WORKING PAPERS

PRACTICES THAT (CREDIBLY) FACILITATE OLIGOPOLY COORDINATION

Steven Salop

WORKING PAPER NO. 73

August 1982

BUREAU OF ECONOMICS
FEDERAL TRADE COMMISSION
WASHINGTON, DC 20580

REVISED August 1, 1982

PRACTICES THAT (CREDIBLY) FACILITATE OLIGOPOLY COORDINATION[1]

Steven C. Salop
Professor of Economics
Georgetown University Law Center

I. INTRODUCTION

It is now well established in both the economics and legal literature that successful price coordination (either express or tacit) is not inevitable--even in highly concentrated industries protected with insurmountable barriers to entry. The key to this insight is the recognition that even though oligopolists' fates are interdependent, individual self-interests are not perfectly consonant. As a result, oligopolists may find it difficult to agree on a mutually acceptable cooperative outcome, achieve that outcome smoothly, and maintain it over time in the face of exogenous shocks and private incentives to deviate. In the current language of Industrial Organization, the joint profit-maximizing point may not be a Nash equilibrium.

---

1 An earlier version of this paper was presented at the IEA Symposium, "New Developments in Market Structure," held in Ottawa, Canada, May 10-14, 1982. This work reflects the research and litigation skills of a number of my former FTC colleagues with whom I worked on the Ethyl case, Robert Burka, Paul Pautler, Margaret Slade, and David Scheffman. I have also benefitted from the comments of Richard Gilbert, Charles Holt, Jack Kirkwood, Warren Schwartz, Joe Simons, and my discussant, Thomas v. Ungern-Sternberg. Many of the ideas discussed here have come out of joint work with Judith Gelman and are discussed more formally in Gelman and Salop (1982). Financial support for this research has been provided by the Bureau of Economics of the Federal Trade Commission.

The likelihood of successful coordination may be increased by the adoption of industry practices that increase oligopolists' incentives to cooperate and reduce their incentives to compete despite their divergent interests. Antitrust commentators refer to such practices as "facilitating devices." Some courts have called them "plus factors." Economic theorists can model these practices as profit penalties and pricing constraints that have the effect of altering the oligopoly equilibrium point. Analysis of these practices is the subject of this paper.

The rest of the paper is organized as follows. Section II briefly reviews the analytics of strategic interaction in oligopolistic industries. The material in this section is not new, but it sets a useful foundation for analyzing facilitating practices. The practices are introduced in Section III. Sections IV and V discuss two examples of contractual provisions that can function as facilitating devices--"most favored nation" clauses and "meeting competition" clauses. Contractual provisions can add credibility to tacit agreements, because they will be enforced by courts. A number of other practices are also discussed briefly in these two sections. Section VI discusses the role of meeting competition clauses in credible entry deterrence. Efficiency rationales for the practices are taken up briefly in the Conclusion.

II. THE SIMPLE ANALYTICS OF TACIT COORDINATION: REVIEW

Successful oligopolistic coordination consists of three elements--agreement about the cooperative outcome, achievement of

that outcome, and maintenance of the outcome over time in the face of changing conditions and private incentives to compete.

Agreement is difficult whenever firms' interests do not exactly correspond. It may be true that raising prices may increase the industry's joint profits. However, absent a binding profit-sharing arrangement, higher profits for one rival may come at the others' expense. When non-price variables such as product design, delivery schedules and collateral service must also be set, the agreements become unavoidably complex. The desire to price discriminate also complicates the agreement. Moreover, in a dynamic context, the agreement must be constantly renegotiated or be made contingent on changing conditions. Otherwise, the agreement will become less profitable when changes occur. Of course, the difficulties in reaching an agreement are compounded when laws prohibit the negotiation of express agreements. In place of open negotiations, the oligopolists must instead rely on tacit understandings subtly signaled through newspaper interviews and at trade association meetings.

Once agreement is reached, the cooperative outcome must still be achieved. This may be a trivial matter for a legal cartel that can openly rely on a court-enforced contract. However, this is not the case for illegal price fixing schemes and tacit coordination. Without such contracts, agreements may not be "binding".

The familiar model of a repeated Prisoners' Dilemma game illustrates these difficulties. Suppose the industry consists of two firms--call them Ethyl and DuPont--which produce

differentiated products at identical costs.[2] Suppose that as a result of government regulation or some other insurmountable barrier to entry, additional entry is impossible. To eliminate the additional analytic complexity created by assymetric positions in the industry, assume that consumer demands for the rivals' products are symmetric.[3] Consider the strategy space for each rival to be the set of its prices over an infinite time horizon, or $(p_1, p_2, \ldots)$.

Our analysis focuses on the relative credibility of possible dynamic equilibria. A credible equilibrium is an outcome that can be achieved and maintained sequentially by firms that are foresighted, but who are unable to precommit to future prices. That is, in every time period each firm is assumed to select a price that maximizes the present discounted value of its profits, taking into consideration its rivals' likely best responses to its price choice. The simple Nash-Cournot equilibrium point may also be a credible equilibrium outcome or not, as will be discussed below. The term relative credibility emphasizes that

---

2 Although the rivals' names are taken from the FTC'S recent Ethyl (1981) case, the facts assumed in these examples do not correspond exactly to those in the case. For example, the real-life domestic lead-based antiknock compound industry also includes two fringe firms, PPG and Nalco. In addition, costs may have been heterogeneous and rivals' products were considered homogeneous by purchasers. Obviously, real life is far richer and more complex than theory. See Grether and Plott (1981) and Carlton (1981) for other economic analyses of Ethyl.

3 Formally, assume that the demands for Ethyl (E) and DuPont (D) satisfy the symmetry condition $\chi E(p,q) = \chi D(q,p)$ for all price pairs (p,q) for the two rivals.

an outcome may be a credible equilibrium (or not) with respect to some information sets and some degrees of strategic sophistication but not others. Because some firms may be more or less informed and sophisticated than others, the analysis is not restricted to a single definition of credibility. It should also be emphasized at the outset that many of these results can also be derived as simple Nash equilibria in analogous static models.

A. TACIT COORDINATION AND THE PRISONERS' DILEMMA

To facilitate the exposition, we will illustrate these concepts with simple examples. In these examples, each duopoly firm chooses its price each period from among a finite set of prices (generally two). Table 1 illustrates the simplest 2 x 2 Prisoners' Dilemma structure. In this example, each firm can select either a high price P_H or a low price P_L.

