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Enhancing bargaining power with most-favored-customer pricing

William S. Neilson*†

Department of Economics, Texas A&M University, College Station, TX 77843, USA

Harold Winter

Department of Economics, Ohio University, Athens, OH 45701, USA

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Abstract

A monopolist faces a finite sequence of identical buyers and negotiates with each buyer individually. Most-favored-customer pricing allows the firm to exploit its position as the repeat player in the game and extract more of each buyer's surplus.

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1. Introduction

A firm that adopts most-favored-customer (MFC) pricing guarantees its present customers a rebate of the price difference if it sells to future customers at a lower price. Previous research has identified two main explanations for a firm's adoption of MFC pricing. MFC pricing can facilitate collusion by making it costly for Bertrand playing firms to deviate from a collusive price [Cooper (1986)].[1] Also, MFC pricing can be used by a durable good monopolist (or cartel) to credibly commit to a permanently high price, thus eliminating the dynamic inconsistency problem associated with the pricing of a durable good [Butz (1990) and Png (1991)]. With both of these explanations the firms that adopt MFC pricing post prices. In this paper we examine the conditions under which a firm that *negotiates* a price with each successive customer can increase its profit by adopting MFC pricing.

In our model, a single firm (or cartel) confronts and negotiates with a new identical buyer in each of a finite number of periods.[2] In this framework the firm's price is determined by a

* Corresponding author.
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[1] Neilson and Winter (1992, 1993) show that the collusive explanation holds up best when only one firm (as opposed to both firms) in a Bertrand duopoly uses MFC pricing.
[2] If the number of periods is infinite, folk theorem-like results state that the firm can capture all of the surplus [Fundenberg et al. (1990)]. Our focus is on strengthening the bargaining power of a firm in a finite setting.

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bargaining solution and, without MFC pricing, the solution is constant across all periods. If the firm adopts an MFC policy, however, it increases its minimum acceptable price in successive periods. We demonstrate that if a bargaining solution increases with the firm's minimum acceptable price, MFC pricing can increase the firm's profit.

This paper is organized as follows. Section 2 presents a model with a single firm and a sequence of identical buyers, and demonstrates that for a certain subclass of bargaining solutions, MFC policies cause the firm's profit to increase. Section 3 establishes that this subclass of bargaining solutions is non-empty, and section 4 offers a brief conclusion.

2. The bargaining model

Consider a monopolist firm that produces a good at zero marginal cost and, in each of a finite number of periods, negotiates with a buyer whose 'value' of the good is V. This value can be interpreted as a buyer's reservation price for the good. Each buyer is present in the market for only one period and cannot re-enter the market under any circumstances. The monopolist and buyers all have discount factors $\delta < 1$, and all parties are risk neutral. In each period the firm is allowed three options: (1) no agreement on price is reached and both parties end up at their disagreement point; (2) agreement on price is reached and the firm does not offer price protection; and (3) agreement on price is reached and the firm offers price protection in the form of a one-period MFC contract, i.e. if the next period price is lower, the firm rebates the previous period's buyer the price difference.

Assume that if an agreement on price is reached in period t, it is determined by the bargaining solution $P_t = \beta(V_t, M_t)$, where V_t is the most the buyer in period t is willing to pay, M_t is the minimum price the firm is willing to accept, or, equivalently, the highest price the firm can credibly refuse, and β is assumed to be increasing in its first argument. Without an MFC contract in period $t-1$, $M_t = 0$ because the firm accepts any positive price. With an MFC policy in period $t-1$, if $P_t < P_{t-1}$ the firm must rebate $P_{t-1} - P_t$ to the buyer in period $t-1$. Total profit in period t is, therefore, $P_t - (P_{t-1} - P_t)$, and this is non-negative only if $P_t \geq \frac{1}{2}P_{t-1}$. Thus, in the presence of an MFC contract, $M_t = \frac{1}{2}P_{t-1}$. In summary, the bargaining solution in period t is $P_t = \beta(V, 0)$ if there is no MFC contract in period $t-1$, and $P_t = \beta(V, \frac{1}{2}P_{t-1})$ if there is an MFC contract.[3]

Since the firm's profit is simply the price, whether or not the MFC contract increases profit depends on whether or not β is increasing in its second argument. If β is increasing in M_t, subsequent buyers pay higher prices than the first buyer, so the firm's profit increases as a result of the policy. If, on the other hand, β is not increasing in M_t, MFC policies do not improve the firm's bargaining position.

