

FEDERAL TRADE COMMISSION

**STRATEGY, PREDATION,
AND
ANTITRUST ANALYSIS**

STEVEN C. SALOP, ED.

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AND
ANTITRUST ANALYSIS

edited by
Steven C. Salop

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A C K N O W L E D G M E N T S

This volume contains the proceedings of a conference held at the Federal Trade Commission. As with any bureaucratic endeavor, both the conference and the preparation of this volume were team efforts. The efforts of Cary Hoagland, Dianne Jones, Kenneth Leyba, Dorothy Tingen, Walter Wujcik, and Betsy Zichterman in the Bureau of Economics Word Processing Center are greatly appreciated. William Comanor, Jack Kirkwood, and Robert Lande provided continuing aid and support. Without Pat Cahill, the conference would not have functioned at all. Without Mark Fratrik, this volume would have remained an "ongoing project" forever.

--SCS--

T A B L E O F C O N T E N T S

	<u>Page</u>
Introduction--Steven C. Salop	1
 I. BACKGROUND AND OVERVIEW	 43
Competition, Entry, and Antitrust Policy	45
A. Michael Spence	
Comments	
William S. Comanor	89
W. J. Liebeler	95
Current Legal Standards of Predation	101
James D. Hurwitz	
William E. Kovacic	
Thomas A. Sheehan III	
Robert H. Lande	
A Confused Lawyer's Guide to the Predatory Pricing Literature	155
George A. Hay	
 II. APPLICATIONS TO ANTITRUST ANALYSIS	 203
✓ Patents, Sleeping Patents, and Entry Deterrence	205
Richard J. Gilbert	
Comments	
Richard Craswell	271
F. M. Scherer	287
Rejoinder	295
Richard J. Gilbert	

T A B L E O F C O N T E N T S

	<u>Page</u>
An Economic Definition of Predatory Product Innovation	301
Janusz A. Ordover Robert D. Willig	
Comments	
David T. Scheffman	397
Frank H. Easterbrook	415
III. NEW TOOLS FOR STRATEGIC ANALYSIS	447
Strategic Interaction: Some Lessons from Industry Histories for Theory and Antitrust Policy	449
Michael E. Porter	
Comments	
Robert D. Stoner	507
Lawrence A. Sullivan	511
Theories of Industrial Organization as Explanations of Experimental Market Behavior	523
Charles Plott	
Comments	
Vernon L. Smith	579
John B. Kirkwood	605
IV. ROUNDTABLE DISCUSSION	623
Participants	
George Hay	
Paul Joskow	
Alvin Klevorick	
Janusz Ordover	
Frank Easterbrook	
Josh Greenberg	
APPENDIX	709
Du Pont Decision	

STRATEGY, PREDATION, AND ANTITRUST ANALYSIS: AN INTRODUCTION

Steven C. Salop¹

The mainstream of industrial organization economics has begun to deal explicitly with dynamic interdependencies among oligopolistic sellers. Traditional analysis focused on oligopolistic interaction at a single moment of time among sellers who ignored the responses of rivals. Sellers are now more often viewed as sophisticated business strategists who take into account rivals' likely responses when evaluating alternative courses of action and who formulate tactics contingent on the dynamics of competitive forces in the marketplace. Economists' increased sophistication is reflected in their greater reliance on dynamic models developed by mathematical game theorists and the greater attention paid to the logical consistency of their analysis.

¹ Visiting Professor of Economics and Law, Georgetown University Law Center, and Associate Director of Special Projects at the FTC at the time of the conference. I would like to thank Richard Craswell, Frank Easterbrook, Mark Fratrik, Judith Gelman, David Scheffman, Robert Pitofsky, and Tom Sullivan for helpful comments and conversations. I have also benefited from reading Oliver Williamson's interesting papers, "Wage Rates as a Barrier to Entry: The Pennington Case," 82 Q. J. Econ. 85 (1968) and "Antitrust Enforcement: Where It's Been, Where It's Going," University of Pennsylvania discussion paper (May 1981), as well as James V. DeLong's "The Role, If Any, of Economics in Antitrust Enforcement," Southwestern Law Review (forthcoming).

This new "strategic" approach has important implications for antitrust because it is more sophisticated and complete. For example, in contrast to the old "structuralist" approach of Bain² and his followers, detailed modeling of oligopoly conduct changes the focus of antitrust rules. Under strategic analysis, the existence of barriers to entry is viewed as a necessary, but not sufficient, first step to finding competitive injury. Once this structural "first tier" is passed, "second tier" analysis of the competitive and welfare implications of the questioned conduct must be undertaken.³ On the other hand, the existence of pro-competitive "efficiencies" is not considered a sufficient defense⁴ but rather must be balanced against any competitive harms uncovered. Thus, this new approach is hostile to per se rules. At the same time, economists are beginning to understand the demands of the Rule of Reason--that it be "focused on the challenged restraint's impact on competitive conditions."⁵ Development of simple tests based on observable conduct is rising toward the top of many industrial economists' agendas.

² J. Bain, Industrial Organization (1959).

³ This division into two tiers is developed in P. Joskow and A. Klevorick, "A Framework for Analyzing Predatory Pricing Policy," 89 Yale L. J. 213 (1979).

⁴ Cf. R. Posner, "The Next Step in the Antitrust Treatment of Restricted Distribution: Per Se Legality," 48 U. Chi. L. Rev. 6 (1980).

⁵ National Society of Professional Engineers v. United States, 435 U.S. 688.

The new approach permits analysis of some issues that were too complex or too subtle to be handled with less sophisticated tools. As this volume illustrates, economists are now developing a framework to evaluate strategies involving firms which interact in multiple markets. Study of the "institutional" structure of the marketplace is also beginning, thus permitting a finer understanding of possible "plus" factors that might improve oligopolists' chances of successful consciously parallel conduct.

It is important that antitrust enforcement agencies keep abreast of the latest developments in economic analysis. Because of the likely importance of this new strategic analysis, the Bureaus of Economics and Competition jointly sponsored a staff seminar on these new developments. The conference was held on June 5 and 6, 1980. The primary purposes of the conference were (1) to report to staff attorneys and economists on the "strategic" approach, (2) to provide academic researchers with an opportunity to hear practicing litigators react to their work, and (3) to facilitate further research, both at academic institutions and at the FTC, into the theory and practical application of strategic antitrust analysis.

This volume contains the proceedings of that conference plus some added contributions included for completeness. The seven papers presented at the conference provide the background and theory underlying strategic antitrust analysis, applications of that analysis to some specific antitrust problems, and some new

tools to carry out the analysis, as well as discussion and commentary on the theoretical and practical implications of the approach. These papers were prepared by some of the leading researchers in their respective specialties. Commentary was provided by a diverse group of legal and economic researchers and practitioners.⁶

OVERVIEW

The volume is organized into four main sections: Background and Overview, Applications to Antitrust Analysis, New Tools for Strategic Analysis, and Roundtable Discussion. In the first section, the paper by A. Michael Spence places the concepts of entry deterrence and predation into the larger context of strategic marketplace competition. Earlier research by Spence on entry deterrence represents an important focal point for strategic analysis.⁷ In the paper presented at the conference, he provides a useful map of the field, including the relationship of research into predatory practices to experience curve analysis and international competition. He also emphasizes the limitations of antitrust in regulating strategic competition. The commentaries by William Comanor and Wesley Liebeler nicely complement Spence's analysis. To Comanor, Spence's analysis "lends credence" to the

⁶ Richard Craswell's commentary was prepared after the conference. The comments given at the conference by Bruce Owen and Robert Reich were not prepared for publication.

⁷ A. M. Spence, "Entry, Investment and Oligopolistic Pricing," 8 Bell J. Econ. 534 (1977).

much discussed and sometimes maligned Alcoa decision. To Liebeler, the analysis implies the market "is not doing badly on its own."

The paper by James Hurwitz, William Kovacic, Thomas Sheehan, and Robert Lande supplies some basic legal background by discussing the recent predation cases, the approaches of different courts to them and the standards of conduct that are beginning to be defined. George Hay provides a parallel review of the academic debate over predatory pricing. Hay also raises the provocative point that entry by less efficient rivals may be procompetitive. However, he does not propose a specific standard to incorporate this complication into the law.

The next section of the volume applies the general theories of strategic behavior to specific antitrust problems. Richard Gilbert analyzes preemptive patenting and other conduct centered on strategic patent accumulation. In addition, he surveys both the theoretical and the empirical literature to gauge the effect of preemptive patenting on economic efficiency and on monopoly power. Gilbert concludes that because identification of exclusionary patenting strategies is difficult, a conservative enforcement approach is appropriate. Commentary on Gilbert's paper is provided by Richard Craswell and F. M. Scherer. Craswell generalizes Gilbert's analysis to mergers with rivals and acquisitions of scarce resources such as mineral deposits. Craswell also discusses the conceptual relationship between preemption and

traditional predatory pricing theory. Scherer takes exception to Gilbert's application of the theoretical paradigm to more complex marketplace structures involving multiple, possibly complementary patents. Scherer also offers a brief defense of the FTC's Xerox settlement.

The paper by Janusz Ordover and Robert Willig begins by discussing a general standard for judging predation. To do so, they first provide an analysis of the relationship between irreversible investments and entry barriers. In a sense, their standard is an extension of Areeda and Turner's standard to more complex, strategic conduct. The authors go on to apply their analysis to some antitrust issues involving product innovation, including the production of components incompatible with a new entrant's equipment. They formulate a number of tests for ascertaining whether an innovation, or the R. & D. leading to an innovation, should be prohibited. Among their most provocative insights is the observation that it may be predatory to set high prices for products complementary to the entrant's brands. Commentary on this paper is provided by Frank Easterbrook and David Scheffman. Both discussants question the economic validity of Ordover and Willig's general standard because the authors neither base it on nor relate it to economic welfare and because it is too broad to satisfy the requirements of a focused rule of reason. The commentators also raise some issues regarding the application of the general standard to product innovation.

Section III supplies two tools new to the study of strategic interaction--industry histories and laboratory experiments. Michael Porter draws on both his economics and his business-school expertise in applying the industry-history approach to antitrust analysis. An industry history is a careful reconstruction of the dynamics of strategic interaction among established rivals and potential entrants. Porter discusses a variety of strategic concepts, including the product portfolio, the experience curve, and strategic heterogeneity.⁸ He illustrates the industry method with a brief case study of the disposable-diaper industry. The case study, as well as the general discussion, focuses on tacit collusion as well as entry deterrence. This unified treatment illustrates the common strategic foundation of these two areas. The commentaries by Robert Stoner and Lawrence Sullivan elaborate on Porter's implicit conduct standards and the general relationship of business strategy studies to antitrust economics.

The paper by Charles Plott surveys the use of laboratory experiments as a tool for analyzing strategic interaction in oligopoly markets. Analysis of experimental markets can sometimes demonstrate the ways in which industrial market structures and marketplace institutions influence strategic interaction and the

⁸ Two excellent complements to Porter's analysis are E. Morrison, "An Introduction to Four Business Strategy Models," and R. Craswell, "Antitrust Policy Issues Raised by Some Business Strategy Models," Policy Planning Issue Papers, Office of Policy Planning, Federal Trade Commission (1980).

prices resulting from that interaction. Two of Plott's most exciting results go to the heart of current antitrust controversies. First, in the absence of communication among sellers, auction-type bidding markets achieve highly competitive outcomes with as few as four sellers. Second, industrywide adoption of contractual provisions such as advance notification of price increases and buyer protection clauses can have the effect of increasing market prices. This is a provocative paper, since it suggests that use of experimental analysis could complement traditional investigations in some antitrust cases, especially those involving facilitating practices. Experimental market analysis might be used in litigation to raise presumptions and suggest quantitative comparisons, as well as to provide a formidable tool for economic research into the institutional structure and behavior of oligopoly markets. Vernon Smith's and John Kirkwood's comments assess a number of the implications of the experimental approach for antitrust enforcement and its potential for providing credible evidence in antitrust cases.

The fourth section of the volume contains the edited transcript of the roundtable discussion that closed the conference. Chaired by Robert Pitofsky, the roundtable included as participants Josh Greenberg, Paul Joskow, Alvin Klevorick, and Don Turner, as well as the previously mentioned Frank Easterbrook, George Hay, and Janusz Ordover. The roundtable format permitted a less technical discussion of some of the policy issues raised by

the conference papers and the predatory pricing debate conducted here and elsewhere.

Finally, the Commission's Du Pont decision has been included in the volume as an appendix. Although Du Pont was not decided before the conference, the complaint supplied a natural backdrop for a number of the authors and commentators. In addition, the economic sophistication with which it approaches the rule of reason represents a contribution to the debate.

THE ISSUES

To place the strategic approach and the papers included in this volume into sharper focus, it is useful to introduce in detail some of the issues raised at the conference. The remainder of this essay carries out that task. Not every point is covered here. Instead, the discussion focuses on a few main areas--the significance of uncertainty and information imperfections in strategic analysis, nonprice conduct over time, and predatory conduct in a multimarket setting. The latter analysis characterizes a wide class of cases as input market predation. These issues are taken up in turn.

Any modern discussion of predatory conduct must begin with Areeda and Turner's seminal article.⁹ Few scholarly works have had so much influence on such a diverse group of researchers and

⁹ P. Areeda and D. Turner, "Predatory Pricing and Related Practices Under Section 2 of the Sherman Act," 88 Harv. L. Rev. 697 (1975), hereafter referred to as Areeda and Turner.

practitioners in so short a time. More than any other article, it has led courts to begin taking an economic view of predation, either by actually adopting the rule or by using it as a starting point. Indeed, the progress the courts have made in the past 6 years in increasing their own economic sophistication has been dramatic.¹⁰ The Areeda and Turner article has also been a strong source of stimulation for economists, spawning a variety of commentary and further research. As Don Turner observed in the roundtable discussion, the article "brought the economists out of the woods."¹¹ Although all the economists contributing to the debate take some exception either to Areeda and Turner's static, nonstrategic mode of analysis or to the policy recommendations drawn from that analysis, all have benefited from the path they have provided.

Areeda and Turner rely on economic authorities that view "classical" predatory pricing with considerable skepticism. Economist commentators such as John McGee and Lester Telser, and subsequent legal commentators such as Robert Bork¹² have argued

¹⁰ For a recent example, see Judge Kaufman's decision in Northeastern Telephone Co. v. American Telephone and Telegraph, published in ATRR No. 1017 (June 4, 1981) at F 1.

¹¹ Roundtable, p. 632.

¹² McGee, "Predatory Price Cutting: The Standard Oil (N.J.) Case," 1 J. Law & Econ. 137 (1958); L. Telser, "Cutthroat Competition and the Long Purse," 9 J. Law & Econ. 259 (1966); R. Bork, The Antitrust Paradox (1980) at 149-79. For the most recent and most complete version of this argument, see F. Easterbrook, "Predatory Strategies and Counterstrategies," 48 U. Chi. L. Rev. 263 (1981).

that except perhaps in the unusual case in which an incumbent predator has superior access to financial resources (a "deeper pocket"), an incumbent cannot use below-cost pricing to permanently and profitably drive out of the industry an entrant who is equally efficient, sophisticated, and strong-willed. A sophisticated entrant realizes that the predator's losses from below-cost pricing must exceed its own, as long as the entrant's market share is smaller and the entrant is equally efficient in every way. By borrowing from an equally strong-willed and sophisticated banker, the entrant can finance its smaller losses until the predator finally accommodates its entry.¹³ Faced with the realization that the entrant is committed to full-scale entry and that such a commitment is less costly to the entrant than predation is to itself, a rational incumbent would indeed let up. Having lost considerable sums in its futile attempt to stem entry, the incumbent would regret ever having attempted to dislodge the entrant with below-cost prices. Once burned, it would not risk the exercise in the future, nor would any other incumbent who understood the power of an entrant's sophisticated resolve. By this

¹³ The entrant's losses, which depend on the quantity it sells, could be further reduced if the entrant decreases its production. The ability of the entrant to minimize its losses in this way depends on whether it can maintain an effective commitment to the industry even by producing little or no output, but not scrapping its sunk costs. As Ordover and Willig point out in their paper, rigorous analysis of this issue requires a distinction between an entrant with industry-specific capital and one without that capital. See Ordover-Willig, p. 305.

argument, under the assumed circumstances, pure price predation without more is self-detering in nature. Because it should thus be rare, this theory lends support to policy arguments favoring adoption of a conservative rule, one that errs in favor of the defendant rather than the plaintiff.

The commentary critical of the Areeda and Turner rule is voluminous.¹⁴ Fundamental criticisms have been levied against their single-market, static analysis of a phenomenon that can also be dynamic and involve multiple markets. Because most of these criticisms are thoroughly discussed by George Hay and others in this volume and throughout the literature,¹⁵ it is not necessary to recite the full litany here. Instead, this discussion centers on three particular issues that have received less attention.

First, the McGee-Telser-Bork theory is based on an assumption that both the plaintiff-entrant and other potential entrants are perfectly informed about their profit prospects and the degree of competition or tacit collusion that will occur after entry. In the absence of such perfect information, the logical consistency of their theory breaks down. As discussed below, in a world with uncertainty and imperfect information, price predation can become

¹⁴ For a recent list, see Joskow-Klevorick, note 3 supra. Many of the important articles are reported in 10 Journal of Reprints for Antitrust Law and Economics (1980).

¹⁵ O. E. Williamson, "Predatory Pricing: A Strategic and Welfare Analysis," 87 Yale L. J. 284 (1977) and R. Posner, Antitrust Law: An Economic Perspective (1976), at 184-96 are good examples.

a rational strategy even for an incumbent with no efficiency or financial advantages over the entrant. Thus, one cannot conclude that price predation must be rare, purely as a matter of logic.

Second, both the McGee-Telser-Bork theory discussed above and the specific cost-based rules of Areeda and Turner apply only to pure predatory pricing in the horizontal product markets in which the rivals compete. Predatory strategies that use nonprice instruments, such as advertising, capacity, refusals to deal, and innovation, are not analyzed independently in the article, but are merely appended to the analysis of price predation in the product market.¹⁶

Finally, many nonprice strategies bring other markets into the analysis. Many of these markets are or can be characterized as input markets. For example, R. & D. is an input into producing new products; advertising is an input into generating new customers. Predatory use of vertically directed practices, such as refusals to deal, discriminatory pricing of inputs, tie-ins, exclusive dealing, and other arrangements that might increase competitors' costs of dealer-provided inputs are additional examples. The applications of the Areeda-Turner (or any other) strict cost-based rule to such practices are not entirely clear. Instead, analysis suggests that nonprice methods in general, and

¹⁶ P. Areeda and D. Turner, Antitrust Law (1978), hereafter referred to as the Treatise. The Treatise does provide a somewhat independent analysis. However, the conclusions remain much the same. See, for example, the discussion at § 728-29.

input markets in particular, are often more cost-effective and more likely to succeed than is simple price predation.

Imperfect Information and Predatory Pricing in the Product Market¹⁷

Even absent any threat of below-cost pricing, new entrants generally face considerable uncertainty about their eventual success in the marketplace. Retailer and consumer acceptance of its product, its elasticity of demand, its cost of producing and distributing the product, the incumbent's costs and its likely response to entry, are all at least somewhat uncertain to the entrant. Therefore, the new entrant is often unsure whether it is "equally efficient" or not. This uncertainty translates into the risk of earning a subnormal return on sunk costs, due either to continuing subnormal profits (if the entrant survives) or one-time capital losses (in the event of exit). Entrants may diminish these risks by engaging in market research and by delaying large and irreversible resource commitments until better information is obtained through experience or testing. However, the entrant can never entirely eliminate this risk; some uncertainty always

¹⁷ Aspects of the theory in this section are analyzed in S. Salop, "Strategic Entry Deterrence," 69 Am. Econ. Rev. 335 (1979); R. Reynolds and R. Masson, "Predation: The Noisy Pricing Strategy," Economic Policy Office, U.S. Department of Justice (1980); P. Milgrom and J. Roberts, "Equilibrium Limit Pricing Doesn't Limit Entry," J. L. Kellogg Graduate School of Management, Northwestern University (1979); D. Kreps and R. Wilson, "On the Chain-Store Paradox and Predation: Reputation for Toughness," IMSSS Technical Report No. 317, Stanford University (1980); and S. Salop and C. Shapiro, "A Guide to Test Market Predation," unpublished manuscript (1980). For a critique, see Easterbrook, supra note 12, beginning at p. 286.

remains. In contrast, the McGee-Telser-Bork theory assumes that entrants face no uncertainty at all.

Taking these uncertainties into account changes the analysis dramatically. As the analysis below demonstrates, when entrants are imperfectly informed about their relative efficiency, the strong logical conclusion that predation threats are "incredible" does not hold. Instead, the analysis resurrects the logic of predatory pricing, and hence, the credibility of threats to predate. Thus, arguments favoring conservative legal tests for predatory pricing cannot rest on the issue of logical consistency alone.

This conclusion is reached by analyzing the following simple hypothetical in detail, using the logic of strategic analysis. Suppose that a new entrant, having read Bork, discounts completely the possibility of the incumbent irrationally attempting predatory pricing. On the other hand, suppose that the entrant faces some uncertainty about its relative efficiency. Under these circumstances, as a matter of logic, the entrant would quite rationally take the incumbent's response to its entry and its own resulting position as indicators of its relative efficiency or net advantage vis-a-vis the incumbent. For example, because lower-cost competitors generally charge lower prices, on average, then a low price would naturally lead the entrant to increase its expectation that the incumbent had low costs. Thus, according to the level of its own costs, the entrant might rationally infer from a low-price

response that it is at a cost disadvantage relative to the incumbent. Given this perceived disadvantage, the entrant might thereby choose to exit and forego expenditures on additional irreversible entry costs and the prospect of subnormal profits in the future.

Other examples are similar. For instance, the entrant generally faces demand-side uncertainty as well, for which it might use market share as a success indicator. If the incumbent steps up or simply alters its advertising and other promotional efforts while the entrant is testing, the entrant may take a low market share as a negative signal of its long-term prospects, rather than as an effect of the change in promotional expenditures.

Following this logic a step further, an incumbent who understands this implication of the entrant's incomplete information has an incentive to bluff by lowering his product price or otherwise reducing the entrant's self-image. Because entrants who believe the McGee-Telser-Bork theory fully discount this possibility, they can be successfully bluffed by strategically minded incumbents. Thus, the theory fails by internal contradiction. Predatory pricing is at least occasionally a rational strategy.

The logic of the strategic process cannot stop here, of course. In the cost case, for example, once the entrant realizes bluffs are rational, it will discount somewhat the information content of the low price. But it will not ignore the low price completely, for a nonpredatory, low-cost incumbent would also

charge a low price. Thus, as long as some entrants are unable to distinguish perfectly between bluffs and hard-nosed competition by more efficient incumbents, they can sometimes be bluffed into exiting or delaying full-scale entry until learning more. More generally, as long as an entrant believes the incumbent may have an advantage, attempting predation might be a successful strategy for an equally efficient incumbent. Nor does the incumbent necessarily perceive its strategy as one of bluff; it might merely compress this entire logical process down to a simple but correct belief that if it cuts its price, an entrant may choose to exit.

A crucial requirement for this type of successful predation is that the entrant be significantly uncertain about its eventual success.¹⁸ A confident entrant cannot be bluffed. It will not exit. Rather it will act like the "Bork" entrant and simply bear the short-run losses due to the "predatory" price either until the incumbent accommodates it or until it concludes that its assumptions were incorrect. In cases in which the entrant is certain enough of its low costs that a successful bluff is impossible, but where the incumbent erroneously believes the entrant can be forced

¹⁸ In this context, "significantly uncertain" means that the entrant perceives some significant possibility that its full-scale entry would yield a subnormal profit rate, even in the absence of the type of strategic pricing being discussed here.

out, consumers not only gain in the short run from the low, "predatory" price, but entry occurs anyway.¹⁹

Just as the entrant is unsure about the incumbent, the incumbent may be uncertain about the entrant. Because this uncertainty means that the incumbent expects some bluffs to fail, the incumbent must lower its expectations of its strategy accordingly. This risk also opens the possibility for an entrant to devise its own strategies of deception and bluff. However, there are two reasons why the incumbent's uncertainty and entrants' counter-strategies are not likely to eliminate the incumbent's net advantage.

First, the incumbent is likely to have a natural information advantage over the new entrant, simply from its longer experience in the industry or the product segment. With respect to relative costs of production and distribution, even if the incumbent knows no more about the entrant's costs than the entrant knows about the incumbent's, the incumbent likely faces less uncertainty about its own costs than does the entrant about its own costs, since one is actual and the other is potential. Similarly, the incumbent knows more about market demand characteristics, such as elasticities and

¹⁹ Although consumers clearly gain from the lower prices inherent in such failed predation, a complete welfare analysis will also take into account that future entrants' expectations of short-run losses (until the incumbent lets up) represent additional costs of entry that will lower, on average, the amount of entry into the industry. This resulting deterrence is a variant of the predatory "reputation" effect discussed by Posner, note 15 supra, and Hay, pp. 107-54 infra. It is clearly difficult to measure, however.

consumer preferences. By disrupting the entrant's test markets and thus delaying the rate at which the entrant learns, this information advantage may be maintained or even increased.²⁰ In addition, in that consumers learn product quality information through continued experience with a brand, the incumbent gains a second information advantage: the incumbent's brand is familiar, whereas the entrant's is unknown.²¹

Second, even ignoring information issues, the incumbent generally has a natural strategic advantage in making binding commitments. This is true even if the firms are otherwise equally situated with respect to product quality and costs. As discussed in all the papers, this strategic advantage arises (paradoxically) from the incumbent's having greater irreversible costs committed to the market. While it is logically possible that this advantage does not exist in particular circumstances²² and while

²⁰ Possible disruption techniques include confusingly similar advertising campaigns and/or fighting brands, well-timed couponing and other promotions, and similar techniques that add "noise" to the "read" of the test market. See H. Niles and M. Siegel, "Fighting it Out in Test Markets," Dun's Review (June 1979) at 69-71. These disruption techniques raise costs by delaying the learning process when the entrant is aware of the incumbent's efforts. If, in addition, the entrant is unaware of the disruption and is thus fooled by the results of its tests, it may underestimate the gains from entry or adopt a less efficient entry strategy.

²¹ Richard Schmalensee, "Product Differentiation Advantages of Pioneering Brands," Working Paper, Alfred P. Sloan School of Management (August 1980). See also Borden, for an application of these issues.

²² For example, even an experienced ice-cream vendor on the beach is unlikely to have a significant advantage over a new entrant.

sophisticated entrants can sometimes equalize or even reverse this advantage by their efforts,²³ the usual case is one of the incumbent's advantage.

Because the incumbent is already established in the industry, it has likely already sunk industry-specific, irreversible costs by the time an (equally efficient) entrant comes upon the scene. The incumbent's natural willingness to protect the returns accruing from this irreversible investment represents a "credible" threat. This can be expressed in a number of ways, depending on the particular institutional structure of the industry and the possible outcomes of entry competition. For example, in a case in which the incumbent and the entrant were to engage in a bidding competition for monopoly rights in the industry, the entrant would surely bid less than the incumbent, because it would have to bear these irreversible setup costs in order to become established.²⁴ Alternatively, as Gilbert demonstrates, in a case in which successful entry would lead to a duopoly of the entrant and the incumbent, an equally efficient entrant generally gains less from successful entry than the incumbent loses from that entry.²⁵ The

²³ See Easterbrook, note 12 supra.

²⁴ This assumes that the incumbent is unable to sell its industry-specific costs to the entrant at full value.

²⁵ The per period gain to the equally efficient entrant is its one-half share of the duopoly joint profits, while the per-period loss to the incumbent is the monopoly profit less its one-half share of the duopoly joint profits. Simple arithmetic shows the incumbent's loss is higher as long as monopoly profits exceed duopoly joint profits--that is, as long as tacit collusion is imperfect.

general hypothesis--that the protection of its monopoly position is worth more to the incumbent than eliminating that position is worth to an equally efficient entrant--is explored with respect to product preemption, R. & D., and patent preemption in Gilbert's paper and with respect to mergers in Craswell's comment on that paper.

In his paper, Spence emphasizes that the incumbent can sometimes magnify this strategic advantage. By virtue of its ability to precommit before the entrant can, the incumbent can purposefully adopt a position before entry (a precommitment) where its "self-interested reaction to a potential entrant is destructive to the entrant."²⁶ Knowing that the incumbent has an incentive to react in this way, the entrant may be deterred or driven out of the industry. As discussed in this volume by Gilbert and elsewhere by Richard Schmalensee,²⁷ marketing a new product first can give strategic benefits far exceeding the gain to consumers from having a desired product sooner. Indeed, as demonstrated by Spence's earlier work,²⁸ these precommitment strategies may be profitable even if they involve the incumbent's sacrificing some

²⁶ Spence, p. 53 infra.

²⁷ R. Schmalensee, note 21 supra. For empirical applications of the pioneering-brand hypothesis, see R. Bond and D. Lean, Sales, Promotion, and Product Differentiation in Two Prescription Drug Markets (Federal Trade Commission, 1977) and I. Whitten, Brand Performance in the Cigarette Industry and the Advantage of Early Entry, 1913-73 (Federal Trade Commission, 1979).

²⁸ Spence, note 7 supra; Williamson, note 15 supra.

efficiency. Of course, in that efficiency is sacrificed for an unprotected goal, social welfare is produced.

In principle at least, the incumbent can also exploit its precommitment advantage in the pricing area. It might commit itself to an "irrational" price in order to avoid the McGee-Telser-Bork dilemma. However, this sort of binding commitment is generally difficult, because price normally remains under the ongoing control of the firm. Instead, the commitment advantage probably occurs primarily through nonprice instruments such as product preemption, input contracts, R. & D., capacity, advertising, and other inputs into the competitive process.

Nonprice Predation and Cost-Based Rules

Product price is only one of a number of competitive instruments. Firms also compete for customers on the basis of nonprice attributes such as product design, pre- and post-sale services, and delivery speed. Contractual provisions, such as two-tier pricing systems, tie-ins, and exclusive dealing, may have important competitive implications in some cases;²⁹ yet their effects are more complex than those of simple price-setting. Still other economic variables which are neither purchased nor valued directly by consumers may have important strategic ramifications. For example, a firm's scale economies, capital intensity, R. & D. program, and control over inputs into its competitors' production

²⁹ In addition to their efficiency effects, of course.

processes may not directly affect consumer choice in the marketplace, but they will still generally affect the speed of entry, future prices, and product mix in the industry. Therefore, it should not be surprising if variables other than prices were sometimes used in predatory strategies. Indeed, most of the recent cases surveyed by the Hurwitz et al. paper concern allegations of some form of nonprice predation.

In their law-journal article, Areeda and Turner placed little emphasis on nonprice predation. Their analysis of the area is firmly based on the foundation of their work on predatory product pricing.³⁰ Nonprice variables are included in the analysis only through their effect on the incumbent's cost.³¹ As mentioned earlier, in their Treatise Areeda and Turner do not alter the flavor of their earlier proposals. Where they do deviate from the cost-based rule, it is generally to propose that conduct be permissible. Bork also analyzes nonprice predation, concluding for the most part that the most cost-effective methods are "predatory litigation" against the entrant, and other regulatory and judicial mischief.³²

³⁰ Areeda and Turner, p. 719 (predatory investment), pp. 728-30 (predatory spending), and pp. 730-32 (excessive product variation).

³¹ Areeda and Turner, p. 720. ("If the additional promotional costs raise the firm's average variable costs above its price, then the promotional spending is predatory.") See also note 16 supra.

³² Bork, supra note 12, at 155-60.

Of course, if analysis of pricing theories could be easily extended to nonprice strategies, additional independent study of nonprice strategies would be unnecessary. However, by virtually all economic indications, it appears that further analysis is needed. While a thorough analysis taking into account competitive benefits, judicial economy, and the possibility of judicial error might result in a final policy recommendation of a purely cost-based standard or even per se legality in some circumstances, that judgment cannot reasonably be made before the relevant analysis has been carried out.³³

The papers given at the conference focus mainly on the non-price area. Spence's paper discusses capacity preemption and technology positioning. Gilbert's analysis concerns strategic use of research and development efforts for patent preemption and accumulation while Ordover and Willig examine exclusionary techniques involving physical tie-ins and new product introductions. Porter surveys a variety of nonprice strategies, including advertising, "blocking" brands, and control over raw materials. Although his focus is on tacit coordination rather than predation, Plott discusses the role of marketplace institutions such as information flows and contractual restraints in affecting strategic interaction. The general conclusion of these papers is

³³ Indeed, Ordover and Willig demonstrate the favorable properties of a pure cost-based rule for one very special case in the product innovation area. Ordover and Willig, pp. 313-20 infra.

that in many cases, nonprice strategic interaction differs fundamentally from price interaction. Similarly, nonprice predation differs dramatically from simple pricing below cost. Thus, in these nonprice cases, exclusive reliance on cost-based rules may result in judicial error.

There are two major reasons why cost-based rules do not always work well. The first reason, already discussed, is that the incumbent often has a precommitment advantage over an equally efficient entrant. The possibilities for making binding precommitments to deter entry or induce exit are far greater with nonprice variables than with product price.

Input Market Predation³⁴

There is a second reason why cost-based standards do not directly apply to nonprice predatory strategies. Many forms of predation are directed away from the output market, although product market prices are ultimately affected.³⁵ Input markets can be a strategic arena when the rivals compete in the input market as well as the output market. For example, by gaining control over a natural resource or accumulating patents, an integrated

³⁴ This section draws heavily on research I am pursuing with D. Scheffman.

³⁵ This type of predation can occur in any number of situations in which the predator operates in multiple markets. Bork, supra note 12, at 156-59, develops a somewhat related theory in the context of a "deep pocket" predator disrupting an entrant's downstream distribution patterns, whereas this section focuses on the example of upstream input markets.

incumbent can sometimes deprive an entrant of access to the most efficient technologies, thereby requiring the entrant to use a more costly production process. Placing the entrant at such a cost disadvantage may induce it to exit from the (downstream) product market, may deter its entry into that market, or may simply cause it to reduce his market share. In either event, the horizontal market power of the incumbent may be effectively increased, permitting it to raise the price of the product to consumers. Thus, although the predatory strategy is "vertical" in method, it is "horizontal" in effect.

Other, possibly predatory conduct may be characterized in terms of its impact on entrants' input costs for producing the competing product. For example, consider the computer example studied by Ordover and Willig. If a dominant firm were to produce an inexpensive mainframe computer incompatible with an entrant's peripheral equipment, it could in effect raise the entrant's cost of producing desirable computer systems, if no good substitute mainframes were available to the entrant. In this case, the mainframe can be viewed as an input into the production of a system. Thus, the relevant horizontal market is computer systems, and the predatory conduct exploits the vertical relationship

between the competitors.³⁶ Other complementary products can also be viewed as inputs in this way. Similarly, Spence points out that advertising and other sales activities can be viewed as inputs into the process of producing revenue.³⁷

Predatory input market strategies differ fundamentally from classical price predation in the product market. First, in some cases, input market strategies that raise the entrant's costs are more cost-effective to the predator, in the sense that they entail relatively smaller short-run cost to the incumbent than to the entrant. As Bork points out, "rivals can be killed or disciplined if the predator is able to inflict disproportionately large costs on his victim."³⁸ In contrast, in the short run, price predation is more costly to the dominant firm than to the entrant, due to the former's larger market share. Second, whereas price predation in the product market has the immediate effect of raising consumer welfare as a result of the lower price, cost

³⁶ By viewing a complementary product as an input into a "downstream" product, it is not surprising that "upward repricing" would be predatory. Ordover and Willig, p. 291 *infra*. Similarly, by requiring the purchase of its own pair of complements instead of allowing the purchase of one component, the effective cost to purchasers of a system that includes the entrant's complementary component may be raised.

³⁷ Spence, p. 73 *infra*.

³⁸ Bork, *supra* note 12, at 148. Bork seems to have a "deep pocket" version of this multimarket analysis in mind.

increases generally raise the price of the product sold to consumers.³⁹ These price increases must then be balanced against any efficiencies the cost increases might entail. Third, as will be discussed below, the market-power, profit-sacrifice, and exit-inducing requirements are somewhat different for input market predation. Because cost increases and price decreases have such contrasting direct effects on both the relative positions of the firms and economic welfare, these differences cannot be captured by the simple extension of cost-based rules to cases of input market predation. The symmetric effect on the incumbent's price/cost margin is the only datum of interest in a strict cost-based standard. Put another way, cost-based rules cannot, by definition, distinguish between product price decreases and input cost increases.

As a result, it is difficult to see how a strict cost-based rule can completely summarize conduct such as strategic control over patents, natural resources and other scarce inputs, refusals to deal, and setting restrictive purchase terms (e.g., tie-ins) or discriminatory high prices for inputs used by (potential) entrants or established competitors. Yet under some circumstances, these strategies can have a predatory effect by raising the rivals'

³⁹ In the short run at least, price cuts raise economic efficiency as long as price exceeds short-run marginal cost. Of course, consumer welfare rises with price cuts regardless of their depth, the losses being incurred by the firm's stockholders.

costs, thereby squeezing their price/cost margins.⁴⁰ The incumbent's costs may or may not rise by as much. Indeed, these strategies may only be costly to the incumbent in that it foregoes the opportunity to obtain additional short-run profits from sales of these inputs to its competitors or other, noncompeting purchasers.

A variety of other strategies have direct effects on the entrant's input costs. For example, an industrywide union contract that promises higher wages raises disproportionately the costs of the more labor-intensive firms in the industry.⁴¹ Thus, where entrants or smaller rivals generally employ more labor-intensive production techniques than does the dominant firm, it might be in the latter's interest to conspire with the union to raise the industrywide wage. Because the dominant firm's costs would rise by less than its rivals' on a per unit basis, it would open up a cost advantage or increase an existing one.⁴² In either case, because an oligopolist's profits generally depend more heavily on its costs relative to its rivals' than on its absolute

⁴⁰ Only if the particular input is a variable factor of production will marginal cost increase. If the input is a fixed factor, the Areeda-Turner rule only comes into play in that average costs are used as a proxy for marginal costs. That is, the proxy gives a better prediction.

⁴¹ This example was originally analyzed by O. E. Williamson (1968), note 1 supra.

⁴² Of course, it might alternatively decrease its cost disadvantage.

level of costs, this cost advantage may translate into increased profits.⁴³ It should be noted that actual exit need not occur in this case for the strategy to be profitable; established rivals can also be disadvantaged.⁴⁴ However, disadvantaged potential entrants might also be deterred and marginal rivals be induced to exit.

In the areas of vertical mergers and vertical restraints as well, an integrated firm can sometimes profitably disadvantage its unintegrated downstream rivals. If it has market power in the common input market, the dominant firm can raise rivals' (or potential entrants') input costs by charging them a high price or withholding the scarce input altogether.⁴⁵ If rivals must pay a higher price for equivalent inputs, they will be placed at a cost disadvantage in the downstream output market, even though they may have an equally efficient underlying technology. If it attempts this strategy, the dominant firm suffers only to the extent that it sacrifices short-run profits. When the damage inflicted on

⁴³ For a case in which increased industry-average costs translates into higher industry profits, see the discussion in note 64 infra.

⁴⁴ This is taken up in more detail below, pp. 35-36.

⁴⁵ Of course, if the entrant can purchase a perfectly substitutable input at an identical price, the strategy would neither disadvantage the entrant nor benefit the dominant firm. But this is precisely because the dominant firm would have no market power in the input market under such circumstances. For an exposition of some aspects of market power measurement, see W. Landes and R. Posner, "Market Power in Antitrust Cases," 94 Harv. L. Rev. 937 (1981).

rivals exceeds the short-run damage inflicted on itself, the dominant firm gains a net advantage from the strategy.⁴⁶

Using somewhat different jargon, Ordover-Willig and Gilbert apply this type of strategic analysis--the former to the type of product innovation and physical tie-in issues arising in the telephone and computer cases and the latter to issues of patent preemption and patent accumulation.⁴⁷ Test market disruption can also be seen as a possible case of input market predation. By disrupting an entrant's test market, the incumbent may raise the entrant's cost of test marketing. In that testing is a necessary input into the efficient distribution and promotion of a new product, the dominant firm can place a cost disadvantage on its rival, if a successful disruption strategy is inexpensive relative to the damage it inflicts. Easterbrook provides the purest example of input market predation--dynamiting competitors' factories.⁴⁸

⁴⁶ The integrated firm would find this multimarket strategy unnecessary for extracting profits from its downstream competitors only in the limiting case in which (1) downstream producers use its product in fixed (not variable) proportions with other factors and (2) it enjoys a perfect monopoly upstream. Although he at least recognized the commonplace nature of the variable-proportions case, Bork treats this strategy as a rare one. See Bork, supra note 12, at 229-30. For a further discussion, see F. M. Scherer, Industrial Market Structure and Economic Performance, 2d ed. (1980), p. 302.

⁴⁷ For an illuminating discussion of blocking patents, see Scherer, supra note 46, at 451-52.

⁴⁸ Easterbrook reports this was alleged but not proved in Empire Gas. See Easterbrook, supra note 12, at 316, fn. 120.

Other applications of this sort of strategic analysis to cases in the areas of vertical mergers and acquisitions, Robinson-Patman Act,⁴⁹ and even vertical restraints are possible.⁵⁰ According to the particular case, the degree of complexity and subtlety of the most profitable strategy will vary. However, every case has the common element that the increased costs inflicted on the entrant translate into a benefit to the incumbent, against which the incumbent balances its direct costs borne or profits sacrificed from the strategy.⁵¹ In each case, the vertical relationship of the rivals affects their relative abilities to compete horizontally in an appropriate product market.

Because of the emphasis on the ultimate horizontal effects, this class of cases is consistent with the recent desirable trend towards a more liberal attitude towards purely vertical restraints, particularly in industries that are competitive at

49 On the other hand, as Plott's experiments show, a rule that prevents selective discounts, as with the Robinson-Patman Act or most-favored-nation clauses, can have the effect of raising prices in oligopolistic industries by introducing rigidity and aiding conscious parallelism.

50 For example, see Bork, supra note 12, at 156-59, for a somewhat different flavor to the analysis.

51 The reader will find Gilbert's numerical examples helpful in cutting through the complexities of the incumbent's benefit/cost calculation. Ordovery and Willig's stylized example of WINC and WAC is also illuminating. Gilbert, pp. 207-12 infra and Ordovery-Willig, pp. 299-301, pp. 334-39 infra.

both levels. In the analysis here, horizontal market power is necessary, at least at one level of competition.⁵²

The conclusion that dominant firms can sometimes disadvantage horizontal competitors by vertical or quasi-vertical strategies, even while staying well within the various cost-based standards, is not a novel one. F. M. Scherer's basic text outlines a number of vertical theories,⁵³ as do Areeda and Turner's Treatise⁵⁴ and Robert Bork's The Antitrust Paradox.⁵⁵ What is significant about the latest analysis is that a framework for devising quantitative, "second tier" tests to infer the existence of these predatory strategies is now becoming apparent. Moreover, as will be discussed below, additional strides have been made in extending the analysis. First, it will be argued that input market predation may be successful even if the incumbent's costs rise by as much as do the entrant's, given that large-scale entry

⁵² A notable exception to this would be the case of a perfectly competitive downstream firm petitioning the Government to create a regulation that disadvantages its actual and potential rivals. For a related point, see Bork, supra note 12, at 347-49. However, it is also significant that market power upstream (where the rivals do not compete with the predator) may be sufficient, even if the predatory downstream division had no static market power.

⁵³ Scherer, supra note 46, at 304-30 (vertical squeezes) and pp. 451-52 (patent accumulation).

⁵⁴ Areeda and Turner, note 16 supra. See, § 778, § 1008, § 1202.

⁵⁵ R. Bork, supra note 12, at 156-59 and 229-30. Bork agrees that the strategies are redundant only in the case in which the dominant firm has "perfect" monopoly power or where special technical conditions are present.

is necessary for equal efficiency. Second, input market predation may be successful against established rivals as well as new entrants, since success does not require that actual exit be induced. Third, a short-run sacrifice of profits in the expectation of long-run gains is not necessary. Instead, the increased profits can be collected at the same time the additional costs are being borne. Fourth, as mentioned earlier, even failed attempts to predate may lower consumer and social welfare, in contrast to the increases in consumer welfare that come from failed price predation. We turn now to these issues.

Input market predation may still be successful even if the dominant firm's costs rise by as much as (or even more than) the entrant's, if large-scale entry is necessary for optimal efficiency. As an example, consider an entrant just marginally willing to enter the industry. Assuming that scale economies would require that entry occur on a large scale for equal efficiency, the entrant will not use the current "monopoly" price in its expected profit calculations, but rather the lower, more competitive price it expects to prevail after entry.⁵⁶ That entry lowers prices is, of course, one of the consumer benefits from competition. Assuming this hypothetical entrant was initially just at the margin with regard to entry, even a small cost increase may deter it, unless it expects the postentry price

⁵⁶ See Hay, pp. 179-89 infra, for a more detailed analysis of this point.

to also rise sufficiently as a result of concomitant increases in the incumbent's costs from the input strategy.⁵⁷

On the other hand, the gains to the incumbent from deterring even such a "marginal" entrant may be substantial. It counts as a gain the lost profits it would have suffered had entry not been forestalled. This includes the market share it would lose plus the losses from the lower price that entry competition would entail. These gains may well exceed its cost of the strategy, even if the incumbent suffers a larger direct cost increase than does the potential entrant.

Moreover, if the entrant were just marginal or less efficient than the incumbent, this does not imply that the losses to consumers from such strategies are necessarily small. Consumers lose not only the opportunity to purchase the product at the lower, more competitive price. They also lose longer-run benefits of innovation induced by competition in the marketplace.⁵⁸ Indeed, in some limiting cases the incumbent's entire net gain may be eliminated, in that it spends (almost) its entire monopoly profit

⁵⁷ Of course, the incumbent will only be prone to raise the price if its marginal costs rise. In Spence's original example, fixed costs rose and marginal costs remained constant or fell. Spence, note 7 supra.

⁵⁸ For a similar point, see R. Posner, "The Social Costs of Monopoly and Regulation," 83 J. Pol. Econ. 807 (1975).

protecting its position.⁵⁹ As pointed out earlier,⁶⁰ Bork has developed a similar theory of input predation. Surprisingly, perhaps, he does not carry the theory forward to this logical extension--that input predation may be successful even if the incumbent's costs rise as much as do the entrant's. To Bork, "the sine qua non of predation . . . is the ability to impose greater costs upon one's victim than upon oneself" ⁶¹ His different conclusion may be due either to his emphasis on deep-pocket predation or to a disregard for the large-scale-entry case discussed here.

Even if an input strategy raises the incumbent's own costs by as much as it raises the entrant's, the conduct need not violate the Areeda-Turner standard. The "practical" version of the Areeda-Turner rule compares the price after entry to the incumbent's average variable cost. Of course, deterrence or predation can only be successful if the expected price after entry is exceeded by the entrant's average total cost. On the other hand, given that entry is deterred or exit is induced, the incumbent earns profits according to the difference between the price absent entry and the incumbent's average total cost. Equal

⁵⁹ Using a similar analysis, Hay discusses the competitive benefits of entrants less efficient than the incumbent. See Hay, pp. 157-62 infra.

⁶⁰ Note 31 supra.

⁶¹ Bork, supra note 12, at 334.

efficiency does not save the standard. Instead, because competition lowers prices, the incumbent may continue to earn profits even if an equally efficient large-scale entrant is deterred.

However, in most cases the incumbent does not need to use a strategy that causes it to suffer an equal or greater cost than the entrant. Through strategic planning analysis, the incumbent can often invent tactics that will disadvantage the entrant more. Porter's paper on the industry-history approach to antitrust investigations discusses ways in which such strategies can be discovered and analyzed.⁶² Both Porter and Spence caution that prohibitions on some classes of exclusionary conduct may induce other, less efficient forms.

Although the discussion of input market strategies in the papers in this volume focuses on cases in which entry is deterred or exit is induced, a dominant firm can sometimes use input market strategies to disadvantage established rivals as well, even without inducing exit or deterring entry. Analysis of this case also points out how simple tests of input market predation can be formulated. To be successful, it is necessary for rivals' costs to be increased disproportionately. If increases in input costs squeeze the rivals' price/marginal-cost margins by more than they squeeze the dominant firm's, then the rivals will be induced to cut back production at the going output prices. Thus, the dominant firm can either increase its output or allow the price to

⁶² See also M. Porter, Competitive Strategies (1981).

rise.⁶³ Either way, to the extent that it gains a cost advantage, its profits rise.⁶⁴ By gathering evidence on rivals' relative costs, the effect of the input market strategy on relative and absolute costs, and the demand elasticities in the product market, this type of predation can thus be inferred from observable marketplace performance data. Of course, the exact formulations of the tests will depend on the structure of the markets at issue and the details of the questioned practices. However, each of these tests shares the common framework of comparing the relative cost increases to rivals and analyzing the effects of the questioned strategy on market performance indices. Thus both profitability and welfare tests can be designed.

The illustrative example also points up another fundamental difference between input market predation and output price predation. Input predators need not sacrifice short-run profits for

⁶³ The exact short-run profitability of this sort of strategy depends upon the relative marginal and average costs of the dominant firm and rivals and the elasticities of demand and supply in the marketplace.

⁶⁴ In fact, in cases where the dominant firm's costs are driven up by the same amount as rivals', joint profits in the industry may rise, with the benefit shared among all suppliers. This could occur as follows: If the additional marginal costs borne by the firms in the industry are treated no differently than any other cost increases, they will act to push up prices in the downstream product market accordingly. This is the horizontal effect. The marginal cost-induced price increase may well exceed the original average cost increases, at least in the short run. In the longer run, the price increases will not be permanent unless the industry is protected by entry barriers or entrants are similarly burdened with the higher costs. This "cost/push" coordination may occur, of course, from Government regulations or industrywide agreements.

long-run gains. As this last case illustrates, the gains can be collected at the same time that the (smaller) sacrifices are borne. If so, the two effects may still be conceptually distinguished, though not temporally separated.⁶⁵

Welfare analysis of attempts to monopolize using input market strategies is also different from price predation in the product market. Unlike a price cut, whose direct, short-run effect is to raise consumer welfare, the direct effect of input market predation is to raise costs, and thus to lower welfare. Therefore, in contrast to unsuccessful attempts at product price predation, if an attempt at input predation fails to induce exit, economic welfare may nonetheless be reduced if consumers do not obtain sufficient benefits from the cost-increasing expenditures. Of course, in that it succeeds, prices increase in the product market as a result of both the cost increases and the resulting increase in the dominant firm's market share.

Despite the possibility for welfare losses from input predation, input pricing strategies should not be prohibited per se. In many cases, input market strategies yield important consumer benefits which more than offset both the increased costs and any loss of future competition. For instance, when a dominant firm responds to an entrant's introduction of a new product by increasing its own advertising expenditures, the entrant's costs of entry

⁶⁵ The Ordovery-Willig proposal is conservative in this regard; it appears to require an actual temporal profit sacrifice. See Ordovery-Willig, p. 245 infra.

may rise. Yet such expenditures are not necessarily undesirable on balance. Consumers may benefit from the increased information inherent in these expenditures.⁶⁶ Similarly, the consumer benefits from product innovation are obvious and must be given sufficient weight. The greater the direct benefits to consumers, the larger must be the direct costs and probable losses in future competition to justify prohibition of marketplace conduct. As some of the examples provided by Ordover and Willig indicate, it is often difficult to discover whether input predation is being attempted. Similar efficiency defenses can be made for most questioned strategies.

For both these reasons, a careful balancing approach is necessary.⁶⁷ The old "structuralist" approach is clearly deficient in this regard. While it noted the possibility of successful predation from input-based strategies, it did not require economic proof of competitive injury to support broad prohibitions against certain types of conduct. Moreover, it did not restrict these prohibitions to industries satisfying appropriate "first

⁶⁶ For a recent exposition of some of the consumer benefits of improved consumer information, see H. Beales, R. Craswell, and S. Salop, "The Efficient Regulation of Consumer Information," J. Law & Econ. (October 1981).

⁶⁷ Although they recognize some of these arguments, Areeda and Turner believe that given the difficulty of measuring consumer benefits, no benefit/cost balancing test should be attempted for many cases. Instead, the cost-based standard should be used exclusively, or the conduct should be legal per se. See Areeda-Turner, note 16 supra.

tier" market-power or entry-barrier tests. Offsetting competitive benefits of the conduct were given short weight. In contrast, the strategic approach and many courts now require the questioned conduct to satisfy competitive-injury tests, the industry to satisfy structural tests, and any offsetting efficiencies to be carefully reckoned into the rule of reason.

CONCLUSIONS

It should be clear from even this lengthy introductory discussion that the development of the strategic approach to anti-trust remains incomplete. The scope of potentially predatory strategies must be explored. Additional tests must be developed to infer the existence or likelihood of predation relative to the efficiency-enhancing impact of questioned practices. The error and welfare properties of these tests should be analyzed in more detail. Issues of judicial economy and the capability of litigation to discover the true facts must clearly be taken into account in this interdisciplinary analysis. As with all economic theory, cross-sectional studies to create empirical benchmarks would be helpful. The theoretical results would surely benefit from further analysis, to generalize some results and prune back others. As in other areas in which economists become involved with the legal process, theoretical provocativeness will often yield to a practical conservatism.

In spite of these caveats, however, a strong start has been made. Neither blind structuralism nor tautological efficiencies analysis is sufficient for designing economically rational antitrust policy. It is hoped this volume will contribute to the further development of the middle road.

I. BACKGROUND AND OVERVIEW

COMPETITION, ENTRY, AND ANTITRUST POLICY

A. Michael Spence*

I. Introduction

My purpose in writing this paper and in speaking today is to explore the relevance and applicability of the American antitrust laws to various aspects of the competitive processes. As economists, lawyers, and business people, we have come to understand these processes in different ways. It therefore seems to me useful from time to time to try to discuss the nature of competitive interaction in terms that help to reduce the dissimilarity of perspectives.

The antitrust laws (as written and interpreted through cases) are, broadly speaking, the principal regulatory instrument with respect to competitive interaction at the industry level in the

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Professor of Economics, Harvard University. I am grateful to the Federal Trade Commission for providing the opportunity to reflect on these problems and to the participants in the FTC Conference for their comments. I am particularly indebted to Bruce Owen and to Steven Salop for many insights and observations on an earlier draft. Finally, I want to thank the lawyers at the FTC for their interest and their patience with an economist's attempt to understand the relevant features of the antitrust laws.

United States.¹ One can ask several basic questions with respect to the regulation of competitive interaction and industry structure. They concern the range of circumstances to which the law is applicable and the welfare consequences (and by that I mean the performance of industries and markets) of the application of the law in those areas where it has jurisdiction. I should like to make clear at the outset what aspects of antitrust law and policy are the focus of attention here.

To this observer, the antitrust laws have their clearest and least ambiguous application to explicitly cooperative behavior and to merger on a scale that is functionally equivalent to complete cooperation. Generally they prohibit it. They make explicit agreements, or conspiracies with respect to price and other variables, illegal. They prevent horizontal mergers that create unnecessary reductions in numbers of competitors, and they prevent trusts. Although the imaginative observer can always locate exceptions, by and large this seems to me to be the least controversial aspect of antitrust regulation.² By that I mean that the

¹ There are other regulatory bodies and activities. But they focus either on particular industries or sectors, or on problems like the environment. There is also foreign trade policy, which has a significant influence on competition and industry structure in the United States. Because of its importance, I shall comment more extensively on its relation to antitrust policy later in the paper.

² There are examples of U.S. industries that have been adversely affected by foreign competition, where the problem can be traced, in part, to an inefficiently fragmented structure in the U. S. industry. Such cases are not common; in those cases, antitrust policy is not reasonably regarded as the source of the structural problem.

welfare consequences of these prohibitions (assuming that their enforcement has had a deterrent effect--and it seems to me that it clearly has) are generally desirable.

There are at least two broad areas in which the applicability of our antitrust law has a considerably more ambiguous applicability. One concerns formally noncooperative behavior that gives rise to cooperative-like results, usually in concentrated industries. While it is tempting to digress into a discussion of this type of competitive interaction and to the regulatory alternatives for dealing with it, I will not so digress (at least not for long), for it is not the subject in which I am primarily interested today. Suffice it to say that there has been a great deal written about the subject.³ At the level of policy, there are at least two schools of thought. One school takes the view that regulating conduct is doomed either to failure or to inconsistency and that the only effective relief is structural. Structural relief, of course, runs squarely into the problem of efficiency and the related question of what initially created the level of concentration actually observed. These questions are not always addressed properly in the policy debate. Another school of thought takes the view that certain practices (open competitive policies by trade associations, "most-favored-nation" clauses in contracts being examples) make avoidance of profit-reducing

³ Much of the relevant part of economic theory has focused on oligopolistic interaction in mature industries.

competition easier, and that these facilitating practices should be banned or circumscribed.⁴

This brings me to the second ambiguous area and the third broad area of antitrust policy--the "monopoly" problem. The monopoly problem is the central focus of most of what I have to say today. In referring to the "monopoly" problem, I mean to include not only monopoly in the sense of a single seller, but also high concentration, large amounts of market power, and rates of return above risk-adjusted costs of capital. I do not want to tackle the monopoly problem directly; that is, I do not want to begin with what the law either is or ought to be. Rather, I should like to discuss what we know and (perhaps equally important) what we do not know about competitive activities and processes, especially the dynamic aspects of competitive interaction, because I believe that an understanding of these processes will

⁴ I do have one observation concerning this broad area. There is a subset of industries that have real problems with price competition (in the sense economists mean it). They are industries where, because of demand fluctuations, lumpy additions to capacity, and capital intensiveness, marginal costs are below average costs. Under these conditions, competition would bid prices down to the level of marginal costs--not all the time, but often enough to create problems. Such industries find ways of preventing prices from being bid down below average costs to marginal costs. I have seen a number of cases in which devices that facilitate the avoidance of the bidding process have been attacked as collusive. Such cases are sometimes brought without consideration being given to industry's rate-of-return figures. Such cases strike me as expensive; and in some cases, futile. But the main point I want to make about them is that they should not be brought without some analysis of what the Government would like the firms in the relevant industry to do in lieu of what is being proscribed in the bringing of the case.

and should influence our thinking about public policy in this broad area.

I have in mind, under the heading of "competitive activities and processes," a number of specific topics. They include entry and entry deterrence, investments and other activities that constrain the opportunities of one's actual or potential rivals, the intertemporal aspects of competition, and the structural features of industries that are influential in determining competitive strategies and industry evolution. I will try to summarize and interpret some of the writing on these subjects and to identify areas in which relatively little is known. My reasons for subjecting you (and many of you are primarily interested in antitrust policy and not the evolution of microeconomic analysis) to such an enquiry are twofold. First, it seems to me essential to the development of a consistent and effective policy with respect to monopoly concentration and market power to have some insight into the ways in which individual firms and groups of firms acquire and maintain positions of market power. The problem with examining these questions in the context of particular antitrust suits at the time they are brought is that one is often looking for items on a list of "bad" or "unacceptable" competitive practices. At the very least, this tends to divert attention from the structural and strategic origins of the market power.

The second reason for delving into the processes whereby market power is acquired is that the performance of an industry or

market is in part determined by the evolution of its products and structure, and not just by the competitive structure of the mature industry. Indeed, in some industries the technology and its evolution produce persistent changes in structure, so that their structure and performance when they eventually mature and stabilize is not the central issue from a welfare standpoint.

The remainder of the paper is divided into four sections. In section II, I discuss entry and entry deterrence and then try to assess how antitrust policy is likely to affect entry-detering behavior and market performance. The underlying models are essentially static in a sense that will be clear (I hope) in the discussion. The longest section is the third. It focuses on the dynamic aspects of strategic investment and competitive interaction. Much of it consists of a discussion of the ways in which a number of structural features of markets influence intertemporal competition. The fourth section deals with foreign competition, in a somewhat abbreviated fashion. Logically it might have been included in section III, but because of its importance and some special considerations that are relevant, it rates a separate section. In the fifth and last section, I have tried to reflect on the implications of the foregoing for antitrust policy. Those who are looking for or expecting a comprehensive policy proposal will be disappointed. But I think there remain some useful propositions to help guide prosecutors in selecting cases, if not courts in deciding them.

One further comment is in order. I refer repeatedly to welfare and market performance in what follows. Whenever these terms occur, they stand for the sum of the benefits to consumers and to producers in a market. Producer benefits are profits. Sometimes it is necessary to add up benefits over time, and that is done by taking a present value using some suitable discount rate. Thus, for my purposes, market performance is measured by the discounted present value of the benefits to consumers and/or producers.⁵

II. Entry Deterrence

Any firm or group of firms that is able to maintain a position of market power and high profitability over an extended period of time must have some form of protection from the expansion of potential or actual competitors. That protection (if it exists at all) consists of a combination of structural features of an industry (economies of scale, for example), and activities (of the firm[s] seeking protection), that deter the expansion of rivals. The activities and the structure interact to create the barriers and to produce profitable operations.

⁵ As a number of observers have pointed out, performance in this sense is arguably not the only objective of antitrust policy. An I agree. Some would argue that no firm can be deprived of its market by inappropriate means without due process of law, regardless of whether or not the market is more efficient without that firm. Therefore, let me simply acknowledge at the outset that improving market performance in the sense defined above is not the sole objective of policy, and that there are other purposes that may override in particular cases.

When economists use the term "structure," they mean two different things. Sometimes the term refers to exogenous characteristics of an industry such as the technology, the production function, or the demand. At other times it refers to concentration, which is the result of a combination of the decisions of firms and of exogenous structure. Naturally, this produces considerable confusion. To avoid some of it, I shall refer to technology and the like as "exogenous structure," meaning that it is not the result of the behavior of firms or their customers. The antitrust laws cannot do much about underlying exogenous structure. They must, therefore, operate either on conduct (so as to alter the incentives for erecting entry barriers), or on the endogenous aspects of structure (like high concentration). The question naturally arises then as to what kinds of conduct are to be deemed acceptable or unacceptable, and in what circumstances.

To answer this sort of question, one probably wants to acquire some familiarity with how entry deterrence is managed in a variety of contexts. It would be foolhardy of me to attempt to offer generalizations that are intended to be without exception. Industries and markets are far too complex and varied to permit that. But there are some tendencies and some propositions that I believe withstand both theoretical probing and exposure to evidence from case histories reasonably well. My intention is to discuss some of these propositions which I believe characterize the competitive structure of many industries, and then to reflect

on the kinds of policies that would make sense in light of the underlying economics.

The first proposition is that the deterrence of entry or expansion has at least two logically quite distinct parts. One consists of the actions that will be taken (or potential entrants anticipate will be taken) if entry occurs. (Henceforth I shall refer to established firms and entrants. The reader should interpret "entrants" broadly to include firms that are expanding or changing their strategies as well as those that are actually newcomers to an industry.) The second class of actions are those that are taken prior to entry. These actions of established firms are designed to influence their own incentives with respect to their reactions to entrants. Therefore they also influence the perceptions of potential entrants about the likelihood of those actions. The moves made prior to entry can be thought of as positioning. The actions in response to entry might be referred to as reactions.

Positioning and reacting are distinct types of activity. But they are strategically related. Positioning affects the incentives of the established firms with respect to reactions. To the extent that these effects are accurately perceived, positioning will influence the profit calculations of potential entrants. The trick in entry deterrence is to find a positioning strategy that is (a) not too costly and (b) creates the incentive for the established firm to react to the entrant in a way that is destructive to the latter. The established firm(s) want to position themselves

in such a way that their self-interested reaction to a potential entrant is damaging to the entrant's profitability without being self-destructive. Or, to put the matter another way, if the established firm does not create a situation in which self-interest makes the entrant unprofitable, then entry will be deterred only if the potential entrant can be otherwise convinced, notwithstanding the economic incentives, that the established firm will act so as to make the return to the entrant's investment unacceptably low. Credibly conveying the intent to destroy--when after the fact of entry it is demonstrably not in the established firm's interest--is not only difficult, it is legally hazardous, because it exposes the established firm to the charge of predatory behavior.

A simple example of positioning would be the construction of production capacity by the established firm sufficient that upon entry, ordinary competitive prices and output would ensure that the entrant was unprofitable.⁶ The capacity can be thought of as an investment by the established firms. Part of the return to

⁶ This issue and other related issues are discussed more fully in A. M. Spence, "Entry, Capacity, Investment and Oligopolistic Pricing," 8 Bell J. Econ. 534 (Autumn 1977); A. M. Spence, "Investment Strategy and Growth in a New Market," 10 Bell J. Econ. 1 (Spring 1979); A. Dixit, "A Model of Duopoly Suggesting a Theory of Entry Barriers," 10 Bell J. Econ. 20 (Spring 1979); E. C. Prescott and M. Ursscher, "Sequential Location Among Firms with Foresight," 8 Bell J. Econ. 378 (Autumn 1977); S. C. Salop, "Monopolistic Competition with Outside Goods," 10 Bell J. Econ. 141 (Spring 1979); R. Schmalensee, "Entry Deterrence in the Ready-to-Eat Breakfast Cereal Industry," 9 Bell J. Econ. 305 (Autumn 1978).

that investment consists of profits that would have been lost in the event of entry. This sort of investment occurs commonly in manufacturing sectors. It need not be undertaken only to deter a potential entrant. The capacity may be intended to reduce the return to capacity expansion by other firms already in the industry. And the phenomenon is not confined to manufacturing. One can observe expansion-detering investment in retailing, for example, where a firm may "overstore" a geographic area to limit the expansion of rivals.

The rate of return to this kind of investment depends upon a number of factors. Usually an important one is economies of scale, or a structural feature that is functionally similar. Scale economies can be found in marketing as well as production. In many situations the costs of advertising per dollar of revenues generated decline with share of market. Thus the entry- or expansion-detering investment may be in advertising rather than production capacity or retail outlets. Or the investment may consist of a combination of these variables. There are many variants of the same theme.

A second factor that affects the entry-detering investment decision at the positioning stage is the aggressiveness with which the established firm competes with the entrant or the expanding firm. For the firm there is a tradeoff between prior investment and aggressive competition after entry, in deterring entry or expansion. The extent of the prior investment affects the need

for being aggressive ex post. It also affects the credibility of the threat to the entrant. This is especially true in markets where the investment is largely irreversible so that the established firm does not have the option of changing its mind. Conversely, aggressive reactions postentry reduce the need for investment at the positioning stage.

Much of the policy embodied in the corpus of the antitrust laws deals with the entry problem by defining what will (from a legal standpoint) be regarded as excessively aggressive or "predatory" competitive behavior, or what I am calling reactions to entrants or expanding firms. Such policies should not be evaluated in a vacuum but rather in terms of the incentive effects they are likely to have. Increasing the stringency of the standards for predatory or unfair competition can have different impacts in different market situations. In some cases it will tip the balance against the strategy of entry deterrence. But in others, it will cause firms to increase the magnitude of their prior investments. It does this by altering the tradeoff referred to above between the positioning investment and the reaction to entry or expansion, after the event. To the extent that prohibitions against predatory behavior constrain firms' reactions to entrants, the prohibitions will increase the incentive for firms to make prior investments that reduce the need for aggressive reactions to deter entry.

As a result of these two possibilities, the welfare effects of increasing the stringency of the definition of predatory behavior are far from unambiguous. I suspect the majority view used to be (and probably still is) that more entry is better than less, and that the hoped-for effect of stringent standards would be exactly that--more entry. It is not my intention to deny that there are instances in which this view is correct. But it is far from being well established empirically that this is the normal case. It is probably true that a majority of economists would assent to the proposition that most concentrated U.S. industries are more concentrated than necessary to be efficient. Although I have considerable doubts and uncertainties about this proposition, let us accept it for the moment. Even if it is true, there remains the possibility that the primary effect of changes in policy directed toward predatory conduct would be to alter prior investment behavior rather than to produce more entry. Then one needs to ask whether those effects are ones that on balance improve or diminish market performance.

Even in the simplest cases, the answer is--it depends. I used the example of capacity as an entry-detering prior investment earlier. The effect of constraining an established firm with respect to pricing or expansion of output in that case is to cause the established firm to increase its capacity. If it uses the capacity fully, the welfare effect is positive. But it may not. And in real market situations where demand is growing, uncertain, or fluctuating, and investments are lumpy, it is not easy to

impose the desired outcome or to devise standards of conduct that induce it. When the prior investment is in advertising or retail capacity, the effects on market performance are even less clear.

My instinct as an economist is to study industries on a case-by-case basis, applying and adapting models as appropriate. For those of us who do this kind of work, the differences among industries sometimes seem more important or interesting than the similarities. And thus we are uncomfortable with general rules. That, of course, is not very useful to courts or litigators, who require some general principles or rules on which to hear and argue cases.

There has been a considerable debate about appropriate standards for identifying predatory behavior recently.⁷ I am not sure that any consensus has emerged from that debate. Probably the most widely accepted standard is the one that prevents pricing below average cost. I shall express some reservations about this rule in the next section on the dynamic aspects of competitive interaction. Its virtues are that it is simple and that there is a reasonable possibility of detecting violations through examination of figures on rates of return. The principal alternative is

⁷ See, for example, P. Areeda and D. Turner, "Predatory Pricing and Related Practices Under Section 2 of the Sherman Act," 88 Harv. L. Rev. 679 (1975); M. Scherer, "Predatory Pricing and the Sherman Act," 89 Harv. L. Rev. 869 (1976); O. E. Williamson, "Predatory Pricing: A Strategic and Welfare Analysis," 87 Yale L. J. 284 (1977); P. L. Joskow and A. K. Klevorick, "A Framework for Analyzing Predatory Pricing Policy," 89 Yale L. J. 213 (1979).

a marginal-cost rule. A marginal-cost rule is not only based on a quantity that is difficult to measure; it is also a less stringent standard in a declining-cost technology. If average costs fall with output, marginal costs are below average costs.

But the point I wish to emphasize is that whatever standard you find most reasonable, a great deal of effective entry deterrence would pass the test rather easily. There are exceptions. The WEO campaign of price cutting in food retailing in the early 1970's by A&P probably violated an average-cost standard. Certainly the stock market reacted strongly and quickly to the low rates of return of A&P and its competitors.

But in many industries, the barriers to entry and the barriers to expansion are the result of the competitive strategies adopted by the major firms, including high rates of investment in advertising and new product introductions. An example might be the ready-to-eat cereal market, which is involved in an ongoing FTC antitrust case. It is not clear that prohibitions against predatory responses to potential entrants would have any material effect on the performance of this type of industry.

Since there are problems with operating on the incentives to deter entry entirely by regulating conduct undertaken in response to entry, one might reasonably ask about regulating the prior investment behavior. There is some precedent for this approach. In the Alcoa case, it was argued that it may not be acceptable for a monopoly to build capacity sufficient to meet a growing demand,

thereby effectively preempting potential competition. In the FTC's titanium dioxide case, the Commission's lawyers argued that Du Pont's capacity expansion program had the effect of preempting the competition and of creating a dominant-firm industry structure and that that was unacceptable in that market context.

While these approaches seem to me to have some merit, I shall argue shortly that there are no known, unambiguously beneficial, simple rules that can be applied to investments prior to entry or expansion. Once again, that negative conclusion is of little use to courts. But at least, focusing on the entry-detering investment process in particular cases does seem to me to be an investigatory strategy that is more likely to capture the economically important aspects of competitive interaction and market performance. Since investment behavior is best discussed in an explicitly intertemporal setting, I am going to interrupt the discussion of policy to turn to the dynamic aspects of competitive interaction.

III. Industry Dynamics and Strategic Behavior

The preceding discussion of entry deterrence was couched in static terms. It is implicitly assumed that entry deterrence has two phases; one of them--the positioning phase--logically precedes the other. It assumes the established firms are already there in the market. Such an approach is conceptually useful for analyzing mature industries. But it leaves unanswered several important questions. For example, there is no explanation of who the

established firms are and how they acquired positions of market power. An important question in an antitrust case is whether market power was acquired by legitimate means or not. The problem of regulating or influencing the evolution of industry structure before it becomes a problem is not therefore easily discussed with a static model. Moreover, the underdeveloped area of evaluating and measuring the intertemporal efficiency of a market gets set aside altogether.

My aim in this section is to describe some of what is known about the evolution of industries and about strategic interaction in the dynamic sense. And then, with that as background, we can reflect on policy options and the desirability or undesirability of regulating investment behavior. I should say in advance that the state of economic theory is not particularly advanced in the area of intertemporal competition.

For the purposes of the ensuing discussions, it will be useful to imagine an industry that is new and growing, or one that is in disequilibrium because of a major technical advance. An industry is in disequilibrium if firms are making investments that cause the structure of the industry to change. If one were trying to predict how such an industry were going to evolve, and whether it would evolve into a dominant-firm structure as in computers, a concentrated oligopoly as in autos, or a relatively competitive and unconcentrated industry like semiconductors, what would be the structural features of the industry that one would study? Or, to put the matter differently, what are the structural features that

influence the strategic choices that firms make and the consequent evolution of an industry's structure?

A. The Magnitude of the Required Investment

The magnitude of the investment required to participate in the market efficiently is a factor that tends to create concentration in several ways. It limits the market to firms whose financial and managerial resources are sufficient to achieve the requisite scale. To the extent that there is uncertainty about the potential size or the rate of growth of the market, the need to make substantial investments to be efficient or cost-competitive increases the riskiness. While investors in securities can diversify the risks away to a large extent, firms and managers can diversify only to a limited extent. Uncertainty, however, is a two-edged sword. While it interacts with scale effects to increase the risk and hence deter the entry of the small or the risk-averse, it may also blunt the incentive for firms to attempt to move quickly and first into dominant positions. Calculations in the context of specific examples suggest that concentration may be a U-shaped function of demand uncertainty. That is, the least and most risky markets tend to produce investment behavior that gives rise to the highest levels of concentration. These calculations are far from definitive, and more work is required to understand the interaction of demand uncertainty and scale economies in influencing the dynamic equilibrium. But they are suggestive of the importance of uncertainty in conditioning the evolution of industry structure.

B. Differential Costs of Expansion in a Market

Firms can differ in the investment required to expand in a market, depending on their starting points. Let me illustrate with an example. General Foods and General Mills probably have lower distribution costs than Kellogg in the cereal market, because they distribute other products through the same retail outlets. Kellogg has a compensating advantage in the form of large market shares on a brand-by-brand basis and overall. Share in this context creates lower advertising costs per dollar of revenues. A logical potential entrant to the market is Procter & Gamble, which has a marginal distribution cost advantage similar to that enjoyed by GF and GM.

In extreme cases, the initial asymmetries can create rather pronounced concentration. IBM's customer base in the business sector in the tabulating machine market, and the expertise that went with it, gave it a significant cost-investment advantage in the early 1950's in computing equipment. That advantage rapidly (within 3 years) turned into a dominant market share in the business segment of the computer market.

One could go on with examples, but the point would be the same. Diversification and history create asymmetries among firms with respect to their strategic opportunities, which, when exploited, can give rise to high concentration and to initial or early positions of market power. There remains of course the question of whether and under what circumstances these initial positions can be maintained.

C. Reversibility of Investment

One significant factor in deciding the latter question concerns the extent to which the investments are reversible or not. Generally, irreversibility creates more permanence and higher concentration. Not only by increasing the exit costs but also by credibly committing the firm to defend its investment, it reduces the anticipated returns to potential rivals. As with uncertainty, irreversibility is a two-edged sword. It protects the firm with the market power position, but in the context of uncertainty, it increases the risk of the initial investment and hence may blunt the incentive to try to acquire a large relative share or to monopolize a segment of the market.

D. Uncertainty

I have adverted to uncertainty at several points without formally announcing it. It is clearly an important influence on industry evolution. As we have seen, the influence of uncertainty is somewhat complex. It is further complicated by the fact that it tends to be resolved over time. This gives rise to a number of interesting possibilities in the evolution of an industry. It is not uncommon (for example) that a market is initially developed by small and medium-sized firms; and then when it begins to accelerate in growth, the market is entered by larger firms, which then grow very rapidly. At the end of that phase, there is often a period of near-excess capacity and pressure on margins.

Why might this pattern be observed? One explanation is that large and small firms differ in the rates at which they can grow, because of differences in organization and in managerial and financial resources. Large firms exploit that advantage by waiting until some of the uncertainty about the market's potential is resolved. Thus the fact of uncertainty and the speed with which it is resolved as the industry develops can affect the timing and magnitude of the investments by entrants. An industry that evolves in the way I just described may become an oligopoly in its mature phase. But is not likely to evolve into a dominant-firm structure or a near-monopoly.

E. The Learning Curve

Closely akin to scale economies is the learning curve or experience curve. On the cost side, the learning curve depicts the relationship between unit costs and accumulated production to date. Generally it is a declining function. The rate of decline varies from industry to industry. In some industries the rates of decline are quite dramatic, on the order of 15 percent every time accumulated volume doubles. While the data required to estimate learning curves accurately have not generally been available to researchers, the emphasis on them by firms in some industries and by certain consulting firms is sufficiently widespread that it seems to me safe to include them on a list of potentially important structural features of an industry.

The competitive implications of the learning effect are interesting. As with scale economies, there is a premium (in the

strategic sense) to early entry, rapid growth, and large relative share of market--all of these for the obvious reason that these things, in conjunction with the learning effect, confer cost advantages. The cost advantages in percentage (as opposed to absolute) terms may or may not diminish over time. But even if they do, the relevant time horizon may be so long as to be largely irrelevant.

The observations concerning the importance of share and of the head start do not tell us much, by themselves, about the competitive process, the evolution of the industry, or its performance in the absence of regulation or constraint. So let me turn to these issues.

When there is a learning curve, the marginal cost of additional output is not the current unit cost. Rather it is the current unit cost minus the present value of the reduction in all future costs which results from the fact that additional output at a particular time will lower unit costs at all future dates. This means that any firm, even a monopoly, will price more aggressively than it would in the absence of the learning effect. Indeed, the prices can be below unit costs, at least initially. It is easy to see that such behavior would be difficult to distinguish from, and could be confused with, predatory pricing. It is this fact, among others, that causes me to be concerned about average cost standards for predatory pricing--at least in relatively new and growing markets.

I have done some calculations of dynamic equilibria in models with learning effects in order to determine, in a rough way, what the impact on competition of this aspect of industry structure might be.⁸ Some of the conclusions, which should be regarded as tentative at this stage, are the following. Learning curves are powerful sources of entry barriers. With substantial learning effects, it is not uncommon for the equilibrium number of firms to be three or four. Entry barriers are greatest when the learning curve is neither very steep (rapid learning) nor very flat (slow learning), but rather somewhere in the middle. It is the moderately rapid learning that creates the largest cost differentials among firms--and hence the greatest entry barriers.

From the standpoint of market performance, there is clearly a tradeoff between competitiveness (as measured by the number of firms) and price/cost margins on the one hand, and technical efficiency on the other. A single firm would be most efficient--that is, could produce at the least cost but would price monopolistically. If there are many firms, the price/cost margins are more nearly optimal, given the cost, but the costs are higher than need be, because the learning is dissipated across competitors. My calculations to date suggest that entry ceases in the neighborhood of the point where competition and cost efficiency are optimally traded off. That is to say, at the point where further

⁸ A. M. Spence, "The Learning Curve and Competition," Harvard Institute of Economic Research, Discussion Paper No. 766 (June 1980).

entry is unprofitable, the benefits of an additional firm from more price competition about equal the cost increases resulting from dividing the cumulated industry output among more firms. I emphasize that this observation is not a logical deduction from a model but rather a generalization from calculated equilibria for numerous cases. The cases are distinguished by having widely different values for the important parameters, like the elasticity of the learning curve with respect to volume, the elasticity and growth of demand, and so forth.

A monopoly performs very poorly relative to two or more firms. The greatest improvement in market performance comes from the move from one to two firms. Of course, the two firms have to compete (i.e., behave noncooperatively) for the benefits to be realized.

A second observation concerns the case where the learning effects spill over to some extent from one firm to the next. One can think of this as a case where the unit costs of an individual firm depend on both its own accumulated output and the accumulated output of the industry. The relative importance of these two variables in driving unit costs down is a reflection of the extent to which the individual firm's production experience is or is not transmitted to other firms. My tentative observations concerning the impact of this kind of structural externality are based on the kind of calculations referred to above. Industry learning effects appear to reduce the aggressiveness of the output decision, to reduce the entry barriers, and to improve market performance. On

the face of it, these effects are not surprising. Economists, however, will develop the sneaking suspicion that there is a potential market failure here, because some of the benefits of a firm's output decision are not appropriated by that firm. This might lead one to suspect that output would be too small. That line of reasoning, however, ignores the social benefit of increased competition. In fact, it is true that profits are lower with industry learning effects. But the impact of the transfer of the learning effects is to permit more competition for any level of industry cost reduction. That benefit tends to accrue to consumers. And the net effect is an improvement in market performance. There is more that could be said about the learning effect, but dwelling further on it in a survey such as this is probably not the best use of the available space.

F. Demand-Side Structure

Let me turn then to the demand side of markets. Thus far I have concentrated primarily on investments and costs. But the demand side deserves (although it has not yet received) equal prominence. Indeed, a survey of U.S. industries in 1980 would, I think, tend to confirm one of Professor Barn's conclusions in his remarkable work on entry barriers; namely, that entry barriers based on product differentiation are generally the most potent sources of above-average rates of return.

There are many aspects of demand structure that can influence concentration and market power. There are, for example, a variety of kinds of effects that are analogous to the learning curve. In

fact, in markets where the products are complex and/or new, there is exactly a buyer learning effect. Thus the demand for the product of an individual firm can depend upon the accumulated purchasing experience of consumers with that firm's products. The experience reduces the uncertainty associated with the characteristics and uses of the products, relative to those of rivals. The competitive implications of this sort of "buyer learning are very similar to those found in the context of cost-reducing experience. Indeed, one can, in certain circumstances, formulate the problem in such a way that the models are formally equivalent. Since the effects are so similar, it is not necessary to repeat the conclusions we drew earlier.

The buyer learning effect is magnified if consumers invest in the product or its use. A well-known example is the computer industry, where there is not only consumer learning but also consumer investment in software that is largely equipment specific. The fact that it is equipment specific is, of course, a matter of strategy and not an act of God. When the buyer invests in the use of the product, the effect is to reduce the relative attractiveness of the products of rivals. Formally, this aspect of structure can be captured by allowing demand to depend on accumulated sales, and it magnifies the accumulated volume effect.

As in the case of cost-side learning, some of the demand-side learning may be an industry effect. Or, to put it another way, experience with one firm's product can have a positive influence

not only on that firm's product, but also on those of rivals. And as in the cost case, this aspect of structure tends to reduce entry barriers and concentration for exactly the same reasons.

There are other reasons why demand may depend on accumulated volume other than learning. If the product is durable, there can be a negative effect of accumulated volume associated with saturation of the market. The durability effect causes a damping of the rate of growth of demand as the industry matures. Once again there is a premium on rapid growth and early entry, particularly if the effect is combined with either scale economies or learning on the production side.

G. Advertising

The subject that is most discussed in the context of demand-side structure and market power is advertising. The technology of advertising is such that the expenditures required to reach consumers with messages tend to be relatively fixed with respect to sales in units or market share. This has led analysts to conclude that there is a rather strong element of economies of scale in advertising that may explain the empirically well-established positive correlation between advertising intensity and profitability. It is also recognized, however, that "scale economies" is not exactly the right concept. Advertising, after all, operates on the demand and hence influences unit sales. It seems somewhat peculiar, therefore, to take the latter as fixed in explaining why advertising results in share of market cost advantages.

There is a relatively straightforward way of avoiding this theoretical box. One can think of a firm as using resources to produce a product and then using more resources to sell it. Or, more usefully, one can think of it as using resources to generate revenues: some of those resources are used in creating a production to sell; other resources go into selling it. If you take the latter view, then advertising and selling activities are inputs to a process that generates revenues. That production function often exhibits economies of scale; hence, there are potential entry barriers associated with it.

H. Interdependencies Between Supply and Demand

There are some additional elements of structure that researchers have observed in case studies of particular industries, which I should like to comment on briefly. One of them concerns a relation between supply-side concentration and demand growth. It is not hard to find examples of industries in which buyers are reluctant to become dependent upon one or a small number of firms because of the loss of bargaining power. Where possible, buyers will avoid buying from concentrated industries, and that acts as a negative entry barrier in the industry. The buyers may actually favor (and, to some extent, protect) the new entrant. This feature is easy to observe in the high fructose market that developed in the 1970's as a substitute for sugar.