TABLE 1: PRISONERS' DILEMMA

		DuPont			
		P_H	P_L	P_H	P_L
Ethyl	P_H	100	-10	100	140
	P_L	140	70	-10	70
		Ethyl's Payoffs		DuPont's Payoffs	

The entries in Table 1 contain the firms' profits in a single period from different pricing combinations in that period. The exact numbers are chosen for illustrative purposes only. We

denote a pricing outcome by the pair of prices chosen by the rivals. Ethyl's price is entered first. Thus, the price pair (P_H, P_L) denotes that Ethyl charges P_H and DuPont charges P_L. Because joint profits for the price pair (P_H, P_H) exceed joint profits at the off-diagonal pairs (P_L, P_H) and (P_H, P_L) and the diagonal price pair (P_L, P_L), we denote (P_H, P_H) as the joint profit maximizing (or cooperative) point. A cooperative agreement would require that Ethyl and Dupont each charge the high price P_H. We denote (P_L, P_L) as the competitive point.

Inter-seller price setting contracts generally violate the antitrust laws. Lack of a binding contract may make it difficult for DuPont and Ethyl to coordinate their behavior even temporarily, even if they reach a meeting of the minds on the mutual desirability of the cooperative strategy P_H. Beginning from the competitive outcome (P_L, P_L), if the dates of the rivals' price increases to P_H are not coordinated, then the price leader's profits are reduced during the transition period. In the example, if Ethyl raises price first, its profits fall to -10 until DuPont follows with its price increase. Of course, DuPont's profits rise to 140 during the transition. Thus, DuPont has every incentive to delay its price increase. Fear of further delays may convince Ethyl to return to P_L, or to forego the price increase to begin with. As a result, the process of attaining the joint profit point may be interrupted.[4]

---

4 It has been argued by the economist-lawyer Donald Turner (1962) that sophisticated oligopolists will easily overcome this problem. Each will recognize his mutual interdepen-
(Footnote continued)

It may appear that the "transitional" difficulties of achieving the cooperative outcome are only a one-time problem. However, this view overlooks the dynamic elements of oligopoly interaction. As cost and demand parameters change over time, the joint profit-maximizing point changes as well. Thus, oligopolists face repeated transitional problems. As we demonstrate below, certain industry practices can facilitate the transitions to make cooperation more credible, allowing the price pair (P_H, P_H) to be achieved repeatedly.

Once achieved, we have the familiar Prisoners' Dilemma--the cooperative outcome must be maintained despite the oligopolists' incentives to compete. Of course, this problem is similar to the difficulties faced in achieving the joint profit point to begin with. The cooperative point (P_H, P_H) is not a simple Nash equilibrium to the single-period Prisoners' Dilemma game. For example, if Ethyl lowers its price to P_L, its profits rise in the shortrun to 140.

Following Stigler (1962) by viewing the model as a repeated game complicates the analysis as follows. Given the payoff structure of Table 1, once DuPont detects Ethyl's price decrease, it has an incentive to match the price cut; this strategy raises

---

4(continued)
dence with his rivals, his longrun interest in raising price quickly, and his rivals' likely identical view. However, this position may underestimate firms' divergence of interests during the transition period. This issue is taken up in more detail below in the discussion of the maintenance of the joint profit point. For a law review answer to Turner's arguments, see the interesting article by the lawyer-economist Richard Posner (1969).

its profits from -10 to 70. Assuming that there is a sufficient time lag between Ethyl's price cut and DuPont's response, a price cut by Ethyl is profitable. This destabilizes the cooperative outcome. DuPont's incentive to cut price and Ethyl's incentive to match are symmetric, of course. In short, in the repeated game, unless detection lags are sufficiently short, each oligopolist has an incentive to cheat. Thus, the cooperative outcome may not be a credible dynamic equilibrium to the repeated game.

It is well known that the incentive of one firm--say Ethyl--to deviate from the cooperative solution depends on its relative profits in the four states (P_H, P_H), (P_L, P_H), (P_L, P_L), and (P_H, P_L) and the relative time intervals spent in each state. The time intervals are themselves endogenously determined by the likelihood and speed of detection of price changes and response by one's rival and the dynamics by which the joint profit point might be reachieved if and when cooperation breaks down. Formally, denoting the profits to Ethyl at the price pair (P_i, P_j), as V_{ij}, and assuming that the joint profit outcome can <u>never</u> be reachieved once it is lost, Ethyl will deviate from P_H if

$$V_{HH} < bV_{LH} + (1-b)V_{LL} \tag{1}$$

where the weight b is endogenous and depends upon all the relative time intervals and Ethyl's time and risk discount rates. The expected relative time intervals depend in turn on Ethyl's expectations about DuPont's behavior and, hence on DuPont's own incentives.[5]

Most formal analyses of tacit coordination have focused on the issue of detecting deviations from the cooperative strategy. Stigler's (1962) model is the classic work, followed by Orr and MacAvoy (1965) on the profitability of cheating given exogenous detection lags. Osborne (1976) analyzes a set of oligopoly decision rules that induce stability. More recently, Green and Porter (1981) have erected a stochastic demand model in which both false positive and false negative signals of cheating can occur, and in which the length of price wars (i.e., the time interval spent at (P_L, P_L)) is endogenously determined.

In most formal models, a retaliatory response occurs immediately, once deviations away from the joint profit point are detected.6 Indeed, this incentive to retaliate has been explicitly built into the Table 1 payoff matrix. On the other hand, if the strategy space is expanded to include selective discounts and other limited cheating tactics, retaliation may not be inevitable even after discounts that are detected.7 First,

---

5 Richard Posner (1969) has pointed out that the easier it is to achieve (and reachieve) the cooperative outcome, the greater is the incentive to deviate from that outcome to obtain higher short run profits. That is, 1-b might be small because (P_H, P_H) can be quickly reattained. Thus, ease of achieving cooperation raises the incentive to cheat. Green and Porter (1981) and Porter (1979) explore this issue by analyzing a cartel's determination of the optimal punishment period.

6 In the Green and Porter (1981) model, this issue is more complicated because cheating is not determined with certainty.

7 See Gelman and Salop (1982) for a dominant firm-competitive fringe duopoly model that has this property.

Ethyl's discount may be offered to a marginal DuPont customer, that is, one whom DuPont had been charging a price approximately equal to marginal cost (including service costs). Even more germane for our purposes is the fact that some contractual provisions can make retaliation more costly. As discussed in detail in the following sections, meeting competition and most favored nation clauses in sales contracts can affect both the incentives to discount and the incentives to retaliate against discounts that are detected.

Before turning to an analysis of these contractual provisions, we first examine cases in which tacit coordination is successful.