3. Examples of bargaining solutions

In this section we explore the plausability of the assumption that $\beta(V_t, M_t)$ is increasing in its second argument. Three different bargaining solutions are considered: two axiomatic solutions and one alternating offers game. In some cases β has the desired property, while in others it does not. Figures 1 and 2 illustrate the first two bargaining solutions by showing the bargaining sets with and without MFC protection of the previous period's price.

[3] If the firm promises to rebate more than the price difference, it can further increase the minimum acceptable price. Because these 'super' MFC policies have no qualitative effect on the results, and because they are not standard in practice, we choose to ignore them.

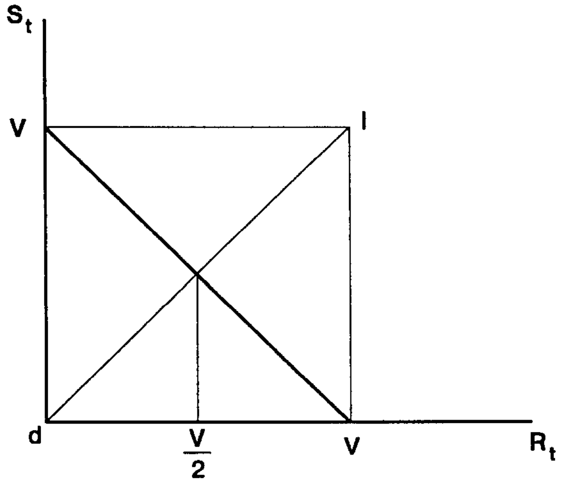

Fig. 1.

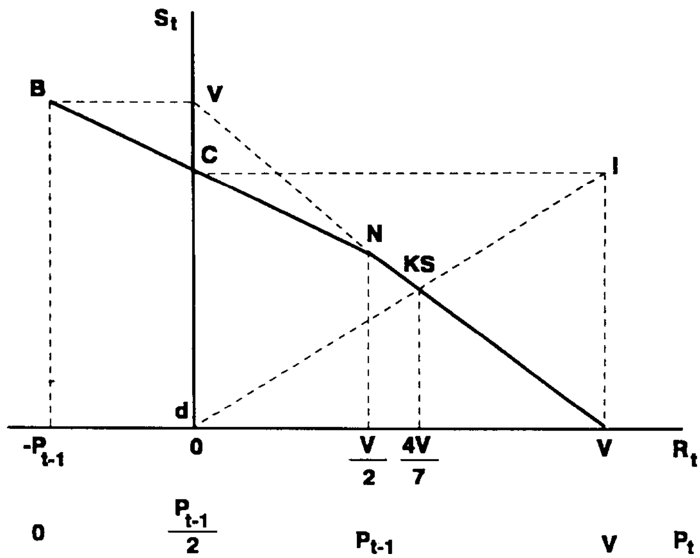

Fig. 2.

In Fig. 1, there is no MFC contract in period $t-1$, and R_t denotes the firm's revenue in period t, which is simply the price in period t, and S_t is the buyer's surplus, defined as $S_t = V_t - P_t$. Since $V_t = V$, the Pareto-optimal frontier is VV and the disagreement point, d, defined as the payoff combination which results if no agreement is reached, is the origin.

Figure 2 depicts the case in which there is an MFC contract in period $t-1$, and now R_t denotes the firm's revenue in period t net of any rebate to the buyer from period $t-1$.[4] If $P_t \geq P_{t-1}$, $R_t = P_t$ since no rebate occurs. If $\frac{1}{2}P_{t-1} \leq P_t < P_{t-1}$, a rebate occurs but net revenue is positive, i.e. $R_t = 2P_t - P_{t-1} \geq 0$. Finally, if $P_t < \frac{1}{2}P_{t-1}$ and there is a sale, a rebate occurs and $R_t = 2P_t - P_{t-1} < 0$.

