}{2}\gamma^D$ for a given pair (γ_A, γ_B), the candidate equilibrium price is $p_{At} = p_{Bt} = p^D$, where $p^D = \frac{2(2-\gamma^D)}{\gamma^D}$ if $\gamma^D \geq \frac{4}{v+1}$, and $p^D = v - 1$ if $\gamma^D \leq \frac{4}{v+1}$.

In the first stage, firm A chooses γ_A in order to maximize Π_A. If $\gamma^D \leq \frac{4}{v+1}$,

$$\Pi_A = 2\gamma_A(2 - \gamma_A - \gamma_B)(v - 1) - 2\gamma_A f, \qquad (4)$$

which is concave in γ_A, and the first-order condition for profit maximization with respect to γ_A, evaluated at $\gamma_A = \gamma_B = \frac{1}{2}\gamma^D$, yields

$$\gamma^D = \frac{2}{3}\frac{2(v-1) - f}{v - 1}, \qquad (5)$$

provided $\gamma^D \leq \frac{4}{v+1}$, i.e., provided $f \geq \frac{2(v-1)(v-2)}{v+1}$. If $\gamma^D \geq \frac{4}{v+1}$,

$$\Pi_A = \frac{2}{9\gamma_A\gamma_B}(2 - \gamma_A - \gamma_B)^2(2\gamma_A + \gamma_B) - 2\gamma_A f, \qquad (6)$$

whose first derivative evaluated at $\gamma_A = \gamma_B = \frac{1}{2}\gamma^D$ is

$$\frac{d\Pi_A}{d\gamma_A} = \frac{8}{3\gamma^D}(2 - \gamma^D)(1 - 2\gamma^D) - 2f. \qquad (7)$$

When $\gamma^D > \frac{1}{2}$, this derivative is negative. If $3 < v < 7$ then $\frac{1}{2} < \frac{4}{v+1} < 1$, so that there is no symmetric equilibrium where $\gamma^D > \frac{4}{v+1}$. Specifically, a symmetric duopoly equilibrium exists

[2] Under the maintained assumptions, it can be seen that we do not need to worry about deviations such that $p_{At} \notin [p_{Bt} - 1, p_{Bt} + 1]$.