B. PURE TACIT COORDINATION

Despite all the difficulties, successful tacit coordination is not impossible. Payoffs may have a structure that permits the cooperative outcome to be a credible (or even a simple Nash) equilibrium. This can occur in two ways. First, as discussed in the context of the Table 1 payoff structure, if the detection lag and discount rate are low enough and V_{HL} and V_{LH} are sufficiently small relative to V_{LL} and V_{HH}, then the cooperative point (P_H, P_H) may be a credible dynamic equilibrium.

Alternatively, if V_{LH} is less than V_{HH}, then we can also have (P_H, P_H) as a simple Nash equilibrium. This is illustrated in Table 2 below, where Ethyl and DuPont's respective off-diagonal payoffs are reduced from 140 to 90.

TABLE 2: PURE TACIT COORDINATION

		DuPont			
		P_H	P_L	P_H	P_L
Ethyl	P_H	100	-10	100	90
	P_L	90	70	-10	70

Ethyl's Payoffs DuPont's Payoffs

Given this payoff structure, the cooperative outcome (P_H, P_H) can be achieved as well as maintained, if firms are sophisticated strategists. Beginning at (P_L, P_L), if Ethyl raises its price to P_H, its profits fall to -10. However, unlike the standard Prisoner's Dilemma, DuPont now has an incentive to raise its price immediately in order to increase its profits from 90 to 100. Knowing this, it is in Ethyl's interest to openly raise its price. Thus, the competitive equilibrium outcome (P_L, P_L) can be avoided; it is not a credible equilibrium. Of course the competitive point (P_L, P_L) remains a simple Nash equilibrium

The analysis of maintaining the cooperative outcome is analogous. In contrast to the standard Prisoners' Dilemma, if Ethyl lowers its price to P_L, its profits fall from 100 to 90; its incentive to discount is therefore eliminated. Not even an unsophisticated Ethyl will lower its price. DuPont's incentives are identical. Thus, in Table 2, (P_H, P_H) is a simple Nash equilibrium as well as a credible equilibrium. It can be both achieved and maintained if DuPont and Ethyl are sufficiently

sophisticated.

III. PRACTICES THAT FACILITATE OLIGOPOLISTIC COORDINATION

Unfortunately for potential colluders, payoff matrices do not always satisfy the pure tacit coordination structure of Table 2. Nor are detection lags always short enough to make a credible equilibrium out of the repeated version of the Prisoners' Dilemma game in Table 1. Therefore, as an alternative, the oligopolists must consciously or fortuitously discover and implement some means of restructuring their payoffs to facilitate achievement and maintenance of the cooperative outcome. We refer to these as facilitating practices.[8]

There are two distinct effects of facilitating practices--information exchange and incentive management. Although particular practices often combine elements of both roles, it is useful to distinguish between them. Because the information exchange effect is better understood, we will discuss it only briefly and focus instead on incentive management.

Information exchange facilitates both explicit and tacit coordination by eliminating uncertainty about rivals' actions. Classic examples of information exchanges are inter-seller verification of price quotations and advance notice of price changes. In each case, the exchange of information shortens or

---

8 For the purposes of analyzing the economic effects of these practices on strategic interaction, it makes no difference whether or not the oligopolists adopt the practices in the belief that they will stabilize the cooperative outcome. Of course, the intent may be an issue in a legal challenge to a practice.

eliminates detection lags and, therefore, the time interval spent in off-diagonal price-pair states. By decreasing the transitional losses from price rises and the transitional gains from price discounts, incentives are altered in such a way as to make the joint profit outcome easier to achieve and maintain.9

The incentive management role of facilitating practices functions by directly altering the structure of the payoff matrix, rather than working through the medium of information exchange. By restructuring payoffs, the incentives for a firm to offer price discounts or raise prices may be directly affected.10 Similarly, a firm may change its incentives to match price changes initiated by its rivals, thereby affecting its rivals' incentives to initiate such price changes. In this way, adoption of facilitating practices can convert competitive oligopoly outcomes into simple Nash or credible equilibria at the cooperative point.

For example, consider the following static model. Let $V_i(p1, p2)$ denote the profit function for firm i (i = 1, 2), given the prices p1 and p2 respectively for the two firms.11 Profit-maximization by each firm implies a simple Nash equilibrium (p1, p2) satisfying the respective first-order

---

9 Reaching an agreement can also be facilitated by the exchange of information among rivals.

10 In terms of equation (1), information exchanges alter b whereas incentive management devices alter the payoffs V_{ij}.

11 Each of the prices can denote vectors of prices and/or other strategy variables, of course.

conditions, or

$$\frac{dV_i}{dp_i} = 0 \qquad i = 1,2 \tag{2}$$

If $V_i(p1, p2)$ is altered, say by the adoption of an incentive management device, the Nash equilibrium changes.

Perhaps the purest example of an incentive management device is a monetary penalty on price discounts. For example, beginning with the Table 1 payoff matrix and an equilibrium at (P_L, P_L), suppose that DuPont and Ethyl each contract with separate third parties. Suppose the contracts require a payment to the third party of a penalty equal to 50 if the firm charges any of its customers a price below P_H, and that price cut is not matched by the rival seller. These penalties transform the rivals' payoffs into the Table 2 payoff matrix. Since the Table 2 matrix has a credible (and simple Nash) equilibrium at (P_H, P_H), the penalty scheme successfully raises industry joint profits, relative to Table 1.

Incentive management devices can also be created by provisions of purchase contracts between an oligopolist and his customers. Embedding an incentive management device in a sales contract has a number of advantages. First, use of a contract (with a purchaser or a third party) allows the oligopolist to make a binding commitment to transform its payoff matrix. If necessary, a public court will enforce the contract. Thus, the credibility of the promised behavior is increased.12 Moreover,

---

12 This point is also made by Posner (1979) at page 1198.

the ability to collect damages gives the buyer an incentive to ensure performance of the contract and to bear the costs of enforcing the contract. If the buyer is better situated than rivals or third parties to detect price discounts, this can increase the efficiency of enforcement. Of course, more efficient enforcement increases the credibility of a promise.

The obvious question is why rational buyers would be willing to act as accomplices in achieving this possibly anticompetitive conduct. To the extent that the contractual provision makes discounting less desirable or price increases less risky, it is difficult to see why buyers would agree to clauses that have such an effect.[13] The answer lies in the possibility of designing contractual provisions that are valued by each buyer individually even as they create an external cost to all other buyers. If such clauses can be developed, though each buyer willingly accepts (or even purchases) the clause, the collective acceptance of the clause by all buyers eliminates the individual benefit by stabilizing the sellers' joint profit outcome. A court might characterize this impact as a "free rider effect in reverse."