A second phenomenon concerns the investment by factors of production in the technology of a particular firm's products. It has been argued that part of IBM's market power stems from the

fact that with a large share, most people who are trained in programming and software development are trained on IBM equipment and systems. A buyer who wants to hire programmers will, therefore, find a larger and better developed market if he purchases the equipment of the dominant firm. Formally, this phenomenon would have the features of the demand-side learning effect. The demand would increase with accumulated volume.

I. Product Development Costs and Economies of Scale

Let me finally describe what I believe to be an increasingly important aspect of industry structure. In some industries, product development costs represent a substantial fraction of total cost, as a result of the opportunities for developing new products or reducing costs. Sometimes high development costs result from rapidly changing demand. The latter can be induced by changes in prices elsewhere in the economy or by other factors. The computer industry is one in which product development costs have historically figured prominently. And it appears to be increasingly characteristic of the automobile industry, where petroleum prices and some regulatory activity have pushed up the product development costs and the rate of product change.

Product development costs are largely fixed costs. Their impact on average costs is therefore smaller, the larger the sales volume over which those costs can be amortized. Industries with these characteristics will exhibit a strong tendency to become highly concentrated, and the dominant-firm structure is common. While more work needs to be done on the question of what

kinds of equilibrium market structures are likely to emerge under these conditions, my conjecture (if you will permit me one) is that symmetric equilibria in terms of market share are unstable. That does not mean that the end result is a monopoly (in the literal as distinct from the legal sense). While the cost functions may appear to have the characteristics of a natural monopoly, it is by now well known that driving smaller competitors out of business in a dynamic setting is not always, or even usually, a good investment for the large firm.

I mention this aspect of industry structure in part because I believe that there is an important subset of American industries that will find that the fixed costs of staying in business are a rising fraction of total costs. The forces causing the changes are diverse; they include rapid changes in technology (especially in the semiconductor and integrated circuit industries), rapid changes in relative prices in sectors like energy, and the advent of significant foreign competition in many sectors. In the not-too-distant future, many of the affected markets will become antitrust concerns. It is probably useful to begin now to think about what the best policy responses might be.

In the course of the evolution of an industry, firms make investment decisions based on calculations of the returns to the investments. The decisions are interactive in the game-theory sense. Part of the process of developing a coherent investment strategy is the calculation of the moves that are likely to be made by rivals, because those moves will affect one's rate of

return. The most likely investment decisions of one's rivals are not independent of one's own investment decisions. And therefore part of the return to most investments consists of the deterrent effect it will or may have on one's rivals' investment behavior. The point I want to make is simply that most strategic investments are entry- or expansion-detering. That is not their only objective, but it is almost always part of the calculation of the return. It is difficult at best--and, quite conceivably, logically impossible--to distinguish between entry-detering investment and other kinds of investment.

A combination of structure, timing, and past history will create strategic opportunities which firms will exploit by committing resources to the point where the marginal returns equal the perceived costs of capital. Part of the marginal return will consist of the damping effect of the investment on the extent of rivals' expansion. Many investments have this preemptive component. Its importance varies from industry to industry with the structural characteristics I adverted to earlier. In a dynamic context, entry or expansion deterrence is an integral and ordinary part of the competitive process; it is not something that can be isolated as unusual or abnormal and then eliminated by regulation. Nor does taking into account the deterrent effects of one's own investment behavior involve peculiar business planning or practice. On the contrary, ignoring these effects would seem to businesspeople to be unusual in the extreme.

IV. International Competition

I adverted to foreign competition in a previous section without dwelling on it. For several reasons, it deserves a prominent place in a general discussion of competition policy. I will not expose you to a long discussion of the subject, but I do want to make some observations that might influence the way in which foreign competition is viewed in an antitrust context.

Foreign competition is not ignored in antitrust proceedings. For example, it is a legitimate counterclaim to a charge of monopolization that there is competition from non-U.S. firms and from imports. But there is still a strong tendency to treat the U.S. market as the relevant market and to regard foreign competition as a minor qualification. In fact, there is a growing number of markets in which the relevant market is the worldwide market.

Foreign competitors are potentially a powerful competitive force, because they can and do sell into the large U.S. market at something approximating marginal cost. This is particularly true of competition emanating from relatively protected, and large, domestic markets like that in Japan. The costs associated with product development, learning, and the like, are recovered in the domestic market, while the costs of exports are treated as incremental. The domestic market may be protected to ensure that cost reductions achieved through serving the domestic market are not diluted by imports. Historically, such a strategy at the national level was necessary to be competitive by U.S. standards.

Even without the aid of a protected domestic market, a firm that can achieve a large share of market worldwide can afford higher product development costs, which result eventually in competitive advantages.

This paper is not the place to attempt a lengthy explanation of the internationalization of many domestic markets. But certainly the trend has been created by a combination of forces. Tariff and other trade barriers have been negotiated downward. The relative size of non-U.S. markets has been growing and providing arenas where foreign competitors can expand to become cost-competitive. And the economies that were severely damaged by the Second World War are building back to more normal levels of activity, investment, and consumption. All this is creating a situation in which U.S. firms and industries face increasingly powerful competitors who have large bases in non-U.S. markets and who often operate in cooperation with their respective governments.

From an antitrust standpoint, increasingly effective foreign competition presents some interesting problems and possibilities. From a strategic standpoint, U.S. policy should be devoted in part to ensuring that non-U.S. markets are not effectively blocked to U.S. corporations at the same time as U.S. markets are relatively open. A failure to pursue such policies will ultimately result in an erosion of the competitive positions of U.S. industries. For competition policy, foreign competition represents an interesting

alternative to operating directly or indirectly on domestic industry structure. Exposing a domestic industry to foreign competition and reducing the domestic industry's concentration are alternative ways of achieving competitive outcomes. In fact, we ought to use a combination of foreign competition and domestic structure to achieve the desired competitive outcomes. Foreign competition, I should say, is regulated by tariff and nontariff barriers.

I am currently involved in some research that focuses on the tradeoffs involved in optimally exploiting antitrust and trade policy. Let me briefly try to provide the flavor of the problem. If, for structural reasons of the type discussed earlier, there are efficiencies associated with high concentration, some of the benefits of concentration can be obtained without having the kinds of pricing problems that would normally occur in a closed economy, by matching increases in concentration with tariff reductions. Such a policy has two effects: it will increase the competitiveness of U.S. firms in non-U.S. markets, and it may reduce tariff revenues. Both these factors need to be taken into account.

To implement coordinated policies in the trade and antitrust areas, we need to become more knowledgeable than we currently are about the answers to a number of questions. For example, how does the optimal combination of trade and concentration vary with the size of the domestic market relative to the worldwide market? How is it affected by the comparative advantage or disadvantage of

domestic and foreign firms in terms of costs (and by costs I mean cost functions: actual costs are endogenous and responsive to policy), the concentration of the nondomestic part of the supply side of the market, the policies and strategies pursued by other countries, the magnitude of economies of scale, learning effects, and product development opportunities and costs?

These are hard questions to answer, but certainly not impossible. And I believe they are important enough to invite the attention of academics and policymakers in the relevant areas of microeconomic regulation, including especially antitrust.

V. Antitrust Policy

The time has come to try to say something about what all this means for antitrust policy in the monopoly area, broadly defined. Let me preface these remarks by saying that I do not regard myself as an antitrust expert. These thoughts are at best a basis for discussion, and certainly not well-worked-out policy proposals.

My first observation is this. To the extent that one's objective is the improvement of market performance as conventionally measured by the present value of the net surplus, then it is not at all clear that preventing market power from developing (even if one could) would be desirable. In industries where the structural basis for market power is a scale economy or a learning effect, relatively efficient market structures may entail having powerful firms or groups of firms.

A second observation is that the structural environment of industries that evolve toward monopolies, near-monopolies, or concentrated oligopolies, is often such that behavior that is normally considered to be predatory is not required for the concentrated outcome to occur. It seems to me unreasonable to expect firms to calculate the returns to their strategic investments in abstraction from what their rivals are expected to do. And what rivals will do depends on precisely those investments. These mutually recognized interdependencies are factors in the investment decisions of firms. The result is an equilibrium in the dynamic sense. Dynamic equilibria often result in market power positions and the dominance of market segments by individual firms, for structural reasons discussed in the previous two sections.

On the other hand, while market power is the natural result of strategy and structure, I can think of a few industries that require a monopoly structure to be efficient markets as large as those in the United States. (I would not say the same thing about smaller countries, whose problems in this area seem to me rather different from ours.) Hence, there is some merit in looking for ways of preventing unnecessarily high levels of concentration, ways that do not place arbitrary restrictions on the private sector and that run minimal risks of impairing market performance and the competitive position of the U.S. industry in world markets. The extent to which this is possible will almost surely

depend upon the structural characteristics of industries and hence will vary from one industry to the next.

A third observation would be the following. Attempting to prevent monopoly power by looking for predatory or unfair conduct whenever and wherever monopoly power develops, strikes me as a costly and ineffective policy strategy. Standards for predation sufficiently stringent to prevent monopoly power in all cases would be considerably more stringent than those we have now. And they would run the risk of constraining firms in ways that are counterproductive and arbitrary. I want to make it clear that I am not arguing against the existence or enforcement of laws prohibiting predatory behavior. The point is rather that this will not and should not serve effectively as the main weapon in the arsenal for dealing with the market power and related performance problems.

There is a related point that deserves comment. Neoclassical price theory notwithstanding, there is a partial conflict of objectives between business and the public sector. There are instances in which the formulation and implementation of strategies by businesses that are in every sense effective and normal business practice, result in market outcomes that are not ideal from the broader perspective of overall market performance. There is a widely accepted myth that the pursuit of profit by "legitimate" means will always result in the right results. Not only is it not true, unless one defines "legitimate" in such a

way as to make it a tautology; acceptance of it biases the process of changing the market outcome toward a search for what must be there according to the theory, namely, some kind of unacceptable conduct.

In saying there is partial conflict of objectives, I do not mean to imply that all instances in which the conflict surfaces should be regulated. Sometimes the cure is worse than the disease. Indeed, the policy problem is to know or to learn what if any market processes are regulatable at reasonable cost and low risk, and by what means. It is hard to start thinking about this problem if one believes that except in a few unusual regulated sectors, the problem does not exist.

One way to deal with these problems is to define activities which result in the acquisition of a monopoly position in a market as unacceptable. That is a logically coherent position, but it amounts to prohibiting monopoly. In particular, the distinction between legitimate and illegitimate means of acquiring monopoly power would essentially disappear. There is, however, a difference between operating directly on structure and operating on conduct at the level of remedies. Preventing monopoly by conduct restrictions may involve the plaintiff in guessing what combinations of activities would, if excluded, have prevented the evolution toward monopoly. When the basis for the monopoly power is largely structural, that game can be frustrating and ineffective.

I do not want to convey the impression that I believe there are no instances in which monopoly power is acquired by economically illegitimate means. On the contrary, examples of predatory conduct do exist, and the law as I understand it is adequate to deal with them.

But the study of strategic investment behavior, intertemporal industry evolution, and the underlying structural determinants of both of these--theoretically, and in the context of case studies--suggests to me, and I hope to others, that there is and will continue to be a significant subset of industries that do not lend themselves to this approach to regulating market power. And I would therefore conclude that we ought either to find alternative ways to regulate, or not regulate at all.

Because structurally based monopoly problems usually stem from some scale economies (broadly defined to include demand-side phenomena and dynamic effects like learning) that are large in relation to the size of some market or market segment, I find the idea of actively using foreign competition as a regulatory device attractive. Considerable expertise is required to do this, because the tradeoffs between efficiency, competitiveness, and the benefits of foreign profits and domestic tariff revenues are complicated, to say the least. And there are other complicating factors. At the moment, trade and competition policy are implemented by different organizations operating relatively independently. That would have to change. In addition, the problem of

negotiating general reductions in trade barriers, while at the same time employing potential foreign competition as a regulatory instrument at the industry level, should prove challenging to the best minds we have. But in spite of these problems, I believe that there is a subset of U.S. industries where controlled import competition is a more sensible and effective regulatory device than deconcentration, constraints on investment behavior, or other remedies that would fall within the scope of domestic competition policy.

Obviously, foreign competition is not a short- or medium-run solution to market-power problems in all afflicted industries. There is, for example, a collection of oligopolistic consumer goods industries in the United States that have persistently achieved high rates of return with no obvious concomitant risks that might justify the observed returns. These industries have been a source of concern to antitrust agencies for some time. Many such industries have little or no foreign competition, essentially because the market expertise required to compete tends to be country-specific. Some of the attempts to deal with market-power problems in these industries within the framework of existing law seem (to this outside observer) to have involved excessively creative applications of the law, to the point where the whole process looks like a costly and somewhat indirect form of rate-of-return regulation. Once again, it appears to me that our regulatory approach through antitrust has been ineffective because of the apparent need to claim that the market power stems from

abnormal business behavior, when it may in fact be the result of normal dynamic competitive interaction and underlying structure.

It is perhaps useful to note that other countries deal with the monopoly problem in somewhat different ways. The British Monopolies Commission, for example, appears to be able to intervene rather more directly in industries that are identified as having some sort of performance problem. I hasten to add that I am not an expert on the Monopolies Commission, but my impression is that the legal context in which its decisions are made and reviewed is somewhat more flexible than our antitrust law.

In certain industries, the entry barriers may result from practices that one would not want to argue are per se illegitimate, but which are in the context of a particular industry rather powerful entry-excluding devices. Some of the examples I have in mind involve exclusive dealerships, with possible examples being the automobile industry (historically) and hearing aids. I am sure there are others. It seems to me that it ought to be possible to devise a regulatory mechanism that permits the Government to disallow such practices in particular cases, after a suitable investigation into the costs and risks of taking that action, without having to argue either that the practices are the result of collusion or that they are unacceptable in all cases.⁹

⁹ Exclusive dealerships, in fact, may be an area in which the law has been applied flexibly and with some sensitivity to the structural differences among markets.

To an economist, the problem with the antitrust law in the monopoly area is not so much what it contains as what it does not contain. It correctly identifies and prohibits classes of actions that are both outside the range of normal competitive business behavior and likely to result in poor market performance. Where it is less effective is in dealing with the existence of market power whose origins do not fit the above description. One might argue that the law was never intended to apply to the latter cases. But if that is true, then I think it would be hard to defend some of the monopolization cases brought in the past 10 to 15 years. The arguments in a number of cases with which I am familiar have an air of economic unreality that is associated with the need to make the arguments fit the facts of the case to a model that does not apply. The cases I have in mind are ones in which there is little or no dispute about the presence of market power, notwithstanding endless debates about the definition of the relevant markets.

In reviewing some of the forces and strategic considerations that influence the evolution of industries' structures, I hope to have created the impression of a rich variety of possibilities and outcomes. This is entertaining for academics who enjoy trying to untangle the web of interacting influences. And it is of course all too easy to apply that knowledge critically to the activities of those who try to modify and enforce the rules within which the economy will operate. There will always be some tension between the general rule and its application to the particular case.

Nevertheless, I believe that recent research provides some help, and future research will provide considerably more help in understanding the process of industry's structural evolution. More to the point from a policy point of view, it provides some categories and some structural phenomena with which to classify industries into groups. Groups of industries will differ by the sources of the market power of the firms that have it. And they will therefore also differ in the ways in which they will respond to policy intervention. It is the last fact that is most relevant from a policy standpoint.

The ability to group industries on the basis of their structural similarities and hence the sources of the market power ought to provide a useful input to the process of selecting and screening cases, and to the formulation of policy at that level. It does not provide simple answers concerning what rules or standards to apply in judicial proceedings. My own view is that the state of our understanding of both dynamic strategy and intertemporal market performance is currently insufficient to justify confident conclusions with respect to rules and standards. But I do think that it is better to admit ignorance than to defend rules based on incomplete static models of industries.

The only conclusions about which I am sure is that the effectiveness of the antitrust process in the United States, insofar as it regulates monopolies and market power, will be substantially affected for the foreseeable future by the sophistication

that can be brought to bear in the analysis and selection of cases and by the imagination that is exercised in finding alternative ways of achieving the objective of improving market performance.

COMMENTS ON "COMPETITION, ENTRY, AND ANTITRUST"

William S. Comanor*

There are fashions in economics, as in other areas of endeavor. Once-accepted doctrine is rejected in favor of a "new learning," which then becomes widely accepted. And the process repeats itself.

This process is a traditional mode of intellectual development in any area of learning. But antitrust analysis is not merely a subject of academic endeavor but has major implications for policymaking. The replacing of new learning for old influences court decisions and affects the development of antitrust law to the extent that current decisions reflect discussion of these issues.

One of the more important areas of "new learning" in anti-trust is the primary focus of this seminar: the implications for antitrust policy of the strategic behavior of private firms. What this term includes is a wider range of firm conduct than had earlier been considered. It extends beyond the limits set by

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collusive and independent firm behavior. While previous discussions of business conduct were limited to one or the other of these two approaches, the concept of strategic firm conduct represents something broader.

Exactly what it represents, however, is still subject to debate. Does it simply indicate the recognition of mutual interdependence, that firms account for the expected conduct of their rivals, or is it something else? Whatever the appropriate definition, this term surely includes the recent literature on predatory conduct as well as the related discussion of entry deterrence and limit pricing. In this regard, I would commend the useful guide to much of this literature by George Hay.¹

A most interesting facet of the new literature dealing with strategic behavior concerns our changing view of landmark anti-trust cases. Specifically, I refer to one of the more interesting cases of the postwar period: the Alcoa decision of 1945.²

When this decision was handed down, it was heralded as the "new Sherman Act," or the "new Section II." It was viewed as representing a new law on monopolization which imposed stringent responsibilities on firms with market power. Henceforth, it was suggested, there would be increased emphasis on structural factors. We believed, then, that firm behavior followed directly

¹ See George A. Hay, "A Confused Lawyer's Guide to the Predatory Pricing Literature," this volume.

² United States v. Aluminum Co. of America, 1948 F.2d 416, 1945.

from the underlying structure of the market, so that the latter represented most of what was required. We had confidence in our knowledge of the direct impact of market structure on both competition and industry performance. For this reason, there was less emphasis on "intent" and more on the economic consequences of market structure in particular industries. Indeed, "intent" was dismissed with the classic line that "no monopolist monopolizes unconscious of what he is doing."

However it was heralded when it appeared, this decision has been subject to considerable questioning more recently. What had been new was now rejected, and the mildest term applied to this once pathbreaking decision was "troublesome."³ The conduct complained of was largely the expansion of industrial capacity ahead of demand. But was not this simply prudent and foresighted behavior? And what could be wrong with it? Was not Alcoa behaving as an innovative competitor: keeping prices down, stimulating demand, and preparing to meet that demand? Commentators suggested that this behavior reflected the search for increased efficiency rather than efforts designed to promote monopoly power.

But if that view represented the "new learning," as it was termed by its proponents, there may now be a "new new learning"--

³ Donald I. Baker, "The FTC's Use of Alcoa, DuPont Cases Put More Businesses in Jeopardy," The National Law Journal, Monday, April 23, 1979.

which, as Professor Richard Nelson of Yale once remarked, looks rather much like the old.

Professor Spence's paper is a good introduction to this newest view of firm behavior. His point is that, inevitably, firms behave strategically in making investment decisions. This process is generally part of their investment calculations, so that "part of the returns to most investments consist of the deterrence effect it will or may have on one's rival's investment behavior."⁴

In this setting, Spence provides new support for the Alcoa decision. At the least, his analysis lends credence to the discussion of Alcoa's market behavior in Judge Hand's decision. Spence suggests that we obtain different analytical results and different interpretations of firm behavior when strategic considerations are taken into account than when they are not. And they are ignored in much of the so-called "new learning."

I agree that there is much promise in this new approach in terms of a greater understanding of firm behavior. But there are analytical problems as well in that if anything, this new approach explains too much. It is too inclusive. Indeed Spence suggests that "it is difficult at best, and quite conceivably logically impossible to distinguish between entry-detering investment and other kinds of investment." If all investment is

⁴ A. Michael Spence, "Competition, Entry, and Antitrust," this volume, p. 75.

at least partly strategic and we cannot distinguish that part from the rest, what good is it for antitrust purposes?

But is this right? Isn't there an issue of "intent" which is relevant here? Our concern then might be with action taken specifically to exclude rivals or to predate. Note, however, that if we take this position, we have come full circle to where monopoly policy stood 35 years ago. There are differences, to be sure, but our analysis returns to the question of "intent" as before.

If we have greater understanding of firm conduct which might lead to the achievement of monopoly power, we seem to have less confidence in our ability to do anything about it. I was struck by two points made at the end of Professor Spence's paper. The first is that market power may well accrue to firms in equilibrium. But he also observes that attempting to prevent monopoly power simply by looking for predatory or unfair conduct represents a costly and largely ineffective policy approach. There is the suggestion that such conduct may simply be too pervasive to limit. Just as the antitrust laws have been unable to preclude tacit collusion despite their apparent impact on monopoly power, other forms of strategic behavior may likewise be ignored. This conduct may simply be so implicit in accepted norms of business conduct that it cannot be readily eliminated by governmental decree.

Furthermore, even if other antitrust remedies are imposed, the question must be raised as to what messages are being sent to business firms with regard to what conduct is permitted and what

conduct is not. We must be conscious of such signals; and here they are unclear.

Professor Spence's paper raises a number of challenging questions. The answers are few, but it does point the way to increased attention to a new set of concerns. The paper in this volume by Hurwitz and Kovacic has more practical considerations in mind. It looks for answers to issues concerning predatory conduct in the pattern of judicial decisions. They have suggested that liability generally requires both the presence of anticompetitive intent and a prospective effect which was more likely to cripple the other firm than to outperform it. Fair enough, but do these two elements not frequently go hand in hand, as suggested by Professor Spence? And then what? Do we look for the predominant effect, or the absence of one effect, or what? In particular, what is the role played by the question of "intent"?

At this point, we cannot draw many conclusions as to the implications for antitrust analysis of strategic behavior. Although this conduct may be so pervasive in business behavior that it cannot be banned, it must be taken into account as we examine and appraise market behavior generally.

COMMENT ON "COMPETITION, ENTRY, AND ANTITRUST"

W. J. Liebeler*

It is hard to find fault with an analysis that starts with the proposition that antitrust laws are likely to be most productive when applied to cartels and to mergers leading to monopoly or near-monopoly levels. I would be inclined to stop there, but if we were to adopt such a sensible approach, there would be little justification for this conference or for most of the antitrust enforcement activities of our host.

Nor is it easy to quibble with a paper that finds impractical any standards for controlling predatory practices other than an average cost standard and which goes on to point out that such a standard would probably have rendered the faltering A&P's principal comeback attempt illegal, while at the same time legitimizing a great deal of activity that Professor Spence, at least, believes to be entry-detering.

I also find congenial the idea that the greatest improvement in market performance comes with the move from one to two firms. I share also Professor Spence's concern with the question of how

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individual firms or groups of firms acquire and maintain positions of market power, which leads directly to his consideration of uncertainty, scale economies, and learning curves. Most refreshing are his explicit recognition of the tradeoff between "competitiveness" and productive efficiency, and his tentative conclusion that entry ceases "in the neighborhood of the point where competition and cost efficiency are optimally traded off." He says:

. . . at the point where further entry is unprofitable, the benefits of an additional firm from more price competition about equal the cost increases resulting from dividing the cumulated industry output among more firms.

The fact that this conclusion "is not a logical deduction from a model, but rather a generalization from calculated equilibria for numerous cases" is noteworthy for at least two reasons. First, it introduces at least one fact into the predatory behavior debate, and second, it suggests that entry into this new academic industry has far surpassed this generally optimal level that Professor Spence finds in the markets he has studied. If we are searching for market failure related to predation, we are, I believe, looking in the wrong place. The editors of the Yale Law Journal and those that provide them with their inputs are not doing as well as other sectors of the market.

I was somewhat concerned, at first reading, to note that Professor Spence seemed to think that the Alcoa and the Du Pont-

titanium dioxide complaint¹ approaches to regulating prior investment behavior seemed to have some merit. After finishing the paper, however, it seems that his true view is that while they may have some merit, they do not have much. I hope that we take to heart his warning that more rigorous predatory pricing rules may not induce more entry--assuming that to be a desirable result--but may only alter investment decisions, and that it is basically impossible to regulate that activity with even remote likelihood of success.

Professor Spence's recognition that entry or expansion deterrence "is an integral and ordinary part of the competitive process" and "not something that can be isolated as unusual or abnormal and then eliminated by regulation," coupled with his empirical findings that in those areas he has studied, entry apparently occurs up to approximately optimal levels, suggests that the market is alive and doing quite well. While that might not argue well for increased budgets for the FTC, it should give us some satisfaction to be led to conclude that while the world may not be the best of all possible ones, it is not doing badly on its own.

His discussion of antitrust policy does not support increased attention to "predatory" behavior. It is not clear to Professor Spence, as it is not to me, that "preventing market power from

¹ The Commission dismissed this complaint in October 1980. E. I. du Pont de Nemours & Co., 3 Trade Reg. Rep. #21,770 (FTC Oct. 20, 1980).

developing (even if one could) would be desirable." This, of course, has obvious implications outside the predatory pricing area as well. Nor is it clear that predatory pricing has much if anything to do with monopoly or concentrated oligopoly. In addition, "attempting to prevent monopoly power by looking for predatory or unfair conduct whenever monopoly power develops" strikes Professor Spence as a "costly and ineffective policy strategy."

His conclusion, that sometimes the cure is worse than the disease, seems to have been reached without extensive firsthand experience with the FTC. While that may make the conclusion less offensive to our hosts, I am willing to surmise that if he had had anything like my experience as director of the Office of Policy Planning and Evaluation of that institution, he would have expressed his conclusion in more universal terms. His conclusion, that we ought either to find alternative ways to regulate or not regulate at all, is one with which I agree completely.

I must admit to some difficulty with Professor Spence's views of the relationship between tariffs and antitrust policy. I would have thought that we should generally oppose tariff restrictions, unless they were needed to protect domestic firms from foreign competition that does not bear costs, such as those associated with domestic environmental protection regulation, for example. If tariffs are an appropriate subject of antitrust concern, it should, in my view, be along the lines of the antitrust division's

campaign--more recently endorsed and taken up by the FTC--against ill-advised government regulation.

All in all, however, I generally agree with Professor Spence's remarks. I suspect, however, that his rather dim view of the likely efficacy of attempting to regulate predatory pricing or other "strategic" behavior will not be so warmly endorsed by our hosts.

CURRENT LEGAL STANDARDS OF PREDATION

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I. Introduction

There is a substantial gap between the recent literature analyzing predation--especially the economic literature--and the attempts of courts to identify and redress such conduct. This is hardly surprising. A consensus has yet to emerge within the legal or economic communities as to what, in theory, should constitute predation. Moreover, courts must temper theoretical economic concerns with evidentiary, procedural, and jurisprudential considerations. Indeed, one may reasonably ask how well even an accepted economic definition of predation could be applied in the courtroom environment of incomplete facts, disputed interpretations, unsettled theory, and limited economic expertise.

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This paper examines what has been occurring in the courts. It has two purposes. The first is to describe the current state of the law regarding predation and significant trends that are developing. The second is to explore the considerations that courts--and therefore economists and others--must weigh in evaluating the legal utility of rules that may be sound as a matter of economic theory. Toward these ends, we first review the legal context into which any economic analysis of predation must fit, emphasizing in particular the evolving legal standards for predatory pricing, innovation, and promotion. We then analyze how courts have applied these legal standards, such as they are, in three particularly instructive cases: Janich Bros., Inc. v. American Distilling Co.;¹ Berkey Photo, Inc. v. Eastman Kodak Co.;² and Transamerica Computer Co. v. International Business Machines Corp.³ Finally, we examine certain patterns we found in 32 recent predation cases. This examination includes a box score summary of how the cases came out--who won, in what kinds of cases, and at what procedural stage--plus some analysis of the

¹ 570 F.2d 848 (9th Cir. 1977), cert. denied, 439 U.S. 829 (1978).

² 603 F.2d 263 (2d Cir. 1979), cert. denied, 100 S. Ct. 1061 (1980).

³ 481 F. Supp. 965 (N.D. Cal. 1979), appeal docketed, No. 80-4048 (9th Cir. Jan. 31, 1980).

judicial and administrative considerations underlying those outcomes.⁴

II. Legal Context

Antitrust law tries to control predation principally through application of Section 2 of the Sherman Act, which prohibits, inter alia, monopolization and attempts to monopolize.⁵ As traditionally formulated, "monopolization" requires the existence of monopoly power plus some conduct indicating "the willful acquisition or maintenance of that power, as distinguished from growth or development as a consequence of a superior product, business acumen, or historic accident."⁶ Traditionally stated, an attempt to monopolize under section 2 requires:

⁴ For our survey we included cases through September 1980, in which pricing, innovation, or promotion were central elements of the plaintiff's predation claims. A detailed explanation of the methods we used to select cases for study is contained in the appendix. The box score summary, in chart form, also appears in the appendix. The statistics upon which this paper relies are based upon the status of the investigated cases as of September 1980.

⁵ 15 U.S.C. § 2 (1976). Predation is sometimes alleged in price discrimination and merger cases, brought under §§ 2 and 3 of the Robinson-Patman Act and § 7 of the Clayton Act, respectively. 15 U.S.C. §§ 13, 18 (1976).

⁶ United States v. Grinnell Corp., 384 U.S. 563, 570-71 (1966). Some authorities have suggested that the conduct element is not clearly mandated by the statutory history, language, or purposes of section 2. 3 P. Areeda & D. Turner, Antitrust Law ¶623a (1978) [hereinafter cited as Areeda-Turner Treatise]. See also, Berkey, 603 F.2d at 298 n. 57; Report to the President and the Attorney General of the National Commission For the Review of Antitrust Laws and Procedures 151-63 (1979) [hereinafter cited as NCRALP Report].

1. The specific intent to control prices or destroy competition;
2. Predatory or anticompetitive conduct directed toward the end; and
3. A dangerous probability of success.⁷

To receive damages for either offense, the plaintiff must show not only that it individually suffered measurable harm from the defendant's anticompetitive conduct, but also that the injury was of a type which the antitrust laws were designed to prevent.⁸

The definition of each of the elements of the monopolization and attempt to monopolize offenses is a matter of controversy and is in flux. This is important because the particular definitions adopted for the various companion elements of these offenses appear to have a large bearing on how a court defines and interprets the anticompetitive-conduct element. Additionally, one might suspect from reading the cases that courts may sometimes define the requisite elements of liability and damages with

⁷ Swift & Co. v. United States, 196 U.S. 375, 396 (1905). See also NCRALP Report, supra note 6 at 144-49.

⁸ Brunswick Corp. v. Pueblo Bowl-O-Mat, Inc., 429 U.S. 477 (1977). Writing for a unanimous Court, Justice Marshall stated:

Plaintiffs must prove antitrust injury, which is to say injury of the type the antitrust laws were intended to prevent and that flows from that which makes defendants' acts unlawful. The injury should reflect the anticompetitive effect either of the violation or of anticompetitive acts made possible by the violation.

Id. at 489. For a recent application of this standard, see Purex Corp. v. Procter & Gamble Co., 596 F.2d 881 (9th Cir. 1979).

greater stringency because a successful private plaintiff's damages are trebled.⁹

A second important legal context for analyzing predation is Section 5 of the Federal Trade Commission Act, which authorizes the Commission to challenge "unfair methods of competition."¹⁰ As interpreted by the courts, this authority permits the FTC to challenge not only violations of the "letter" of the Sherman Act, but also incipient violations of the "spirit" of that Act.¹¹ Unlike Section 2 of the Sherman Act, Section 5 is available only for public enforcement. Of course, private plaintiffs may introduce proven Section 5 violations as evidence in their Section 2 suits, but this, without more, would establish a basis for a treble damage award only where the Section 5 violations also constituted violations of the "letter" of the Sherman (or Clayton) Act.¹²

⁹ Clayton Act § 4, 15 U.S.C. § 15 (1976). See, e.g., Transamerica, supra note 3, at 1007-08; Berkey, supra note 2, at 288-89. See also SMC Corp. v. Xerox Corp., 463 F. Supp. 983 (D. Conn. 1978); ILC Peripherals Leasing Corp. (Memorex) v. IBM Corp., 458 F. Supp. 423 (N.D. Cal. 1978).

¹⁰ 15 U.S.C. § 45 (1976).

¹¹ FTC v. Sperry & Hutchinson Co., 405 U.S. 233, 244 (1972); FTC v. Brown Shoe Co., 384 U.S. 316, 320-22 (1966); see Averitt, "The Meaning of 'Unfair Methods of Competition' In Section 5 of the Federal Trade Commission Act," 21 B.C. L. Rev. 227 (1980).

¹² In discussing and analyzing the current standards of predation below, however, we concentrate on Section 2, because most of the recent litigation has occurred under that provision, albeit sometimes in combination with Clayton Act, Robinson-Patman Act, or F.T.C. Act claims.

III. Current Standards

A. Pricing. Professors Areeda and Turner touched off the current round of predatory pricing commentary by their proposal in 1975 that prices at or above marginal cost should be conclusively presumed lawful and that prices below marginal cost should be conclusively presumed unlawful.¹³ Areeda and Turner suggest the use of average variable cost as a surrogate for marginal cost in most cases, because marginal cost is so difficult to calculate. Areeda and Turner make three significant exceptions, however. First, they would permit pricing below average variable cost, although above marginal cost, in times of slack demand or excess capacity.¹⁴ Second, they would allow pricing below marginal cost if still above average total cost. Such situations would arise when excess demand pushed output beyond the level where average costs are minimized.¹⁵ And third, Areeda and Turner would permit

¹³ "Predatory Pricing and Related Practices Under Section 2 of the Sherman Act," 88 Harv. L. Rev. 697 (1975) [hereinafter cited as Predatory Pricing]. See also Areeda-Turner Treatise, supra note 6, at ¶¶ 710-22. See note 14 infra and accompanying text for three exceptions. An excellent collection of much of the modern predation literature can be found in "Predatory Conduct and Empirical Studies in Collusion," 10 J. of Reprints for Antitrust L. & Econ. 1 (1980).

¹⁴ See William Inglis & Sons Baking Co. v. ITT Cont. Baking Co., 461 F. Supp. 410, 418-19 (N.D. Cal. 1978), appeal docketed. No. 78-3604 (9th Cir. Dec. 11, 1978), for a case allegedly presenting this situation. By contrast, Transamerica, from the same district and also on appeal, would not permit pricing below average variable cost and would place the threshold of suspicion at average total cost.

¹⁵ Areeda-Turner Treatise, supra note 6 at ¶ 715b2.

temporary promotional pricing below average variable cost when not employed by a monopolist.

The Supreme Court's most recent expression regarding appropriate cost-based measures for predatory pricing was in its 1967 decision in Utah Pie Co. v. Continental Baking Co.¹⁶ This opinion appears to accept at one point that pricing below average total cost may be predatory.¹⁷ Notwithstanding the High Court's comment, the less restrictive Areeda-Turner proposal has become the foundation of or point of departure for predatory pricing analysis in the lower courts.¹⁸ Significantly, however, judges did not adopt this test without qualification. Initially, courts in the Fifth and Ninth Circuits accepted the Areeda-Turner test for markets with low entry barriers. Yet even these early cases fashioned an exception to the rule's strict application where

¹⁶ 386 U.S. 685 (1967).

¹⁷ The Supreme Court treats "below cost" pricing as predatory and defines "below cost" to be "less than . . . direct cost plus an allocation for overhead." 386 U.S. at 698. The High Court does not provide any elaboration on how much and what kinds of overhead costs are to be allocated, nor on the legal significance (mere evidence? presumptive threshold of illegality?) of the standard.

¹⁸ O. Hommel Co. v. Ferro Corp., 472 F. Supp. 793 (W.D. Pa. 1979) is the only case in this survey which applied Utah Pie as controlling precedent. Cf., e.g., International Air Indus. Inc. v. American Excelsior Co., 517 F.2d 714 (5th Cir. 1975), cert. denied, 424 U.S. 943 (1976) (distinguishing Utah Pie). Most cases, however, ignore Utah Pie.

entry barriers are high.¹⁹ More recently, courts have moved toward considering still further tempering factors. In the Tenth Circuit, Pacific Engineering & Production Co. of Nevada v. Kerr-McGee Corp. expresses the need to evaluate market structure and long-range considerations.²⁰ In the Seventh Circuit, Chillicothe Sand & Gravel Co. v. Martin Marietta Corp. strongly echoes the desirability of considering "other factors."²¹ Meanwhile, back in the Ninth Circuit, three new wrinkles have appeared. The district court in ILC Peripherals Leasing Corp. (Memorex) v. International Business Machines Corp. proposes a defense for firms which, regardless of their costs, set prices to meet the prices charged by rivals.²² The court of appeals in California Computer Products, Inc. (CalComp) v. International Business Machines Corp. endorses the Areeda-Turner standard on the facts before it but suggests that in other circumstances, limit pricing might be

¹⁹ International Air Indus. Inc. v. American Excelsior Co., 517 F.2d 714 (5th Cir. 1975), cert. denied, 424 U.S. 943 (1976); Hanson v. Shell Oil Co., 541 F.2d 1352 (9th Cir.), cert. denied, 429 U.S. 1074 (1977); Janich Bros. v. American Distilling. While neither Hanson nor Janich explicitly set forth the high-entry-barriers exception, they relied heavily on Int'l Air, which did. The courts have not described the precise nature of this high-entry-barriers exception.

²⁰ 551 F.2d 790 (10th Cir.), cert. denied, 434 U.S. 879 (1977).

²¹ 615 F.2d 427, 432 (7th Cir. 1980). The court does not spell out what these other factors are, however.

²² 458 F. Supp. 423, 433 (N.D. Cal. 1978), appeals docketed, Nos. 78-3050 & 78-3236 (9th Cir. Sept. 12 & Oct. 6, 1978). Areeda and Turner explicitly reject this approach. Areeda-Turner Treatise ¶ 717.

objectionable, and that a firm's pricing above marginal cost may be predatory because of "other aspects of its conduct."²³ Most recently, the district court in Transamerica distinguishes Ninth Circuit precedent and moves the threshold of suspicion in most situations from average variable cost to average total cost. Finally, the Federal Trade Commission also has substantially endorsed an average-total-cost test in In re Borden (ReaLemon).²⁴ The Western District of Pennsylvania has*relied on Utah Pie to achieve this same result in O. Hommel Co. v. Ferro Corp.²⁵

Overall, we perceive no broadly accepted legal standard for predatory pricing. In future cases, courts may, for example, (1) treat average variable cost as a rebuttably presumptive threshold of illegality, (2) adopt pricing below average total cost as the critical measure of predation, (3) use rule-of-reason analysis for pricing between average variable and average total cost, or (4) abandon all presumptive cost-based approaches in favor of a rule-of-reason analysis. The newest generation of predatory pricing cases suggests, however, that courts are, for the most part, willing to trade the sureness that the strict Areeda-Turner

²³ 613 F.2d 727, 743 (9th Cir. 1979).

²⁴ 92 F.T.C. 669 (1978), appeal docketed, No. 79-3028 (6th Cir. Jan. 10, 1979). This case is notable for its three separate opinions discussing, inter alia, advantages and disadvantages of various predatory pricing tests.

²⁵ 472 F. Supp. 793 (W.D. Pa. 1979).

approach purports to offer for a somewhat more complex analysis, including evaluation of entry barriers.²⁶

B. Innovation. Economic controversies notwithstanding, among courts that have faced the issue, there is little doubt that a firm which is dominant in one market can alter the design of its dominant product to give it a competitive edge in satellite markets for necessarily compatible goods. Whether, and when, such design changes should be characterized as predatory has been a central issue in most of the reported cases against IBM, as well as in Berkey's case against Kodak.²⁷ An important related question, for both liability and remedy issues, has been whether or not the innovating firm has an enforceable duty to predisclose its anticipated design changes to its competitors.

Despite the perceived competitive dangers, courts have been extremely cautious in this area; indeed, design changes--especially those that improve products--have been virtually immune from successful challenge. The Berkey court perhaps says it most clearly: "Because . . . a monopolist is permitted, and

²⁶ The most widely accepted departure from the Areeda-Turner standard has been the expressed willingness of courts to apply cost tests other than average variable or marginal cost, where entry barriers are high. See pp. 62-64 supra and pp. 92-95 infra. Generally, however, these expressions of departure are dicta, for although several opinions have contained a high-entry-barriers qualification, only one--the Federal Trade Commission's Borden decision--contained a finding that entry barriers were high in the case before it.

²⁷ See, e.g., Berkey, supra note 2, at 280-89; Memorex, supra note 9, at 436-37.

indeed encouraged, to compete aggressively on the merits, any success that it may achieve through 'the process of invention and innovation' is clearly tolerated by the antitrust laws."²⁸

The court explained further that it would be difficult, if not impossible, to devise an effective predisclosure rule that would give business managers adequate guidance and protect their incentives to innovate.²⁹ The courts in Telex Corp. v. International Business Machines Corp.,³⁰ Memorex, CalComp, and Transamerica achieved similar, if not identical, outcomes.³¹

This issue is not completely closed, however. Each court addressing the matter did seem to perceive a difference between (1) product improvements and (2) design change for the pure and simple purpose of predation. The question is whether this difference, recognized in theory, can be applied in practice. No court

²⁸ Berkey, 603 F.2d at 281 (citation omitted).

²⁹ In dissenting from the Supreme Court's denial of certiorari, Justice Rehnquist, joined by Justice Powell, took a dim view of suggestions that monopolists may have a duty to predisclose new product introductions, regardless of whether the new product in question was developed by the monopolist acting alone or as part of a joint venture. Berkey, 100 S. Ct. at 1061-62. See note 6251 infra.

³⁰ 510 F.2d 894 (10th Cir. 1975), cert. dismissed, 423 U.S. 802 (1975), reversing per curiam, 342 F. Supp. 200 (N.D. Okla. 1973).

³¹ While Berkey did not purport to create a blanket antitrust immunity for new product introductions, it held that "it is not the product introduction itself, but some associated conduct, that supplies the violation." 603 F.2d at 286 n. 30. For a case involving alleged predatory accumulation of patents, see SCM Corp. v. Xerox Corp., 463 F. Supp. 983 (D. Conn. 1978), appeal docketed, No. 79-7017 (2d Cir. Jan. 8, 1979).

has been especially eager to technically evaluate relative product quality or to second-guess consumer preference. The Memorex court felt that innovation should be immune from challenge as long as there exists a good-faith engineering dispute as to whether the design change had a legitimate purpose.³² Transamerica applied a more generous standard of review but ultimately required that a product change have virtually no redeeming qualities before it could be condemned.³³ Even under this standard, Judge Schnacke did find that IBM had in one clear instance predatorily degraded its product. He held that this would have constituted monopolizing conduct under Section 2, except that IBM lacked the requisite monopoly power. As discussed below, Judge Schnacke also concluded that IBM's conduct was not sufficiently pernicious, without more, to constitute an attempt to monopolize. Berkey, also discussed in greater detail below, provides the only other relatively recent finding of predation in a context of product development and

³² 458 F. Supp at 439. Berkey suggests that one measure of "improvement" may be found in consumer acceptance of the product. See note 63 infra.

³³ The Transamerica court was faced, inter alia, with evaluating a change instituted primarily to hurt competition but which demonstrated some technical advantages over its predecessor and caused only negligible harm to rivals. Finding competitive effect more important than a defendant's intent, particularly in the circumstances before it, the Court nonetheless declared IBM's predatorily inspired act to be lawful. 481 F. Supp. at 1005. See pp. 84-86 infra.

Both Memorex and Transamerica are now on appeal before the Ninth Circuit. Unless, of course, the cases are settled, one or both of these matters may provide the Supreme Court with an opportunity to discuss predation standards for pricing and product development.

introduction. There the court of appeals affirmed a \$1 million award for Berkey on the ground that Kodak had violated Section 1 of the Sherman Act by extracting agreements from Sylvania and General Electric that the two firms would keep secret new flashcubes they were developing in separate joint ventures with Kodak.³⁴ Even this finding is not without a cloud, however, as Justices Rehnquist and Powell sharply questioned its wisdom in their dissent from the Supreme Court's denial of certiorari.³⁵ Thus, in our opinion, the current case law leaves dominant firms relatively free to do as they wish when acting alone in the

³⁴ 603 F.2d at 299-305. The court of appeals refused to accept Kodak's argument that the joint venture disclosure claim was no different from Berkey's attack upon Kodak's disclosure practices for its own cameras and film. Judge Kaufman wrote that "[t]here is a vast difference . . . between actions legal when taken by a single firm and those permitted for two or more companies acting in concert." *Id.* at 301. He added that "[w]here a participant's market share is large, . . . we believe joint development projects have sufficient anticompetitive potential to invite inquiry" *Id.*

The court ruled that joint development agreements between a monopolist and firms in complementary markets were not per se § 1 violations. Among the considerations Judge Kaufman found important in evaluating the challenged agreements' reasonableness were the following:

- 1) Kodak's dominance in cameras had given it leverage which it could use to control the terms of the flashcube's disclosure (*Id.* at 302 n. 67);
- 2) Kodak's technological contributions to the development projects were "arguably minimal" (*Id.* at 304);
- 3) The agreements' effect was to keep a "desirable innovation" off the market for an unnecessarily long time "solely to suit Kodak's convenience" (*Id.* at 302).

³⁵ 100 S. Ct. at 1061-1062. See note 62 *infra*.

product change area. At the moment, the only danger--and it is a relatively slim one--is of liability for a product change with no claim to be an improvement but made with demonstrably predatory intent.

C. Promotion. There have been few predatory promotion cases. One reason appears to be that the nature and variety of promotional activity make analysis very difficult. Some forms of promotion--promotional discounts, for example--greatly resemble price cuts, perhaps even enough to be analyzed under predatory pricing standards. The success of other forms of promotion, however--such as television advertising, for example--may be relatively more dependent on their content than on their cost to the promoter. The timing and geographical location of promotional campaigns--and pricing campaigns as well--may have strategic impact unrelated to the dollar cost of those campaigns.³⁶ Purely cost-based measures of predation, therefore, may not accurately assess such strategic effects.³⁷

³⁶ Some authorities suggest that nonprice forms of competition may be even more effective than pricing as an instrument of predation. See, e.g., Salop and Porter, in this volume; Hurwitz, Kovacic, and Lande, "Judicial Analysis of Predation: The Emerging Trends," 34 Vand. L. Rev. (Jan. 1982).

³⁷ While Areeda and Turner recognized in their original article that advertising may be predatorily increased in response to entry, they acknowledged that they were "not wholly satisfied" with their solution, which treated only extraordinary promotional expenses (e.g., where especially heavy promotion is timed to new entry) as part of average variable cost. Areeda and Turner, "Predatory Pricing," supra note 13, at 729. More recently, their Treatise appears to take the additional step of treating all--not
(footnote continued)

While the cases traditionally seem to accept that promotion may be used to erect or fortify barriers to entry,³⁸ the decisions have not as yet developed any legal standard for addressing the question of predatory promotion, even by monopolists. The most recent case to hold that a dominant firm may have violated the Sherman Act by engaging in various nonprice activities is Hunt-Wesson Foods, Inc. v. Ragu Foods, Inc.³⁹ In that case, Hunt was a new entrant into the spaghetti sauce market, offering a novel "Extra Thick and Zesty" product. Hunt alleged that Ragu, the dominant firm, violated the Sherman Act by: (1) granting price reductions in Hunt's test-market areas; (2) announcing plans to market its own "Extra Thick and Zesty" product shortly before Hunt was scheduled to begin its national promotion; (3) appropriating the phrase "thick and zesty," thus impeding consumer identification of

(footnote continues)

just extraordinary--promotional expenses as part of average variable cost. 3 P. Areeda and D. Turner, Treatise, supra note 6, at ¶721, 721a. See also In re Borden (ReaLemon), 92 F.T.C. 669 (1978); Morning Pioneer, Inc. v. Bismark Tribune Co., 493 F.2d 383, 386 (8th Cir.), cert. denied, 419 U.S. 836 (1974); Buffalo Courier-Express, Inc. v. Buffalo Evening News, Inc., 601 F.2d 48 (2d Cir. 1979).

³⁸ See, e.g., American Tobacco Co. v. United States, 328 U.S. 781, 797 (1946); Mt. Lebanon Motors, Inc. v. Chrysler Corp., 238 F. Supp. 453 (W.D. Pa. 1968), aff'd per curiam, 417 F.2d 622 (3d Cir. 1969); Rea v. Ford Motor Co., 497 F.2d 577 (3d Cir. 1974). See also F.T.C. v. Procter & Gamble Co., 386 U.S. 568, 600-01 (Harlan, J., concurring); Bailey's Bakery, Ltd. v. Continental Baking Co., 235 F. Supp. 705 (D. Hawaii 1969), cert. denied, 393 U.S. 1086(1969).

³⁹ 627 F.2d 919 (9th Cir. 1980).

that phrase with Hunt's product; (4) copying a figure used in each of Hunt's advertising layouts (a spoon pouring sauce over spaghetti) for use in a Ragu national advertisement; and (5) labeling the Ragu sauce to conceal that it was actually thickened by starch, rather than by long simmering.⁴⁰ Thus, Ragu allegedly attempted to predate against Hunt-Wesson both in its pricing and in the timing and content of its promotional activities.

The district court held that Ragu's nonpricing activity did not constitute a Sherman Act violation. The Court of Appeals for the Ninth Circuit disagreed, phrasing the issue and its holding as follows:

[T]he question presented here is whether any market could exist, consistent with the allegations of Hunt's complaint, in which Ragu's non-price-related activities could have contributed to an anticompetitive effect. Assuming the existence of some market power, Ragu's conduct could have made Hunt's entry into the market more difficult and costly, to the detriment of competition generally.⁴¹

The appellate court then remanded the case to the district court for a determination on the merits of the nonprice predation claims.⁴²

The conclusions to be drawn from the predatory advertising and promotional decisions are mixed.⁴³ First, pure advertising or

⁴⁰ Id. at 923.

⁴¹ Id. at 927.

⁴² Id. at 929.

⁴³ Buffalo Evening News, supra note 37, and Lormar, Inc. v. Kroger Co., 1979-1 Trade Cas. ¶62,498 (S.D. Ohio 1979) are the other major predatory promotion cases included in this survey.

promotion cases are rare. Because of this, it is relatively simple for counsel to distinguish legal support for predatory advertising claims by emphasizing the nonpromotional aspects of the cited cases. Second, many of the courts discuss advertising or promotion as a secondary issue or an afterthought. These discussions, therefore, tend to lack the force and depth of analysis that is found in the treatment of other issues. Third, the decisions tend to place an even higher burden of persuasion on the plaintiff in predatory advertising or promotion cases than in pure predatory pricing cases. This result has probably occurred because courts have such a difficult time distinguishing between competitive and predatory behavior in this area. While the distinction is hard to draw in pure predatory pricing cases (despite the availability of cost-based, bright-line standards), it is even harder to draw when promotional and other nonpricing factors are added to the calculus.

In sum, the predatory advertising and promotion cases generally recognize, albeit in dicta, that nonpricing activity can be an instrument of unlawful predation. Indeed, no decision suggests that advertising or promotion cannot or should not be declared predatory in the proper circumstances. The general test, however, to the extent one exists, remains quite tolerant of a business' selection of competitive strategy. As stated in *Berkey*, "[a] monopolist is not forbidden to publicize its product unless the extent of this activity is so unwarranted by competitive

exigencies as to constitute an entry barrier."⁴⁴ Beyond this, however, for more settled standards, one must look outside the province of antitrust to the various private and public regulatory programs.

IV. Three Cases Examined

As the discussion above demonstrates, the legal standards for predatory pricing, innovation, and promotion have undergone significant change in the past 5 years. An examination of three recent, influential cases illustrates how courts are applying these evolving standards in practice. These cases are as follows:

A) Janich Bros., Inc. v. American Distilling Co., a 1977 Ninth Circuit decision involving an alleged attempt to monopolize the distribution of half-gallon bottles of gin and vodka in California by predatory pricing;

B) Berkey Photo, Inc. v. Eastman Kodak Co., a 1979 Second Circuit decision involving alleged attempted monopolization of the amateur-camera, film, and photofinishing markets by various predatory practices connected with product development;⁴⁵ and

⁴⁴ 603 F.2d at 287.

⁴⁵ Berkey claimed that Kodak had violated § 2 of the Sherman Act by (1) using its monopoly in film to improve its position in the amateur-camera and photofinishing-service markets, and (2) using its monopoly in film and color paper to extract supracompetitive prices for both of these goods. In addition, Berkey alleged that Kodak had violated § 1 by conspiring with flashlamp manufacturers
(footnote continued)

C) Transamerica Computer Co. v. IBM Corp., a 1979 district court decision involving alleged attempted monopolization and monopolization of the markets for two computer peripheral devices by predatory pricing and predatory product changes.

A. Janich

In Janich, the Ninth Circuit, per Judge Wallace, closely followed the Areeda-Turner rule by requiring Janich to show that American Distilling had priced below its average variable cost.⁴⁶ Significantly, however, the rigor with which the court applied the Areeda-Turner test appears to have been greatly influenced by the amount and quality of evidence Janich marshaled to prove each of the three major requirements of the attempt offense: intent, dangerous probability, and conduct.

Janich relied essentially upon the disputed pricing strategy to establish all three elements. Although Janich had sought to introduce direct testimony to show American Distilling's predatory intent, Judge Wallace rejected this offer of proof as inadmissible

(footnote continues)

to unlawfully limit the disclosure of a new flashcube. See note 30 supra. A brief, useful discussion of Berkey's claims is contained in a student note, "Antitrust Scrutiny of Monopolists' Innovations: Berkey Photo, Inc. v. Eastman Kodak Co.," 93 Harv. L. Rev. 408 (1979).

⁴⁶ Judge Wallace states that price below average variable cost "ordinarily" is the standard, without specifying what extraordinary conditions would justify a deviation. 570 F.2d at 857.

hearsay.⁴⁷ The weakness of Janich's own evidence, therefore, left the pricing behavior as the sole basis from which the court might infer intent.⁴⁸

One gathers from the opinion that Janich did not try to build a case around entry conditions and their long-run effects--an omission one rarely sees in later cases. Perhaps as a consequence of this, Judge Wallace touched only briefly upon market structure considerations.⁴⁹ He noted, however, that proof of market power

47 Judge Wallace did not express reluctance to receive admissible direct testimony or other "subjective" evidence to discern intent. In general, the judiciary's willingness in certain circumstances to review "subjective" evidence of a defendant's state of mind may stem from the regularity with which judges--especially trial judges--must analyze such proof to discern intent in many types of civil and criminal cases. See Utah Pie, supra note 14, at 696-97 n. 12.

48 In addition to its Sherman Act claim, Janich alleged violations of the Robinson-Patman price discrimination prohibitions and, in turn, asked the court to treat this conduct as evidence of intent. At trial, the jury found for American Distilling on these claims. Judge Wallace upheld this finding on appeal, and therefore declined to use the purported instances of discrimination as proof of intent.

49 For example, the opinion contains no discussion of entry barriers. Judge Wallace relies in part upon Int'l Air Indus. Inc. v. American Excelsior Co., which explicitly posited an entry-barriers exception, 517 F.2d at 724-75, and Hanson, which mentioned, without endorsing, the possibility of using entry-barrier analysis to temper use of an average-variable- or marginal-cost test. 541 F.2d at 1358 n. 5. This, coupled with the statement that pricing above average variable cost "ordinarily" does not create Section 2 liability, suggests that Janich itself leaves the door open for plaintiffs to establish an entry-barriers qualification. Several later district court opinions from the Ninth Circuit have interpreted Janich and Hanson as establishing, or at least allowing, an entry-barriers exception. See, e.g., Memorex 458 F. Supp. 423, at 431-32; Transamerica 481 F. Supp. at 988-89. Cf. Murphy Tugboat v. Crowley, 454 F. Supp. 847, 853-54 & n. 8 (footnote continued)

can expand the range of conduct that satisfies the attempt standard.⁵⁰ Thus, it appears that the court chose a tougher conduct liability standard in part because plaintiff failed to show a market structure conducive to successful predation.⁵¹

Similarly, the court's summary rejection of long-run welfare analysis as a tool for assessing the legality of a pricing strategy may be explained in part by the nature of the evidence before the court. Judge Wallace embraces the Areeda-Turner view that long-run consequences are "intrinsically speculative and indeterminate" and thus unsuited for judicial study.⁵² Yet, on the whole, the opinion does not necessarily say that analysis of long-run consequences is always inappropriate. Rather--and this appears to be the underlying economic rationale of the case--when

(footnote continues)

(N.D. Cal. 1978), appeal docketed, No. 79-4266 (9th Cir. May 2, 1979) (interpreting Janich to require pricing below marginal cost and high entry barriers).

⁵⁰ 570 F.2d at 854 n. 4. Such proof would serve to demonstrate the "dangerous probability" that a course of conduct would result in monopoly power.

⁵¹ Plaintiff also did not persuade Judge Wallace that half-gallon containers of gin and vodka were the proper market in which to analyze American Distilling's pricing policy. The court found that the full line of container sizes was the appropriate market here, although it said a single size, if shown to be sufficiently significant, could constitute a market by itself. 570 F.2d at 856.

⁵² 570 F.2d at 857 n. 9. Unlike Areeda and Turner, who state their assumptions for this position, Judge Wallace does not specify why the nature of the judicial role makes the prediction and evaluation of these consequences inappropriate.

pricing conduct, bereft of independent proof of intent or likely market power, provides the exclusive ground for inferring anti-competitive effects, there is little basis for making sensible long-run predictions, and liability ought to be found only where the conduct in question is likely to have an immediate and significant anticompetitive effect. This rationale may explain why the court adhered closely to the Areeda-Turner rule, which focuses so strongly upon short-run welfare effects.⁵³ In contrast, later opinions acknowledge the difficulty of making accurate long-run predictions but seem more willing to try where plaintiffs give the court more to work with.

B. Berkey

The Second Circuit's Berkey opinion is especially important for its treatment of dominant-firm product innovation.⁵⁴ The court prefaces its review of specific liability standards by discussing at length the chief aims of the antitrust laws.⁵⁵ Judge Kaufman points out that although monopoly power was Congress' central concern in passing the Sherman Act, judicial

⁵³ This analysis draws upon Judge Schnacke's interpretation of Janich in Transamerica, 481 F. Supp. at 988-89, and the Areeda-Turner Treatise, supra note 6, at ¶ 820.

⁵⁴ The court of appeals overturned all but a small portion of an \$87 million judgment won by Berkey at trial. 603 F.2d at 309-10. See text accompanying note 34 supra.

⁵⁵ 603 F.2d at 271-76. But cf. Berkey, 100 S. Ct. at 1061-63 (dissenting opinion of Justices Rehnquist and Powell, stating that some of the propositions enunciated by Judge Kaufman appeared "little less than bizarre").

decisions have virtually always held that Congress did not make the mere possession of monopoly power an offense. Instead, he writes, the courts have perceived a legislative mandate that liability be found only where anticompetitive conduct creating or maintaining the power is proved.⁵⁶ This mandate may be explained, in his view, only by Congressional recognition that it is important to preserve incentives for growth through competitive behavior and innovation, and to ensure fair treatment of firms that have become dominant by such means.⁵⁷

Because Judge Kaufman, therefore, regards the preservation of competitive incentives as an important antitrust policy objective, he declares that "any success that (the monopolist) may achieve through 'the process of invention and innovation' is clearly tolerated by the antitrust laws."⁵⁸ Accordingly, the court rejected Berkey's principal claims that Kodak had a duty to disclose its own product design changes before their commercial introduction.⁵⁹ Berkey had argued that such "predisclosure" was necessary to afford firms competing with Kodak in satellite

⁵⁶ 603 F.2d at 273-75.

⁵⁷ 603 F.2d at 274.

⁵⁸ 603 F.2d at 281. See also id. at 301: "We have stated that we respect innovation, and we have construed § 2 of the [Sherman] Act to avoid an interpretation that would stifle it."

⁵⁹ 603 F.2d at 281, 285. The court, however, viewed Berkey's disclosure argument more favorably where products developed in the course of a joint venture were the issued. See pp. 9-10 and note 34 supra.

markets for compatible goods an adequate opportunity to redesign production and other facilities. The court, however, feared that a disclosure obligation would enable the rivals of an innovative, dominant firm to free-ride on the coattails of that dominant firm's research and development efforts, consequently diminishing its incentives to innovate.⁶⁰

The court did not premise its conclusion entirely on the importance of preserving incentives to compete. Equally important to the court was the administrative difficulty of "discerning workable guidelines" for courts and businesses to follow in determining when predisclosure would be, on balance, procompetitive.⁶¹ Although some passages of the opinion imply that failure to predisclose innovations might be a matter of antitrust concern in some circumstances,⁶² the court felt unable to proceed much

60 603 F.2d at 281-83. The court writes: "If a firm that has engaged in the risks and expenses of research and development were required in all circumstances to share with its rivals the benefits of those endeavors, this incentive would likely be vitiated." Id. at 281.

61 603 F.2d at 282.

62 603 F.2d at 281-82. ("Withholding from others advance knowledge of one's new product . . . ordinarily constitutes valid competitive conduct." [Emphasis added.]) Two members of the Supreme Court apparently believe that failure to predisclose does not constitute an antitrust violation under any circumstances. Justice Rehnquist (with Justice Powell joining) later observed: "If the Sherman Act requires predisclosure by one competitor to another before a new product can be marketed, I think that the raised eyebrows resulting from such a holding should come from this Court, and not from extrapolations by other Federal courts of the decisions of this Court interpreting the Sherman Act." 100 S. Ct. at 1062.

further without the benefit of sensible, administrable tests. One suspects, therefore, that the courts might welcome such tests--if they could be developed.

The importance of administrable tests also was evident in another aspect of the Berkey opinion. Judge Kaufman's analysis indicates that product improvements, not changes per se, are immune from antitrust attack. A crucial--and, it seems, dispositive--factor for Judge Kaufman in determining whether a product is an improvement is the good's success in the market.⁶³ But beyond the market test, the court shrinks from independently evaluating the product's technical merits. This seems largely because the judges are uncertain about how to balance a product's good qualities against its anticompetitive qualities without a market test.

⁶³ To the Berkey court, success need not be universal; it is sufficient that a meaningful number of all users found that the product fulfilled their needs. Judge Kaufman states:

A product that commends itself to many users because superior in certain respects may be rendered unsatisfactory to others by flaws they consider fatal

[I]n such circumstances no one can determine with any reasonable assurance whether one product is "superior" to another. Preference is a matter of individual taste. The only question that can be answered is whether there is sufficient demand for a particular product to make its production worthwhile, and the response, so long as the free choice of consumers is preserved, can only be inferred from the reaction of the market.

603 F.2d at 286-87.

Berkey failed in large measure to show that Kodak's behavior caused it cognizable injury. The court apparently accepted the theoretical validity of some of Berkey's leverage arguments-- stating, for example, that Kodak may have abused its dominance in film and cameras by limiting its new Kodacolor II film to a camera format Kodak alone produced. Nonetheless, the court observed that Berkey had not submitted proof that the practice had caused the firm to lose camera sales.⁶⁴ In this regard the Berkey opinion is representative of a more general phenomenon: by holding that the plaintiff failed to prove that the challenged practices actually caused it measurable harm, courts occasionally have made otherwise difficult and controversial decisions on liability less likely to affect the ultimate outcome of the case.⁶⁵

C. Transamerica

Transamerica is one of several cases that have dealt with challenges to IBM's pricing and product development strategies and found these strategies to be lawful. Transamerica provides an

⁶⁴ 603 F.2d at 288-89.

⁶⁵ See Transamerica, 481 F. Supp. at 1007-08 and n. 109. This is not to say that courts generally have treated damages correctly or incorrectly, but only that such holdings tend to insulate the results from reversal on appeal by rendering harmless any errors made with respect to the legal standards for liability.

interesting contrast with Janich and indicates, we suspect, the type of analysis one might expect in future predation cases.⁶⁶

The first noteworthy feature of Transamerica is the court's market-definition/market-power analysis, which presents the most extensive consideration of economic issues in any of the cases we reviewed. Perhaps most significantly, the court formulates a general definition of entry barriers and then proceeds to evaluate the height of entry barriers in the pertinent markets. For the future, it appears virtually certain that plaintiffs who challenge a dominant firm's behavior will submit proof of entry conditions, either to qualify for the judicially created entry-barrier exception to the Areeda-Turner rule or as part of a rule-of-reason analysis. If, as in Transamerica, courts assess entry conditions as part of the traditional first step in analyzing monopoly power, then they can most likely apply the insights from that inquiry to examine the long-run effects of a pricing strategy with only a modest additional administrative burden.⁶⁷

⁶⁶ The court and the parties used an interesting procedural device at trial. Before either side presented its evidence, the parties stipulated that the case would be submitted to the court for decision, should the jury fail to agree upon a verdict. After the trial, which lasted 7 months, the jury were deadlocked on all the issues. Judge Schnacke, therefore, proceeded to decide the case. 481 Supp. at 974. See also Memorex, 458 F. Supp. at 444-49.

⁶⁷ In an attempt case, a court could likewise apply insights from its evaluation of the "dangerous probability of success"--especially a consideration of market power and entry barriers--to its analysis of conduct.

Second, Judge Schnacke's opinion presents one of several unmistakable departures from the Areeda-Turner average-variable-cost rule.⁶⁸ Like Areeda and Turner, Judge Schnacke immunizes pricing above average total cost and condemns pricing below average variable cost; however, he describes as a "defendant's paradise"⁶⁹ and a "potent weapon in the hands of a monopolist"⁷⁰ a rule which, like the Areeda-Turner rule, gives a blanket sanction to prices between average total and average variable cost. For that range, Judge Schnacke adopts a "rule of reason" approach, principally on the ground that by pricing within this range, a monopolist can exclude equally (or even more) efficient firms if it has an especially "deep pocket" or other exploitable strategic advantages.

Closely related to the court's pricing analysis is its treatment of Transamerica's challenge to IBM's accounting procedures. Transamerica asked the court to reallocate certain of IBM's expenses, with the effect of raising IBM's cost figures for some peripheral equipment.⁷¹ Judge Schnacke thoroughly reviewed plaintiff's arguments but made no bold ventures with the issues--accounting matters about which expert witnesses for both sides

68 See text accompanying notes 19-25 supra.

69 481 F. Supp. at 995 (quoting Williamson, "Predatory Pricing: A Strategic Welfare Analysis," 87 Yale L. J. 284, 305 (1977)).

70 481 F. Supp. at 992.

71 481 F. Supp. at 998-1001.

vigorously disagreed. The court relied heavily upon the consistency of IBM's accounting methods over time to reject Transamerica's claims that IBM's books and profit projections understated its costs.⁷² In addition, Judge Schnacke noted that traditional accounting practices seldom collect marginal cost data in a form that makes the determination of marginal cost easy.⁷³ Although Judge Schnacke ultimately left IBM's accounts untouched, the court and the parties appear to have devoted a significant amount of time to these issues.⁷⁴ In general, challenges to accounting methods may provide a focus for litigation efforts and a source of protraction in future cases.

In evaluating Transamerica's product development claims, Judge Schnacke said he would treat as predatory only those product changes whose sole purpose and effect is exclusionary.⁷⁵ Under this approach, the court did not condemn even predatorily motivated product changes if those changes appear to be improvements. Judge Schnacke adopted this strict view for the same reasons that

⁷² 481 F. Supp. at 998-1001.

⁷³ 481 F. Supp. at 993-94.

⁷⁴ Accounting questions provided the subject matter for a substantial portion of an earlier opinion in this case as well. See In re IBM Peripheral EDP Devices Antitrust Litigation, 459 F. Supp. 626 (N.D. Cal. 1978). See also CalComp, 613 F.2d at 740 n. 19.

⁷⁵ 481 F. Supp. at 1002-03. In Berkey, Judge Kaufman intimates that a dominant firm's purposeful efforts to create technological incompatibilities with its products may warrant scrutiny. 603 F.2d at 283.

moved Judge Kaufman to proceed with extreme caution in Berkey: he wanted to reward and preserve IBM's technological genius and appeared to doubt both that courts possessed the analytical tools to carry the inquiry further and that intent should play an important role in this area.⁷⁶

The Transamerica court did identify one instance in which IBM clearly had degraded the capacity and quality of a component solely to render its central processing units incompatible with its rivals' peripheral equipment. The court, however, shrank from finding either attempt or monopolization liability for IBM on the basis of this act. Had IBM been a monopolist--which it was not, in the court's view--the conduct would have constituted monopolization.⁷⁷ But this same conduct was not sufficiently predatory to create attempt liability, presumably because the court did not believe that this conduct, without more, created a dangerous probability of monopoly. The court buttressed its ultimate conclusion with a finding that Transamerica had failed to prove damages for any of its claims.⁷⁸ Again, this illustrates the manner in which the entire spectrum of litigation issues (including damages and

⁷⁶ 481 F. Supp. at 1003. As suggested in note 75 supra, the Berkey opinion does refer to circumstances in which intent might be more important.

⁷⁷ 481 F. Supp. at 1010.

⁷⁸ 481 F. Supp. at 1007 n. 109.

remedy) operates to determine a defendant's ultimate risk under a liability standard.

V. Patterns

This review of Janich, Berkey, and Transamerica reveals many of the issues that arise when economically inspired legal standards are brought to bear upon complex situations characterized by disputed facts, unsettled theory, and conflicting equities. A return to the broad picture is useful now, however, to investigate important patterns in the outcomes and in the judicial reasoning of a wider spectrum of recent predation cases. In these patterns, we suggest, economists may discover the administrative and jurisprudential issues that beyond facts and theory, also move courts and influence how economic proposals are transformed into legal rules. Specifically, this analysis suggests three broad considerations that help in evaluating the desirability of a proposed legal standard that appears sound in terms of pure economic theory. These are: (1) the frequency with which the truly objectionable conduct may be expected to occur; (2) the likelihood that the conduct described by the proposed rule will have significant anticompetitive or procompetitive effects in particular instances; and (3) the abilities of business managers and courts to understand and sensitively apply any resulting legal standard without excessive uncertainty or expense.⁷⁹ In the

⁷⁹ See Kirkwood, "Comments on Emerging Antitrust Issues Affecting the Conduct of Dominant Firms," 49 Antitrust L. J. (forthcoming).

following sections, we discuss these considerations and some of the more detailed issues each subsumes.

(A) Frequency. There is no consensus on how frequently predation occurs. This disagreement is due in part (although not completely) to the controversies among courts and scholars as to what in theory should constitute predation. Still, despite the uncertainties, the frequency issue is important, for it helps guide policy assessments of whether we should ignore predation, treat it summarily, provide "bright-line" rules of conduct, or subject each alleged instance to the fullest scrutiny. Additionally, an indication of how often predation is judicially found to have occurred may give insights regarding the impact of current legal standards governing liability and relief.

The most inviting starting point for examining this issue is with the statistics of recent predation cases, the "box score."⁸⁰ Of the 32 predation cases covered in this survey, 7 have yet to reach an initial decision on the merits at the trial stage. The opinions in those cases turn mainly on questions of procedure

⁸⁰ The analysis in this paper has been updated as of June 1981, and the analysis expanded by Hurwitz, Kovacic, and Lande, in "Judicial Analysis of Predation: The Emerging Trends," 34 Vand. L. Rev. (Jan. 1982). Of the 51 cases reviewed there, plaintiffs won 4 and lost 34, although some of these cases, including all 4 plaintiff's victories, are on appeal; 8 had yet to reach an initial decision on the merits (opinions on procedural issues were relevant to the survey, however), and 5 others, all defendant's victories, were reversed on appeal, remanded, and still await disposition on the merits. As a general matter, the trends and patterns discussed in this paper persisted as of June 1981.

but also deal in varying degrees with predation standards. Two other cases were reversed on appeal, remanded, and still await disposition on the merits. Of the 23 remaining cases, plaintiffs won 2 and lost 21.⁸¹

One cannot draw definitive conclusions from these numbers, of course, because the figures cannot account for the number or quality of cases that were settled, or unnecessarily pursued, or not brought at all. It is difficult to discern, moreover, whether or how the numbers reflect the impact of prior cases⁸² or the effects of changing economic and social conditions.

Underlying their proposed predation test, Areeda and Turner have an explicit assumption that predation is "highly unlikely."⁸³ Overall, the figures alone serve neither to confirm nor to

⁸¹ Both of the plaintiffs' victories--Borden and MCI Communications Corp. v. American Tel. & Tel. Co., 969 Antitrust & Trade Reg. Rep. (BNA) A-3 (N.D. Ill. June 19, 1980), appeal docketed, No. 80-2171 (7th Cir. 1980)--are now on appeal. Among the 32 cases we examined, 13 were decisions on the merits, for which no further proceedings or appeals were possible. Defendants won all of these cases. The appendix gives the numbers in greater detail, identifies the cases placed in each category, and provides important qualifications regarding how certain cases have been classified.

⁸² Prior cases may have influenced the size and composition of the current array of predation cases. Indeed, plaintiffs may well have been encouraged to file suit by the Supreme Court's 1967 Utah Pie decision; by Control Data's lucrative settlement (including attorney's fees) of its monopolization suit against IBM in 1972; and by the huge district court awards of damages to Telex and Berkey (both later reversed). We cannot measure precisely, of course, the impact of such encouragement on the quality of cases brought.

⁸³ Areeda-Turner Treatise, supra note 6, at ¶ 711c.

contradict this. Clearly, there seems to be more than an incidental perception that predation is occurring but an equally strong pattern in the outcomes favoring defendants, suggesting that true predation has not occurred. This inference is strengthened by the absence of significant entry barriers in most of the cases considered.⁸⁴ On the other hand, by contrast with the current rarity of plaintiffs' victories, Professor Koller found that in cases prior to 1971, the plaintiff prevailed in 45 cases, while the defendants won only 28.⁸⁵ This suggests that the current cases reviewed have been somewhat more meritorious than their outcomes indicate, and/or that the Areeda-Turner formulation may have made the law's application far tougher for those who perceive themselves to be injured by predation.⁸⁶

⁸⁴ The presence of four factually similar cases against IBM may inflate the numbers of defendants' victories somewhat, although of four different courts each had the opportunity to apply its own analysis. The four cases, which contain a mixture of pricing and product-development issues, are Transamerica, CalComp, Telex, and I.L.C. (Memorex). To these one might add a fifth case, Greyhound Computer Corp. v. IBM, 559 F.2d 488 (9th Cir. 1977), cert. denied, 434 U.S. 1040 (1978), which we classify as a pricing case.

⁸⁵ Koller, "The Myth of Predatory Pricing: An Empirical Study," 4 Antitrust L. & Econ. Rev. 105, 110-11 (Summer 1971). Altogether, Koller examined 123 predation cases. Defendants won 28, private plaintiffs won 12, the Justice Department won 8, the FTC prevailed in 25, another 32 resulted in consent decrees, and 18 were decided on procedural issues.

⁸⁶ This conclusion should be restricted to private plaintiffs. Only 2 of the 32 cases we reviewed were brought by the Government, making this sample too small to draw any conclusions. In fact, this private-plaintiff/Government-plaintiff breakdown should serve to qualify somewhat any conclusions about the impact of the Areeda-Turner test on general liability standards, for courts in
(footnote continued)

Firm conclusions remain elusive. While the sheer volume of recent predation cases may tend to detract from the Areeda-Turner view that true predation is rare, defendants clearly have enjoyed overwhelming success in that litigation. On individual analysis, the facts of most plaintiff's cases seem quite thin by current standards; entry barriers have been almost uniformly low, independent evidence of the defendant's anticompetitive intent has sometimes been lacking,⁸⁷ and, in some cases, defendant's prices have not even been below his average total costs.⁸⁸ While a possible explanation for these weak cases is that true, demonstrable predation does not occur, a less dramatic conclusion would be that by the time these cases were decided, the "rules of the game" had been changed by theoretical economic and legal developments. Regardless, it is clear that if predation does indeed exist, it is a more complex and less clear-cut phenomenon than these plaintiffs would have liked to believe. The academic debates continue unabated. For the present, therefore, the spate of scholarly

(footnote continued)

private cases may have been reluctant to subject a defendant to treble damages or may have perceived only a weak causal link between the defendant's conduct and the plaintiff's alleged injury.

⁸⁷ See, e.g., Hanson, note 19 supra; Janich, note 1 supra; Buffalo Courier-Express, note 37 supra; Lormar, note 43 supra.

⁸⁸ See, e.g., Americana Industries, Inc. v. Wometco de Puerto Rico, Inc., 556 F.2d 625 (1st Cir. 625); Transamerica, note 3 supra; Chillicothe, note 21 supra.

commentary which criticizes the Areeda-Turner position and emphasizes the strategic aspects of predation suggests that the possibilities of sophisticated predatory conduct should not yet be ignored.⁸⁹

B. Competitive dangers. In assessing the competitive dangers of predation, courts are wary of the potential dangers to competition from judicial attempts to limit predation.⁹⁰ Courts display, for example, substantial deference for innovators and for firms that have developed their industries.⁹¹ Judges express reluctance to risk inhibiting a dominant firm's operations, unless both the need for such action and the method for accomplishing it are clear. The opinions are at best mixed in their attitudes

⁸⁹ See, inter alia, Hay, "A Confused Lawyer's Guide to the Predatory Pricing Literature" (1980), this volume, and Joskow and Klevorick, "A Framework for Analyzing Predatory Pricing Policy," 89 Yale L. J. 213 (1979). Because most of the cases we reviewed were filed before publication of the 1975 Areeda-Turner article, one would need to monitor reported opinions for several more years to assess more fully how judicial acceptance and qualification of the Areeda-Turner rule has affected the litigation and decision of predation cases. The possibility should not be overlooked, of course, that none of the current or prior legal tests of predation adequately distinguish economic predation from competition that enhances long-run consumer welfare. If this is so, then no ratio of plaintiff's victories to defendant's victories would shed light on the actual frequency of predation.

⁹⁰ See, e.g., Hanson, 541 F.2d at 1358-59.

⁹¹ See, e.g., Transamerica, 481 F. Supp. at 982.

toward providing entrants with some measure of special protection, temporary or otherwise, even in situations where the dominant firm's behavior clearly is calculated more to frustrate smaller rivals than to benefit consumers. Indeed, the cases suggest that competitively unsuccessful plaintiffs may bear an extra, unspoken burden of demonstrating that they are not just blaming others for their own failings.

Notwithstanding these important factors, courts have broadened their analysis of alleged predation beyond price/cost relationships. Most prominent among the additional dimensions of competition that courts are considering are entry barriers and the strategic implications of a dominant firm's conduct. Courts seem to believe, with economists, that the competitive dangers of a dominant firm's response to entry are low if the barriers to entry are low. We do not know precisely how courts will treat cases involving high entry barriers, for they have not yet found them to be so.⁹² It may reasonably be presumed, however, that

⁹² In Borden, the Federal Trade Commission found that Borden's ReaLemon trademark was so well established and highly promoted in the face of entry that it did constitute a barrier to entry. 92 F.T.C. at 791.

courts do perceive a greater competitive threat in such situations than do Areeda and Turner, for Areeda and Turner intended their rule to apply regardless of the height of market barricades, whereas courts consistently have emphasized this factor.⁹³

In addition to examining entry barriers, courts have also recognized strategic considerations. They have not tried to analyze them in any formal fashion, as economists of late have been doing. Nonetheless, as Berkey and Transamerica reveal, courts believe that interrelationships among markets can provide a strategic lever, particularly where a monopolistic supplier in one market is a competitor in another. At least one court notes that a firm's reputation as a predator, whether true or false, may effectively deter competition by equally efficient potential rivals.⁹⁴ Overall, the strategic implications of business conduct

⁹³ Areeda-Turner Treatise, supra note 6 at ¶ 714c. It is interesting to note that the judicial opinions we studied reflect little of the controversy that exists in the economist's world regarding the nature and existence of entry barriers.

⁹⁴ Transamerica, 481 F. Supp. at 989-90. Additionally, in an earlier but analogous perception of strategic impact, the Supreme Court in 1967 suggested that mergers may raise entry barriers simply by their effect on market structure: "[T]he substitution of the powerful acquiring firm [Procter & Gamble] for the smaller, but already dominant, firm [Clorox] may substantially reduce the competitive structure of the industry by raising entry barriers and by dissuading the smaller firms from aggressively competing. . . ." FTC v. Procter & Gamble Co., 386 U.S. 568, 578 (1967).

appear ripe for further judicial consideration, although courts still need usable methods for systematically analyzing and evaluating the intricacies of competitive relationships.

C. Administrability. Assuming predation occurs more than rarely and in some circumstances presents a significant competitive danger, courts must decide what, if anything, to do about it. The ideal, of course, is a rule or standard sufficiently sensitive to distinguish between economically desirable and undesirable conduct, yet is sufficiently clear and simple for courts and business managers to apply accurately. Given these goals, the cases reveal a clear tension between "bright-line" approaches and a fuller, "rule of reason" analysis.

In the courts, the prevailing trend appears to be toward the "rule of reason" approach.⁹⁵ One promised virtue of the Areeda-Turner test--simplicity--has been somewhat elusive in the courtroom. Whereas Areeda and Turner have discouraged analysis of

⁹⁵ As noted previously, the stringency of the definition chosen for one of the various legal elements of liability or damages appears to have a large bearing on the definitions adopted for the other elements. As one of the trends we have observed in the cases, this tendency to balance may well be related to, and perhaps contribute toward, the movement of courts away from bright-line standards for predatory pricing. It also may be one factor that has allowed the courts to remain responsive--as indeed they have--to the current flurry of scholarly analysis.

entry barriers and long-run considerations, courts have nonetheless undertaken the first and thereby opened the door to the second. Although Areeda and Turner suggest that average variable cost may be computed without undue difficulty, courts may find that litigators, concentrating their substantial efforts on this critical issue, will increasingly seek to fully discover and restructure in court the defendant's complete cost accounts. Moreover, courts typically have been willing to extend their analyses beyond price/cost relationships to consider non-cost-based evidence of the defendant's intent and arguments about the strategic implications of the defendant's conduct. Thus, courts seem to find a somewhat more complicated approach--an approach more in line with most economists' proposals--to be both administrable and consistent with their own sense of where the greatest dangers lie.

Notwithstanding the above, certainly no opinion has yet adopted an unbounded "rule of reason" approach. The Berkey court, for example, was concerned that placing some nonspecific duty upon Kodak to predisclose its new product introductions would not give Kodak adequate guidance regarding the exact nature and extent of product changes governed, the extent of the information that had

to be supplied, or the time requirements for supplying that information.⁹⁶ Similarly, while a firm may find it difficult to determine exactly when its price dips below average variable cost, a standard that includes other factors as well could be even more difficult for firms to follow.⁹⁷ In essence, if businesses cannot predict the application of predation rules to their activities, either their incentives to compete vigorously will be chilled through self-restraint, or their rewards for hard competition will be jeopardized by the risk of litigation.

⁹⁶ Berkey, 603 F.2d at 282-83. As discussed above, the court of appeals did go so far as to condemn Kodak for preventing a joint venture from disclosing the nature of the flashlamp upon which they were working, a view Justices Rehnquist and Powell later criticized. See note 62 supra.

⁹⁷ See, e.g., Schmalensee, "On the Use of Economic Models in Antitrust: The ReaLemon Case," 127 U. Pa. L. Rev. 994, 1028-29 (1979) (comments on Scherer's proposed multiple-factor analysis of predatory pricing). We note that courts have not yet attempted to apply proposals suggesting restriction of a dominant firm's output in the face of new entry. Such an approach is outlined by Williamson, in "Predatory Pricing: A Strategic and Welfare Analysis," 87 Yale L. J. 284 (1977). Nor have courts attempted to prevent dominant firms from making nonpermanent price reductions in the face of entry, as suggested by Baumol, in "Quasi-Permanence of Price Reduction: A Policy for Prevention of Predatory Pricing," 89 Yale L. J. 1 (1979).

The tension is not gone. There are still relatively clear, almost per se, protections for innovation. By contrast, no specifically formulated test for predatory promotion has yet gained currency, and rule-of-reason analysis therefore prevails. In the middle, judicial treatment of pricing has been moving somewhat toward a hybrid solution, with conclusive presumptions against pricing below marginal cost and in favor of pricing above average total cost, and a "rule of reason" analysis in between. The hybrid approach has a certain appeal, for it reduces the range of situations that require complicated analysis, yet allows fuller analysis in borderline cases.⁹⁸ As economists and others expand our knowledge of competitive relationships and activities, one hopes we will be able to limit the range of uncertainty still further, singling out more precisely the cases presenting the greatest danger to competition and consumer welfare.