[4] The horizontal axis in Fig. 2 has two labels. The top set of labels show the firm's profit at each point, and the bottom set shows the corresponding price.

The disagreement point is still $d = (0, 0)$, and the firm prefers the disagreement point to outcomes that yield $P_t < \frac{1}{2}P_{t-1}$, that is, points along the segment BC. Thus, the relevant bargaining set is the Pareto-optimal frontier CNV and the disagreement point d.

Three bargaining solutions – Nash, Kalai–Smorodinsky, and alternating offers – are considered below to determine whether an MFC policy enables the firm to increase its profit, which depends on whether β is increasing in the firm's minimum acceptable price. For simplicity, attention is restricted to the case where there are two periods and the first-period price is protected with an MFC policy.[5].

3.1. The Nash solution

In Fig. 1, for $t = 1$, define the convex hull VdV to be set of outcomes H_1, the firm's profit to be R_1, and the buyer's surplus to be S_1.[6] Because $d = (0, 0)$, the Nash solution for the game (H_1, d) can be characterized as $N_1^* = (R_1^*, S_1^*)$ such that $R_1^* S_1^* > R_1 S_1$ for all $R_1, S_1 \in H_1, R_1, S_1 \geq 0$, and $R_1 \neq R_1^*, S_1 \neq S_1^*$. In this case, the Nash solution yields a price $P_1 = V/2$, and the seller and buyer evenly split the gains from trade.

In Fig. 2, for $t = 2$, define the convex hull $dCNV$ to be the set of outcomes H_2. As can be seen, H_1 contains H_2 and $N_1^* \in H_2$; therefore, because of the axiom of Independence of Irrelevant Alternatives (IIA), $N_2^* = N_1^*$ since the Nash solution (point N in Fig. 2) satisfies IIA. Continuing this reasoning establishes that the bargaining solution is $\beta(V, M_t) = V/2$, and price protection offers no advantage to the firm in this setting since the Nash solution does not increase with the firm's minimum acceptable price.

3.2. The Kalai–Smorodinsky (KS) solution

With the bargaining set H_1, define the ideal point $I_1 = (R_1^{\max}, S_1^{\max})$ such that $R_1^{\max}(H_1, 0) = \max\{R_1 \in \mathbb{R} \mid (R_1, S_1) \in H_1 \text{ and } S_1 \geq 0\}$ and $S_1^{\max}(H_1, 0) = \max\{S_1 \in \mathbb{R} \mid (R_1, S_1) \in H_1 \text{ and } R_1 \geq 0\}$. In period 1, the ideal point is $I_1 = (V,V)$, i.e. V is both the maximum surplus the buyer can receive and the maximum profit the firm can receive. The Kalai–Smorodinsky (1975) solution is found by drawing a line from the disagreement point to the ideal point and finding the intersection on the Pareto-optimal frontier. In this case, the KS solution yields a first period price of $P_1 = V/2$.

In period 2, the maximum surplus the buyer can obtain is $3V/4$ (at point C) since the minimum acceptable price is $V/4$. Therefore, the ideal point for the set H_2 is $I_2 = (V, 3V/4)$, and the KS solution falls along the segment NV in Fig. 2, which corresponds to higher profit than the seller would reach without protection. In fact, the second period price is $4V/7$ (Point KS in Fig. 2).

To derive the formula for $\beta(V, M_t)$ corresponding to the KS solution, note that the ideal point for period t is $(V, V - M_t)$. Solving simultaneously the equation of the ray connecting the origin to the ideal point and the equation for the relevant segment of the bargaining set yields $\beta(V, M_t) = V^2/(2V - M_t)$. Note that β is increasing in both its arguments, and when the KS solution is used MFC policies increase profit.

[5] The two-period case is sufficient to establish whether or not β is increasing in M_t, which in turn is sufficient to establish whether an MFC policy can increase profit in the more general case.

[6] Bargaining sets are generally assumed to be convex and compact. All the solutions used below satisfy Pareto optimality, and any solution in the convex hull VdV is also an element of the Pareto frontier VV.