We now turn to a number of examples of practices that can transform incentives in this way. It should be noted that these practices sometimes have procompetitive and efficiency benefits as well as potential anticompetitive effects. For now, we focus

---

13 Of course, a buyer would clearly be willing to accept the clause for a compensatory payment in excess of his loss $P_H - P_L$, per unit purchased. However, compensation at this high level eliminates any benefit to the oligopolist.

on the latter and discuss some of the efficiency benefits in the last section. This choice of emphasis does not reflect a belief that the anticompetitive effects are always larger or more important, or that courts should take a per se approach to these practices. Rather, because the subject of this paper is strategic interaction and oligopoly equilibrium, a careful balancing of benefits against likely anticompetitive impact is necessarily beyond the scope of the analysis.

IV. MOST-FAVORED-NATION CLAUSES

A most-favored-nation (MFN) clause in a sales contract provides the buyer with insurance protection against the contingency that the seller offers a lower price to another customer. These clauses may prevent price discrimination when the seller offers a discount price to another buyer, either in the future (a "retroactive" MFN) or in the present (a "contemporaneous" MFN). Although all MFN's change the seller's incentives in the same general way, it is clearer to illustrate some issues with the case of a retroactive MFN and others with a contemporaneous MFN.

A. RETROACTIVE MFN

Consider an industry--for example, large scale steam-turbine generators[14]--in which public utility customers contract for the purchase of custom manufactured generators. Because delivery

---

14 The Justice Department alleged that GE and Westinghouse had MFN clauses that facilitated tacit coordination. See the General Electric Competitive Impact Statement (1977) and Hay (1979).

occurs many months after the contract is made, increased competition, reduced demand, or reduced costs during the intervening time period may reduce the average price paid by later buyers for comparable generators. By placing the following MFN clause in the sales agreement, early buyers may share that price decrease:

> If at any time before [buyer] takes delivery of said generator. [seller] offers a lower price for a comparable size and quality generator to any other purchaser, [seller] will also offer that lower price to [buyer].

That is, any future price decreases must be rebated to the buyer.[15] This rebate mechanism effectively creates a penalty system similar to the one discussed in Section III and illustrated in Table 2 above. The MFN requires the seller to pay a monetary penalty if he lowers his price.[16] Because price decreases are penalized, they are discouraged. Thus, if all rivals provide all buyers with MFN protection, the cooperative outcome (P_H, P_H) can be stabilized, once it is achieved.[17]

---

15 Variants of this contract could provide for a rebate of price cuts made even after delivery is taken, or for a partial rather than a full rebate. The contract might also ease enforcement of the clause by providing the buyer with the right to inspect the seller's books.

16 The total penalty equals the price decrease times the number of outstanding orders. It is paid even if the discount is matched.

17 Of course, the MFN makes it more difficult to achieve a lower price cooperative outcome, if changed conditions warrant a lower price. This is a cost to the oligopolists of adopting such a plan. In contrast, the Table 2 penalty scheme does not share this problem because only unmatched price cuts are penalized.

Cooper (1981) has shown that provision of an MFN by even just one rival may be advantageous to all sellers, including the one that institutes the MFN. This is a strong result, because a seller's unilateral adoption of an MFN also places it at a competitve disadvantage--it is deterred from matching selective discounts offered by its rivals. However, as demonstrated by Cooper, this competitive disadvantage may be more than offset by the effect of the clause in stabilizing a higher price.

This outcome is illustrated in the Table 3 payoff matrix below. Beginning from Table 1, this matrix adds the possibility of charging a third price p_M, where $p_L < p_M < p_H$. Relative to Table 1, it also assumes that one rival, Ethyl, offers an MFN which requires it to pay a penalty of 50 for any price decreases below an initial price, whether matched by Dupont or not. Since the penalty is paid only for price decreases, the matrix is constructed contingent on a particular initial price pair. In Table 3, the assumed initial point is the asymmetric price pair (p_H, p_M).

We may illustrate the possibility of a credible equilibrium at the asymmetric price pair (p_H, p_M) as follows. DuPont has no incentive to raise its price to p_H. The penalty provision of the MFN eliminates Ethyl's incentive to lower its price to p_M or p_L. Assuming detection and retaliation can be carried out swiftly, DuPont has no incentive to lower its price to p_L; for if it does Ethyl will quickly respond by lowering its price to p_M. In contrast, absent the MFN, (p_L, p_L) might be the equilibrium, because the short term gains from cutting price are relatively

TABLE 3: RETROACTIVE MFN

		DuPont					
		P_H	P_M	P_L	P_H	P_M	P_L
	P_H	100	80	-10	100	130	140
Ethyl	P_M	80	40	30	80	90	125
	P_L	90	75	20	-10	80	70
		Ethyl's Payoffs			DuPont's Payoffs		

larger if the MFN is eliminated.18 If the equilibrium is altered in this way, Ethyl's profits rise from 70 (without the MFN) to 80 (with the MFN), in spite of its induced competitive disadvantage. DuPont's profits rise from 70 to 130. These results illustrate Cooper's proof of existence.

B. CONTEMPORANEOUS MFN

Most-favored-nation clauses are also found in longterm requirements contracts governing the sale of repeatedly purchased

---

18 This can be seen as follows. Given the MFN, if DuPont lowers its price from p_M to p_L, it will obtain a shortrun gain of 10 (i.e., 140-130) and suffer a longrun loss of 5 (i.e., 130-125) when Ethyl retaliates by cutting its price to P_M. In contrast, absent the MFN, beginning at (P_H, P_H), DuPont gains 30 (i.e., 130-100) from a cut to p_M and loses 10 (100-90) from a matching cut by Ethyl. In this case, DuPont's shortrun gain rises by more than its longrun loss rises. Similarly, beginning at (P_M, P_M), a DuPont cut from P_M to p_L gives a shortrun gain of 35 (i.e., 125-90) and a longrun loss of 20 (i.e., 90-70) when Ethyl matches. Again, the gain rises by more than the loss. See Cooper (1981) for a more general model.

industrial supplies. These clauses insure buyers against contemporaneous price discrimination in favor of other buyers.[19] Consider the following standard form:

> If [seller] should, during the term of this contract, offer or sell goods of equal quality and quantity to any other buyer at a price lower than that provided for herein, [buyer] shall receive the benefit of such lower price on all shipments made hereunder for which such lower price is effective.

This clause differs somewhat from the retroactive MFN. Whereas the retroactive MFN penalizes all price decreases made at some date, this contemporaneous MFN penalizes and deters only selective discounts, that is, price cuts that are restricted to a limited number of customers.[20] General price cuts are not penalized or deterred. Thus, selective discounts are made relatively less profitable than general price cuts. In that oligopoly competition takes the form of selective discounts, the MFN may serve to stabilize the cooperative outcome.