⁹⁸ See Joskow and Klevorick, "A Framework for Analyzing Predatory Pricing Policy," note 89 supra.

APPENDIX

A. Note on Methodology

The statistical summary of recent predation cases included in this appendix focuses upon the three categories of activity that commentators widely regard as the most significant and appropriate subjects for analysis: pricing, innovation, and promotion. These types of conduct have occupied the overwhelming share of modern scholarly commentary on the subject of predation. Complicating this selection process was the broad variety of business practices which reported opinions have treated, at least for analytical purposes, as potentially predatory. While not promising to be exhaustive, therefore, the survey seeks to catalogue and categorize most reported opinions since 1975 in which pricing, innovation, or promotion were major ingredients of the plaintiff's monopolization, attempt-to-monopolize, or price-discrimination claims.

Applying the selection criterion described above, we examined but excluded cases in which judges or litigants have characterized as predatory several other forms of behavior. Chief among these types of conduct are:

- Exclusive Dealing Arrangements. See, e.g., Fleeer Corp. v. Topps Chewing Gum, Inc., 1980-1 Trade Cases ¶ 63,420 (E.D. Pa. 1980).

- Refusals to Deal. See, e.g., Almeda Mall, Inc. v. Houston Lighting & Power Co., 615 F.2d 343 (5th Cir. 1980); Alladin Oil Co. v. Texaco, Inc., 603 F.2d 1107 (5th Cir. 1979); Byars v. Bluff City News Co., 609 F.2d 843 (6th Cir. 1979); Pacific Coast Agricultural Export Ass'n v. Sunkist Growers, Inc., 526 F.2d 1196 (9th Cir. 1975), cert. denied, 425 U.S. 959 (1976); United States v. CBS, Inc., 459 F. Supp. 832 (C.D. Cal. 1978).
- Shifting From A System of Dual- to Self-Distribution. See, e.g., Photovest Corp. v. Fotomat Corp., 606 F.2d 704 (7th Cir. 1979), cert. denied, 100 S. Ct. 1278 (1980); Knutson v. The Daily Review, Inc., 548 F.2d 795 (9th Cir. 1976), cert. denied, 433 U.S. 910 (1977); Coleman Motor Co. v. Chrysler Corp., 525 F.2d 1338 (3d Cir. 1975).
- Tying Arrangements and Full-Line Forcing. See, e.g., SmithKline Corp. v. Eli Lilly & Co., 575 F.2d 1056 (3d Cir.), cert. denied, 439 U.S. 838 (1978); Sargent-Welch Scientific Co. v. Ventron Corp., 567 F.2d 701 (7th Cir. 1977), cert. denied, 439 U.S. 822 (1978).
- Vertical Price Squeezes. See, e.g., City of Mishawaka v. American Electric Power Co., 616 F.2d 976 (7th Cir. 1980), petition for cert. filed, 49 U.S.L.W. 3054 (U.S. June 27, 1980) (No. 79-3054); Columbia Metal Culvert Co., Inc. v. Kaiser Aluminum & Chemical Corp., 579 F.2d 20 (3d Cir.), cert. denied, 439 U.S. 876 (1978).
- Vexatious Litigation. See, e.g., Lektro-Vend Corp. v. Vendo Co., 1980-2 Trade Cas. ¶ 63,444 (N.D. Ill. 1980).

In addition, we excluded cases in which the plaintiff has alleged pricing, innovation, or promotion-based predation, but the court's opinions have not yet addressed the merits of those claims or the standard for assessing them. See, for example, Zenith Radio Corp.

v. Matsushita Electric Industrial Co., 1980-2 Trade Cas. ¶ 63,288 (E.D. Pa. 1980).

The appendix itself has three parts in addition to this methodological note. The first is a list, by judicial circuit, of the cases included in our statistical analysis. The second is a chart that classifies the opinions according to the type of predation alleged, the procedural stage at which the court rendered its decision, and the outcome. This chart should be read in conjunction with the "Explanatory Notes" describing our classifications for cases that did not fit precisely into one category or another. The final section is a "box score" table that numerically summarizes that data presented in the classification chart.⁹⁹

⁹⁹ The authors wish to thank Peter Koenig for his assistance in preparing the classification chart.

B. POST-AREEDA-TURNER PREDATION CASES

1st Circuit

- A. Americana Industries, Inc. v. Wometco de Puerto Rico, Inc., 556 F.2d 625 (1st Cir. 1977).

2d Circuit

- B. Berkey Photo, Inc. v. Eastman Kodak Co., 603 F.2d 263 (2d Cir. 1979), cert. denied, 100 S. Ct. 1061 (1980).
- C. Brager & Co., Inc. v. Leumi Securities Corp., 84 F.R.D. 220 (S.D.N.Y. 1979).
- D. Buffalo Courier-Express, Inc. v. Buffalo Evening News, Inc., 601 F.2d 48 (2d Cir. 1979).
- E. SCM Corp. v. Xerox Corp., 463 F. Supp. 983 (D. Conn. 1978), appeal docketed, No. 79-7017 (2d Cir. Jan. 8, 1979). See also 599 F.2d 32 (2d Cir. 1979) and 474 F. Supp. 589 (D. Conn. 1979).

3d Circuit

- F. O. Hommel Co. v. Ferro Corp., 472 F. Supp. 793 (W.D. Pa. 1979).
- G. Outboard Marine Corp. v. Pezetel, 461 F. Supp. 384 (D. Del. 1978). See also 474 F. Supp. 168 (D. Del. 1979).
- H. Structure Probe, Inc. v. Franklin Institute, 450 F. Supp. 1272 (E.D. Pa. 1978).
- I. Weber v. Wynne, 431 F. Supp. 1048 (D. N.J. 1977).

5th Circuit

- J. International Air Industries, Inc. v. American Excelsior Co., 517 F.2d 714 (5th Cir. 1975), cert. denied, 424 U.S. 943 (1976).

6th Circuit

- K. Lormar, Inc. v. Kroger Co., 1979-1 Trade Cas. ¶ 62,498 (S.D. Ohio 1979).

7th Circuit

- L. Chillicothe Sand & Gravel Co. v. Martin Marietta Corp., 615 F.2d 427 (7th Cir. 1980).
- M. MCI Communications Corp. v. American Tel. & Tel. Co., 969 Antitrust and Trade Reg. Rep. A-3 (N.D. Ill. June 19, 1980), appeal docketed, No. 80-2171 (7th Cir. 1980). See also 462 F. Supp. 1072 (N.D. Ill. 1978).

8th Circuit

- N. Inter City Oil Co. v. Murphy Oil Corp., 1976-1 Trade Cas. ¶ 60,948 (D. Minn. 1976).
- O. United States v. Empire Gas Corp., 537 F.2d 296 (8th Cir.), cert. denied, 429 U.S. 112 (1976).

9th Circuit

- P. California Computer Products, Inc. (CalComp) v. IBM Corp., 613 F.2d 727 (9th Cir. 1979).
- Q. Foremost International Tours, Inc. v. Qantas Airways, Ltd., 478 F. Supp. 589 (D. Hawaii 1979), appeal docketed, No. 79-4764 (9th Cir. Nov. 2, 1979).
- R. General Communications Engineering, Inc. v. Motorola Communications & Electronics, Inc., 421 F. Supp. 274 (N.D. Cal. 1976).
- S. Greyhound Computer Corp. v. IBM Corp., 559 F.2d 488 (9th Cir. 1977), cert. denied, 434 U.S. 1040 (1978).
- T. Handguards, Inc. v. Ethicon, Inc., 601 F.2d 986 (9th Cir. 1979), cert. denied, 100 S. Ct. 688 (1980).
- U. Hanson v. Shell Oil Co., 541 F.2d 1352 (9th Cir.), cert. denied, 425 U.S. 959 (1976).
- V. Hunt-Wesson Foods, Inc. v. Ragu Foods, Inc., 627 F.2d 919 (9th Cir. 1980).

- W. ILC Peripherals Leasing Corp. (Memorex) v. IBM Corp., 458 F. Supp. 423 (N.D. Cal. 1978), appeal docketed, Nos. 78-3050 & 78-3236 (9th Cir. Sept. 12 & Oct. 6, 1978).
- X. Janich Bros., Inc. v. American Distilling Co., 570 F.2d 848 (9th Cir. 1977), cert. denied, 439 U.S. 829 (1978).
- Y. Murphy Tugboat Co. v. Crowley, 467 F. Supp. 841 (N.D. Cal. 1979), appeal docketed, No. 79-4266 (9th Cir. May 2, 1979). See also 454 F. Supp. 847 (N.D. Cal. 1978).
- Z. Purex Corp. v. Procter & Gamble Co., 596 F.2d 881 (9th Cir. 1979).
- AA. Robert's Waikiki U-Drive, Inc. v. Budget Rent-A-Car Systems, Inc., 491 F. Supp. 1199 (D. Hawaii 1980).
- BB. Transamerica Computer Co. v. IBM Corp., 481 F. Supp. 965 (N.D. Cal. 1979), appeal docketed, No. 80-4048 (9th Cir. Jan. 31, 1980). See also 459 F. Supp. 626 (N.D. Cal. 1978).
- CC. William Inglis & Sons Baking Co. v. ITT Continental Baking Co., 461 F. Supp. 410 (N.D. Cal. 1978), appeal docketed, No. 78-3604 (9th Cir. Dec. 11, 1978).

10th Circuit

- DD. Pacific Engineering & Production Co. of Nevada v. Kerr-McGee Corp., 551 F.2d 790 (10th Cir.), cert. denied, 434 U.S. 977 (1977).
- EE. Telex Corp. v. IBM Corp., 510 F.2d 894 (10th Cir.), cert. dismissed, 423 U.S. 802 (1975).

F.T.C. Cases

- FF. In re Borden, Inc., 92 F.T.C. 669 (1978), appeal docketed, No. 79-3028 (6th Cir. Jan. 10, 1979).

C. BOX SCORE--CLASSIFICATION OF REPORTED OPINIONS*

		Pricing Cases	Innovation Cases	Promotion Cases
1. Dispositions on the Merits (including pending appeals)				
a.	By defendant's pretrial motions	D won, R ⁹ ,A,AA ⁹ ,G ⁵		
b.	By defendant's trial or post- trial motions	D won L,U,X,Y ⁴ ,CC ⁴	p13,14,W ⁴ ,13,14	
c.	Final decisions on the merits			
i.	Jury Verdict	P won M ⁴ D won J	E ^{3,4}	
ii.	Nonjury Verdict	P won FF ^{4,8} D won H,I,O ⁸ ,Q ⁴ ,DD ¹²	B ¹ ,BB ⁴ ,13,14,EE ^{13,14}	
2. Nonfinal Dispositions				
a.	Plaintiff survived defendant's pretrial motions	C,F,S ^{10,14}		V
b.	Defendant defeated plaintiff's motion for temporary or preliminary injunctive relief	K ⁶ ,N ⁷		D ²
c.	Appeal reversed and remanded Trial Court's decision for _____	P D Z ¹¹	T	

* Notes clarifying our classification of certain cases may be found on pp. 46-47.

C. BOX SCORE--CLASSIFICATION OF REPORTED OPINIONS
(Continued)

EXPLANATORY NOTES

As a general matter, we have used the categories "plaintiff won" and "defendant won" to indicate which side substantially prevailed on the central predation issues before the court. The following are notes that clarify our classification of cases that might have been placed in more than one category.

1. We have treated Berkey as a nonjury verdict for the defendant because the court of appeals reversed, without remand, the principal predation-based verdict for plaintiff. Several lesser predation issues were remanded for further consideration at trial and are outstanding as of this writing.
2. The court of appeals reversed the trial court's grant of a preliminary injunction to plaintiff.
3. Plaintiff here attacked Xerox's accumulation of patents and refusal to grant licenses. The jury rejected certain of SCM's predation claims, and the trial judge ruled that the plaintiff could not recover any damages. The court's ruling on damages is now on appeal to the Second Circuit.
4. Currently on appeal.
5. The trial court granted defendant's motion for summary judgment as to plaintiff's predatory pricing claims. The trial is proceeding on defendant's alleged use of territorial restrictions.
6. Plaintiff's complaint alleged predatory promotion in addition to predatory pricing. The trial court here denied Lormar's motion for a temporary restraining order.

7. The trial court denied plaintiff's motion for a preliminary injunction. At the same time, the court also denied defendant's motion for summary judgment on plaintiff's pricing claims.
8. Government suit.
9. The trial court granted defendant's motion for summary judgment on plaintiff's federal anti-trust claims.
10. The court of appeals reversed and remanded the district court's entry of a directed verdict for defendant.
11. Plaintiff also alleged predatory promotion.
12. The court of appeals reversed, without remand, the trial court's judgment for plaintiff.
13. Also involved important predatory pricing allegations.
14. Litigation involving IBM as a defendant.

D. BOX SCORE--NUMERICAL SUMMARY

		Pricing Cases	Innovation Cases	Promotion Cases	Total Cases	
1.	Dispositions on the Merits (including pending appeals)	P won D won	2 15	6	2 21	
a.	By defendant's pretrial motions	D won	4		4	
b.	By defendant's trial or posttrial motions	D won	5	2	7	
c.	Final decisions on the merits					
	i. Jury Verdict	P won D won	1 1	1	1 2	
	ii. Nonjury Verdict	P won D won	1 5	3	1 8	
2.	Nonfinal Dispositions	No. of Cases	6	1	2	9
a.	Plaintiff survived defendant's pretrial motions		3	1	4	
b.	Defendant defeated plaintiff's motion for temporary or preliminary injunctive relief		2	1	3	
c.	Appeal reversed and remanded Trial Court's decisions for _____	P D	1 1	1	1 1	

A CONFUSED LAWYER'S GUIDE TO THE PREDATORY PRICING LITERATURE

George A. Hay*

The recent wave of economic literature on predatory pricing¹ has caused an acute problem for lawyers and judges who lack extensive training in economics. The literature is at times quite technical; more important is the rate at which policy conclusions from parts of this literature have been appearing in judicial opinions, not only from trial and appellate court judges but

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¹ See Areeda and Turner, "Predatory Pricing and Related Practices Under Section 2 of the Sherman Act," 88 Harv. L. Rev. 697 (1975) [hereinafter cited as Areeda and Turner 1]; Areeda and Turner, "Scherer on Predatory Prices: A Reply," 89 Harv. L. Rev. 891 (1976) [hereinafter cited as Areeda and Turner 2]; Scherer, "Predatory Pricing and the Sherman Act: A Comment," 89 Harv. L. Rev. 369 (1976) [hereinafter cited as Scherer 1]; Scherer, "Some Last Words on Predatory Pricing," 89 Harv. L. Rev. 901 (1976) [hereinafter cited as Scherer 2]; R. Posner, Antitrust Law: An Economic Perspective (1976); Williamson, "Predatory Pricing: A Strategic and Welfare Analysis," 87 Yale L. J. 284 (1977). For restatement and modest modification of the Areeda and Turner position, see their Antitrust Law, vol. III, pp. 148-93. For a more detailed treatment of the link between the economic literature and the emerging legal doctrine, see Brodley and Hay, "Predatory Pricing: Competing Economic Theories and the Evolution of Legal Standards," 66 Cornell L. Rev. 738 (1981).

administrative law judges and regulatory commissions as well.² This development is rather astonishing, given the complexity of much of this literature. It is also somewhat alarming, since the flood of writing does not appear to have produced any consensus among scholars on which of several theories or policy recommendations is most appropriate.

This paper offers an explanation and a commentary on much of the recent literature involving predatory pricing. The purpose of the paper is less to determine the single "best" judicial approach to dealing with allegations of predatory pricing than to focus subsequent discussion by highlighting the major issues that are involved and by isolating the important differences among the approaches taken by various authors.

A point that will be stressed in the discussion is the importance of distinguishing between models of predatory behavior on the one hand and rules to govern predatory behavior on the other. Some writers on the subject may reach differing policy conclusions simply because of differences in the models they employ. For example, models to be discussed will differ in assumptions about

² See International Air Indus., Inc. v. American Excelsior Co., F.2d 714 (5th Cir. 1975); Hanson v. Shell Oil Co., 514 F.2d 1352 (9th Cir. 1976); Janich Bros., Inc. v. American Distilling Co., 570 F.2d 348 (9th Cir. 1977); Pacific Eng'r. v. Kerr McGee 551 F.2d 790 (10th Cir. 1977); In re Borden 891 ATTR E-1 (FTC 1978); Transamerica Computer Company v. International Business Machines Corporation, 936 Antitrust & Trade Reg. Rep. (BNA), (N.D. Cal. October 18, 1979), Chillicothe Sand & Gravel Company v. Martin Marietta Corporation, 949 Antitrust & Trade Reg. Rep. (BNA), (7th Cir. 1980).

the ease of entry, the shape of cost curves, the credibility of a predatory threat, the scale needed to enter efficiently, and the extent of strategic behavior, i.e., reacting to a specific legal standard by adjusting certain aspects of the firm so as to achieve the desired effect without violating the standard.³

However, even where the models of predation are reasonably similar, the policy conclusion may differ because of differences in the factors that are considered in deriving an optimal rule. A major issue here will be the fact that any rule will be employed in an environment of less than full information on the part of prosecutors, courts, and firms that are potentially subject to the rules.⁴ This means that enforcement errors of various kinds may occur, and an optimal rule will reflect a concern with the costs associated with these errors.⁵

The flow of the paper is as follows. I first discuss a very simple model of predation, which I label the classical model, and consider the various analytic arguments that have been raised in

³ For example, if a rule prohibits pricing below variable costs, firms may use a technology that has high fixed and low variable costs specifically for the purpose of achieving a predatory effect without having prices violate the variable cost rule. These issues are treated in much greater depth below.

⁴ For a discussion of how firms might react to a less than precise rule against predation, see Alan Beckenstein and Landis Gabel, "Predation Rules: An Economic and Behavioral Analysis," presented at the December 1979 meetings of the American Economic Association.

⁵ This factor is emphasized in the recent paper by Joskow and Klevorick, "A Framework for Analyzing Predatory Pricing Policy," 89 Yale L. J. 213 (1979).

the context of that model (including, for example, whether predation is ever a rational strategy for a dominant firm). I turn then to the controversial paper by Areeda and Turner, which, in the context of a more formal version of the classical model, focuses on the factors that should be considered in fashioning an "optimal" rule to govern predation. Finally, with the Areeda and Turner policy considerations firmly in mind, I consider criticism and extensions of the Areeda and Turner version of the classical model, focusing particularly on the possibility of large-scale entry with its implications for limit pricing (Scherer) and strategic behavior (Williamson).

I. The Classical Model

The early writings on predation were not greatly concerned with a precise definition or model of predation. However, the concept implicit in most writings is that of a dominant firm pricing below cost for the purpose of eliminating a rival.⁶ The major thrust of those writings was to express skepticism that predatory pricing would ever be a rational strategy for a dominant firm. Thus it would not be attempted, or, if attempted, it would not succeed. Either way, predation did not seem to be a serious policy problem.

⁶ McGee, in the most widely cited article on the subject, implicitly defines predatory pricing as pricing below cost. "Assume that in another market there are several competitors, all of whom Standard wants to get out of the way. Standard cuts price below cost." McGee, "Predatory Price Cutting: The Standard Oil (N.J.) Case," 1 J. Law & Econ. 137 (1958). See also Elzinga, "Predatory Pricing: The Case of the Gunpowder Trust," 13 J. Law & Econ. 233 (1970).

This skepticism about the profit potential in predation was based on two observations. First, given the dominant firm's larger volume of production, it would lose more money during the period of predation than would an equally efficient victim.⁷ At the very least, this condition would require that the monopolist have a substantially deeper pocket than the victim. Even in that situation, the victim, realizing that the predator was losing substantially more money than itself, would need only to locate a wealthy "parent" to help it ride out the storm. Given the long-run profit potential in sharing such a concentrated market, it was believed that such a firm would not be difficult to find. Therefore, since the threat of predation by the monopolist was not "credible," he might as well resign himself to sharing the market.⁸

Second, even if the predation did succeed in eliminating the victim, it would not be profitable unless the monopolist could then recoup his temporary losses by charging a supercompetitive price for some period of time. But this situation requires that there be barriers to entry; and if one firm could enter, there is

⁷ There was a suggestion that this problem could be exacerbated by the victim's choosing to shut down during the period of the price cut, forcing the predator to serve the entire market at a loss, and then reappearing when the monopolist attempted to raise price. See McGee, p. 140.

⁸ Of course, in McGee's analysis, merger was the preferred option. But under present antimerger law, such mergers would not be possible in most circumstances.

a strong likelihood that others would be poised to do so as well once the prices were raised back to supercompetitive levels. Moreover, since the victim's assets are physically intact, they would presumably be available to be put back into action at the first opportunity, either by the victim or by a firm to whom the assets had been sold.

There are several obvious responses that can be addressed to this suggestion that predation would not be likely to be a rational strategy for a dominant firm.⁹ The first has to do with the demonstration value of predatory pricing for a firm that anticipates other prospective entrants over time, or that operates in several geographic markets and anticipates the prospect of entry in those markets if successful entry is observed in the current one. It can be argued that it pays a firm to absorb losses even beyond what it could ever expect to recoup in the market at hand, if by doing so this firm will establish a credible threat to pursue the same policy in any market in which an entrant appears. If the threat is truly credible, it need not be exercised beyond the first time, since future would-be entrants will elect not to challenge the monopolist, figuring that it is a hopeless cause. To make this model work requires only good information (i.e., the story of the predation in the first market has to be communicated to the future would-be entrants), and some nontrivial costs of

⁹ The more fundamental criticisms of the classical model are discussed below.

entry and exit (so that unsuccessful entry attempts are not costless).

Hence Posner, for example, writes:

If, however, a firm operates in number of markets and faces actual or potential competitors each of whom is limited to one of its markets, it may find it worthwhile to expend considerable resources on crushing a single competitor in order to develop a reputation (for willingness to use predatory pricing) that may enable the firm to exclude other potential competitors without any additional below-cost selling. Stated otherwise, the costs incurred by the firm in using predatory pricing in one market may generate greater deterrence benefits in other markets

. . . My conclusion is that predatory pricing cannot be dismissed as inevitably an irrational practice.¹⁰

A second response involves the assumption implicit in the classical model that a rule prohibiting below-cost pricing by a dominant firm is sufficient to catch all instances of socially undesirable predation.¹¹ In particular we accept, for purposes of discussion, the assumption that if the dominant firm does not price below its own costs, no equally efficient rival will be eliminated, but question whether the elimination of a less efficient rival cannot have an anticompetitive effect.¹²

¹⁰ See Posner, supra note 1, at 186.

¹¹ Here we are addressing the rule itself, not the inevitable fact that some below-cost pricing will go undetected.

¹² Yamey has addressed this point as well. Yamey, "Predatory Price Cutting: Notes and Comments," 15 J. Law & Econ. 129 (1972). Note that if the entrant is less efficient, the argument that the dominant firm must incur large losses to eliminate a rival is significantly weakened. Hence, even without the demonstration effect, predation may be a rational strategy.

Consider the case depicted in figure 1. The entrant has costs, labeled MC_e , that are below the monopoly price (P_m) but greater than the costs of the dominant firm (MC_m).¹³ We assume for the moment that the entrant is more or less unique; i.e., if this entrant is eliminated, there will not be another one for some time,¹⁴ and that the monopolist knows this.

Upon entry, the price is assumed to be driven to P_c , the level at which the entrant breaks even.¹⁵ The monopolist, given our predatory pricing rule, can lower price below P_c , so long as he does not go below his own costs. The entrant, foreseeing the prospect of indefinite losses, withdraws, permitting the monopolist to raise price back to P_m and hold it there indefinitely.

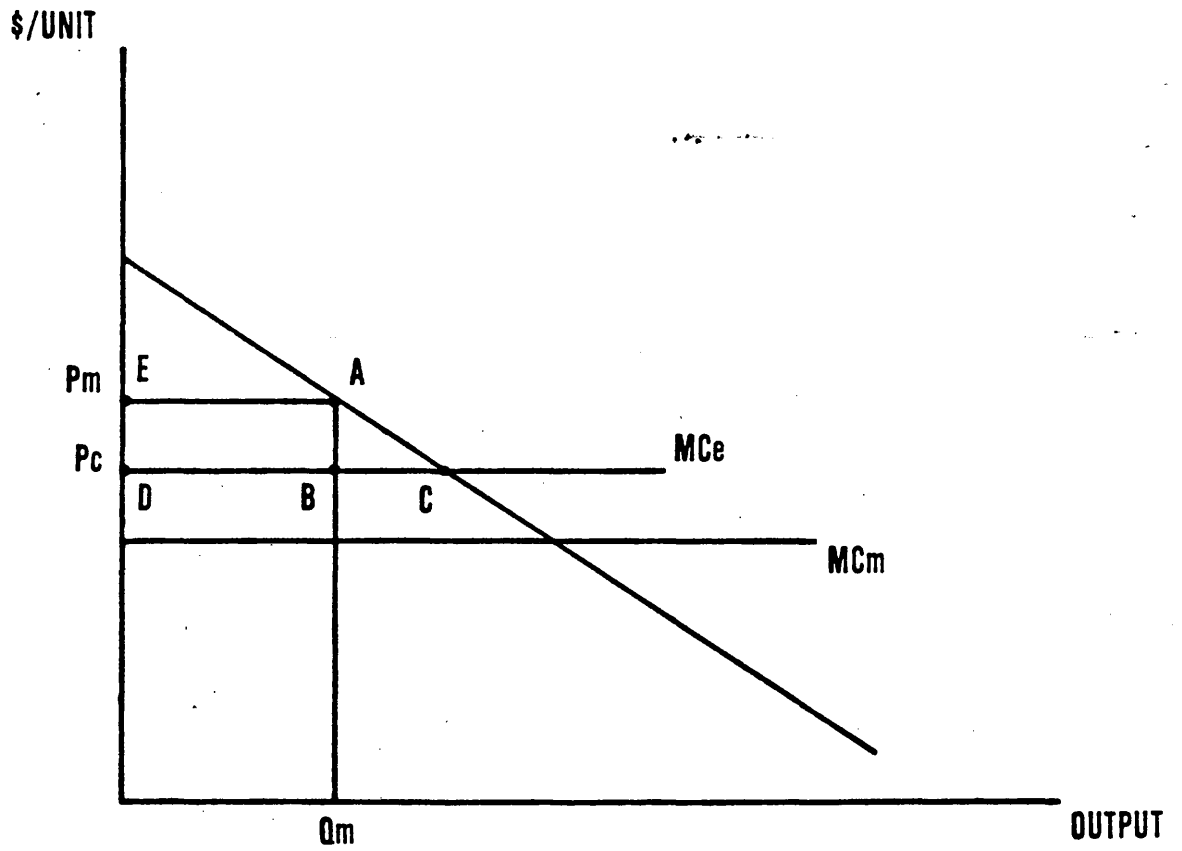
Assuming events unfold as related, it seems clear that if measured by the economic effect, the behavior of the monopolist has been undesirable, even though it has not involved predatory pricing as classically defined. Consumers suffer the deadweight loss in the amount of the triangle ABC and the transfer of

¹³ We will need to introduce nontrivial setup costs to impose some penalty for unsuccessful entry. These costs need not give rise to any significant scale economies, however, and for convenience of exposition, we can draw all cost curves as flat. This assumption is specifically relaxed in the next section.

¹⁴ This could be either due to some barriers to entry--e.g., know-how, which only this entrant is positioned to overcome--or through the disincentive for another attempt at entry, once the monopolist has established the threat to eliminate anyone foolish enough to try.

¹⁵ Obviously, this is a somewhat optimistic assumption.

Figure 1



revenues to the monopolist in the amount of the rectangle ABDE. A partial offset to the deadweight loss ABC stems from the fact that the monopolist is more efficient; that is, there is a waste of society's resources (of the cost difference between the two firms) for every item that is produced by the entrant instead of the monopolist. However, by making appropriate assumptions about the share of the market that would be captured by the entrant at P_C , it is easy to ensure that there remains a net deadweight loss.¹⁶

Based on this admittedly simplified example, we conclude that predation can have an undesirable economic effect even where the victim is less efficient. Hence, even a perfectly enforced rule that prohibits prices from going below the costs of the predator may not eliminate all possible instances of undesirable predation.¹⁷

The literature seems curiously silent on this point and maintains a rather solid antipathy towards the less efficient

¹⁶ For an illustration of this calculation in a somewhat different context, see Williamson, "Efficiencies as an Antitrust Defense Revisited," 125 U. Pa. L. Rev. 699 (1977).

¹⁷ The dilemma becomes even more acute when we introduce concepts such as learning by doing or the experience curve, with their implications that the new entrant is almost inevitably "less efficient" at the early stages. As he accumulates more experience, however, his costs fall, until at some point (hopefully) he is as efficient as (or more so than) the original monopolist. Yet, if the dominant firm can create sufficient short-run losses, the entrant's financial support may evaporate.

The reason for this loss of support is that the financiers cannot be sure that their "infant" will move down the textbook curve. Given this uncertainty, they may be unwilling to underwrite large short-term losses.

entrant. Posner, for example, argues that "a seller may want to weaken or destroy a competitor, but if the only method used is underselling him by virtue of having lower costs there is no rational antitrust objection to the seller's conduct."¹⁸ Similarly, Areeda and Turner conclude that "the low price at or above average cost is competition on the merits and excludes only less efficient rivals."¹⁹

As indicated in our discussion, it is difficult to find analytic support for these conclusions. Hence, on analytic grounds it appears that predatory pricing as depicted in the classical model cannot be dismissed as an irrational or harmless tactic, and, moreover, that a rule prohibiting below-cost pricing

¹⁸ Posner, supra note 1, at 188.

¹⁹ Areeda and Turner, supra note 1, at 706. There are two exceptions to the statement that pricing that fails to go below the dominant firm's costs is assumed in the literature to be procompetitive. Yamey focuses on the use of predation to induce a smaller rival to enter into a tacit or explicit conspiracy and concludes that:

The only special feature of price cutting below cost is that . . . the firm is 'losing money.' But nothing either in McGee's original analysis or in subsequent elaborations depends on this feature.

Insofar as the aggressor's pricing behavior may have the desired effect this will stem from the rival's assessment of the aggressor's determination to frustrate its expectations. (Yamey, supra note 12, at 133, 134.)

Scherer, in an exchange growing out of the original Areeda and Turner article, explicitly recognizes the possibility of a long-run gain from preserving an inefficient competitor in the short run. (Scherer, supra note 1, at 885-87.)

by a dominant firm will not catch or deter all instances of anti-competitive price cutting. It remains to be seen, however, whether in light of the administrative considerations mentioned at the outset a rule prohibiting predatory pricing is desirable, and, if so, whether the optimal rule will protect the less efficient entrant.

II. Areeda-Turner and The Search for an Optimal Rule

In their influential article,²⁰ Phillip Areeda and Donald Turner explicitly consider the issue of an optimal rule to govern predatory pricing. The element that complicates the problem is the fact that in implementing any proposed rule, prosecutors and courts will be operating with something less than full information (concerning, for example, a firm's costs, its financial reserves, and barriers to reentry or subsequent new entry). Hence, no rule will ever be enforced perfectly, because even well-intentioned enforcers will lack the knowledge to make unerring distinctions among situations that appear to be similar. Thus, with any rule, there will be enforcement mistakes. Moreover, there is uncertainty too, on the part of firms that are potentially subject to the rules, regarding what prosecutors and courts will do. This means that in an effort to avoid running afoul of the law, they may eschew actions which are not in fact predatory and which may be procompetitive in nature.

²⁰ Areeda and Turner, supra note 1.

The impact of these factors is that with any given rule against predation, two types of "errors" can result. With no rule at all, or a relatively "loose" rule against predation, there is the risk that some instances of undesirable predation will go unprosecuted. (This would be called an Error of Omission or Type II Error in statistical terminology.) This situation results in the persistence of monopolies and the kind of deadweight loss from resource misallocation usually associated with monopoly pricing.²¹

The risks of this kind of error can be reduced by making the rule against predation tighter (e.g., by prohibiting any price reduction by a monopolist). However, an overly strict rule will also have costs associated with it, viz., the risk that genuinely desirable behavior will be prosecuted or deterred. (The error of mistakenly stopping desirable behavior is called an Error of Commission or Type I error.) In general, the result of tightening the rule to reduce Type II error is to increase the expected loss from Type I error. An optimal rule would reflect the impact of these conflicting forces as well as other elements, such as pure administrative costs, associated with any particular choice of rule.²²

²¹ For a discussion of the economist's concept of deadweight loss, see Posner, supra note 1, at 6-14.

²² Actually, for any given proposed rule there is a subsidiary optimization problem relating to the optimal amount of administrative expense to incur in enforcing the rule.

Areeda and Turner undertake to address these administrative concerns in the context of a formal model of predation that is somewhat more complex than the simple model incorporated in figure 1. In particular, they relax the assumption of constant unit costs and employ a nonlinear U-shaped cost function. The key diagram is presented in figure 2 below. The most obvious complication is that with nonlinear cost functions, the marginal costs, average variable costs, and average total costs are no longer equivalent; hence, it is incumbent on the proponent of such cost functions to be precise about the cost standard that is to be applied in testing for predation.

The cost curves in figure 2 are replicated in figure 3, with two differences. First, the average variable cost curve is omitted for clarity of exposition. The various price/cost combinations discussed in Areeda and Turner employ only marginal costs and average (total) costs.²³ Second, two alternative demand curves are imposed on the diagram--the first (D_1D_1) representing relatively strong demand and the second (D_2D_2), relatively low demand.²⁴

²³ Elsewhere in the paper they suggest that average variable costs could be used as a proxy for marginal costs. As one can see by comparing the two diagrams, the proxy may not be a very good substitute.

²⁴ Since the aim of the price rule is to eliminate the smaller rival, it is appropriate to assume that any price/quantity choice by the monopolist must be on the industry demand curve.

Consider the monopolist's possible responses to a new entrant under either of the two possible states of demand. (Note that the monopolist's original price is not indicated in figure 3. We need know only that it was high enough to make it attractive for the entrant.) Consider first the demand curve labeled D_1D_1 . We focus on three possible prices the monopolist might choose.²⁵ Price P_a is clearly above both the monopolist's average cost for output Q_a and his marginal costs for that output. The monopolist is not losing money (although he may not be earning as much as he could), and any price higher than P_a would worsen resource misallocation in the short run.

If P_a is not low enough to eliminate the entrant under the demand conditions of D_1D_1 , the monopolist may have to drop price even further--say, to P_b . Given that the monopolist is producing output Q_b , it is clear from the diagram that the price covers average costs but is below marginal costs and results in some resource misallocation from excess production.

If P_b is not low enough to exclude the entrant, the monopolist would find it necessary to lower price to P_c . At the output Q_c associated with P_c , the price does not cover either the monopolist's marginal costs or his average costs. Not only does the monopolist misallocate resources directly (by producing output for which price is less than marginal cost), but the rival

²⁵ Obviously, the monopolist will only go as low as is necessary to force the entrant out of business.

Figure 2

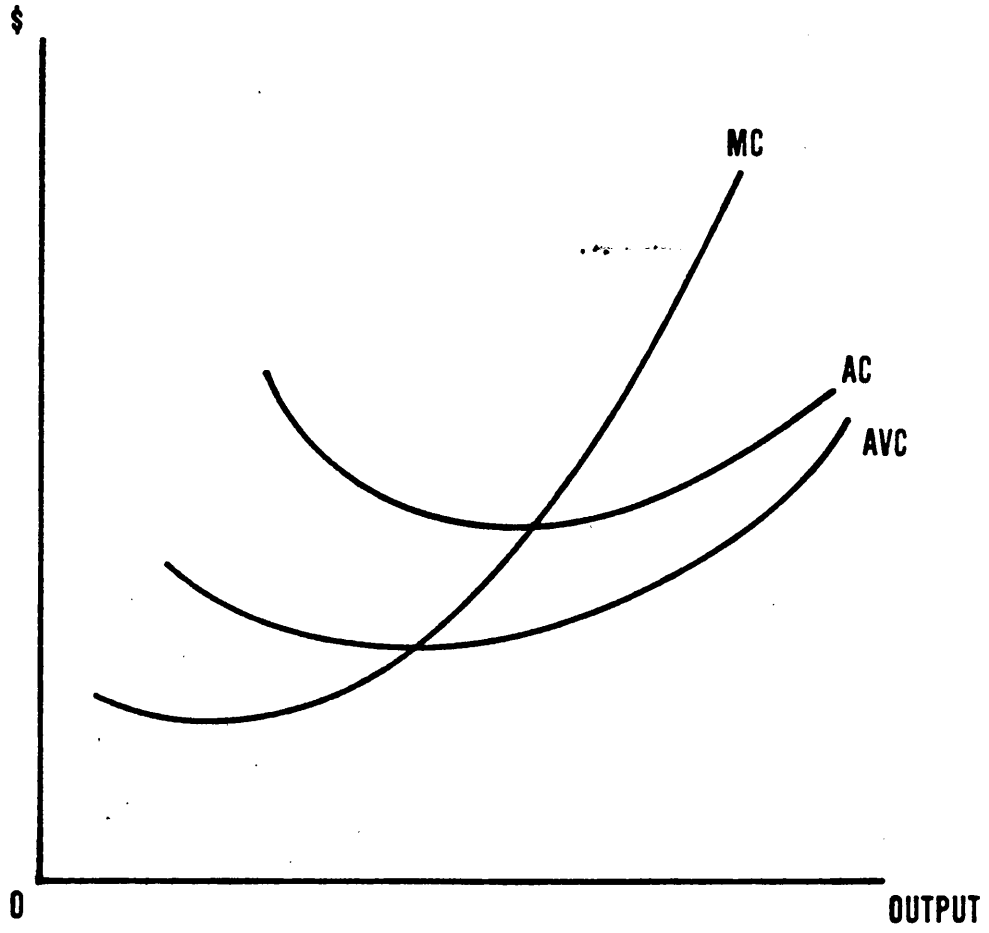
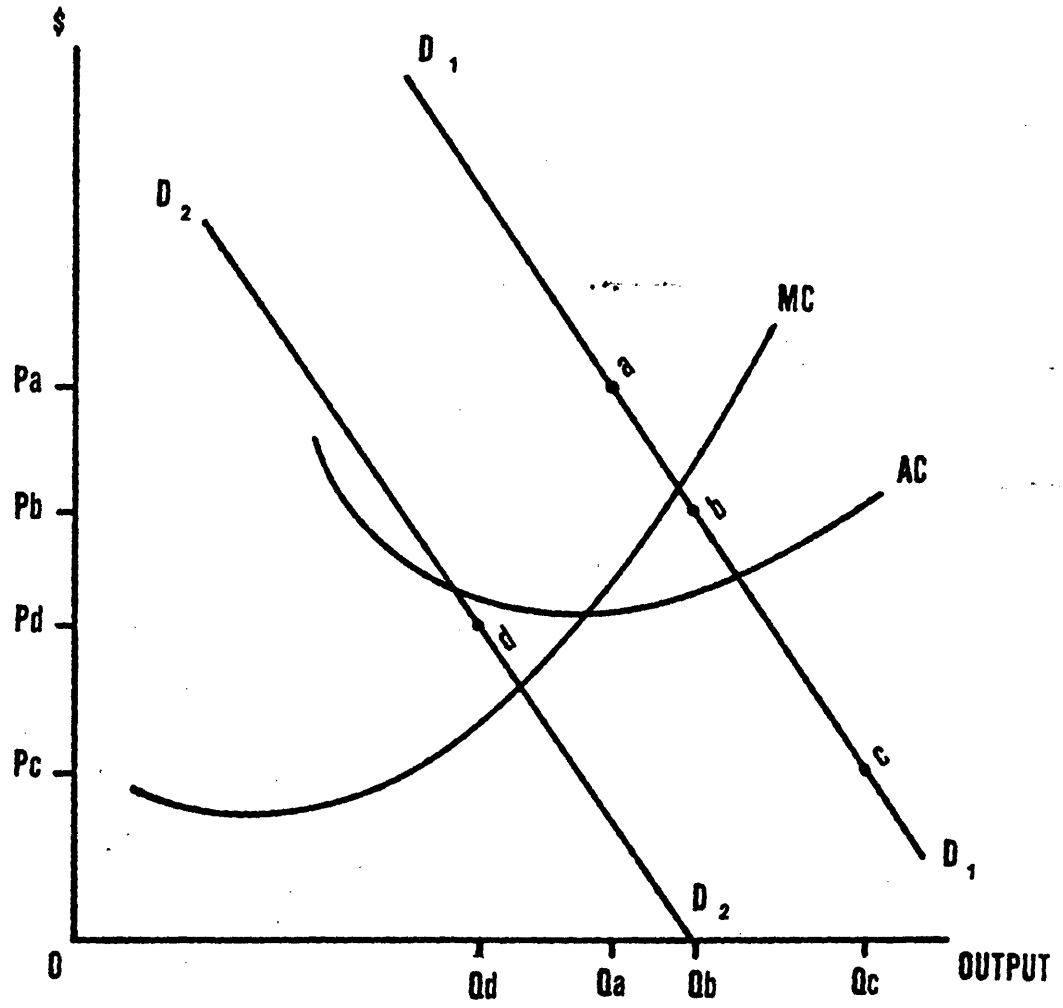


Figure 3



who is eliminated only by a price as low as P_C is more efficient than the monopolist.

The situation of "slack demand" associated with D_2D_2 creates the possibility of yet another Areeda and Turner combination. This is the situation associated with P_d . At the output Q_d associated with P_d , price is greater than marginal cost but below average costs. Hence, the entrant (and the monopolist) would lose money, and if the entrant expects the monopolist's pocket to be deep enough and his determination strong enough, he will presumably see the folly of remaining in the market and will drop out. This can occur even if the entrant is just as efficient as the dominant firm.²⁶

All together, we have four different possible price cost relationships in the Areeda and Turner predatory pricing scenarios. These are summarized in table 1 below.

Table 1

Price/Cost Relationships for a Predatory Pricing

1. P_a	$P_a > MC, AC$
2. P_b	$MC > P_b > AC$
3. P_C	$P_C < MC, AC$
4. P_d	$AC > P_d > MC$

²⁶ Clearly there can be prices analogous to P_a and P_C on the slack demand curve D_2D_2 . But these offer no new analytic features and are not considered here.

P_c , being less than both marginal and average costs, is clearly analogous to the below-cost pricing of the simple classical model. While there is always some risk that a rule outlawing prices such as P_c will result in erroneous conviction of desirable price cuts or will deter firms with large market shares from engaging in desirable price cuts, the risk is not regarded by Areeda and Turner as sufficiently serious to overlook the obvious harm of such a price. Hence, they have no serious qualms about urging that prices for a dominant firm that are below both average and marginal costs be viewed as unlawful.²⁷

P_b and P_d have no direct analog in the simple classical model. P_b misallocates resources, since production is carried beyond the point at which price equals marginal costs. On the other hand, if the demand level associated with P_b is permanent, a smaller rival with access to the same technology as the dominant firm (i.e., a firm that has a small-scale plant with average costs as low as the minimum point of the dominant firm's average cost curve) would be able to survive at P_b .²⁸ This situation is clearly related to that of the less efficient entrant in the

²⁷ When average variable cost is substituted for marginal cost, the status of P_c is equivocal, since P_c can be above average variable costs and hence resemble P_b .

²⁸ The situation where a firm must have a large plant to achieve minimum average costs is dealt with in the next section.

classical model, and most of the same policy issues, which we discuss below, are present.²⁹

P_d , since it is below the monopolist's average costs, can eliminate even an equally efficient rival, if the rival expects the monopolist to maintain the price for a long enough time (i.e., if there is a "credible" threat). On the other hand, given the low level of demand, there is excess capacity in the market, and any price higher than P_d would exacerbate the short-run resource misallocation.³⁰

While Areeda and Turner's permissive attitude toward these special cases (P_b and P_d) has been criticized,³¹ it seems safe to conclude that the analytics alone do not yield an unequivocal recommendation as to their desirable legal status, and policy considerations must be introduced. For our purposes, however, the policy considerations can be addressed just as conveniently with respect to P_a , where the predatory price is above both the monopolist's marginal costs and his average costs.

²⁹ The use of average variable costs for marginal costs renders P_b indistinguishable from P_a .

³⁰ P_d may be above or below average variable costs. If below, the use of average variable costs as a proxy for marginal costs puts P_d in the same category as P_c . If P_d is above average variable costs, the use of the proxy has no effect on the status of P_d .

³¹ See Scherer 1, note 1 supra, Scherer 2, note 1 supra, and Williamson, note 1 supra.

The analytical results for P_a are entirely analogous to those of the simple classical model; i.e., a price can be above the monopolist's costs and still be anticompetitive by excluding less efficient entrants that might have had a procompetitive impact on the market price. Areeda and Turner nonetheless focus on the fact that an equally efficient rival will not be eliminated by P_a . They label this kind of pricing behavior by the dominant firm "competition on the merits" and argue that it not be regarded as unlawful.

It is not entirely clear whether Areeda and Turner recognize the possibility of an anticompetitive result stemming from the elimination of a less efficient entrant. However, it is clear that even if they recognized such a possibility, they might nonetheless wish to maintain the lawful status of P_a because of the administrative concerns which are summarized in our earlier discussion of Type I and Type II errors. Specifically, they are fearful that any alternative rule will have serious consequences in terms of deterring socially desirable pricing behavior by firms with sizable market shares.

Several courts have adopted without reservation the Areeda and Turner standards for illegal predation, while others have shown some sympathy for the possibility that a price above the monopolist's costs can result in an anticompetitive effect.³² Their efforts to convert these concerns into rules of law have

³² See note 2 supra.

yielded varying results, but typical is the approach taken by the Memorex court.³³

In the Memorex case, the court rejected IBM's argument that prices may be predatory only when they are below marginal or average variable cost and indicated it would not rule out the possibility of predation where prices were above marginal or average variable cost but below the short-run profit-maximizing price and where barriers to entry were high. The opinion frequently refers to the possibility of future gain by a dominant firm by undercutting its current competitors (and presumably driving them out of business). The court, however, found that Memorex did not meet its burden of proof even on this looser standard for predation.

Areeda and Turner also discuss the possibility that the monopolist will elect to practice "limit pricing"; i.e., permanently maintaining a price less than the short-run profit-maximizing level in order to deter entry. They give an example in which the monopolist's profit-maximizing price is \$100 per unit, but \$100 would attract entry where a \$90 price would not, since average total costs for a new entrant are \$91 even at his most efficient level of output. (The monopolist's average total costs are assumed to be \$80.) Hence, the monopolist maintains his price at \$90 and entry is successfully deterred.

³³ Memorex Corp. v. IBM, 458 F. Supp. 423 (N.D. Cal. 1978).

The analytical argument as to why such limit pricing should be permitted is that the limit price gives the consumer all he could ever hope to gain from competition (i.e., even with entry in the Areeda and Turner example, the price would not go below \$91).³⁴

There are three problems with this argument. The first problem is that the argument overlooks (or dismisses) the possibility that allowing inefficient competitors to enter in the short run may produce long-run benefits if those firms move down the learning curve over time.

The second problem stems from the rich body of (highly complex) literature dealing with the optimal dynamic limit pricing strategy of a dominant firm.³⁵ The thrust of this literature is that if there is any serious lag to the process of entry, and if the rate of entry is affected by how high the monopolist sets his price, then the optimal strategy for the monopolist (in our example) may be to set an initial price higher than \$91 (and reduce it gradually towards \$91) as entrants come in over time. Thus while with limit pricing the consumer eventually gets the benefit of a "competitive" price, there may still be a substantial period during which he pays substantially more.

³⁴ Essentially the same argument is presented in "Telex v. IBM: Monopoly Pricing Under Section 2 of the Sherman Act," 84 Yale L. J. 558 (1975).

³⁵ This literature is nicely summarized in Scherer, Industrial Market Structure and Economic Performance (1979), pp. 229-43.

The third problem is that if entry must occur on a large scale to achieve reasonably efficient operation, an optimal "limit" price may be well above the competitive level even when the entrant is equally efficient. We put this issue aside for the moment, as it is the subject of the next section of the paper.

Our tentative conclusion is that the analytic arguments, standing alone, are not sufficient to refrain from any legal attack on limit pricing. Recognizing this, Areeda and Turner³⁶ turn to two policy arguments to support their recommendations. The first emphasizes the speculative and uncertain nature of any possible long-run competitive gains from encouraging entrants that are less efficient than the monopolist in the short run as compared with the present (and certain) benefits of superior competitive performance. The second argument relates to the administrative problems; that is, the difficulty of coming up with an alternative rule that produces superior results. This is obviously in the spirit of the Type I/Type II error kind of analysis suggested above.

With respect to the policy arguments, it is important to recall that those arguments are raised initially in the context of Areeda and Turner's conviction that a price that passes their "test" will exclude only less efficient rivals. This conviction must be reexamined, however, when the implicit assumption of

³⁶ Areeda and Turner, supra note 1, at 705-6.

small-scale entry gives way to the possibility that an entrant must enter on a fairly large scale if it is not to suffer a serious cost disadvantage. It is this possibility which gave rise to the extensive debate between Areeda and Turner and F. M. Scherer, to which we now turn.

III. Criticisms of the Areeda-Turner Model

A. Scherer and Large-Scale Entry

When a would-be entrant is contemplating whether or not to attempt entry, his primary concern is what his profits will be if and when he enters. Along with his own costs, this will depend on the price that will prevail in the market if and when he enters. The current price itself is largely irrelevant to his calculus unless he expects that it will remain unchanged as he enters.³⁷

Where entry occurs on a small scale, the assumption that price after entry will be virtually identical to preentry price, while not compelling, is at least plausible. The assumption rests on the expectation that the monopolist will not expand output

³⁷ Indeed, the early models of limit pricing made precisely that assumption. Hence, the price charged by the monopolist preentry was the sole basis on which the prospective entrant made his decision. This situation gave rise to the possibility of limit pricing, i.e., maintaining low prices now to discourage future entry. For a fuller description of the limit pricing model, see Scherer, Industrial Market Structure and Economic Performance (1979) at 234-36, and references cited therein.

postentry to teach the entrant a lesson or to drive him out altogether.³⁸

When entry must occur on a large scale not to incur a serious cost disadvantage, there is a much greater likelihood that the very fact of entry will depress prices below the preentry level. This will fail to occur only if the dominant firm is willing to reduce output enough to accommodate the new firm. Where the new firm's output is large, this may be unlikely. In any event, it would be extremely optimistic for the entrant to assume that the market price will not be affected by entry.³⁹

The upshot of all this is that the preentry price could be quite profitable for the monopolist, but the price anticipated by the entrant if he enters might be below his own costs even where he is just as efficient (i.e., has access to the same cost function) as the dominant firm. This possibility creates the potential that by strategically choosing the preentry level of price and output and demonstrating the resolve to maintain that

³⁸ With small-scale entry, so long as the monopolist does not expand output, the postentry price will not be appreciably different from the preentry price. There is also an implicit assumption that additional entry will not be forthcoming in sufficient numbers to expand industry output enough to depress price. See, for example, Sherman and Willet, "Potential Entrants Discourage Entry," J. Pol. Econ. 75, Part 1 (August 1967).

³⁹ The other side of the same coin is the credibility of any threat by the monopolist to hold output at the preentry level. This issue is discussed in greater detail below.

output, the dominant firm can discourage entry even by an equally efficient rival without foregoing most of the short-run profits as the simple limit pricing models suggest.

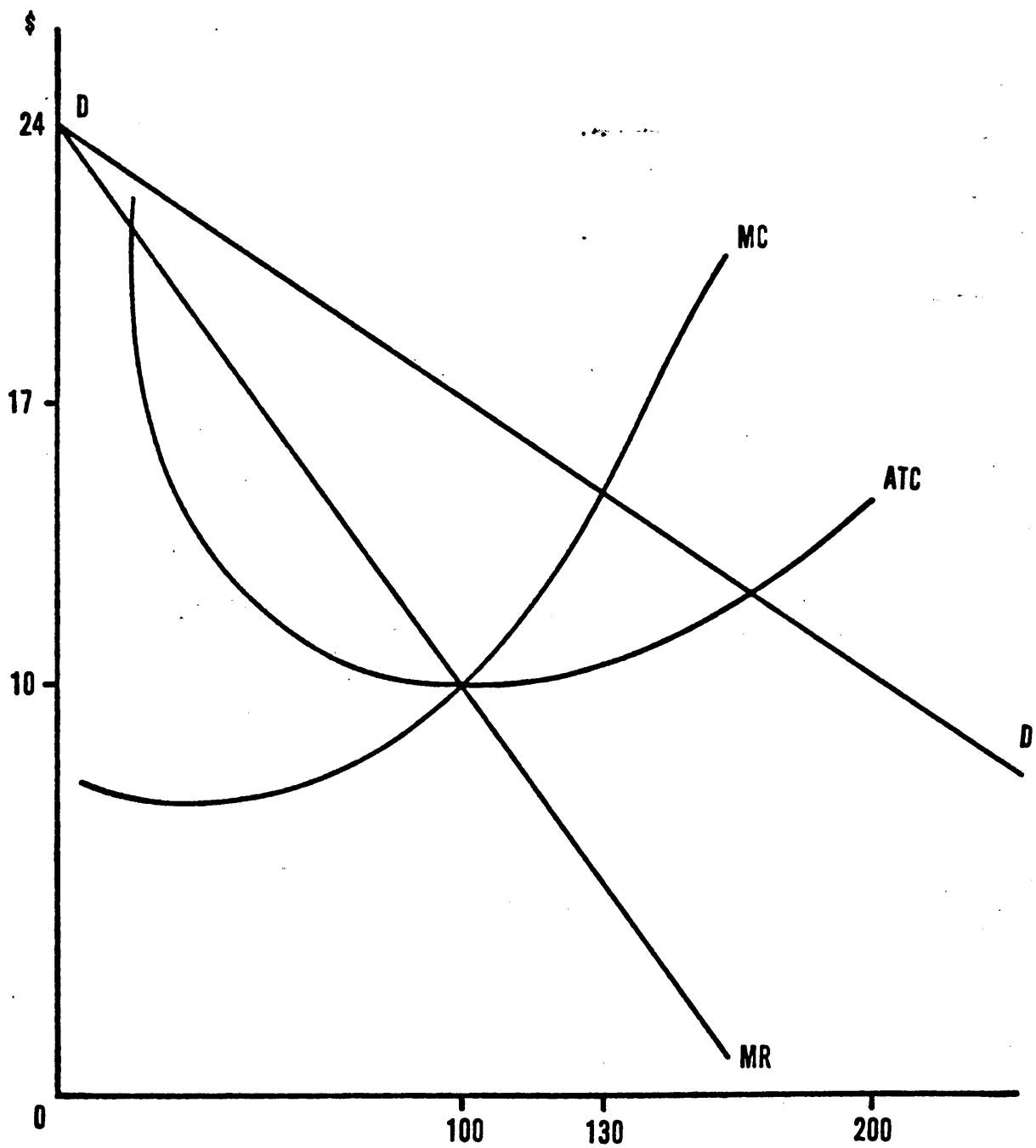
It is convenient to illustrate the large-scale entry problem with the cost and demand functions used by Scherer in his exchange with Areeda and Turner. This is depicted in figure 4 below, which contains the industry demand and marginal revenue curve and the monopolist's marginal and average cost curves, appropriately labeled. The short-run profit-maximizing price is \$17 and the corresponding output is 100 units.

It is assumed that the entrant is equally efficient as the monopolist in the following sense: he has access to a technology (i.e., cost function) which is similar to that of the monopolist in that there is some level of output which will yield average (total) costs equal to \$10 (the minimum of the monopolist's ATC). The output level at which that occurs is not necessarily the same output level at which the monopolist reaches his minimum average (total) costs (i.e., 100 units).

Specifically, we will assume that the entrant's ATC bottoms out at 80 units.⁴⁰ Hence, if the monopolist produces at his short-run profit-maximizing output (100 units) and the entrant

⁴⁰ The specific example we use here is different from Scherer's, which focused on Areeda and Turner's average cost exception to their marginal cost rule (P_b in our earlier discussion). Our example shows that even if that exception were dropped, exclusion of equally efficient firms would be feasible.

Figure 4



enters with an efficient plant (80 units), both firms would make a profit, since the market price at 180 units would be about \$11 and both firms would have average costs of \$10.

Note that after entry the dominant firm might expand output--say, to 130 units--forcing the price (given the entrant's output of 80) below \$10, at which both firms lose money. If the dominant firm has a deep enough pocket and can effectively threaten to continue to absorb losses, the entrant may be driven out. This, however, is nothing more than our classical case of predation dressed up with nonlinear cost curves. Whether or not it is likely to occur (or be effective), it is illegal under the classical test and, of course, under the Areeda and Turner tests as well.⁴¹

Scherer, however, is concerned with a more subtle prospect. Specifically, suppose the dominant firm, anticipating the possibility of entry, sets his preentry output at 130 (with a market price of \$14.90). This price/output combination apparently violates neither the classical test nor any Areeda and Turner modification thereof. If the entrant believes that the dominant firm will maintain the level of output in the face of entry, he will calculate that the market price will fall below \$10 and he will lose money.⁴² Hence, he may decline to enter, and the dominant

⁴¹ Because at an output of 130 units, the dominant firm's average and marginal costs both exceed the market price.

⁴² The entrant's output of 80 when added to the dominant firm's output of 130 produces a price below \$10.

firm has deterred entry without engaging in predation. (The deterrence is not costless to the dominant firm, since he has to forego the short-run profit-maximizing price of \$17 so long as there is a threat of entry. But at \$14.90, he still does quite well.)

Thus, we have a situation where an equally efficient entrant will apparently be deterred and where limit pricing does not yield the consumer all the benefits he would get from competition. If this situation can realistically be expected to occur, we may have a serious policy problem which the classical tests do not reach. For while throughout this paper we have pointed out that the standard predatory pricing rules do not protect against the predation of a less efficient entrant; here we would have a case where an equally efficient entrant is deterred from entering.

In one sense, there is nothing novel about the problem just posed. In our discussion of the demonstration effect in the classical model, we noted that the ideal situation for a monopolist is to have an effective threat that he will predate if entry occurs, since in this way he avoids entry without actually having to lower prices. Indeed, we see that often a single episode of predation would not be profitable in its own right but is carried out because of its impact on the expectations of future entrants or would-be entrants in other geographic markets. In other situations, if he thought it might work, the monopolist might simply announce his intention to cut prices should entry

occur, with the idea of making the entrant believe it would be unprofitable to enter.

A critique of each of these strategies, of course, is that they cannot work in the face of laws governing predatory pricing (assuming the prospective entrant is equally efficient), since if the dominant firm does respond to entry by lowering prices, he would be then pricing below costs in violation of the classical tests. Hence, the entrant will know that the dominant firm cannot lawfully carry out the threat. The threat, therefore, is not "credible," and entry should not be deterred. Does Scherer's feared strategy differ in any significant way from the threat mechanisms just discussed? Specifically, is there any reason to believe that the preentry expansion of output poses a credible threat, where the other varieties did not?

The issue is whether the threat can be carried out without the monopolist's violating the legal criteria for predation. If not, the entrant ought not to be deterred, confident that the law will protect him. Specifically, if the monopolist maintains his output at 130 units when the entrant enters with 80 units (driving the price below \$10), can the monopolist realistically be blamed for violating the Areeda and Turner standards or any other predatory pricing rule? Put differently, would the law require that

the monopolist reduce output (to 120 units or less) so as to make room for the entrant to operate profitably?⁴³

It is difficult to give an unequivocal answer. Areeda and Turner seem to feel that there would exist an implicit obligation for the monopolist to move over.⁴⁴ Some recent court opinions, however, seem to attach some weight to the question of who started the price cutting.⁴⁵ It is possible that the answer (properly or not) may depend on the presence of documentary evidence indicating that the preentry output was set deliberately with an eye toward discouraging entry.

There is also an issue of economic credibility with respect to the Scherer threat that is essentially the issue we discussed in connection with the classical model. We indicated, in that discussion, reasons why predation might prove to be a losing strategy including the fact that the dominant firm would lose more during the period of predation than the victim. Hence, absent certain other factors, the actual entrant might be skeptical that the price war would continue if he, the intended victim, showed some determination to call the monopolist's bluff. Rather, he might anticipate that the monopolist will quickly see the light

⁴³ We have been assuming that the entrant is equally efficient in the sense described above. Obviously, we could also ask whether the dominant firm must make room for a less efficient entrant.

⁴⁴ Areeda and Turner 2, note 1 supra.

⁴⁵ California Computer Products, Inc. v. IBM, 5 Trade Reg. Rep. (CCH) ¶ 62713 (1979). Note also that an important aspect of McGee's discussion of the Standard Oil case was the question of who initiated the price cutting. See McGee, supra note 6, at 154-67.

and come to a de facto understanding to share the market. The prospective entrant may even doubt that predation will be attempted.⁴⁶

We have assumed, for purposes of examining the Scherer concern, that the "normal" fear of predation is not enough to deter entry; that is, the monopolist cannot expect to charge the short-run profit-maximizing price and still deter entry by some sort of implicit threat or by various forms of "spoken" threats. We want to ask whether there is anything in the preentry expansion of output that makes postentry predation (by rigidly maintaining that output in the face of below-cost prices) more likely and therefore more credible as a threat.

The answer, I think, is equivocal but leans in the direction of a more credible threat. On the one hand, the monopolist's plant, according to our simple description of it, is still optimally designed to produce 100 units rather than 130. Hence, the monopolist will not suffer higher costs if he "backs off" to 100 units, a level which, as we indicated, gives ample room for a new entrant, and still leaves supernormal profits for the dominant firm. On the other hand, there are probably some one-time costs, not reflected in our diagram, of moving to a higher sales level

⁴⁶ The "other factors" that might cause these conclusions to be overturned involve the prospect of other entrants (either future entrants in this market or entrants into other geographic or related product markets) and the incentive this creates for the dominant firm to absorb losses and thus to convey the appropriate message.

(getting used to a higher level of production, establishing customer contacts, etc.). Such costs would make it at least somewhat cheaper to remain at 130, once having already reached it, than to expand at the time of entry.⁴⁷ Our conclusion is that there is a "weak" degree of credibility, which could be improved if there were some real disadvantage to the monopolist of going back to 100 units after entry occurs. The prospect of deliberately "building in"⁴⁸ such disadvantages is the subject of some recent literature on predation and limit pricing and will be discussed further below.⁴⁹

To summarize the findings of this section, it is possible that if entry can occur economically only on a fairly large scale, it may be possible for a monopolist to deter entry by an equally efficient rival without appearing to violate the classical tests for predation. The policy problem remains of what alternative criteria exist that, when all sources of enforcement error are considered, give on balance better results.

⁴⁷ The issue of sunk costs works both ways. The entrant might conclude that once he had made the initial investment, the monopolist would realize that as long as the entrant was covering variable costs, he (the entrant) would not be driven out. Hence, the entrant would hope that the monopolist, recognizing this fait accompli, would eschew the price war and reach an accommodation.

⁴⁸ The issue of building in disincentives to secret price cutting in order to increase the stability of a scheme of tacit collusion is discussed in Hay, "Oligopoly: Theory & Policy," unpublished manuscript.

⁴⁹ Important recent works include Salop, "Strategic Entry Deterrence," 69 Am. Econ. Rev. 335 (1979) and references cited therein.

This question is particularly acute in the present context, because any alternative rule might force the firm to charge higher prices in the periods preceding entry. How then to distinguish the low prices that are the result of a firm trying legitimately (and procompetitively) to expand the consumer use of its product⁵⁰ from the low prices (and high output) designed to scare off an efficient entrant? This problem is so difficult to resolve that one might well want to cling to some rather simple cost tests, despite the knowledge that not all anticompetitive pricing conduct can be covered. An alternative approach was contained in the Memorex decision, discussed earlier. Additional discussion about alternatives will be deferred, however, until we have completed our review of the criticisms of the classical theory of predation.

B. Williamson and Strategic Positioning

In the previous section, we discussed a new set of problems that may arise under the classical tests for predatory pricing (as modified by Areeda and Turner) when the scale required for efficient entry is large enough to cause a depressing effect on the market price. Specifically, firms might set a preentry level of output sufficiently large that if it was maintained after the entry, price would fall below the entrant's (and the monopolist's)

⁵⁰ E.g., low aluminum prices as the result of an effort to increase the substitution of aluminum for other metals. See M. Peck, Competition in the Aluminum Industry (1961).

costs. Hence, if the threat by the dominant firm to maintain output is credible, even an equally efficient entrant might be deterred from entry.

We noted, however, that if the threat were actually carried out, the dominant firm's price ex post would be below the Areeda-Turner marginal cost floor. If this would subject the dominant firm to liability under the Sherman Act,⁵¹ there is serious doubt that such a threat would be credible to the entrant, and the strategy would not succeed. Under such circumstances, the concern raised by Scherer would not appear to pose a serious policy problem.

However, in a recent paper, Oliver Williamson argues that there is a more complex strategy available to the dominant firm that may permit it to deter entry even where the Areeda and Turner standard must be satisfied at all times.⁵¹ This strategy involves choosing plant size and capital structure in anticipation of entry that permit the dominant firm, without violating the Areeda-Turner standard, to respond to entry in such a way that the entrant loses money. The entrant, anticipating this unhappy result, is deterred from making the attempt.

⁵¹ Williamson, note 1 supra.

As Williamson points out:

Each predator pricing rule gives rise to pre-entry price, output, and investment adjustments on the part of dominant firms whose markets are subject to encroachment. To neglect the incentives of rules whereby dominant firms make pre-entry adaptive responses of a strategic kind necessarily misses an important part of the problem.⁵²

The key relationships in the Williamson model are contained in figure 5, which depicts the industry demand curve and marginal revenue curve and the dominant firm's long-run average cost curve. The most important characteristic of the cost curve is that to reach minimum optimal scale Q_{\min} , the firm must produce at a fairly high level of output. Q^* is the unconstrained profit-maximizing output.

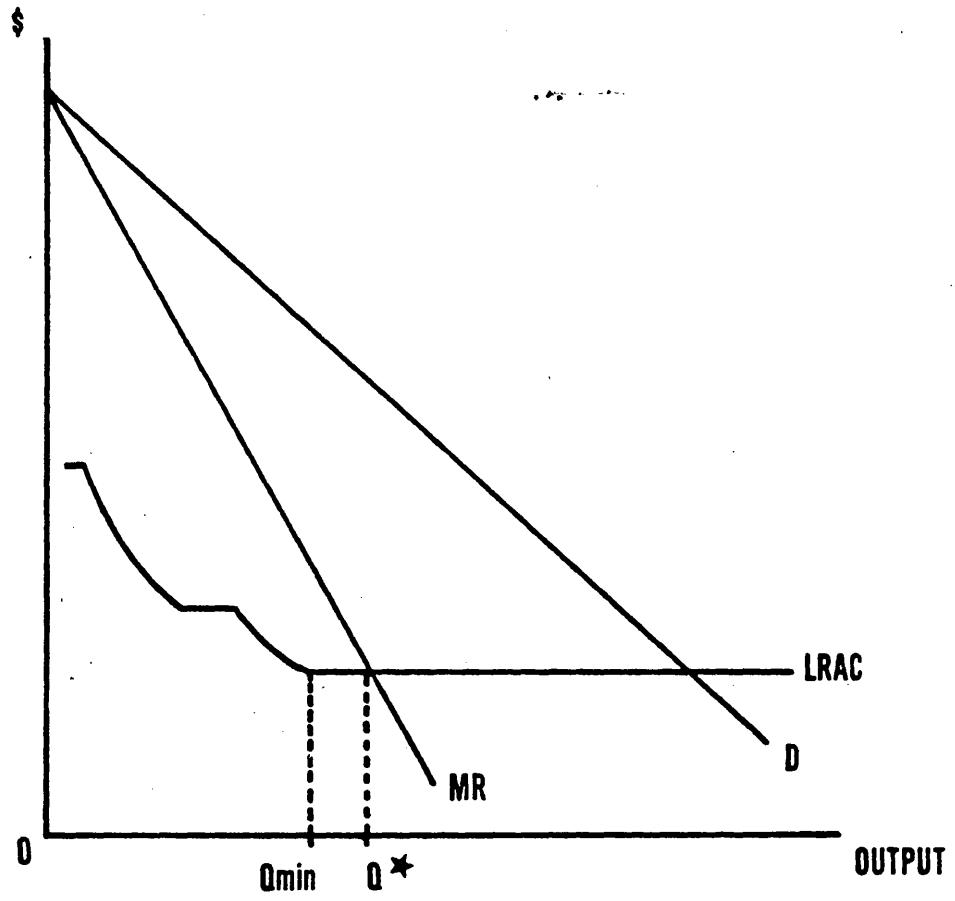
The main assumptions of the Williamson model are as follows:

- (1) The entrant has access to the same technology (i.e., cost curve) as the dominant firm.
- (2) The entrant can enter at any scale he finds profitable. In particular, he can enter at less than minimum optimal scale if that alternative is most advantageous. In the Scherer model, for reasons that were unspecified, the entrant was required to enter at minimum optimal scale even though a smaller scale may have been more advantageous.⁵³ In this respect, the Williamson model is more favorable to the entrant than the Scherer model.

⁵² Williamson, supra note 1, at 293.

⁵³ This proposition is illustrated in figure 4. If the dominant firm maintains its output at 130 units, then the entrant, with his shrunken version of the monopolist's cost curve, will be able to cover costs by producing somewhere in the neighborhood of 60 units. This result comes about because the demand curve rises more steeply than the cost curve.

Figure 5



- (3) If entry actually occurs, the dominant firm must choose an output such that postentry price covers short-run marginal costs (i.e., the Areeda-Turner criterion must be satisfied at all times). In this respect also, the Williamson model is more favorable to the entrant than the Scherer model. There is, however, one unstated but implicit exception to this rule; namely, that the dominant firm cannot be forced to reduce output if it means he will be producing at less than minimum optimal scale.⁵⁴
- (4) Unlike the Scherer model, where the entrant expects the dominant firm's output to be unchanged if he enters (a fairly pessimistic assumption in its own right), in Williamson the entrant expects that the dominant firm will expand output postentry to the fullest extent consistent with satisfying the marginal cost standard. In this respect, the Williamson model is considerably less favorable to the entrant than the Scherer model.
- (5) Unlike the Scherer model, in which the size of the dominant firm's plant was chosen to fit the no-entry profit-maximizing level of output,⁵⁵ in the Williamson model the plant size is chosen strategically; that is, to permit the firm to inflict losses on the entrant without violating the Areeda and Turner rules.

With these assumptions we can turn to figure 6 to see how the firm uses its choice of plant size strategically to discourage entry. Here the firm chooses to construct the plant associated

⁵⁴ Otherwise the entrant could enter at any scale he saw fit, and the dominant firm would be forced to reduce output (so as to maintain price) or withdraw entirely.

⁵⁵ I.e., the cost curve in figure 4 should be considered to be one of a family of short-run cost curves. The specific cost curve chosen was that which minimized average costs for the no-entry level of output (100 units).

with the short-run average and marginal cost curves depicted.

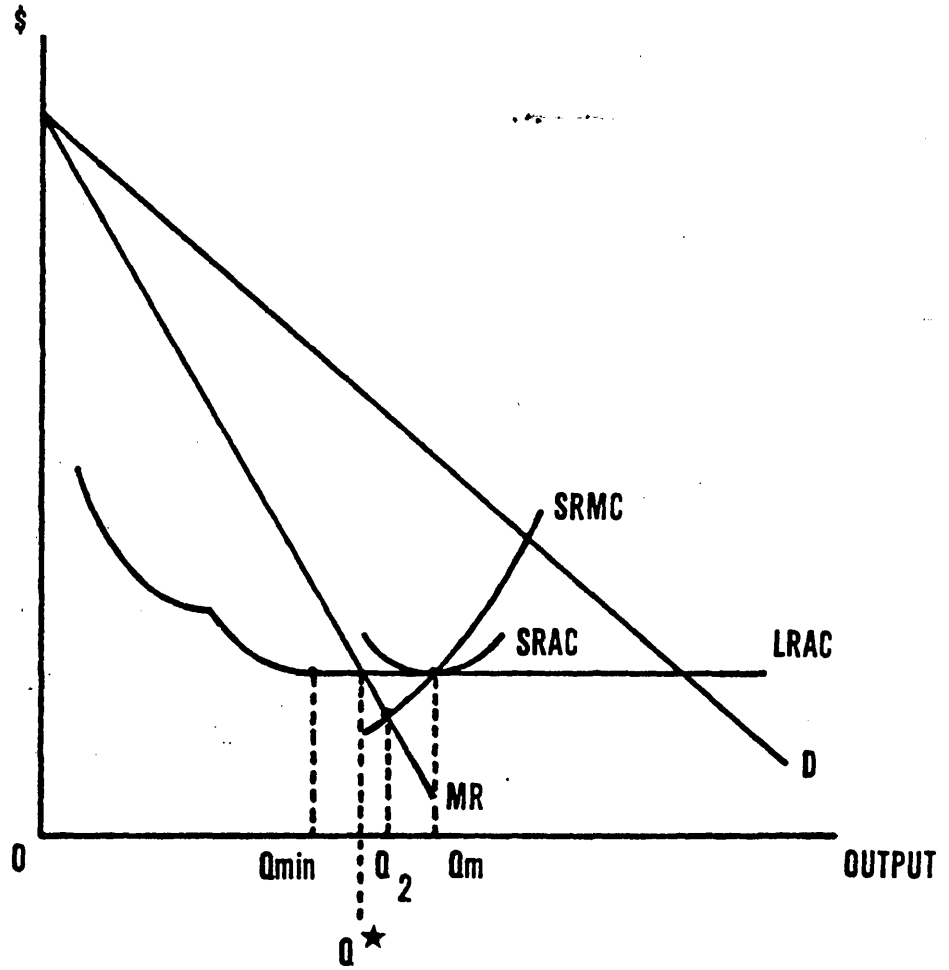
This plant is chosen because it results in the following dilemma for the entrant:

- (a) There is not enough room to enter at minimum optimal scale; that is, if the entrant enters at Q_{\min} , his output, when added to the output Q_M of the dominant firm at minimum optimal scale (given the plant size chosen), causes price to fall below the entrant's average costs (and by our now-explicit assumption, the dominant firm does not have to reduce output beyond Q_m to make room for the entrant).
- (b) If the entrant chooses an output less than Q_{\min} , for any output chosen the dominant firm can, if necessary, expand output enough to cause the postentry price to be below the entrant's average costs but not below its own short-run marginal costs.⁵⁶

Hence, there is no output the entrant can choose that will be profitable, and he will decline to enter. Meanwhile, the dominant firm, having chosen the plant size strategically with a view towards entry, will operate it at the short-run profit-maximizing level (given the plant size), Q_2 . Williamson notes that the output level Q_2 is greater than the no-entry profit-maximizing output Q^* , so the consumer gains some advantages from the precommitment strategy employed by the dominant firm but not as much benefit as

⁵⁶ For levels of output in the vicinity of Q_{\min} , the entrant's costs will exceed price even if the dominant firm holds output at Q_m . However, as the demand and cost curves are drawn, as the entrant further reduces output, price increases faster than his average costs, and at some output level they are equal. At this point the dominant firm must begin to expand output past Q_m if he wishes price to remain below the entrant's costs.

Figure 6



he would have gained had the monopolist not behaved strategically and had entry taken place.

The conclusion that can be drawn from the Williamson model is that there is another situation in which the classical test (as amended by Areeda and Turner) fails to deter undesirable predatory (or limit) pricing by a dominant firm. The key to this particular model is the possibility that a firm will choose its plant size with a view towards allowing it flexibility in responding to new entry by expanding output and driving down the price, while at the same time not violating the predatory pricing guidelines.

There are two questions that ought to be raised with respect to the Williamson model. The first is whether the behavior described by Williamson makes sense for the monopolist from a long-run profit-maximization standpoint. For the Williamson threat to work probably requires that the extra-large plant be in place at the time the entrant is ready to produce. Given the uncertainty surrounding the entrant's plans and the time needed to construct or expand one's own plant, this means that the dominant firm might have to forego the no-entry profit-maximizing output level more or less permanently in anticipation of possible future entry.⁵⁷ It might be the case, however, that the present discounted value of profits would be maximized by operating from

⁵⁷ Clearly this problem could be assumed away by assuming that the dominant firm is aware of the entrant's planning and can expand his plant in less time than it takes the entrant to build a new one.

an optimal-size plant and hoping that some lawful strategies will still work to discourage most entrants.⁵⁸ This dilemma for the monopolist is peculiar to the Williamson model, since in the Scherer model the dominant firm need merely expand output (from the existing optimal-size plant) when he senses that entry is around the corner. This is not intended as a criticism of the Williamson model so much as a statement of some additional conditions necessary to make the model plausible.

A second question goes to the credibility of the Williamson threat, and is similar to issues raised in connection with our other models as well. Put simply, if the entrant actually takes the plunge and builds his plant, is he likely to be driven out by the dominant firm's strategy? The entrant has invested in fixed plant and equipment just like the monopolist. Is he likely to abandon it in the face of low prices? While variable cost curves do not appear in the Williamson diagrams, from inspection it does not appear as though the Williamson postentry price is below the shutdown point of the entrant.⁵⁹

In addition, the dominant firm is foregoing considerable profits during the price war. Is it possible, given the unlikelihood that the entrant will be driven out in the short run, that the

⁵⁸ This issue is discussed in Williamson, "Williamson on Predatory Pricing II," 88 Yale L. J. 1183 (1979).

⁵⁹ If the threat contained in the Williamson model is not credible, then entry deterrence might require an even larger plant, so that if entry occurs, the entrant will lose money even if the monopolist and the entrant cooperate postentry. See Salop, note 49 supra.

dominant firm's optimal strategy will be to reach a live-and-let-live understanding with the entrant? If so, and the entrant anticipates this, he may not be deterred from entry. Again, this problem is not unique to the Williamson model⁶⁰ and one might not need much risk aversion on the entrant's part to eliminate any doubts about the efficacy of the limit pricing strategy.

Having noted that under certain assumptions, including those related to strategic behavior, the Areeda-Turner rules fail to deter all anticompetitive predation, Williamson considers the possibility of alternative rules. However, his focus is not on whether alternative rules will be more effective in halting predatory or limit pricing; he properly despairs of finding such a rule that does not by itself create inefficiencies.⁶¹ Rather, his primary goal is to make the firm that insists on limit pricing provide the maximum possible consumer benefits in the preentry world.⁶²

Williamson proposes an output rule which he compares favorably to the Areeda-Turner rules on efficiency grounds. The rule prohibits the dominant firm from increasing output beyond the

60 See pp. 159-61 infra.

61 We have described these inefficiencies as costs from Type I Error; i.e., from prosecuting (or deterring) socially desirable pricing.

62 Recall that in the simplest limit pricing model the monopolist can deter an efficient entrant only by setting price at the competitive level to begin with. Of course, if the monopolist is successful in deterring entry, the preentry world lasts indefinitely.

preentry level in response to entry. While, as we indicated, this does not eliminate limit pricing, it requires the dominant firm, in the course of limit pricing, to produce at a higher level in the preentry period than it would if it could wait for the entrant to make its move before increasing output. Higher preentry output obviously means lower price, so the consumer is better off than under the simple no-entry profit-maximizing price. Indeed, Williamson argues that his rule has superior efficiency properties in the preentry period to the Areeda-Turner rules, although this has been the subject of rather heated debate.⁶³

IV. Conclusions

This paper has examined a variety of models of predatory and limit pricing. These models have differed widely in their underlying assumptions and their behavior outcomes. Yet, in other ways the models have much in common, and comments made on the simplest classical model carry forward to the most complex of models.

Specifically, we can make the following observations:

- (a) Predatory (or limit) pricing under certain hypothetical conditions can be a profitable strategy. Conditions favorable to profitable predation include the following: situations where the entrant, if he survives, is expected to benefit from learning by doing but will give up quickly in the face of a short-run losses; situations of several geographic markets where a threat carried out once is believed in other markets; situations where

⁶³ See Areeda and Turner, "Williamson on Predatory Pricing," 87 Yale L. J. 1337 (1978) and Williamson, note 58 supra.

future entrants would be deterred after witnessing predation against a current entrant; and situations where an entrant suffers severe cost penalties if he does not enter on a large scale.

- (b) Predatory pricing can have anticompetitive consequences. Moreover, anticompetitive consequences can ensue even where the entrant is "less efficient" than the dominant firm.
- (c) No simple rule appears capable of stopping all possible instances of anticompetitive predatory or limit pricing.
- (d) In addition to social costs from undeterred predation, there may be equally serious costs if socially desirable pricing strategies are discouraged. This discouragement can occur either because the rule governing predation explicitly forbids such a pricing strategy or because the rule is sufficiently imperfect in administration that risk-averse firms will eschew certain legitimate strategies out of fear of being prosecuted.
- (e) The ideal rule will not be costless, but will achieve a balance of the costs associated with error; that is, error from undeterred predation (Type II) and error from overzealous prosecution and deterrence (Type I).

Methods of dealing with predatory pricing have fallen into one of the following categories:

- (a) No prohibitions on pricing at all;
- (b) Cost-based rules (e.g., the Areeda-Turner rules);
- (c) Cost-based rules with provision for exception under certain well-defined circumstances (e.g., the Memorex rule that might prohibit a monopolist's price reduction, even though the price remains above costs, where barriers to entry are high);

- (d) Non-cost-based rules;
(This category includes Williamson's output rule and a proposal from Baumol that requires any price reduction by a monopolist in the face of entry to be continued in effect even if the entrant expires.)⁶⁴
- (e) Discretion with the courts to pursue a more or less ad hoc inquiry into the long-run welfare implications of pricing behavior in a specific fact situation.
(Such an inquiry might utilize internal evidence of the monopolist's intent. This in effect is Scherer's proposal.)

The attractiveness of one method over another will depend on many factors. First and foremost, however, is the decision-maker's expectation as to the likelihood of predation in a world of no rules. Implicit or explicit in the writing of many of the classical writers⁶⁵ was the view that predation would never be profitable and would not be attempted (or if attempted, could not succeed). Hence, to minimize the discouragement of welfare-improving price behavior, they would opt for no rule. A second major factor is the degree of confidence in the ability of the enforcement agencies and the courts to make correct decisions in situations where good data not always available and surrounding circumstances are complicated.

⁶⁴ See Baumol, "Quasi-Permanence of Price Reduction: A Policy for Prevention of Predatory Pricing," 89 Yale L. J. 1 (1979).

⁶⁵ And some of their descendants. See R. Bork, The Antitrust Paradox (1978).

The choice among the various candidates is not easily made. The vast differences between the many distinguished economists and lawyers who have addressed themselves to predatory pricing is testimony to that point. It is hoped that further reflection and analysis in light of the principles laid out in this paper will help decide.

I I. A P P L I C A T I O N S T O A N T I T R U S T
A N A L Y S I S

PATENTS, SLEEPING PATENTS, AND ENTRY DETERRENCE

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"[t]he mere accumulation of patents, no matter how many, is not in itself illegal." Automatic Radio Mfg. Co. v. Hazeltine Research, Inc., 339 U.S. 827, 834 (1950).

I. Introduction

The Supreme Court's statement in Automatic Radio v. Hazeltine Research regarding the accumulation of patents is one finding in a series of precedential decisions that define the intersection of patent exploitation and illegal monopolization under Section 2 of the Sherman Act. Although the Court left ample room for consideration of behavior in conjunction with patent acquisition that may be deemed in violation of the antitrust laws, the decision recognizes the right of individuals to pursue the rewards of the U.S. Patent Code, which may convey monopoly power

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in the economic sense, without regard to the number of patents eventually accumulated.

On several occasions the Supreme Court and lower courts affirmed the limitations of the Automatic Radio v. Hazeltine Research decision. Patent acquisition is not outside the scope of Section 2.¹ As in cases not involving patents, a Section 2 violation requires evidence of exclusionary conduct, along with either the attainment of monopoly or specific intent to monopolize and a dangerous probability of success.² To date, the exclusionary behavior necessary for patent acquisition to violate Section 2 of the Sherman Act or other antitrust laws has included examples of the following practices.

- (i) The firm acquired one or more patents under conditions of fraud (e.g., suppression of evidence which might have placed the patent in the public domain).³

¹ L. A. Sullivan, Handbook of the Law of Antitrust (1977), p. 507.

² See Swift & Co. v. U.S., 196 U.S. 375, and Walker Process Equip. Inc. v. Food Machinery & Chemicals Corp., 382 U.S. 172.