3.3. Alternating offers

Suppose that the firm and the buyer engage in an alternating offers bargaining process. One party proposes a price, and the second party either accepts or rejects. If the price is accepted, the sale takes place at that price. If the price is rejected, the second party proposes a new price, and the first party either accepts or rejects. This process goes on for T periods. If no offer accepted at the end of T periods, no sale takes place. At the end of T periods, the next buyer arrives, and the process repeats for a finite number of buyers.

There are two cases of interest, corresponding to who makes the last offer. If the firm makes the last offer, the bargaining solution depends on V but not on the firm's minimum acceptable price. If the buyer makes the last offer, the bargaining solution is increasing in both V and M_t. To illustrate these results, consider the case $T = 2$, and let $\rho = \delta^{1/T}$. If the firm makes the last offer, it proposes a price of V, which makes the buyer indifferent between accepting and rejecting. It is assumed that proposals are accepted when a party is indifferent. In the first period, the buyer offers price ρV, which makes the seller indifferent between accepting or rejecting. The bargaining solution is $\beta(V, M_t) = \rho V$, which is not increasing in M_t.

On the other hand, if the buyer makes the last offer, he offers price M_t, which gives the buyer surplus $V - M_t$. In the first period, the seller proposes price $V - \rho(V - M_t)$, which leaves the buyer indifferent. The bargaining solution is $\beta(V, M_t) = V - \rho(V - M_t)$, which is increasing in both its arguments. For MFC policies to increase the firm's profit when negotiations are done using alternating offers, it is necessary that the firm be the one to decide whether to accept or reject the proposal in the last period.

For MFC policies to enhance bargaining power, it must be the case that the bargaining solution increases with the firm's minimum acceptable price. In the above examples, of the two axiomatic solutions, the Kalai–Smorodinsky solution satisfies the requirement but the Nash solution does not. With the alternating offers game, if the firm makes the last acceptance decision the requirement is satisfied, but if the buyer makes the last decision it is not satisfied. As is always the case with bargaining solutions, it is extremely difficult to provide an empirical justification for a particular solution: thus, there is no a priori reason to accept or reject any solution. For our purposes, we are trying to provide a rationale for MFC pricing in a bargaining framework, and we demonstrate that there is a non-empty set of bargaining solutions that allow MFC pricing to enhance the firm's bargaining position.

4. Conclusion

This paper shows that an MFC pricing policy may enable a firm to increase its profit in a bargaining situation. In light of this, there are at least three hypotheses to explain the existence of MFC pricing: (i) to facilitate collusion in an oligopoly; (ii) to stabilize price in a durable good monopoly setting; and (iii) to enhance a firm's bargaining position. The three rationales pertain to different settings. In the facilitating practice story, the firms are Bertrand oligopolists, while in the other two stories the firms are either monopolists or are acting as a joint profit-maximizing cartel. In both the oligopoly and durable good stories firms post prices, while in the bargaining story the firms deal with customers one by one. Each alternative rationale, then, has its place, and it remains to study which one is driving the use of MFC policies by real-world firms.

References

Butz, D.A., 1990, Durable-good monopoly and best-price provisions, American Economic Review 80, 1062–1076.

Cooper, T.E., 1986, Most-favored-customer pricing and tacit collusion, RAND Journal of Economics 17, 377–388.

Fudenberg, D., D.M. Kreps and E.S. Maskin, 1990, Repeated games with long-run and short-run players, Review of Economic Studies 57, 555–573.

Kalai, E. and M. Smorodinsky, 1975, Other solutions to Nash's bargaining problem, Econometrica 43, 513–518.

Neilson, W.S. and H. Winter, 1992, Unilateral most-favored-customer pricing: A comparison with Stackelberg, Economics Letters 38, 229–232.

Neilson, W.S. and H. Winter, 1993, Bilateral most-favored-customer pricing and collusion, RAND Journal of Economics 24, 147–155.

Png, I.P.L., 1991, Most-favored-customer protection versus price discrimination over time, Journal of Political Economy 99, 1010–1028.