Since general price cuts are not penalized by a contemporaneous MFN, adjustments to a lower price cooperative outcome are not deterred if they become necessary.[21] Similarly, the ability to retaliate with a general price reduction against rivals' secret discounts is not constrained. Only selective

---

19 These other buyers may be downstream competitors as well.

20 It should be noted that buyers who are well informed about the prices paid by other buyers may induce a de facto, if not explicit, MFN policy. See the discussion of posted prices in Section IV(C) below.

21 If costs fall, for example, then the joint profit-maximizing price may decline.

discounts are penalized.

Gelman and Salop (1982) construct a formal model in which an oligopolist does not respond to the selective discounts initiated by his rival. Assuming that the existence of secret discounts is detected, but the identity of the customers offered the discounts is not, then selective matching of secret discounts is clearly impossible. At the same time, retaliation with a general, matching price cut may not be in the oligopolist's self-interest if the selective discounts were not offered widely.22

Following this analysis, a contemporaneous MFN constrains the oligopolist's response in the same way as would its inability to identify the customers offered discounts. For example, suppose that DuPont offers a selective discount to a limited number of Ethyl's customers. Suppose Ethyl can identify these customers. However, due to the MFN, suppose Ethyl can only feasibly respond with a general price cut to all its customers. In this case, it will compare the profit reduction from this customer loss to the alternative of offering a general price cut to all its customers, including those not approached by DuPont. The deeper is DuPont's discount and the fewer customers that are approached by DuPont, the relatively more costly is a matching response by Ethyl. Hence, the more likely it is that Ethyl will accommodate the discounts rather than respond with a general price cut. In short, if DuPont restricts its secret discounting,

---

22 In addition, as discussed earlier, it may be unprofitable to match discounts to marginal customers. The following analysis applies to this case as well.

it is more profitable for Ethyl to accommodate rather than touch off a price war.

At the same time, the contemporaneous MFN also prevents Ethyl from offering its own selective discounts to DuPont's customers. Thus, if Ethyl has an MFN and DuPont does not, a credible equlibrium may exist at the point where Ethyl offers the high price P_H to all its customers, and DuPont offers the price P_H to most customers and a discount price P_L to the rest. If both rivals offer an MFN, elimination of all selective discounting may stabilize the cooperative outcome (P_H, P_H).

An example of this analysis is provided in Table 4. Denoting a selective discount strategy as P_H/P_L, Table 4 is constructed by expanding the strategy space of Table 1 to include the possibility of a selective discount strategy P_H/P_L for either rival. Of course, an MFN will prevent a firm from offering selective discounts.

TABLE 4: CONTEMPORANEOUS MFN

		DuPont					
		P_H	P_H/P_L	P_L	P_H	P_H/P_L	P_L
	P_H	100	80	-10	100	130	140
Ethyl	P_H/P_L	130	85	20	80	85	60
	P_L	140	60	70	-10	20	70
		Ethyl's Payoffs			DuPont's Payoffs		

Three cases must be considered: (i) No MFN, (ii) MFN by one

rival only (e.g. Ethyl), and (iii) MFN by both rivals.

No MFN: If neither rival is constrained by an MFN, the cooperative solution (p_H, p_H) is a credible equilibrium only for sufficiently rapid detection rates, as discussed earlier. Because selective discounts are more difficult to detect than general price cuts, (p_H, p_H) may only be immune to general cuts--not to selective discounts. In this case it is usually argued that the selective discounting price pair (p_H/p_L, p_H/p_L) is more likely to be the credible equilibrium than (p_H, p_H).[23] Assume that is the case here.

MFN by Ethyl Only: If Ethyl unilaterally institutes a contemporaneous MFN, it effectively commits itself to eliminate the strategy p_H/p_L. In this case, as discussed earlier and illustrated in Table 4, it is not profitable for Ethyl to match DuPont's selective discounts with a general price cut to p_L.[24] Assuming that general discounts are deterred by rapid detection and retaliation, the outcome (p_H, p_H/p_L) is the credible equilibrium.[25]

MFN by Both Rivals: If both rivals institute an MFN, only general discounts are feasible. As discussed above, if rivals

---

23 See Gelman and Salop (1982) for a technical analysis of this point.

24 If DuPont offers selective discounts, Ethyl's profits fall to 80. However, if it retaliates with a general price cut to p_L, its profits fall further to 60.

25 Of course, in a model with a continuous strategy space, the level of the high and low prices may also change, relative to the case of no MFN.

always match detected general price cuts but do not match detected selective discounts, then, if detection is sufficiently rapid, neither rival will deviate from p_H. Thus, the cooperative outcome (p_H, p_H) may become a credible equilibrium.

This demonstrates how the adoption of an MFN can improve the likelihood of the cooperative outcome being a credible equilibrium. Mutual or unilateral adoption of most favored nation clauses can be in the self-interest of the oligopolists.[26]

In spite of this anticompetitive effect, buyers may be willing to "purchase" the "protection" of an MFN for two reasons. First, insurance protection against price reductions may have value to risk-averse buyers. The MFN provides this insurance.[27] Of course, broad MFN protection reduces the probability that a lower price will ever materialize because it induces an adverse incentive (a "moral hazard") in sellers who provide it. However, for any individual buyer, this effect may be small relative to the insurance benefit. Instead, the adverse incentive is mainly an "external" effect that injures other buyers. The profit-maximizing purchaser does not reckon this external effect into his calculus. Thus, the more buyers there are in the market, the

---

26 As discussed for the case of a retroactive MFN, unilateral adoption of a contemporaneous MFN may be in each rival's self-interest even if the clause is not also adopted by rivals. This benefit to a firm from unilateral adoption of an MFN is independent of any increased efficiency or buyer preference for the MFN. Instead, it derives from its effect of stabilizing a more cooperative outcome.

27 Other than increased oligopolistic competition, prices could also fall if costs or aggregate demand decrease, if barriers to entry are reduced, etc.

more likely will the price stabilizing effect be ignored by buyers.[28]

In addition, a buyer who does add this potential injury to other buyers into his profit calculus may count that injury as a benefit, not as a cost. If rival buyers are also his downstream product market competitors, then his profitability is enhanced when his rivals' costs rise.[29] Looking at the problem in this way, a buyer may be willing to pay more for an MFN, because the MFN acts as a type of bribe to the seller to forego deeper discounts to rival buyers.

C. POSTED PRICES, RELATIVE VALUE SCALES, AND PRODUCT STANDARDS

Provision of a most-favored-nation clause would appear to require a long-term supply contract. However, this is unnecessary. In fact, a number of common pricing conventions have effects similar or even equivalent to an MFN.