³ See Walker Process v. Food Machinery and U.S. v. Singer Mfg. Co., 347 U.S. 174.

(ii) The firm acquired a patent portfolio at least in part through the purchase of patents or exclusive licenses on potentially competitive technology.⁴

(iii) The firm engaged in extensive cross-licensing of potentially competitive technology with one or more firms already in the industry and with restrictions on the availability of licenses to new entrants. Particular emphasis is on cross-licenses for nonblocking patents.⁵

(iv) The firm licensed patents to potential competitors with price, use, or exclusive grant-back provisions designed to extend the scope of an existing patent monopoly.⁶

This is a cursory review of factors contributing to Section 2 violations involving patents, and it is not my purpose to explore the economic implications of alternative licensing arrangements.⁷

⁴ See Kobe, Inc. v. Dempsey Pump Co., 344 U.S. 837, U.S. v. United Shoe Machinery Corp., 347 U.S. 521.

⁵ See U.S. v. Hartford-Empire Co., 232 U.S. 386.

⁶ Examples include U.S. v. United States Gypsum, 333 U.S. 364; U.S. v. New Wrinkle, Inc., 342 U.S. 371; U.S. v. General Elec. Co. (Lamps), 80 F. Supp. 989.

⁷ A detailed study of patent license arrangements is in W. S. Bowman Jr., Patents and Antitrust Law, A Legal and Economic Appraisal (1973).

I shall address solely the possible anticompetitive effects of research and development activity and patent exploitation internal to the firm. The Report of the Attorney General's National Committee mittee to Study the Antitrust Laws (1955) implies that accumulation of patents based entirely on internal research and development is not an exclusionary practice in violation of Section 2. This conclusion contrasts with Judge Hand's remarks in the Alcoa case, which specifically mentioned "drastic expenditures of research and development with knowledge or intent to preempt and dominate an industry" as a possible Section 2 offense.⁸

Judge Hand's remarks are exceptional, since the records of antitrust decisions reflect a strong support for internal research and development as activity which is nonexclusionary and honestly industrial. No doubt the performance of the courts has been motivated by the clear objective of the patent grant, as authorized by the Constitution, "to promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries."⁹ While the motivation is clear for distinguishing the act of patenting itself from abuses of the patent grant, this paper questions the logic of the distinction. By imposing restrictions on the use of the patent grant, the courts have determined implicitly a tradeoff between incentives for R. & D. and the exercise of

⁸ U.S. v. Aluminum Co. of America, 148 F.2d 416.

⁹ U.S. Constitution art. I, sec. 8.

monopoly power. Section II of this paper demonstrates that a similar tradeoff between monopoly power and R. & D. incentives exists even if all R. & D. is internal to the firm and each patent is exercised without the use of restrictive practices. A firm with monopoly power as a consequence of existing patents or other fortuitous circumstances may have more to gain than potential rivals from research and development of competitive technologies. Put another way, the firm can protect and maintain its monopoly position by developing and patenting substitute technologies. The preservation of monopoly through internal research and development--or preemptive research and development expenditures in the language of Judge Hand--may prove more profitable than the purchase of exclusive licenses from potential rivals. Furthermore, research and development may produce patents which are valuable to a competitor but are left dormant by a firm with monopoly power. These results emerge from a simplified analysis of preemptive patenting, and while they depend on particular assumptions, the results apply in more general circumstances.

The existence of an inviolable patent right is not a crucial element of the incentive for preemptive investment. What is important is that the net return from invention and innovation must be sufficiently great to compensate for the competition from imitating firms. Expressed in terms of an advantage to being first, the theory of preemption also applies to activities such as capacity investment, firm location, brand selection, and product

differentiation, although each case presents special considerations that alter the costs and benefits of preemptive behavior.¹⁰ Preemption cannot be effective if the gains from being second are not much less than the gains from being first. Also, in the absence of effective patent protection, preemption need not result in the preservation of a monopoly position in an industry.

Section III of the paper examines the implications of preemptive patenting for economic efficiency. Successful preemption requires that a firm patent before competitors. Luck aside, a preempting firm must be at least as progressive as rivals. Nonetheless, a progressive R. & D. strategy could adversely affect economic efficiency if potential competitors must conduct an active R. & D. program in order to maintain an effective competitive threat. If preemption keeps competitors off the frontier of technical progress, the strategy could create a barrier to entry as competitors' costs of product development and production lag

¹⁰ For a discussion of preemptive capacity investment, see A. M. Spence, "Entry, Capacity, Investment, and Oligopolistic Pricing," 8 Bell J. Econ. 534 (Autumn 1977), and "Investment Strategy and Growth in a New Market," 10 Bell J. Econ. 1 (Spring 1979), and R. J. Gilbert and R. G. Harris, "Investment Decisions with Economies of Scale and Learning," 71 Am. Econ. Rev. 172 (May 1981, no. 2). A discussion of firm location is in B. C. Eaton, "The Theory of Spatial Preemption: Location as a Barrier to Entry," Queens University Discussion Paper (1976), and R. Reynolds, "Location and Entry Deterrence," U.S. Dept. of Justice Discussion Paper (1978). Brand selection is examined in R. Schmalensee, "Entry Deterrence in the Ready-to-Eat Breakfast Cereal Industry," 9 Bell J. Econ. 1 (Autumn 1978), and for an early discussion of product differentiation, see R. F. Lanzillotti, "Multiple Products and Strategy: A Development of Chamberlin's Theory of Products," 68 Q. J. Econ. 461 (1954). For a current discussion of issues in strategic behavior, including preemption, see the article by Spence, infra, pp. 1-48.

behind the costs of the dominant firm. As the cost gap increases, the dominant firm can reduce expenditures on R. & D. with a lower risk of encouraging entry.

Before condemning preemptive patenting, note that a preemption strategy must begin with accelerated investment in R. & D., which can be relaxed only if it is successful and if market experience is essential to the efficiency of R. & D. and production. If preemption is not successful, or if the success is only transient, the net result is a progressive industry without persistently high market concentration.

Section IV of the paper is a review of empirical results on the role of patents in industrial markets. The evidence does not justify a broad policy designed to minimize instances of preemptive patenting by reducing the monopoly value of patents, as the disincentive effects on R. & D. could, and very probably would far outweigh the benefits from reduced concentration. Nonetheless, studies show substantial differences in technological opportunities and in the monopoly value of patents from one industry to another. In view of the very limited monopoly power afforded by patents in most industries, preemptive patenting could occur in only exceptional circumstances. The issue of preemption as pervasive behavior would involve the gains to established firms from accelerated research and development (and other) expenditures distinct from patenting. Section V presents two antitrust cases involving allegations of monopolization in conjunction with patenting.

II. The Strategic Use of Preemptive Patenting

A Model of Preemptive R. & D.

The incentives for preemptive patenting emerge most clearly in a simple model. Suppose an existing firm has a monopoly position in the sale or manufacture of a product (labeled product 1). I will assume that product 1 is a well-defined market and the existing firm's share of that market is 100 percent, although much less drastic assumptions will do. The essential ingredient is that the existing firm enjoy considerable monopoly power in the market for product 1. This monopoly may be the consequence of an earlier patent or unique access to factors of production or distribution.

The next assumption concerns the possibility of entry into the market which is currently the sole domain of the existing firm with product 1. I will assume that entry can take place only through the invention and patenting of a single patentable substitute for the monopolist's product, which I will label product 2. This is admittedly a powerful assumption, and allowing more avenues of entry will alter, but not necessarily destroy, the incentives for preemptive patenting. I will return to this question.

The possibility of patenting product 2 introduces three possible outcomes that are relevant to the analysis.

- (a) No one patents product 2. In this case the existing firm continues to enjoy the quiet life of a monopolist with product 1. For illustration, assign an annual value of \$100 for the profits earned by the firm when no one patents product 2.
- (b) A competitor patents product 2. Assume all potential competitors are similar, so that there is no need to distinguish one rival from another. The effect of entry on the former monopolist's profit will depend on the characteristics of products 1 and 2, and on the competitive practices of the rival firms. For illustrative purposes once again, assume entry lowers the existing firm's profits to \$70 per annum and assume the entrant firm earns an equal amount from the sale of product 2. Total industry profits are \$140, which exceeds the former monopolist's profits of \$100. The increase in industry profits may occur because product 2 appeals to a different market than product 1 (they are differentiated products) or because product 2 has lower production costs than product 1, but market prices permit the sale of both.

(c) The monopolist patents product 2. The monopolist's quiet life continues, but now production opportunities are expanded to include the possible manufacture and sale of product 2 along with product 1. Unless the monopolist is managerially or technically disadvantaged relative to a competitor, the monopolist can earn (at the very least) the same net revenues as a rival firm from the sale of product 2. The monopolist need only replicate the activities of the competitor. This would generate at least the \$70 of annual profits earned in case (b) from the sale of product 2. In addition, the monopolist can earn \$70 of annual profits from the sale of product 1 by acting in the same way as in case (b), where entry occurs.

If the monopolist can duplicate the activities of an entrant, the monopolist can earn the \$140 of total industry profits, as in case (b); but this is only a lower bound. Competition typically erodes total industry profits. By patenting product 2 and avoiding competition, the monopolist has the opportunity to coordinate pricing and production of both products, to increase total profits above the \$140 earned when entry occurs.

Assume the monopolist can earn \$150 per year from the sale of both products.

The outcomes corresponding to cases (a), (b), and (c) are summarized in table 1. The rows correspond to products 1 and 2, and the columns are the firms that patent the particular product. Each box contains two numbers; the entry in the northwest corner is the profit earned by the monopolist, and the entry in the southeast corner is the profit earned by the rival. Thus the lower left-hand box contains the profits earned if the monopolist patents product 2, while the lower right-hand box contains the profits earned if a rival patents product 2. Note that the difference between monopoly profits with and without product 2 is \$50, while the profit earned by a rival is \$70. This has led Arrow to conclude that a monopolist has a lower incentive to invent than a potential competitor.¹¹ While this result is generally true, it is not relevant to the situation where entry may occur and threaten the monopolist's market. The relevant incentive for the monopolist is the difference between the \$150 earned with product 2 and the \$70 earned if a rival patents product 2, or \$80 per year. Furthermore, the difference between the former monopolist's profits with and without a rival always exceeds the profits earned by the rival when competition erodes industry profits and the monopolist is as efficient as the rival firm.

¹¹ K. J. Arrow, "Economic Welfare and the Allocation of Resources to Invention," in The Rate and Direction of Inventive Activity (1962).

TABLE 1

Profits Conditional on Market Structure
and Patent Rights

	<u>Firm</u>					
	Original Monopolist	Rival				
<u>Patent</u>						
Product 1	<table border="1"> <tr> <td>100</td> <td>0</td> </tr> </table>	100	0	-----		
100	0					
Product 2	<table border="1"> <tr> <td>150</td> <td>0</td> </tr> </table>	150	0	<table border="1"> <tr> <td>70</td> <td>70</td> </tr> </table>	70	70
150	0					
70	70					

The responsiveness of inventive and innovative activity to market forces has a long history of debate, but statistics suggest that industrial development of new products and processes responds to perceived profitmaking opportunities.¹² A conclusive proof of the relation between profits and R. & D. is extremely difficult, but case studies by Mansfield offer some support.¹³ A study of a large electrical equipment manufacturer showed that the commitment of funds to R. & D. projects increased with expected profitability, and in several industries projects were accelerated when profits were sensitive to early completion.

These studies support a view that patenting and product development will tend to occur when expected profits are higher, and that there is a tradeoff between the cost of an R. & D. program and the timing of both patenting and product development. Figure 1 presents an oversimplified description of this tradeoff. The time T is the lag between the initiation of an R. & D. program and the award of patent protection, and C is the present-value cost of the R. & D. program. More generally, the patent date bears a highly uncertain relation to expenditures on R. & D., but on average, the lag should decrease with greater expenditures on R. & D.--at least for relatively short expected lags. One might

¹² The sensitivity of R. & D. to profit opportunities is discussed in detail in section IV.

¹³ E. Mansfield, Industrial Research and Technological Innovation (1968).

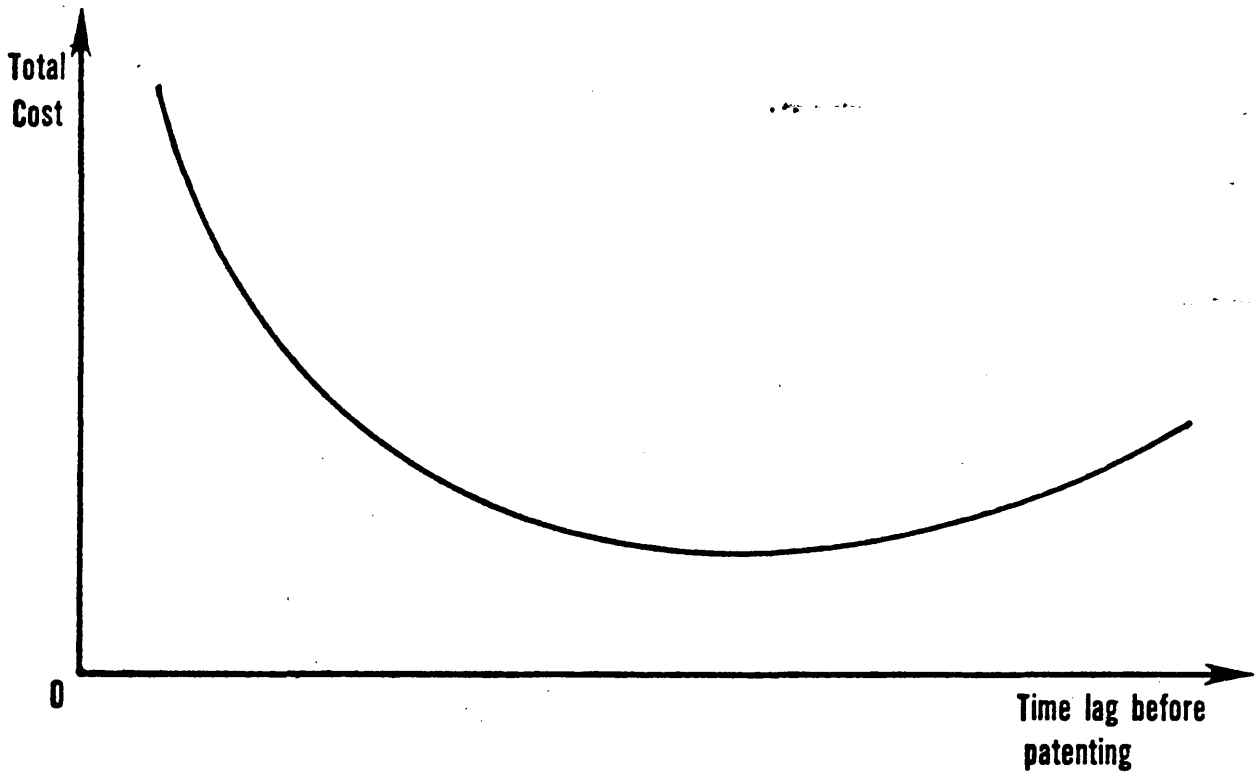


Figure 1. Relation between costs of patenting and time lag between start of program and actual patenting.

argue that beyond some point, additional delays only increase total discounted costs, as the efficiency of the research and development team may fall while certain overhead expenses continue for the duration of the project.

In the absence of any barriers to entry in the performance of research and development, competition should result in normal economic profits from R. & D. when the costs of the research programs are taken into account and adjustments are made for risk. In general, competition will lower expected profits by reducing the probability that any one firm will patent and by obligating firms to spend more on R. & D. as a prerequisite to success. A complete analysis of this problem awaits further research,¹⁴ but as an approximation, assume competitors bid for the patent by quoting an amount which they are prepared to spend on R. & D. If the patent lag is a deterministic function of expenditures, the firm that bids the most will win the patent, and competition will insure that the winner earns only a normal return on the R. & D. program. Since the assumptions leave no allowance for risk, the amount committed to R. & D. must equal the present-value profits from the patent on product 2. For a competitor, this is \$70 per year, discounted from the date of invention.

¹⁴ Examples of equilibrium models of R. & D. include the work of G. C. Loury, "Market Structure and Innovation," 93 Q. J. Econ. 395 (August 1979) and P. Dasgupta and T. Stiglitz, "Uncertainty, Industrial Structure, and the Speed of R. & D.," 11 Bell J. Econ. 1 (Spring 1980).

Now suppose the monopolist joins in the bidding for patent rights to product 2. Although the patent increases monopoly profits by only \$50, the opportunity cost to the monopolist of failing to patent product 2 is \$80 per year. Therefore, the monopolist should bid up to the present value of \$80 per year, or \$10 per year more than any competitor.

The situation is illustrated in figure 2. The curve labeled \$70 is the present value of the patent to a competitor who patents at date T ; the value falls with T , as a longer invention lag means profits start at a later date. The curve labeled \$80 is the value of the patent to the monopolist when the monopolist patents at date T . The date T^C is the earliest patent date for which profits to a competitor are not less than the cost of invention. This is the date which should result from competitive bidding for the patent. Now, at T^C , the value of the patent to the monopolist exceeds its cost (at T^C , the cost of the patent equals its value to a competitor, which is less than the value to the monopolist). The monopolist can spend more than a competitor on R. & D. and advance the patent date before T^C . The monopolist can patent as early as T^0 and still break even on R. & D., but in this simple example with no uncertainty, the monopolist need only advance the date slightly before T^C (by spending slightly more on R. & D.) in order to preempt all potential competitors.

Note that the logic of this simple example does not depend on the particular numbers assumed. More generally, let Π_C

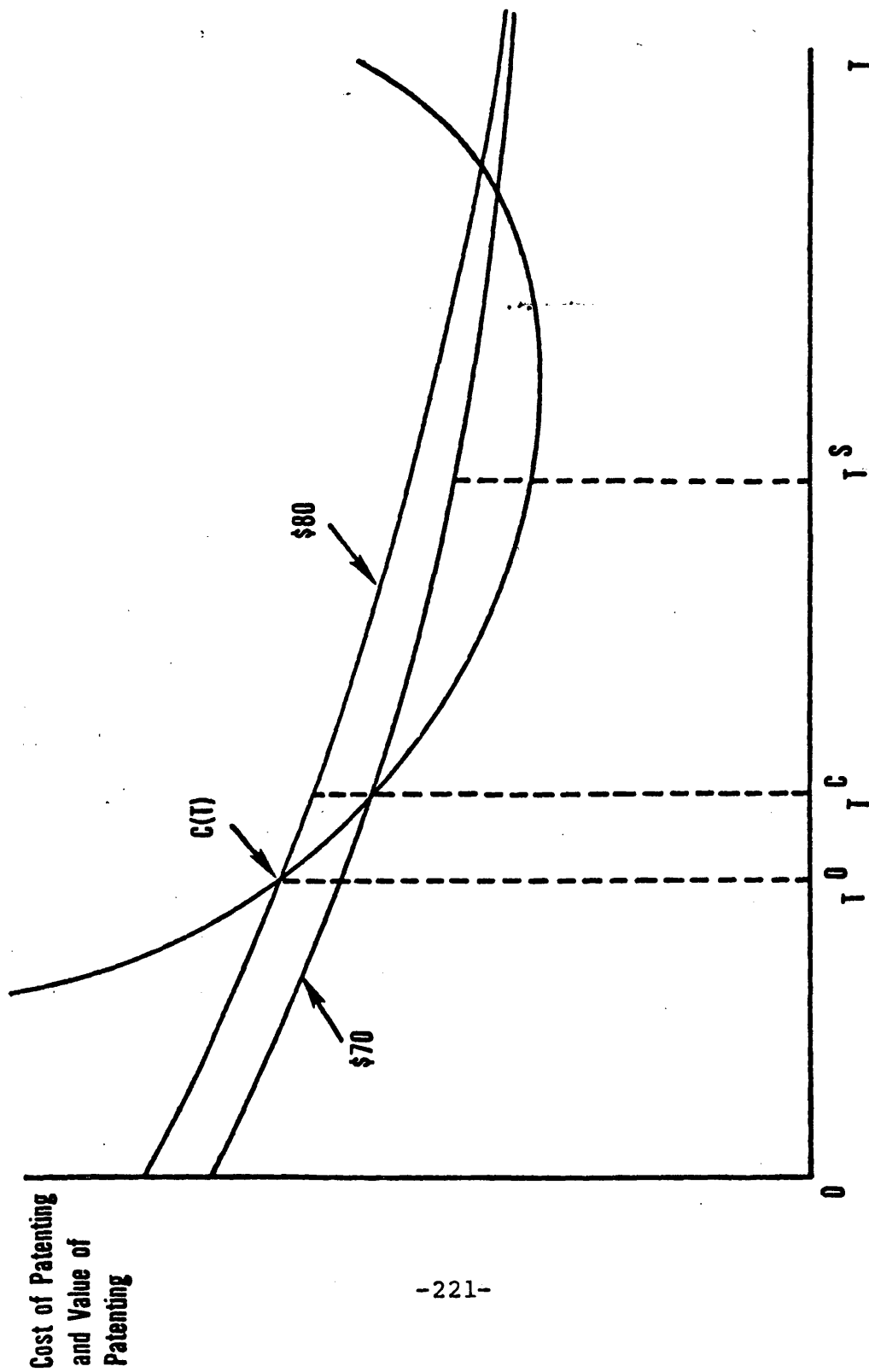


Figure 2. Determination of the Competitive and Monopoly Patent Dates

represent the annual profit earned by a competitor with the patent, Π_m the total profit earned by the monopolist with both patents, and Π_o the profit earned by the former monopolist when a rival firm enters the market. Preemption is a profit-maximizing strategy whenever $\Pi_m - \Pi_o$ (the opportunity cost of not preempting) exceeds Π_c (the maximum amount the monopolist must spend to preempt rival firms). This condition reduces to $\Pi_m > \Pi_o + \Pi_c$, or monopoly profits must exceed total profits with competition. In most circumstances this is a quite reasonable presumption.

Preemption v. Licensing

Instead of preemptive patenting, the monopolist could purchase an exclusive license to the competitive technology, if and when it is patented by another. The patent acquisition blockades entry, and the monopolist should be willing to pay for exclusion. However, the patentee should know the the patent is more valuable to the monopolist, and should attempt to extract some of this value in royalties. Consider the situation summarized in table 1. The patent is worth \$70 to a potential entrant and \$80 to the monopolist. A potential competitor could offer the monopolist exclusive patent rights and demand up to \$80 in compensation, since it is worth that much to the monopolist to avoid entry. The possibility of selling out to the monopolist increases rivals' incentives to invent, but it does not eliminate

the gains from preemption. The patent is still worth \$80 to the monopolist and, depending on the outcome of a bargaining process, somewhere between \$70 and \$80 to a rival. If only for transaction costs, a rival should not expect to receive the full \$80 monopoly value for the patent. Note that if the purchase of exclusive licenses is made illegal,¹⁵ this decreases the potential reward (in the form of royalties for exclusive licenses) to potential competitors and hence increases the incentive for preemptive patenting.¹⁶

Preemption and "Sleeping Patents"

Suppressed, or "sleeping," patents are inventions that are not put to commercial use. Although most patents sleep because they are economically inferior to existing technology or not worth the development cost, the possibility that a firm or group of

¹⁵ The purchase of exclusive licenses is not *per se* illegal. However, in U.S. v. Singer Mfg. Co., 374 U.S. 174, 83 S. Ct. 1773, 10 L. Ed. 2d 823 (1963), the Court declared purchase of an exclusive license, where a nonexclusive license would have provided adequate protection, an "exclusionary" act contributing to a Sherman Act Section 2 violation.

¹⁶ Of course, in the preemption case the firm produces a new patented design, while patent acquisition is merely a transfer of existing patented technology from one firm to another. For this reason, preemption may be viewed with more sympathy than patent acquisition. The distinction is quite similar to that encountered when a firm increases its market share by building new capacity versus acquisition of a competitor's capacity.

firms with monopoly power might suppress a patent that a competitor would use has been an issue of antitrust concern¹⁷ and a driving force for compulsory licensing under several national patent codes.¹⁸ Whether or not patent suppression is a significant issue will be addressed later, in section IV, but for now I will consider only the incentive for patenting an invention that is not put to use.

In a world of certainty, a monopolist protected from entry would never invest resources to produce a sleeping patent, since the monopolist could postpone the patent date until the best moment for innovation and reduce present discounted costs.¹⁹ Yet a sleeping patent may occur as a result of preemptive patenting by the monopolist. As an illustration, consider the case where product 2 has the same production cost and the same demand characteristics as product 1, but development of the new product from the patented design to the production stage is costly. The firm with product 1 would never produce product 2, but it could be profitable to patent product 2 and suppress its use.

¹⁷ See Sullivan, supra note 1, at 511-12.

¹⁸ See UNCTAD, The Role of the Patent System in the Transfer of Technology to Developing Countries (United Nations, 1975), p. 10.

¹⁹ See, e.g., P. Dasgupta, R. J. Gilbert, and J. E. Stiglitz, "Invention and Innovation Under Alternative Market Structure: The Case of Natural Resources," Princeton University Working Paper (1979).

Table 2 shows the profits from patenting the essentially identical products 1 and 2. The patent on product 2 clearly cannot increase the monopolist's profits of \$100 which he would earn with only product 1. If a rival firm patents product 2, I assume both firms earn \$40 per year, so that total profits fall from \$100 to \$80. As before, the monopolist must spend only slightly more than \$40 to preempt all rivals, and the benefit from preemption is the difference between a profit of \$100 with the sleeping patent and \$40 if entry occurs. Preemption is a profitable strategy, even though the preempted patent is never used. Indeed, the argument for preempting and suppressing a patent is quite strong when the patented technology is less efficient than the existing technology. In this case, total industry profits when a competitor uses the new technology are lower than monopoly profits--not only because competition lowers profits, but also because the use of the less efficient technology lower total industry profits.

Multiple Patents

The preceding discussion suggests that preemptive patenting should be more conspicuous than it is. Several reasons could be advanced to explain the apparent contradiction. Section IV examines survey and statistical data on the role of patent protection in R. & D. programs. In most industries, patent infringement is rarely a significant barrier to entry. Most components, processes, and machines can be designed in many different ways

TABLE 2

Profits Conditional on Market Structure and Patent Rights When Products 1 and 2 are Identical

		<u>Firm</u>	
		Original Monopolist	Rival
<u>Patent</u>	Product 1	100 <hr style="border: none; border-top: 1px solid black;"/> 0	-----
	Product 2	100 <hr style="border: none; border-top: 1px solid black;"/> 0	40 <hr style="border: none; border-top: 1px solid black;"/> 40

with similar performance characteristics. No two products--for example, toasters--may be exactly alike, but a competitor can design his toaster to avoid infringing patents owned on another's toaster without a serious loss of market appeal. The process of imitation might be called "inventing around" a patent, or perhaps there simply may be many roads to the same destination.

The consequences of extending the preceding analysis to allow for multiple patents is obviously dramatic. If at any moment of time there are many patentable versions of economically similar products with comparable development costs, then the use of preemptive patenting to fence in a monopoly is about as effective as holding back a flood with a sieve. It should be clear that the crucial question in a preemption strategy is the degree to which patenting can successfully impede the entry of competitors. This requires that existing patents be effective in preventing entry using available technology (which may include infringing patents). It also requires that at any moment of time existing patents leave very little room for the development of new potentially competitive techniques, either by current competitors or from research and development in other fields.²⁰

The evidence presented in section IV suggests that patents are not effective in restraining competition in most industries.

²⁰ A more detailed discussion of preemption with multiple patents is in R. J. Gilbert and D. N. G. Newbery, "Preemptive Patenting and the Persistence of Monopoly," Am. Econ. Rev. (forthcoming).

However, the degree of patent protection varies, and in exceptional cases patent infringement can be a significant barrier to entry. In the vast majority of industries a wide range of technological alternatives in a given product area rules out preemption as a credible strategy to maintain monopoly.²¹ Although this paper deals almost entirely with the possible anticompetitive effects of preemption in the exceptional cases where it can occur, the cost of patenting can have important consequences for market structure when preemption is not effective. To the extent that new product development is necessary to avoid infringing patents, this raises the cost of entry. The abundant literature on limit pricing shows how entry costs are a factor in permitting a dominant firm to impede entry while earning greater than normal profits.²² The costs of inventing around patents vary, but note that it is not the cost of patenting that affects entry, but the cost of developing a new design. Even if patenting itself were a minor expense, new product development incurs expenses that could be avoided by using already patented designs.

Of course the product differentiation advantages from developing a new design can more than compensate for the costs of product development. Even if patent infringement were not an

²¹ See section IV infra.

²² In addition to the seminal work by J.S. Bain, Barriers to New Competition (1956), see also A. M. Spence (1977), note 10 supra, and A. Dixit, "The Role of Investment in Entry Deterrence," 190 The Econ. Journal 95 (March 1980).

issue, most firms would avoid the role of follower associated with marketing an existing design. The possibility of patent infringement is a further encouragement for firms to differentiate their products.

Uncertainty

Various studies have shown that industrial firms conduct R. & D. with a high degree of confidence in technical, if not always commercial, success.²³ Their efforts are rarely a blind exploration into the unknown; but neither are the results of a corporate R. & D. program known with absolute certainty. Several sources of uncertainty may affect the incentives for preemptive patenting. The invention process, the characteristics of the invention and the market, and the competitive strategies of potential entrants are all more or less uncertain. Uncertainty in the invention process means that the patent date is not a deterministic function of expenditures on R. & D. Uncertainty in the characteristics of the invention and in the strategies used by competitors after entry affects the value of a new technology after it is patented.

Uncertainty in the invention process does not greatly change the deterministic analysis of preemption, provided R. & D. expenditures are sensitive to the expected returns and the established firm is no more averse to risk than rivals. With uncertainty, a

²³ Mansfield (1968), note 13 supra.

firm may not be able to preempt competitors with probability one. Any competitor may be lucky and win a patent. However, a firm can invest in R. & D. at a level sufficient to make the expected probability of success by a rival low enough to induce the rival to invest his resources elsewhere. If a firm invests at this level, no rival will elect to directly compete in a patent race. Firms may stumble upon patentable technologies as byproducts of R. & D. in other fields, and this indirect competition may limit the rewards of preemptive patenting.

Uncertainty in the characteristics of inventions, the market, and competitive strategies may lead an established firm to choose a level of investment in R. & D. that does not preempt entrants. The established firms and potential entrants may differ in their expectations of the returns from patenting. For example, as in table 1, entrants may expect a profit of \$70 from entry, but the monopolist may think there is only a small chance that any entrant expects more than a profit of \$50. The monopolist would plan an R. & D. program that preempts only entrants who have low profit expectations, and this may fail to deter the entry of more optimistic firms. Also, rivals could have access to private information which affects the return from patenting and leads to expectations that are more optimistic than those held by the established firm.

III. Preemption Patenting and Economic Efficiency

The theory of preemptive patenting identifies situations where a firm with monopoly power can preserve its monopoly through a process of vigorous internal research and development. Successful preemption means persistently high concentration in particular markets and the potential to exercise monopoly power. This result provides some ground to question antitrust immunity for internal patenting; but a theory, by itself, is too weak a foundation on which to build law. Any substantive policy recommendation requires a thorough investigation of both the overall impact of preemptive patenting on economic efficiency and the empirical evidence for actual use of preemptive strategies in industry. This section offers some comments on the relation between preemption and economic efficiency when preemption involves either patenting or, more generally, accelerated research and development; the empirical evidence is examined in section IV.

With regard to economic efficiency, preemption, by definition, requires a firm to be at least as progressive in the conduct of research and development as any potential competitor; and given uncertainty about the expectations and capabilities of rivals, a firm may have to invest substantially more than competitors to assure technological success. Accelerated research and development would seem to be advantageous to economic progress, but this could have a negative impact on overall economic efficiency in at least four ways.

- (i) The level of R. & D. under competitive conditions could be sufficiently great that any increase incurs costs in excess of economic benefits.
- (ii) The benefits of patent protection could steer research and development in the direction of producing inventions that are easily patented, all else equal, rather than producing inventions that contribute most to economic progress.
- (iii) The preempting firm may be less efficient at R. & D. than rivals.
- (iv) Successful preemption may reduce competition in the future by denying competitors the incentive to stay in the R & D. race and at the frontier of technical change in the industry.

Ward Bowman has challenged the view that patent protection could generate too much R. & D.²⁴ He points out that the monopoly value of a particular new process or product is less than its total contribution to economic surplus.²⁵ Therefore Bowman

²⁴ Bowman (1973), note 7 supra.

²⁵ Provided the patent grant is not used to facilitate industry collusion, or to extend monopoly power by means of exclusionary practices made possible by the patent grant. Bowman argues at great length the feasibility of extending monopoly power by means of the patent grant. His main concern was the effectiveness of ties and other license restrictions in leveraging the monopoly power of the licensee. I have attempted to avoid the question of leveraging the patent monopoly through restrictive license agreements except insofar as it concerns preemptive patenting.

concludes that equating the private value of an invention to the marginal cost of invention would not result in excessive R. & D. expenditures.

An optimal investment in R. & D. would equate the marginal economic value of the R. & D. to its marginal cost, but the marginal economic (or social) value of R. & D. is not necessarily the invention's contribution to total surplus. Rather, it is the increase in surplus which occurs because the product is available earlier, or available at lower cost, than it would be without the R. & D. expenditures of the inventor or innovators. Also, free entry does not equate the private value of a patent to its marginal cost. This occurs at date T^S in figure 2. Free entry should dissipate profits, so the value of the patent should be approximately equal to its average cost. For these reasons, the level of investment in R. & D. under competitive conditions could be greater or less than the socially optimal level. In addition (and as Bowman recognizes), the private value of a patent may be much more than its social value if the patent is used as a strut to facilitate industry collusion.

Although in theory competitive markets can be "too progressive," it would seem foolhardy to attack preemption solely because it resulted in excessive expenditures on R. & D. Too little is known about the specific ways markets allocate resources to

R. & D. in practice, and about the specific ways technical change contributes to economic growth. Some empirical evidence is available on the former question. Mansfield et al. examined the returns from 17 representative innovations and found a median before-tax return of 25 percent.²⁶ Over the same period the average before-tax rate of return on stockholder equity of approximately 16 percent for industrial corporations.²⁷ Free entry in the race for patents would imply approximate equality between rates of return on patented inventions and other comparable investments. Taking the technological and market risk of R. & D. into account, which was borne out by returns in the sample from a negative value to more than 40 percent, the median return of 25 percent is not inconsistent with free entry producing a "normal" return on research and development. But then again it does not overwhelmingly support the notion that industrial expenditures on R. & D. are excessive. Furthermore, Mansfield and his colleagues found that in most cases the innovations produced substantial cost savings that were not captured as profits by the innovating firms. Adding these spillover benefits to the innovator's profits, the

²⁶ E. Mansfield, J. Rappaport, A. Romeo, S. Wagner, and G. Beardsley, "Social and Private Rates of Return from Industrial Innovations," 91 Q. J. Econ. 221 (May 1977).

²⁷ From Statistics of Income, Corporation Income Tax Returns.

median total return on R. & D. expenditures was 56 percent--more than twice the private return. Unless one can make a convincing argument that potential inventors are very scarce, this high social return suggests that private firms invest, if anything, too little in research and development.

The possibility that patents distort the direction of R. & D. has been debated for decades. Plant argued that patents provide incentives which draw resources away from R. & D. activities that do not enjoy patent protection or where patent protection is less secure.²⁸ Knight argued that patents encourage "the last-step routinizers" and not those who contribute major advancements in knowledge and technology.²⁹ I shall not add to this long debate. The relevance of distortions in the direction of R. & D. spending ultimately depend on the degree to which patents actually provide significant protection from competition. This crucial question is examined in the next section.

The possible inefficiency mentioned in point (iii) can be significant if firms actively pursue a preemption strategy. Economic efficiency requires that activities be carried out by firms with the lowest incremental cost. A firm attempting to

²⁸ A. Plant, "The Economic Theory of Patents for Inventions," 1 Economica 30 (February 1934).

²⁹ F. Knight, Risk, Uncertainty, and Profit, 8th ed. (1957).

extend monopoly power may preempt a more efficient firm by essentially using the monopoly gains from preemption to subsidize the research program. This can be illustrated by returning to the numbers in table 1 of section 2. The value of a patent to a competitor was \$70 in that example, but the monopolist retained \$80 of profit by preemptively patenting; that is, the monopolist had an extra incentive of \$10. Now suppose the monopolist is less efficient than a competitor, and in particular suppose it cost the monopolist \$79 to duplicate an R. & D. program that cost a competitor only \$70. The monopolist should carry out the program despite the higher cost, because the monopolist will earn an extra \$10 from the patent.

This result is particularly onerous for economic efficiency. A firm could dissipate nearly all monopoly profits from preemptive patenting on wasteful R. & D. and still benefit from excluding competition. The monopoly profits, which could be recycled into productive activities, are instead sacrificed in a wasteful R. & D. program whose main effect is to exclude competition. This is the worst of all worlds.

The final item on the list, point (iv), is both the greatest potential source of inefficiency associated with preemptive research and development and the most resistant to analysis. Preemption could create barriers to entry if it is necessary to continue an active R. & D. program in order to maintain an effective competitive threat. This assumption is basic to the concept

of "experience curves," which associate cost minimization with cumulative production experience. Here the relevant experience curve is in the performance of research and development. If the costs of invention and innovation increase from lack of experience, the pressure of competition relaxes the longer a preemptive R. & D. program is successful. The experience curve develops into an entry barrier, equal to the difference in product development and production costs, and as the height of the barrier increases, a monopolist can reduce expenditures on R. & D. with a lower risk of encouraging entry of competitors. This enables a monopolist to "enjoy the quiet life." Empirical studies of investment in research and development as a function of industry concentration suggest that a part of the quiet life may be reduced commitment to R. & D.³⁰ This is substantiated by several theoretical studies as well.³¹

One could advance several arguments against the notion that preemption ultimately will reduce investment in R. & D. A preemption strategy must begin with accelerated investment in R. & D., which can be relaxed only if it is successful and if experience is an essential component of R. & D. If the preemption is not successful, or if the success is only transient, the firms

³⁰ See the survey of qualitative and quantitative evidence in F. M. Scherer, Industrial Market Structure and Economic Performance, 2d ed. (1980), pp. 430-38.

³¹ See, e.g., Arrow (1962), and Dasgupta, Gilbert, and Stiglitz (1979), note 19 supra.

never enjoy the opportunity to slow down and rest on their laurels. This would be consistent with Schumpeter's view of "creative destruction," where monopoly profits both encourage and facilitate rapid technological progress.³²

The importance of the experience curve in patenting is highly problematical. Important and patentable advances in one industry may occur from research programs in other industries, or as the product of creative thinking by individuals not attached to potentially competing firms. A preemptive R. & D. program could not stop the flow of new inventions from these diverse sources. Examples of major breakthroughs from firms that are currently lagging in an industry or are newcomers to the industry are common. Also, even where experience curves are crucial, the experience is embodied by people who are highly mobile between firms. A firm with significant monopoly power can pay an essential employee more than a competitor could afford to keep the employee from transferring company secrets, but in most firms many workers have access to company secrets and each could make some profit by defecting. The firm with monopoly power could not afford to pay each worker the maximum amount that could be earned by defection, so retaining all knowledge by discouraging defection is typically not practicable.

³² J. A. Schumpeter, Capitalism, Socialism, and Democracy, 3d ed. (1950).

IV. Empirical Evidence

The Patent Office records show that in 1974, about 104,000 applications for patents were filed in the United States and almost 80,000 patents were granted. Table 3 lists the record of patent applications and grants for the years 1955 to 1974. Since the patent grant extends for 17 years, a first estimate for the number of patents in force in 1974 is the total number granted from 1957 up to 1974, or approximately 1,072,000. This figure is an overestimate, as it includes patents that have been challenged and overturned in cases before the Patent Office and the courts. The Patent Board of Appeals considered 2,983 cases in fiscal year 1974 and reversed 531 patent grants.³³ Approximately 600 additional patent cases were in litigation or pending before the courts.³⁴ Several of these cases involved more than one patent. It is commonly observed that about 70 percent of patents actually challenged in court cases are overturned. Taking a figure of 1,000 reversals in 1974 as representative, the correction to the number of outstanding patents is quite small (less than 2 percent), which leaves more than one million patents in force in 1974. The number of patents actually used in commerce in 1974 is much smaller. Scherer reports a 54 percent utilization rate in a

³³ U.S. Patent Office, ibid., table 12.

³⁴ U.S. Patent Office, ibid., table 13.

Table 3¹

Applications Filed and Patents Granted

Fiscal Years 1955-74²

Year	Total Patent Applications	Total Patent Grants	Acceptance Rate = $\frac{(c)}{(b)}$
(a)	(b)	(c)	(d)
1955	78,710	29,775	37.8%
1956	75,733	40,694	53.7
1957	73,783	45,102	61.1
1958	76,956	43,676	56.8
1959	78,363	52,482	67.0
1960	79,331	50,607	63.8
1961	81,171	47,492	58.5
1962	85,265	51,343	60.2
1963	85,046	54,287	63.8
1964	87,836	44,400	50.5
1965	89,234	53,245	59.7
1966	93,391	66,586	71.3
1967	88,508	70,310	79.4
1968	90,663	61,851	68.2
1969	96,821	62,238	64.3
1970	100,573	66,730	66.3
1971	104,160	70,686 ³	67.9
1972	103,122	83,655	81.1
1973	101,391	67,972 ⁴	67.0
1974	103,979	79,878	76.8

¹ Source: U.S. Patent Office, Commissioner of Patents Annual Report, Fiscal Year 1974, U.S. Department of Commerce, tables 3 and 4.

² Patent grants include withdrawn numbers.

³ Does not include 1,300 voided numbers.

⁴ Does not include 1,356 voided numbers.

study of 590 U.S. patents assigned to domestic corporations.³⁵ Taylor and Silberston, in their study of the U.K. patent system, estimated that somewhere between one-fifth and one-third of U.K. patents in force are actually worked.³⁶

Empirical issues related to the theory of preemptive patenting include the following. The theory assumes patenting responds to potential profitability and the timing of patenting is sensitive to expenditures on R. & D. Is there empirical evidence supporting these assumptions? The theory also predicts that patents may be used to prevent entry without being worked by the patentee. What percentage of the great bulk of patents that are never worked actually have commercial value but are left sleeping to deter entry? How important is patent protection in research and development decisions? What is the relationship between patenting and industry concentration?

This section surveys existing studies to gain some insights into the workings and incentive effects of patent systems. Unfortunately, the number of in-depth studies of patent incentives is small and the data that exist are not fully adequate for a convincing test of patent incentives, particularly with regard to

³⁵ B. Sanders, "Patterns of Commercial Exploitation of Patented Inventions by Large and Small Corporations," Patent, Trademark, and Copyright Journal 51 (1964), reported in F. M. Scherer, "The Economic Effects of Compulsory Patent Licensing," New York University Monograph (1977).

³⁶ C. T. Taylor and Z. A. Silberston, The Economic Impact of the Patent System (1973).

dynamic effects of patent accumulation. It is nonetheless possible to conclude that the evidence does not justify a broad policy designed to minimize instances of preemptive patenting by reducing the monopoly value of patents. The disincentive effects on internal R. & D. could, and very probably would, far outweigh the benefits from reduced concentration. Yet studies of industry research and development and patenting do show substantial differences in technological opportunities and in the value of patents from one industry to another, and patenting could be used to maintain monopoly power in specific (although exceptional) circumstances.

Patenting and Profits

The Mansfield case study of a large electrical equipment manufacturer (discussed earlier) supports a causal link from the profitability of a new product or process to investment in research and development. Both the commitment of funds and the timing of R. & D. expenditures were sensitive to perceived profits. The evidence for a causal link between perceived profitability and the timing of patenting is not so clear. Some support for the patent-profits connection comes from the work of Jacob Schmookler, who studied the temporal relation between patenting in capital goods industries and investment in the industries that use the capital goods.³⁷ Greater investments should increase both the

³⁷ J. Schmookler, Invention and Economic Growth (1966). See also comments in F. M. Scherer (1977), note 35 supra.

demand for capital goods and the profitability of new products, which, if the theory is correct, should increase patenting. Schmookler found that cycles in investment and patenting were correlated, and that investment tended to lead patenting, which supports the view that patenting responds to profits. At least for industrial corporations, which account for most R. & D. expenditures, both R. & D. expenditures and patenting appear to respond to the pull of profits.³⁸

Assuming patenting responds to profits, what about the monopoly profits afforded by patents? Taylor and Silberston attempted to assess the value of patents by asking executives to estimate the proportion of R. & D. expenditures dependent on patent protection. The results of the survey are shown in table 4; but note that the question is highly speculative and many executives could supply only very approximate figures.³⁹ The average proportion of R. & D. expenditures dependent on patent protection was only 8 percent for the responding companies; but individual industry estimates varied widely. Patent protection

³⁸ In 1972, U.S. corporations with 5,000 or more employees accounted for 89 percent of all reported expenditures on R. & D. by manufacturing companies, while accounting for only 53 percent of employment. Companies with 5000 or more employees do not account for a disproportionate share of patents received, which reflects their major role in development. See F. M. Scherer (1980), supra note 30, at 418.

³⁹ This table appears as table 9.2 in Taylor and Silberston (1973), supra note 36, at 199.

Table 4¹Estimated Impact of Patent Protection on
R. & D. Expenditures, 1968

25 Responding Companies

<u>Industry</u>	(1) R. & D. Expenditure in the United Kingdom (£m)	(2) R. & D. Expenditure Dependent on Patent Protection (£m)	(3) (1) as Proportion of (2) (%)
Chemicals:			
Pharmaceuticals	4.9	3.1	64 ²
Other finished and specialty	7.1	1.8	25
Basic	5.5	0.2	5
Mechanical Engineering:			
Plant, machinery and equipment	3.6	0.3	7
Components and materials	2.1	0.1	2
Electrical engineering	42.7	negligible	negligible
Total of above	65.9	5.5	8

¹ Source, table 9.2, Taylor and Silberston (1973), note 36 supra.

² F. M. Scherer, in his conference comments on this paper, asserted that this figure is biased upwards because new entrants comprised a high percentage of the respondents. While special circumstances affect this figure (and the others) in table 4, Taylor and Silberston's general views on patent protection in pharmaceuticals are stated as follows:

"Bearing in mind that these results [in table 4] are heavily influenced by the experience of firms whose expansion in this field has been relatively recent and rapid, and which might therefore be expected to be more sensitive to patent protection than others, we would guess that the answer for the entire pharmaceutical industry in the U.K. . . . would be probably somewhat lower--but hardly lower than, say, one-half of R. & D., etc., on pharmaceuticals . . ."
Taylor and Silberston (1973), note 36 supra.

was of negligible importance in electrical engineering and had only a minor impact (2 to 7 percent) on R. & D. spending in those industries grouped together under mechanical engineering. The figures were substantially higher in the chemicals industry, ranging from a low of 5 percent in basic chemicals to 64 percent in pharmaceuticals.⁴⁰ Taylor and Silberston also investigated the proportion of production activity dependent on patent protection. The pattern of responses was quite similar, ranging from 68 percent in pharmaceuticals to a negligible proportion in electronic components.⁴¹

In their study of the private and social returns from industrial innovations, Mansfield et al. found that the difference between private and social returns for the sampled innovations did not bear a significant relation to the existence of patent protection.⁴² This suggests the relation between patent protection and profitability is insignificant, under the assumption that social returns are not strongly correlated with patenting (they could be correlated, for example, through the decision to disclose an invention in a patent application). Factors such as the cost of imitation and the importance of the invention did show a

⁴⁰ Scherer argues that substantial increases in the cost of certifying new drugs should decrease the importance of patent protection in the United States. See Scherer (1977), note 35 supra.

⁴¹ Taylor and Silberston (1973), note 36 supra.

⁴² Mansfield et al. (1977), supra note 26, at 237.

significant correlation with the excess of social over private returns from invention in the sample data set.

The clear implication of these surveys is that on average patent protection has a minimal impact on R. & D. and production decisions, but patent protection can be an important factor in isolated cases. The value of patent protection depends on the cost of imitating inventions either by making minor changes in the patented design or by pursuing quite different technological routes which lead to inventions that are near substitutes for the patented article. In those industries where patent protection has a negligible impact, the cost of inventing around patents is typically small. Taylor and Silberston found that where patents had only a minor impact on R. & D., the cost of avoiding patent infringements was generally small, and the cost of duplicative R. & D. caused by designing around patents was either not substantial or was justified because the new direction of R. & D. produced useful and sometimes unanticipated returns.⁴³

Ease of inventing around patents is not the only reason why patents may not offer substantial protection from competition. In industries such as electronics, where product life cycles are very short--perhaps only a few years--the product runs its economic course before patent infringement poses a deterrent to competitors (indeed, the product could be obsolete before the patent grant is

⁴³ Taylor and Silberston, id. at 200.

issued by the Patent Office). The patent grant does offer substantial protection when the cost of imitating the patented article is high. Scherer cites the example of Hoffmann-La Roche's patented drugs Librium and Valium, where potential competitors have tried at least 2,000 molecular variants in attempts to design around the patents--with little success.⁴⁴ In contrast, inventing around antibiotic patents was relatively easy.⁴⁵

Competitors may be relatively unconcerned about patents when the rigors of the market require firms to differentiate their products and develop independent lines of expertise. Patents pose no barrier when product imitation results in an inferior market perception or a guaranteed second place in the race for profitable products. Product differentiation and the accumulation of know-how may raise barriers to competitive imitation that are quite independent of the existence of patent protection. Taylor and Silberston's surveys identified the provision of know-how as crucial to many transfers of technology. In many cases the patent disclosure is grossly inadequate to enable firms to copy new technology. Their findings contradict the idealistic view of knowledge as a pure public good with very low distribution costs. In many cases firms accumulate private stores of know-how whose market value far exceeds the value of associated patents.

44 Scherer (1979), supra note 35, at 22.

45 Id.

Sleeping Patents

A quick glance at the Patent Gazette reveals that many patents cover discoveries that are remote from any immediate commercial application. For economic efficiency, most sleeping patents should, and do, enjoy an indefinite rest. Since many patents fall into this category, it is difficult to determine whether any of them are held for purpose of maintaining monopoly power simply by examining the Patent Gazette. A more direct approach is a study of experience with compulsory patent licensing.

Several countries have patent laws that require compulsory licensing in one form or another at "reasonable" terms if the patentee fails to put the technology to use within a specified time or if the patentee otherwise abuses the rights of the patent grant. One notable result of experience with compulsory licensing provisions is the infrequency of their use. For example, the total number of patents in force in the United Kingdom at the end of 1968 was about 224,000, of which perhaps 2/3 to 4/5 were not in commercial use. During the entire period 1959-1968, only 57 applications for compulsory licenses were filed in the United Kingdom and 6 were granted (see table 5). Of these applications, 41 were for compulsory licenses for manufacture of drugs and medicines.⁴⁶ The applications were under section 41 of the U.K.

⁴⁶ Taylor and Silberston (1973), supra note 36, at 17.

Table 5¹

Number of Compulsory Licenses Filed and
Granted in Selected Countries
(with Compulsory Licensing Provisions
in their Patent Laws)

Country	Period Covered	<u>Number of Applications</u>			
		Filed ^a	Refused	Abandoned	Granted
<u>Developed Market Economies</u>					
Australia	1958-1963	None	--	--	None
Canada	1935-1970	192	14	72	79
Denmark	b	7	--	1	3
Ireland	b	1	--	--	None
Japan	1958-1963	None	--	--	None
Netherlands	1958-1963	None	--	--	None
New Zealand	1955-1963	None	--	--	None
Norway	1910-1963	27	2	11	11
Switzerland	1952-1963	None	--	--	None
United Kingdom	1959-1968	57	--	--	6

Table 5¹ (Continued)

Number of Compulsory Licenses Filed and
Granted in Selected Countries
(with Compulsory Licensing Provisions
in their Patent Laws)

Country	Period Covered	<u>Number of Applications</u>			
		Filed ^a	Refused	Abandoned	Granted
<u>Developing Countries</u>					
Cuba	1958-1963	None	--	--	None
India	b	4	--	--	1
Israel	b	3	--	--	None
Morocco	1958-1963	None	--	--	None
Philippines	b	8	--	--	None
Republic of Korea	b	1	--	--	1
<u>Socialist Country</u>					
Poland	b	7	--	--	None

¹ Source: UNCTAD, The Role of the Patent System in the Transfer of Technology to Developing Countries (United Nations, 1975), table 13, p. 50.

^a Including applications pending at the end of the period covered.

^b Precise period not specified, but reference to "over a recent 5-year period."

Patents Act, which requires the Comptroller to grant compulsory licenses for patent drugs, medicines, and foods, unless he sees "good reasons" for not doing so. Of these 41 applications, 23 were filed in 1963-64. It should be noted that these licenses typically were not for patents withheld from the market; they were licenses to patents under production and enjoying significant profits. Table 5 summarizes activity in several countries with provisions for compulsory licensing. Many of the licenses filed and granted in table 5 are for patents already in commercial use.⁴⁷ Even if this were ignored, the frequency of applications for licenses to use "sleeping" patents is clearly very low. Also Canada, which registers the largest number of compulsory licenses in the sample, is atypical amongst the major industrialized nations because about 95 percent of the 34,000 patents granted in Canada in 1972 were to foreign nationals.⁴⁸

The frequency of applications for compulsory licenses does not support the claim that firms sit on patents and systematically deny them to potential competitors. But one cannot conclude from the low incidence of compulsory license requests that firms never

⁴⁷ Of the countries listed in table 5, at least Canada, in addition to the United Kingdom, has mandatory licensing provisions for drugs. India has used mandatory licensing for drugs since 1970. See Scherer (1977), supra note 35, at 38.

⁴⁸ For developed market economy countries as a whole, the average fraction of patents to foreign nationals was 64 percent. See UNCTAD, supra note 18, at 38.

hold sleeping patents in order to prevent entry or deter competitors. A compulsory license grant may be a very poor substitute for a patent or a restricted license. If a compulsory license is available to all applicants, the license provides any one applicant with little protection to justify expenditures incurred in the development and manufacture of the patented article. Taylor and Silberston find that patent protection is about as important in product development and manufacture as it is in research and development decisions.⁴⁹ Also, restrictive provisions in patent licenses are more often at the insistence of the licensee than the licensor.⁵⁰ Licensees appear to place a high premium on exclusivity. And finally, a compulsory license provides little protection if the remaining life of the patent is short compared to the time required to develop the product or process to commercial application. This would occur if it takes several years to obtain a compulsory license and the term of the patent is unchanged.

Scherer provided statistical support for the importance of exclusive rights to inventions by correlating the utilization of patents obtained during Government contract work with several variables, including the presence of exclusive rights to the patents. He found the presence of exclusive rights had a significant positive effect on the number of patents that were actually

⁴⁹ Taylor and Silberston (1977), note 36 supra. See tables 9.2 and 9.3.

⁵⁰ Ibid. at 126.

utilized.⁵¹ Furthermore, several cases were identified where the absence of exclusive rights impeded or frustrated commercial utilization.⁵²

While most patents in force, but unused, remain dormant because they have no commercial value, evidence exists suggesting that (at least in West Germany) some patents are held primarily to deny their use to others. A study by Grefermann et al. of the German patent system found that between 15 and 32 percent of the patents in their sampled data set were not utilized. While these figures are low for the United States, they are notable because the German patent system imposes (modest) fees which increase over the life of the patent grant. For more than half of the unused patents, utilization had not occurred but was foreseen or hoped for. However, 43 percent of the unused patents were held either to retain exclusive rights to a technology whose exploitation was delayed or to deny its use to competitors.^{53,54} Clearly the

51 Scherer, (1977), supra note 35, at 79-81. Note, however, that the regression model left most of the variance in utilization rates unexplained.

52 Id. at 82.

53 Grefermann et al., "Patentwesen und Technischer Fortschritt," in Scherer (1973), supra note 14, at 55.

54 For a specific example of sleeping patents, J. S. McGee notes that J. M. Browning sold gun patents to firms in bundles of several patents, and the firms would only use some of the patents bought, while retaining rights to the remainder; although it is not clear that these patents were held to deny their use to others. See J. S. McGee, "Patent Exploitation: Some Economic and Legal Problems," 9 J. Law & Econ. 135, 145 (October 1966).

German patent fee system did not prevent the holding of patents whose use was delayed temporarily or indefinitely; retention of patents for this purpose appeared to be well worth the patent fees in many instances.

Preemption and Industrial Structure

A prediction of the preemption theory is that successful monopolization of an industry, either through internal R. & D. or other means, will set the stage for expenditures on R. & D. by the dominant firm designed to limit the entry or expansion of potential competitors. Testing the theory is very difficult. It is not obvious how large a market share is necessary before a firm can succeed in preempting potential rivals. It is possible that at any moment of time several multiproduct firms in an industry can conduct preemptive patent strategies, each of which is successful in avoiding entry into particular monopolized product lines. Taylor and Silberston note that firm managers in the United Kingdom have a tendency to focus their patent activities on areas of expertise and have a policy of "keeping off the grass" controlled by rival firms.⁵⁵ This behavior is consistent with preemptive patenting, but very hard to detect statistically with aggregated data.

⁵⁵ Taylor and Silberston (1977), note 36 supra. See also the discussion of product differentiation in Lanzillotti (1954), note 10 supra.

One approach is to simply survey firms and ask what factors are important in R. & D. decisions. Scherer and his colleagues asked companies to rank the importance of five factors: the necessity of maintaining competitive leadership, the necessity of remaining competitive, the desire for efficient production, patent protection on inventions, and the desire to expand sales or diversify product lines. Most respondents ranked patent protection lowest, stressing instead the need to remain competitive or gain competitive leadership.⁵⁶ Taylor and Silberston found that only 4 of 34 respondents considered patent protection a decisive criterion in deciding whether to pursue an R. & D. project for more than 10 percent of all projects.

The low weight placed by respondents on patent protection does not necessarily contradict the existence of preemptive research and development. Firms who preempt potential competitors can reasonably view their actions as necessary to maintain competitive leadership. Those companies who are preempted are neither better nor worse off as a result of patent protection, and may stress the need to gain competitive leadership in other markets.

Many statistical studies have examined the relationship between R. & D. spending to patenting and concentration, but for reasons mentioned earlier, most of these studies are too aggregated to test the presence or absence of preemptive patenting.

⁵⁶ F. M. Scherer et al., Patents and the Corporation (1959), at 117-18.

Still, some observations can be made. Without resort to statistical analysis, Scherer points out that "the high concentration in such fields as synthetic fibers, organic chemicals, telephone equipment, electric lamps, and photographic equipment was built in part upon patent and know-how barriers to entry."⁵⁷ In these industries, relatively high rates of technical progress have coincided with relatively high indices of market concentration.

A different picture emerges from studies correlating firm expenditures on R. & D. and concentration across industries grouped by similar indices of technological opportunities. Scherer, in a study of 56 industries, found a negative correlation between the employment of scientists and engineers and industry concentration for the markets with the greatest technological opportunities. The correlation was +0.30 for the moderately progressive group and +0.47 among the "traditional" products industries with the lowest average investment in R. & D.⁵⁸

A closer examination of these results is necessary before any conclusions can be made relevant to preemptive R. & D. However, the correlation between R. & D. spending and concentration, and its dependence on technological opportunities is consistent with the preemption theory. Preemption is not likely to be a viable strategy in markets where the technology is so fertile that

⁵⁷ F. M. Scherer (1980), supra note 30, at 435.

⁵⁸ Id.

firms can easily leapfrog one another by pursuing independent R. & D. paths. Preemption is viable only when a firm can fence in a research area, either by virtue of a basic patent or because opportunities are limited.

One implication of the preemption theory is the lack of a clear ceteris paribus relationship between industry concentration and intensity of research and development. Successful preemption requires a firm to be at least as progressive as rivals. If conditions facilitate preemption, a firm that is dominant in a particular market or submarket may record an impressive record of technological progress. Preemption concerns should not motivate an accelerated research and development program if product development by rival firms is easy. At the other extreme, a firm that has a substantial lead over potential rivals may feel sufficiently insulated from competition to ignore new technological opportunities or throttle back on existing research and development. The preemption theory implies that studies of the market-structure/research-and-development connection should attempt to include, in addition to measures of technological opportunities, measures of or proxies for the presence of dominant firms, the change in market structure over time (related to recent success or failure of entry and firm growth), the costs of imitative product development, and advantages from technological leadership, such as persistent learning economies.

V. Preemption and Case Law

How might the theory of preemption apply in specific anti-trust actions alleging monopolizing behavior? One approach is to review particular antitrust monopolization decisions involving patenting or other potentially preemptive behavior, but this encounters difficulty. The conventional legal view has regarded patenting internal to the firm as honestly industrial behavior; so little evidence is available pertaining to internal R. & D. as exclusionary conduct. In addition, case records give only a glimpse of actual events. Yet perhaps the most important observation in the two cases discussed in this section pertains to the way the cases were litigated rather than to the specific events. Although the possibility of exclusionary R. & D. and patenting was an important issue in each case, both decisions addressed the legality of acts with less obvious implications for market structure and performance. Exclusionary R. & D. and patenting were largely ignored as the central issue of monopolizing behavior.

Kobe, Inc. v. Dempsey Pump Co. (198 F.2d 416 [1952])

The case of Kobe v. Dempsey Pump comes close to a consideration of patenting as an unduly exclusionary strategy. The plaintiff (Kobe) sued the defendant (Dempsey Pump Co.) for infringing patents on the design of hydraulic pumps for pumping oil from wells. The defense was patent misuse, and a counterclaim was filed alleging monopolization. The court found that the

defendant did infringe, but ruled patent misuse and monopolization by plaintiff and awarded damages to defendant based upon the financial impact of the infringement suit.

The court in its decision placed considerable emphasis on Kobe's aggressive method of patent enforcement. Kobe did not examine the Dempsey pump for specific patent infringement; but the company president stated,

. . . he thought Dempsey was infringing because he did not think that anyone could build a pump without infringing on the Kobe structure or patents held by it.⁵⁹

Kobe brought the infringement suit against Dempsey and later notified major purchasers that Kobe was contesting the legality of the Dempsey pump. This notice appeared to have a significant negative impact on Dempsey's sales. Meanwhile, Kobe turned out to be correct. The Dempsey pump infringed four patents owned by Kobe and one patent for which Kobe was exclusive licensee, although all but the patent held as licensee were judged invalid.

The court clearly found the nature of patent acquisition contributory to a violation of the Sherman Act, Sections 1 and 2. The court reviewed the history of the formation of the Kobe Corporation, which is summarized in figure 3. Five inventors in the 1920's played major roles in the design of hydraulic oil well pumps. Three (Crum, Humphrey, Scott) joined their patents under what eventually became the Rodless Pump Company, which enjoyed a

⁵⁹ 198 F.2d at 421.

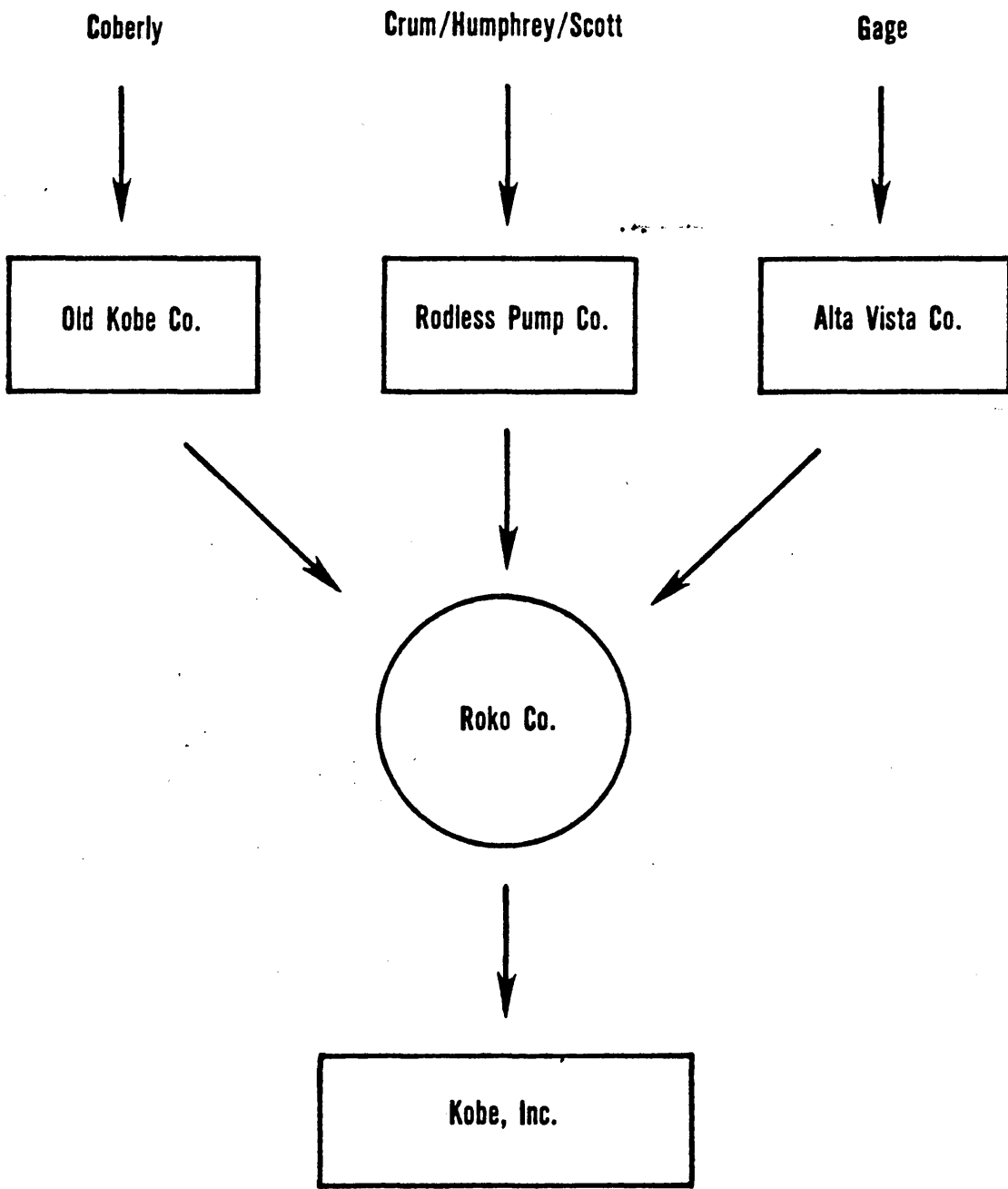


Figure 3. Evolution of the Kobe Corporation

short and modest financial success. A fourth, Gage, assigned his patents to the Alta Vista Company, which also had a small success. Coberly was about to begin production but was concerned about infringing on others' patents. He approached the Rodless Company and worked out an agreement to pool patents. They created the Roko Corporation, whose sole function was to pool patents, grant licenses, and acquire other patents relating to hydraulic pumps. The pool was not open to other competitors. The only manufacturing license was granted to Old Kobe, with Coberly as its president. In 1934, Roko acquired the Gage patents and either patent rights or exclusive licenses on the Alta Vista hydraulic pump technology, and was then free of any known competition or patent infringement on hydraulic oil pumps.

Many of the agreements negotiated with the Roko Corporation required patentees to assign to Roko the patent rights or exclusive licenses on any inventions relating to hydraulic pumps that may be acquired over a future time period of 10 or more years. From 1933 to 1945, Roko and Old Kobe acquired more than 70 patents from inventors in and out of their own organizations. Only the Coberly pump was produced during this period. In return for patent rights, some agreements called for royalties from the proceeds of all pumps sold, which allowed the holding company to buy out potential competitors and retain control over which pumps should be manufactured and sold. In 1944, Roko and Old Kobe were reorganized to form the Kobe Corporation, and in 1948, the first

competitive threat emerged, with the introduction of the Dempsey pump.

The court was well aware of the exclusionary aspects of the Kobe-Roko agreements but placed considerable weight on the nature of the infringement proceedings initiated by Kobe. Perhaps this was necessary, given that the plaintiff was claiming patent infringement, or perhaps this was the optimal strategy to justify the court's monopolization decision. While more information would be desirable, the record suggests behavior by plaintiff that is consistent with preemptive patenting, and the theory suggests that a monopolization case based on preemption can have a logical justification.

SCM Corp. v. Xerox Corp. (463 F. Supp. 983 [1978])

I shall comment only briefly on this case, which was anything but brief; the trial consumed 14 months and the trial transcript totals 46,802 pages. The plaintiff (SCM Corp.) alleged that defendant (Xerox Corp.), acting unilaterally and in concert with other companies, excluded plaintiff from the field of plain-paper copying. The jury found the defendant in violation of Sections 1 and 2 of the Sherman Act and Section 7 of the Clayton Act with respect to one of the plaintiff's several exclusion claims.

Although patent misuse was an issue in SCM v. Xerox as it was in Kobe v. Dempsey Pump, the court opinions had little similarity. Infringement was not an issue, although in pretrial pleadings Xerox alleged infringement by SCM--but this was severed from the trial. The heart of SCM's case was based on refusals by Xerox of SCM's requests to license plain-paper-copying patents, which SCM alleged were part of a design to exclude SCM from the plain-paper-copying market. The jury's findings were influenced by the license refusals; but more decisive was evidence describing a 1956 agreement between Xerox Corp. and the Battelle Memorial Institute (which initially developed the xerography process under license from the inventor, Chester Carlson), whereby Battelle assigned its xerography patents to Xerox and gave Xerox the right to all future xerography patents and technology, in return for 55,000 shares of Xerox stock and an obligation by Xerox to support research at Battelle in an amount of at least \$25,000 per year.

One could question the legal and economic significance of the 1959 Xerox-Battelle agreement. Battelle was not in direct competition with Xerox, and as an inventor-developer had no obligation to encourage competition by licensing patented xerography technology to other firms. Judge Newman, in his decision, seemed to agree, stating:

The "Progress of Science and Useful Arts" is . . . aided by enabling a company, prior to the time it has developed a marketable product and thereby acquired any market power, to acquire patents from others, especially from non-competitor research entities.⁶⁰

Judge Newman's comments cast doubt on the harmful effects of a mere acquisition of exclusive patent rights from a noncompetitor; and there is little else in the *SCM v. Xerox* decision to support exclusionary behavior with regard to patents.⁶¹

Judge Newman did raise the issue to the jury of monopolization by means of internal patenting as well as patent acquisition.

The jury was told that once a company had acquired monopoly power, it could not thereafter acquire lawful patent power if it obtained new patents on its own inventions primarily for the purpose of blocking the development and marketing of competitive products rather than primarily to protect its own products from being imitated or blocked by others.⁶²

This instruction to the jury raises the issue of preemptive patenting, and Judge Newman notes that while there is no case law authority for this standard,⁶³ he considers it a reasonable accommodation between the policies of the patent and antitrust

⁶⁰ 463 F. Supp. at 1013.

⁶¹ The court interrogated the jury, directly asking them to list or describe whatever patent-related exclusionary conduct of Xerox was a proximate cause of SCM's not entering into plain-paper copying in 1969. To this question, the jury answered only, "1956 Battelle agreement." (463 F. Supp. at 1010.)

⁶² 463 F. Supp. at 1007.

⁶³ *Kobe v. Dempsey Pump* might have provided a case law standard, but the decision was confused with the legality of Kobe's aggressive patent enforcement policy.

laws. Noting the risk of possible inhibition of R. & D. as a consequence of this standard, he says:

It would seem a fair question whether assigning that risk to a company with monopoly power is a reasonable cost to avoid the substantial market control that would ensue if a company with monopoly power were free to continue its dominant position by patenting, for blocking purposes, alternative methods of competition.⁶⁴

The jury eliminated this issue from the case by finding that SCM had not proved that Xerox, after it had monopoly power, obtained any patents primarily for the purpose of blocking the development and marketing of competitive products. Yet this was not an issue actively debated by complaint counsel, and we can speculate whether a greater awareness of preemptive patenting in the courts might have altered the direction of this case.

⁶⁴ 463 F. Supp. at 1007.

VI. Concluding Observations

Actual identification of preemptive patenting is exceedingly difficult. When a firm succeeds in patenting before others, it is likely the firm is simply more efficient than potential competitors, or that the firm simply had more optimistic expectations of future market conditions, which motivated large expenditures on R. & D. and productive capacity. In any case it may be impossible to reject these explanations as hypotheses. One might be able to present evidence relating to the relative efficiency of firms' R. & D. operations when firms actively compete in the same market, but when one firm has succeeded in patenting before others, potential competitors may not have an R. & D. record long enough to permit an efficiency comparison.

The difficulty in pinpointing preemptive activity does not make the theory useless in antitrust proceedings. The preemption theory demonstrates that predatory or other overtly exclusionary activities are not necessary for a firm to maintain monopoly power. What policy actions are appropriate in the event that preemption could be identified is yet another matter, as the economic welfare "might be better served" because the actual welfare impacts of preemption depend on specific market circumstances, such as the extent of learning economies and the possibilities for innovations from research programs in other industries (see section III).

Given the difficulties of identifying preemptive patenting and assessing its economic consequences, I propose that antitrust actions alleging preemptive patenting should meet several stringent conditions. First, the market in question must have general characteristics which are favorable to preemptive patenting. If not, preemption should not be considered as a strategy that could be used with success by a dominant firm. Second, judgment of an antitrust violation, should require evidence of exclusionary behavior in addition to preemptive patenting. This is simply an admission that preemption is so difficult to verify that it cannot alone serve to define a zone of exclusionary conduct in violation of antitrust laws.

Any case alleging preemptive patenting should evidence market characteristics favorable to preemption. Recalling the discussions of the theory of and empirical evidence for preemptive patenting, the favorable conditions include the following.

- (i) Patents must offer the potential of significant monopoly power. Patents must be sufficiently broad to fence in a significant market, and inventing around patents must be difficult. Also, the costs of patent enforcement must be low enough to make it feasible to monitor potential competitors for infringements of patents.⁶⁵
- (ii) Patenting must be responsive to expenditures on research and development. This is necessary to assure that a firm can exclude competitors by stepping up expenditures on R. & D.
- (iii) Patenting must be localized to the industry in which preemption is alleged to occur. If inventions frequently occur as joint products of R. & D. in unrelated markets, preemptive patenting is virtually impossible, since the R. & D. activities of noncompetitors provide a means for potential entry.

⁶⁵ As discussed in connection with the case of Kobe v. Dempsey Pump, the resources which a firm allocates to patent enforcement could be a useful signal for preemptive patenting.

(iv) The technologies that might provide potential substitutes for products or processes controlled by a dominant firm must be patentable. The essence of preemptive patenting is the extension of monopoly by patenting potential substitutes. The substitutes must have the effect of potentially reducing (but not eliminating) monopoly profits, and they must be patentable to allow for exclusion of competitors.

Preemptive patenting can be rejected if an industry does not exhibit all of the above characteristics. The discussion in section IV suggests that these conditions are highly restrictive and preemptive patenting could occur in only exceptional cases. Of course, we have argued that preemption can take other forms including accelerated expenditures on research and development without regard to patent protection, or other activities such as capacity expansion, brand and product selection, or resource acquisition. However, each presents different implications for economic efficiency and market structure.

COMMENTS ON "PATENTS, SLEEPING PATENTS, AND ENTRY DETERRENCE"

Richard Craswell*

The task Professor Gilbert sets for himself is to analyze the possible anticompetitive effects of a firm's internal patenting activity. In the course of doing so, however, he develops a model whose implications extend far beyond the acquisition of patents through internal research and development. Indeed, the major interest of Professor Gilbert's model (to this writer, at least) is not in the specific policy recommendations he derives for dealing with patent cases, but rather in the light he casts on theories of preemption and predation in general. In the field of predation, where heat rather than light has often been a dominant characteristic, Professor Gilbert's paper comes as a welcome addition to the literature.

The paper's basic model is relatively easy to summarize. An incumbent firm has a patent monopoly in one market, but there is a potential for inventing around the patent and developing a patentable substitute product. If a rival firm makes that invention

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first and patents the substitute, the two firms will split the market evenly, as the products are assumed to be perfect substitutes. However, it is also assumed that the two firms will not be able to coordinate their prices perfectly, so that each firm will end up earning half of an amount that is something less than the full monopoly profits. If the incumbent makes the invention first and gets the patent, though, the incumbent will still hold an undisturbed monopoly and will, of course, earn the full monopoly profits.

Acquiring the patent, then, would raise an entrant's profits from zero to less than half of the monopoly profits, but would raise the incumbent's profits from less than half of the monopoly profits (the amount earned if the entrant gets the patent) to the full monopoly profits. As the latter figure will always exceed the former, the patent will be worth more to the incumbent than to any entrant, and the incumbent should be willing to spend more than would be entrants in order to acquire the patent. Assuming any form of direct relationship between the amount spent on R. & D. and the likelihood of making the invention first, the incumbent will end up with the patent more often than not, and his monopoly will be maintained. In fact, the incumbent will usually end up with the patent even if he is less efficient at R. & D. than are his rivals, so long as his inefficiency does not completely negate the advantage due to his larger expenditure on R. & D.

This model presents a stylized view of the innovation process, of course, but most of the simplifying assumptions are not vital to the model's results. For example, in many industries it may be that an innovator's advantages do not depend on patent protection at all but instead depend on some combination of trade secret protection, the time lag required for competitors to duplicate the invention, and the greater consumer acceptance earned by the first firm to market a new product.¹ However, the source of this advantage is largely irrelevant to the Gilbert model, whose only real requirement is that some such advantage exist. As long as the first firm to develop an invention is assured that the invention will not be copied for at least some period of time, then being first will mean continued monopoly profits to the incumbent and much smaller profits to an entrant. Under these conditions, the incumbent will still have an incentive to outspend an equally efficient entrant on R. & D.

An interesting aspect of the model is that its applicability is not limited to patents, or even to preemption. The analysis is in many ways similar to that used to explain mergers to monopoly, and also has similarities to some theories of strategic (non-deep-pocket) predation. Though the policy implications of this

¹ See, e.g., R. Schmalensee, "Product Differentiation Advantages of Pioneering Brands," MIT Working Paper #1140-80 (August 1980); R. Bond and D. Lean, Sales, Promotion and Product Differentiation in Two Prescription Drug Markets, FTC Bureau of Economics Staff Report (1977).

generalized model are far from clear, it unquestionably adds to our theoretical understanding of preemption and predation. This can most easily be seen by first relating the Gilbert model to traditional merger analysis, and then moving on to consider other forms of preemption and predation.

The advantage of starting with mergers is that the analysis is much more straightforward. Hardly anyone would disagree with the proposition (as qualified below) that competitors can reduce competition and generate monopoly profits if enough of them merge into a single entity. If Firms A and B have patented the only two economical methods of producing widgets, for example, then their merger will enable them to exploit their patents more fully than if they were forced to act as independent competitors. More precisely, the merger will enable them to increase their joint profits.² This, of course, is the basic theory behind all of merger law, whether patents are involved or not. Scholars may well disagree about whether the current Clayton Act standards represent the best application of this theory--but the theory itself is rarely disputed.

To finish out the merger case, however, two qualifications should be noted. The first and most obvious is that monopoly profits will only be generated if the merging firms have a

² Cf. W. Bowman, Patent and Antitrust Law: A Legal and Economic Appraisal (1973), ch. 10. The size of the increase depends on whether the two firms had formerly priced as perfect competitors or whether they had managed to achieve some degree of oligopolistic coordination in their pricing.

sufficiently large share of the affected market and if barriers to entry are sufficiently high that increased profits will not attract new entry. (The word "sufficiently" is used intentionally, to dodge the issue of just how large those market shares and entry barriers have to be.) In the area of patents, the requisite entry barriers are usually assumed to flow from the patent itself, although this may not be valid if, for example, the patent can easily be invented around. However, as we have seen, in some industries there may be other barriers, such as trade secret protection or first-entrant advantages in consumer acceptance of the new product. The only requirement is that some such barrier exist; I will make that assumption for the remainder of these comments.

The other qualification is that traditional merger theory says nothing about how the increased industry profits will be distributed among the participants in the merger. This is essentially a bilateral (or, at least, small-number) bargaining problem, whose outcome is largely irrelevant to the effect of the merger on competition. The higher profits may all be captured by the shareholders of Firm A, or the management of Firm B, or the investment bankers acting as intermediaries, or by any combination of these parties; but the distribution actually selected should have no bearing on the future state of competition in the industry. The only assumption required is that the problem of agreeing on a distribution scheme not be so difficult as to block the merger and prevent anyone from realizing the increased profits. As

long as this requirement is met, the merger will take place, and competition in the industry will be correspondingly reduced.

The Gilbert model is not primarily concerned with the acquisition of patents by merger, of course; its focus is the "accumulation of patents based entirely on internal research and development."³ However, many of the same motivations still apply. In the Gilbert model, the issue is whether a competing substitute product will first be invented and patented by an incumbent monopolist or by a new entrant. If the entrant gets the patent, then the competing patents will be held by two independent entities who will have to price at least somewhat competitively,⁴ and the full monopoly profits will not be realized. If the incumbent gets the patent, though, the effect will be the same as if the two firms holding the patent had merged. That is, the patents will all be in the hands of a single firm, which will then be able to realize the monopoly profits that would have been lost, had the patents been held separately.

It is these extra profits--the same profits that provide the incentive for mergers to monopoly--that give the incumbent an incentive to bid more for the patent under the Gilbert model.

³ R. Gilbert, "Patents, Sleeping Patents, and Entry Deterrence," p. 208.

⁴ Gilbert assumes only that the firms were unable to price as high as a perfectly functioning cartel, so that there are still unrealized monopoly profits to be captured. This seems a reasonable assumption.

Just as the realization of potential monopoly profits supplied the motive for acquiring a competitor's patent in the merger case, the same monopoly profits supply the motive for acquiring an undiscovered patent in Gilbert's model. The only difference is that rather than purchasing the patent from a competitor (in the merger case), in Gilbert's model the incumbent must "purchase" the patent from Mother Nature.⁵ Either way, the monopoly profits attainable by consolidating the patents in a single firm make it clear why that purchase should always be made.

This view of the model also sheds some light on the issue Gilbert addresses under the heading of "preemption vs. licensing."⁶ Even under the Gilbert model, the entrant might be willing to spend just as much as the incumbent to acquire the new patent if it could then sell the patent to the incumbent at a price equal to its full value in terms of the additional profits from monopoly. In effect, the entrant would be acting as an arbitrageur between Nature and the incumbent, bidding up Nature's "price" until it reached the maximum the incumbent would be willing to pay.

Gilbert discounts this possibility of competitive rent-seeking by pointing out that bargaining difficulties and other

⁵ Formally, the firms do not purchase a sure thing by investing in R. & D. but purchase a lottery ticket, which may or may not pay off with a successful patent. As long as the firms are equally efficient at R. & D. and do not differ in their risk aversion or their estimates of the probability of success, this refinement does not change the analysis.

⁶ Gilbert, supra note 3, pp. 222-23.

transaction costs will probably prevent the entrant/arbitrageur from capturing the full value of the patent for himself, so the amount that the entrant is willing to spend on R. & D. should still be less than the amount the incumbent can spend. Even if transaction costs are not that high, an equally telling objection is that such an acquisition by the incumbent is much more likely to come under the scrutiny of the antitrust laws.⁷ In any event, from a policy standpoint it doesn't really matter whether such arbitrage takes place or not, because all arbitrage will do is change the route that the patent takes before ending up in the hands of the incumbent. It will also affect the distribution of the monopoly profits between the incumbent and the entrant, of course, but the distribution of the profits is not going to change the competitive outcome. Whatever the distribution, the patents will still end up in the hands of a monopolist, as this is the only way that the full monopoly profits can be realized. The real value of Gilbert's analysis is that it shows that acquisition and internal development are merely substitute paths to the same end, and suggests that the law therefore ought not to treat them quite so differently.⁸

⁷ The differing treatment under the current antitrust laws of the acquisition of an existing patent and the development of the same patent through internal R. & D. can thus be viewed as a ban on this form of arbitrage.