Whenever a seller deals in a market in which all transactions are consummated at an identical (posted) price, the analysis of the MFN is applicable. Indeed, transacting only at a single list price is the essence of an MFN.[30] The only

---

28 The possibility that the buyers' cost-minimizing outcome of "no MFN" will be achieved for a market characterized by an oligopsony among buyers depends on an analysis analogous to the one carried out here for oligopolistic sellers.

29 Indeed, if the downstream industry demand is sufficiently inelastic and barriers to entry sufficiently high, then the buyer's (and his rivals') profits will increase from MFN-induced, industrywide increases in input prices. See Nelson (1957), Salop and Scheffman (1981), and Maloney and McCormick (1981) for models of this phenomenon.

difference is that an MFN is a binding contractual clause, whereas price posting (with no discounts permitted) is generally adopted unilaterally and voluntarily.31 One way a firm might effectuate a binding committment without a contract is to rapidly make all of its transactions prices public. Then those buyers who discover they have paid more than some other buyers may have a powerful tool for negotiating a matching discount.

A similar analysis can be applied to relative value scales and other multiproduct pricing formulae. A relative value scale is a pricing system in which there is a fixed relationship among the prices of a number of products, thereby restricting price movements to proportional changes in all prices. For example, an auto repair shop might set an hourly rate and apply a standard job completion time from a private or trade association publication (a "flat rate manual").32 In this case, the job completion times in the flat rate manual define the relative value scale. Insurers like Blue Cross sometimes utilize relative value scales for setting reimbursement levels for medical services.33 Hay (1979) notes the similar effect of the "price

---

30 Analysis of "secondary" line violations of the Robinson-Patman is analogous.

31 Of course, the efficiency benefits of posted prices may also differ from those of a standard MFN.

32 Of course, the auto repair industry probably has insufficient entry barriers to use a relative value scale to effectively raise prices for very long.

33 See Kass and Pautler (1979), Eisenberg (1980), and Arizona v. Maricopa County Medical Society (1982).

simplification" scheme used by GE and Westinghouse.

Product standardization can also be analogized to an MFN. By setting the product attributes that define the standard, product standardization eliminates some non-price competition--no seller can offer more or less of the standardized product attributes. As a result, all competition must be in the price dimension. Given the large efficiency benefits of product standardization, however, it is likely that the efficiency benefits generally swamp any anticompetitive effects. However, National Macaroni suggests a possible anticompetitive use of product standardization. This case concerned standardization of a grain mix. Following a shortfall in the harvest of Durum wheat (semolina), the defendent grain purchasers agreed to fix the ratio of semolina and farina in macaroni. By preventing competition for the scarce supplies of the more expensive and preferred semolina variety, total expenses could have been reduced at the expense of wheat farmers.34

V. MEETING COMPETITION CLAUSES

A meeting competition clause (MCC) in a long term supply contract or advertisement provides the buyer with insurance protection against a lost opportunity in the contingency that the buyer is offered a lower price by some other seller.35 The level

---

34 The Court did not carefully compare efficiency benefits to the postulated anticompetitive effects.

35 Although our analysis focuses on the case of an MCC in a long term contract, much of this analysis applies directly to the case of binding "We will not be undersold"
(Footnote continued)

of protection offered by an MCC depends on the exact form the provision takes. One common variant is the meet or release (MOR) clause, as illustrated by the following example.[36]

> If the [buyer] should be offered by a responsible manufacturer anti-knock compound of equal quality and in a quantity equivalent to or less than that remaining as a commitment hereunder, at a lower delivered cost to the [buyer], and [buyer] gives [seller] satisfactory evidence thereof before the date on which any shipment is required, [seller] shall either supply such quantity of compound at the lower cost or permit [buyer] to purchase elsewhere. Any quantity so purchased shall be deducted from the quantity deliverable under this contract.

The meet or release clause serves mainly as an information exchange device. If the buyer discovers a lower price elsewhere, he cannot escape from his obligation to purchase from his original supplier without informing that supplier of the lower price.[37] By requiring this flow of information, the clause eliminates any detection lag. Thus, the seller is protected against the possibility of losing sales to a rival offering an undetected discount to a current customer. In this way, an MOR facilitates selective matching of otherwise secret discounts. Assuming that the seller wishes to match the discount, the

---

35 (continued)
advertising claims as well.

36 MOR clauses were offered by all of the Ethyl defendents but were not included in the Complaint. They have been litigated in other contexts, however. For example, see Peterman's (1978) analysis of the International Salt case.

37 Unless the supply contract includes an exclusive dealing provision, the buyer can purchase extra supplies at the lower price without informing his originial supplier.

rival's strategy is countered. As a result, the joint profit outcome is made relatively more credible.

A. No-Release MCC

It is unlikely that a seller would choose to meet rather than release in all cases. For example, if a rival offers a price below the seller's marginal cost, the seller has no direct incentive to match.[38] Likewise, the seller has no incentive to match a discount which he suspects the buyer will reject. For example, if the rival's product is of lower quality or otherwise unsuitable, the buyer might be suspected of using the lower bid simply as a bluff in order to obtain a better deal.[39]

In these cases, an MOR clause offers no protection to the buyer. The buyer prefers, ceteris paribus, a contractual provision that allows the seller no escape. This can be accomplished by deleting the release language from the provision. Of course, such a no-release MCC may lead to allocative inefficiencies.[40] However, if the seller's primary interest is in deterring rivals' discounts, the losses entailed by this

---

38 Of course, by requiring the seller to price below marginal cost, an MCC can increase the credibility of threats to predate. This is taken up in Section VI below.

39 By an analogous argument, it would not be sufficient to simply meet the price of a higher quality product. Instead, the seller would need a beating competition clause.

40 The clause may require the seller to provide units at prices below his marginal costs. Thus, the buyer may be consuming beyond the point where his marginal benefit equals the seller's marginal cost.

inefficiency may be small relative to the anticompetitive benefit of the clause. For, by deleting the release option, the clause is made a more credible deterrent. Now, the seller must meet all rivals' offers.

Formally, in the 2 x 2 example, the cooperative outcome is stabilized as follows. If both rivals provide no-release MCC's the off-diagonal price pairs (P_L, P_H) and (P_H, P_L) are made unattainable. Given the remaining choice between the two diagonal price pairs (P_H, P_H) and (P_L, P_L), neither oligopolist wishes to deviate from the joint profit outcome.

An MCC also facilitates successful achievement of the cooperative outcome. For example, a seller who provides a no-release MCC to current customers can raise price to P_H without losing any sales to a lower priced rival. Buyers are automatically given the rival's lower price until all firms raise their prices. This eliminates the transitional losses that might otherwise deter price rises. It also eliminates the rival's transitional gains and with it the incentive to delay a matching price increase. In this sense, when a duopoly seller who has an MCC raises his price to P_H, his rival is automatically transformed into a de facto price leader, with the ability to set prices for both firms.41

B. MCC Plus MFN

When a no-release MCC is provided jointly with an MFN,42

---

41 This price leadership is restricted to prices no greater than P_H, of course.

oligopoly coordination is further facilitated. As discussed in Section IV(B), unilateral provision of a contemporaneous MFN places the provider at a competitive disadvantage against rivals not burdened with the clause. This is because the MFN prevents him from selectively matching discounts that are detected. The joint provision of a no-release MCC with the MFN counters this disadvantage somewhat.

By requiring himself to match, the seller eliminates the source of his disadvantageous incentive to accommodate selective discounts. This incentive is disadvantageous because it raises the profitability and, hence, the likelihood that his rival will offer such selective discounts. Of course, if the rival is not deterred by the MCC, his discount must be matched with a general price cut, and the seller bears a larger loss.43 On the other hand, because of the credibility added by the clause, the need to actually carry out the threat may be reduced.

A complex variant of these contractual provisions is a marketwide MFN-MCC combination. The following example of such a combination clause is taken from a contract governing the sale of natural gas from a particular field. Unlike the previous contracts discussed, this particular clause offers MFN-MCC

---

42 The following analysis applies to industries with the effective MFN entailed by posted prices as well as to contracts that specify MFN protection explicitly.

43 For example, the rival may wish to cut price because of a cost decrease, in order to generate greater demand by current and new customers, rather than to divert customers from competitors.

"protection" to the (natural gas) seller rather than to the buyer.

> In the event [buyer] or any other gas purchaser shall pay for any gas delivered . . . under conditions comparable to those provided herein, a price higher than that provided here, to any seller, then the price of all gas delivered hereunder shall be increased to an equivalent price. [Buyer] shall have the right to require under the provisions of this paragraph reasonable proof of the delivery of gas to any other gas purchaser and the price thereof.[44]

Analysis of this clause is left as an exercise for the interested reader.

VI. PREDATION, ENTRY DETERRENCE, AND MEETING COMPETITION CLAUSES

The focus of the analysis so far has been oligopoly coordination. It has been assumed throughout that the industry is protected by insurmountable barriers to entry. In this section, we discuss the role of meeting competition clauses in facilitating entry deterrence.[45]

Recall the usual critique of the Bain/Sylos-Labini models of limit pricing as a rational entry deterrent. It is argued that it would be irrational for an incumbent dominant firm to deter entry by setting a low "limit" price before entry occurs. Instead, the incumbent could increase his profits by setting the

---

44 Adapted from Louisiana-Nevada Transit Co. v. Woods, 393 F. Supp. 177, 178-79 (W.D. Pa. 1975).

45 See Modigliani (1958), Salop (1979) and Dixit (1982) for surveys of this literature.

higher "monopoly" price before entry, and threatening to lower its price in the event that entry actually occurs. Given the threat, it is argued, no actual entry would occur, because the entrant would anticipate insufficient profits at the lower post-entry price. Hence, the incumbent could always get the benefit of charging the monopoly price even while deterring entry.[46]

This argument is usually countered in turn by the observation that the incumbent's threat to actually lower price after entry lacks credibility. Once entry actually occurs, it is generally in the incumbent's interest to accommodate the entrant by behaving cooperatively.[47] Knowing this, a rational entrant would not be deterred. A similar argument demonstrates the non-credibility of threats to carry out below-cost "predatory" pricing.

By providing a no-release MCC, an incumbent can add needed credibility to its threat. Even if the incumbent would otherwise prefer to accommodate a rational entrant, the MCC requires him to match the entrant's price.[48] Similarly, even if below-cost pricing is unprofitable, it must be carried out. Knowing that

---

46 By assuming that the incumbent can rapidly lower his price after entry, this argument obviously assumes that the incumbent is not paralyzed by regulation, unaware of entrants' existence, or otherwise catatonic.

47 Of course, this counterargument implicitly assumes that tacit coordination will be successful. This may not be obvious, as shown earlier.

48 An MCC merely requires matching price cuts to the incumbent's current customers. An MFN-MCC combination would extend the discount to all potential customers.

the threat will be carried out, a rational entrant will be deterred. Although the appropriate language of the MCC depends on the details of the industry,[49] the benefit of the MCC to the incumbent is clear. An MCC can deter entry by allowing the incumbent to make credible threats to lower his price in the event of entry, even to a below-cost, "predatory" level. As Richard Gilbert emphasized at the IEA symposium, the MCC makes Sylos' Postulate credible.

VII. CONCLUSIONS

In this paper, the role of buyer-seller contracts in facilitating credible oligopoly coordination has been explored. It has been shown that a number of common contractual provisions can restructure oligopolists' payoff matrices in such a way that the Nash equilibrium is altered. This may occur for either simple Nash or credible dynamic equilibria.

This brief survey is not a definitive treatment of the area. All the practices would benefit from additional rigorous analysis in standard oligopoly models. However, it seems clear that the main results can be generalized. When contractual provisions add constraints to oligopolists' profit-maximization calculus, the equilibrium changes.

---

49 For example, if, at equal prices, some consumers strictly prefer the entrant's product the incumbent can strengthen his threat by offering a beat or release or beating competition clause instead. A beating competition clause might offer an x% discount off competing bids. Of course, this could lead to "self-predation" if a more efficient entrant threatens entry.

Some experimental evidence on this point has recently been generated by Grether and Plott (1981).[50] These authors compare the pricing performance of an industry with MFN's, public price posting, and advance notice of price increases to the same experimental industry absent these practices. Their results confirm that all three practices in combination raise prices significantly.[51]

Although this survey has shown how these contractual provisions can raise prices in oligopolistic markets protected by entry barriers, it has clearly not attempted a welfare analysis of the practices. Such an analysis must balance the benefits received by buyers and sellers against any anticompetitive effects of the contractual provisions. Some of the possible benefits have already been discussed in the context of the analysis of specific practices. It is worth reviewing them here.