⁸ The relationship between predation against and acquisition of one's competitors has occasionally been noticed outside of formal models, in contexts other than patenting. See, e.g., J. McGee, (footnote continues)

Obviously, the basic theory here is not limited to the acquisition of competing patents. It takes only a slight modification to extend it to, say, the acquisition of new mineral deposits, labor inputs, or any other scarce resource by an incumbent firm with an existing monopoly over that resource. If a new mineral deposit is discovered, for example, possession of that deposit would mean continued monopoly profits to the incumbent but only competitive profits to any other firm that acquired it, so the incumbent firm should have an incentive to spend more than any independent firm in seeking out any new deposits (i.e., in "purchasing" deposits from Mother Nature). Similarly, if some other firm does discover the deposit first, it will be in their mutual interest to have the incumbent purchase that deposit from its discoverer (or to obtain it through merger). The only difference between this case and the patent example is that with no patent protection for mineral deposits, some other barrier to entry is needed to protect the eventual monopoly profits and thus to make them worth bidding for. If some such barrier is present, though--economies of scale, for example, or natural limits on the number of deposits available to be cornered⁹--the preemption analysis should carry over completely.

(footnote continued)

"Predatory Price-Cutting: The Standard Oil Case," 1 J. L. & Econ. 137, 139-40 (1958).

⁹ This is analogous to the assumption of the Gilbert model that there is only a single patentable substitute, which the incumbent
(footnote continues)

A more difficult issue, however, is the extent to which this preemption analysis can also be carried over into the "standard" predation case, where there are no specialized assets to be acquired and the only instrument of predation is a reduction in price. In principle, it might seem that the same analysis ought to be applicable. Certainly the merger-to-monopoly analysis discussed earlier did not depend on the presence of any specialized assets such as patents or mineral deposits. As long as the resulting monopoly is protected by some form of barrier to entry,¹⁰ it will always be in the interests of one firm to acquire all of the others and thus realize the potential monopoly profits.

If the preemption model does apply, it would suggest that even when such mergers are banned, some firm will still have an incentive to acquire the same monopoly by internal expansion (the analog of internal R. & D.). For example, suppose that Firm A is a nationwide widget firm that faces several local competitors in one of its markets. Firm A could acquire its competitors' market

(footnote continued)
and the entrants are competing to discover. If there were an infinite number of such substitutes, the incumbent's battle to exclude entrants would never end, and there would be no period in which the monopoly profits could be enjoyed.

¹⁰ It is worth stressing that such barriers to entry are necessary to any theory of preemption or predation. Joskow and Klevorick would thus incorporate such a requirement in the "first tier" of their predation standard, and Gilbert would include it as a threshold before internal patenting would even be subject to antitrust scrutiny. Gilbert, *supra* note 3, p. 267; P. Joskow and A. Klevorick, "A Framework for Analyzing Predatory Pricing Policy," 89 Yale L. J. 213, 245-49 (1979).

shares (and thus realize the monopoly profits in that market) by merging with them all, but the antitrust laws would presumably prevent that. Firm A's alternative is to "purchase" those market shares directly by bidding to take away its rivals' customers-- i.e., by offering widgets to them at a lower price. The amount of A's "bid"--the rough analog of the amount A was willing to spend on R. & D. in the Gilbert patent model--is the amount of short-term loss (including any foregone profits) incurred on these reduced-price sales. If Firm A is willing to bid enough, it will take all the customers away and end up with a monopoly (the analog of outspending the entrant on R. & D. and ending up with all the patents). To make the analogy complete, though, we need some reason why Firm A would be willing to bid more than its competitors in this contest for market share.

As a preface, it should be noted that equating the acquisition of patents or mineral deposits with the "acquisition" of customers or market shares is not as farfetched as might first appear. In practice, a firm seeking to expand its market share typically embarks on a complicated course of price reductions and promotional strategies that may be every bit as speculative as investing in R. & D. in the hope of obtaining a patent. One can analyze firms' relative efficiency in marketing and promotion, just as one can speak of a firm as being more or less efficient than its rivals at R. & D. In fact, businessmen and marketers often refer to their strategies not simply as "cutting prices,"

but rather as "buying market share."¹¹ The only obvious difference is that Gilbert's patent monopolist outspent his rivals in purchasing innovations from Mother Nature, while in this analogy the monopolist must purchase his market share directly from the consuming public.

Suppose, then, that the nationwide widget firm (Firm A) can never be eliminated from a local widget market (in the sense that it could always reenter at a very low cost), but that its local competitors would face significant reentry hurdles if they were driven out. Suppose further that the same (or some other) entry barriers also keep out any firm not currently in the market. In this situation, the best that any of the local competitors can do is to remain in the market as roughly equal competitors, earning a competitive profit. The amount that they are willing to "bid" for their customers (i.e., the size of the losses they are willing to incur to stay in the market) will be correspondingly limited. By contrast, if Firm A can eliminate its local competitors by taking enough of their customers away then it will be earning the full monopoly returns (still assuming some barrier to entry), and should consequently be willing to bid more. That is, the local competitors are bidding for the difference between zero and their share of the profits at the competitive equilibrium, while Firm A

¹¹ See, e.g., B. Catry and M. Chevalier, "Market Share Strategy and the Product Life Cycle," 38 J. Marketing 29 (October 1974); W. Fruhan, "Pyrrhic Victories in Fights for Market Share," 50 Harv. Bus. Rev. 100 (Sept./Oct. 1972).

is bidding for the difference between its share of the competitive equilibrium and the entire monopoly profits. For the same reason that Firm A was willing to bid more for all of the patents in Gilbert's model, Firm A will bid more for all of the customers in this extension of it.

However, this analogy also points out two important differences between patent preemption and predation. The first is that amounts spent in "bidding" for customers--unlike amounts spent on R. & D.--typically increase on a per-customer basis. That is, while the absolute amount that Firm A is willing to bid may be more than its rivals, Firm A will also have to be selling to more customers, so the larger absolute amount may translate into a smaller per-customer price reduction.¹² One of the crucial facts that make Gilbert's preemption model work is that success in an R. & D. effort typically requires only a larger absolute expenditure than any rival, without regard to how many customers each firm has.

The second important difference has to do with the source of the asymmetry between the incumbent (Firm A) and its rivals. The asymmetric profits that drive the Gilbert model are due to the fact that if the incumbent gets the new patent he ends up with a monopoly, while the best the entrant can do (if he gets the

¹² Cf. McGee, note 8 supra. It is less clear that other promotional activities besides cuts in price--large-scale advertising, for example--would also be more expensive to firms with more customers.

patent) is become an equal competitor. The incumbent can keep the entrant out of the market entirely, but the entrant has no chance of similarly dislodging the incumbent.¹³ In Gilbert's model, this was due to the not implausible assumption that the incumbent had an unbreakable patent on a perfect substitute for the product in question. In the predation analogy, however, this asymmetry could only be reproduced by assuming that Firm A (the nationwide firm) faced no barriers to entry into the local market, but that everyone else did. Such conditions may perhaps hold in some markets, but they are not the conditions assumed by many preemption models,¹⁴ and removing the asymmetry would destroy this incentive to predate.

On a theoretical level, this is in no way as criticism of Gilbert's preemption model. Even if the asymmetry assumption is not universally valid, it certainly seems plausible enough to hold

¹³ A similar asymmetry motivates many models of strategic entry deterrence, in which the incumbent incurs preentry costs that make entry less profitable when it occurs. Even though such strategies may impose equal costs on the incumbent and on any entrant, the proper strategy will impose costs that reduce an entrant's profits from the competitive level to zero (thus deterring entry), while reducing the incumbent's profits from the monopoly level to some smaller but still positive number. See, e.g., S. Salop, "Strategic Entry Deterrence," 69 Am. Econ. Rev. 335 (1979); A. M. Spence, "Entry, Capacity, Investment, and Oligopolistic Pricing," 8 Bell J. Econ. 534 (1977).

¹⁴ See, e.g., F. Easterbrook, "Predatory Strategies and Counterstrategies," 48 U. Chi. L. Rev. 263, 269 (1981): "The predator's rival, after all, has the same incentive as the predator to ride out the price war and collect monopoly profits once one of them has collapsed. . . ."

in an interesting number of cases, including many involving patents. If the preemption model can contribute to a better understanding of monopolists' behavior in those cases (and I think it can), then it still represents a useful addition to the theoretical literature.

On a practical level, though, the question that immediately arises is how many real cases fall into this category. One of the most interesting aspects of Gilbert's empirical results--and the only aspect I will comment on here--is his conclusion on the prevalence of preemptive patenting. By and large, Gilbert concludes, the evidence does not support the proposition that preemptive patenting is a widespread phenomenon.

Thus, when we get to the level of the legal and policy implications, the preemptive patenting analysis runs up against the same questions that plague all of predation theory. The fundamental policy questions are: (1) How serious a problem is it? (2) How easily can we tell when it's going on? and (3) How much do we lose (in terms of chilling desirable competitive behavior) if we turn the courts loose in an effort to prohibit it? The first and third are empirical questions about real-world business behavior; the second is an empirical question about the behavior of an institution of which we know even less than we do about real-world businesses--i.e., the behavior of the legal system. Gilbert acknowledges these issues, and tries to respond by suggesting limits to keep a preemption cause of action within reasonable bounds--but it is still at bottom a judgment call as

to whether such a cause of action (even one so limited) would on balance improve or hinder the economy's performance. Those who agree with his implicit level of confidence in the legal system will undoubtedly agree with his conclusions, but those who do not will not, and at the present stage of our knowledge there is not much that can be said in choosing between these two views.

In short, the Gilbert paper should be welcomed unequivocally by scholars who have worked on predation issues and who hope to continue to do so. The paper makes a real contribution to our theoretical understanding of preemption and predation, both with respect to patents and in other areas as well. At the same time, it reminds us that the fundamental policy issues have yet to be solved, thus ensuring the market for further conferences such as this in the future.

COMMENTS ON "PATENTS, SLEEPING PATENTS, AND ENTRY DETERRENCE"

F. M. Scherer*

At another FTC conference earlier this year, I observed that the difficulty of a discussant's assignment increases with the quality of the paper under review. My task this time is uncomfortably easy. Professor Gilbert has brought together a considerable quantity of theory and evidence on various aspects of the preemptive patenting question. Unfortunately, the material is inadequately integrated, the analysis is insufficiently sensitive to the real-world conditions a policy-relevant study must confront, and the discussion is at significant points superficial or inaccurate.

The most basic difficulties emerge in the paper's theoretical section. There is nothing intrinsically wrong with the stories Gilbert's payoff matrices and related analysis tell. The problem is, they advance our understanding little because of unduly restrictive or unrealistic assumptions. For instance, Gilbert repeatedly uses such concepts as "patenting," "R. & D.," and "innovation" as if they were interchangeable, and as if getting a

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patent--as distinguished from developing a superior new product or process--were the main objective of business enterprises. This implicit assumption could be true in some cases and innocuous in others. But it is misleading and counterproductive in dealing with that quantitatively important set of cases in which, as the author recognizes in his empirical survey, there are sufficient incentives for R. & D. and innovation even without the expectation of exclusive patent rights. A patent grant, it is well known, represents a policy tradeoff. Society confers a monopoly privilege that would ordinarily be deemed undesirable, in order to get a valued innovation it otherwise would not have. But if (because of first-in advantages, other barriers to imitation, or the hot breath of competition) the innovation would be made even without patent protection, the grant of patent rights (making imitation even more difficult) means incurring a social cost for no offsetting first-order social benefit. Gilbert's theoretical scheme ignores this difficulty, which may be of special importance to the question of preemptive patenting, if--as I believe the evidence supports--firms already well established in a market have strong nonpatent incentives to improve their products.

The essential focus of Gilbert's model is a race to the Patent Office to get a single patent whose possession determines the outcome of the game. One can undoubtedly find cases in which this is a realistic scenario; the Gould vs. Schawlow & Townes contest over basic laser patent priority rights comes to mind.

But such cases are exceptional, I am persuaded by having examined during the past 2 years some 15,000 patents received by U.S. industrial corporations. It is much more common for significant new products or processes to be blanketed by dozens or even hundreds of patents, over which another blanket of improvement patents is thrown, followed by patents on still another generation of improvements, et cetera. The Xerox Corporation, for example, had applied for nearly 300 patents at the time it introduced its first 914 console copier in 1959, and in each subsequent year it has added literally hundreds more to its portfolio. This creates a number of problems for Gilbert's theory. If a single product is covered by many patents whose application and issue dates may stretch over years, when does one declare "finish" in the race to the Patent Office? How does a firm determine the optimal rate of R. & D. in a race with such indistinct termini? And what should the theory say, if anything, to guide policymakers attempting to determine when the public interest has been overstepped by the multiplication of patents, fencing in some technology, or by the extension of monopoly positions over time through accumulated improvement patents? If the notion of preemption is about anything at all, it is about such real-world behavior, not one-shot races to the Patent Office.

Professor Gilbert's analysis also ignores the frequently important problems arising when patented inventions are complementary. Thus, A obtains a set of basic patents in some product

line. B conceives and would like to develop an improvement, but needs to use some of A's patented technology in order to execute the improvement. It is entirely possible for a payoff structure to arise under which the social benefit from B's improvement (i.e., the sum of producer's plus consumers' surpluses) exceeds B's development costs, so that, from the standpoint of economic efficiency, the improvement should be completed. Under conditions of monopolistic competition with no bars to the use of complementary patents, B might capture sufficient pre-improvement surplus from A along with the incremental producer's surplus attributable to the improvement that B is motivated to undertake the development. But if A were the incumbent monopolist, it would view as its gain only the producer's surplus directly added by the improvement, and this may fall short of development costs, leading A to reject both internal development of the improvement and licensing improvement rights to B. A socially desirable improvement is therefore lost. It would be an abuse of language to call A's behavior in this instance preemptive, but such impasses are likely to arise as a byproduct of the blanket patenting by which firms preempt or otherwise exclude their rivals. Therefore, they should be taken into account in formulating a realistic welfare economics of preemption.

The remainder of my comment concerns the two case studies in Gilbert's policy conclusion section. I have no firsthand familiarity with the Kobe case. From the facts as stated, Kobe's

behavior seems egregious enough to warrant public concern. I am also not acquainted in detail with the record and legal arguments in the SCM/Xerox case. However, other information leads me to believe that more can usefully be said on SCM's situation and on the broader set of patent and antitrust issues posed by the copying machine industry. Three specific lines of thought are suggested.

First, it should come as no surprise to readers of this volume that there was another major copying machine industry antitrust case. In 1973, the FTC charged Xerox with monopolization; and in 1975, following tough negotiations, a consent settlement was entered. I participated in the internal debate over whether the settlement should be accepted. One input was a set of comments elicited from interested parties, including competitors of Xerox. I recall vividly that the FTC staff viewed SCM as odd-man-out in the position it took. I have not had a chance to review the documents, but my recollection is that SCM seemed more concerned about minimizing Xerox's continuing potency as a competitor than about breaking open the patent logjam and then slugging it out in the marketplace--which is what the FTC staff wanted and what other Xerox rivals appeared to accept. If he wishes to draw policy inferences from the copying machine industry antitrust history, Professor Gilbert would be well advised to dig deeply into the FTC case record.

Second, the research I have been doing on corporate patenting yielded a thought-provoking surprise. Sixteen companies in my sample obtained a total of some 390 patents in the field of xerography during a 10-month period chosen to reflect the results of 1974 research and development. SCM was in my sample, but not among the 16. As nearly as my coworkers and I could tell, it received no copying-machine patents. If IBM, Kodak, 3M, Addressograph-Multigraph, Bell & Howell, GAF, Litton, Pitney-Bowes, and others found it possible to come up with patentable inventions despite Xerox's entrenched position, why not SCM? Was my zero-patent observation a random aberration? Or was there a failure of R. & D. or competitive nerve? I don't know the answer, but I suspect it is relevant to evaluating SCM's claim for antitrust relief.

Finally, I want to note that the Xerox settlement posed some of the most difficult questions the Bureau of Economics confronted during my 2-year tenure at the FTC. I personally had mixed emotions about it. On one hand, I believe Xerox did a superb job in opening up an extremely important new technological and business frontier. Its performance in that respect was to be applauded, not condemned, and like Professor Gilbert, I see much reason for caution about undermining the patent rights of firms that have pioneered technologically. On the other hand, Xerox had benefited from several "generations" of patents covering Chester Carlson's basic conceptual inventions--the use of such materials

as selenium, key lens designs, and the selenium drum; numerous inventions regarding details of the 914 copier and subsequent machines; and then a host of improvement inventions. By 1975, xerography had been a commercial success for 16 years--nearly the traditionally intended duration of the patent grant. Was nothing to be done about the huge portfolio of Xerox patents overhanging the market, which at best fostered litigation and increased the risks of entry and at worst stifled improvement of the xerographic art? My own belief was that the 1975 settlement could break open the patent bottleneck, and that this was neither too much nor too little under the circumstances. Subsequent events have persuaded me that this judgment was correct. Price competition has intensified, there have been major product improvements (many from Xerox rivals), and yet (as nearly as I can discern), Xerox's incentive to pursue R. & D. vigorously was not impaired. Perhaps I err. If so, it is more likely to be in the direction of underestimating the amount of competition that would have emerged in any event, absent FTC intervention. But I believe the FTC action did help and that the case provides a good example of how markets can be made to work better through antitrust when an accumulation of patents threatens technological arteriosclerosis. It would be interesting to see that belief subjected to a thorough, critical, scholarly examination.

REJOINDER TO F. M. SCHERER

Richard J. Gilbert

The intent of this paper was to show that product development with patent protection can allow an established firm to maintain a monopoly in the absence of an efficiency advantage over competitors. The first part of the paper showed that an established firm can have more to gain from product development than a competitor, under the assumption of particularly effective patent protection. The second part examined the extent of patent protection in different industries and argued that situations where patent protection is sufficient to limit entry are exceptional. A third section reviewed two antitrust cases with the purpose of identifying litigation where the theory might apply, without serving judgment on the outcomes.

Professor Scherer attacks this paper on several fronts, but he does not address the main arguments. Scherer maintains that the failure to distinguish patenting from research and development is a fatal flaw; he cites the numerous patents attached to most products as a devastating criticism; he introduces complementary patents and the history of the Xerox litigation as crucial oversights. Although Scherer's arguments bear on the subject matter of this paper, they sidestep the main issues. Scherer uses strong

language in his discussion, but his comments are peripheral to the intent of the paper and at several points he has not followed through the implications of his own arguments. A closer inspection shows that his arguments do not weaken the results in this paper.

Scherer calls attention to the distinction between patenting and research and development activity. Clearly patenting and research and development are not equivalent, and they were not assumed equivalent in the paper. The issue of patent protection raises two basic questions which are central to the paper and which I had hoped Professor Scherer would address:

- (i) Are the conditions required for preemptive patenting so restrictive as to make it an impossible events?
- (ii) Does the preemption theory apply to investments in R. & D. in the absence of effective patent protection?

Scherer claims that cases in which the outcome of competition is determined by a patent race are exceptional. A large part of the paper examined the question of patent protection, and we are in agreement on this point. The issue, however, is whether patenting is ever an important element of entry-detering behavior. It is not surprising to me that a broad study of patent records would show that most do not fit the dimensions of the simple

model in this paper. This does not address the question of whether patent protection can be sufficient to allow preemptive behavior in isolated circumstances.

The simple patent model in this paper presents a vivid, if not typical, example of the incentives for entry-detering behavior. Even if patent protection is never sufficient to impede entry, there remains the possibility that the preemption theory can apply to accelerated investments in research and development. Assuming new product development requires a substantial commitment of resources, it is possible to show--using arguments similar to those in section 2 of the paper--that an established firm can have an incentive to introduce products before its competitors. The incentive is the ability to coordinate pricing and production decisions so as to avoid the profit losses associated with rivalry. There are also limitations to the gains from preemptive behavior, as the costs of aggressively anticipating entry could outweigh the costs of rivalry.

Preemption requires an advantage from being first. Patents are an example of winner-take-all, but learning economies, irreversible investment (which can include R. & D.), or product differentiation can also provide gains to an innovating firm that strictly exceed the benefits from imitation. The possibility of avoiding or reducing losses on existing products provides an extra incentive for an established firm to be the first to introduce potential substitutes. It is the direct reward from innovation

and not just the desire to exclude competitors that motivates accelerated investment by an established firm. Only in the very exceptional case of purposeful development of sleeping patents is entry deterrence the main concern. There are many reasons why an established firm may not be the innovator: complacency, inefficient technology, oversight, and luck are a few. And the gains from imitation can be large enough to reduce or eliminate incentives for preemption. The relevant point is that patent protection is not the key to preemptive behavior.

Scherer cites the typically large number of patents attached to products as another criticism of the paper. Complex technologies do integrate numerous innovations, and cases where single patents define a product are not common. Preemptive patenting is also unusual, but it is not limited to cases where a single patent circumscribes a product area. If patents, individually or in a portfolio, make entry more difficult, the arguments in this paper apply. Most individual patents will not deter entry into a significant market, but a collection of patents can increase the cost of entry in the absence of cross-licensing agreements. In this situation, just as a single patent will not impede entry, a single patent also will not assure an entrant technological access to a product area. The argument cuts both ways.

The efficacy of patents, and R. & D. more generally, in deterring competition depends on the extent to which patents and the accumulation of technical know-how make entry more difficult over time. A distinct "finish" in a patent or R. & D. competition

is unnecessary if a potential entrant reasons that the costs of catching up to an established firm, or just participating as an also-ran, are greater than the potential rewards.

Scherer raises questions pertaining to patent complementarities, which I had avoided to focus on the pure incentives for preemptive behavior. Patent complementarity can strengthen the argument for preemption. This is evident from Scherer's discussion, if he would take the analysis one step backward in time. To the extent that a patent dominates improvement patents, it allows the patentee the option of developing the improvement or blocking its use. The increased protection of a dominant patent makes it more valuable in an entry-detering strategy. An established firm has a greater incentive to develop a dominant patent because it is potentially effective in limiting competition, at least from product improvements. Of course, dominant patents may apply more to examples of technological breakthroughs where the potential rewards and the uncertainties are large enough to stimulate research and development on many fronts. Also, since all firms in an industry stand to lose from excessively restrictive patent enforcement, this encourages cross-licensing arrangements.

Scherer devotes considerable space in his comments to the particulars of the SCM v. Xerox case and its antecedents. My purpose in reviewing this case was not to determine whether SCM was a legitimate potential competitor in the electrostatic copying market, or whether the decision was just. I was interested in

identifying examples where preemptive patenting was, or could have been, an issue in an antitrust litigation. Both SCM v. Xerox and Kobe v. Dempsey Pump involved, at least in part, the allegation that patent accumulation was an element of monopolizing behavior. The decision in the SCM v. Xerox case rested on the legality of an expired grant-back agreement, while in the Kobe case, unduly aggressive patent enforcement was a main consideration. My objective was to consider the potential scope for preemptive patenting as an alternative to the issues which occupied the courts. Any assessment of preemptive patenting in an antitrust proceeding requires a critical examination of the particular circumstances, and even so, the welfare implications are contradictory, because preemption requires accelerated investment in research and development, with only a probability of successful entry deterrence.

Scherer's comments address issues which are relevant to a full policy analysis. My purpose was to describe the incentives for accelerated product development by an established firm and to discuss its general implications for market structure and economic efficiency. I did not intend this paper to be a policy analysis or an evaluation of specific cases. The analysis can be extended to include questions raised by Scherer. While these issues they affect the incentives for preemption in specific circumstances, they do not invalidate the arguments presented in this paper.

AN ECONOMIC DEFINITION OF PREDATORY PRODUCT INNOVATION

Janusz A. Ordover
Robert D. Willig*

I. Introduction

Many forms of business behavior have been attacked as predatory since the enactment of the Sherman Act in 1890.¹ However, we think it can be fairly concluded that neither the courts² nor legal and economic scholars³ have been able to develop a general standard of predatory behavior with which to test diverse

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¹ 15 U.S.C. §§ 1-7 (1976). Predatory behavior comes also within the purview of the Clayton Act, 15 U.S.C. §§ 12-27, of the Robinson-Patman Act, 15 U.S.C. §§ 13-136, 21a (1976), and of the Federal Trade Commission Act, U.S.C. §§ 41-51 (1976).

² Early cases of alleged predation are briefly reviewed in L. Sullivan, Antitrust (1977), ch. 2. See also ABA Antitrust Section Monograph No. 4, "The Robinson-Patman Act: Policy and Law," volume I (1980). For an extensive review of the post-Areeda-Turner cases, see J. Hurwitz et al., "Current Legal Standards of Predation," in this volume.

³ The recent outpouring of writing on predation has been stimulated by P. Areeda and D. Turner, "Predatory Pricing and Related Practices under Section 2 of the Sherman Act," 88 Harv. L. Rev. 679 (1975). Scholarly responses to this article are critically examined in P. Joskow and A. Klevorick, "A Framework for Analyzing Predatory Pricing Policy," 89 Yale L. J. 213 (1979) and in J. McGee, "Predatory Pricing Revisited," 23 J. Law & Econ. 289 (1980).

industrial practices for possible anticompetitive effects or intent. In section II of this paper, we present an economically sound and judicially workable general definition of predatory behavior and briefly explicate its various elements.⁴ We argue that predation should be defined as a response to a rival that sacrifices part of the profit that could be earned, under competitive circumstances, were the rival to remain viable, in order to induce exit and gain consequent additional monopoly profit.

In section III we indicate how the much-discussed cost-based tests for predatory pricing can be deduced from this general standard. This permits us to clarify these tests and to expand their scope to apply to realistic instances of multiproduct firms.

With this material as necessary introduction, we turn, in section IV, to the main focus of this paper--the development from our general standard of specific tests to distinguish between predatory and procompetitive product innovations.

We find that antitrust scrutiny of product innovations is not a priori unwarranted. Surprisingly, we find that even genuine innovations (that is, new products that in some regards are superior to existing ones in the eyes of both engineers and consumers) can in fact be anticompetitive. Such predatory innovations do not provide benefits to consumers that are worth the cost, and are

⁴ For a fuller discussion of our general definition, see J. A. Ordover and R. D. Willig, "An Economic Definition of Predation," Economics Discussion Paper (1981).

motivated by the additional monopoly profits that are made possible solely by the exit they induce.

We analyze two types of exit-inducing tactics that entail introductions of new products and that may or may not be anti-competitive. The first tactic is the introduction of a new product that is a substitute for the products of the rival firm and that endangers its viability by diverting its sales. While this tactic in itself has not been scrutinized in antitrust litigation, it has been a part of more complex tactics that have been the subject of an important and rapidly growing line of cases. These tactics are employed in the context of systems rivalry. They entail introductions of new systems of components that are incompatible with components manufactured by rivals, together with the constriction of the supply of components that are complementary to those of rivals. This complex tactic endangers rivals' viability by inducing consumers to bypass their use of rivals' products.

In sections V and VI we develop workable tests for ascertaining whether or not such tactics involve predatory product innovation. These tests reflect two novel considerations that have not been incorporated in any existing tests for predatory behavior. First, as detailed in section V, our standard leads us to the scrutiny of the R. & D. investment in the innovation. Second, as detailed in section VI, our standard implies that in the context of systems rivalry, the predatory act may be the upward repricing or withdrawal of the preexisting components

complementary to the rivals' products. We provide an overview of these matters in section IV. In section VI we show that the workable tests derived from our general standard can protect competition and deter anticompetitive product innovation without distorting incentives for procompetitive innovation and without unduly taxing scarce judicial resources.

Finally, in appendices we discuss the application of our standard to the scrutiny for predation of product preannouncements and cross-market entry.

II. General Standard of Predatory Behavior

Our proposed general standard of predation is founded on a natural and basic interpretation of the phrase "intent to monopolize" that is central to the antitrust statutes under which business behavior is examined. A predatory practice is an action undertaken with the intent to increase monopoly power by means of inducing the exit of a rival. Here, by "intent," we mean that the essential purpose of the practice was the additional monopoly power that would result from the rival's exit. It would be clear that monopolization was the purpose of the practice if the practice would have been unprofitable without the exit it actually caused, but profitable with it. Obviously, even if a practice caused a rival's exit, it would not be predatory if it would have been profitable without any additional monopoly power resulting from the exit. Thus, in our interpretation, there is intent to monopolize if the practice can only be rationalized by means of

the additional monopoly power it generates. From this interpretation of intent, it then follows that predatory behavior can be defined as a response to a rival that sacrifices part of the profit that could be earned, under competitive circumstances, were the rival to remain viable, in order to induce exit and gain consequent additional monopoly profit.

A market must have several structural characteristics for a practice that induces a rival's exit to generate additional monopoly power and thus conceivably violate our general standard of predatory behavior. First of all, a market must be horizontally concentrated. In an unconcentrated market, there is sufficient competitive discipline from the remaining rivals to eliminate monopoly power, irrespective of the exit of one of them.

Second, a market must be protected by a form of entry barriers that we term entry hurdles. These exist whenever the prospective entrant is cost disadvantaged vis-a-vis the incumbent, solely because the incumbent is already functioning as an ongoing concern, while the entrant has not yet committed the requisite resources. The cost difference between the entrant and the incumbent vanishes, once the prospective entrant overcomes the entry hurdle and enters the industry. In general, entry hurdles arise when investments are not fully reversible.⁵ The necessity

⁵ The importance of sunk and fixed costs for market organization is fully explicated in W. J. Baumol and R. D. Willig, "Fixed Costs, Sunk Costs, Entry Barriers, Public Goods, and the Sustainability of Monopoly," Q. J. Econ. (forthcoming).

to sink, and thus to put totally at risk, the irreversible portion of the requisite investment in effect faces the prospective entrant with a cost disadvantage relative to the incumbent. Because potential entrants, but not actual entrants, are disadvantaged by entry hurdles, the incumbent may have an incentive to push the entrant over the entry hurdle and to thereby gain incremental monopoly power. Conversely, where there are no entry hurdles there can be no incentives for predation because prospective entrants constrain the market power of the incumbent as effectively as do actual entrants.

Lastly, for a tactically induced exit to augment extant monopoly power, a market must be characterized by the presence of reentry barriers. A reentry barrier is defined as the additional cost which must be incurred by a firm which has exited in order to restart its operations. If all physical and human capital that has been retooled or dispersed upon the firm's exit can be costlessly reassembled, then no reentry barrier exists. Absent reentry barriers, a firm confronted with possibly anticompetitive behavior of its rival can shut down its operations and then costlessly reenter the market as soon as the alleged predator attempts to recoup profits which he sacrificed during the predatory campaign. Thus, where reentry barriers are truly inconsequential, recoupment of sacrificed profits would not be possible, because the

dominant firm's rivals would always remain viable. Consequently, there can be no motive for predation absent reentry barriers.⁶

To summarize: in a market which is horizontally unconcentrated, or in which entry hurdles and reentry barriers are not significant, a dominant incumbent firm cannot hope to earn any additional monopoly profits from the induced exit of a rival. In such a market, actual and potential competitors effectively constrain the market power of an incumbent firm, whether or not the rival whose exit is at issue remains viable.

Here, then, there can be no motive for predatory behavior. Consequently, behavior need not be scrutinized for predation and should be presumed procompetitive if the market in which it occurs is unconcentrated, or has no entry hurdles, or has no reentry barriers. Thus, ascertaining whether the relevant market has these characteristics is a structural test that should be performed prior to the application of any test like ours to allegedly predatory behavior.⁷

In markets in which all of the structural preconditions listed above do not obtain, a firm may rationally engage in anti-competitive behavior, with the intent of inducing exit of a rival,

⁶ It is interesting to note in this regard that Robert Bork's argument that successful predation is impossible, or unlikely, depends significantly on his unstated assumption that rivals of the alleged predator do not face significant reentry barriers. See R. Bork, The Antitrust Paradox (1978), pp. 149-54.

⁷ In this regard we are in agreement with the two-tier approach advocated by P. Joskow and A. Klevorick, note 3 supra.

in order to gain additional monopoly profits. The hallmark of such anticompetitive predatory behavior is that it entails a sacrifice of a part of the profit that could be earned, under competitive circumstances, were the rival to remain viable.

The possibility of gaining additional monopoly profits provides the necessary element of motive for engaging in anticompetitive behavior. On the other hand, the mere fact of a rival's exit as a result of the alleged predator's action--even in markets in which exit does lessen competition--does not constitute proof that predation actually took place. Indeed, exit-inducing actions cannot be considered predatory if they are a part of competitive interactions. Because of cost or other disadvantages, not every entrant or existing rival will be assured positive output and profits in a sufficiently competitive marketplace. Such inefficient rivals could be induced to exit by actions which the incumbent would find profitable without his taking account of their effects on the rival's viability and on any consequent additional monopoly profits. Such actions are innocent of predation under our standard.

Under our standard, predatory sacrifice of profit is assessed under the premise of the continued viability of the rival. This possibly counterfactual premise means that the rival remains ready to produce, should he so choose, without incurring new startup costs, whether or not he has actually ceased production. Thus, the continued-viability premise is equivalent to the

premise of the absence of reentry barriers. Then, a firm's action entails predatory sacrifice of profit if there is some alternative action which would yield greater profit if there were no reentry barriers. The fact that such an action was chosen by a firm indicates that it was motivated by the thereby induced exit of its rival.

These concepts are illustrated in tables 1 and 2, which display the present discounted values of the profits of the incumbent under various scenarios. The actual action of the incumbent induces the exit of his rival, while the alternative action does not. The numbers displayed in table 1 indicate that the incumbent has incentive to choose the exit-inducing "actual action," because it yields him a profit of 110, while the alternative yields only 105. However, here, this choice is predatory because under the counterfactual premise of the continued viability of the rival, the actual action entails a profit sacrifice of 5; that is, the difference between 105 and 100.

In contrast, the choice by the incumbent of the "actual action" in the scenario of table 2 is not predatory, even though it does induce exit. The incumbent does have incentive to make this choice, because it yields him a profit of 110 instead of the profit of 95 that he would earn from the alternative action. However, the actual action entails no predatory sacrifice of profit,

because it yields higher profit even under the premise of the continued viability of the rival.⁹

INCUMBENT

		ACTUAL ACTION	ALTERNATIVE ACTION
RIVAL	VIABLE	100	105
	EXISTS	110	

TABLE 1

It should be emphasized that our definition of predatory profit sacrifice is not that short-run profit be sacrificed for future monopoly gain. For example, the actual action of table 1

⁹ An alternative display of these data focuses on two different measures of the profit of the incumbent, given his action: the true profit and the profit he would earn given the viability of the rival. For table 1, these figures are as follows.

	Actual Action	Alternative Action
True profit	110	105
Profit with viable rival	100	105

The actual action is rational, inasmuch as 110 exceeds 105, but it is predatory, because 100 is less than 105. This viewpoint permits uncertainty in the rival's response to be readily incorporated in the test for predation, by regarding the profit figures as expected values.

might earn current period profits of 10, while the alternative action might earn only 5. Then, despite the fact that the actual
 INCUMBENT

		ACTUAL ACTION	ALTERNATIVE ACTION
R	V		
	I		
I	A		
	B	100	95
V	L		
	E		
A	E		
	X	110	
L	I		
	T		
	S		

TABLE 2

action maximizes short-run profit, it is nonetheless predatory because it does not maximize overall profit, given the rival's viability. An effect of this kind need not arise in the context of predatory price-cutting. However, it may well occur where the action to be tested for predatory intent involves investments (for example, in plant capacity or R. & D.). For example, a predator may respond to entry by shifting from a relatively expensive R. & D. program aimed at significant quality improvement to a cheaper one aimed at an exclusionary redesign (as detailed in sections IV and VI). In such a case, the predatory investment decision may raise short-term profit, raise expected long-run profit (because of additional monopoly power), but lower long-run profit, under the premise that the new rival remain viable.

Our standard stipulates that the sacrifice of profit be assessed "under competitive circumstances." As such, sacrifice cannot be inferred merely because the incumbent avoided a cartel-like response that might have yielded both him and his rival greater profits. Instead, for the assessment of sacrifice, the profitability to the incumbent of his actual and alternative responses is to be gauged on the presumption that the rival reacts to them in a competitive fashion. From this vantage point, a cartel-like response would not benefit the incumbent because the rival's competitive reaction to it would undermine its profitability. Thus our standard does not penalize the incumbent for competitive responses, even if they damage the rival. The standard does not protect a rival who can only prosper under non-competitive circumstances. The standard, therefore, is designed to protect competition by protecting competitive rivals from predation.

The practical relevance of our proposed standard would be problematic if its application necessitated estimation of data like those presented in our numerical examples. Fortunately, we are able to identify certain conditions that are readily testable and that logically imply predatory sacrifice of profit. Thus, while our definition of predation is not in itself a workable test, it provides a unifying, general, and open-ended standard from which specific and workable tests can be logically derived. Novel tests for predatory product innovation are so derived in

sections IV, V, and VI. In the next section we sketch how cost-based tests for predatory price-cutting can also be derived from the general standard, and how useful new variants naturally emerge as well.¹⁰

III: Application of the General Standard to Predatory Price-Cutting

The purpose of this section is twofold. First, we demonstrate that in the simplest context of an incumbent firm that produces a single product (or service), the application of our general standard yields the familiar Areeda-Turner cost-based price tests. Second, with the view towards the discussion of predatory product innovations in section V, we develop the relevant price tests for a multiproduct (multiservice) incumbent firm.

Consider, as a stereotype, the example of an incumbent dominant firm which, in response to entry, drops its price and thereby endangers the viability of the entrant. The application of our standard requires that the structure of the relevant market be examined for concentration, entry hurdles, and reentry barriers before the price cut is appropriately scrutinized for possibly anticompetitive effects. If the market does exhibit all these structural features, and if the price cut demonstrably raises the probability of the entrant's exit to a dangerous level, then our

¹⁰ For a complete analysis, see J. A. Ordover and R. D. Willig, "An Economic Definition of Predation," Economics Discussion Paper (1981).

standard directs attention to the question of whether the incumbent's response entails predatory sacrifice of profit. This response is composed of decisions pertaining to the firm's price, output flow, and perhaps such other elements as capital investment and marketing activities. A finding of predation would be supported if it could be established that a different response would earn greater profit for the incumbent under the premise of the continued viability of the rival.

In the context of this stereotypical example, the premise of the continued viability of the rival rules out consideration of future monopoly profits made possible by the entrant's exit. Even if the response of the incumbent causes the rival to shut down production, if the rival's viability were unimpaired (as would be the case absent reentry barriers), the fact that he would rationally expand output if prices were to sufficiently rise renders his shutdown irrelevant to his constraint on the incumbent's market power. The fact that the incumbent's response did induce the rival's exit may have actually provided the profit rationale for the chosen prices, output, et cetera. However, under the continued-viability premise, the rival's irreversible exit is treated as if it were only a reversible shutdown. As such, the fact that the response did induce the rival's exit would have no influence on the expected future profits of the incumbent, under the premise of the continued viability of the rival.

Consequently, the examination of whether the incumbent's response entails predatory sacrifice may only require testing whether an alternative response, less threatening to the entrant's viability, would have yielded a higher level of current profit under competitive circumstances. This conclusion rests on the supposition that the response at issue has no impact on the incumbent's future profits, apart from effects on the degree of competition offered by the rival. This supposition rules out intertemporal demand effects, like those that motivate promotional pricing, and any impacts on future profitability of current period output and investment elements of the response. Although such effects may sometimes be important, and although our standard can readily account for them, here, for simplicity, we disregard them.¹¹ Thus, we assume here that under the continued-viability premise, the response to the rival affects only the current profits of the incumbent.

In this simplified setting, the actual response of the incumbent exhibits predatory sacrifice if there exists an alternative price and output response that would raise the incumbent's current profits under competitive circumstances and that would lower the probability of the rival's exit. The relevant such alternative response to be examined entails a quantity flow that

¹¹ For example, we have derived workable tests from our general standard that apply where the incumbent invests or disinvests in capital facilities as part of his response. See J. A. Ordover and R. D. Willig, note 4 *supra*. Also, we discuss the treatment of responses that include R. & D. investment in section V *infra*.

is smaller than that actually chosen by the incumbent, say by δ , together with the corresponding higher price. Which higher level of price would actually result, under competitive circumstances, from an output cutback of δ depends on the precise properties of market demand as well as on the details of the rivals' structures of production costs. Fortunately, however, a cost-based test for predatory profit sacrifice can be derived without assessment of that higher level of price, as long as one proceeds under the natural presumption that an output reduction would not result in a lowered market price.

Then,¹² the incumbent's cutback of δ in sales would reduce his revenues by less than his original price multiplied by δ ; $\delta \cdot p$. If the price were unaffected, the revenue reduction would, of course, equal this figure. And, if the price were to rise, this reduction would be partially offset by the additional revenue earned on each remaining unit of output.

Consequently, this alternative response, designed to be less damaging to the rival, would also increase the incumbent's profits under the viability premise, if it yielded a saving in production costs that exceeds the reduction in revenues. As such, predatory sacrifice of profit can be inferred if the cost saving from reducing output by δ is larger than $\delta \cdot p$, which, as just explained,

¹² That is, let p' and p be, respectively, the alternative and actual prices, and let $q^{\circ-\delta}$ and q° be the associated levels of output. Then, with $p' > p$, the reduction in revenues is $pq^{\circ} - p'(q^{\circ-\delta}) \leq pq^{\circ} - p(q^{\circ-\delta}) = p\delta$, as stated in the text.

is a conservative estimate of the revenue reduction. Thus, there is evidence of predatory sacrifice if the incumbent's actual price is less than the average saving in costs that could be achieved by cutting back output, where the average is taken over the size of the cutback, for any such hypothetical contraction.¹³

There are several different-sized cutbacks that specialize this general test to particularly useful cost-based price floors. First, for consideration of the alternative response that entails elimination of the incumbent's entire output, the test for predatory sacrifice is whether the price is below the average avoidable cost of the product line in question. Second, for consideration of small output cutbacks, the test is whether the price is below the marginal (avoidable) cost.¹⁴

Thus, familiar cost-based tests for predatory pricing can be logically derived from our proposed general standard. Surprisingly, we find that both average cost and marginal cost define correct price floors. There is evidence of predatory sacrifice if

¹³ That is, with $C(q^\circ)$ and $C(q^\circ - \delta)$ denoting the total cost flows incurred for output levels q° and $q^\circ - \delta$, respectively, there is evidence of predatory sacrifice if

$$p < \frac{C(q^\circ) - C(q^\circ - \delta)}{\delta}$$

¹⁴ Other sized cutbacks yield additional cost-based price floors that are particularly germane in various circumstances. For example, if the incumbent has expanded output following the rival's entry, the relevant size of cutback is equal to the post-entry output expansion. The resulting test is whether the price is below the average cost incurred for that expansion. See J. A. Ordovery and R. D. Willig, note 4 supra, for a detailed discussion.

the price is found to be below either one of them. In particular, if the price is below marginal cost, a slightly smaller output level would have raised the incumbent's profits, under the premise of the continued viability of the rival. Similarly, if the price is below average cost, elimination of the incumbent's output flow would have raised his profits under the same premise. Since either of these alternatives would have endangered the rival's viability less, both define correct tests of predatory sacrifice under our standard.¹⁵

Another valuable result of deriving cost-based tests from the standard is that the appropriate cost concepts are thereby clarified. In all cases, it is the cost saving from an output contraction that is to be compared with the associated revenue reduction. Hence, for example, capital costs should be included if they could have been thus saved. Also, advertising and other marketing costs should certainly be included in the average-cost test, to the extent they could have been entirely avoided if the incumbent were to cease production.¹⁶

The tests for predatory pricing derived from the general standard protect and enhance competition without simultaneously interfering with its workings. By their very construction, the

¹⁵ The relative stringency of these tests will depend on the particular circumstances in which they are applied. For example, where there are economies of scale in avoidable costs, the average-cost test is the more stringent one.

¹⁶ See J. A. Ordover and R. D. Willig, note 4 supra, for a fuller treatment of these issues.

tests cannot indicate any normal competitive response to be predatory, whether or not that response induces a rival to exit. This follows from the fact that competitive responses entail no sacrifice of profit under the premise of the continued viability of the rival. On the other hand, the tests do constrain behaviors that induce exit and that are not part of the normal competitive process.

Further, it can be theoretically demonstrated that application of our proposed standard would protect from tactical exit inducement any rival who would actively produce in the socially optimal allocation of production among extant firms. Conversely, it can be shown, the standard would permit the inducement of exit of a firm that is insufficiently efficient to actively produce in that socially optimal arrangement.¹⁷

For example, suppose that both the incumbent and the rival have constant marginal and average costs. If the costs of the incumbent are lower than those of the rival, then the latter would

¹⁷ These results, it should be noted, do not imply that application of the standard would necessarily raise the level of social welfare if the incumbent and its rivals failed to actively compete. In fact, hypothetical examples can be constructed in which all extant firms exhibit noncompetitive behavior; the standard protects an existing firm from exit inducement; but the exit of that firm would raise social welfare. Rather, the standard is only assumed to raise social welfare if firms behave competitively in the absence of predation. However, the standard would also raise social welfare in any scenario in which society would be benefited by the survival of a firm that would be part of the social optimum. We regard such scenarios to be the normal case.

not actively produce in the socially optimal allocation of production between them. In this case, the incumbent can induce the rival's exit by lowering his price to a level just below the rival's cost. No alternative price, less damaging to the rival, would earn the incumbent greater current profit under competitive circumstances. This follows because a higher price could be undercut by the rival, thus yielding the incumbent no sales. Yet the price just below the rival's cost does earn the incumbent some profit, since his cost is lower still. Thus, this response entails no profit sacrifice and therefore induces exit without violation of our standard of predation.

If, instead, the costs of the incumbent exceed those of the rival, then the latter would actively produce in the socially optimal arrangement. In this case, according to our general result, any exit-inducing response by the incumbent must entail predatory sacrifice. Here, this is true because a price below the rival's cost must cause the incumbent a negative profit that is less than he would earn with any one of these alternative responses that are less damaging to the rival: a small cutback in output, eliminating production, or raising his price to the level of his cost and accepting any sales that may result. Of course, if it succeeds in driving out the rival, and in thereby making possible later additional monopoly profits, the low price of the incumbent may be his most profitable response. Nonetheless, as just explained, that low price is not the most profitable response under the premise of the continued viability of the entrant. That

is why such a tactic could be found to be predatory under our proposed standard.

III B: Price Floors for Multiproduct Firms

In this section we sketch the development of a test for predatory price cutting that pertains to multiproduct firms. This test is a necessary component of the test developed below for predatory product introductions. In addition, it shows how cost-based price floors should be correctly adjusted for demand interrelationships to test for predatory price-cutting under our standard.¹⁸

We consider, for simplicity, the same scenario analyzed above with one additional complication: the product whose price and output level are at issue is cross-elastic with another product offered by the incumbent. That is, we seek a floor on a price whose level affects the quantity demanded of another product sold by the incumbent. As before, the test for predatory sacrifice investigates whether a contraction, of size δ , in the output level, q^0 , of the good in question would increase the current profit of the incumbent under competitive circumstances.

In this case, as above, we presume that the output contraction would not cause the price, p , to fall, so that $p \cdot \delta$ is a conservative estimate of the loss in revenue from the sales of the

¹⁸ The courts have had difficulty in assessing the proper method of accomplishing this. See In re IBM Peripheral EDP Devices Antitrust Litigation, 459 F. Supp. 626 (N.D. Cal. 1978); Transamerica Computer Co. v. IBM, 481 F. Supp. 965 (N.D. Cal. 1979).

product. However, in this multiproduct case, the effects on the incumbent's profit are not necessarily limited to this revenue loss and to the savings in cost from the output contraction. Instead, there may be an additional net effect on current profits due to the change in the level of sales of the cross-elastic product, Δy , that is induced by the output contraction and by the corresponding rise in the price. This additional effect on profit is equal to the change in revenue, $w \cdot \Delta y$, where w is the price of the cross-elastic good, net of the change in production cost caused by the induced output change.

Thus, there is evidence of predation if the conservative estimate of the loss of direct revenues from the output contraction, $p \cdot \delta$, is less than the sum of the direct cost saving from the contraction and the net effect on profit caused by the induced change in the sales of the cross-elastic product. Equivalently, the test for predatory sacrifice is whether the price at issue is below the cost saving from the cutback, averaged over the size of the cutback, plus an adjustment for the cross-elastic effects. This adjustment is the ratio of the induced output change, Δy , to the cutback, δ , multiplied by the margin between the price, w , and the average cost change associated with the cross-elastic good.¹⁹

¹⁹ To be precise, the contraction of δ would increase the incumbent's current profit if $p'(q^\circ - \delta) + w(y^\circ + \Delta y) - C(q^\circ - \delta, y^\circ + \Delta y) > pq^\circ + wy^\circ - C(q^\circ, y^\circ)$, where C now denotes the multiproduct cost function. With $p' > p$, a sufficient condition for this inequality to hold is:

$$p < \frac{C(q^\circ, y^\circ) - C(q^\circ - \delta, y^\circ)}{\delta} + \frac{\Delta y}{\delta} \left[w - \frac{C(q^\circ - \delta, y^\circ + \Delta y) - C(q^\circ - \delta, y^\circ)}{\Delta y} \right].$$

Hence, we have derived from our standard an adjustment to the cost-based price floors that takes into account interrelationships among the demands for the incumbent's products. To analyze the effects of the adjustment on the price floors, we assume that the price of the cross-elastic good is not less than its average incremental cost. This is likely to be the case, because it is not this price whose level is being tested for predation. And, in general, absent predatory intent, it would not pay the incumbent to maintain that price below average incremental cost.

Then, the adjustment would raise the cost-based price floor if the cross-elastic product were a substitute for the good in question in the eyes of consumers. Here, the test for predatory price-cutting is made more stringent because price cuts have the additional negative effect on the incumbent's current profit of diverting profitable sales from its other product. Obversely, demand complementarities make the test less stringent because, in this case, price cuts have the additional positive effect on the incumbent's current profits of stimulating profitable sales of its other product. In both cases, the size of the adjustment to the cost-based price floor is greater the larger is the markup on the cross-elastic good, and the more sensitive are its sales to the price and output of the good at issue. No adjustment is called for if there are no significant cross-elastic effects, or if there is no significant markup over average incremental costs on the cross-elastic good.

III C: Concluding Remarks

In this section of the paper, we have derived tests for predatory price-cutting from our proposed general standard. For the scrutiny of a price that affects the demand of no other product of the incumbent, the tests are cost-based price floors, in the spirit of the Areeda-Turner test. However, we have shown that both marginal and average costs define correct floors, and we have provided a framework for analyzing what cost elements are properly reflected in the floors. Finally, we have derived the adjustment to the cost-based floors that properly reflects interrelationships among the demands for the various offerings of a multiproduct firm.

In the remainder of the paper, we utilize this same analytic approach to derive from our general standard tests for predatory product innovations.

IV: Predatory Product Innovations--An Overview

Predatory pricing, discussed in the preceding section, is only one of the many strategies that a firm may use to induce exit of a competitor. As we shall see below, cutting prices on the existing product lines to below some relevant floor is not always the most effective strategy for forcing a competitor back over an entry hurdle or a reentry barrier. In this section, we argue that an introduction of a new product can be anticompetitive and predatory. Of course, the introduction of a new product can also be procompetitive, as well as directly beneficial to those consumers who prefer the new product to the already existing ones.

Our main task here is to provide some specific tests which would permit one to distinguish between predatory and nonpredatory product innovations. According to our general economic standard of predation, an introduction of a new product is predatory if it is a response to a rival that sacrifices part of the profit that could be earned, under competitive circumstances, were the entrant to remain viable, in order to induce exit and gain consequent additional monopoly profits.

Before this standard can be applied to the problem at hand, one must recognize that, unlike a simple price cut, an introduction of a new product is a composite strategy. It involves, at least, the following fundamental decisions: (a) the choice of the product design; (b) the choice of the timing of the announcement of the new product; (c) the choice of the price for the new product; (d) the choice of associated adjustments in the prices of the existing products; and (e) the choice of the size and of the content of the research and development and promotional budgets. It is plain that each of these choices can have an impact on the viability of competitors and, therefore, on the strength of competition following the introduction of a new product. Thus, in order to test for the predatoriness of an introduction of a new product, it is necessary to scrutinize these decisions not only singly but also jointly, as components of an overall strategy.

Professors Areeda and Turner shy away from this approach and argue against an extensive antitrust scrutiny of investments in new products, or product lines. In the Areeda-Turner test, for a

new product to be judged nonpredatory it is only necessary that its price satisfy the de minimis condition of exceeding or equaling the short-run marginal cost (or, if marginal costs cannot be computed, the short-run average variable cost). We think that, for at least two reasons, this position is incorrect. First, even in the absence of antitrust sanctions, manipulation of the product set can frequently be more effective than price cutting as an anticompetitive tactic. Consequently, there is a strong policy reason not to exclude strategies for the introduction of new products from antitrust scrutiny, unless reasonable tests for predatoriness cannot be feasibly implemented.

Second, short-run marginal cost and short-run variable cost do not commend themselves as the correct cost-based price floors for new products. If the presence of a viable competitor only restricts the innovating firms to charging a price that is no lower than the short-run marginal cost, then the initial expenditures on research and development need not be recouped. Such a finding might indicate that the new product would increment the firm's profits only by inducing the exit of otherwise viable competitor(s). If this is indeed the case, social benefits from the new product are questionable.

Our analysis considers two types of tactics that entail product introductions and that may be either procompetitive or predatory. The first tactic is the introduction of a new product that is a substitute for the products of the rival firm and that endangers its viability by diverting its sales. The second tactic

is employed in the context of systems rivalry. It consists of constriction in the supply of components that are vital to consumers' use of the rival's products, coupled with the introduction of systems components that enable consumers to bypass their use of the rival's products. Each of these tactics may have at least three distinct types of effects. First, they both may result in an increased variety or an increased quality of products available to consumers. Second, they both may serve as vehicles for pro-competitive entry of new firms or for a procompetitive expansion of the number of rivalrous product offerings. Third, however, the principal effects of these same tactics may, in other circumstances, be to undermine competition; for example, through the elimination of rivals whose viability is essential for competition. The aim of our analysis is to demarcate some of the circumstances in which each of these two kinds of tactics is pro- or anticompetitive. In particular, we analyze the structural features of the markets that are necessary for a finding under our standard that a defendant's actions had a predatory motive. In addition, we provide workable tests, applicable in the two scenarios, for ascertaining whether the defendant's actions entailed predatory sacrifice of profits.

In section V, we consider an introduction of a new product which is a substitute for the existing product(s) of a competitor. We argue that product introductions of this type can be essentially viewed as a two-stage price adjustment: First, a decrease in the price of the new product to the level of the price actually

set, from a level sufficiently high to choke off any possible demand for it; second, whatever adjustments were effected in prices of the existing products from their preintroduction levels. (Here, withdrawal of a preexisting product is viewed as an increase in its price to a level that chokes off all demand for it.) Given this framework, an introduction of a new substitute can be tested for its possible predatoriness using the already summarized tests for the scrutiny of pricing behavior of multi-product firms. As detailed below, the treatment of research and development expenses is the novel element of these tests when they are applied in the context of product innovation.

In section VI, we analyze introductions of new systems. A system is a collection (package) of complementary products which are combined by a manufacturer, or a consumer, to yield a final product. Tennis rackets and tennis balls; cameras and film; central processing units and plug-compatible peripherals--all are examples of systems. The presence of complementarity relationships among products requires that the various components of the system be compatible with one another.²⁰ This being the case, the viability of a firm which produces only some of the components that comprise the system depends critically on the prices and on the availability of the remaining components. A dominant firm may

²⁰ Such complementary components have been misleadingly characterized as "physical tie-ins" in "Comment, Physical Tie-ins as Antitrust Violations," Ill. L. J. 224 (1975). They have been usefully analyzed in "Note, An Economic and Legal Analysis of Physical Tie-Ins," 89 Yale L. J. 769 (1980).

exploit this interdependence in the final goods market by pricing up, or even withdrawing from production, the components complementary to the products of its competitors, while introducing a new system which is incompatible with its competitor's components. This policy of introducing a new system and simultaneously subjecting competitors to a vertical price squeeze may be a more effective tactic for inducing exit than would be a simple predatory price cut on the existing products. Yet, like a price cut, this policy may simply be an innocent and socially desirable aspect of competitive interactions.

In section VI, we provide the extensive analysis that is necessary to explicate some of the possible motives for tactical exit inducement in the context of systems rivalry. We show that the alternative tactic of vertical price squeezes does not necessarily enable a firm with monopoly power over some system components to extract all rents available in the final market.²¹ In particular, this tactic could be less effective than inducing the exit of a rival when the extant monopoly power of the dominant firm is limited by another inferior source of supply.

There are structural preconditions on the various facets of the systems market that are necessary (but not sufficient) for the existence of motives for tactical exit inducement. There

²¹ W. Bowman, "Tying Arrangements and the Leverage Problem," 67 Yale L. J. 19 (1957); L. Telser, "A Theory of Monopoly of Complementary Goods," 52 J. Bus. 211 (1979); R. Posner, Antitrust Law: An Economic Perspective (1976), pp. 171-211.

must, of course, be monopoly power over some of the components sold by the defendant, as well as hurdles to entry into the final systems market. There must be hurdles to entry into the production of some of the system's components--which ones depends on the nature of the ineffectiveness of the vertical price squeeze. And the tactically induced exit must substantially weaken competition in the systems market.

We show that the defendant firm sacrifices some of the profit that it could earn, were its rival to remain viable, if it refuses to sell a component of the old system that is needed by the rival, rather than offer it at a compensatory price. By definition, this is the lowest price at which sales of a preexisting component would not lower the innovator's profit, given the viability of the rival. Loosely speaking, the compensatory price (a) covers the cost of supplying the old component and (b) yields the same incremental profit as would the cross-elastic sales of new and other components, under the premise that the terms of those sales are constrained by the viability of the rival in the systems market. We show that, in some simple situations, the above definition of the compensatory price implies that after the innovation is introduced, the manufacturer must offer the same or lower markup on the old component as he charges on the parallel component of the new system, in preference to discontinuing the old component. More generally, a price above the compensatory level entails predatory profit sacrifice if there is a lower price which both benefits the rival and raises the innovator's profit under the premise of the

continued viability of the rival. It is important to emphasize that the viability of a rival must be assessed in terms of his ability to compete in the final systems market and not in terms of his ability to offer components that are compatible with the new line of the innovator. We think that the latter conception of viability, while being more pro-rival than the one we have adopted, could result in a socially undesirable chilling of the innovative process.

It is crucial to note that compensatory prices need not induce any demand for the component or for the old system of which it is a part, if consumers view the new system as sufficiently superior to the old one. This would be the case if the exit of the rival were economically efficient, were the result of legitimate competitive interaction, and were not caused by predation. The thrust of our approach is that such a judgment is correctly rendered by the market reaction to a properly compensatory structure of prices, rather than by the market reaction to a structure of prices that predatorily disadvantages the rival's offering.

A manufacturer who is prepared to offer old components at compensatory prices may, nevertheless, be predating. To support an allegation of profit sacrifice, a plaintiff may demonstrate that the innovation was not intended to earn a positive incremental profit, given the continued viability of the rival, but was instead motivated by the additional profits that the rival's exit would make possible. The calculation of the incremental profit must be based on (a) complete costs, which include economically

allocable expenditures on research and development, and (b) full incremental revenue, which includes the net revenue foregone on the possible sales of the existing components or systems.

We show, in the context of a simple market scenario characterized by the availability of an inferior source of supply, that the application of these tests for compensatory pricing and for the R. & D. motive would enhance social welfare. The tests permit socially desirable innovations, whatever their effects on market structure. And they simultaneously restrain socially wasteful innovations whose only motivation was the additional monopoly profits enabled by their anticompetitive effects.

There exists yet another test for predatory sacrifice that can be usefully appended to those described above in some special circumstances. This test would scrutinize whether there existed an alternative design of the product which would have yielded a higher incremental profit than the design actually chosen, on the assumption of the continued viability of the rival. Note that the tests proposed above compare an innovation to the status quo: that is, to the situation with no new product. The test suggested now would compare the innovation actually marketed to some alternative product design. Generally, such an investigation could only be based on cost and demand data too speculative for legal standing. However, in some instances, there may be an evident alternative design that is at once less exclusionary of rivals, less costly to

produce, and equally desirable to consumers.²² The decision by a defendant against such a design would entail a predatory sacrifice of profit.

We close the paper with appendices that discuss product preannouncements and retaliatory cross-market entry, respectively. This form of entry occurs when, in response to entry in its own (geographical) market, the firm introduces its own product, or attempts to expand its sales, in the (geographical) market of the entrant. Although this type of conduct differs in many details from the introduction of a product innovation, it can be viewed as an introduction of a new product, especially if the firm cross-enters a territory in which it did not compete before. In this instance, research and development expenditures may be nonexistent, or minimal, but promotional expenditures may be substantial, and are analogous to the expenditures on research and development that characterize product innovations.

What is peculiar about predatory cross-market entry is that its aim is to induce a rival's exit not from the market which has been cross-entered, but rather from the market that was first entered. One could take a position that cross-market entry is prima facie predatory: if cross-entry is (innocently) profitable after the rival's entry, it is incumbent upon the cross-entering

²² Compare Berkey Photo, Inc. v. Eastman Kodak Co., 457 F. Supp. 404 (1978), 603 F.2d 263 (2d Cir. 1979), cert. denied, 100 S. Ct. 1061 (1980). See "Note, An Economic and Legal Analysis of Physical Tie-Ins," 89 Yale L. J. 769 (1980) for an argument with a similar thrust.

firm to prove that it was not profitable prior to the initial entry.

We take the opposite position and suggest that cross-market entry be presumptively legal. It is plausible to argue that entry may be easier when a rival is engaged in his own expansion in other markets, and thus leaves some room for profitable operation in his own market. By placing the burden of proof on the plaintiff, our position is generally more procompetitive than is the stated alternative view. However, under our standard, a plaintiff would be permitted to argue that cross-market entry had the intent of monopolizing or attempting to monopolize the defendant's original market.

In the appendix on product preannouncements, we argue that the scrutiny of innovations under our standard largely obviates the need for additional scrutiny of timing of the announcement for its possible anticompetitive effects.

IV A: A Stylized Example

Before proceeding to a more detailed discussion, we illustrate some of the key concepts of our standard by means of a stylized example of rivalry through product innovation. Consider a market for systems that are comprised of proverbial widgets and widget accessories. Widgets Incorporated (henceforth WINC) is the dominant manufacturer of widgets. Widget accessories are offered by WINC as well as by its rival, WAC. At some point in time, WINC introduces a new line of widgets and compatible accessories. Because the accessories produced by WAC are incompatible

with the new line, the viability of WAC is threatened by the innovation.

Beginning with this sketch, let us summarize some additional features of the scenario that would immunize WINC from a finding of predation under our standard. First, there could be no predation if the exit of WAC would fail to increase the monopoly power of WINC. This would be the case if there were available sufficiently close substitutes for widget systems to render the systems market competitive; if other firms could offer accessories that are compatible with WINC's new line or with the widgets of other viable suppliers; or if, despite current concentration, the systems market, or the production of widgets, or the offering of new-line-compatibles were unprotected by entry barriers.

Second, there could be no predation if WAC did not face a reentry barrier into the systems market. This would be the case if WAC could retool to produce accessories compatible with the new line without substantial disadvantage vis-a-vis the parallel production by WINC. While the need to sink costs and other hurdles would constitute such disadvantages, they must be balanced against whatever outlays WINC had to incur to develop and introduce its new accessories.

Finally, even if the above-mentioned structural features of the markets permitted a finding of predation, WINC could be nonetheless legally invulnerable under our standard if its behavior exhibited no sacrifice of profit. In the hypothesized scenario,

this would necessarily entail WINC continuing to offer WAC-compatible widgets at no higher than a compensatory price, in preference to discontinuing sales of these preexisting components. The compensatory price for a widget would yield WINC the same incremental profit as it would earn from the cross-elastic sales of new-line components. This is the sale of components in the new line that would be displaced by a sale of an original widget. Thus, if the sale of one original widget would displace the sale of one new widget, the compensatory price for an old widget would yield a markup over its current production cost equal to the markup earned on new ones.

By offering original, WAC-compatible widgets at such a compensatory price, WINC avoids incurring a sacrifice of profit, under the presumption of the continuing viability of its rival WAC. Nonetheless, the availability of compatible components does not assure the continuing viability of WAC. There may be no, or very little, market demand for systems comprised of original widgets and accessories when the new line is available, even if the original widgets are priced in a compensatory manner. Of course, this is especially likely if the new line of widgets is regarded by consumers as being sufficiently superior to the original one.

Thus, it is not continuing sales of the old-model widgets that is to be required of WINC, but rather the offer to supply them (for a reasonable duration) at a compensatory price. This requirement could not, by the very nature of a compensatory price,

diminish the innovator's profit contingent on the viability of its rival. Instead, it could only forestall whatever additional monopoly profits could be earned by the tactical exit inducement of the rival.

The important conclusion to be drawn from this example is that compensatory prices need not be so low as to induce some demand for the component. If consumers view the new system as sufficiently superior to the old one, economic efficiency would dictate that it should supersede the old system. This remark is subject, however, to two important caveats. First, whether or not the new product or system is economically superior to the old one cannot be deduced merely from market acceptance of the new product. Market acceptance of a new product depends not only on its price and technological properties but also on the scope of the available substitute products and on their prices. Thus, if the innovator by his anticompetitive behavior restricts the scope of the available substitutes or raises their prices, then market acceptance of the new system is not a correct index of social benefits from innovation. Rather, the proper test of economic superiority of the new offering in part rests on its market acceptance when the old line remains available at compensatory prices.

Second, whether or not the new product is economically superior to the old one cannot be deduced merely from market acceptance of the new product, even if the preexisting components are

sold to rivals at compensatory prices. What must be examined is whether the initial decision to invest in R. & D. can be justified, given the continued viability of rivals, or equivalently, given compensatory pricing of preexisting components.

Thus, to continue our hypothetical, suppose that WINC has expended a large sum to develop its new line of widgets and accessories. Moreover, suppose that the new line is only slightly superior to the old in the eyes of consumers, incurs equal unit variable costs of production, but excludes WAC's line of accessories by means of an inimitable interlock configuration. The price that can be charged for the new widgets is only slightly higher, because of their slight quality improvement, than that formerly charged for the old widgets. On the advice of counsel, WINC continues to offer original widgets at a compensatory price. Here, because the unit variable costs of the two models are equal, the compensatory price of the old model is equal to the price of the new one. Then, as a consequence of the slight quality differential, all consumers abandon the old line for the new one. This loss of demand for WAC's old widget accessories causes WAC to go out of business because it cannot redesign its components to be compatible with the interlocks of WINC's new line of widgets. And WAC's exit yields WINC additional monopoly profits that are protected by sufficiently high entry barriers.

In this scenario, WINC could be found guilty of predatory product innovation under our standard. First, the product introduction induced the exit of WAC by diverting its sales to the

incompatible new line. Second, the hypothesized facts indicate that the development costs of the new widget line could not be recovered from the added profits afforded by the slight quality improvement, as long as WAC remains viable. Hence, the decision to expend these development costs clearly entailed a predatory sacrifice of profit. Finally, WINC stood to gain additional monopoly profits from the induced exit of WAC, and these evidence the rational, if illegal, motive for the predatory sacrifice.

The predatory sacrifice in this example would be pellucid if substantial R. & D. expenses could be attributed to the development of the interlock configuration itself and if this feature yielded no benefits to consumers. Consequently, the decision to develop the interlock could only be attributed to its exclusionary effects on WAC. Then, a finding of predatory sacrifice would be inescapable, regardless of whatever consumer benefits were derived from the remainder of the R. & D. expenses.

V: Introduction of New Substitute Products

We now turn to a more detailed discussion of the diverse types of competition through product innovation. We begin with a fairly simple case--an introduction of substitutes--which allows us to isolate some of the basic features of this type of competition. We should mention, however, that unlike systems competition studied below, introduction of substitutes has not been a subject of extensive antitrust scrutiny as possibly predatory conduct. Nonetheless, the tests of predatory product innovation developed here are necessary to the development below of tests of predation

that are relevant to the more complex scenarios that have been actively subject to such scrutiny.

The prototypical instance of a possibly predatory introduction of a substitute product is as follows. The dominant manufacturer of widgets in a concentrated industry introduces a new and superior model. The price of the new model is set sufficiently low to induce a large share of buyers to switch from previous models, among which there was some interfirm competition. Because of the loss in sales and net revenues, some rival manufacturer abandons the production of widgets and disperses his productive assets. After exit occurs, the innovating firm readjusts prices and earns additional monopoly profits that are protected by entry hurdles and reentry barriers.

These facts allow us to draw two conclusions. First, the innovator and his rival were participating in the same market because (a) the quality and the level of the price of the new model adversely affected the profitability and thus the viability of the rival and (b) the exit of the rival beneficially affected the profitability of the innovating firm. Second, because of the existence of entry hurdles, actual competitors are more effective than are potential competitors in controlling the monopoly power of the innovating firm.

The simplest way to approach the question of whether or not the new product is a predatory innovation is by a cost-based test analogous to those developed (section III B, supra) to test price

cuts by multiproduct firms for predation. Here, as in the multiproduct case, the usual cost-based tests for predatory pricing must be modified by demand-side adjustments. In particular, the lowering of one price will have a negative effect on the sales of substitute products offered by the price-cutting firm. The corresponding losses in incremental profits must be added to the incremental cost of the product whose price was reduced.

An introduction of a new product can be viewed as a reduction in the price of an existing product from a price level sufficiently high to choke off all effective demand. In this context, the test compares the market price and quantity of the new product with the comparison scenario in which the new product is not available and the firm's profits accrue only from the sale of the already existing products. This comparison must take into account any diversion to the new product of sales from the preexisting products of the innovator.

Hence, under our standard, the introduction of a new substitute product is vulnerable to a finding of predation if the revenues from its sales fail to exceed the incremental costs of its production, plus the reduction in net revenues caused by the diversions in sales from the preexisting products of the innovator. In such a case, there is prima facie evidence that the product introduction entails a sacrifice of profit under the premise of the continued viability of the innovator's rivals.

In this context, as in all others, a showing of profit sacrifice is not in itself sufficient for a finding of predation. In addition, it must be demonstrated that the likelihood of the

rival's exit is substantially raised by the product introduction. It must also be demonstrated that the additional monopoly profit that would accrue to the innovator after the exit of the rival would have made the introduction of the new product profitable for the innovator. This last element of the test for predatory product introduction ensures that the alleged facts utilized by the plaintiff to show profit sacrifice are consistent with the existence of a motive for a predatory tactic.

It must be emphasized that both the character and the details of this test depend to a large extent on the significance of the relevant postentry research and development costs. If these costs are small relative to the other incremental costs of the produced quantities of the new product, then the test for predatory price reductions by a multiproduct firm is directly applicable. (Note that preentry R. & D. costs cannot be logically included in the calculation of predatory price floors. This is discussed more fully below.) However, if postentry R. & D. expenditures are significant, then it is the decision to undertake the R. & D. investment that, along with the innovator's pricing strategy, must be tested for predatoriness.

In this case, the concept of the test is an examination of the intent underlying the investment decision. This would entail scrutiny of the levels of profits with and without the viability of the entrant, and inclusive of the postentry R. & D. costs, that were anticipated (ex ante) at the time the investment was made. But such anticipations are not directly observable from market

data. Consequently, recourse must be made either to evidence on the investment planning process or to necessarily imprecise inferences from current market data. Inferences of this kind may be admissible components in a plaintiff's argument, and they can entail simply substituting market data for expectations. From this viewpoint, it is clear that an admissible line of defense for the defendant could entail a showing that his ex ante anticipations were not those alleged by the plaintiff nor those inferred from market data. Such a showing could not be adduced from purely speculative evidence, in view of the Court's dictum that intent can be deduced from conduct.

In particular, the defendant may be able to justifiably claim that his inability to recover the full incremental cost of the newly introduced product, including the postentry R. & D. costs, was due to an exaggerated estimate of consumers' demand for it. One element in such a showing could be a proof that the defendant attempted to recoup the initial outlay on R. & D. An initially high compensatory price that was followed by price reductions needed to bolster sales may be indicative of such an attempt, when supported by the appropriate marketing studies. All this may be, however, academic: if the new product is truly unwanted, it is not likely to cause the exit of a rival who produces a substitute product. It is not likely, therefore, that a charge of predatory innovation will be brought in such an instance. Of course, even an unsuccessful product may be required to pass cost-based price

tests from which all elements of postentry R. & D. costs have been removed. The mere fact that the product does not succeed does not necessarily immunize the innovating firm from a possible charge of predatory conduct.

The preceding discussion indicates that whether or not the new product passes the test of nonpredatory pricing depends significantly on the extent to which R. & D. costs are included in the cost-based price floor. The proper allocation of these costs depends on when the allegedly predatory innovation was undertaken. If the new product is available before entry occurs and is taken "off the shelf" after entry occurs, the R. & D. costs are properly viewed as sunk and the correct test for predatory pricing is the same as for a multiproduct firm.

This treatment of the R. & D. costs may give an innovator incentives to accumulate new product designs in anticipation of entry and to then wait with their introduction until entry occurs. It is difficult to conjecture how strong these incentives would be. Certainly, carrying product designs in anticipation of uncertain entry is costly. It is also conceivable that firms may introduce too many products too soon in order to create an artificial entry barrier. (See the complaint In re Kellogg.)²³ Thus we conclude that the incentives for overaccumulation of product designs need not be overly strong.

²³ R. Gilbert, "Patents, Sleeping Patents, and Entry Deterrence," in this volume; R. Schmalensee, "Entry Deterrence in the Ready-to-Eat Breakfast Cereal Industry," 9 Bell J. Econ. 305 (1978).

To make them even weaker, the plaintiff can be permitted to utilize as evidence of predatory product introduction the fact that the defendant did not bring the off-the-shelf innovation to market prior to entry. The plaintiff can argue that it was the exit-inducing aspect of the product introduction that made it profitable for the defendant postentry, even though the introduction was evidently unprofitable preentry. As such, the product introduction would entail the sacrifice of profit under the premise of the continued viability of the entrant.

Despite the strength of this argument, we hesitate to treat off-the-shelf product introductions in response to entry as being prima facie indicative of predation. Intrinsic complications that would generally attend this line of argument would focus on the other alterations in the profitability of the product introduction that are caused by the alteration in market structure. For instance, the defendant could argue that the introduction was more profitable postentry than it would have been preentry because of the reduction in the diversion of demand from his own substitute products. On the other hand, the plaintiff could argue that preentry, the new product would have had greater sales than it would have in the more competitive postentry market. While these arguments must rest on speculative evidence, disregarding them out of hand might have a chilling effect on the socially desirable process of product competition.

It is not the implication of our analysis, however, that the new products should be exempt from thorough antitrust scrutiny. Because technological progress is desirable and should not be stifled by antitrust laws, it may be tempting to follow the view, expressed in ILC, Peripherals Leasing Corp. v. International Business Machines, 458 F. Supp. 423, 439 (N.D. Cal. 1978), that if engineering data suggest that the new product is superior to the product it replaced, the antitrust inquiry should end. Yet, it is plain that not all new products conduce to higher social welfare.²⁴ Under our standard, the relevant question is whether the anticipated incremental profit of the new product was positive, given the continued viability of the rival. As we have seen, the incremental profit measure is properly calculated net of the losses resulting from diversions of sales from the innovator's preexisting products, as well as net of all postentry R. & D. costs. Where these costs are small because the newly introduced product had been developed previously, the plaintiff may attempt to adduce anticompetitive conduct from the fact that the off-the-shelf design was brought to market only in response to entry.

²⁴ E. M. Chamberlin, The Theory of Monopolistic Competition (6th ed. 1948); A. M. Spence, "Product Selection, Fixed Costs, and Monopolistic Competition," 43 Rev. Econ. Stud. 217 (1976); A. K. Dixit and J. E. Stiglitz, "Monopolistic Competition and Optimum Product Diversity," 67 Am. Econ. Rev. 297 (1977); R. D. Willig, Welfare Analysis of Policies Affecting Prices and Products (1979).

Thus, it is the treatment of the R. & D. process and its costs that distinguishes the application of our standard to introductions of substitute products from its application to price cuts on homogeneous products. In the next section it is shown that additional and novel issues arise in the application of our standard to systems rivalry and the introduction of complementary products.

VI A: Systems Rivalry

Most of the important recent cases in the area of predatory product innovations were concerned with the allegedly anticompetitive impact of innovations in the context of systems rivalry.²⁵ Typically, the defendant was a firm that had been offering systems components (e.g., computer mainframes or film) compatible with components produced by its rival (e.g., computer peripherals or film processing), as well as components competitive with its rival's. The defendant then introduced an entire new system comprised of components incompatible with those of its rival. In

²⁵ California Computer Products, Inc. v. International Business Machines Corp., 613 F.2d 727 (9th Cir. 1979); Greyhound Computer Corp. v. International Business Machines Corp., 559 F.2d 488 (9th Cir. 1977), cert. denied, 434 U.S. 1040 (1978); Telex Corp. v. International Business Machines Corp., 510 F.2d 894 (10th Cir.), cert. dismissed, 423 U.S. 802 (1975); In re IBM Peripheral EDP Devices Antitrust Litigation, 481 F. Supp. 965 (N.D. Cal. 1979), appeal pending No. 80-4048 (9th Cir. Jan. 31, 1980) ("Transamerica"); ILC Peripherals Leasing Corp. v. International Business Machines Corp., 458 F. Supp. 423 (N.D. Cal. 1978), appeals pending, Nos. 78-3050 and 78-3236 (9th Cir. 1978) ("Memorex"); Berkey Photo, Inc. v. Eastman Kodak Co., 603 F.2d 263 (2d Cir. 1979), cert. denied, 100 S. Ct. 1061 (1980).

such a case, the rival's ability to compete in the final systems market could depend on the availability of compatible complementary components. Then, the rival can be doubly disadvantaged by the introduction of a new system. First, if the new system is superior to the old system, demand for the latter will tend to decline even if the price of the old system remains unchanged. Second, the innovator can increase the price of the old system by either raising the prices of the old components that are compatible with rivals' complements or by withdrawing the old components altogether. Despite its disadvantages to rivals, a firm's introduction of such a new system may be socially advantageous, inasmuch as it improves the product choices available to consumers and enhances interfirm competition.

It is the purpose of this section to provide workable tests for ascertaining whether or not an introduction of a new system, coupled with price adjustments on components of the old system, has been anticompetitive. As dictated by our general standard, it is necessary for a finding of predatory intent to show both motive and sacrifice of profit. To show motive, it is required first to establish that the market is concentrated and exhibits entry hurdles and reentry barriers. In addition, more presumptive elements of motive concern the profit rationale for exit-inducing tactics vis-a-vis the alternative stratagem of a vertical price squeeze.

A distinguishing feature of the test for sacrifice of profit is that it proceeds in two novel stages. The first stage, which is particular to systems rivalry, involves an examination of the postinnovation prices of the components that are complementary to the products offered by rivals in the systems market. We argue that for the innovator's behavior to be free of profit sacrifice, he must stand ready to provide his rivals with the needed components at compensatory prices rather than discontinue them. Loosely speaking, the prices of old components or the terms of long-term supply contracts (where they are economically necessary) are compensatory if they (a) cover the cost of supplying the old component and (b) yield the same incremental profit as would the cross-elastic sales of new and other components, contingent on the rival's viability in the systems market. Compensatory prices of old components should not be permitted to reflect the additional monopoly profits that would accrue to the innovator if he were to first induce the exit of a competitive manufacturer of complementary components.

The second stage of the test for sacrifice of profit in the systems context examines the rationality of the R. & D. investment in the new product under the maintained assumption that the innovator is willing to sell old components at compensatory prices. Thus, the second stage employs the predation tests developed in section V, wherein we applied our standard to introductions of substitute products.

The plan of the rest of this section is as follows: In subsection VI B, we provide a detailed discussion of systems rivalry. We describe the diverse tactics that may conceivably be used by a firm with monopoly power over one or more components to induce the exit of a rival manufacturer of complementary products. We briefly outline the conceivable profit motives for such exit-inducing tactics. We show that such tactics may raise the profits of a dominant firm when a vertical price squeeze would not yield the maximum attainable monopoly profit, even in the presence of monopoly power over one of the components. This discussion is elaborated in subsection VI C.

Subsection VI D contains the main findings of this section. We show how compensatory prices can be calculated from the data. We argue that in some simple situations, compensatory pricing requires that all components vital to a rival's viability be priced with markups equal to those of their parallel counterparts in the new system, if the alternative is to instead discontinue their availability. We show that in the context of a simple model, our tests would find predatory all socially undesirable innovations that were motivated by tactical exit inducement. And our tests would find all socially desirable innovations to be innocent of predation, regardless of their possible effects on market structure. Finally, in subsection VI E, we discuss the burden of proof entailed by our suggested test for predatory product innovation.

VI B: Basic Concepts in Systems Rivalry

We define a system as a collection (package) of complementary products which are combined by a manufacturer, or a consumer, to yield a final product. Since the components of the system are complementary products, an increase in the price of one of them reduces the demand for the remaining components. For example, an increase in camera prices tends to reduce the demand for film; an increase in prices of computer central processing units tends to reduce the demand for the associated peripheral equipment, et cetera.

A system can frequently be assembled from complementary components produced by different manufacturers. For this to be possible, various components must be compatible with each other. When components of various manufacturers are interchangeable without much loss in their efficiency, competition in the final market (i.e., the systems market) is enhanced. Conversely, incompatibilities may reduce competition. Consequently, creation of incompatibilities may conceivably increment the monopoly profits of a firm which has monopoly power over one or more of the components.

Figure 1 summarizes diagrammatically the basic elements of systems rivalry. Each system consists of two complementary components which we denote with numbers. Manufacturers are labeled with letters. Thus, A1 stands for the first component manufactured by firm A, while B2 stands for the second component

manufactured by firm B. In the diagram, components are denoted by boxes. A line joining two boxes indicates that the two components are compatible. An absence of a line indicates an incompatibility. Thus, in figure 1, A1 and B2 are compatible, but C1 and A2 are not.

In figure 1, the final systems market, denoted by a circle, is characterized by substantial intersystem rivalry: consumers can select from three distinct systems, all of which may be perfect substitutes for each other.

Let us now modify the diagram in order to reflect a possibly less competitive systems market. As indicated in figure 2, firm A has monopoly power over the first component. It is also an integrated firm: it produces both components one and two. Firm B specializes in the production of the second component, which is compatible with A1. It is plain that in the market scenario depicted in figure 2, firm A has substantial market power, and that the ability of firm B to compete in the systems market may be substantially lessened by the absence of the alternative source of supply of the needed component, viz., of firm C, as in figure 1.

Given the market situation depicted in figure 2, several business decisions available to firm A may disadvantage firm B as its rival, whatever the underlying motive, and irrespective of their effect on competition. First, firm A can refuse to deal with firm B by withholding the complementary component from the open market and selling it exclusively as a part of a system.