First, both MFN and MCC clauses provide buyers with insurance against certain contingencies. Risk-averse buyers desire insurance protection. There are significant limitations to the size of this benefit, however. First, a buyer may overestimate the value of this insurance if it ignores the price rigidity that may be induced by the clauses. Similarly, a buyer will likely ignore the externality it inflicts on other buyers,

---

50 For a survey of some earlier experimental work, see Plott (1981).

51 Given the limited number of experiments run, their preliminary study was unable to significantly measure the individual effects of each practice.

that is, the effect of its clause on the price paid by other buyers. As stated earlier, inserting an MFN into one buyer's contract is tantamount to bribing the seller to refuse to offer deeper discounts to other buyers.

Although buyers may benefit from insurance, it is not clear that the seller is always best situated to provide this insurance, as opposed to an independent insurance company or some other third party. First, the seller may be more risk-averse than either buyers or insurance companies. Second, a seller is not generally well situated to spread the risk of a decrease in its own selling price, relative to some other firm unaffected by the price change. On the other hand, the seller probably has an informational advantage in providing this insurance. Even if it did not provide insurance, it would require information about future prices in order to plan its business.[52]

A second possible benefit of the clauses is that they allow a buyer to purchase before completing his search process. Eliminating this delay can benefit both the buyer and the seller offering the clause. Third, the MCC allows the seller to price discriminate whereas the MFN prevents discrimination.[53] Thus, industry-wide adoption of either type of clause can benefit some

---

52 Of course, one aspect of the seller's informational advantage--the fact that it controls somewhat the probability of a price cut--is the very adverse incentive ("moral hazard") induced by the clauses, not an efficiency benefit.

53 See Salop (1977) and Weismeth (1982) for analyses of price discrimination on the basis of informational differences.

buyers and harm others.[54]

It should be clear that these benefits may apply better to some industry settings than to others. According to the characteristics of the product sold, the terms of the sales contract, the degree of industry concentration, the height of entry barriers, the structure of competition among buyers, et cetera, the relative sizes of the efficiency and coordination facilitation effects of particular clauses may tip the welfare balance in one direction or the other. More research is needed on this issue. For now, antitrust analysis of these clauses must clearly proceed on a case-by-case basis.

---

54 It should be added that the elimination of buyers' price competition for inputs entailed by adoption of an MFN may harm final consumers.

REFERENCES

Carlton, D., "A Reexamination of Basing Point Pricing," Journal of Law and Economics, forthcoming.

Cooper, T.E., "Price Protection Policies and Tacit Collusion," Unpublished Manuscript, University of Florida, 1981.

Dixit, A.K., "Recent Developments in Oligopoly Theory," American Economic Review 72 (1982), pp. 12-17.

Eisenberg, B.S., "Information Exchange Among Competitors: The Issue of Relative Value Scales For Physicians' Services," Journal of Law & Economics 23 (1980), pp. 441-460.

Gelman, J.R. and Salop, S.C., "Judo Economics, Entrant Advantages and the Great Airline Coupon Wars," Unpublished manuscript, Federal Trade Commission, 1982.

Green, E.J. and Porter, R.H., "Noncooperative Collusion Under Imperfect Price Information," Unpublished Manuscript, University of Minnesota, 1981.

Grether, D.M. and Plott, C.R. "The Effect of Market Practices in Oligopolistic Markets: An Experimental Examination of the Ethyl Case," Unpublished Manuscript, California Institute of Technology, 1981.

Hay, G.A., "The Oligopoly Problem: Theory and Policy," Unpublished Manuscript, Cornell University, 1979.

Kass, D.I. and Pautler, P.A., Physician Control of Blue Cross Plans, Federal Trade Commission, 1979.

Maloney, M. T. and McCormick, R. E., "A Positive Theory of Environmental Quality Regulation," Journal of Law & Economics (25) 1982, pp. 99-124.

Modigliani, F., "New Developments on the Oligopoly Front." Journal of Political Economy 66 (1958), pp. 215-32.

Nelson, R., "Increased Rents from Increased Costs: A Paradox of Value Theory," Journal of Political Economy, 65 (1957), pp. 387-393.

Orr, D. and MacAvoy, P., "Price Strategies to Promote Cartel Stability," Economica 44 (1965), pp. 185-197.

Osborne, D.K., "Cartel Problems," American Economic Review 66 (1976), pp. 835-44.

Peterman, J.L., "The International Salt Case," Journal of Law &

Economics 22 (1979), pp. 351-64.

Plott, C.R., "Theories of Industrial Organization as Explanations of Experimental Market Behavior," in S.C. Salop et al., Strategy, Predation, and Antitrust Analysis, Federal Trade Commission, 1981.

Porter, R. "Detection of Dynamic Cartel Enforcement," Unpublished Manuscript, Princeton University, 1979.

Posner, R.A., "Oligopoly and the Antitrust Laws: A Suggested Approach," Stanford Law Review 21 (1969), pp. 1562-1606.

Posner, R.A., "Information and Antitrust: Reflections on the Gypsum and Engineers Decisions," Georgetown Law Journal 67 (1979), pp. 1187-1203.

Salop, S.C., "The Noisy Monopolist: Imperfect Information, Price Dispersion and Price Discrimination", Review of Economic Studies 44 (1977), pp. 393-406.

Salop, S.C., "Strategic Entry Deterrence," American Economic Review 69 (1979), pp. 335-338.

Salop, S.C. and Scheffman, D.T., "Strategic Interaction in Multiple Markets," Unpublished paper, Federal Trade Commission, 1981.

Schelling, T.C., The Strategy of Conflict, Cambridge, 1960.

Scherer, F.M., Industrial Market Structure and Economic Performance (2d Edition) Chicago, 1980, pp. 160-64.

Stigler, G.J., "A Theory of Oligopoly," reprinted in Stigler, The Organization of Industry, Homewood, Illinois, 1968, pp. 39-66.

Turner, D.F., "The Definition of Agreement Under the Sherman Act: Conscious Parallelism and Refusals to Deal," Harvard Law Review 75 (1962), pp. 655-706.

Wiesmeth, H., "Price Discrimination Based on Imperfect Information: Necessary and Sufficient Conditions," Review of Economic Studies 49 (1982), pp. 391-402.

CASES CITED

Arizona v. Maricopa County Medical Society, No. 80-419, U.S. Sup. Ct., 6/18/82.

International Salt Co. v. United States, 332 U.S. 392 (1947).

In re Ethyl Corp., No. 9128 (FTC Initial Decision Aug. 5, 1981), appeal argued, (Feb. 2, 1982).

Louisiana-Nevada Transit Co. v. Woods, 393 F. Supp. 177, (W.D. Pa. 1975).

National Macaroni Mfrs. Ass'n v. FTC, 345 F.2d 421 (7th Cir. 1965).

United States v. General Electric Co., Competitive Impact Statement, 42 Fed. Reg. 17003 (March 30, 1977) (consent decree).