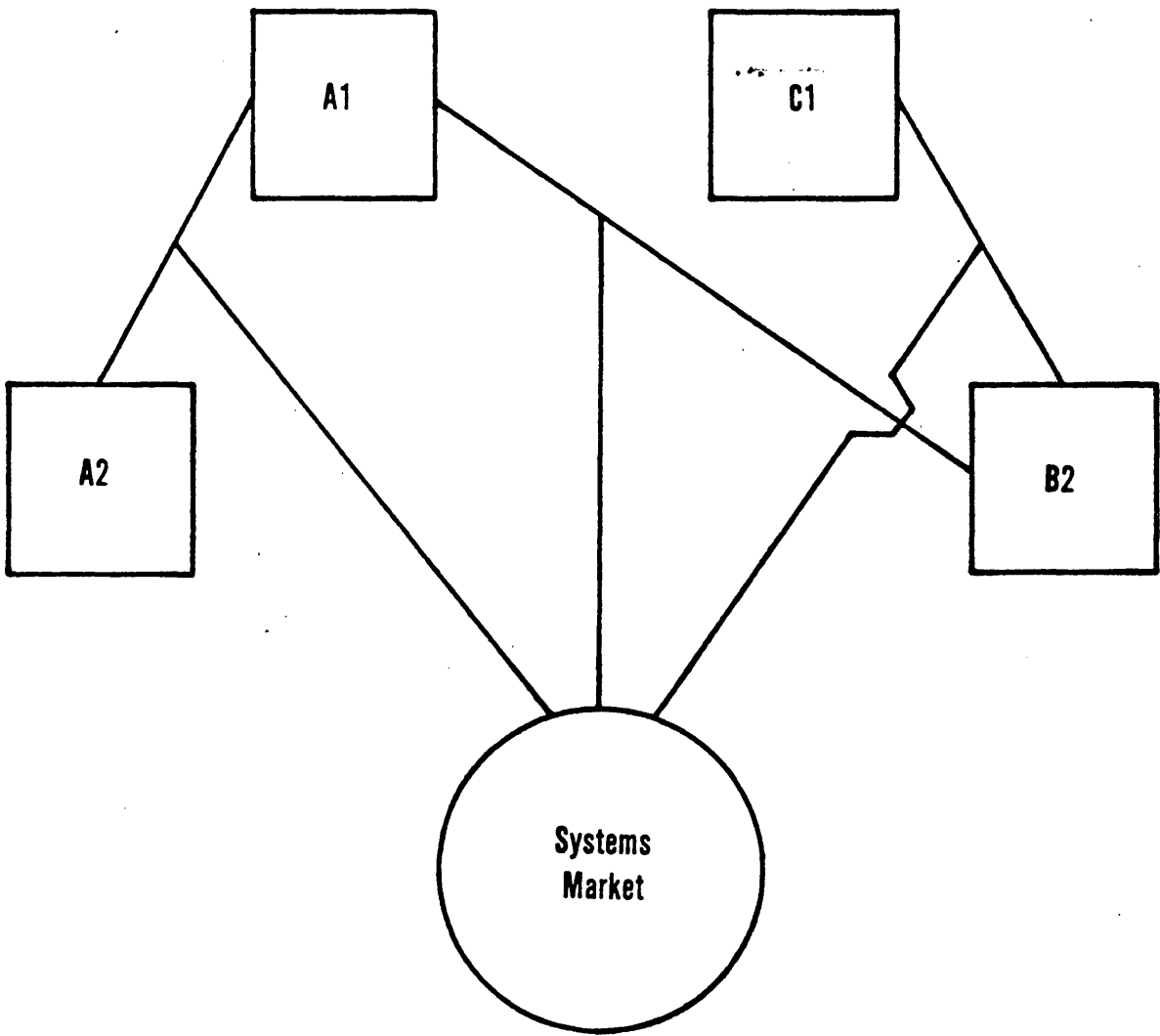


Figure 1

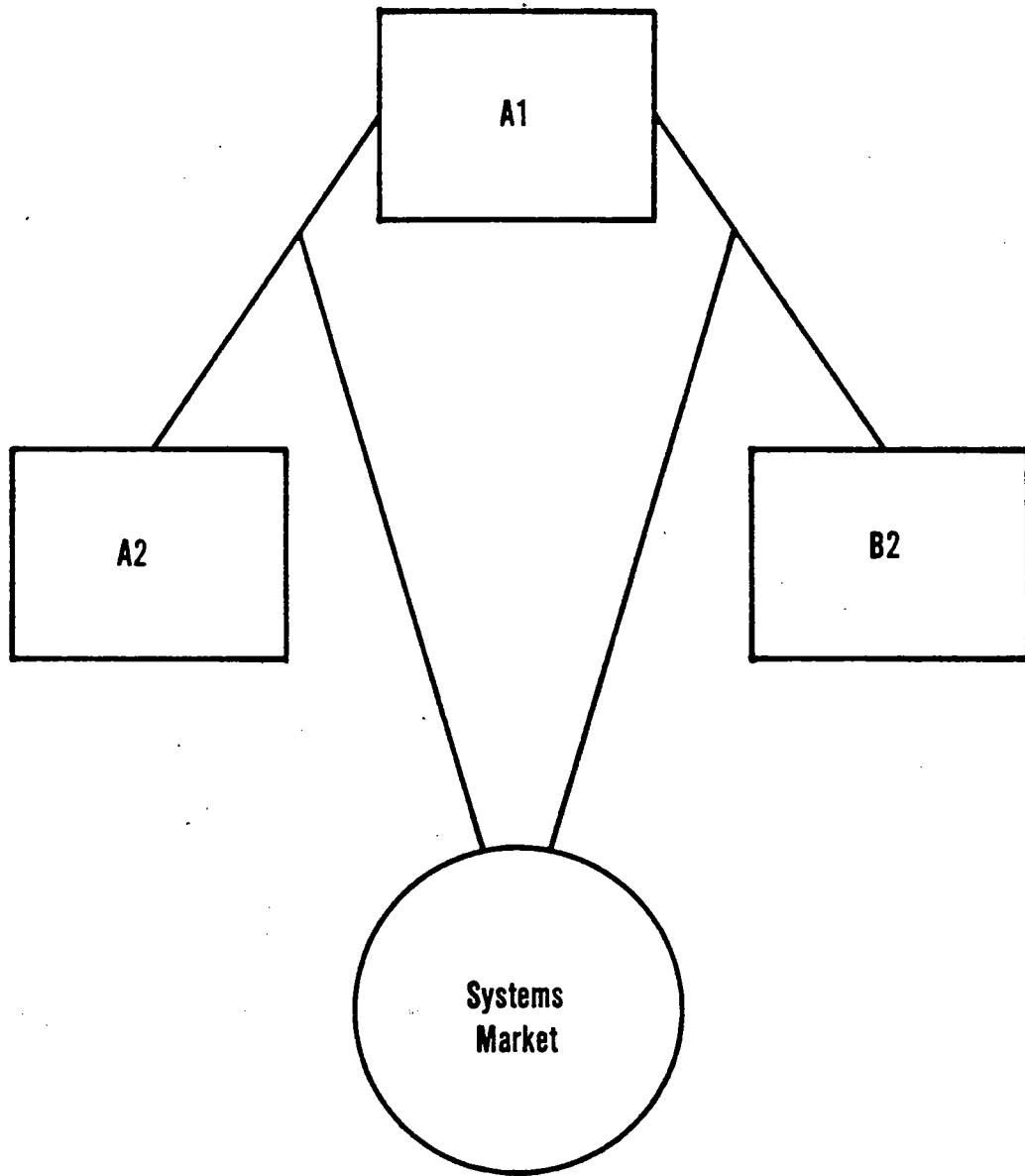


Figure 2

Plainly, if B has an alternative source of supply, as he does in the scenario diagramed in figure 1, the refusal to deal by firm A may have only insubstantial impact on the ability of firm B to compete with A. That impact will be less significant if (a) the component C1 is a good substitute for A1, in the eyes of the final consumers; (b) component B2 can easily be made compatible with the components of either of the two manufacturers; (c) manufacturer C does not increase his prices following the refusal to deal by firm A. Absent, however, such an alternative source of supply as manufacturer C, a refusal by A to deal with B leaves firm A as the sole supplier of systems, at least temporarily.

Refusal to deal can be viewed as a form of price discrimination, which is another business strategy that may, incidentally or otherwise, disadvantage a competitor. A price-discriminating firm sets two prices: a high one on components sold to a rival or to the rival's customers, and a lower price to those customers who do not purchase components manufactured by the rival. The limiting form of this stratagem arises when the higher price chokes off all effective demands. Such a price may have the same effect on the rival as a pure refusal to deal: it may conceivably leave the firm which has monopoly power over one of the components as the sole supplier of systems. That is, it may permit the firm with monopoly power over one component to extend that power to the systems market.

Refusal to deal and price discrimination, in a scenario of this kind, may be procompetitive sound business practices regardless of their effects on rivals. This would be the case, for example, if they were necessary to maintain the quality reputation of the system, the product differentiation of the system, or the assured supply of requisite system components. Yet, in some instances, the two strategies described above might transparently lack business reasons to justify their implementation other than monopolization or attempt to monopolize. In such instances, the monopolist may seek other, less obviously anticompetitive strategies which would permit him to extend his monopoly power over one of the components into a monopoly position in the systems market. It is our major contention that introduction of new systems may be employed as a camouflaged anticompetitive strategy precisely because introduction of new products or systems is usually regarded as being procompetitive and as enhancing consumers' welfare.²⁶

Of course, introductions of new products and systems should be viewed as presumptively socially beneficial. Still, one should not be blind to the conceivable anticompetitive effects of and intent behind them.

²⁶ See ILC Peripherals Leasing Corp. v. IBM, 458 F. Supp. 423, 439 (N.D. Cal. 1978); Berkey Photo Inc. v. Eastman Kodak Co., 603 F.2d 263, 287 (concluding that market acceptance of an innovation is the best indicator of product quality and of benefit to the public so long as the market is characterized by the free choice of consumers); "Comment, Antitrust Scrutiny of Monopolists' Innovations: Berkey Photo Inc. v. Eastman Kodak Co.," 93 Harv. L. Rev. 408 (1979).

An introduction of a new system could harm rivals' sales and disadvantage them as competitors for at least two reasons. First, if the new system is superior to the already available systems, demand for the old systems will decline. This decline will be greater, the better is the new system and the lower its price as compared to the price of the old systems. Second, following the introduction of a new system, the innovator may increase the prices of the old components or even discontinue their production. The discontinuance of the old components will be particularly damaging to a rival's profits (a) the more incompatible are his components with the new components; (b) the more costly it is to introduce a new line of components which are compatible with the innovator's new components; (c) the more costly or inferior are the needed compatible substitute components that are available.

These harms to rivals may well be incidental effects of socially beneficial and procompetitive product innovation. However, harms to rivals may, in some instances, be the primary motivation for what we label predatory product innovation. The task here is to provide workable tests for identifying such anti-competitive behavior.

When the innovating dominant firm continues to make available the old components at compensatory prices, the introduction of a new system can be scrutinized as possibly anticompetitive conduct using the tests developed in section V. A novel set of issues arises, however, if subsequent to the introduction of a new

system, the defendant raises the prices of the already existing components to above the compensatory levels. In this instance, the allegedly anticompetitive conduct does not involve a price cut, but rather a price increase. Consequently, a standard comparison of prices to costs does not reveal the underlying intent.

The standard of predatory behavior developed in section II, supra, yields a set of tests which can be implemented in the context of systems competition. The implication of our standard is that for a system innovation and an attendant price revision to be, in combination, predatory conduct, three necessary conditions must be met. First, the conduct must substantially increase the probability that a rival will exit. Second, the timing, the method, and postintroduction pricing policies must involve a sacrifice of profits when compared to those that could have been earned if the innovator had pursued a different strategy and had the rival remained viable. Third, there must be a motive for inducing or attempting to induce the exit of a rival manufacturer of complementary products.

Before turning to a detailed exposition of the motive and sacrifice prongs of the predation test, we address the issue of how to define viability in the context of systems rivalry. The relevant market for the definition of the rival's viability is the final systems market. In order to compete in that market, the rival must not have irreversibly exited. In addition, there must remain available, either directly to the rival or indirectly to

his customers, the compatible components requisite for a complete system. When such components can be obtained from the defendant or some other (albeit inferior) supplier, the rival's viability in the systems market is tantamount to continued availability of his productive assets. However, even if the productive assets of the rival were to remain available (e.g., no reentry barriers), the rival would not be viable in the systems market if the requisite compatible components were unavailable. This could only occur if all of the following conditions were to obtain: (a) the defendant refuses to sell the components at compensatory prices; (b) there are no existing alternative suppliers of compatible parallel components; (c) there are entry barriers that prevent a new entrant from supplying the requisite components; (d) the rival has no substantial advantage over prospective entrants in the production of components compatible with the new system. Note, then, that even if the rival were denied the availability of the old complementary components, he nonetheless would remain viable in the systems market if he were able to promptly and cheaply alter his components to compatibility with the new system.

It may be tempting then to simply define viability in terms of the rival's ability to offer components that are compatible with the new system. Unfortunately, this pro-rival conception of viability suffers from irresolvable difficulties. The most important is that in a free market economy, the prospect of temporary quasi-monopoly profits is necessary to stimulate the

innovative process. In other words, the innovating firm must be assured some "imitation lag" to be able to recoup its initial outlay on R. & D. If the imitation lag were to shrink to zero, rivals could generally undersell the innovator and still make a positive incremental profit, inasmuch as their expenditures on imitative R. & D. would generally be lower than those of the original innovator. To take this into account, the court would have to determine (a) the socially optimal duration of the imitation lag for each new system and (b) whether or not the innovating firm has unduly lengthened the imitation lag. We cannot think of workable procedures that would make such findings free of substantial errors. Fearing those errors, the prospective innovators might reduce their investments in R. & D., and the innovation process would be stifled. It is preferable, therefore, to define viability narrowly; i.e., as the availability of the assets of the rival for his continued competitive role in the systems market.

The question still remains why the viability of a rival manufacturer of a complement should limit the profits of a firm which has some monopoly power over one of the components of the system. Shouldn't such a firm be able to extract all the monopoly profit by executing a vertical price squeeze on the rival who purchases from it the requisite complements? The answers to this question are critical for the understanding of the possible profit rationales and motives for tactical exit inducement in the systems context. They will also prove essential for the construction of tests of predatory sacrifice of profits. The next section

discusses the mechanics of vertical price squeezes and delineates a prevalent market circumstance in which this tactic is less effective than exit inducement in extending to the systems market monopoly power over one of the components.

VI C: The Economics of Vertical Price Squeezes

We now turn to a more detailed discussion of vertical price squeezes in order to better grasp what are and what are not motives for inducing the exit of a rival who produces competing complementary components. The discussion will also facilitate the understanding of the notion of compensatory price which underlies our conception of profit sacrifice.

In order to focus the analysis of this section, we first examine a market scenario in which a firm with market power has no motive to engage in anticompetitive exit-inducing behavior vis-a-vis its rival. In such a situation, which is depicted in figure 3, the dominant firm can extract all the monopoly profit that is available in the systems market by subjecting the rival to a carefully designed vertical price squeeze. Because of the possibility of perfect vertical price squeezes, some analysts hold the view that a firm with market power over one component will in general lack incentives to lever its market power in one market into a monopoly in the other market. As we shall see below, this view is not generally correct.

A perfect-price-squeeze situation is illustrated in figure 3, which is figure 2 augmented by the display of the production costs

in the appropriate boxes. Thus, the unit incremental cost of the monopolized first component is constant and equal to c. The unit incremental cost of the second component is the same for either firm and is equal to a. All consumers are identical and are assumed to have a maximum willingness to pay, or reservation price, of b for either system. In other words, if the system price were b or less, each consumer would buy one system. If, however, the price exceeded b, consumers would refuse to buy systems.

We shall show that in this scenario the viability of the rival, firm B, need not diminish the profits of firm A, the monopolist over component one.²⁷ To demonstrate this, we first consider the profits that could be earned by A in the absence of B, and then analyze the profits that could be earned by A with a perfect price squeeze executed on a viable B.

Absent B, firm A could maximize its profit by simply selling systems to consumers at the highest possible price: their willingness to pay of b. Since each system would cost A $c+a$ to produce, each sale would yield a profit margin of $b-(c+a)$. And A's total maximal profit would be that margin on the y volume of sales provided by the entire systems market.

²⁷ In fact, if the rival were a more efficient producer of component two, the profits of firm A would be larger with a viable firm B than without. See note 28 supra.

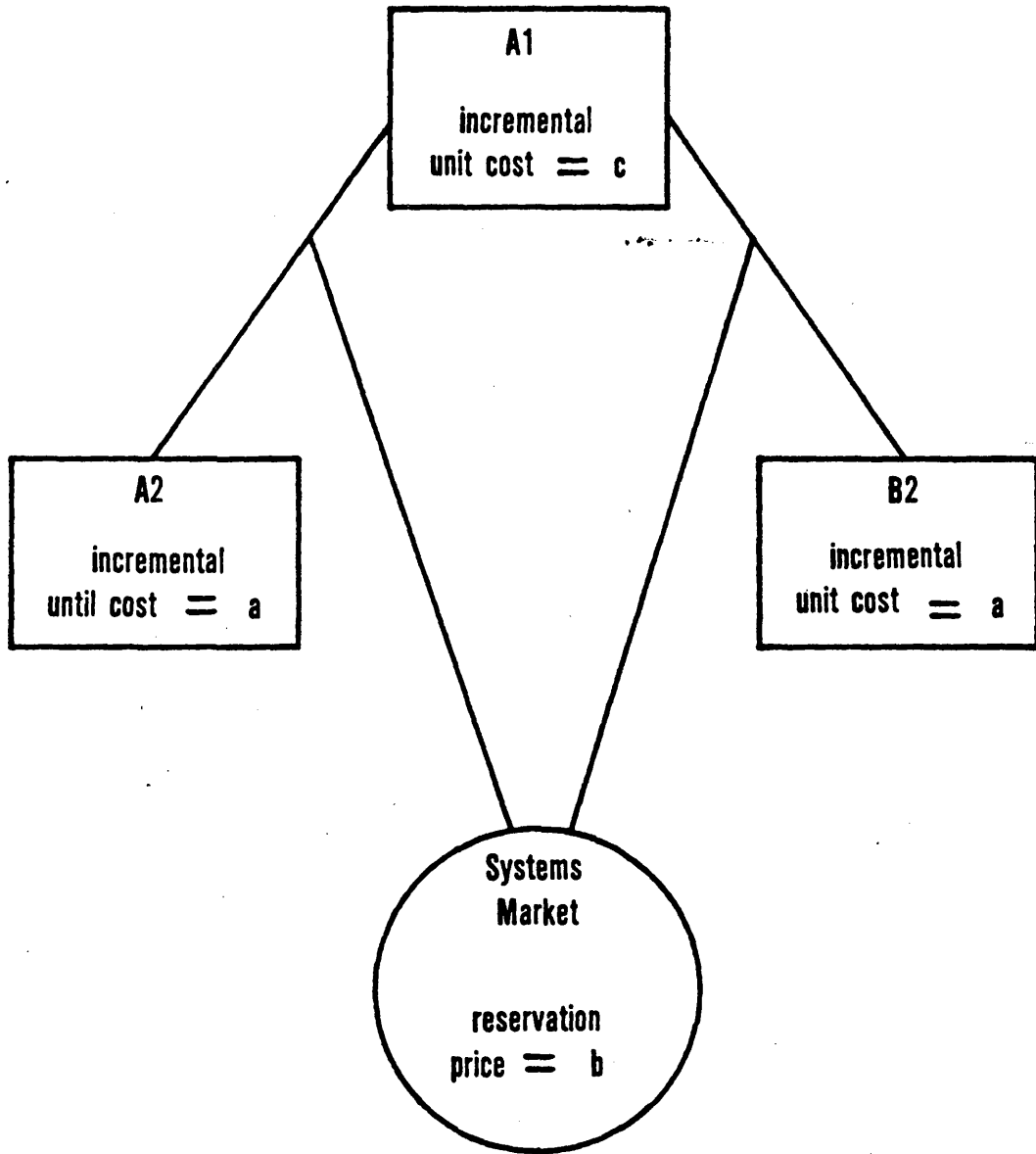


Figure 3

If, instead, firm B were as efficient as A and competitive, its viability would constrain the equilibrium price of type two components to a, its unit cost. Nonetheless, firm A could extend to the systems market its monopoly over type one components by charging a price of b for entire systems, a price of $(b-a)$ in the open market for type one components, and a price of a in the open market for type two components. Then, each sale of a system of any kind in the entire systems market yields a profit to A of $b-(c+a)$, as was the case above. A direct sale of a whole system by A has $b-(c+a)$ as the price/cost margin. A system comprising components A1 and B2 yields A a profit of $(b-a)-c$, through its sale of component A1 at the price of $(b-a)$ and with the cost of c. Finally, a system assembled by consumers that is comprised of A1 and A2 yields firm A a profit of $(b-a)-c$ on its sale of A1 and no profit on its sale of A2 at cost. Thus, with such pricing, firm A does not lose profits if consumers choose systems that include the rival's component rather than systems wholly composed of A's own products. And, A is able to extract the maximal profits available in the entire systems market.²⁸

28 As mentioned in note 27 *supra*, if firm B could produce type two components at a lower cost than firm A (namely a'), A could still extract the maximal profits available from the entire systems market--but only if firm B remains viable. Here, the profit-maximizing tactic for firm A is to set a price of $(b-a')$ for component A1 and a price just above b for an entire system. Then firm B will be unable to price B2 above a', since a higher price would raise the total cost of a system to consumers above their willingnesses to pay. As a result, firm A would sell no components of type two and would earn a profit of $(b-a'-c)$ on each
(footnote continues)

The crucial implication of our analysis is that in the hypothetical market of figure 3, the monopolist has no motive to induce the exit of an equally efficient rival. The monopolist earns an incremental profit of $b-(c+a)$ on a system sale and the same profit on a sale of a single component of type one. The component price of $(b-a)$ is therefore fully compensatory: by charging the rival this price, the monopolist can transfer to himself all the monopoly profit that can be earned in the systems market. Consequently, in this hypothetical example, we find that the monopolist has no motive to induce the exit of the rival because there are no additional monopoly profits which could be earned subsequent to the rival's exit. In other words, there are no incentives for leveraging the monopoly power over one of the components into monopoly power in the market for the other component.

However, as we now show, such incentives do arise if the structure of the market scenario presented in figure 3 is enriched by postulating the existence of an inferior source of supply. In this case, only the exit of the rival will enable the monopolist to secure the maximum available monopoly profits in the systems market.

(footnote continued)
system sold. This is the maximal profit available from the entire systems market and is greater than $(b-a-c)$ on each system, the maximum profit that would be available to A in the absence of firm B.

In figure 4, we illustrate the market scenario in which the extant monopoly power of the dominant firm is limited by another inferior source of supply. There are now three firms in the market: the dominant firm A, which manufactures both components, and the specialized firms B and C, each producing only one component. We assume that the dominant firm has a slight cost advantage equal to d over the other manufacturer of the first component. This small advantage could, however, be levered into substantial monopoly profits, in the absence of the rival manufacturer of the second component.

In the market scenario of figure 4, the presence of firm B substantially reduces the profits of the dominant firm. In the absence of that rival, the dominant firm can set the system price at b and earn the maximal profit of $b-(a+c)$ on each unit sold. With firm B actively competing, on the other hand, the incremental profit of A is reduced to d. This follows because the competing perfect substitute system of C1 and B2 can be sold for a total price of $(a+c+d)$, and at that systems price, the profit margin of A would be only d.

Of course, in this scenario, in the absence of the competing firm C, the dominant firm would be able to earn the full monopoly profits by implementing a perfect vertical price squeeze. We assume that the viability of firm C and its offering of component C1 do not rest on events in the markets in question. Instead, we hypothesize that C1 has alternative uses to which A1 need not

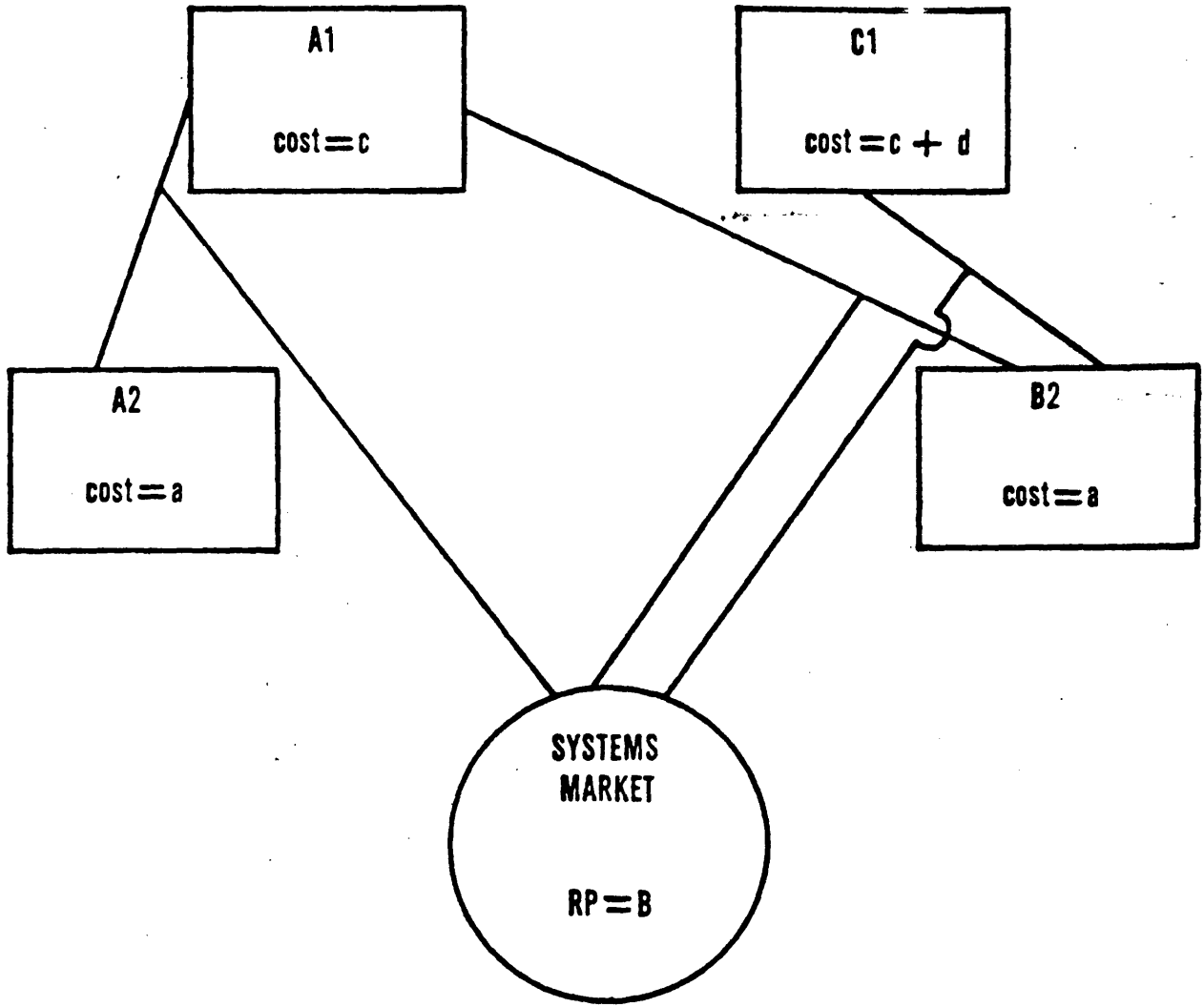


Figure 4

apply, which is consistent with the postulated cost advantage of A1 over C1 in this market. Consequently, only the tactical inducement of the exit of B will enable A to capture the full monopoly profit available in the systems market.

In this simple scenario, the most direct tactic for inducing the exit of firm B involves a combination of a refusal to deal with a low systems price. In this instance, the dominant firm refuses to sell the first component in the open market and prices its systems just below $(a+c+d)$. At this price, consumers will not demand systems assembled from the components C1 and B2, unless firms B or C are willing to sell their components below cost.

In the event that the dominant firm cannot refuse to deal with the rival, it still can induce exit by selling the second component below cost. For example, the dominant firm could sell the first component for $(c+d)$, but price the second component below a, its incremental unit cost. This tactic obviously violates the Areeda-Turner rule and our cost-based price floor for nonpredatory prices. More subtly, the dominant firm may induce the exit of its rival by charging it a discriminatory price for A1 that is slightly below $(c+d)$, while setting a lower internal transfer price for A1 and an internal price for A2 equal to a. However, this tactic can be uncovered by means of the following calculation of the internal transfer price of A1: The imputed price for A1 can be found by subtracting the imputed price for A2 from the price of the system comprised of A1 and A2. The unit

production cost provides a conservative estimate for the imputed price of A2 because it implies a larger imputed price for A1 than would any other figure that was not below cost. Then, if this imputed price for A1 is smaller than the actual price charged B, the latter price is discriminatory and has the effect of excluding B from the market, to the profit advantage of A.²⁹

This example of a market structure indicates that a dominant firm may be unable to obtain the maximum monopoly profit by means of a simple vertical price squeeze.³⁰ In this simple case, alternative and more profitable tactics rely on either refusal to deal or on discriminatory pricing with exclusionary effects.³¹ Due to the existence of a robust inferior source of supply, only the rival's exit would permit the monopolist maximal profits.

The purpose of the foregoing analysis has been to identify some of the possible features of systems markets that could

²⁹ This is not to say that where there are both direct sales of a component and bundled sales, the direct sales price should be used for such comparisons to the exclusion of the other available, albeit indirect, price data.

³⁰ Other examples are developed in J. A. Ordover and R. D. Willig, An Economic Definition of Predation: A Report to The Federal Trade Commission (1981). These turn on rivals' interference with the dominant firm's ability to implement profit-maximizing segmentation of the systems market by means of implicit price discrimination. In these examples, unlike the one in the text, tactics other than exit inducement can be utilized by the dominant firm, in conjunction with price squeezes, to secure maximal monopoly profits.

³¹ As we have emphasized before, in more complex market scenarios, price discrimination and refusals to deal may have sound business motives and procompetitive effects.

motivate tactical exit inducement. Plainly, alternative sources of supply, albeit inferior, are prevalent features of complex actual systems markets. Consequently, for legal scrutiny of alleged tactical exit inducement, we would not require detailed dispositive showing of their presence. However, to satisfy the motive element of our general test for predation, we would require demonstration of certain structural conditions in the system market.

First, the defendant must possess monopoly power over some of the components of the system. Second, there must be hurdles to entry into the final systems market. Third, where there are robust, alternative, inferior sources of supply of some components, there must be entry hurdles and reentry barriers in the supply of the components needed to complete a system. Finally, where market segmentation would be profitable, there must be entry hurdles and reentry barriers in the supply of components that would undermine implicit price discrimination.

In the next section, we argue that a dominant firm can, where the requisite motives exist, avail itself of an exit-inducing tactic which has nothing ". . . odd, . . . jarring or unnatural-seeming about it. It will strike the informed observer as normal business conduct, as honestly industrial."³² The tactic comprises an introduction of a new and not necessarily superior system, together with possible repricing of the old components.

³² L. Sullivan, Handbook of Antitrust III (1978).

VI D: Predatory Systems Rivalry And Compensatory Pricing of Complementary Components

In the preceding sections, we discussed in some detail the conceivable motives for inducing an exit of a rival who manufactures products which are complementary with the monopolized component. We showed that when a vertical price squeeze fails to yield a maximum systems profit, the monopolist may attempt to eliminate the rival. Thus, in the preceding sections, we have focused on two prongs of our test for predation. In particular we (i) described some sets of actions which could induce an exit of a rival, if those actions were to persist and if the rival were also to assume that they will persist, and (ii) showed in what circumstances the alleged predator would have motives to undermine the viability of an existing rival.

We have not discussed, however, in the context of systems rivalry, the third essential element of our predation test, namely the showing of sacrifice of profit. Following our earlier definition, there is a sacrifice of profit if a feasible action, less damaging to the rival than the action actually chosen by the alleged predator, would have yielded the innovator a higher expected level of profit than did the chosen action, given the competitive viability of the rival. When the rival manufactures complementary products, it is not surprising that the less damaging alternative action should involve prices that are lower than the actual prices of the necessary complementary components. The repricing or withdrawal policy of the innovator would entail

predatory sacrifice of profit if the lower price were feasible³³ and yielded no less profit on the premise of the continued viability of the rival.

A lower price on the preexisting component could have four distinct effects on the profits of the innovator. First, it could increase profit by the markup on additional stimulated sales of the preexisting component and its complements sold by the innovator. Second, it could lower the revenue obtained from any inframarginal sales of the preexisting component. Third, it could decrease profit by the markups on the diverted sales of the new components. Fourth, inasmuch as a lower price on a preexisting component is less likely to induce the rival's exit, the expected future profits of the innovator could be diminished by the resulting diminution of his future monopoly power in the systems market.

It is this fourth effect that could provide the motive for exit inducement through introducing the new components and repricing old ones. Likewise, it is this effect on profit that is eliminated from consideration, under the premise of the rival's continued viability in the systems market. The test for predatory profit sacrifice should disregard profits that were made possible

³³ However, in instances where the costs of providing the preexisting components are prohibitive, the compensatory price will be driven by cost considerations alone to a prohibitive level. This could occur, in particular, if the provision of the new components were to render physically impossible the provision of the old ones. Yet, in such cases, our standard would suggest scrutiny of the design of the new components for anticompetitive intent.

only by the actual exclusion of the rival from the systems market.³⁴ The inclusion of the gains from anticompetitive exit inducement in the calculation of profit sacrifice would render predatory sacrifice of profit logically impossible.³⁵

We define as compensatory the lowest price for a preexisting component which would compensate the innovator for making it available, given the rival's viability in the systems market. The

³⁴ A useful rule of thumb in this regard in some circumstances may be to exclude from consideration losses of profits earned on new line components that are parallel to the rival's components. Precedence should be given, however, to whatever data are available that pertain to the period following the introduction of the innovation, but prior to the actual exclusion of the rival from the systems market. Where data limitations render ambiguous the attribution of incremental profits to the various components, we would urge that conservative methods be chosen to bias the scrutiny of profit sacrifice towards the innovator. The example presented below shows that such conservatism is not necessarily inappropriate.

³⁵ These same issues arise in the more familiar context of pure price predation. There an allegedly predatory price may be defended as being below cost for promotional reasons. With future sales intertemporally complementary with current sales, the low or even negative markup on current sales may be rationalized by higher future net revenues. However, if the allegedly promotional prices induce the exit of a rival, the question arises as to how future net revenues should be calculated. If the future markup of price over cost were calculated on the basis of the rival's induced exit, then predatory pricing could never be identified. By definition, predation involves sacrifice of profits for the sake of additional monopoly gains. If the monopolist rationally engages in predatory behavior, the discounted present value of his profits is increased as a result of successful predation. Consequently, if future revenues were calculated using the markups that could be applied after the exit of a rival, then on the basis of those calculations, there would be no profit sacrifice. It follows, therefore, that when there is intertemporal complementary cross-elasticity, the future markups utilized to assess profit sacrifice must reflect the counterfactual viability of the rival; that is, they must be lower than the markups that would obtain in the absence of the rival.

implication of this definition is that an innovator who substantially damages rivals by refusing to offer preexisting components, rather than offering them at compensatory prices, is sacrificing profit under our standard. However, the innovator need not be held to pricing at only a compensatory level if higher prices would yield him higher profit, still contingent on the rival's viability. Nonetheless, prices higher than the compensatory levels may be scrutinized for exclusionary profit sacrifice.

In the simplest case, the compensatory price yields a markup equal to that charged on the parallel component of the new line. This result obtains where the only relevant effects of the pricing on the innovator's profits arise from the sales of the preexisting component and from the one-to-one diversions of sales of parallel new-line components. In the simplest case, such diversions occur if the price differential between systems comprised of new and preexisting components exceeds the consumers' evaluation of the quality differential. Here, there would be predatory profit sacrifice if the rival were induced to exit by a price above the compensatory level, and if he or his customers would be purchasing the preexisting component at a lower, but supracompensatory, price. Such a lower price would raise the relevant profits of the innovator by yielding him a markup on the stimulated sales of the preexisting component that exceeds the markup on the diverted sales on the component in the new line.

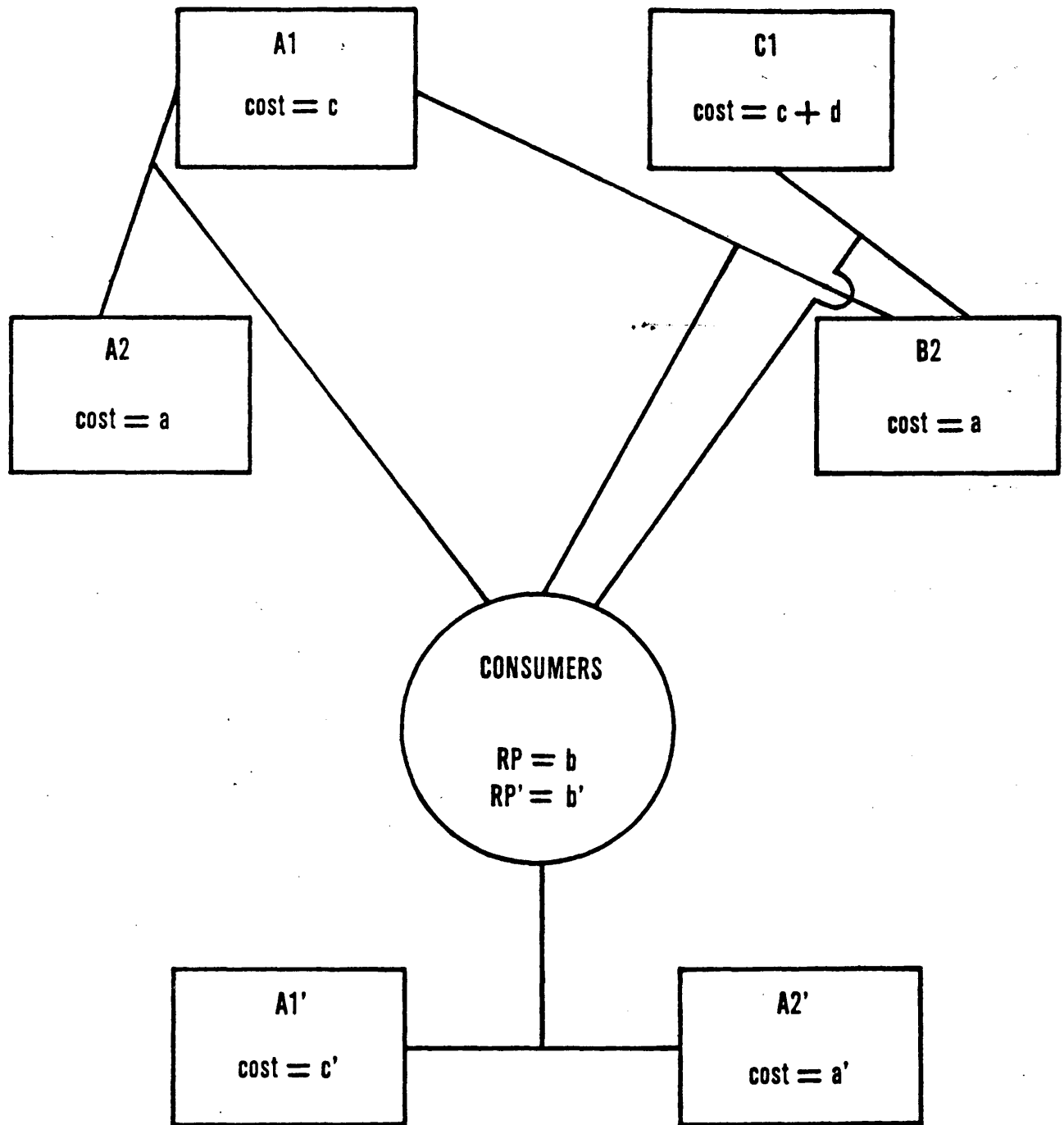
In more complex situations, the equal-markup rule for compensatory pricing may have to be modified. For example, if the sale of one preexisting component diverts the sale of more than the one parallel new-line component, then the compensatory markup must equal the sum of the thus foregone markups. And, in general, the compensatory price must reflect the aforementioned three profit effects of postinnovation policies towards the pricing of preexisting components, all under the premise of the rival's viability in the systems market.

We now provide a detailed exposition of the determination and effects of compensatory levels of prices, in the context of the already exemplified market structure that provides the clearest incentives for predatory product innovation. In this context, we show the social optimality of our tests of the intent underlying the innovator's pricing of the preexisting components and his decision to undertake his R. & D. investment.

Figure 5 depicts an expansion of the market structure, diagrammed above as figure 4, in which the dominant firm's rival has access to an inferior source of supply. Here, A_1' and A_2' stand for the components of the new system introduced by the dominant firm A . As indicated, the new components are incompatible with the old ones. The associated unit costs are c' and a' , and consumers' reservation price for the new system is b' . We make no assumptions at this point regarding the technological or economic superiority of the new system.

In this market scenario, the tactic that A can employ to induce the exit of B has two parts. First, A sets the price of A1 at the level denoted p . Second, A offers the new system at a price (p_s') low enough to induce all consumers to choose it over the old system comprised of A1 and B2, sold at a total price of $p+a$, and over the old system comprised of C1 and B2, even when the latter is sold at its cost of $(c+d+a)$. Thus, p_s' is set to make $(b'-p_s')$, the consumer surplus from the new system, greater than both $b-(p+a)$ and $b-(c+d+a)$, the consumer surplus evaluations of the systems comprised of A1 and B2 and of C1 and B2, respectively. As a consequence, sales of component B2 fall to zero, and the viability of the rival, firm B, is endangered. The motive of A for such exit inducement in this scenario, explicated in section VI C, supra, is the additional monopoly profit that will be available to A in the systems market, after firm B has irreversibly exited.

To ascertain whether predatory sacrifice has occurred, the factfinder must inquire whether a price for A1 lower than that actually charged would be less damaging to firm B and would simultaneously raise the profit of A, under the viability premise. Since firm B remains viable in the systems market until the dispersal of its productive assets, due to the availability of the compatible component C1, this inquiry can be based on data pertaining to the period that is both postinnovation and preexit.



Legend: RP reservation price for the old system
 RP' reservation price for the new system

Figure 5

During this period, the price of A1 that may induce the exit of B chokes off all sales of both B2 and A1. Then, if a lower price would stimulate sales of A1 at a markup greater than those earned on the diverted sales, the actual choke price of A1 would entail predatory sacrifice. The lowest price for A1 that would compensate for the lost markups on diverted sales, the compensatory price, is $(c+p_s'-a'-c')$.³⁶ Consequently, a refusal by A to drop the price of A1 towards the compensatory level, in preference to holding the price higher and thereby effecting no sales, would entail predatory sacrifice of profit.

The information we have thus far hypothesized about this market structure permits the compensatory price level for A1 to be either above or below the aforementioned actual price of p . We now indicate why the exit-inducing tactic can entail a compensatory price for A1 if and only if the new system is economically superior to the old one without consideration (yet) of the R. & D. costs needed for innovation.³⁷

³⁶ This compensatory price can be calculated in either of two ways in this scenario. First, it is the price which yields the same incremental profit as would the cross-elastic sales of the other components (A1' and A2'), under the usual premise. Second, it yields the same markup as that on the parallel new component, A1', when that is calculated conservatively, as suggested in note 34 supra.

³⁷ Specifically, there exist p and p_s' such that (i) $b-(p+a) < b'-p_s'$; (ii) $b-(c+d+a) < b'-p_s'$; and (iii) $p < c+p_s'-a'-c'$, if and only if $b'-(c'+a') > b-(c+a)$. Condition (i) is that consumers prefer the new system to A1 and B2 when B2 is priced at cost; (ii) is that consumers prefer the new system to C1 and B2 when they are both priced at cost; and (iii) is that the price of A1 does not
(footnote continues)

Let us first consider the case in which $b'-(c'+a')$, the net social benefit from the production and consumption of a new system (exclusive of initial R. & D. outlays), exceeds $b-(c+a)$, that of an old system. Then, A could set p_s' just below $(b'-b+c+d+a)$, p at the corresponding compensatory level just below $(b'-(c'+a'))-(b-(c+a))+(c+d)$, and thereby induce the exit of B. At these prices for A's components, B can make no sales of B2 components at any price at or above production cost. This follows because here, consumers' surpluses from the C1, B2 system offered at cost, $b-(c+d+a)$, is just below consumers' surpluses from the A1' system, $b'-p_s'$. And here, A1 is offered at a price above $(c+d)$, the cost of C1, so that consumers prefer C1, offered at cost, to A1, offered at price p . Thus, in this case, A can induce the exit of B without violating the compensatory-price test.

Now let us consider the converse case in which the old system is economically superior to the new one, even without accounting for the needed R. & D. costs, so that $b-(c+a)$ exceeds $b'-(c'+a')$. Here, we show that A cannot diminish the appeal to consumers of the old system vis-a-vis the new one sufficiently to induce B's exit without violating the compensatory-price test. Suppose, first, that A sets the price of A1, p , above $c+d$ so that C1, sold

(footnote continued)
 exceed its compensatory level. The relationship $b'-(c'+a') > b-(c+a)$ means that the net social benefit from the production and consumption of a new system exceeds that from an old one. The truth of the proposition can be established by straightforward algebra.

at cost, is preferred to A1. Then, to induce all consumers to purchase the new system rather than the C1, B2 combination, A must set p_S' low enough to make $b'-p_S'$ exceed $b-(c+d+a)$. This means that p_S' must be less than $(b'-b+c+d+a)$. Consequently, the compensatory price level, $(c+p_S'-a'-c')$, must be less than $(c+d)+(b'-a'-c')-(b-a-c)$, which is, in this case, in turn less than $(c+d)$. Thus, here, the compensatory-price test is failed because p was assumed to exceed $c+d$.

Instead, suppose that A sets p below $c+d$, so that the A1, B2 system is the best alternative to the new system. Then, to drive the demand for B2 to zero, A must set p_S' low enough to make $b'-p_S'$ exceed $b-(p+a)$. But, then, p must exceed $(p_S'+b-a-b')$, which in turn is equal to the sum of the compensatory price, $c+p_S'-a'-c'$, and $(b-c-a)-(b'-c'-a')$, the positive difference between the net benefits of the old and new systems. Thus, here too, any prices set by A that could induce the exit of B must fail the compensatory-price test.

The argument thus far has established that A is able to find a price for the new system at which (i) all consumers prefer it to the old one; (ii) B's exit is induced; and (iii) the offering of A1 satisfies the compensatory-price test; if and only if the displacement of the old system by the (already developed) new one is socially beneficial.

Let us now turn to the second part of the test for predatory sacrifice--the examination of the motive for the R. & D. investment needed to introduce the new system. As described earlier,

our basic standard dictates that the R. & D. expenses be compared with the additional net revenues they make possible, given that a compensatory price for A is maintained. Assuming that $b'-(c'+a')$ does exceed $b-(c+a)$, so that the exit-inducing tactic is consistent with compensatory pricing of A, the maximal net revenues obtain from the highest feasible level of p_s' . This is equal to $b'-b+c+d+a$, as in the instance described above. The associated net revenues are $(b'-b+c+d+a)-(a'+c')$ per systems consumer. Without the development of the new system, as explicated in section VI C, the maximal net revenues available to A would be d per systems consumer. Then, the incremental net revenue made possible by the revenue made possible by the innovation is the difference between these two figures; i.e., $(b'-b+c+a-a'-c')$ per systems consumer.

The test for predatory sacrifice is whether this difference in total net revenue is large enough to justify the R. & D. outlay. If it is, then the R. & D. investment can be attributed to an innocent profit motive, even though it results in the exit of B. If it is not, however, then intent to monopolize is evidenced because only that motive can rationalize the innovation.

This test exactly coincides with the test of whether the R. & D. investment is socially warranted. If and only if $(b'-c'-a')-(b-c-a)$ times the number of systems customers exceeds the R. & D. expense, the social benefits from replacing the old system with the new one exceed the costs of the requisite innovation. Thus, the presented tests for compensatory pricing and for

the R. & D. motive would conduce to social welfare. They would permit socially desirable innovations, whatever their effects on market structure. And they would simultaneously restrain socially wasteful innovations whose only motivation was the additional monopoly profits enabled by their anticompetitive effects.

For example, if the new system were technologically inferior to the old one, and if its incremental production costs were not substantially lower, then such a system could not then be used as a vehicle for monopolization, or for attempt to monopolize under our standard. Indeed, if the new system were inferior, the compensatory price for the old component would be such that an equally efficient rival would be able to sell the old system at a price which yields consumers greater net benefits than would the purchase of a new system. Thus, the socially wasteful investment needed to develop the new system would be deterred.

More surprisingly, technological superiority of a new system does not automatically immunize it from the finding of predation. Instead, the requisite R. & D. investment may be scrutinized for the motive underlying it. This scrutiny proceeds on the assumption that the innovator is required to offer the old components at compensatory prices. This requirement places a ceiling on the markup that an innovating monopolist can earn on a sale of each new system. Stated differently, the incremental profit from the innovation must be calculated on the assumption of the continued availability of the rival, which is tantamount to his ability to

purchase components at compensatory prices. Thus, a technologically superior new system would be developed if and only if the value to consumers of its superiority over the preexisting systems were greater than the required development costs.

Our standard avoids repressing socially valuable innovations by positing that, in the context of systems competition, the relevant market in which monopolization is to be assessed is not the market for components compatible with those of the alleged predator. Such a narrow market definition would incorrectly suggest that an introduction of a new system might be anticompetitive just because it was to create incompatibilities between the complementary products of the rival and those of the alleged predator. It would further incorrectly suggest that the monopolist might be obligated to permit competitors to avail themselves of the new components in order to compete with the innovator in the production and marketing of the new system. We see no reason why the innovator should open up new systems to rivals' components. Forcing him to do so would only endanger the incentives for investment in the development of new products insofar as innovators require quasi-monopoly (at least temporarily) in new designs to encourage and recover R. & D. investment (on this point, see our discussion of preannouncements of new products in appendix 1, *infra*). Consequently, focusing on incompatibilities among various generations of components distracts from the realization that anticompetitive effects of systems innovations should rather be traced to the

manipulation of prices of the old components. Introduction of new systems makes possible seemingly innocent price increases on the old components which disadvantage the rival. However, when the innovator offers preexisting components at compensatory prices, his ability to damage his rivals and induce their exit is, as we have shown, appropriately constrained.

It must be noted that the precise optimality properties of the tests for compensatory pricing and for the R. & D. motive have not been formally demonstrated in models more general than that analyzed in this section.³⁸ In particular, far more research is necessary to analytically characterize the tests' normative properties in models with a diversity of consumer types. Nonetheless, we feel that we have shown that our viewpoint on product introductions in systems markets enables socially beneficial appraisals of possibly anticompetitive behavior.

³⁸ It should be noted that in the model we have analyzed here, the behavior of firms vis-a-vis product introductions would be socially optimal in the absence of tactical exit inducement. Thus, in this model, the only possible cause of social inefficiency is predation. We conjecture that this is why our standard enables the social optimum to be achieved here. In contrast, more general models induce causes of social inefficiency in addition to predation. For example, the works cited in note 4 supra find other reasons for some profitable product introductions to be socially inefficient. We would be neither surprised nor disillusioned to discover that our suggested tests for predatory innovations sometimes ameliorate and sometimes exacerbate such other imperfections in market performance. We feel that it is unreasonable to expect workable tests for predatory conduct to accomplish more than the cure of the social ills from predation.

VI E: The Burden of Proof

Our analysis has shown that antitrust scrutiny of product innovation, under our suggested standard, can conduce to social welfare by deterring some anticompetitive conduct, without stifling procompetitive and socially beneficial behavior. However, our analysis has not yet explicitly considered whether or not our standard would spur costly and stifling excessive litigation over product innovations. In this concluding section, we argue that our standard would restrain excessive litigation by means of the burden of proof that it places on prospective plaintiffs.

As we have emphasized throughout, our standard narrowly delineates the set of circumstances in which the actual behavior of an innovating firm is appropriately examined. Since, in our view, innovation is presumptively beneficial, it is the plaintiff who should carry the burden of demonstrating that the pre-conditions for scrutiny of innovating behavior obtain.

In the first place, the plaintiff must establish structural conditions on various facets of the systems market: possession of monopoly power by the defendant over certain of the system's components; hurdles to entry into the final systems market as well as into the production of certain of the system's components; and substantial weakening of competition in the systems market from the alleged induced exit.

Second, the plaintiff must convincingly argue that given the defendant's actions, the rival's exit from the systems market

is highly likely.³⁹ Here, such exit may entail either dispersal of productive assets or unavailability of economically requisite complementary components.

Next, the plaintiff must show that the rival's likelihood of exit was substantially increased by the defendant's actions. If he shows, in addition, that the rival's exit probability was significantly raised by the repricing or withdrawal of the defendant's preexisting complementary components, then and only then should the attention of the factfinder focus on these policies. To demonstrate that these policies had the alleged effect, it is necessary that the plaintiff show that the defendant's components are, in fact, vital to the viability of the innovator's rivals as competitors in the systems market. The preexisting components must be shown to be strongly complementary to those of the defendant's rivals, and to have been the most preferred complements to the rival's offerings before the innovation, where the comparison includes both marketed and potentially self-produced alternatives.

With these preconditions met, the plaintiff may argue that the defendant's postinnovation policies towards his preexisting

³⁹ This requirement stems from the fact that the procompetitive benefit to social welfare from the application of our standard arises from the forestalled exits of socially desirable competitors. On the other hand, the social costs of litigation under our standard would be smaller, the more demanding were the standing requirements applied to the plaintiff. Thus, requiring a truly dangerous probability of the exit of the defendant's rivals restrains excessive litigation, while maintaining the standard's efficacy.

components entailed predatory sacrifice of profit. As we have shown, such sacrifice is tantamount to a refusal to sell these preexisting components for prices that are at or above compensatory levels. Thus, the plaintiff must demonstrate that the rival of the defendant was willing to purchase the requisite components for prices that were at least compensatory but that the defendant was unwilling to accept any such offer.*

Our requirement that the system innovator make available the old components at compensatory prices may appear to be quite harsh on the innovating firm. In fact the opposite is the truth. First of all, even if the monopolist refuses to provide his rival with the needed components at compensatory prices, he can nevertheless defend himself against a charge of predation. Such a defense would entail showing that his refusal to sell the components at compensatory rates was a part of a bargaining strategy aimed at securing supracompensatory prices for his components. For this defense to be admissible, the monopolist must demonstrate that he and his rivals were engaged in good-faith bargaining over the relevant prices.

Second of all, the required offering of complementary components need only be of limited duration. Thus, if rivals do not avail themselves of the option during 12 months, for example, the option can be discontinued without engendering further culpability. This closure rule raises a potentially dangerous possibility that the innovator will keep the price of the new system low during the period the option is in force, only to raise it when the

option expires, if at that time the rival still remains a threat. For two reasons, this danger should not be exaggerated: first, compensatory prices are linked to the prices of new components in such a way that when the latter decline, so do the former. Thus, a temporary reduction in the prices of new components confers some benefits on the rival in terms of lower compensatory prices; second, if systems prices are kept low, implying low markups and low compensatory prices, the price structure may run afoul of the second stage of the predation test, which requires that the initial R. & D. be rational, in that it yields sufficiently large incremental profit.

Third, our rule need not burden the innovator unduly because the required compensatory prices for old components are determined on the basis of their current unit costs. These must include all costs that can be reasonably attributed to the provision of the requisite capital equipment. This equipment may be substantially more scarce and congested than it was prior to the new introduction, due to its being shared with the new line. It is possible, on the other hand, that the requisite capital will be underutilized due to the loss of economies of scale that were previously enjoyed in the absence of diversion of demand to the new line. Also, the rival of the defendant could offer a long-term purchase agreement to assure coverage of the capital costs of maintaining the production of the preexisting components. Such assurances have the effect of reducing the compensatory level of price.

Even if the plaintiff is unable to meet all the pre-conditions for the compensatory price test, or to show that the defendant violated it, he may nevertheless carry the burden of proving that the R. & D. investment was anticompetitive. This entails showing first, that the various facets of the systems market satisfy the strict structural conditions for the possibility of predation to occur; second, that the innovation significantly raises to a dangerous level the probability that the defendant's rival will be induced to exit the systems market; and finally, that the R. & D. investment entails predatory sacrifice of profit (as indicated in section V, supra). This substantial burden of proof should be placed on the plaintiff, to discourage socially wasteful litigation, to conserve judicial resources, and to avoid chilling the innovative process.

As we have demonstrated, however, where this burden of proof can be met, antitrust scrutiny of product innovation is warranted. Guided by our proposed standard, such scrutiny can protect competition and deter anticompetitive behavior without distorting incentives for procompetitive innovation.

Appendix 1: Product Preannouncements

The timing of the announcement of a new product is an element of the complex of decisions that comprise a product innovation strategy. In general, to apprise consumers of the new product, the innovator will preannounce the offering before it becomes commercially available. In some important recent cases, it has been suggested that the choice of timing may be considered an anti-competitive tactic.⁴⁰ It is instructive to note, however, that whereas in at least one instance a product announcement was attacked as being anticompetitive because it was made substantially ahead of the actual introduction of the new product, in other instances, announcements were considered to be anticompetitive for precisely the opposite reason--that they were not made sufficiently ahead of the actual introduction of the new product.

This disparity of views regarding the proper timing of announcements of new products should alert us to the possibility that it may be difficult to develop workable tests for the legality of timing of product announcements. Under our basic standard, the trier of fact would have to determine whether the timing of the preannouncement would have been any different if

⁴⁰ Complaint, 20-21, United States v. IBM Corp., No. 69 Cir. 200 (S.D.N.Y. Jan. 12, 1969); ILC Peripherals Leasing Corp. v. IBM Corp., 458 F. Supp. 423, 436 (N.D. Cal. 1978) ("Memorex"); Berkey Photo, Inc. v. Eastman Kodak Corp., 603 F. 2d 263, (2d Cir. 1979). In general see "Note, Berkey Photo, Inc. v. Eastman Kodak Co.: The Predisclosure Requirement--A New Remedy for Predatory Marketing of Product Innovations," 10 Rut.-Cam. L. J. 395 (1979).

the innovator were to anticipate that the rival would remain a viable competitor until the moment of the market introduction of the new product.

What are the considerations that inform the timing of the announcement? The first possibly anticompetitive consideration is the negative effect that the preannouncement could have on the revenues of the innovator's rivals. If, as a result of an early announcement, the prospective buyers postpone their purchases until the new model becomes commercially available, the innovator and some of his rivals may experience substantial reductions in their cash flows. Such a reduction could endanger the viability of a rival.

When the innovator assumes that the rival would remain viable, preannouncement would most likely be delayed for the following two reasons: (a) If the rival were to exit before the new product is introduced, the innovator's sales of the existing models would increase and would thereby diminish the negative impact of the preannouncement on his sales; (b) The incremental profit of the new product would be increased if the rivals were to exit before the new product is introduced. Thus, the continuing presence of viable rivals increases the costs and reduces the benefits of early preannouncement.

The second consideration which informs the innovator's timing of preannouncement is (a) the ability of the rivals to copy, or "reverse-engineer," the components of the new system and (b) their

ability to redirect their R. & D. expenditures to those substitute products which would be more effective in competing with the newly announced product. Since an innovator requires a temporary quasi-monopoly on the new products in order to recoup his sunk cost on R. & D., preannouncement may deprive him of that necessary lead time over his competitors. It is perhaps plausible that the innovating firm will build features into the new product which hamper the ability of the rivals to reverse-engineer the new product. If consumers are not willing to pay for these extra features, our test for the innocent recoupment of the sunk R. & D. expenditures will identify expenditures on them as predatory. However, we do not wish to prescribe the socially optimal length of the imitation lag. Nor do we want to regulate product design.

Lastly, the innovator must be guided in his choice of the timing of the preannouncement by the need to secure the availability of complementary components when the new product is introduced commercially. If old components are compatible with the new line, or if the innovating firm produces the requisite components, preannouncement is not necessary. In the former case, the problem of coordinating the availability of the components is solved by virtue of the fact that no new products are needed. In the latter case, the coordination problem is solved internally by the innovator who manufactures all the requisite components. In the remaining situations, a general preannouncement may be made by the innovator to aid the market in correctly solving the coordination

problem. Also, the innovator may enter into a joint venture with a component manufacturer forming, by contract, a temporarily integrated company. In either case, antitrust scrutiny of the timing of preannouncements may only confound the coordination problem, retard the innovation process, and deprive consumers of socially beneficial innovation.

We conclude, therefore, that any choice of the timing of a preannouncement should be presumptively legal. The diversity of considerations that may underlie the decision to predisclose the new product makes it difficult to fashion an easily implementable test for anticompetitive product preannouncements. Furthermore, the need for such a test is substantially reduced by our requirement that the innovating firm stand ready to provide its rivals with complementary components at compensatory prices.

Appendix 2: Retaliatory Market Entry

Retaliatory market entry occurs when, in response to the entrant's inroads into the incumbent's market, the incumbent cross-enters the entrant's (geographical) market. The purpose of such a response, when predatorily motivated, is to induce the initial entrant to exit from the incumbent's market and not from his own.

The application of our basic standard of predation requires that the plaintiff demonstrate that for the entrant, exit is the best response to the defendant's actions. Yet, as we noted above, it is highly implausible to assume that the entrant will be induced to exit from his market when cross-entered by the incumbent. Given that exit is not imminent, the plaintiff must provide another cause of action. That he can do by putting forth the argument that only the desire to punish the entrant could have motivated the incumbent to retaliate with entry. This argument rests on the observation that if the entrant's market promised adequate returns prior to the entrant's invasion of the incumbent's market, the incumbent should have entered it then. The fact that the entrant moved into the incumbent's market should not have, on the face of it, changed the market conditions there sufficiently to suddenly justify entry.

Whereas the showing that the incumbent cross-entered the entrant's market is sufficient to establish a cause of action, it does not establish a prima facie case of predation. The reason

for this stand is that the incumbent can carry the burden of proving that the entrant's appearance in the incumbent's market changed market conditions sufficiently to make entry worthwhile. For instance, the entrant's preoccupation with the expansion in the incumbent's market might have weakened his position in his own market. Alternatively, his success in the incumbent's market could have left the incumbent with sufficient excess capacity to make the cross-entry worthwhile, especially if severe price cutting in his own market would be necessary before he could recapture his market share.

There is also another reason why regarding retaliatory entry as prima facie illegal would not be socially desirable. This reason stems from the fact that the incumbent who cross-enters the entrant's own market increases the competitive pressure in that market and benefits the consumers there. Because it is desirable to stimulate competition, it may be preferable to place the burden of proof on the plaintiff, who must show that a presumptively competitive behavior is in fact motivated by retaliatory considerations. Stated differently, cross-market entry forces a choice between trying to stop the deterring effects of retaliation and promoting procompetitive cross-market entry. We think the balance should be in favor of encouraging competitive cross-market entry. Consequently, such entry should be presumptively legal.

Nevertheless, a cross-entered firm may establish its case of predatory cross-entry by demonstrating that the incumbent's price in the newly entered market is below the correct cost-based price floor. If the entrant begins with excess capacity, then for output levels less than full capacity, average variable cost is the correct floor. If the incumbent expands output beyond his existing capacity, the price floor must be raised to the full long-run marginal cost. Promotional pricing is the only, albeit weak, defense against this showing of predatory sacrifice of profit in the context of retaliatory market entry.

COMMENTS ON "AN ECONOMIC DEFINITION OF
PREDATORY PRODUCT INNOVATION"

David T. Scheffman*

I. Introduction

Professors Ordoover and Willig (hereafter denoted OW) have made three contributions to the debate on predatory practices. First, they have proposed a new general definition of predation. Second, they have developed an analysis of predatory product innovation. Finally, the OW paper has entered yet another contestant in the predatory-behavior-rule tournament. In many respects, the paper is an interesting contribution to the ongoing discussion of predation. However, as I will argue below, much of the OW analysis is loose and misleading. This is a serious flaw in any economics paper, especially one aimed at noneconomists. Therefore I will take it as my main task here to point out the inherent weaknesses in the OW analysis. This should not be taken as an indication that OW have not provided some useful contributions. I will end my comments with a brief discussion of those contributions.

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Authors should not be pilloried for weaknesses in early drafts of a paper, but it is worth pointing out that earlier versions of this paper were entitled "The Economic Definition of Predation" (emphasis added). Several readers and discussants took serious issue with the pretentiousness and, more importantly, the validity of that title, so that now at least the title of the paper is much more circumspect. However, even in the final version, OW state that they ". . . present an economically sound and judicially workable general definition of predatory behavior." Thus, although the focus of much of the paper is on predatory product innovation, the linchpin of the analysis is the OW general definition of predation. Although the application of the definition to predatory product innovation is itself flawed, the basic weakness of the OW analysis lies in the limitations of their general definition. Therefore I will begin by discussing the general definition. Initially, I will abstract from the precise meaning of the OW predation standard and instead discuss the general welfare implication implications of such a standard.

II. The OW Definition of Predatory Behavior

A. The Efficiency Implications of the OW Standard

OW define predation as

. . . a response to a rival that sacrifices part of the profit that could be earned, under competitive circumstances, were the rival to remain viable, in order to induce exit and gain consequent additional monopoly profits.¹

¹ OW, p. 305.

Superficially, the OW definition is very similar to that of Areeda and Turner (AT), who state

. . . predation in any meaningful sense cannot exist unless there is a temporary sacrifice of net revenues in the expectation of future gains. Indeed, the classically feared case of predation has been the deliberate sacrifice of present revenues for the purpose of driving rivals out of the market and then recouping the losses through higher profits earned in the absence of competition.²

One advantage of the OW definition is that they recognize that predation may not involve current (as opposed to future) sacrifice by the predator. In fact, successful predation may not involve an actual sacrifice of profits at all.³ It is for this reason, among others, that OW require the measure of sacrifice to be relative to the benchmark: "under competitive circumstances, were the rival to remain viable."

In addition, unlike AT, OW are to be commended for at least attempting to derive standards of predation for specific cases (e.g., "simple" price predation) directly from their proposed general standard. Only by a great leap of faith and logic do AT arrive at their essentially ad hoc cost-based rules from a starting point of their definition of predation. Unfortunately,

² P. Areeda and D. Turner, "Predatory Pricing and Related Practices under Section 20 of the Sherman Act," 88 Harv. L. Rev. 698 (1975).

³ In the sense that it is conceivable that a successful predator could have higher profits each period using a successful predatory strategy. Steven Salop and I have developed some models producing that result.

the OW definition is too imprecise for direct application and furthermore is not based on a solid economic foundation.

Let us begin with the economics of the OW standard. If we temporarily withdraw from the mare's nest of judicial applicability, I believe virtually all economists⁴ would agree with the thrust of the following definition of (successful) predation:

any action taken by a firm with market power which causes a rival to exit and in so doing reduces social welfare.

If we take this as our criterion, it's important to realize that there is no simple rule equivalent to this definition of predation. It is misleading to claim otherwise. For example, OW state

. . . it can be theoretically demonstrated that application of our proposed standard would protect from tactical exit inducement any rival who would actively produce in the socially optimal allocation of production among extant firms. Conversely, it can be shown, the standard would permit the inducement of exit of a firm that is insufficiently efficient to actively produce in the socially optimal arrangement.⁵

I am not sure exactly what is being claimed here. However, only in the qualifying footnote to the previous quotation do OW admit

⁴ At least those who believe the main purpose of antitrust enforcement is to increase economic efficiency.

⁵ OW, p. 319.

[t]hese results, it should be noted, do not imply that application of the standard would necessarily raise the level of social welfare. . .⁶

Indeed, this statement is too weak. Application of the OW standard will reduce social welfare in some circumstances.

If a clincher is needed, OW provide it themselves by demonstrating that their standard results in the AT cost-based rule for simple cases of price predation. It is not well known that violation of the AT rule is neither a necessary nor a sufficient condition for welfare-reducing predation to have occurred.⁷

I will have more to say on the welfare implications of the OW standard in the context of predatory product innovation below; but summarizing here, I would argue that the OW standard is not an economic definition of predation at all. An economic definition must be based directly on a concern with economic efficiency. Instead, the OW definition is an ad hoc legal definition, loosely based on the case law and legal literature rather than on economic efficiency concerns.

The fact that the OW standard is not firmly rooted in economic efficiency does not, in itself, mean that such a standard would be bad policy. Imperfect rules can be more efficient than

⁶ OW, note 17.

⁷ See, for example, F. M. Scherer, "Predatory Pricing and the Sherman Act: A Comment," 89 Harv. L. Rev. 869 (1976); R. Posner, Antitrust Law: An Economic Perspective (1976), pp. 184-96; and O. E. Williamson, "Predatory Pricing: A Strategic and Welfare Analysis," 87 Yale L. J. 284 (1977).

complicated, costly, error-prone judicial proceedings. However, I will argue below that OW have not provided convincing arguments as to the utility of their standard. In particular, they have not identified the tradeoffs involved in adopting their standard.

B. The Sacrifice of Profits Criterion

Both AT and OW base their predation standards on a sacrifice in profits. Why? The AT intuition is that the predator must give up some current profits in order to reap the rewards of increased market power in the future.⁸ The sacrifice-of-profits criterion is meant to discriminate between predation and competition, either of which may cause a rival to exit. The AT logic starts with the classic atomistically competitive firm. Such a firm produces at price equal to marginal cost. Therefore (goes the AT argument), producing where price is less than marginal cost is evidence of noncompetitive behavior. The problem with this argument is the leap of faith from the model of textbook competition to real-world markets. Most real-world markets are not atomistic, i.e., firms are large enough to have an effect, at least in the short run, on industry levels of price and output. This does not mean, however, that such markets are necessarily noncompetitive. Where rivalry is strong and the potential entry is great, even large firms will not have substantial market power.

⁸ OW point out that this intuition is not always correct.

Imagine, for example, a two firm industry which would be operationally defined as competitive because of the absence of any barriers to potential competition. Suppose a third firm enters but that returns to scale allow only two firms to remain viable even in the short run. Once the firm enters, there will be intense competition amongst the three firms for the two "positions" in the industry. The forces of competition (operationally defined) would in all likelihood lead to cutting price--perhaps even below average variable costs--until one rival exits. The entrant is likely to have higher average variable costs and so be the one to eventually exit.

The apparent facts of this case would be that the incumbents incurred short-run losses in order to force the exit of the entrant. However, there clearly was no predation involved in this example. By assumption, no firm had market power or could hope to attain it by predation. It is well recognized that the alleged predator must have market power which is protected by entry barriers. Otherwise, there can be no gains to predation. (Incidentally, I can see no benefit whatever in the new jargon, "entry hurdles," etc., which OW have attempted to inject into this discussion.)

Now let's change the previous example so that the incumbents do have protected market power. Suppose that there are substantial barriers to entry protecting the industry (i.e., no one but the entrant could enter and the entrant cannot reenter after exiting). In this case, monopoly prices will be earned before and

after exit. But again assume that the size of the market and returns to scale make it impossible for more than two firms to remain viable. Even more serious price cutting may occur now, since the winners will get the benefits of future monopoly profits. Nevertheless, under the hypothetical, efficiency requires one firm to exit; and again, it will probably be the entrant. In addition, it is likely to be that efficiency would require the quickest possible exit of the entrant, which would be stimulated by the most vigorous price cutting by the incumbents. We would not want to penalize such behavior by a predation suit. Therefore, although the apparent facts suggest sacrifice of profits, no finding of predation should be entered.

Thus sacrifice of profits is not necessarily an indication of (welfare reducing) predation, even if the "predator" later benefits from exit by an increase in market power. In addition, as OW have pointed out, sacrifice of current profits may not be incurred in a successful predatory strategy. Indeed, as I mentioned above, it is possible that a successful predatory strategy requires no sacrifice of profits at all. Unfortunately, OW are prisoner to the sacrifice of profits intuition and attempt to rescue it by posing a hypothetical benchmark against which to measure loss of profits--"under competitive circumstances, were the rival to remain viable."

C. The OW Hypothetical Benchmark

Since sacrifice of current profits is not always necessary for successful predation, and (of more importance) such a

sacrifice is not, in itself, evidence of predation, OW attempt an end run around this problem by specifying an artificial benchmark against which sacrifice of profits might be measured. It is for this purpose (and an ad hoc attempt to explicitly bring in efficiency concerns) that the OW standard requires sacrifice of ". . . part of the profits that could be earned under competitive circumstances."⁹

What the authors mean by "under competitive circumstances" is left imprecise. "Competitive circumstances" apparently means that the rival is assumed to remain viable and react "competitively" to actions of the predator. What this would mean for the simplest case of price predation is apparently that the rival would remain viable and produce at price equal to marginal cost. For more complicated instances, particularly ones involving product innovation, what "under competitive circumstances" would mean is unclear.

OW have three objectives behind their hypothetical benchmark. First, they need a benchmark different from actual profits against which to measure sacrifice of profits, for the reasons I elucidated above.¹⁰ A second objective behind the "under competitive circumstances" proviso is to rule out findings of predation in situations in which inefficient firms are forced out after the breakdown of a cartel or tight-knit oligopoly pricing.¹¹

⁹ OW, p. 307.

¹⁰ Predation may not involve actual sacrifice of profits.

¹¹ OW, p. 312.

The intuition here is that "under competitive circumstances" would preclude a plaintiff's winning simply on the basis of a collapse of the umbrella afforded by cartel pricing. However, whether the criterion even solves this problem is uncertain, given the imprecision of the meaning of "under competitive circumstances." Their final objective is to attempt to tie their standard to efficiency concerns. However, as I have already pointed out, this cannot be successfully accomplished.

An efficiency-based standard could condemn "sacrifice of joint profits when evaluated at 'efficiency' prices relative to the second best efficient allocation in the industry." What this means is as follows. Consider the (second-best) efficient pattern of production for the industry. Corresponding to this allocation is a set of prices such that if firms maximized profits taking these ("efficiency") prices as given, the efficient allocation would obtain. Deviation by any firm from this efficient allocation would entail a sacrifice in profits if profits were evaluated at the "efficiency" prices. However, this standard cannot be summarized by any simple rule. The only method of application is the general judicial enquiry described by Scherer. In any event, sacrifice of profits is redundant in this "correct" standard, since this standard simply restates, in technical jargon, my earlier proposed definition of predation.

OW are certainly not advocating a calculation of efficiency prices against which sacrifice of profits could be measured. Unfortunately, their proposal that sacrifice of profits be

measured relative to the benchmark of "under competitive circumstances" is impossibly vague and bears no obvious relationship to the efficiency criterion.

C. Applicability of the OW Standard

OW claim that their standard is judicially applicable. In its present form, I think, this is simply not true. Since it is completely unclear--even in the abstract--as to what might be meant by "under competitive circumstances" in situations more complex than the simplest case of price predation, attempting to apply such a vague standard to real world cases seems beyond the pale.

In addition, the standard requires that the (alleged) predator's behavior be weighed against other hypothetical actions (assuming these actions could be defined) which in many instances the predator would not take in any conceivable situation. For example, if the victim is of sufficient size, it is unlikely to act "competitively" (in the classic textbook sense) under any circumstances. Although I am not a legal scholar, I would presume that there are potentially serious legal problems with attempting to apply a standard where the benchmark for "correct" behavior may be inconceivable behavior by the predator. If OW were to concede that it is actually efficiency with which they are concerned, a more sensible approach is to junk their proposed standard and proceed along the lines suggested by Scherer.¹²

¹² Scherer (1977), note 7 supra.

I have already conceded that imperfect rules may be more efficient than complicated open-ended judicial decisionmaking. However, in determining how compromises to judicial economy should be made, it is absolutely essential to consider three aspects of any proposed rule. The first of these is whether the rule is capable of application. The second is the effect of the proposed rule on business behavior and, concomitantly, on efficiency. The issue here is that as with any type of regulation, some agents will devote resources to evading the rule. I will take this up below. The final aspect to be considered is the rule's "error structure." Errors of two kinds will be made by any simple rule.¹³ Predation will be found to have occurred (according to the rule) in some instances in which it didn't actually occur, and actual instances of predation will in some cases be missed by the rule. It is very important to understand the likelihood of the two types of errors and the situations in which they may occur. Only with this knowledge can the possible benefits accruing from the simplicity of a rule be balanced against the costs of such simplicity.

For example, the error structure of the AT cost-based rule is fairly clear. Pricing below average variable cost for nonpredatory reasons seems a very unlikely occurrence which would raise obvious red flags signifying special circumstances (such as the

¹³ See P. Joskow and A. Klevorick, "A Framework for Analyzing Predatory Pricing Policy," 89 Yale L.J. 213 (1979).

mistaken-entrant example above). Even the AT short-run marginal cost test may not be very prone to the error of incorrectly finding predation, given the judicially recognized margin of error involved in quantifying short-run marginal cost. Time will tell, if and when the AT rule is widely adopted. On the other hand, as Scherer has argued,¹⁴ missed cases of actual predation may be a significant problem for the AT rule. If, however, as many authors have argued,¹⁵ predation is a very unlikely occurrence, the costs of such a rule (in terms of missed cases) may be swamped by the savings in costs of expensive needless litigation arising out of a less stringent standard.

Thus the AT rule has the advantage of being simple and clear enough to have hope of judicial implementation and a fairly straightforward error structure. Of course, the AT rule is only meant to be applied for cases of price predation. Predatory product innovation is necessarily much more complex--as will be any rule proscribing such predation. I will now turn to the OW analysis of predatory product innovation.

III. Predatory Product Innovation

The OW analysis of predatory product innovation is in many respects quite interesting and innovative. The reader will not be

¹⁴ Scherer, note 7 supra.

¹⁵ McGee, "Predatory Price Cutting: The Standard Oil (N.J.) Case," 1 J. Law & Econ. 137 (1958); Koller, "The Myth of Predatory Pricing--Empirical Study," 4 Antitrust L. & Econ. Rev. 105 (Summer 1971).

surprised, however, to learn that I believe the OW standard for judging predatory product innovation is probably impossible to apply and, in any event, should not be used as a standard. All the reservations I enunciated above on the general OW predation definition are greatly reinforced when applied to product innovation. What "under competitive circumstances" means in this context is anyone's guess. The testimony on this issue arising from the usual tournament of economic experts in an antitrust case would, I predict, produce a record unintelligible even to OW.

I have already discussed the (non)relationship of the OW standard to efficiency. However, since very strong efficiency properties for their product innovation tests are claimed in the paper, I must address the issue of efficiency again. OW claim that

[t]hus, the presented tests for compensatory pricing and for the R. & D. motive would conduce to social welfare. They would permit socially desirable innovations, whatever their effects on market structure. And they would simultaneously restrain socially wasteful innovations whose only motivation were the additional monopoly profits enabled by their anticompetitive effects.¹⁶

The noneconomist or casual reader of the OW paper might be puzzled (if not misled) by this claim. As I explained above, the OW standard is not an efficiency standard. Therefore, instances of socially wasteful predation could occur without violating the OW standard (assuming it could be applied) and instances of socially

¹⁶ OW, p. 382.

beneficial competition could be found to be predatory under the standard. How then can OW make the claims above? The answer is that the quotation appears in the context of some extremely simplifying assumptions about technology and demand. In particular, they assume all firms have constant cost technologies and that demand is perfectly inelastic. Under these assumptions, the usual efficiency problems arising from the exercise of market power simply do not arise. For example, there is no efficiency loss (deadweight loss) from monopoly in a market with perfectly inelastic demand. In contrast, without the completely unrealistic OW assumption of inelastic demand, no efficiency properties can be claimed for their standard.

A. The Effects of the OW Standard on Business Behavior

Scherer and Williamson have argued forcefully that the AT rule may have very undesirable effects on business behavior. The possible effects of the OW standard are even more chilling to contemplate. The social desirability of innovation is, I think, of sufficient strength to make tinkering with the incentives to innovate in such a casual manner unthinkable. Thus far the courts have largely been circumspect in finding against the defendant when any kind of "true" innovation is present. It may be that this prudence has been excessive. However, the costs of a permissive standard are at least roughly discernable. The costs of the more restrictive OW standard in terms of the potential for stifled innovation are completely unknown and so, applicability

problems aside, not worth the risk. I can only suggest that the courts, it is to be hoped with the benefit of increasingly perceptive economic testimony, continue to grope for a suitable standard.

Despite the fatal flaws in the OW standard, their analysis of product innovation does increase our understanding of some of the issues involved. I will turn to these now:

IV. OW on Product Innovation

I have come here to bury the OW standard, not to praise it. However, there are many useful insights into product innovation arising from the OW analysis. I will briefly summarize a few of the major ones here. (1) Raising the price of some components of a system may be a successful predatory strategy. Although from an economic point of view this will often be equivalent to a predatory "refusal to deal," the possibility that price increases may be predatory is worth pointing out. Indeed, predatory or preemptory interference with (potential) rivals' input markets is an issue which deserves closer attention. Williamson, for example, has pointed out that preemption or predation may in some instances be most effectively carried out by predatory actions affecting the victim's input markets.¹⁷ (2) Market acceptance is not conclusive evidence of economic superiority of a new product. Thus, it would probably be wise for the courts to look more closely before

¹⁷ O. Williamson, "Wage Rates as a Barrier to Entry: The Pennington Case," 82 Q. J. Econ. 85 (1968). Steven Salop and I are currently extending and generalizing the Williamson analysis.

labeling a new product "innovative." (3) It may be possible in some circumstances to view the introduction of a new product as a change in the price of existing product (although I am not as sanguine as OW on this point). (4) Predation may allow leverage of market power in situations in which a vertical price squeeze will not conduce leverage. The nice OW example making this point should help to stimulate some needed new attention to the area of vertical restraints.

Each of these insights and others provoked by the OW analysis deserve closer scrutiny. Further research could lead to big payoffs, both in increasing our general understanding of product innovation and hopefully also in providing better guidance to the courts and antitrust enforcement agencies. I hope OW and others will pursue their research in this direction.

COMMENTS ON "AN ECONOMIC DEFINITION OF
PREDATORY PRODUCT INNOVATION"

Frank H. Easterbrook*

The article by Ordover and Willig is an entrant in a highly competitive market for theories of predation.¹ Like any other new product, this one should be successful if it is superior in some way to its rivals. A theory might be superior if it were sold at a lower price--perhaps if it were shorter or easier to understand than the existing products. Alas, the Ordover-Willig contribution is neither. But a new theory need not be easier to digest in order to claim superiority; it also could succeed by overcoming problems of its predecessors or having superior welfare properties in other ways. But the Ordover-Willig approach starts de novo; and, as I discuss below, it creates more difficulties than it overcomes.

It is sometimes useful for economists to define a phenomenon and attach a label, which is essentially what Ordover and Willig

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¹ J. A. Ordover and R. D. Willig, "An Economic Definition of Predatory Product Innovation," pp. 306-96, this volume ("Ordover-Willig"). Much of the rest of the literature is summarized by George A. Hay, "A Confused Lawyer's Guide to the Predatory Pricing Literature," pp. 155-202, this volume.

do. The process of definition contributes to careful thought and offer insights for further work. But the label Ordoover and Willig choose for what they define is one with special antitrust significance. To call something "predatory" is to invite a court to declare that thing unlawful and to award damages to rivals. Yet the purpose of the antitrust laws is to promote consumers' welfare, a concept closely tied to economic efficiency. An essay discussing "predation" without regard to the effect of defined practice (or the authors' antidotes) on consumers' welfare is fundamentally misleading. It suggests an application to antitrust cases that the approach does not have.² The Ordoover-Willig contribution may assist in future inquiries; I am quite sure, though, that courts should await these further results before placing any reliance on the Ordoover-Willig approach to predation.

In the discussion that follows, I devote most of my attention to the basic Ordoover-Willig framework, in which predation is equated with profit sacrifice.³ Only in part V do I return to the application of their approach to innovation. Since Ordoover and Willig treat innovation as simply an application of a more general

² Other economists have been more cautious. See, in addition to Michael Spence's contribution to this volume, B. Curtis Eaton and Richard G. Lipsey, "Exit Barriers are Entry Barriers: the Durability of Capital as a Barrier to Entry," 11 Bell J. Econ. 721 (1980). ("Application to policy is clearly premature.")

³ The reader interested in the full development of the Ordoover-Willig approach should consult their "An Economic Definition of Predation" (discussion paper 1980). The "Economic Definition of Predation" (footnote continues)

framework, I do likewise. And because I am convinced that the general framework is flawed, the details of its application to innovation become less interesting.

I

Society's well-being is maximized by a legal rule that holds as low as possible the sum of (1) the welfare loss from predatory practices and any ensuing monopoly; (2) the welfare loss from incorrectly correctly labeling (or threatening to label) ordinary competition as predation; and (3) the cost of administering an antipredation rule. Ordover and Willig apparently assume that (1) would be large in the absence of a legal rule against predation, although they do not justify this assumption. They ignore cost (2) altogether, and they deal with cost (3) in only a rudimentary way.

The driving force behind the Ordover-Willig approach is the belief that there are exit-inducing strategies that significantly reduce welfare, yet are profitable to the "predator." Ordover and Willig do not, however, identify any such strategies. Surely most exit-inducing strategies create rather than destroy efficiency. A firm that discovers how to produce a product for less will find that several--perhaps all--of its rivals go out of business or

(footnote continued)
of Predation" paper is the one originally presented at this conference. The current paper on innovation started as the concluding section of that larger paper and has evolved into the self-contained paper that appears here.

turn to other markets. Certainly antitrust law should not condemn these strategies, which extend efficient methods of production to a larger share of output. Moreover, not even all strategies that would induce the exit of equally or more efficient competitors are of antitrust concern. Such strategies often would be unprofitable. It is very hard for a firm to force a rival out of the market without losing a great deal of money. Unless the predator can recoup the loss during a postpredation monopoly, it will avoid giving its money away to consumers. There is no need to apply a legal sanction to a strategy that is self-detering.

The Ordoover-Willig approach does not need to grapple with the self-detering nature of predatory strategies, because the authors limit their discussion to the profitable ones. But what strategies are profitable? The article does not name one, and there is no sufficient reason to think that there are very many. I have discussed this problem in detail elsewhere, and I have argued that the potential "victims" of predation usually can defend themselves.⁴ No predatory strategy can work without the cooperation of consumers, who must desert the victim and buy from the predator even though that causes them to pay a monopoly price later on. If consumers are rational, they will not become instruments of their own harm. They will, instead, buoy up the intended

⁴ See Frank H. Easterbrook, "Predatory Strategies and Counterstrategies," 48 U. Chi. L. Rev. 263 (1981).

victim with long-term contracts;⁵ and victims have other strategies open to them. These responses work for innovations as well as for pricing strategies. It is simply unsupported for Ordover and Willig to assume, as they do, that low prices lead to exit. Yet this is the cornerstone of their approach. The assertion that an innovator's "small advantage could . . . be levered into substantial monopoly profits"⁶ depends entirely on the supposition that a slightly lower price charged by the predator will cause customers to desert the victim. That supposition must be backed up by argument, which Ordover and Willig do not supply.

The few examples of clearly predatory campaigns show how difficult the process can be. In United States v. Empire Gas Corp.⁷ the predator cut prices well below marginal cost repeatedly and also may have used more cost-effective strategies (such as dynamiting a competitor's plant and defrauding competitors' customers). But the predator in Empire Gas steadily lost market share to its rivals. They rode out the periods of predation, watched Empire lose money, and then returned to their old market shares once Empire tried to recoup its losses. The fate of the Empire

⁵ Pacific Engineering & Production Co. v. Kerr-McGee Corp., 551 F.2d 790, 794 (10th Cir. 1977), provides a wonderful example. Customers gave the intended victim "stay-alive" orders at more than the "predator's" price, in order to prevent the victim's exit.

⁶ Ordover-Willig, p. 366.

⁷ 393 F. Supp. 903 (W.D. Mo. 1975), aff'd, 537 F.2d 296 (8th Cir. 1976), cert. denied, 429 U.S. 1122 (1977).

Gas Corp. demonstrates why predation is unusual. Scholars regularly find that supposed episodes of predation were no more than hard competition.⁸ Attempting to force an established firm from the market is so notoriously unprofitable that there are few examples of anyone trying to do so, let alone of anyone succeeding.

Because frontal assaults on existing firms are suicidal, much of the recent literature has addressed the question whether less costly strategies might reduce competition. Perhaps, for example, a firm operating in several markets could cut price in one of them in order to send a message to rivals in the rest. If a firm could establish a credible reputation for wild behavior, it might deter entry in some or all of its markets. Alternatively, a firm could invest in strategies that deter entry--through plant capacity decisions, product design decisions, or other alterations of market forces. These decisions might irrevocably alter the pattern of response to entry, making it rational for a firm to respond to entry in a way that causes every participant in the market to lose money. If the firm can make the commitment credible, it will deter all prospective entrants and never be compelled to carry out its threat.

⁸ Easterbrook, supra note 4, at 312-18.

I am deeply skeptical of claims that these predatory strategies could work.⁹ A threat to inflict substantial harm on oneself in order to inflict a lesser harm on others usually is not credible. Moreover, for every predatory strategy there is a counterstrategy that turns the predator's investment into a loss. It is not my purpose here, though, to debate the strength and weaknesses of predatory strategies. My point is that Ordover and Willig pay no attention to them. Their approach is static, not strategic. They look for an actual exit, thus omitting analysis of the ways in which predation conceivably might be profitable.¹⁰ All of these methods involve entry deterrence. When a multi-market firm signals its willingness and ability to inflict a loss on entrants, it does not care about actual exit. It can send the message by holding to a price less than its rivals' average total cost in one market. If the threat to repeat the demonstration is credible, prospective entrants and rivals in other markets then forbear. No firm need exit in the demonstration market; the dominant firm gains because entry ceases. And an entry-detering selection of capacity, product characteristics, and so on--if credible--aborts the process of entry. We never observe a rival enter, let alone a rival exit.

⁹ See Easterbrook, supra note 4, at 282-97.

¹⁰ Ordover and Willig sometimes modify their rule by suggesting that a dangerous probability of exit, rather than actual exit, is enough to satisfy their tests (see Ordover-Willig, p. 324 note 39). I suggest later on that this makes the approach unworkable. Even at face value, though, this maintains a focus on exit that is inconsistent with the strategic literature, which focuses on entry deterrence.

Because a theory in which exit is an indispensable element of predation excludes all cases in which predation is likely to be profitable, such an exercise does not provide a sound footing for legal policy. Indeed, an exit-based analysis focuses attention on just those cases in which there is least need for concern. In the Ordover and Willig view, predation is impossible if firms freely enter or exit (that is, if there are no entry hurdles) or if exit is very costly (that is, if all of the firm's initial investment is sunk at the moment of entry). They reason that if entry hurdles are very high and the newly purchased assets have no alternative employment, there will never be a true exit; a firm faced with below-cost pricing would simply write down its investment but stay in the market. But the signaling and entry-deterrence approaches suggest that a prospective entrant would see the size of any irretrievable commitment as the most serious obstacle to entry. The amount the entrant sinks is the amount it can lose, and thus--if a threat to turn the sunk cost into a loss is credible--is the size of the deterrent to entry. Signaling or strategic commitments by incumbents are most effective in warding off entry when the entry hurdle is highest and investments are irreversible. The Ordover-Willig approach makes a finding of predation impossible in just those cases in which inflicting a loss on an entrant is the most effective entry deterrent.

On the other hand, when entry hurdles are small (but positive), so that firms enter and exit from the business freely, it

would be quite easy to find predation under the Ordovery-Willig approach. There will be frequent exits; it often should be possible for the exiting firm to show that some alternative strategy by the predator would have prevented the exit and met Ordovery and Willig's other conditions. When entry hurdles are low, however, it is implausible to suppose that the "predator" will recoup, or that if it does, the welfare loss will be significant.

In sum, Ordovery and Willig make it hard to find predation when entry hurdles are high, losses suffered by entrants great, and opportunities for strategic posturing plentiful. Firms in such markets are unlikely to exit. Ordovery and Willig make it easier to find predation when losses are smaller, bluffs less potent, and the welfare loss from successful predation trivial. Surely a theory that inverts the approach suggested by the recent literature on predatory strategies should be taken with a good deal of caution.

Even if Ordovery and Willig had attempted to identify the strategies that create serious threats to allocative efficiency, it still would have been necessary for them to establish that the application of their rule improves efficiency. They remark, rather laconically, that "the precise optimality properties of the tests . . . have not been formally demonstrated."¹¹ The understated nature of this remark conceals some problems. It may well

¹¹ Ordovery-Willig, p. 84.

be that in many circumstances the creation of exit inducements--whether by predation or otherwise--is efficient.¹² Take the invention of an improved widget that requires substantial research and development--so much R. & D. that costs can be recovered only if the inventor captures most or all of the market. This new widget is profitable if and only if other firms exit; if rivals stay in the market, it is less profitable than some alternative strategy that the innovator could have pursued. Yet consumers may find the invention-cum-monopoly quite desirable. It may dramatically reduce the average total cost of production, and it is unlikely to lead to monopoly pricing. The "monopolist's" price will be constrained by the availability of the older-model widget, which rivals can continue to provide (under long-term contract, if necessary).

This problem, which is most apparent in application of the Ordovery-Willig test to innovations, crops up in their analysis of predatory pricing as well. They propose a floor of average cost.¹³ Yet in industries with economies of scale--or where the firms are learning by doing--prolonged periods of pricing below average cost are desirable. The most efficient firms will survive, with capacity tailored to the market's demand. The

² See C. C. von Weizsäcker, "A Welfare Analysis of Barriers to Entry," 11 Bell J. Econ. 399 (1980).

³ Ordovery-Willig, p. 314.

Kerr-McGee case¹⁴ provides an example. There an industry found itself with excess capacity when the demand for its product suddenly declined. Because there were substantial economies of scale in production, the most efficient arrangement was for all but one firm to exit. The usual exit-inducing device is for the most efficient firm to cut price to marginal cost, driving out the others. Ordover and Willig apparently would call this predation, because some alternative response (perhaps establishing a duopoly, with duopoly pricing?) would have been more profitable for the price cutter and would have preserved at least one rival firm. It is not apparent that anyone other than Ordover and Willig views the preservation of inefficient firms in a natural monopoly as desirable.

II

I have argued, so far, that Ordover and Willig do not make a convincing case that they have identified and addressed a significant threat to efficiency. Even if they had done so--if there are profitable yet inefficient exit-inducing strategies--that would not be a sufficient argument for their legal rule against predation. It still would be necessary to determine the likelihood that the rule would penalize or deter ordinary competition, and to determine the costs of enforcing the rule.

¹⁴ See note 5 supra.

Lower prices, greater output, innovations, and the exit from the market of less efficient competitors are the hallmarks of competition. It is just these things that Ordoover and Willig propose to punish. All legal systems err. When cases are decided on the preponderance of the evidence, error is frequent. The less precise the rule, the greater the risk of error. The risk of a finding of liability is itself a cost of doing business--a cost firms can avoid by raising price, cutting down on innovation, and otherwise acting less like competitors and more like cartelists. The costs of risk and error are unlikely to be small. Unless the welfare gains from enforcing a rule against predation are significant, the costs are a good reason to have no rule at all, or at least to have a rule that errs on the side of condoning predatory conduct.

Then there are the costs of administering the rule. These include the costs of apprehending and punishing violators, including the costs of courts and lawyers; the costs of precautions firms will take to hide or avoid liability; and the cost of writing, publishing, reading, and teaching others about predatory pricing theories. The costs of adjudication in antitrust cases are very large and depend on both the stakes and the uncertainty of the legal rule. The larger the stakes, the more the parties spend, because they will invest in litigation until the marginal dollar of litigation expenses affects the judgment by just one dollar. The greater the uncertainty, the more the parties invest,

because the harder it becomes to settle a case.¹⁵ The costs of precautions or altered behavior also could be large. As Michael Spence points out in his contribution to this volume, a legal rule that stops one method of predation or entry deterrence may simply induce firms to adopt other harder-to-detect methods that have welfare properties inferior to those of the method that can be detected and banned.

Predatory pricing cases are especially costly to litigate and entail especially high risks of error, because they involve inquiries into the firms' costs. The books a firm keeps will not be very useful for this purpose; accounting entries rarely mirror economists' definition of "costs," so it is necessary to reconstruct the firm's costs in a way that fits the categories pertinent to the litigation. And even a rule making it hard for a plaintiff to prevail on the merits will give rise to extensive litigation. A plaintiff with a 1-percent chance of winning \$100 million in damages frequently will find litigation profitable.

¹⁵ See Frank H. Easterbrook, William M. Landes, and Richard A. Posner, "Contribution Among Antitrust Defendants: A Legal and Economic Analysis," 23 J. Law & Econ. 331 (1980), for a summary of an economic approach to settlement and an application to antitrust law.

The largest cases of the past 10 years have been about predation.¹⁶ Yet despite the enormous litigation costs and the great sums invested in research by plaintiffs searching for treble damages, we have yet to find a case that Ordover and Willig (or almost anyone else) would call predation, in which the predator found the venture profitable.

Ordover and Willig disregard litigation expenses entirely. Although they maintain that their approach yields rules capable of application in litigation (a claim I dispute below), the magnitude of the administrative costs plays no role in the selection of particular rules. I suspect that the costs of litigation and other administrative expenses are large, that the costs of condemning (or deterring) lawful competition are large, and that the welfare losses from predation are small. Nothing Ordover and Willig have written indicates the contrary. Ordover and Willig

¹⁶ See, e.g., Berkey Photo, Inc. v. Eastman Kodak Co., 603 F.2d 263 (2d Cir. 1979) (\$87 million judgment reversed in part), cert. denied, 444 U.S. 1093 (1980); California Computer Products, Inc. v. International Business Machines Corp., 613 F.2d 727 (9th Cir. 1979); Telex Corp. v. International Business Machines Corp., 510 F.2d 894 (10th Cir.) (\$260 million judgment reversed), cert. dismissed, 423 U.S. 802 (1975); In re IBM Peripheral EPD Devices Antitrust Litigation, 481 F. Supp. 954 (N.D. Cal. 1979) ("Trans-america"); ILC Peripherals Leasing Corp. v. International Business Machines Corp., 458 F. Supp. 423 (N.D. Cal. 1978) ("Memorex") aff'd, 636 F.2d 1188 (9th Cir. 1980). The \$1.8 billion judgment recently entered against AT&T in MCI Communications, Inc. v. AT&T, appeals docketed, Nos. 80-2171, 80-2288 (7th Cir., August 25 and September 8, 1980) was based in substantial measure on a finding of predation, and the Government's long-running cases against IBM and AT&T also involve claims of predation.

therefore have not made a case for having any legal rule against predation, let alone the rule they propose.¹⁷

III

No test of predation is simple to administer, but the Ordovery-Willig approach is in a class by itself. If it could be implemented at all, it would amount to a program of work relief for economists. Perhaps economists are entitled to a greater share of firms' litigation investments; lawyers have monopolized litigation in the past, and a little competition would be healthy. The Ordovery-Willig approach, though, would make economists' speculations the centerpiece of litigation.

The Ordovery-Willig approach calls for answers to hypothetical questions asked on counterfactual assumptions. The court first must know the relationship among the profits the alleged predator actually made (given that the victim left the market), the profits it would have made if the victim had not left, and the

¹⁷ I extend this argument in Easterbrook, supra note 4, at 333-37.

profits the predator could have made if it had selected a different strategy that did not induce exit.¹⁸ In light of the difficulty courts have had ascertaining historical costs, it is foolish to suppose that they could cope with a rule calling on them to determine what costs would have been under some different strategy and what the alleged predator's profits would have been, given those different costs and given the presence of the rival in the market.

The Ordovery-Willig approach would be nightmarish in practice. No one could evaluate the lawfulness of the challenged conduct until some plaintiff had selected some proposed alternative strategy and the courts had evaluated the consequences of this strategy. It would become very risky to introduce any new products, very difficult to settle a case, and very costly to try

¹⁸ It is hard to overstate the complexity of this task. How is a court to determine what costs would have been under some other state of affairs? Ordovery and Willig offer no clues. The approach is shot through with other ambiguities. For example, Ordovery and Willig would apply their test only in concentrated markets (see p. 315) but do not define "concentrated." Does this mean a four-firm concentration ratio, or is the Herfindahl index to be used? If the latter, how concentrated is concentrated enough? How can we define markets and compute the Herfindahl in litigation? In dealing with promotional activities and with strategies that may cause exit but need not do so, Ordovery and Willig recommend that all costs and profits be converted to expected values (see p. 343 and p. 350, note 9). This requires courts to determine costs and profits under many additional possible outcomes. The tests employ noneconomic terms such as "impossibility," "intent," "needed," and "good-faith bargaining," none of which is defined. See p. 330, p. 372 note 33, and p. 386. It is not even easy to determine when a rival has left the market; Ordovery and Willig define "viable" rivals to include ones not currently producing. See pp. 310-11.

the cases that are not settled. We could expect the IBM case (now in its seventh year of trial) to be the paradigm of litigation under the Ordover-Willig approach.

The Ordover-Willig formulae would not work at all unless the court could determine the elasticities of supply and demand in the market.¹⁹ Without knowledge of the elasticities, the court could not determine the income the alleged predator would collect in the future or could have made under strategies it did not follow. Yet most economists would agree that elasticities are elusive. All lawyers would agree that it is almost impossible to determine elasticities by the methods of litigation. A swearing match between experts, each critical of the other's methodology, is not well designed to yield a reliable answer when judges and juries--scarcely comprehending what the fuss is about--do the choosing. If courts could find elasticities, they could determine monopoly power without resort to market definitions, for example; yet the need to resort to market definitions and market share as proxies for market power is strongly felt.²⁰

Indeed, courts barely are able to calculate firms' costs, and without knowledge of costs (as well as income) they cannot compute profits. In litigation under the Robinson-Patman act, for

¹⁹ The court must determine firm elasticities, not just market elasticities, and must compute detailed cross-elasticities as well. Ordover-Willig, p. 322.

²⁰ See William M. Landes and Richard A. Posner, "Market Power in Antitrust Cases," 94 Harv. L. Rev. 937 (1981).

example, a firm charged with price discrimination may defend by showing that a particular discount was justified by cost savings. Efforts to assert this defense routinely fail, though, because courts cannot ascertain "cost"; whichever party has the burden of persuasion loses. Similarly, the Supreme Court has rejected attempts to argue that mergers are justified because they create efficiencies;²¹ that refusal obviates the need to inquire into the costs of production. The wisdom of the Court's refusal to inquire into costs is fortified by the chronic inability of regulatory commissions to calculate the costs and revenues of utilities even under the best conditions--the commissions have decades to study the matter, full access to all data, and the cooperation of the utility. It does not seem likely that a court, in a single encounter with an unwilling defendant, will be able to improve on this performance and to calculate with any precision a firm's costs and sales, and thus its profits, under hypothetical conditions.

The difficulty in applying the Ordoover-Willig approach may be illustrated by the fact that they have not offered an example of how the test could be used in any particular case. It is hard to complain too loudly about this; none of the litigated cases assembled a record with the Ordoover-Willig test in mind. I suspect,

²¹ United States v. Philadelphia National Bank, 374 U.S. 321 (1963); FTC v. Procter & Gamble Co., 386 U.S. 568 (1967). See Robert H. Bork, The Antitrust Paradox (1978), pp. 124-29.

though, that a team of capable economists (and engineers!) could spend years working with data about a single alleged predatory episode and still not have more than a rough guess about what the Ordover-Willig approach would require a court to do.

Ordover and Willig attempt to deal with some of the problems I have described by giving the plaintiff discretion to propose the alternative strategy the predator could have followed and the existence of the structural conditions of their approach (concentration, likely exit, and so on).²² Then the defendant will be allowed to prove that its strategy did not entail sacrifice, as the test defines that term. But they do not give an illustration of how this would work in practice; and at all events, as George Stigler has pointed out, economists should not rig the outcome of an inquiry by shuffling the burden.²³ (Stigler would leave the burden-picking to lawyers and preachers.) Ordover and Willig's burden-allocation approach effectively removes from litigation the questions that are most important to the Ordover-Willig theory. As a result, plaintiffs have a much easier time. They, after all, have the choice of proposed non-exit-inducing strategy. They surely will pick the combination most favorable to themselves, so that we should expect them to prevail in many

²² Ibid., pp. 323-27.

²³ George J. Stigler, "The Ethics of Competition: The Friendly Economists," Center for the Study of the Economy and the State, Special Paper (1980).

cases in which Ordovery and Willig would find no predation, were the data all known. No one who believes that the welfare loss from predation is small could be sanguine about a test that enables clever plaintiffs to carry the day in predation cases, because vexing issues have been assigned to the defendants.²⁴ It would be better, as I have suggested elsewhere, to leave the plaintiff with the burden on every issue and to restrict suits to consumers who claim to be paying a monopoly overcharge. That would cut out suits by firms seeking protection from hard competition, a category of suits that leads to the most costly litigation.²⁵

IV

Any legal rule gives rise to adaptations, which may be worse than the behavior condemned by the rule. Some particularly nasty

²⁴ The allocation of burdens in the Ordovery-Willig approach is inconsistent with the usual rules, under which the plaintiff must carry the burden on all items in dispute. For example, in cases involving claims of racial discrimination in employment, the plaintiff establishes a prima facie case by showing that a job was open, that he was qualified for the job, and that someone else filled it. Then the defendant has the opportunity to articulate a nondiscriminatory reason for the decision, after which the plaintiff has an opportunity to prove that the defendant's reason is pretextual. Texas Dep't of Community Affairs v. Burdine, 101 S. Ct. 1089 (1981). A similar approach, applied to a claim of predation, would allow the defendant to discharge its responsibilities by articulating a justification consistent with competition on the merits. The plaintiff then would be required to prove that the defendant's justification was a pretext, and that the conduct was indeed predatory.

²⁵ Easterbrook, supra note 4, at 318-33.

adaptations could follow in the wake of the Ordover and Willig approach: it might encourage the entry of inefficient firms, discourage firms from expanding output, and encourage fake (unnecessary) exits. I discuss these in turn.

After its creation by merger, the U.S. Steel Corp. set a monopoly price. It did nothing to discourage entry, preferring to charge as high a price as it could on any sales not made by other firms. This attracted less efficient entrants who found the market attractive because the expected postentry price still exceeded their marginal costs. The "inverted umbrella" of U.S. Steel apparently produced both high prices and inefficient production for many years after the merger.²⁶ The Ordover-Willig approach to predation could compel monopolists to behave like U.S. Steel, even though this strategy significantly reduced the efficiency of production.²⁷ Any attempt to evict a less efficient firm from the market by selling at marginal cost could be characterized as a profit sacrifice in exchange for future monopoly profits. Selling at marginal cost is predation, under

²⁶ See George J. Stigler, "The Dominant Firm and the Inverted Umbrella," 8 J. Law & Econ. 167 (1965). But see Donald O. Parsons and Edward John Ray, "The United States Steel Consolidation: The Creation of Market Control," 18 J. Law & Econ. 181 (1975).

²⁷ Many of the predation cases cited in note 16 supra involve responses by dominant firms to the entry of apparently less efficient rivals. The district court's decision in Telex, for example, adopted a view of predation that would have compelled IBM to act like U.S. Steel; the court of appeals reversed. See Richard A. Posner, Antitrust Law: An Economic Perspective (1976), pp. 194-96.

the Ordoover-Willig approach, because it is rational only if the inefficient rival exits; in any other event, the more efficient firm could make more money by selling at the rival's marginal cost. Yet surely consumers are poorer if antitrust rules induce firms to cut back output and tolerate the presence of inefficient rivals.²⁸

Ordoover and Willig appear to be of two minds about this problem. At one point they acknowledge the difficulty but then insist that it is not important. They say that "application of the standard would [not] necessarily raise the level of social welfare if the incumbent and its rivals fail to actively compete"--that is, if the incumbent decides to behave like U.S. Steel (as it well might)--but continue: "[T]he standard would also raise social welfare in any scenario in which society would be benefited by the survival of a firm that would be part of the social optimum. We regard such scenarios to be the normal case."²⁹ This appears to be what lawyers call a confession and avoidance, although it is cast in military jargon. Ordoover and Willig are saying that if enterprises behave like dominant firms, then their approach may well reduce welfare, but that they do not expect firms to behave in this fashion. Why not? Economists ordinarily assume that firms maximize their profits. If a

²⁸ I expand on this argument in Easterbrook, supra note 4, at 296-304.

²⁹ Ordoover-Willig, p. 319 note 17.

reduction of output after the fashion of U.S. Steel increases profits, firms will pursue that course. And the survival of inefficient fringe firms is rarely the "social optimum"; Ordover and Willig offer no hint about why they see the survival of such firms as optimal.

Later in the paper, however, Ordover and Willig address the case of pricing and designing components of what they call a "system." In responding to the argument that it is unnecessary to monkey with the physical compatibility of these components in order to extract a monopoly profit, Ordover and Willig point out that a firm could increase its profits by changing physical characteristics of goods in order to reduce competition from "an inferior source of supply"³⁰--that is, from a firm whose products or methods of production are not optimal for the "system" in question. In designing a rule that will prevent predation against these "inferior source[s] of supply," Ordover and Willig appear to extol the virtues of inefficiency. Why would consumers want this "inferior source of supply" to continue? How would such a source survive even under ordinary competition? Models of perfect competition assume that such inferior or more costly products quickly are driven from the market. It is hard to understand why--in the name of antitrust--courts should protect inferior, inefficient, or costly sources of supply that would be extinguished by ordinary competition.

³⁰ Ibid., p. 365.

Ordinarily a monopolist of one component in a finished good (which is what Ordover and Willig apparently mean by "system"; a car is a system made up of many inputs) does not want to exclude equally or more efficient producers of other inputs, and it is indifferent to the fate of less efficient suppliers. The less costly the other inputs, the more the firm can charge for its monopolized input. The firm does, however, want to avoid substitution against its monopolized input. If the monopolist attempts to set the monopoly price, the producer of the final good will use less of that input and more of something else, even though the substitute carries a higher real resource cost. (For example, automakers may substitute vinyl for cloth if cloth is monopolized.) The monopolist can avoid this problem is integrating-- that is, by making the final good (system) itself.³¹ The integration, which we can treat as the expulsion from the market of other firms, increases consumers' welfare. Ordover and Willig disregard this point in arguing that the exit of rival suppliers reduces welfare.

I have assumed so far that the dominant firm, faced with entry, picks a profit-maximizing price. Entry, however, changes the elasticity of demand facing the dominant firm. The dominant firm must guess the elasticity under the new conditions in order to choose a response. It must estimate the new elasticity on the

³¹ See Richard A. Posner and Frank H. Easterbrook, Antitrust (2nd ed. 1981), pp. 815-17, 874-75.

basis of fragmentary information. Since the perfectly competitive response to the new entry sometimes entails a higher price and sometimes a lower one (depending on the elasticities and the scale of entry), a firm easily could err, moving the wrong amount or even the wrong direction. If so, the firm "sacrifices" profits. And if the new entrant then leaves the market, it has a good claim of predation under the Ordoover-Willig theory. It would be fair to call this "accidental predation." The firm can reduce (but not avoid) the risk by increasing price, if the entrant appears to be failing. The Ordoover and Willig approach thus reduces the effectiveness of entry in undermining monopoly or cartel pricing.

Finally, Ordoover and Willig disregard the strategies available to new firms when faced with the incumbent's response to entry. Suppose the incumbent invents a strategy that reduces the value of a rival's assets but still leaves those assets worth more in their current employment than in any other. The rival should stay in the market. But under the Ordoover-Willig approach, a predatory pricing remedy would be available if the entrant irrevocably left the business. If the assets were worth \$1,000 more in their current employment than in any other, but if the firm thought it could collect \$10,000 in a predatory pricing suit, it would quit the business. This creates a welfare loss of at least \$1,000--the reduction in the value of the assets. I say "at least" \$1,000, because awarding damages in a case like this also

would discourage lawful, hard competition. (By assumption, the incumbent's response was lawful under the Ordovery-Willig test, because exit was not the new firm's best response.)

Ordovery and Willig would be entitled to complain here that I have misunderstood their approach. The rival in the case just given should not recover, they might argue, because (if we ignore damage recoveries) exit was not the best response. But there will always be a grey area; the rival will argue that it calculated in good faith that its assets had their highest value in other markets. Because such a calculation is an integral part of the rival's decision under the Ordovery-Willig test itself, a court almost certainly would look at the actual exit and stop. Only powerful evidence that the departure had been precipitated by the expectation of damages recoveries would make a difference, and only a careless firm would leave such evidence in its files. Any attempt to tell whether a given firm "should" have exited would spoil the simplicity of the one feature of the Ordovery-Willig approach capable of mechanical application. Allowing a defendant to argue that the exit was induced by the prospect of litigation would open the theory to other manipulation as well. Could a plaintiff that did not exit argue that it should be treated as if it had departed, on the ground that departure would have been the best response, but that it erroneously calculated otherwise at the

critical moment?³² Would it matter that because there was no exit, the predator never recouped its losses?

V.

Ordover and Willig start with a discussion of predatory pricing, but they spend the bulk of their paper arguing that their approach gives insights--and legal rules--concerning the proper treatment of innovation, product mix, R. & D. expenditures, and related decisions. The extensions of the theory to these decisions are intriguingly argued, but I doubt that the effort is worth the candle. If the theory does not adequately resolve the problems that occur in dealing with price alone, the extension to price-quantity-quality mixes (or to still more complicated assortments of attributes) redoubles the problems. No court is likely to be able to determine whether some nonexistent invention, if pursued and developed through an alternative strategy, would have been better for both the developer and its rivals. The Ordover-Willig approach invites unguided speculation by courts. It is a plaintiff's dreamland.

³² In discussing the plaintiff's burden, Ordover and Willig suggest that it is enough to show that exit was "likely," that the defendant's acts "substantially increased" the likelihood and (or?) that the innovation "raises to a dangerous level the probability that the defendant's rival will be induced to exit the systems market" (see pp. 386, 389; and p. 386 note 39). Introduction of this probability calculus destroys predictability for at least two reasons: Ordover and Willig do not tell us how likely is too likely (is $p=.2$ enough? or $p=.7$?), and they do not suggest how a court can determine such likelihoods if the rival survived in fact. See also Easterbrook, supra note 4, at 329-30.

Moreover, introducing a new product is even more of a gamble for a firm than picking a new price in response to a change in the elasticity of demand. When a new firm enters the market for an existing product, the incumbent knows what prices and quantities have cleared the market in the past, and it can make an educated guess about the elasticity. When a firm introduces a new product, it does not have even this much information. That explains why so many new products fail to win the test of the market; they turn out to be unprofitable at the prices consumers will pay. Adoption of the Ordover-Willig approach would significantly increase the risk of product introduction. The product might fail, in which case the innovator must swallow the loss, or the product might succeed, in which event a rival would argue that some alternative strategy would have done the rival less harm. The rival has the best of all possible worlds. First it gets to see whether the product succeeds in the market, and then it can challenge the successful products with arguments based on the hypothetical profitability of hypothetical strategies. This is bound to reduce, perhaps by a significant amount, the profitability of innovations.

Ordover and Willig concentrate most of their attention on innovations involving complementary goods. They observe (and certainly they are correct) that changes in product design may be the least costly way of eliminating a rival in the complementary good. For example, IBM, which makes both central processing units

and disk drives, may find that the cheapest way to dispatch rival disk manufacturers is to change some trivial feature of the central processing unit, so that rivals' drives no longer are compatible with it. Much of the recent litigation alleging predation has involved product alterations that affect competitors who make complementary goods.³³

As I have observed before, a rule of the sort Ordover and Willig propose is apt to penalize desirable conduct, because courts will be unable in practice to distinguish the desirable from the

³³ See Berkey Photo and the IBM cases collected in note 16 supra. It is interesting, however, that one of the IBM cases, although applying questionable analysis to the definition of predatory pricing, has been quite critical of any attempt to attack product changes. See Transamerica, note 16 supra, 481 F. Supp. at 1022: "Large firms attempting to conform their conduct to [the] proposed rule would have a difficult time indeed. Any successful action they might take to win sales necessarily tends to improve or preserve their market position. Disappointed competitors, if they can conceive of some alternative price, product, modification or practice they would have preferred, would be encouraged to bring suit. Even if the large firm recognizes and tries to resolve the problem, it cannot assure its safety Management's safest course might be to do nothing, but that, of course, would violate their duty to shareholders and would do nothing to benefit a healthy, innovative and competitive market. It is an unwise policy for the law to coddle competitors, especially if the protection comes at the expense of destroying a larger firm's incentive to compete. Even companies that choose to enter dominated markets must be prepared to face competition on the merits. When a monopolist chooses an alternative that does not unreasonably restrict competition, the law is not offended. It is the choice of an unreasonable alternative, not the failure to choose the less restrictive alternative, that leads to liability. IBM did not lie dead in the water when faced with competition. It took action. And the action it took may have caused some competitors to suffer more than other actions would have. But the action IBM took . . . did not unreasonably restrict competition, and thus, did not violate the law."

undesirable. It will induce firms to reduce investments in R. & D. in order to reduce the risk of paying damages. It will discourage firms from evicting less efficient suppliers of complementary goods from the market. And, in return for all of this, the rule gives us little of value. The authors furnish no sound reason for concluding that their rule increases society's welfare. They apparently assume that exit-inducing innovation is undesirable for the same reason tie-ins are undesirable; the firm extends its monopoly from a single product to the entire system. Yet they do not argue the point further. It is far from clear why even explicit ties ("I will sell you my new widget only if you buy a complete widget system from me") reduce welfare. If they do not, then neither does innovation that imperfectly mimics the results of ties. Innovations that lead to monopolies of systems may be desirable because they enable inventors to capture more of the value of their information and because they reduce the ability of complementary goods suppliers to take a free ride on the reputation of the innovator. To ban strategies that lead to monopolies of systems is to ban the creation of efficiencies.³⁴

Ordover and Willig say that their approach does not sacrifice any efficiencies available from obtaining monopolies of the

³⁴ I elaborate on this in Easterbrook, supra note 4, at 304-12. See also the text at note 31 supra, for an argument that a firm can increase efficiency by using its monopoly of one input to obtain a monopoly of a "system."

systems. "Our standard avoids repressing socially valuable innovations by positing that, in the context of systems competition, the relevant market in which monopolization is to be assessed is not the market for components compatible with those of the alleged predator [F]ocusing on incompatibilities among various generations of components distracts from the realization that anticompetitive effects of systems innovations should rather be traced to the manipulation of prices of the old components."³⁵ This means (if I understand it correctly) that Ordover and Willig do not care whether the innovator obtains a monopoly of systems incorporating new widgets. They would be satisfied if the innovator continued to produce old widgets, because the existence of old widget systems would set a price cap on new widget systems and ensure that the dominant firm could not obtain monopoly profits.

It is unclear why the predator must bear the burden of offering old-model widgets. Why can't the intended victim manufacture these items, if they are necessary? If the predator intends to charge a monopoly price on the new widget system, even a relatively inefficient firm may find it lucrative to make old-model widgets (if not new-model widgets)--taking a free ride on the innovator's R. & D. So long as old-model technology is available, rivals' threats to manufacture these items should be sufficient to prevent the innovator from collecting a monopoly price on new widget systems.

³⁵ Ordover-Willig, pp. 383-84.

If, instead, the innovator must continue to offer the old-model widget for sale,³⁶ this will decrease the effective returns from all innovation. Ordover and Willig would require the offer to be made at a "compensatory" price--which, they are at pains to point out, does not mean that the price must be low enough to induce sales. A price is compensatory if old-model sales at that price would be as profitable as new-model sales. Yet if the new model is sufficiently superior to the old, no one will purchase old models at "compensatory" prices.³⁷ Then the innovator will be stuck with an inventory of unwanted products or will be saddled by committing part of its productive capacity to an item no one wants. No matter how the innovator attempts to comply with the Ordover-Willig requirements, the ex ante profits of innovation will be lower. If it sells old widgets at the "compensatory" price, it makes no more than if it had sold only new widgets; and if old widgets gather dust at the "compensatory" price, the innovator is out of pocket. As a result there will be fewer new products. This is a steep price to pay for a rule that, I have argued, produces no benefits. Nothing in the Sherman Act requires or authorizes courts to follow a rule of this sort.³⁸

³⁶ Or perhaps to engage in "good-faith bargaining" about selling the old model, whatever that may mean. Ibid., p. 387.

³⁷ Ibid., pp. 330-31, 336, 349, 373-74.

³⁸ It is at least interesting that Ordover and Willig do not cite a single Supreme Court case to support the proposition that their approach is consistent with the Sherman Act. I have no reason, though, to think that the authors have overlooked persuasive authority. The Court appears to be unwilling to condemn innovations. United States v. Grinnell Corp., 384 U.S. 563, 570-71 (1966).

I I I. N E W T O O L S F O R S T R A T E G I C
A N A L Y S I S

STRATEGIC INTERACTION: SOME LESSONS
FROM INDUSTRY HISTORIES FOR THEORY AND ANTITRUST POLICY

Michael E. Porter*

Antitrust policy has been constructed from a foundation of models of competition that are largely static and cross-sectional, reflecting the bulk of research in mainstream industrial organization. The focus has been structural on the one hand, taking the industry as the unit of analysis, and behavioral on the other, with a preoccupation with the motivations for and consequences of particular competitive practices.

While studying the same market outcomes as antitrust investigations, the tradition of research on corporate strategy has been quite different. Here research has emphasized the study of in-depth case histories of firms' strategic interaction over a substantial period of time. The industry history, as practiced at business schools,¹ has had a number of distinctive elements when compared to bread-and-butter research in industrial organization.

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The author, professor at the Harvard Graduate School of Business Administration, has benefited from comments by R. E. Caves.

¹ And originally in a somewhat different form by Edward Mason and his followers.

First, its emphasis is longitudinal, built around a careful re-creation of competitive moves and other events in the sequence in which they occurred. Second, it is broad and quite detailed in coverage of firm behavior and industry events rather than focusing on one or a few elements of competitive behavior such as investment or pricing. Third, it emphasizes the uncertainties present in predicting the future that bear on the decisions facing firms. Fourth, it places great emphasis on a full and complete description of each major competitor, including its full range of activities in all markets in which it competes, and a great deal of emphasis on "internal" factors such as the identity and backgrounds of management, the evolving organizational arrangements in place, et cetera.

The industry-history approach to studying competitive outcomes, then, rests on some explicit or implicit premises about their determinants that differ from those of past emphasis in industrial organization research.² While making no claims to be an expert in antitrust or of covering the concerns of antitrust systematically, I will attempt to outline in this paper some of the important issues for antitrust policy that seem to arise from the study of strategic interaction through industry histories, as well as some tentative policy modifications that result. In raising these issues, I will make use of an extended discussion of

² Recent industrial organization research is changing to some extent in this regard. More on this below.

the disposable-diaper industry. The diaper industry is a strategic example because it illustrates richly the general possibilities for strategic interaction as well as poses, in the extreme, the specific dilemma of strategic behavior designed to achieve scale or learning economies. It is hoped that the discussion here will also contribute to the building of increasingly rich models of strategic interaction in industrial organization research.

I. The Concept of Strategy

Industry histories show that strategic interaction among firms is often guided by a strategy, or a coordinated plan consisting of a set of economic (and sometimes noneconomic) objectives and time-dimensioned policies in each functional area of the firm (e.g., marketing, production, distribution, and so on) to achieve these objectives.³ The objectives and policies are simultaneously determined and reflect the firm's assessment of its capabilities and limitations relative to competitors and its search for a distinctive competitive advantage. Since each firm is seen as a unique collection of tangible and intangible assets and skills built up through its past activities, the emphasis in strategy formulation is in staking out a position based on the firm's unique capabilities that can be defended (that is, which

³ See K. R. Andrews, The Concept of Corporate Strategy (1971). The concept of strategy has been institutionalized in nearly all major corporations, through the widespread adoption of formal systems for strategic planning.

possesses mobility barriers--see below) against competitors. Strategic interaction among firms is the playing out of strategies over time through investment decisions and tactical moves and countermoves. Successful strategies are those that are internally consistent and accurately reflect the firm's strengths and weaknesses relative to its competitors and its competitors' expected behavior.

The concept of strategy implies that antitrust analysis cannot form normative judgments about one aspect of firm behavior, or design remedies to correct it, in isolation. For example, a firm might have a distribution policy of exclusive dealing. Looking at its other activities, this firm might also be emphasizing high-quality products, an active product-innovation policy, fast service, extensive dealer support, and advertising stressing product quality, placed primarily in specialized magazines and trade journals. All these policies form a consistent strategy. Another firm practicing exclusive dealing in the same industry, on the other hand, might offer little service, products of only acceptable quality, minimal efforts in sales promotion to the retailer, and heavy television advertising. The first firm's exclusive dealing could be socially desirable on balance, depending on the market shares of other competitors. The second firm's strategy, on the other hand, implies that its policy of exclusive dealing is probably designed to create a strategic entry barrier with little offsetting social benefit.

That an overall strategy guides strategic interaction also implies that a remedy aimed at one aspect of a firm's behavior must be probed to see how it will affect the ability of the firm to carry out its previous strategy, and whether the firm is likely to adjust other elements of its strategy to compensate or redefine its strategy completely. The firm will strive to maintain an internally consistent approach to competing, and one to which it is uniquely suited. If an antitrust remedy eliminates a key part of the strategy, then the firm may be forced to adjust its entire strategy to one that may or may not lead to an outcome that is better from a social viewpoint than the original position. For example, if a firm is blocked from a particular vertical contractual arrangement with its customers, it may turn instead to heavy image advertising. Or if antitrust restraints on predatory pricing prevent a market leader from disciplining its rivals and signaling potential entrants using price, it may turn instead to the myriad other disciplining tactics available (see below) to preserve its strategic position, which may have the same effect but be extremely difficult to police effectively.

II. Strategic Heterogeneity

Industry histories and my discussion of strategy highlight the fact that firms compete with quite heterogeneous strategies, despite the fact that they are in the same industry. Heterogeneous strategies reflect firms' efforts to achieve a sustainable competitive advantage, given their differing and evolving

bundles of tangible and intangible assets and skills, as well as the presence in many industries of market segments consisting of clusters of buyers who place differing weights on the market attributes under a firm's control (product characteristics, price, marketing practices, distribution channel, et cetera). A necessary corollary to these sources of strategic heterogeneity is that the pattern of strategies being followed in an industry will often shift over time and vary from industry to industry.

As I have argued elsewhere, heterogeneous strategies imply diverse bases for market power of different firms in the same industry.⁴ The notion of entry barriers protecting all incumbents in an industry must be supplanted by a broader concept of mobility barriers, or factors that deter other firms from replicating a particular strategic configuration. Strategic interaction, then, is the process by which firms seek to get behind or create sustainable mobility barriers. Within the same industry, firms with different strategies will possess differing types of mobility barriers as well as mobility barriers of varying overall height.

The mobility barrier concept calls into question intent as an operational indicium in antitrust. Firms, once in an industry, are

⁴ R. E. Caves and M. E. Porter, "From Entry Barriers to Mobility Barriers: Conjectural Decisions and Contrived Deterrence to New Competition," 91 Q. J. Econ. 241 (1977); M. E. Porter, "The Structure Within Industries and Companies," 61 Rev. Econ. & Stat. 214 (1979); M. E. Porter, Competitive Strategy: Techniques for Analyzing Industries and Competitors (1980); A. M. Spence, "Entry, Capacity, Investment, and Oligopolistic Pricing," 8 Bell J. Econ. 534 (1977).

no longer "equal" except in size. There are often a variety of different protected positions in an industry. Mobility theory implies that all firms strive to drive other firms out of their strategic territory and create a well-protected strategic group. This "intent to monopolize" is pervasive, where the monopoly is sought over a particular strategic configuration.

Similarly, Salop's⁵ interesting formulation of entry deterrence as natural or strategic may not represent a clear distinction. Scale economies, for example, do not exist but are created by a firm's investment decisions based on choices about strategic configuration. The firm invests in research to perfect larger scale facilities, and in the facilities themselves, to create a mobility barrier or defend itself against another firm that has attempted to create a mobility barrier. The mobility barrier is hardly unintentional nor a side effect of innocent profit maximization, as Salop's formulation of natural barriers (of which scale economies are cited as an example) implies.

The theory of mobility barriers also implies that antitrust analysis of market power and remedies aimed at reducing market power cannot always be industrywide but rather must be directed at the groups of firms following similar strategies (strategic groups). There is generally no single test for the presence of market power that can be applied to any industry. An industry

⁵ S. C. Salop, "Strategic Entry Deterrence," 69 Am. Econ. Rev. 335 (1979).

need not be concentrated overall for a particular strategic group to have enormous market power. Remedies aimed at the sources of market power of one strategic group may have little impact on that of another group; worse yet, they can allow another strategic group to reinforce its market power.

III. Dynamic Cost Reduction

The recent attention in corporate planning on strategies based on the "experience curve" has emphasized the importance of dynamic cost reduction in strategic interaction. Much of the recent discussion has centered around the so-called "experience curve." The term "experience curve," popularized by the Boston Consulting Group (BCG), mixes together two familiar but quite disparate phenomena--(static) economies of scale and (dynamic) product and process technological changes (learning) that lower cost. These together, holds BCG, propel real costs down in proportion to the firm's cumulative production volume.⁶

For purposes of understanding strategic interaction, the BCG formulation is unsatisfying because it mixes static economies of scale, learning that depends on time, and learning that depends on cumulative production volume. Because the operation of static economies of scale is well known, I will concentrate here on the learning aspects.

⁶ The overall decline of cost in proportion to cumulative volume is offered by BCG as an empirical regularity. For a fuller description of the BCG formulation, see O. Abell and S. Hammond, Strategic Market Planning (1979), and Porter (1980), note 4 supra.

Learning reduces costs over time as the firm discovers how to do things better in product design, process layout, job design for workers, machine operating rates, organizational coordination, and the like. Thus, firm learning can be very broadly based and involves managerial as well as technological dimensions. Some learning and the associated product and process changes can increase possibilities for static economies of scale, while other learning leads to absolute cost improvements.

There are three plausible ways to formulate the rate of learning, with very different implications for strategic interaction:

- (a) as a function of cumulative volume;
- (b) as a function of time in the industry;
- (c) as a function of exogenous technological change.

The one most often stressed in the corporate strategy field is that learning is a function of cumulative volume.⁷ In this formulation, the firm growing the fastest will be gaining cumulative volume (and lowering cost) the fastest. Thus the optimizing firm should price even below cost in the growth stages of an industry's development to gain market share and hence reduce cost

⁷ Note that this is not precisely equivalent to the Boston Consulting Group formulation, which is that overall cost declines are based on cumulative volume, made up of a learning and scale economies component. Because they are usually so collinear, the empirical evidence presented by BCG does not allow a discrimination among the significance of the various sources of cost decline, nor the alternative formulations of the rate of learning.

relative to rivals. As the industry matures, this strategy can lead to a dominant firm with a large cost advantage over its competitors. All firms, including entrants, are compelled to seek market share--the firm with the greatest risk-taking ability and staying power will ultimately win out.⁸

The formulation that learning is strictly a function of cumulative volume forces us to confront some familiar tradeoffs in economics, those between market power or monopoly (allocative efficiency) and cost (technical efficiency) on the one hand, and between market power and innovation on the other. A learning curve based on cumulative volume implies that the large-market-share firm, since it generally has the greatest "experience," will often be more efficient at any given time, even though it may have a great deal of market power. The learning curve also implies that the largest-market-share firm (that is accumulating volume the fastest) will likewise be the most innovative in improving product or process to lower cost. Thus, any policy that limits a firm's ability to strive for and later occupy a dominant market position will have negative consequences for long-run costs.⁹ This affects not only the appropriate policy towards what is an

⁸ The nature and duration of the battle for dominance will clearly depend on the extent to which one firm can get out in front in cumulative volume due to early entry or because rivals fail to recognize or act on the learning curve in their behavior.

⁹ In the short run, holding back a leader from gaining share may lead to faster cost declines by followers and thus, perhaps, lower average industry costs.

acceptable market share, but also complicates policy towards so-called "predatory" behavior. Pricing below variable costs in pursuit of market share may be justified by dynamic efficiency considerations, even though such behavior would violate even the lenient Areeda-Turner test recently proposed in the literature on predatory behavior.

While the strict cumulative volume formulation of the learning curve raises these problems, it is critical to recognize the conditions that underlie this strict formulation, because they often do not hold in practice. The strict formulation assumes that the process of learning based on accumulated volume goes on indefinitely, which is probably not true in all situations where much of the learning occurs early in the industry's development. The strict formulation also assumes that the leader's learning can be kept proprietary. If it can be copied, the leader may indeed be learning the fastest; but this does not imply greater efficiency for the leader, nor that the leader will pull away from the pack. Moreover, if we added the assumption that learning is costly and requires R. & D. spending, then the opportunity for low-cost copying can put the leader at a disadvantage, which will reduce incentives for learning.

Another qualification to the strict cumulative volume formulation of the learning curve is the possibility that innovations may change product or process technology enough to create a new learning curve that the leader is ill prepared to jump onto

because of his past investments.¹⁰ Or, competitors may be able to chip away at a leader's market share by focusing on particular parts of the product line or customer segments, taking advantage of the leader's inflexibility due to high volume. The risks of these sorts of outcomes will rationally deter firms in many industries from even attempting learning-curve-driven strategies.¹¹

A second formulation of learning is that it is a function of time in the industry. Here costs decline for many of the same reasons, but the innovative process that discovers opportunities to lower costs is a function of how long the firm has been looking. If learning is a function of time, rather than cumulative volume, the implications for strategic interaction are much different. Here firms will strive for early entry or acquisitions of early entrants as a base for subsequent strategies. New entry and growth by followers do not threaten the learning advantages of leaders. Conversely, there is no mechanism for leaders to get further ahead. Rather, the cost differences are stable but shrinking as a proportion of total cost as the industry and firms grow older. The only way a firm can improve its relative position in such a world is to acquire an older firm (or its

¹⁰ Cumulative volume learning is most likely to lead to dominant outcomes in markets where innovation is incremental and correlated to the level of R. & D. spending. Here the market share leader can readily preserve its low-cost position.

¹¹ For a more detailed discussion of these risks, see Porter (1980), note 4 supra, chs. 1 and 12.

personnel). Unlike the cumulative volume formulation, however, the learning rate cannot be accelerated, and hence the ability of a firm to alter its position (and hence the incentive to do so) is much less pronounced.

Learning as a function of time raises few special problems for antitrust except in the premium it places on early entry. Since technical efficiency is maximized if there are many early entrants, policy that prevents one early entrant from erecting entry barriers towards others is indicated. While prevention of artificial entry barriers is a bread-and-butter concern of anti-trust, however, what is novel here is the need to do so very early in an industry's development. Antitrust has, by and large, ignored this period of an industry's development, focusing rather on more mature industries, when remedies can have little or no impact on time-related learning.

A third formulation of learning is that it depends on exogenous technological changes, such as improvements in machinery purchased from equipment suppliers, improvements in raw materials, exogenous inventions such as computer controls, and so on. Here there is no link between learning and market position, except insofar as market position cuts against the ability of firms to

assimilate exogenous developments. For example, exogenous learning may involve new scale-sensitive machinery, in which case small-scale firms then fall behind in cost position.¹²

Exogenous learning also offers few novel concerns for anti-trust. Where its employment in the industry is scale-related, exogenous learning can raise or exacerbate the static-efficiency/market-power dilemma. Where diffusion of exogenous learning is not scale-related, the primary antitrust concern is to insure that all firms in an industry get access to the learning and no firm is able to prevent diffusion to others through contractual arrangements or other practices. Policies to reach these ends should raise few dilemmas, because the fact that learning is exogenous to the industry should mean that there is little chance of blunting the incentives for innovation in the process controlling practices that impede wide diffusion.

This discussion suggests that the nature of the antitrust policy problem raised by dynamic cost reduction depends centrally on the precise nature of dynamic cost reduction present in the industry. Thus, policy towards monopolization can no longer aim for sweeping rules (like maximum market shares) or get lost in debates over intent, but must proceed on a market-by-market basis governed by the economic structure involved. Where conditions

¹² Though it may well be sensible for small firms to wait and let others make the first mistakes in introducing exogenous innovations.

lead to a learning curve strictly related to cumulative volume, then the policy dilemma is perhaps most acute. Here a firm's desire to drive competitors out of a market to increase its market share can, in some industries, have a legitimate positive justification in efficiency. Policy must get over its preoccupation with sorting "good" monopolists from "bad" monopolists and confront directly the tradeoff between efficiency and market share that exists in such industries. Since appropriable learning curves based on cumulative volume clearly occur empirically, enhanced attention to dynamic cost reduction should add new respectability to the cost justification for firm behavior, which has had a tendency to be viewed as a smokescreen used by business to further its own ends. Some more specific policy options will be discussed below.

In practice, static scale economies and dynamic cost reductions of all three kinds often interact to cause a competitive process resulting in a dominant market leader with significant and stable cost advantages over existing and potential competitors. For example, Procter & Gamble (P&G) has dominated the huge disposable-diaper industry largely through the operation of scale economies and the learning curve. Appendix A shows an estimated income statement for P&G in disposable diapers, compared to that of an entrant into the market aiming at a nationally branded position who begins an entry in 1974 and reaches equilibrium

market share in 1980.¹³ The assumptions which yield the entrant's income statement are relatively optimistic, and P&G is assumed not to retaliate. P&G's estimated cost advantage of 15 percent once the entrant reaches equilibrium (with an even greater cost advantage while the entrant is reaching its target share) is due to a sharp proprietary learning curve in manufacturing and product development, significant static economies of scale in research, advertising, sales force, transportation, and (to a lesser extent) in manufacturing, product differentiation, and absolute cost advantages due to raw material access and favorable access to hospital sampling kits for new mothers. The bulk of these cost advantages are due to true economies due to scale and learning curve phenomena and not to bargaining power.

Appendix A clearly illustrates the degree to which static and dynamic considerations cumulate and interact to produce a low-cost dominant leader, and the enormous risk an entrant would have to bear to enter the disposable-diaper market.¹⁴ It is also easy to see, using such a calculation, where P&G's costs of entry were lower than the hypothetical entrant's, largely because P&G avoided some of the fixed costs the entrant must bear once P&G is in the

¹³ Essentially, the same situation will face a follower in the market who aspires to national-brand status.

¹⁴ This risk of entry is made even greater by P&G's likely retaliation to entry. Another calculation that illustrates this point is found in R. G. M. Sultan, Pricing in the Electrical Oligopoly, volumes I and II, Division of Research, Harvard Graduate School of Business Administration (1974).

market. Remedies that would induce entry into disposable diapers or allow followers to gain significant market share from P&G must be extreme. Eliminating all P&G advertising, for example, would only lower P&G's cost advantage by perhaps 3 percentage points out of 15. Any effective remedy, further, would force a significant loss in efficiency. Breaking P&G into two equal pieces and forcing it to divest one might come close to restoring competitive balance, but would lead to higher costs as a percentage of sales in R. & D., manufacturing, sales, and transportation.¹⁵

IV. The Firm as an Interrelated Portfolio of Businesses

Industry histories reveal that in strategic interaction, firms must often be viewed as portfolios of activities rather than as entities competing independently in each industry in which they have operations. Widespread diversification in the U.S. since the 1960's has led to business units of multibusiness firms being the rule rather than the exception as competitors in most industries. Not only does logic argue that firms will simultaneously optimize over their entire range of business units, but modern strategic planning practice emphasizes that firms should view their businesses as a portfolio and should manage them accordingly.¹⁶

¹⁵ And raise difficult problems with the brand name.

¹⁶ See, for example, a summary of the popular Boston Consulting Group's, McKinsey & Company's, and PIMS' approaches to portfolio planning in Abell and Hammond (1979), note 6 supra.

Modern portfolio management approaches place great stress on taking cash from less favorable or slow-growing business units and plowing it into gaining market share in promising business units, making the firm an internal capital market with a deep pocket. There is widespread belief among managers that the diversified firm gains resulting advantages in access to capital compared to single-business firms, implying imperfections in the external capital market.¹⁷

Going hand in hand with the fact that many of today's large firms are managed as portfolios of businesses is the existence of pervasive interrelationships among the activities of many diversified firms. These interrelationships range from relatively intangible forms--like the fact that P&G has a high degree of accumulated knowledge in market research and consumer testing that can be applied to any of its consumer products--to actual sharing of brand names, distribution channels, purchases, logistical networks, service organization, sales forces, component fabrication, assembly plants, and so on, among often disparate products.

Such interrelationships can have a major impact on costs, and mean that traditional product or industry boundaries are no longer

¹⁷ The social efficiency of this internal allocation of capital advantage must still be regarded as dubious and depends critically on still-undeveloped understanding of the capital market's imperfections and distortions introduced through the tax system.

sufficient to define relative cost positions among firms. For example, P&G employs the same retail channels, sales force, and logistical system in disposable diapers as it does in its other paper products (bathroom tissue, paper towels). It saves perhaps 2 to 4 percent of sales by using its Charmin Division sales force to sell both diapers and paper products during the same sales call, spreading the fixed costs of the call over more units. Before its diaper volume became large, P&G saved transportation costs (about 10 percent of sales) relative to a firm that only sold diapers, by shipping full carloads combining diapers and other paper products. P&G has probably taken advantage in diapers of expertise in paper products gained in its other paper products businesses and Buckeye Cellulose Division (and vice versa). Finally, P&G reportedly eliminates additional costs by not having to offer as many promotions to the retailers to secure favorable shelf positioning as other diaper brands, because of its presence in other grocery-store product lines as well as its diaper-market share. The competitor that is not optimally diversified, then, faces a significant cost disadvantage relative to P&G in disposable diapers, even before considering industry-specific economies of scale or other mobility barriers. Savings of this order of magnitude due to appropriate diversification are not atypical in my study of a wide range of industries, and they often

involved cost savings in groups of products more disparate than those in the P&G example.¹⁸

Where firms have interrelated portfolios of businesses that are managed as such, some important behavioral and normative implications are raised for examining strategic interaction in a particular industry. First, the objectives (and behavior) of a particular business unit can only be understood by studying the firm's entire portfolio. The firm will invest scarce capital, managerial time, and attention in pursuing learning curves or otherwise gaining market share in some businesses, while allowing market share in others to erode ("harvesting"). Further, a diversified firm's behavior in one business will be affected by how that behavior will impact interrelated businesses. The firm may rationally price below variable cost in one business in order to build market share and volume that will lead to cost reductions in shared distribution or logistics facilities that lower cost for the whole group of related businesses using these facilities. Conversely, a firm may defend a particular business against competitive attack to a degree that appears irrational (or "predatory") until one recognizes that if market share is lost in that

¹⁸ Note, also, that many of the cost savings enjoyed by P&G are real economies and not the fruits of bargaining power.

business, the market position of other related businesses will be damaged. Thus, the complications raised by the learning curve for determining predation will be exacerbated by cost-related diversification. Any industry-specific test for market power or for the social appropriateness of a particular competitive practice becomes similarly suspect. Preventing an industry leader from defending its share in an industry may allow a related diversified firm to build even greater barriers through improving its position in that industry on top of superior volume in related industries.

Another consequence of the existence of interrelated businesses managed as portfolios is that there will be strong pressures in many industries for offensive or defensive related diversification or vertical integration. Firms will be motivated to search for related diversification in order to create strategic cost advantages that carry over to their other businesses. A firm making sophisticated castings which it assembles into one end product, for example, may look for other (otherwise unrelated) industries using similar castings, so that it can reap economies of scale that lower overall costs. Conversely, P&G's presence in disposable diapers in combination with facial tissue, bathroom tissue, and paper towels placed strong pressure on Scott Paper and Kimberly-Clark (Kleenex) to enter the disposable diaper field defensively. If they did not, both firms might face serious disadvantages in transportation costs, selling costs, relationships

with retailers, and even raw material purchasing costs.¹⁹ Offensive and defensive motivations for related diversification can both be present in a given situation. Johnson & Johnson (J&J), for example, is the preeminent firm in many baby-care product lines. Disposable diapers represented the only rapidly growing new product area in the baby care field and offered obvious possibilities for transference of the J&J brand name and distribution system. Hand in hand with these as motivations for J&J's entry into disposable diapers was the threat that P&G and other diaper firms posed for entry into J&J's traditional baby care products, as these firms developed brand names associated with baby care and sales volumes that offered possibilities for economies of joint operation in several baby-care product lines.

The result of such offensive and defensive motivations for related diversification is that we should (and do) observe many situations in which firms are diversified in parallel or nearly parallel ways and compete with each other in multiple industries. For example, John Deere, Caterpillar Tractor, International Harvester, Ford, and J. I. Case, among other firms, all have come over time to operate in multiple and overlapping product areas in

¹⁹ This is the same basic motivation as that identified by Knickerbocker, Oligopolistic Reaction and Multinational Enterprise (1973), in his study showing the marked tendency of multinationals to defensively enter a country market if one of their competitors did.

the farm equipment, construction equipment, and light- and heavy-truck sectors. Related diversification driven by the search for strategic interrelationships has become the dominant motivation for diversification in the 1970's and now the 1980's, supplanting the conglomerate diversification of the 1960's.

Such related diversification with important cost consequences raises some vexing questions for antitrust policy above and beyond confusing what is predatory behavior. On the one hand, cost-motivated offensive- and defensive-related diversification increases efficiency, and can and does have the procompetitive effect of encouraging entry when diversification involves green-field expansion or acquisition of a base that is subsequently developed. Often the synergies of related diversification allow entry into industries that might in their absence seem to offer insurmountable barriers. On the other hand, the process of offensive and defensive entry into related clusters of businesses may ultimately lead to a significant increase in overall entry barriers by forcing a newcomer to enter the whole cluster of businesses (be optimally diversified) or face a serious disadvantage.²⁰ Further, related diversification can exacerbate the efficiency/market-power tradeoff posed by the learning curve when they occur together.

²⁰ The basic problem bears some resemblance to the familiar vertical integration problem.

Another consequence of the existence of interrelated businesses managed as portfolios is that strategic interaction can and does involve multiple industries. Where businesses are interrelated, firms rationally formulate strategic plans in related groups of businesses simultaneously. A move by a competitor in one industry can be met by a response in that industry or in another related industry in which that competitor also operates. To preserve overall balance, for example, Scott Paper could counter a P&G move in facial tissue either through a response in facial tissue or one in bathroom tissue designed to preserve the total volume of product moving through the same sales force and distribution system (and thereby its relative cost position).

Where strategic interaction among firms occurs simultaneously in several industries, this in some ways complicates the achievement of tacit collusion by greatly increasing the number of variables in the implicit bargain. It also means that a firm's improvement in market share in one industry can have benefits elsewhere in the portfolio, raising the incentive for attempting to gain share. However, there are also some reasons which suggest that competition in multiple industries can facilitate tacit collusion. Competition in multiple industries offers possibilities for various forms of side payments. For example, one firm could yield share in an industry, allowing the leader to raise entry barriers to new firms, while the firm was allowed to gain share in another industry without retaliation. Furthermore, firms

can maintain equal profits and market power despite unequal shares, as long as they divide up markets in such a way as to preserve balance in the volume of shared components, the volume of products moving under shared brand names, and volume through shared channels, sales force, or logistics facilities.

Competition in several industries may also allow otherwise unavailable forms of market signaling and competitor disciplining that enhance tacit collusion by lowering the risk of competitive outbreaks. For example, what I have called a cross-parry is a situation in which a firm responds to a competitive threat in one industry with a response in another industry in which it and the threatener compete. Compared to having to meet the threat directly, such a response can credibly signal displeasure, while being relatively easy to disengage from without triggering a series of moves and countermoves. This is because of the risk that a direct response might be interpreted mistakenly as an attack rather than as a signal of displeasure. Further, where firms compete in several industries, a punishing retaliation to a move in one industry can be much more severe, because it can involve simultaneous attacks in a number of businesses. Finally, a firm can punish another's transgressions in one market in another jointly contested market where the defender's share is small, or where the aggressor is the most vulnerable, thus forcing the aggressor to bear a high relative cost. Thus, simultaneous competition in multiple industries raises new issues for antitrust scrutiny of competitive practices.

V. Global Competition

Some important issues for antitrust are raised by the increasing incidence of industries in which strategic interaction is global, an observation that becomes apparent when one examines industries such as automobiles, television sets, broadcast equipment, and many others. Global industries emerge when there are sources of strategic advantage to competing in a coordinated manner in a number of national markets, such as large scale economies in manufacturing or research or internationally cumulative learning.²¹ In some global industries the advantages stem from current scale economies or learning, while in others the global firm may be utilizing past investments in intangible assets.²²

In global industries, while some mobility barriers are market-specific (e.g., distribution channels), other potentially larger barriers stem from the firm's global position (e.g., manufacturing scale economies). In such industries, the firm's behavior and market power in any one national market are determined by its situation globally. It may price below cost in the U.S. market, for example, so that it can gain enough volume to lower production cost to successfully compete against global

²¹ See Porter (1980), note 4 supra, ch. 13, for a more extended discussion of the economics of global industries.

²² For the classic treatment of the utilization of intangibles by multinationals, see R. E. Caves, "International Corporations: The Industrial Economies of Foreign Investment," 38 Economica 1 (1971).

competitors in Europe or Latin America. If such economies are in fact attainable, such behavior is not predatory but motivated by real efficiencies, though it surely leads to barriers to entry. Barriers to entry/mobility in global industries clearly often exceed those that can exist in national industries.²³

Obviously, in global industries, antitrust analysis must be global. In an industry that is global, the tradeoff between domestic market and efficiency is eased because even the dominant domestic firm will face ample potential competition.²⁴ Structural remedies that increase competitiveness from the sole point of view of the U.S. market can seriously backfire in a global industry. Limiting a firm's market share in the United States can threaten its efficiency and hence competitive position elsewhere in the world, for example, and invite the entry of foreign firms into the U.S. market that might ultimately be able to erect even higher barriers.²⁵

Global competition and related diversification interact in many industries to produce situations in which a firm must be both

²³ The increase in the number of industries in which competition is global has led to an increase in what I call coalitions, or transnational horizontal agreements among firms with different home markets. These raise some intriguing issues for antitrust.

²⁴ Unless all firms are global in parallel.

²⁵ Note, however, that if global firms have merely capitalized on past investments in intangibles, then the existence of worldwide competitors does not imply any efficiency gain to allow a dominant U.S. leader.

global in scope and optimally diversified in order to be competitive. For example, a television-set manufacturer that is not global and not diversified into videotape recorders will have little chance of success in the next decade. This exacerbates the policy considerations that have been raised.

VI. Signaling and Tacit Collusion

Industry histories can reveal much about the sources of the current competitive equilibrium by uncovering patterns of market signaling among existing competitors and potential entrants. These are a myriad forms of market signals that communicate to competitors with varying degrees of credibility without the need for actual large-scale investments or moves in the marketplace, some of which I have attempted to catalog elsewhere.²⁶ Some of the most common are shown in figure 1. Careful examination of competitive behavior and public and quasi-public statements by managements, with extreme attention placed on the sequencing of statements and events, can expose signaling behavior.

Since market signaling can clearly facilitate tacit collusion, eliminating market signaling practices enhances competition. However, while I am generally skeptical of market signals, they raise some vexing issues for antitrust. While signals surely can have socially undesirable effects in deterring entry or facilitating tacit collusion among existing firms, the problem is

²⁶ Porter (1980), note 4 supra, ch. 4.

that nearly all market signals have some socially beneficial component. Announcements of capacity expansion can promote efficiency through reducing excess capacity due to bunching of capacity additions. Publication of actual prices or pricing policies can allow buyers to bargain more effectively. Public comment by executives on industry events, or company announcements which state the logic of firms' moves, can increase the degree to which the capital markets are well informed. The problem is that market signals contain information, and information is beneficial to market functioning.

Another problem with policy toward market signals is that there are so many forms of market signals that limits on particularly obvious ones for which the positive social benefits seem negligible may do little to control undesirable signaling behavior. Since so many aspects of company behavior can be signals, banning signals is a bit like trying to keep firms in a tight oligopoly from recognizing each other's existence.

VII. Entry/Mobility Deterrence

Study of strategic interaction in industry histories reveals a wide array of behavior available to firms to deter entry, much of which has been little studied by industrial organization researchers. Since the same entry-detering tactics can also be employed to deter or defend against attempts at increasing share by incumbents, the analysis of that case (mobility deterrence) is parallel.

Some behavioral and normative issues in entry-detering tactics can be illustrated through pursuing my example of the disposable-diaper industry. Figure 2 shows some of the feasible behavior available to P&G to deter entry (or discourage market share gains by incumbents) in the disposable-diaper industry. The tactics in figure 2 are generalizable to many industries. Further, they reflect the fact that entry (and mobility) is not an instantaneous move but rather takes time and often occurs in a sequential fashion, involving the occupation of a series of strategic groups over time.²⁷ Thus, if the entrant or competitor seeking to gain share can be punished early in the process, he may give up altogether. Much of the recent literature on entry deterrence makes a sharp distinction between the pre- and postentry game which is inappropriate.²⁸ It may be rational for the incumbent to carry out a threat long after the entrant has first appeared in the market, for this reason and because the incumbent's reaction to this entrant (or uppity incumbent) can signal other entrants and incumbents.

The alternative entry-detering behavior in figure 2 varies along a number of significant dimensions for the competitive outcome. The tactics vary in the certainty with which they inflict

²⁷ See Caves and Porter (1977), note 4 supra. There are often one or more particularly desirable sequential entry paths.

²⁸ For example, Salop (1979), note 5 supra, at 335; R. Schmalensee, "Entry Deterrence in the Ready-to-Eat Cereal Market," 9 Bell J. Econ. (1978), pp. 313-14.

a penalty on the potential entrant (or competitor) and in the certainty with which the potential entrant (or competitor) will notice them. This means that they have differing entry-detering values.

More importantly, though, the tactics also vary greatly in their relative cost to the dominant firm (P&G) compared to the potential entrants (or competitors). Some tactics, like public comment, or forms of signaling such as speculative patent suits, or introducing a blocking brand into test market, cost the leader relatively little but can significantly raise the expected costs (or risks) of the entrant. Other tactics, like increasing advertising in an entrant's rollout markets or introducing a new generation of the product, have a considerable cost to the leader but inflict a proportionally even higher cost on the entrant or smaller-share competitor, because advertising and product development are subject to economies of scale. Furthermore, such entry-detering tactics may raise product differentiation or overall demand, which benefits the leader and offsets some of the cost to him. On the other extreme, competitive price-cutting inflicts a huge cost on the leader because of the leader's large overall volume and the fact that price cutting by the leader will induce few customers to switch to him because of his already large share. Offering cents-off coupons in the market where an entrant is introducing his product ("rolling out") can target the entry-detering investment better than an across-the-board price cut,

but still it is relatively more costly to the leader because of his larger share and the fact that unlike the entrant, most coupons will be redeemed by the leader's already existing customers.

Entry/mobility-detering behavior also varies in its ability to be localized to a particular potential entrant or competitor. Advertising in test markets can localize the defense to the particular product features stressed by a particular entrant. Couponing, on the other hand, will affect (and thereby cause response from) all competitors in the market. The potential entrant or competitor is clearly placed in the best possible situation where the leader must make investments in entry/mobility deterrence across the board rather than being able to target its moves to the particular geographic market or part of the product line under siege.

This analysis of alternative entry-detering behavior suggests that the form of competitive behavior often attacked in antitrust investigations of predatory aggressive price cutting may be the most benign in terms of the exercise of market power. Entry/mobility deterrence through predatory pricing is across the board and offers the dominant firm none of the scale economy benefits that some other forms of behavior do. The preoccupation of the predation literature (and antitrust scrutiny) with price is unfortunate, in this light, and might be better spent on finding ways of preventing tactics that deter entry or mobility which are effective and yet low-cost to a dominant firm.

A final case in entry/mobility deterrence is the apparent paradox that it may well be rational for the firm to encourage entry of appropriately positioned and weak firms in order to block other more threatening firms, or to preserve such weak firms when they get into difficulty.²⁹ The presence of other weak incumbents, for example, may lower the prospective entrant's initial share or force the entrant to bear retaliation from these incumbents as well as the leader. The leader may well encourage entry of weak firms into segments that offer natural possibilities for sequenced entry, in an analogy to the brand-proliferation argument.

VIII. Differences Among Firms' Objectives and Abilities

Study of industry histories suggests that firms' objective functions in a given industry can differ a great deal. The first reason has already been discussed; firms in a particular industry will have differing patterns of related diversification. Further reasons stem from uncertainty and from lack of owner control.

Where there is uncertainty about the future, managers use various mechanisms for predicting the aspects of the future relevant to their decisions. Industry histories illustrate that managements often place great reliance on their past backgrounds

²⁹ Entry can be encouraged through licensing, selling of component parts, and the like.

and experiences as analogies to the current situation.³⁰ Particularistic company norms or rules of thumb are followed. Crude signals are employed, such as the widespread use of the rate of market growth as an indication of future industry attractiveness. All this implies that firms may react differently to a given market situation, and the particular forms of predictive mechanisms employed by individual firms can affect the manner in which investment decisions are made and how the industry evolves. These considerations must be factored into analyses of firms' responses to antitrust remedies, mergers involving their competitors, and so on.

Interacting with these considerations is the separation between ownership and control. The essence of the separation is that managers do not perceive their personal interests to be coincident with maximizing the long-run value of the firm. This can be because of bankruptcy fears, monetary incentives based on short-run profitability, criteria for promotion that often stress short-run performance, and other failures of reward systems that

³⁰ See Porter (1980), note 4 supra, ch. 3.

stem from imperfect information.³¹ Separation between ownership and control also allows other forms of managerial utility maximization, such as pursuit of status, exit barriers due to emotional attachments, and the like. Finally, separation of ownership and control, coupled with various transactions and information costs, also gives room for differences among companies in the decisionmaking power and authority of different functional departments or individual executives. The degree of separation between ownership and control and its internal consequences can and does vary among firms in a given industry, with the result that competitors can differ sharply in their motivations.

Varying separation between ownership and control, differing internal reward systems, and varying approaches to dealing with uncertainty imply that firms may differ greatly in their time horizons, willingness to bear risk, and what they derive utility from. Such factors can strongly influence the pattern of strategic interaction in an industry as well as structural outcomes, by

³¹ For example, a manager may be better off if he makes an incorrect move in an expected value sense than all other competitors also make than if he does not follow competitors' behavior. The fact that other competitors made the move may well insure a favorable evaluation of the manager under imperfect information, or at least allow him to keep his job. If the manager diverged from the industry and proved to be wrong, on the other hand, he would almost certainly lose his job. See M. E. Porter and A. M. Spence, "The Capacity Expansion Process in a Growing Oligopoly: The Case of Corn Wet Milling," Harvard Graduate School of Business Administration Working Paper (October 1978).

leading to some firms investing earlier and more aggressively than others or defending their positions more stubbornly.³²

As firms' objectives vary, so do their abilities, a straightforward corollary of much of my earlier discussion in this paper. Thus, some firms may have more capital to invest to grow more rapidly than others, or more skill in marketing or in cost minimization. All this can also influence strategic interaction and structural outcomes.

IX. The Determinants of Market Structure

One of the most striking points that emerges from the study of strategic interaction through industry histories is the extent to which history and chance play an important role in interacting with economic variables to determine the structural outcome in an industry. Buyer characteristics, technology, and cost functions are surely important determinants of industry structure that have been emphasized in previous research. The discussion here suggests that a dynamic view of cost functions should be added to this list of structural determinants. Yet economic structure does not map fully to the industry outcome. There are at least four other important determinants of structure: various kinds of first-mover advantages, chance discoveries or decisions, the identity of

³² This analysis may explain some of the differences in "animal spirits" of different competitors, observed by F. M. Scherer, A. Beckenstein, E. Kaufer, and R. D. Murphy, The Economics of Multi-Plant Operation: An International Comparisons Study (1975), in explaining different proclivities of aggressive addition of large-scale capacity.

industry participants, and the level of uncertainty during industry development.

The disposable-diaper industry discussed above provides a good example of the first two--chance decisions and first-mover advantages. As the data in appendix A illustrate, P&G held a dominant position in the disposable diaper industry as of 1974. Its 70 percent market share is well protected by significant mobility barriers, and P&G has maintained its position through 1980, despite serious challenges by the likes of J&J, Kimberly-Clark, Union Carbide, and a number of other Fortune 500 firms. Industry structure in the disposable-diaper industry in 1980, now an over-\$1-billion market, is highly concentrated, and informed estimates give P&G well-above-normal returns on investment.

Why did this structural outcome occur in disposable diapers? Part of the answer surely lies in the potential economies of scale and learning that were present to be reaped by the firm that reached high production volume and national distribution, had the appropriate kind of diversification to allow cost sharing, and won the largest market share. P&G pursued these aggressively and is by far the most efficient firm in the industry. Yet almost a dozen firms (including Scott Paper, Kimberly-Clark, J&J, Borden, Colgate-Palmolive, and others) in 1965 had the potential to be in P&G's position in 1980--each with substantial resources, appropriate diversification in related products, and probably the corporate capabilities to master the required technology. The history

of disposable diapers reveals an intriguing sequence of events that has had a major impact on the current structure. Several firms were producing disposable diapers before 1966, when P&G introduced its Pampers brand nationally--among them a unit of J&J, Kendall Corporation, and Parke-Davis. These firms sold crude disposable diapers as a costly specialty product, largely through drugstores. P&G correctly perceived the possibility to make disposable diapers a mass-market product, and developed a way to manufacture diapers at high speed and correspondingly low cost.

While P&G got the jump on the preexisting disposable-diaper competitors, however, a number of other firms also perceived the opportunity posed by disposables. Companies of the stature of Borden, Scott Paper, and International Paper were in the market about the same time, or soon after P&G, with their own disposable diapers. Unfortunately, however, all three of these companies bet on the wrong product technology. Each produced a two-piece diaper, consisting of reusable plastic pants and a disposable liner--the product configuration that had become standard in Europe some years previously.³³ By the time that it became clear that P&G's one-piece diaper was the preferred alternative in the U.S. market, P&G was already national and enjoyed most of the mobility barriers outlined above. While all this was occurring,

³³ The two-piece variety was much cheaper and more nearly cost-competitive with the prevailing substitutes for disposable diapers--diaper delivery services and home laundering.

several other companies, including J&J and Kimberly-Clark, saw the possibility for a superior one-piece diaper using a better liner material and a more absorbent pulp pad. Though their improved diaper indeed proved to be superior by most accounts, by the time these firms got their product on the market, P&G already had a dominant market share and significant cost advantage.³⁴ P&G was able to modify its diaper to incorporate the new features pioneered by competitors in time to counter the entries of these new firms as they rolled out their products nationally.³⁵

Thus, the disposable-diaper market was dominated by P&G through a combination of the extent of latent scale and learning economies combined with P&G's ability to be the first mover. The structure of the industry was largely determined for the next 20 years in the first 4 years after P&G's introduction of Pampers, in 1966. In the high uncertainty that prevailed during this period, P&G bet correctly on basic product technology, was able to achieve some manufacturing process breakthroughs, and built its share and

³⁴ It takes approximately 6 years to roll out a diaper brand nationally because of natural lead times, the requirement to have regional plants because of high transport costs, and the risks of investing in several highly specialized plants all at once before customer acceptance has been tested.

³⁵ This raises another important structural feature of the diaper market, which contributed to the dominated outcome--the fact that technological change after the initial one-piece breakthrough was incremental and more a function of R. & D. spending than chance or creativity. Hence, R. & D. became largely a fixed cost necessary to remain viable in the industry, thereby subject to scale economies and giving the leader (P&G) an advantage.

volume quickly. Once its volume, and other first-mover advantage like product differentiation and favorable access to hospital sampling kits, had allowed it to rapidly build mobility barriers, P&G was able to neutralize subsequent attempts by entrants to gain market share at its expense, despite the fact that the entrants had the necessary financial resources and were diversified in such a way as to allow them to enjoy shared costs with other of their businesses.

Imagine, however, that Scott Paper and Borden had not introduced a two-piece diaper but rather had correctly perceived the one-piece diaper to be the preferred alternative of U.S. consumers. With three capable competitors starting at the same time, it is quite likely that the structure of the disposable diaper industry in 1980 would be a great deal different. Unless other chance events occurred, no one firm would have likely gotten far enough ahead to gain a significant competitive advantage. With incumbents each holding much lower market shares than P&G has had, other entrants would have faced lower barriers to entering the market than those implied by appendix A. The industry in 1980 would likely be one with much lower concentration, but perhaps higher average cost levels.

Would society have been better off with the latter structure? Perhaps, if the equally balanced market shares of three or four competitors promoted vigorous rivalry and nearly normal returns. Yet the socially desirable outcome would depend on whether the

differences between these lower returns and P&G's current returns offset the low costs P&G currently enjoys because of its dominant market share.

This example illustrates that in markets with scale economies and/or learning curves, a significant first-mover advantage is simply getting ahead in the race down the cost curve. Another common first-mover advantage is favorable access to raw material supplies or other inputs. In a world of imperfect contracting, early entrants can often develop loyalties to raw-material or component suppliers that allow them to get first claim on inputs in the periods of shortage that often accompany the rapid-growth phase of an industry's development. Or they can tie up raw materials before market forces bid up their prices.

Another form of first-mover advantage, operative in the diaper industry, is potentially lower-cost brand development into a market. An interesting case of this, recently analyzed by Schmalensee,³⁶ shows that this effect does not depend solely on advertising, but can occur in a world where firms do not advertise at all.

The impact of the second important historical determinant of industry structure--chance decisions--goes beyond the interaction with first-mover advantages discussed in the diaper example.

³⁶ R. Schmalensee, "Product Differentiation Advantages of Pioneering Brands," Working Paper, Alfred P. Sloan School of Management (August 1980).

Early strategic choices made by incumbents in an industry are usually made under great uncertainty. The uncertainty present in the disposable diaper industry early in its development is typical of many industries in this state. During this period, firms must decide among alternative product configurations, marketing approaches, and manufacturing technologies, among other things. Which of these product configurations, marketing approaches, and/or manufacturing technologies becomes the industry standard is partly a function of which is "best" in an underlying structural sense but also can be a function of which alternative happens to be chosen and developed by the largest number of most capable firms. Once a given alternative is developed and refined, adopting another one that could ultimately be better may face substantial catch-up costs or other barriers. Since differing product configurations, manufacturing technologies, marketing approaches, et cetera, may have very different consequences for industry structure, history can influence structure through this mechanism as well.

A third determinant of industry structure revealed by industry histories is the identity of the particular firms that happen to be participants in the industry during its infancy.³⁷

³⁷ The identity of early incumbents is partly endogenous as a result of industry structure but has a high random component in a world of uncertainty, transactions costs, and diversification of established firms. To cite just one example, not all established firms who would be favorable entrants into an industry will be seeking diversification during any given time period.

The strategic choices firms make are usually influenced by their objectives as well as their stock of resources and skills. I have argued above that these will differ among firms. In the U.S. wine industry, for example, early entrants were generally independent, family-controlled companies that had been started de novo. Their resources and skills limited their strategies to ones based on regional distribution, little advertising, and emphasis on quality. The structure of the wine industry that emerged was one characterized by low concentration. In the mid-1960's, however, Gallo had grown to significant size, and a number of large consumer marketing companies entered the industry through acquisition. These firms applied tried and true consumer-packaged-goods marketing techniques to wine. They increased the rate of product introductions (many of them lower quality wines or mixtures of wine and other juices), raised advertising rates, took advantage of established distribution systems to achieve national market coverage, and automated production.

The latter two historical determinants of structure reveal an important cause of structural change in mature industries. Mature industries often undergo structural change because of the entry of new firms with significantly different resources and skills than incumbents, even though underlying economic structure is unchanged. Such an entry can allow the pursuit of new approaches to competing that had latent potential but were unreachable or passed over by previous incumbents. Mature industries also often undergo major structural change when a competitor discovers a way

of competing that was overlooked in the early choices among alternative strategies, even though the underlying economic structure is constant.

A final historical determinant of industry structure in maturity, exposed in joint work with Michael Spence, is the level of uncertainty about future demand and technology during the developmental period.³⁸ High uncertainty in the developmental period tends to limit the optimal size of moves, temper investments to reap first-mover advantages, and thereby promote the development of a more competitive industry structure in equilibrium. Certainty, conversely, encourages attempts at preemptive behavior during the industry's developmental period to reap first-mover advantages and deter subsequent entry.³⁹ While preemptive forays can lead to intense competition in the short run, preemptive strategies tend to result in higher concentration in maturity.

This analysis of the determinants of structural change besides underlying economics illustrates the potentially high leverage that antitrust policy can potentially have early in the development of an industry compared to its ability to change structure in the mature period. Yet, during this period, most industries are usually ignored from an antitrust point of view.

38 Porter and Spence (1978), supra note 31.

39 With certain future demand, the firm that can credibly commit to build capacity to meet this demand may be able to keep others from trying.

While exactly which firms reap a first-mover advantage or an advantage from a chance innovation is not in itself usually normatively significant, the process by which the structural outcome is determined (which does have normative significance) may be influential in ways that have little cost in social terms.

X. Some Additional Implications for Antitrust Policy

I have identified a number of implications of strategic interaction for antitrust policy above. However, a number of more general points emerge as well as some more particular policy implications in several important types of industry settings. A general point that seems hard to overemphasize is that there seem to be few standards for unreasonable market power that apply to all industries. The normative significance of market power can differ a lot, depending on its bases and the manner in which it was achieved. Second, the traditional focus of antitrust on the narrowly defined (based on product substitutability) industries with geographic market boundaries stopping at the U.S. border has been made obsolete in many situations by recent developments in strategic planning practice and shifts in the fundamental ways in which major corporations compete in the 1980's.⁴⁰

⁴⁰ This is not to say that some antitrust analysis and proceedings do not take such things into account, but rather that many still do not.

In pursuing more specific policy recommendations, we must treat separately those industries where a significant efficiency/competition tradeoff exists because of large scale economies, related diversification, or long-lived proprietary learning based on cumulative volume.⁴¹ In all three of these situations, a dominated outcome is likely. Except in the case of pure static scale economies, conventional standards of predation should not apply, because the usual definition of variable cost is not appropriate. In such industries, we are in a second-best world where the focus of policy ought to be on encouraging competitive pressure on the leader without sacrificing efficiency through tempering incentives for growth and market share. Direct intervention in the competitive process is generally bad policy. Some policy alternatives will be described below.

In industries where efficiencies due to scale, diversification, or learning are only moderate, strategic interaction can still lead to a dominated outcome if a leader can move aggressively to get out ahead and bolster his position with other barriers or first-mover advantages. Once the industry becomes so dominated, practical remedies are limited. Hence, the best hope for improving the outcome is to act during the developmental process in the industry, before the leader gets too far ahead. Unfortunately, the decision to take any antitrust action early in

⁴¹ If the industry is global, of course, there is no problem.

the life of the industry requires a forecast of what the structural outcome in the industry will be--an uncertain prospect at best--and we must still be concerned about tampering with incentives for static and dynamic cost reduction.

These reasons lead me to believe that the most desirable goal for policy in developing industries is to work to insure indirectly that one firm does not unnecessarily get too far ahead, to facilitate the right kinds of firms entering, and to stimulate competitive pressure from sources other than direct U.S. competitors. This might consist of the following kinds of policy, many of which could also improve performance in industries with large economies of scale, cost sharing, or learning:

- (1) Selective relaxation of the standards for horizontal mergers among nonleaders. While mergers do not necessarily lead to efficiencies, in some circumstances they can be pooling learning or providing the volume to construct efficient scale facilities, logistics systems, et cetera.
- (2) Selective relaxation of standards for related acquisitions of nonleaders, and even, in some cases, leaders. Some related acquisitions can, through opportunities for cost sharing, give rise to real economies and allow followers to seriously challenge leaders. Such acquisitions may well lower the cost of entry for outside firms bent on challenging a leader and thus yield an effective entrant whose entry would not occur de novo. The usual concern that such an acquisition will not be used as a base for aggressive growth is minimized where industry structure promises to yield a dominated outcome, because a follower acquired and not invigorated will likely be driven out of the market. Further, where related diversification produces significant real economies, even acquiring a leader may be justified, though our tolerance for such acquisitions should be much lower.

- (3) Elimination of artificial barriers that allow a leader to get ahead of followers, and entry-detering tactics that do not involve any countervailing social benefits. In many industries, artificial barriers such as unresolved patent suits filed by the leader, licensing delays, delays in product certification, and the like, give a leader what turns out to be an unsurmountable jump. Antitrust authorities should work actively to reduce such barriers to a minimum by working with sister agencies and the courts to get expeditious resolution of decisions, consistent with protecting the rights of those involved. Furthermore, entry-detering tactics which merely delay or punish competitors, rather than propelling the incumbent down the cost curve or improving its product offering, should be eliminated. Eliminating these offers no risk of compromising social goals.
- (4) Preserve customer bargaining power. Customers with bargaining power can ensure that even a strong leader passes on many of the benefits of his efficiency. Policy towards vertical contractual relationships needs to be particularly sensitive to agreements which co-opt customers in industries prone to a dominated outcome.
- (5) Open trade policy and elimination of any artificial barriers to entry by foreign multinationals. Elimination of governmental as well as any other trade barriers or restraints on foreign multinational entry can yield effective competition despite a tendency towards concentration in the U.S. market.
- (6) Approval and encouragement of cost-saving contractual arrangements among competitors. A second-best approach to preserving competition, while at the same time not sacrificing too much efficiency, is to allow competitors to form joint ventures to perform scale- or learning-sensitive production or distribution operations, or to sell scale- or learning-sensitive component parts, services, or even portions of the product line among themselves. As long as such arrangements are sanctioned only with due warnings about the consequences of abuses, they seem to offer a possibility of

both low costs and a reasonable number of competitors.⁴² Such arrangements are common among foreign firms such as Japanese producers. Despite very favorable cost positions, for example, there are five major Japanese television set producers who sell scale-sensitive color picture tubes among each other.

XI. Mature Industries

Once an industry has become mature, tough standards for predation begin to make more sense, with the caveat that cost sharing or global competition should lead to viable defenses. Given the often entrenched positions of leaders in mature businesses, however, the best hope for increasing competitiveness in concentrated, mature industries seems to rest in encouraging the entry of optimally diversified (or global) firms that can thereby offset the advantages of incumbents, have the resources to support major investments to overcome barriers outright, and/or can perceive new ways of competing that allow them to vault mobility barriers cheaply or nullify past learning or scale advantages of incumbents. Since internal entry is perceived to be very risky against entrenched incumbents, this implies that related acquisitions by established firms of industry followers or near-leaders be actually encouraged. Existing merger policy is most appropriate in mature, unconcentrated industries, to keep them that way, rather than in mature oligopolies.

⁴² Some parallel suggestions are made by Scherer et al. (1975), ch. 9, note 37 *supra*, though largely in response to static single and multiplant scale economies and not to learning effects.

FIGURE 1

Forms of Marketing Signaling

- Prior announcements
- Public discussion of moves or industry events
- Disclosure of data about costs, market position, or other company strengths
- Publication of policies for pricing and determination of other competitive variables
- Fighting brands
- Form and timing of moves relative to industry convention
- History of response to entry or competitor moves, in any of the industries in which the firm competes
- Maintenance of retaliatory resources, such as excess cash
- Actions against new competitors' products in test markets
- Cross-parry in another jointly contested industry
- Behavior divergent from apparent profit maximization
- Binding (and communicated) commitments that raise exit barriers, such as long-term contracts, capital investments, and others

FIGURE 2

Possible Entry/Mobility Detering Tactics in Disposable Diapers

	<u>Cost to Procter & Gamble (P&G)</u>	<u>Cost to an Entrant (Competitor)</u>
<u>Signaling</u>		
1. Signaling a commitment to defend position in diapers through public statements, comments to retailers, etc.	none	raises expected cost of entry by increasing probability and extent of retaliation
2. File a patent suit	legal fees	legal fees plus probability that P&G wins the suit with subsequent cost to the competitor
3. Announce planned capacity expansion	none	raises expected risk of price cutting and the probability of P&G's retaliation to entry
4. Announce a new generation of diapers to be introduced in the future	none	raises the expected cost of entry by forcing entrant to bear possible product development and changeover costs contingent on the ultimate configuration of the new generation
<u>Capacity</u>		
5. Build capacity ¹ ahead of demand	present value of investment in excess capacity	raises the risk of price cutting and the probability of P&G's retaliation to entry

FIGURE 2 (Continued)

<u>Price</u>	<u>Cost to Procter & Gamble (P&G)</u>	<u>Cost to an Entrant (Competitor)</u>
6. Cut price	across-the-board reduction in sales revenue	equal proportional reduction in sales revenue but smaller total lost revenue; demand for entrant more likely to be price elastic if have lower product differentiation
7. Cut price in "new-born" diaper sizes	focuses price cut on first diaper a mother will buy	greatly raises the cost of inducing trial by the new mother, who is most susceptible to switching brands
8. Increase cents-off couponing in test or rollout markets	focuses effective price cut on contested markets; most coupons will reduce revenues on sales P&G would have made anyway	most coupons redeemed will lead to incremental revenue from <u>new</u> buyers
9. Load buyer with inventory by discounting large economy size package in rollout markets	reduction in sales revenue part of sales; probably to price-sensitive customers most susceptible to competitor incursion	greatly raises the cost of inducing trial for the entrant
<u>Advertising</u>		
10. Raise advertising nationally	the cost of a given dollar increase in advertising will be spread over a large sales volume	must match P&G in absolute message volume to maintain relative position, but the cost of advertising is spread over much smaller base; may also suffer diseconomies by not having national media available

FIGURE 2 (Continued)

	<u>Cost to Procter & Gamble (P&G)</u>	<u>Cost to an Entrant (Competitor)</u>
<u>Price</u>		
11. Spot advertising overlays in test or rollout markets	same, but focuses resources on contested markets	same, but no disadvantage due to national media access
<u>Product</u>		
12. Put a "blocking" brand ² into test market	cost of product development and market testing	credible threat that second brand will be aggressively rolled out nationally if entry occurs; raise probability of closing off lowest-cost entry into the industry
13. Introduce a "blocking" brand ³	cost of brand introduction	raise cost of entry by exposing entrant to more direct retaliation by the leader
14. Introduce a new generation of the product ⁴	fixed cost of new product development expenditures and manufacturing changeover spread over large volume	fixed cost of product development and manufacturing changeover must be spread over smaller volume; also elevates the risk of potential entrants that future product generations will make existing investment obsolete
<u>Exit Barriers⁵</u>		
15. Raise exit barriers through investment in specialized assets, long-term supply contracts with raw material sources, high labor severance or layoff benefits, etc.	increase cost of failure	credible threat that leader will defend his position

FIGURE 2 (Continued)

1 This case was analyzed by A. M. Spence, "Entry Capacity Investment and Oligopolistic Pricing," 8 Bell. J. Econ. 534 (1978).

2 A brand which occupies a natural market segment for entry. In the diaper industry, this is a premium brand. The second most natural segment would be a lower-cost, lower-quality brand positioned between the regular Pampers product and private labels. Given the product performance sensitivity of the customer, however, this is much less likely to succeed.

3 This situation has been analyzed by Schmalensee (1978), note 36 supra.

4 Under some circumstances, it can be more effective to introduce the new generation after the entrant has begun a rollout, because this makes the entrant's investment in rollout of the old generation obsolete and damages its brand reputation, as well as forcing it to match the new generation. The entrant can be more likely to withdraw under these circumstances.

5 For a discussion of exit barriers, see Caves and Porter (1976); Porter (1980), note 4 supra.

FIGURE 3

A. Estimated Diaper Unit Cost for Procter & Gamble*

	1974 <u>Dollars per unit</u>	<u>Percent of total</u>
Raw materials--		
Fluff pulp	\$.006	15.0%
Cover sheet	.005	12.5
Backing sheet	.001	2.5
Packaging	.003	7.5
Manufacturing labor	.003	7.5
Depreciation and maintenance	.001	2.5
Utilities	<u>.001</u>	<u>2.5</u>
Total manufacturing costs	\$.020	50.0%
Freight	.004	10.0
Selling, general, and administrative costs	<u>.006</u>	<u>15.0</u>
Pretax profit	\$.010	25.0%
Manufacturer Sales Price	\$.040	100.0%

* Based on Bruce Kirk, Disposable Diaper Investment Potential, R. W. Presspich and Co., Inc.

FIGURE 3 (Continued)

B. Sample Investment Decision Facing Entrant into the Disposable-Diaper Industry in 1974

(1974 dollars in millions)

	Pre-1975	1975	1976	1977	1978	1979	1980	%
Total Estimated U. S. Market		--	--	--	--	--	\$700	
<u>Potential Entrant Operating Statement</u>								
Sales		\$ 5	\$ 20	\$ 60	\$100	\$150	\$200	100
Implicit market share		--	--	--	--	--	29%	
Contribution		1.38	5.5	16.5	27.5	41.3	55.0	27.5
R. & D.		10.0	10.0	10.0	10.0	10.0	10.0	5.0
Sales force		.25	1.0	3.0	5.0	6.0	8.0	4.0
Advertising		2.8	5.6	8.4	11.2	15.0	11.0	5.5
Coupons		.5	2.0	6.0	5.0	1.5	2.0	1.0
Samples		1.3	1.9	2.5	3.1	3.6	3.0	1.5
Pretax cash flow*		(13.5)	(15.0)	(13.4)	(6.8)	6.2	21.0	10.5
<u>Capital Investment (before operating losses)</u>								
R. & D. prior to startup	\$20.0	--						
Plants	20.0	20.0	20.0					
Cumulative capital investment	40	60.0	80.0	100.0				

* Depreciation is included in manufacturing costs.

FIGURE 3 (Continued)

Assumptions in Figure 3B

1. Total market in 1980
 - 3.8 million births
 - 75 percent penetration of disposable diapers
 - 55 changes per week
 - baby in diapers an average of 25.5 months
 - manufacturer's selling price \$.04 (same as 1973)
2. Six-year rollout, reaching national distribution in 1980.
3. Five regions in the United States of equal baby population. Enter one new region per year.
4. Assume pattern of sales growth similar to that of Kimberly-Clark.
5. Assume 27.5 percent contribution to advertising, sampling, couponing, sales force, and profit. Baseline for this figure is figure 3A above, which gives the estimated income statement for Procter & Gamble (P&G):
 - assume no purchasing disadvantage (materials 37.5 percent)
 - assume entrant's manufacturing cost = 20 percent (instead of 12.5 percent) due to learning curve and scale economies
 - assume entrant's freight cost = 13 percent (instead of 10 percent) due to lack of full carload shipments

FIGURE 3(Continued)

- assume administrative costs = 3 percent (best guess for P&G)

Revenues

		100%
Materials	37.5	
Manufacturing	20.0	
Freight	13.0	
Administrative	<u>3.0</u>	
Total	73.5	

Contribution 27.5%

6. Assume product and process R. & D. a fixed cost of \$10 million per year (estimate of expenditures of major competitors).
7. Assume use of food brokers until 1979 (at cost of 5 percent of sales) and own sales force thereafter (4 percent of sales).
8. Assume advertise on a regional basis until 1980. In each region, spend at a level to match P&G's 1973 spending plus a catch up of 15 percent plus a penalty for not being national of 10 percent (P&G's network advertising is approximately 1/3 of total advertising; network discount estimated at 30 percent).
9. Assume cents-off couponing at rate of 10 percent of sales price in 1975, 1976 and 1977, 5 percent in 1979, and 1 percent of sales thereafter.
10. Assume 600K babies born per region per year. Babies in diapers 25.5 months. Sample costs \$1.00. Send a sample to each baby initially. Once in region, sample only new babies.
11. Assume up-front R. & D. investment of \$20 million (2 years at assumed required rate).
12. Assume construction of five plants with enough lines to produce a total of \$200 million in diapers. Investment \$10 million for initial four-machine facility plus \$1.0 million for each additional line added to the facility. Sales rate per line \$5.0 million. Will require 40 lines.

COMMENTS ON "STRATEGIC INTERACTION: SOME LESSONS FROM
INDUSTRY HISTORIES FOR THEORY AND ANTITRUST POLICY"

Robert D. Stoner*

Professor Porter's thesis that antitrust policy should not be made on the basis of industry snapshots, but rather only after careful consideration of the interface between present strategic conduct and the evolution of industry structure, seems beyond dispute. This prescription appears particularly important in light of Michael Spence's presentation at yesterday's session, in which he argued that the strategic choices which a dominant firm makes grow primarily out of industry structure, and that therefore, an adopted course of conduct, even if entry-detering, might well have more than offsetting structure-related efficiencies and rationales. The interplay between structure and strategy as an industry evolves seems to be the basis point of departure for both Spence and Porter in an attempt to analyze the competitive consequence of a given course of conduct.

Towards that end, Porter suggests numerous specific ways that industry histories can be brought to bear on antitrust analysis.

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Although there are many useful insights, it seems to me that the most provocative are Porter's views on the differential roles he sees for antitrust in the early and mature stages of an industry's development. In the early stages, Porter seems to believe that there is an important role for antitrust in preventing mobility barriers from being erected around industry leaders. He advocates, for example, vigorous enforcement of the merger laws, and seems to imply that strategic deterrence behavior that did not appear to have a strong efficiency rationale might (at this juncture only) merit some antitrust attention. However, as an industry matures and structural and other historical factors combine with strategic behavior to put certain firms in protected positions, Porter, like Spence, seems not to favor an approach which centers on attacking this strategic conduct. Rather, Porter would stimulate competition by encouraging the entry (even by acquisition) of large diversified firms, to shake up the industry, much as Spence would encourage foreign competition. These prescriptions are notably different from those of Oliver Williamson, who, while reviewing the process of market power accretion in much the same dynamic, historical way that Porter endorses, advocates a nonfault monopoly approach to the problem of persistent market power.

It seems clear, of course, why Porter does not advocate an antitrust approach attacking strategic conduct as a possible solution to the monopoly problem in mature industries. First, he believes that all strategic behavior shares the attribute of

trying to negatively affect competitors, and that it is, therefore, hard to distinguish good from bad strategic conduct.¹ Second, he believes that, since the undertaking of a full industry history on a case-by-case basis would be necessary to evaluate allegations of strategic deterrence conduct, such an approach would be an ineffective way to go about attempting to deconcentrate U.S. industry. In other words, Porter advocates a rule of reason as the only theoretically sound approach to "characterize" various forms of strategic conduct, and then rejects that approach as unwieldy. I trust that further discussion, both today and in the future, with regard to either per se rules or more limited rules of reason will test the efficacy of that judgment. Whatever the outcome, it seems beyond doubt that Porter's central thesis is correct: an understanding of industry history (albeit not a totally exhaustive analysis) is necessary to be able to make valid judgments about a number of particular antitrust problems.

¹ In a related area, Porter stated his belief that intent should not be a proper focus of debate in analyzing strategic behavior. I believe there is something of a semantic problem, however, with regard to the meaning of predatory "intent." If the reference by Porter was simply to the "intent" to hurt a competitor, then clearly, all strategic behavior has this intent, and the term is not very meaningful. However, much of the recent predation literature has attached a more sophisticated and economically relevant meaning to predatory "intent": intent to affect competitors in a way that would be irrational absent a desire to change markets in a way that would be welfare-reducing. The Ordover-Willig predation test, for example, appears to be an attempt to infer this type of intent economically--to determine through use of counterfactual analysis whether an economically relevant predatory intent exists. The Joskow-Klevorick test appears to share this focus. It is not clear that Porter would object to attempts to define this sort of predatory intent.

COMMENTS ON "STRATEGIC INTERACTION: SOME LESSONS FROM
INDUSTRY HISTORIES FOR THEORY AND
ANTITRUST POLICY"

Lawrence A. Sullivan*

The stream of thought associated with antitrust and that associated with corporate strategy have been flowing in separate beds. Antitrust analysis deals with the performance effects of particular patterns of firm conduct and the extent to which conduct is a function of structure. It also searches for manifestations of firm purpose in the hope that these may aid in characterizing conduct. Studies of corporate strategy deal with the processes, procedures, and content of the plans by which firms select their corporate objectives and outline programs for achieving them. Both streams wander through common terrain. It is perhaps inevitable that they will come into relationship. Initiatives by the Bureau of Economics, of which this seminar is an example, are hastening the process.

Michael Porter's useful and interesting paper could serve to introduce the antitrust analyst to the use of corporate strategy studies in antitrust. The paper reminds us that there are no

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simple solutions for issues in competition policy. Before one can assess the performance effects of any business practice, one must understand the dynamic context in which it is set. The practice must be seen and evaluated as part of a process of changing and developing strategic interaction within the firm's competitive environment.

The paper reminds us, also, that the ultimate issues for public policy concern remedies. If the antitrust agencies want to change things for the better, they must not only understand the strategic moves now taking place, but must predict with accuracy how a complex dynamic system will respond to possible remedial interventions. In light of an injunction or damage award, firms may alter their plans; even if objectives are not changed, programs for achieving them may be redesigned. But antitrust litigation is worth the effort only if it succeeds in changing corporate strategies in ways that will yield a socially better performance. These reminders from a significant contributor to the strategy literature may help to clarify the agenda for antitrust and reduce the likelihood that time and energy will be spent on trivia.

Professor Porter is also convincing in his suggestion that students of strategy--and, in particular, the industrial historians--have a special contribution to make to the process of understanding antitrust issues. Broadening the concept of the firm's competitive environment to extend beyond the traditional market may prove to be a significant contribution. Corwin Edwards

and others who define themselves as industrial-organization economists have looked at intermarket relationships, of course, but few have made this a central concern.¹ The Porter paper suggests, moreover, that longitudinal analysis is more adept than cross-sectional analysis at identifying strategic patterns that may link the units of conglomerate firms. It is probably too early to assess broad policy suggestions which may be latent in the notion of supermarket competitive environments--too early, perhaps, to do much more than formulate hypotheses about possible policies. I see in this light Professor Porter's suggestion about encouraging entry into concentrated markets by acquisitions by diversified firms having the resources for major investments. I doubt whether we know enough yet to think seriously about policies which would entail such fine-grained public decisionmaking as this one would require. Yet, concepts like the product portfolio and the consequent broadening of the competitive environment are concepts which ought to have the watchful attention of policymakers, just as they now have the active attention of students of corporate strategy.

Longitudinal analysis of the kind done by Professor Porter also underscores how crucial timing may be to an antitrust agency. Positions of power may be temporary. In unstable settings, leaving strategic forces alone may be the best way to dissipate power.

¹ E.g., Edwards, "Conglomerate Bigness as a Source of Power," in Business Concentration and Price Policy (1955).

In other situations, an early intervention may be essential if good effect is to be attained. All of this serves to complicate questions about what kind of conduct in what kind of circumstance ought to be viewed as predatory.

Subsequent scholarship convinces that courts ought to severely qualify, if they do not reject outright, the static analysis of predation that Areeda and Turner proposed.² But we may not yet know enough to fashion an alternative that does not rely heavily on particular intuitions of particular fact-finders about particular situations. Perhaps we should make peace with this limitation on the law's resources. Perhaps we should accept, at least for the interim, that predation is any conduct which can confidently be said to make no commercial sense except insofar as it may discourage entry or discourage firm-oriented, rather than industry-oriented, conduct by existing rivals.

I do not think the assertion that predation, so defined, is a natural phenomenon--an inevitable consequence of corporate strategic planning--is a valid reason not to try to identify and inhibit it. This view, which is expressed or implied in some of the strategy literature (though not in Professor Porter's paper) is Herbert Spencer's Social Darwinism in modern garb.

² See Areeda and Turner, "Predatory Pricing on Related Practice Under Section 2 of the Sherman Act", 88 Harv. L. Rev. 697 (1975). George Hay's paper, this volume, cites and summarizes the extensive literature criticizing the Areeda-Turner view.

The potentially telling argument against a very broad view of predation is that in application, a broadly stated norm may too often be overinclusive. This is a real problem and one which requires that analysts, enforcement agencies, and courts all proceed with caution when scrutinizing single-firm conduct. But analysts are making significant progress in dealing with this problem, as the recent paper by Joskow and Klevorick demonstrates.³ Longitudinal studies of an industry, making use of structural classifications like those suggested by Joskow and Klevorick, might be particularly helpful in distinguishing strategies chosen to outdistance others from those chosen to inhibit others.

Professor Porter is, perhaps, making a different defense for that subset of strategic moves referred to as "price signaling." But the basis, either in strategy concepts or longitudinal analysis, for his suggestion that enforcement agencies should be slow to challenge this kind of conduct eludes me. True, an efficient exchange of information tends to enhance rationality. But if structural analysis teaches anything, it is that rational, self-interested conduct by producers will be in the public interest in some structural settings and adverse to the public interest in others. When, due to the structure, rational pricing

³ Joskow and Klevorick, "A Framework for Analyzing Predatory Pricing Policy," 89 Yale L. J. 213 (1979).

is pricing that maximizes the return to the industry rather than to the firm, I see little public interest in facilitating it.

Another important contribution of the corporate strategy literature is the empirical base it provides. Some antitrust analysts (and I count myself among them) assert that in many industrial structures, firms exercise a broad discretion. According to this view, a large firm in a typical oligopoly makes numerous choices about matters of social concern that are limited only weakly by market pressures; in such a context, decisions about product design, pricing, labor policy, acquisition policy, and plant location policy are all subject to a rather unrestrained managerial judgment. Other antitrust analysts, by contrast, regard market forces as sufficient to require firms to select always the most efficient alternative, lest otherwise they not survive. Strategy literature--and, indeed, the very existence of consulting firms which assist in strategy design--provide support for the first of these views.

For many reasons, then, antitrusters ought to become more familiar with the strategy literature and the scholars who produce it. Whether strategic analysis, longitudinal or cross-sectional, will transform the antitrust enterprise is of course quite a different question. I am not sure that Professor Porter implies that it may or that it should; but he does stress some of the more stodgy aspects both of conventional antitrust enforcement and of conventional industrial organization analysis, upon which much

antitrust conceptualizing is now based. While it is appropriate for Professor Porter to emphasize the novel aspects and transforming potential of his own discipline, a balanced judgment must take account of the continuities between (on the one hand) strategic analysis and the historical aspects of it that Professor Porter particularly represents, and (on the other hand) industrial organization analysis and current antitrust enforcement programs.

Some existing antitrust enforcement is already broader in scope than Professor Porter seems to recognize. The Antitrust Division's IBM and AT&T cases, the FTC's Du Pont, Oil, and Cereal cases, as well as private cases like those against Kodak, all come to mind as examples.⁴ Cases like these transcend the examination of a particular practice, a particular aspect of competitive behavior, or even a particular market structure. Each is a wide-canvas litigation in which the plaintiff's theory takes account of dynamic and strategic interactions. I am not suggesting that those who are developing case theories do not have much to learn about strategic interaction or much to gain from taking a longitudinal view of the industries involved. Most of us involved in antitrust are still at the steepest part of this particular learning curve. I insist only that the learning process has already begun and that the conception of antitrust enforcement which Professor Porter paints is perhaps slightly dated.

⁴ Some of these cases are discussed by Hurwitz, Kovacic, Sheehan, and Lande, in "Current Legal Standards of Predation," this volume.

Also, increasing numbers of industrial organization economists have been addressing dynamic and strategic problems. I think particularly of Williamson, Spence, Schmalensee, and Salop.⁵ Some of their work might be claimed, I suppose, as contributions to a new genre of strategic studies. Some, indeed, may be sufficiently longitudinal in emphasis to exemplify the kind of work that Professor Porter particularly admires--though of that I am less sure. In any event, though he stresses history in his paper, I do not suppose that Professor Porter would separate himself from the intellectual movement that the scholars I have mentioned exemplify. Yet each of these scholars comes out of an older tradition and is drawing upon as well as extending the concepts and methodology of that tradition. It is the growth and development of a discipline that we are witnessing, not a revolution.

Strategy students who, like Professor Porter, are doing industry histories, probably owe something--at least a sense of direction--to the historical economists who were in revolt against the English classical tradition throughout the last quarter of the 19th century and the first quarter of the 20th. These economists stressed the interaction of personalities and institutions and saw industrial development as a dynamic human endeavor. More recent forerunners of the strategic analyses of industries

⁵ I cited some of this literature in "Antitrust, Microeconomics, and Politics: Reflections on Some Recent Relationship," The Economics of Firm Size, Market Structure and Social Performance, FTC (1980).

are the industry studies done by industrial organization economists. Such studies--a staple for antitrust--vary, of course, in thoroughness and insight. But the best of them can convey a finely textured and dynamic conception of an industry and can be of immense value to enforcement agencies.⁶

It is true, nonetheless, as Professor Porter suggests, that antitrust has yet to come fully to terms with the recent developments dealing with dynamic problems; and the strategy literature can bring these developments to bear on antitrust issues in useful ways. Thus I am not disagreeing with Professor Porter so much as trying to emphasize elements of continuity, rather than elements of novelty, in the intellectual ferment associated with strategic industry studies.

When addressing public policy, the industrial historian will encounter in a special way the epistemological problems that plague all historians--and indeed, all social scientists. The potential for making unique policy contributions lies in the capacity to particularize--to identify and convey a sense about the way realities were perceived and acted upon by decisionmakers in a particular context. This, no doubt, is the justification for what Professor Porter describes as a lack of standardization within his discipline and its emphasis on process. But to give policy guidance, the industrial historian will have to generalize

⁶ E.g., J. Markham, Competition In The Rayon Industry (1952).

and develop and use a conceptual scheme. Indicative approaches have value, not because they avoid generalization but because the generalizations they yield are tentative, open to revision, and not overbroad. If the work of the strategic analysts is to have predictive force and significance for antitrust policy, it must--perforce--use theory.

It is the quality of the comprehension of the ongoing competitive dynamic which will determine the usefulness of any industry study for the development of antitrust policy. That quality is likely to be highest when the scholar doing it draws upon techniques and concepts which have withstood the critical appraisal of practitioners of an established discipline. If I am correct in this assumption, industrial historians ought not to strive earnestly to differentiate themselves.⁷

⁷ Strategic histories must meet the standards of history as well as economics, of course. When they deal with broad institutional developments, they partake more of history than of economics. E.g., Chandler, *The Visible Hand* (1977). But when they focus on a single industry and are intended to aid in the development of competition policy for that industry, the economics content must be high.

In a significant sense, this conference marks a beginning, it is to be hoped, to prompt students of corporate strategy to turn more explicit attention to issues of public policy. If they do, antitrust will be in their debt. But this conference is also an appropriate place to acknowledge some of antitrust's existing debts to industrial organization scholarship and to emphasize some of the values of continuity, both in scholarship and in policy development.

THEORIES OF INDUSTRIAL ORGANIZATION AS EXPLANATIONS
OF EXPERIMENTAL MARKET BEHAVIOR

Charles R. Plott*

The current professional interest in experimental economics seems to stem in part from a recently acquired ability of economists to explore subtle implications of institutional details for market performance. Advances in understanding the role of information in market models suggest the possibility that the contribution of institutions in affecting information patterns and resource allocation can be identified and assessed. Game theory has increasingly focused upon the structure of strategy spaces as dictated by special institutional structures. The discovery of the theoretical existence of decentralized, incentive-compatible processes for the provision of public goods allows one to speculate about the possibility of many different types of institutions which might solve the public-goods and free-rider problems. The continued growth and development of the field of law and economics has directed the theory toward the study of the relationship between legal technology and economic principles. Theoretical works on the nature of institutions and possible manifestations of their influence fill the journals.

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Two problems accompany these academic exchanges and emphasize the need for data such as those generated by experimental methods. First, many different theories compete in providing predictions about the consequences of institutional change. Such theories are generated from a variety of sources (e.g., small changes in the mathematical representation of an institution or of the individualistic behavioral response within an institutional environment can produce dramatic differences in predicted system behavior). Secondly, history is not always cooperative in creating circumstances which separate the predictions of theories. Two theories may have dramatically differing predictions within all future scenarios, but within all past conditions their predictions might be almost identical. Thus, historical circumstances do not always provide the opportunity for the relatively inaccurate models to be pruned from the tree of viable hypotheses.

These two problems are compounded by the sheer complexity of naturally occurring processes. Data are frequently buried. Many variables intervene. Furthermore, scholars of institutions and their consequences approach the subject with different preconceptions, experience, intuition, and academic disciplinary backgrounds, and can accordingly be led to substantially different interpretations of such data that exist. Resolution of competing ideas can take years, if not decades.

Experimental methods provide a source of shared experience for scholars who are developing and evaluating theories about complicated, naturally occurring processes. While laboratory

processes are simple in comparison to naturally occurring processes, they are real processes in the sense that real people participate for real and substantial profits and follow real rules in doing so. It is precisely because they are real that they are interesting. General theories must apply to special cases, so models believed to be applicable to complicated, naturally occurring processes should certainly be expected to help explain what occurs in simple, special-case laboratory markets. Theories that do not apply to the special cases are not general theories and thus cannot be advocated as such.¹

¹ Experimental Results

For those who are unfamiliar with laboratory experimental methods, a brief description should help. The basic tool is the theory of induced preference (V. Smith, "Experimental Economics: Induced Value Theory," 66 Am. Econ. Rev. 273 (1976)). Each individual buyer, i , is given a function $R_i(x_i)$, indicating the amount of money s(he) may collect from the experimenter, expressed as a function of the number of units, x_i , of an abstract commodity s(he) purchased during a period. The profits for the individual are the differences between the redemption values and the purchase prices. (In most studies, a commission of 10 cents or so is paid in addition to the redemption values. However, the maximum price an individual can pay is declared by the experimenter to be $\frac{\partial R(x_i)}{\partial x_i}$.) Thus, if an individual prefers more money

to less and if the only value derived from the abstract commodity is from its resale value, the function $\frac{\partial R^i(x_i)}{\partial x_i}$ measures the limit

prices of individual i .

Cost functions are induced similarly for sellers. That is, each seller, i , is given a function, $C^i(x_i)$, indicating the cost s(he) will incur with sales of x_i . Profits are the differences between revenues and costs. Thus, according to the competitive model, $\frac{\partial C(x_i)}{\partial x_i}$ is the (inverse) supply function for i .

(footnote continues)

Laboratory data become relevant to the extent that questions can be posed which make the study of special cases relevant. It may not be possible to learn about complicated processes directly by re-creating them in a laboratory. General Motors, with all its size and institutional complexity, cannot be re-created many times for the convenience of those who wish to know what might have happened had one of its features been altered. Still, one might be able to learn something about competing models of a complicated process by gaining experience with their accuracy in simple cases. Circumstances in which models tend to be less reliable can be identified, and to the extent that the predictions of a model are accurate over a wide range of laboratory circumstances, one gains some confidence in their accuracy when applied to the more complicated, naturally occurring circumstances.

(footnote continued)

If the laws of economics apply in general, then they should apply to this simple market as well. The people are real. The incentives are real. The abstract commodity now has value, by virtue of the fact that payments can be substantial and by virtue of the theory of derived demand. The commodity is scarce. The fact that the market is simple in comparison to its natural counterparts does not mean that the behavior is simple. Nevertheless, the simplicity should reinforce our expectation that models and theories which are being applied in those complicated cores should work well indeed when applied to the simple ones.

One need only inquire now about models which accurately predict the observed conduct. All prices and incomes are observable. Efficiency can be measured as the standard consumer's plus producer's surplus. Efficiency in this sense is 100 percent if and only if participants maximize total earnings (extract the maximum possible from the experimenter). Thus, some of the major economic dimensions of industrial performance can be assessed.

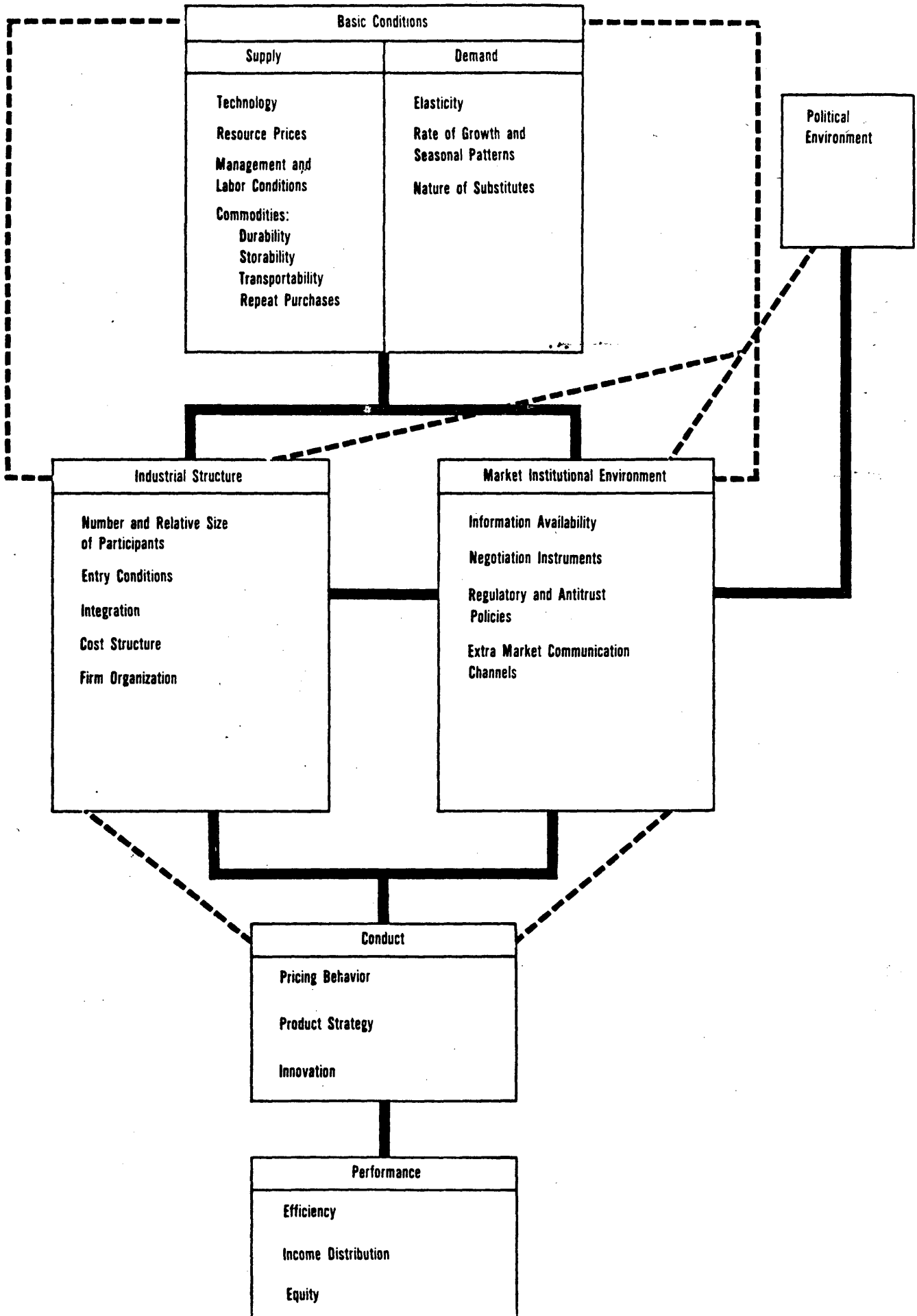
I. EXPERIMENTAL QUESTIONS RELATIVE TO INDUSTRIAL ORGANIZATION THEORY

The special cases reviewed here are those which have been of importance to industrial organization theorists. Figure 1 helps place them in a proper context by showing diagrammatically how the experimental questions are related to those of more traditional concern. The flow of the theory and the methodological perspective is consistent with that developed by Scherer.² The diagram is taken from Scherer, with a few changes imposed to highlight the particular links which experimentation has been used to explore. Variables which contribute to the nature of market demand--costs, the psychological makeup of consumers, production technology (as dictated by the physical properties of the commodity and engineering and management knowledge), resource availability, et cetera--are listed in the category of "basic conditions." Traditional theory provides an analysis of how the basic conditions tend to influence industrial structure (the number and size of firms, cost structures, degree of integration, etc.). This influence is represented by the dark arrow. The theory then continues, to explore how industrial structure, when combined with principles of economic behavior, dictates conduct and performance.

Within this framework, the special cases explored with laboratory tools can best be identified by adding another category, drawing variables from both the traditional conduct category and

² F. M. Scherer, Industrial Market Structure and Economic Performance (1971), pp. 3-7.

FIGURE 1



the basic conditions category. These variables are those that characterize the market institutional environment. They are the rules and organizational structures that govern pricing and purchase decisions. In some cases they might be identified as aspects of managerial style and thus placed in the basic-conditions category. In other cases they may be identified as aspects of the general marketing strategies of firms and thus be listed as part of conduct (e.g., price posting). Still in other cases, they are dictated by sources external to the industry, such as governmental regulatory policies or, as in the case of the securities industry, by the policies of another industry (e.g., the stock exchanges) which specializes in providing marketing services. The particular market institutions which have been studied so far are listed in the next section.

Laboratory studies have focused upon how industrial structure and market institutions influence conduct defined in terms of price patterns and resource allocation and also how the two categories influence performance defined in terms of income distribution and efficiency (the dark arrows). The link which has not yet been explored systematically is the influence of market structure on market institutional variables. No doubt in time this link will receive attention. Its importance is widely recognized, but it does pose problems for experimental methods, as discussed in the concluding section. Nevertheless, the reader should be aware of the limited scope of existing results so they can be placed in a proper context.

Because laboratory studies focus upon particular links, they are special cases for the general theories which explain all the interactions, feedbacks (as represented by the dotted lines in the figure), and influences among all three groups of variables: industrial structure, market institutions, and conduct. Within the general theory, certain types of industrial structures are thought to directly influence market institutions (cartel organizations, for example, are thought to be more likely in markets with few firms); and then the market institutions, once developed, induce feedback effects which operate to change the industrial structure (e.g., firm size). Thus, the theory is applied to explain how both types of variables will evolve, and while evolving, will jointly influence market conduct. Experimental studies have tended to use this last link of the general theory as a guide to what to look for in the behavior of simple industries (relative to the naturally occurring industries). In most experimental work, the basic conditions, the industrial structure, and the market institutions are all exogenously determined treatment variables. All are held constant while the resulting conduct is observed, so that the joint influences of industrial structure and market institutions on conduct and performance can be ascertained and understood in terms of the theories as applied to those circumstances.

II. THE SURVEY

Three broad generalizations seem to characterize observations drawn from laboratory environments. First, the standard mathematical models (with certain exceptions and qualifications) appear to apply with extraordinary accuracy. Basic principles of economics do seem to be operating. Secondly, there is a strong interaction between market institutions and industrial structure in determining market conduct and performance. The applicable model seems to shift with institutional changes. Third, successful collusions observed so far tend to involve the adoption of some type of institutional enforcement mechanism. Extramarket communications, for example, seem to be useful in establishing procedures and practices which can have an independent effect on prices. The success of attempts to collude seem to be related, in part, to success in establishing effective procedures.

The fact that interactions exist between industrial structure and market institutions poses an expositional problem. The number and variety of market institutions found in the world are staggering. When considered along with the different types of industrial structures, the possible combinations become large. The strategy of experimentalists for understanding them has been to identify the most prominent forms of market institutions and then to study the special variations. We have partitioned experiments into two general classes. The first class contains institutions and procedures in which there are no opportunities for decisionmakers to

communicate, other than through the ordinary activities of buying and selling. In the second class we explore the decisions made within institutions which allow "extramarket" communications. In these processes, some participants (conspirators) can make plans, commitments, and/or agreements about the actions they will take in the market.

Five prominent forms of market institutions have been studied in the experimental literature: (a) auction markets, (b) posted bid (offer) markets, (c) negotiated price (telephone) markets, and (d) price protection and advance notice policies. The fifth-- sealed bid (offer) markets--will not be reviewed here.³

Actually, the listing of only five different types involves an oversimplification. Each of these types can be subdivided further into special types. Auction markets, for example, can be either English or Dutch, according to whether the prices start low and are bid up by competition or start high and are reduced until some competitor accepts. English auctions can be "double oral" or "one-sided." Markets differ according to whether or not the terms of contracts are public and the sequence in which bids, offers, and terms become known. The possibilities are so rich that it sometimes seems more appropriate to think in terms of a continuum rather than fixed classes. For example, posted price auctions

³ See V. L. Smith, ed., Research in Experimental Economics, vol. 2 (forthcoming), which contains several papers on sealed bid processes.

look very similar to sealed bid auctions if sellers must post prices without the knowledge of other prices and without the ability to immediately "adjust" prices in light of the competition.

In addition to industrial structure and the market institutional environment, situations can differ according to the general information of participants. Agents may or may not be aware of the options or the payoffs of others. There may also be differences in knowledge about others' knowledge. So the reader can see that relative to what one would like to know, the number of studies covered below is modest indeed.

III. THE ABSENCE OF EXTRAMARKET COMMUNICATION

The behavior of the four different types of market institutions listed above will be reviewed. It seems fair to say that none of these different types of market institutions have been explored in sufficient detail to provide definitive statements about the influence of a wide variety of basic economic conditions such as demand elasticities and industrial structures. Nevertheless, the number of experimental conditions has been sufficiently rich to admit some comparisons and reasonable conjectures about what more systematic studies will reveal. The market studies reviewed in this section maintained strict control over communication. In most cases participants were in the same room but

communication was limited to the making of bids and offers, et cetera, as allowed by the technology of trading.

A. The Oral Auction Market

Oral auction markets are characterized by public bids (offers) to buy (sell) units and the freedom of any participant to accept terms which (s)he wishes. Several variants exist, depending upon the length of time or circumstances under which a bid (offer) remains outstanding, whether the bid (offer) is made orally or logged through a computer, the roll of the specialist's "book," et cetera.

The overwhelming result is that these markets converge to the competitive equilibrium. Figure 2 is typical of the time pattern of prices. Shown there is the price of every sale in the order in which it occurred. Each period represents a market day with a given demand and supply. The competitive equilibrium is \$2, with a volume per period of eight contracts. As market days are replicated under identical conditions, prices tend to converge to the competitive equilibrium. Efficiency levels tend to converge to near 100 percent. If a change in parameters had occurred, such as a shift in demand or in supply, the prices would have converged to the new equilibrium after two or three periods.

As long as the industrial structure has a few buyers and sellers, these convergence and efficiency properties appear to be independent of the basic economic conditions. Different shapes of

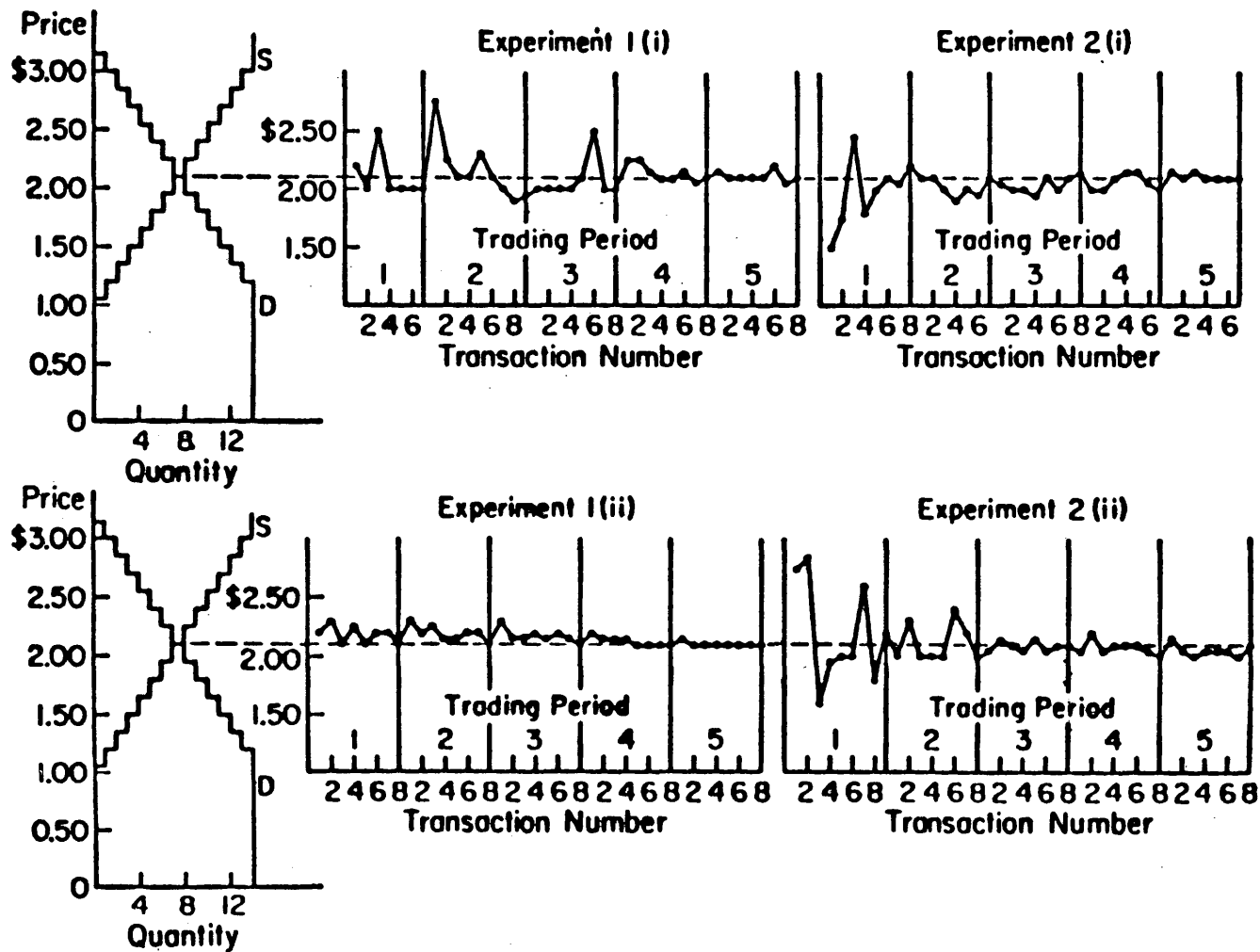


FIGURE 2

Source: Smith, Vernon L. "Bidding and Auctioning Institutions: Experimental Results." In Bidding and Auctioning for Procurement and Allocation, edited by Y. Amihud. New York: New York University Press, 1976a).

demands and supplies such as were systematically examined by Smith⁴ yield no substantial differences. The parameters explored covered various cases of demand elasticity and nonlinearity. In Smith,⁵ a completely inelastic (in the relevant range) demand was used along with a fixed supply (greater than the quantity demanded). In all cases, after a few periods the market performance was close to that predicted by the competitive model.

Offers aspects of the basic economic conditions have been changed to allow for seasonality,⁶ middlemen,⁷ and other features having to do with the time dimension of a commodity life. In all cases the competitive model is an accurate predictor of market

⁴ V. L. Smith, "An Experimental Study of Competitive Market Behavior," 70 J. Pol. Econ. 111 (1962); V. L. Smith, "Experimental Auction Markets and the Walrasian Hypothesis," 73 J. Pol. Econ. 387 (1965); V. L. Smith, "Bidding and Auctioning Institutions: Experimental Results," in Bidding and Auctioning for Procurement and Allocation, ed. Y. Amihud (1976).

⁵ Smith (1965), note 4 supra.

⁶ R. M. Miller, C. R. Plott, and V. L. Smith, "International Competitive Equilibrium: An Empirical Study of Speculation," 91 Q. J. Econ. 599 (1977); A. W. Williams, "International Competitive Equilibrium: On Further Experimental Results," in Research in Experimental Economics, ed. V. L. Smith, Vol. 1 (1979); Elizabeth Hoffman and C. R. Plott, "The Effect of Intertemporal Speculation on the Outcomes in Seller Posted Offer Auction Markets," 96 Q. J. Econ. 223 (1981).

⁷ C. R. Plott and J. Uhl, "Competitive Equilibrium with Middlemen: An Empirical Study," 47 S. Econ. J. 1063 (1981). This study involved a slight variant of the oral double auction. Bids and offers were left open until accepted or changed. Thus, the market institutions were similar to a double oral auction with limit orders and an open book.

behavior. The model, when assets are involved, must be altered to accommodate rational expectations⁸ and inside information as to asset returns.⁹ Still, the empirical generalization is that with the oral double auction, the competitive model is an accurate predictor under all perturbations of the basic economic conditions, even though only three or four sellers and/or buyers may be involved.

Basic economic conditions do seem to influence the direction of convergence to equilibrium and thus the distribution of income and profit. The path to equilibrium seems to be from above (below) if consumer's (producer's) surplus is greater than producer's (consumer's) surplus. Thus, one might expect that markets with relatively steep demands and reasonably flat supplies record somewhat elevated profits for the sellers relative to the competitive equilibrium. These profits would accrue at disequilibrium trades, and so the phenomenon would also be accompanied by falling prices. If the industry has been characterized by unanticipated demand or supply shifts, prices and profits or losses can certainly reflect disequilibrium trades. To date, only one study has attempted to characterize the dynamic adjustment path,¹⁰

⁸ R. Forsythe, T. R. Palfrey, and C. R. Plott, "Asset Valuation in an Experimental Market," Econometrica (forthcoming).

⁹ C. R. Plott and S. Sunder, "Efficiency of Experimental Security Markets with Insider Information: An Application of Rational Expectations Models," J. Pol. Econ. (forthcoming).

¹⁰ Smith (1965), note 4 supra.

and the conclusions from this are clouded.¹¹ No good theory of adjustment exists, and experimental studies have not yet explored the influence of basic economic conditions on adjustment paths sufficiently to provide any further generalizations.

Changes in the market institutions are known to influence price and profit patterns. Double auctions conducted by computer can affect the speed of convergence, especially with inexperienced participants.¹² For single-unit auctions, differences are exhibited among the Dutch auction, the English auction, and the second-price auction. Theoretically (Nash bidding hypothesis), the English and the second-price auctions should yield the same revenue, while the Dutch, assuming some risk aversion, should yield more than both. The fact is, however, that the Dutch auction yields amounts less than or equal to the other two.¹³ The Dutch auction also yielded less revenue than the first-price auction, which is theoretically similar.

The most dramatic difference within the class of oral auction institutions occurs with the one-sided auctions. The approach to equilibrium is from above (below) if the auction is a one-sided

11 F. D. Nelson, "A Note on 'Experimental Auction Markets and the Walrasian Hypothesis,'" Social Science Working Paper No. 307, California Institute of Technology, Pasadena (1980).

12 A. W. Williams, "Computerized Double-Auction Markets: Some Initial Experimental Results," 53 J. Bus. 235 (1980).

13 V. M. Coppinger, V. L. Smith, and J. A. Titus, "Incentives and Behavior in English Dutch and Sealed-Bid Auctions," 18 Econ. Inquiry 1 (1980).

(offer) auction. That is, if buyers (sellers) can bid (offer), while sellers (buyers) must accept or reject without making counteroffers (bids), then the approach is from above (below). The distribution of income is against the side which articulates the terms.¹⁴ Exactly why this occurs is not known; but notice the implication. Sellers who face an oral auction institution would prefer that the buyers bid. To the extent sellers can organize themselves to compete by accepting favorable bids and not making counteroffers, the approach to equilibrium (and thus profits) will be influenced in their favor. Similarly, markets organized as oral-offer markets may have some use as tools to counteract "unjustified market power" of sellers. It is important to note, however, that the nonmonopolized, one-sided oral auctions examined to date have all been nearly 100 percent efficient. The institution affects only the distribution of income.

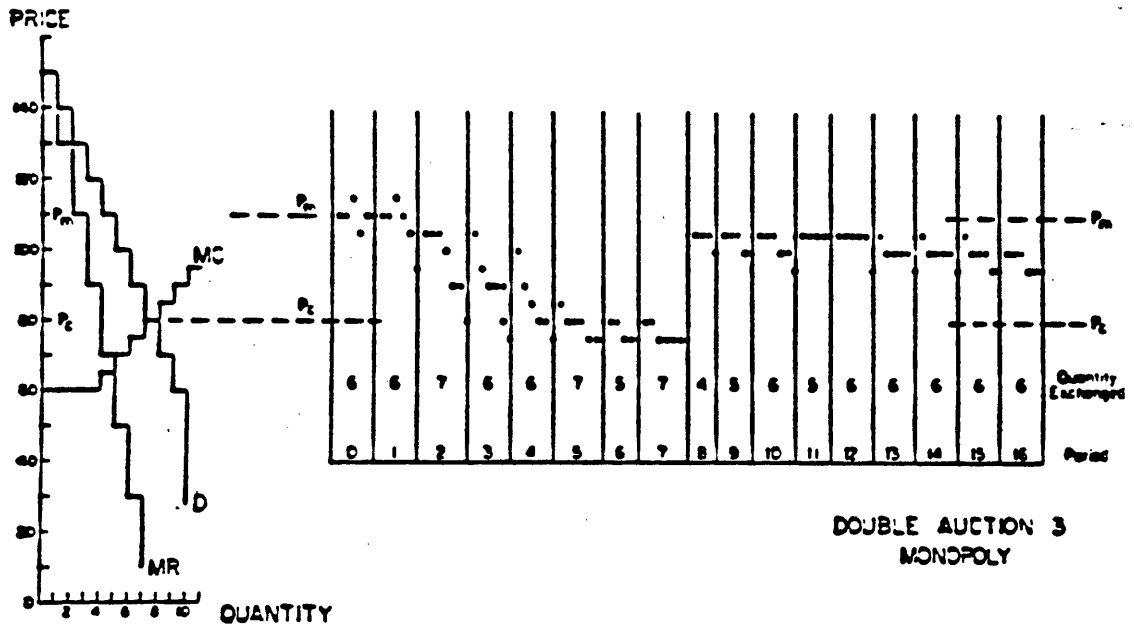
The importance of industrial structure has not been systematically explored. For one reason, the results under the oral auction institutions appear to be almost independent of industrial structure. Experiments with three and four sellers converge with regularity to the competitive equilibrium. If influences from industrial structure exist, they are not so pronounced as to be clearly detectable in existing data.

¹⁴ V. L. Smith, "Effect of Market Organization on Competitive Equilibrium," 78 Q. J. Econ. 181 (1964); C. R. Plott and V. L. Smith, "An Experimental Examination of Two Exchange Institutions," 45 Rev. Econ. Stud. 133 (1978).

Monopoly is the exception to the lack of attention. In a remarkable series of experiments, Smith¹⁵ demonstrated the importance of industrial structure. Monopolies can definitely cause prices to diverge from the competitive equilibrium. However, the monopoly model itself did not do so well. There is a strong tendency for prices to erode away from the monopoly equilibrium price. In some cases the price actually approached the competitive equilibrium. The number of observations so far is too small to determine which model is the best to modify. Figure 3 reproduces the time series from a particularly interesting experiment, which demonstrates the difficulty in making any general statement about the comparative accuracy of the models. Prices start high near the monopoly price, erode to the competitive equilibrium, return to the high levels, and begin to erode again. This interesting behavior seems to be attributable to the buyers, who have considerable power under this institution. By some process of "counterspeculation," they tend to withhold purchases and force prices down when facing a monopolist in this arena. Exactly what coordinates this action is unknown; these buyers cannot communicate except through bids and offers. But, as will be shown below, certain institutions seem to prevent it and therefore help the monopolist.

¹⁵ V. L. Smith, "An Empirical Study of Decentralized Institutions of Monopoly Restraint," in Essays in Contemporary Field of Economics in Honor of E. T. Weiler, ed. G. Horwich and J. Quirk (forthcoming).

FIGURE 3



Source: Vernon L. Smith. "An Empirical Study of Decentralized Institutions of Monopoly Restraint." In Essays in Contemporary Fields of Economics, edited by George Horwich and James Quirk. West Lafayette, Indiana: Purdue University Press, forthcoming spring 1981.

B. Negotiated Prices

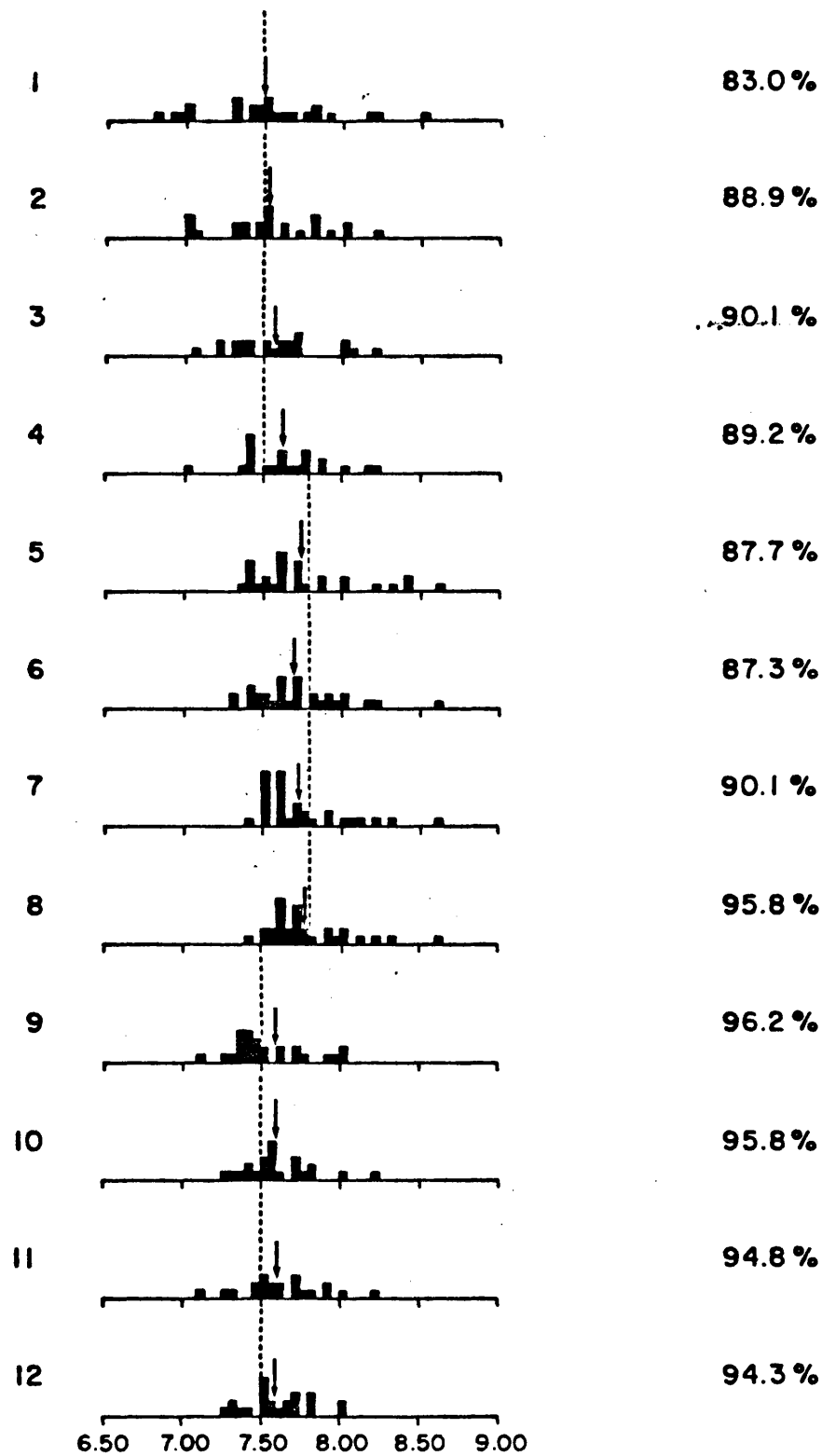
Negotiated-price market institutions are those within which the terms of trade are privately negotiated with each transaction. Experimentally, these conditions have been implemented through a telephone system, where buyers and sellers (each located in a private office) negotiate privately by telephone. Buyers can call sellers and vice versa and discuss terms and/or agree on a contract price. Contact among buyers or among sellers is prevented. Consequently, in these markets, information about prices is not public. Buyers can shop among sellers, and shopping costs are low (in some experiments, advertising is permitted); but shopping and negotiating are the only sources of information.

The first experiments of this kind were done by Hong and Plott.¹⁶ The distribution of prices from one such experiment is shown in figure 4. As can be seen, the system begins with a high variance. Evidently some buyers are just better negotiators than others; but the source of this (dis)advantage, whether they shop more (less), make more (less) credible promises or threats, et cetera, is unknown.

With time, the variance shrinks. The mean price approaches the competitive equilibrium. When demand shifts (periods 5 and 9), the prices approach the new equilibrium. Efficiency in these markets is high, as is shown on the figure.

¹⁶ J. T. Hong and C. R. Plott, "Implications of Rate Filing for Domestic Dry Bulk Transportation on Inland Waters: An Experimental Approach," Bell J. Econ. (forthcoming).

Period Session 4 (Negotiated) Negotiated Price Efficiency



Comp. eq. -----
 Average Price —————>

FIGURE 4

Only two different industrial structures have been explored within this market institution. The Hong and Plott study had 11 buyers of about equal size. The 22 sellers, however, ranged from very large (the 5 largest firms had 60 percent of the market) to very small sellers--some of whom should not exist, according to the competitive model, because their costs were above the competitive equilibrium price. As is implicit in the price/time series, the competitive model is reasonably accurate. The exceptions were the marginal sellers (who were able to exist by selling at prices above the competitive equilibrium prices to [evidently] poorly informed buyers) or those who did not care to shop.

The second study is by Plott,¹⁷ who studied telephone markets with two large sellers (35 percent each) and two small sellers (15 percent each). Sellers in the experiment even had accurate knowledge of the market demand functions. The average prices as shown for all periods on figure 5 are typical of the general results. Similarly to the Hong and Plott results, prices start with a high variance. With time, variance is reduced and the competitive equilibrium is approached.

C. Posted Prices

The posted-price institution has received more scholarly attention than any other. Frequently, however, those conducting

¹⁷ C. R. Plott, "Price Protection Policies and Market Performance," California Institute of Technology (1981). Mimeographed.

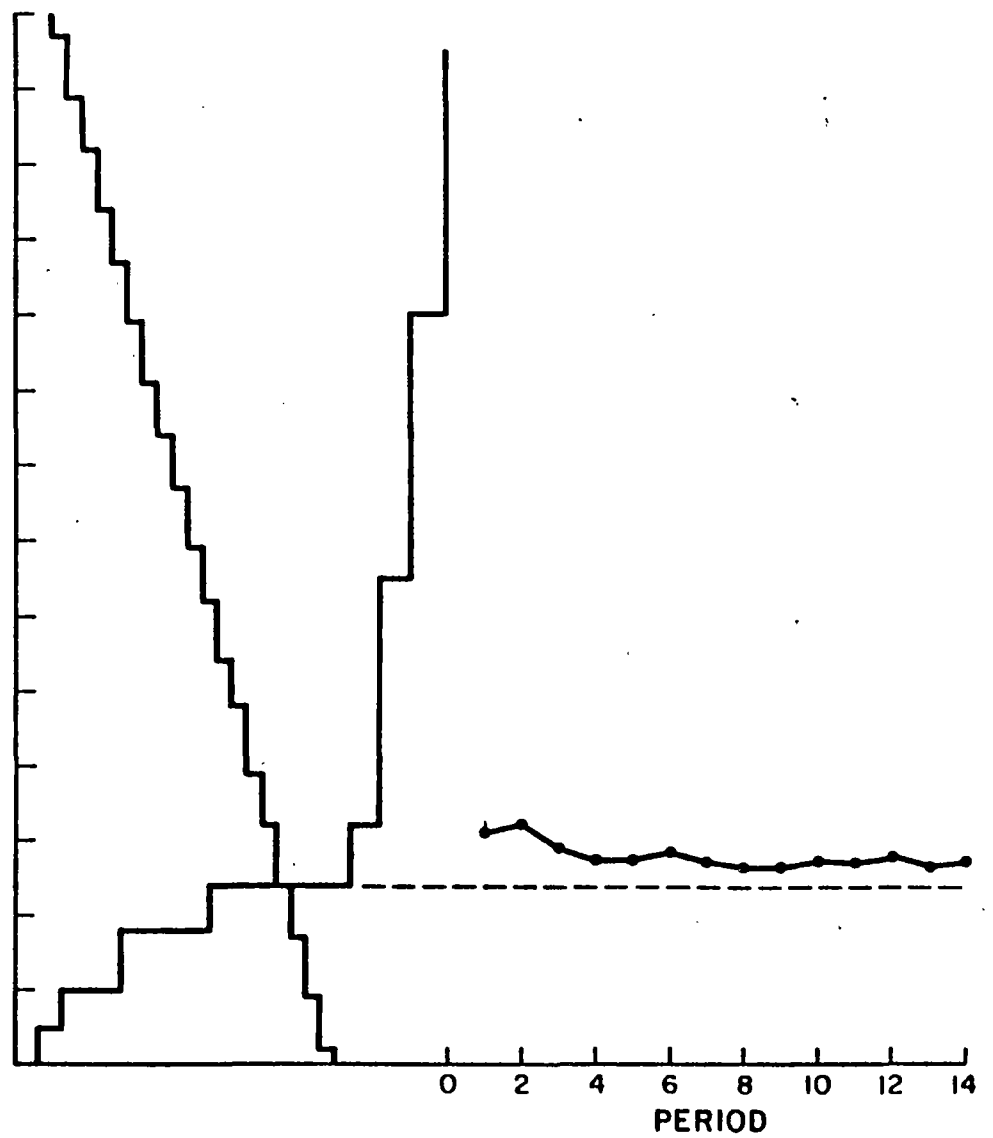
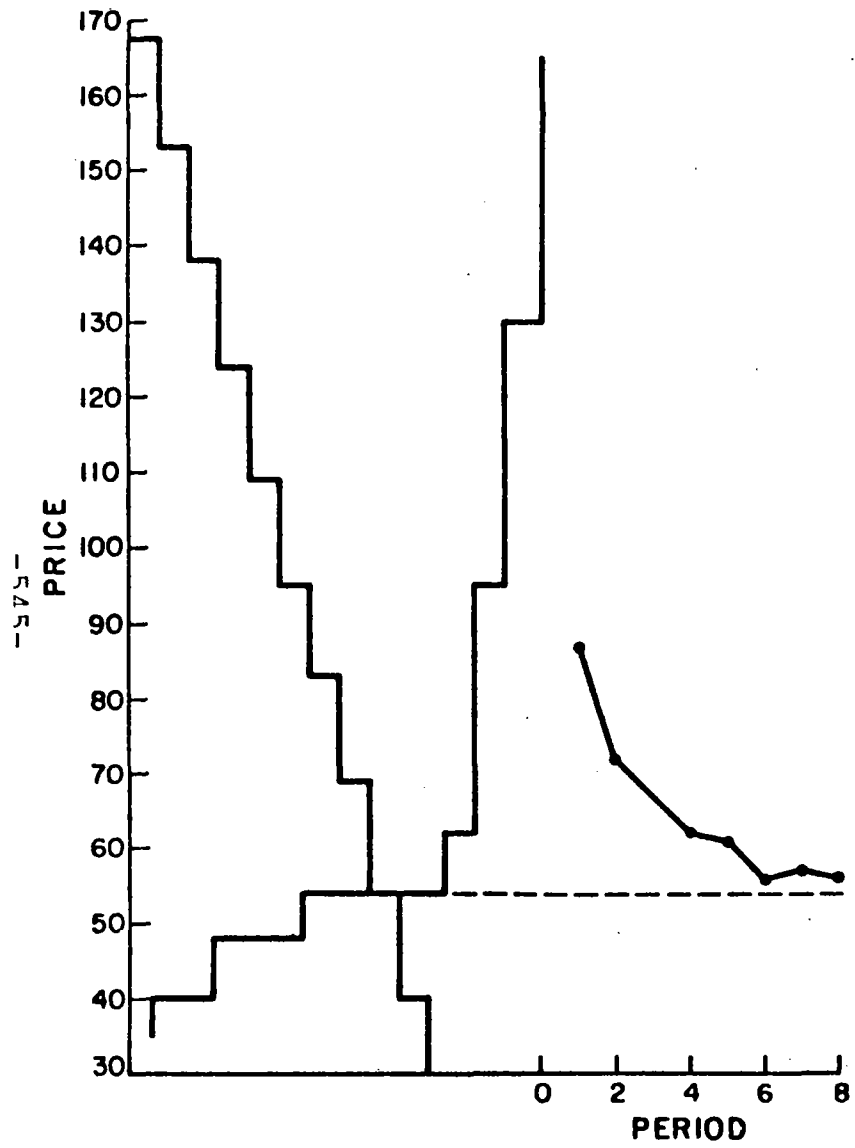


FIGURE 5

AVERAGE PRICE PER PERIOD
FOR ALL PERIODS IN TWO MARKETS

the research did not view themselves as engaged in a comparative institutional analysis. The original duopoly experiments of Fouraker and Seigel¹⁸ utilized the posted-price institution. Almost all "market games" and "prisoner's dilemma" experiments can be interpreted as having posted prices. However, before reviewing duopoly, perhaps it is best to review the two polar cases of "many" sellers and one seller.

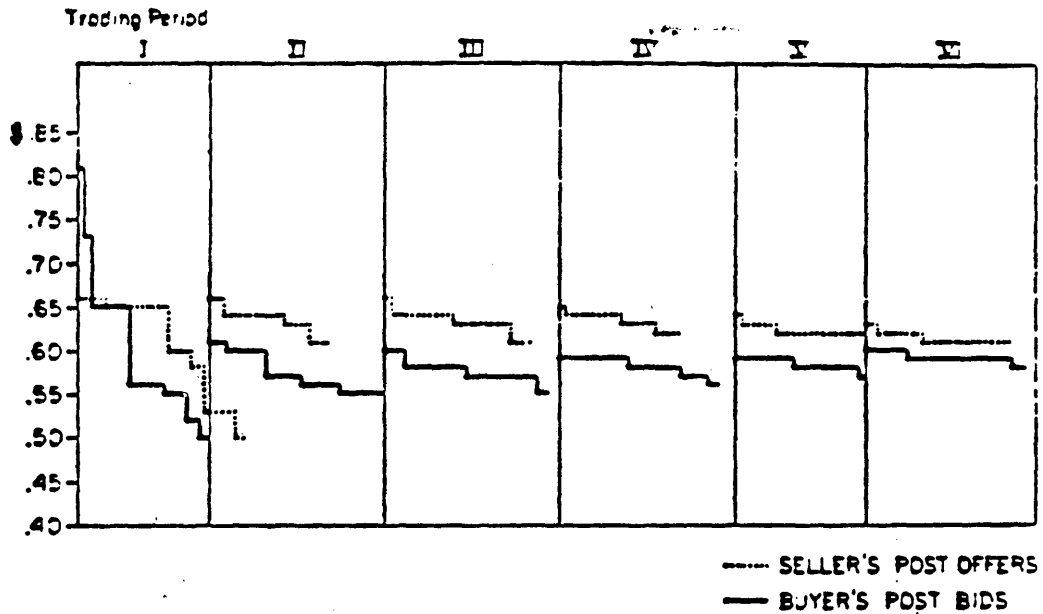
Two generalizations seem possible at this time. The most significant generalization is that posted-offer (bid) markets tend to have higher (lower) prices than do oral-double-auction markets. Secondly, efficiency tends to be lower under the posted-price institutions than under the oral double auctions.

These tendencies were first observable in experiments run by F. Williams,¹⁹ who (incorrectly) thought they were due to the fact that his traders could buy or sell more than one unit. The results of two of his experiments are shown in figure 6. These show the cumulative volume of trades at each price (e.g., the curve indicates the number of trades at price P or above). Prices at first are removed from equilibrium, but with time they drift to close to the equilibrium. Whether or not posted-price markets ever stabilize at the competitive equilibrium is an open question.

¹⁸ L. E. Fouraker and S. Siegel, Bargaining Behavior (1963).

¹⁹ F. Williams, "The Effect of Market Organization on Competitive Equilibrium: The Multiunit Case," 40 Rev. Econ. Stud. 97 (1973).

FIGURE 6



WILLIAMS' RESULTS:

CUMULATIVE DISTRIBUTION OF TRADES WITH MULTIUNIT INCENTIVES*

The figure represents for each price p^ , the volume of trades which took place at a price $p \geq p^*$.

Source: Charles R. Plott and Vernon L. Smith. "An Experimental Examination of Two Exchange Institutions." Review of Economic Studies 45 (February 1978):135

Certainly this does not occur within the number of periods characteristically necessary for oral auctions.

The Williams results were replicated by Plott and Smith,²⁰ who also demonstrated that the market institution, and not multiple units, is the cause. The possible importance of basic market conditions and industrial structure are investigated in Hoffman and Plott²¹ and Hong and Plott.²² In the former, posted prices in markets with storage and speculation were studied. In the latter study, 33 sellers were involved, as opposed to the 4 in all other experiments. The two generalizations were observed to hold in all cases.

The Plott and Smith experiments, and many subsequent experiments, used as buyers people who could withhold purchases and play favorites to encourage low prices. The Williams experiment, on the other hand, utilized a computer in some sessions to simulate demanders, according to the following strategy: first, purchase from the low-priced seller all s(he) wished to sell, and then move to the next low-priced seller, continuing until excess demand does not exist. One of the principal discoveries of Plott and Smith was that their demanders behaved passively (or purely competitively), almost exactly like the Williams computer. This suggests

20 Plott and Smith (1978), note 14 supra.

21 Hoffman and Plott (1981), note 6 supra.

22 Hong and Plott, note 16 supra.

that one of the major features of the posted institution is that the "power" of the nonposting side is somehow eliminated. From an intuitive point of view, one can see that when facing posted prices, abstinence is less likely to be met by more favorable terms, because once the price is posted it cannot be changed until after the buying period is over. "Counterspeculation," as present in one-sided oral auctions, is absent under posted prices.

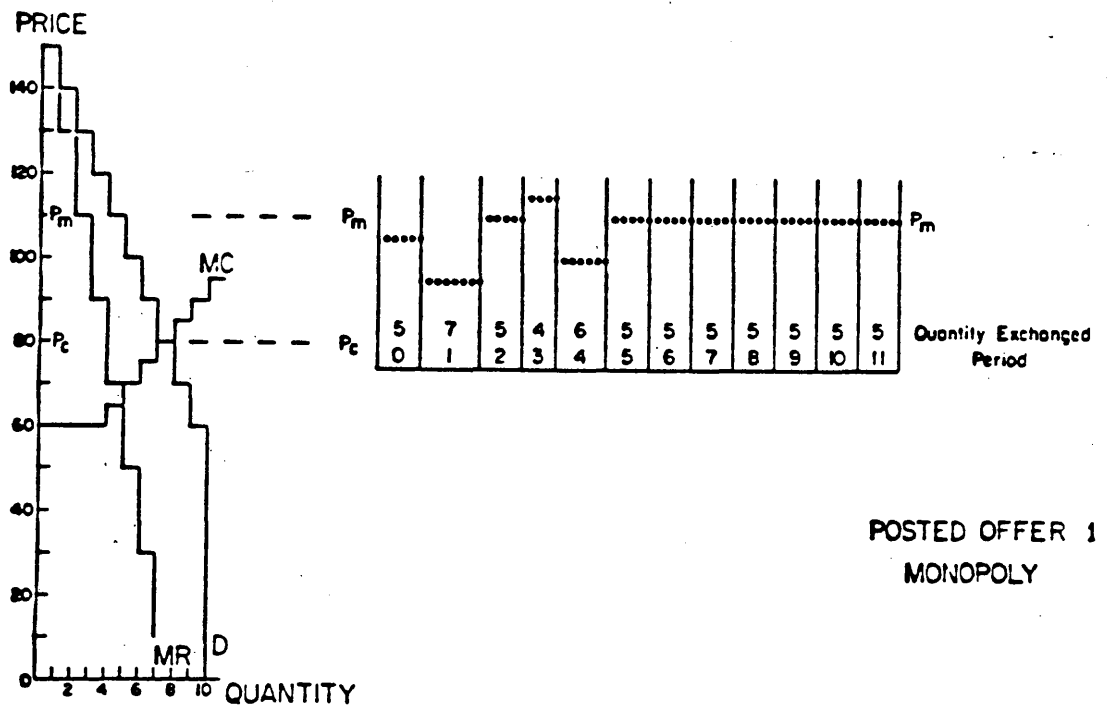
Results of monopoly operating with a posted price are reported in Smith.²³ The importance of industrial structure and the interaction between structure and market institutions is seen by studying figure 7 and comparing the results with those from other monopoly experiments (e.g., figure 3). As can be seen, under the posted-offer institutions, monopoly behaves exactly as monopoly theory asserts. The monopolist adjusts prices to measure demand (the measurements are accurate because of buyer behavior), ascertains the profit-maximizing price, sets price at that level, and leaves it there. Buyers facing fixed prices reveal their demand function. Compared to the oral auction, the posted-offer market is mechanical.

The posted-price institution has been used in almost all oligopoly experiments. The practice was (perhaps inadvertently) introduced by Fouraker and Siegel.²⁴ Each subject seller was

²³ Smith (1981), note 15 supra.

²⁴ Fouraker and Siegel (1963), note 18 supra.

FIGURE 7



Source: Vernon L. Smith. "An Empirical Study of Decentralized Institutions of Monopoly Restraint." In Essays in Contemporary Fields of Economics, edited by George Horwich and James Quirk. West Lafayette, Indiana: Purdue University Press, forthcoming, 1981.

given a profit table indicating profits as a function of own price and the competitor's price. The sellers during a period chose only a single price, and the decision was irrevocable. Since a fixed profit function was provided, the procedures implicitly assume that buyers do not speculate and behave "passively" as under the posted-price institution.

For the most part, the basic market conditions were for homogeneous commodities. Use of a profit table implies that the market demand function is known with certainty (unlike experiments discussed above). Prices above a competitor's price result in no sales and a small loss. Cost conditions were such that zero profits were earned at the competitive equilibrium and price levels below this involved a loss for all agents (a feature added by J. L. Murphy, referenced below). The economic interpretation would be one of no rents, and one consequence of this lack of "producer surplus" is that prices must necessarily approach the competitive equilibrium from "above." The major treatment variable in the basic economic conditions category was the symmetry of the payoff functions, thus implying something about similarity of costs (for the homogeneous-product case, the interpretation would be that all costs are constant at zero). Market structures were primarily duopolies, but triopolies were also studied.

The primarily institutional variable, aside from the posted price, involved the amount of knowledge available to agents. Under the Fouraker and Siegel complete-information condition, the

public information was that all agents knew all past choice and profits of all other agents. In the incomplete-information condition, the public information was that profits were unknown and an agent only knew whether his price was higher or lower than competitors.

If one uses as the market price the lowest price in the market--the price at which all trades take place--then Fouraker and Siegel discovered a strong tendency for prices to converge toward the competitive equilibrium. By the 14th period, the competitive equilibrium price prevailed in 11 of 17 markets and was at the neighboring price (the price nearest the competitive equilibrium for 5 more) in the case of incomplete information. The complete-information case yielded convergence in the direction of the competitive equilibrium in all markets, but prices were higher at the 14th-period stage.

In a study by Murphy,²⁵ a similar decay process was observed in duopolies operating under the incomplete-information condition. In general, however, he found the decay process to be slower, with prices tending to hang somewhat higher above the competitive equilibrium than did those of Fouraker and Siegel (attributed by Murphy to the threat of possible loss which was possible in his payoff tables). In addition, Murphy observed 5 duopolies (out of 17) which were able to coordinate price increases which converged

²⁵ J. L. Murphy, "Effects of the Threat of Losses on Duopoly Bargaining," 80 Q. J. Econ. 296 (1965).

to the joint maximum, and a sixth was near the joint maximum. Convergence to the joint maximum was not monotone. Instead, almost all of the duopolies experienced the competitive decay at first; and then, after several periods, prices began to drift upwards for those that ultimately converged to the joint maximum. (the Murphy experiments were 24 periods, as opposed to 14 for Fouraker and Siegel).

Presumably this "cooperative" phenomenon in duopolists operating under these conditions is facilitated by many trials, and experience. The latter was explored extensively by Stoecker²⁶ within the same parametric and institutional environment as Murphy, but with complete information. Rather than use many periods of a single market, Stoecker allowed individuals to obtain experience from many markets of 10 periods each. Thirty-seven out of 50 duopoly markets managed substantial cooperation (at or near the joint maximum). None of the remainder exhibited the property of the oral double auction of monotone convergence to the competitive equilibrium. Jumps of price were common.

In Fouraker and Siegel and in Stoecker, both of the basic economic conditions of profit-function symmetry (Stoecker studied two different types of asymmetry) and the market structure (two-, three-, and five-agent markets) were examined. Symmetry results in high market prices. Presumably this is because coordination is

²⁶ R. Stoëcker, Experimentale Untersuchung des Entscheidungsverhaltens im Bertrand-Oligopol (1980).

easier--the actions of the other can be more clearly understood, and there can be no disagreement over the joint strategies. If both are to charge the same price, a unique Pareto optimum exists. An increase in the number of firms almost always results in a convergence of price to levels near the competitive equilibrium. However, a slight upward bias relative to the competitive equilibrium, even when the number of firms is "large," appears to be part of the general properties of the posted-price institution.

The work of Friedman,²⁷ Hoggatt,²⁸ and Dolbear et al.²⁹ has extended the posted-price research initiated by Fouraker and Siegel in several directions. In these markets, products are no longer homogeneous in the sense that higher prices than a competitor's result in zero sales and a loss. As a result of this innovation, the information conditions can be altered. Perfect information means that all profit functions and past price choices

27 J. S. Friedman, "Individual Behavior in Oligopolistic Markets: An Experimental Study," 3 Yale Economic Essays 359; J. W. Friedman, "On Experimental Research in Oligopoly," 36 Rev. Econ. Stud. 399 (1969); J. W. Friedman, "Equal Profits as a Fair Division," in Beitraege zur Experimentellen Wirtschaftsforschung, ed. H. Sauermann, Vol. II, p. 19 (1970).

28 A. C. Hoggatt, "An Experimental Business Game," 4 Behavioral Science 192 (1959); A. C. Hoggatt, "Measuring Behavior in Quantity Variation Duopoly Games," 12 Behavioral Science 109 (1967).

29 F. T. Dolbear, L. B. Lave, G. Bowman, A. Lieberman, E. D. Prescott, F. Rueter, and R. Sherman, "Collusion in Oligopoly: An Experiment on the Effect of Numbers and Information," 82 Q. J. Econ. 40 (1968). Reprinted in 10 J. Reprints for Antitrust L. and Econ. 415 (1980).

are known. Incomplete information means that all past prices (or quantities, as appropriate) are known but only their own profit functions are known.

The findings are best represented in the recent book by Friedman and Hogatt,³⁰ which describes the results of several oligopolistic markets under varying parametric and information conditions. The two models are compared: the joint-maximum model and the Cournot equilibrium. The competitive equilibriums where price equals marginal cost are not examined. Of course, the Cournot equilibrium prices are above these prices.

If the markets are characterized by perfect information and symmetric profit functions, the joint maximum is a good predictor for markets with up to four sellers. For the market with six sellers, prices dropped substantially to the Cournot equilibrium or just above it. If symmetry is dropped or if perfect information is dropped,³¹ the number of sellers becomes a very important treatment variable. In the duopoly markets, significant (but less than perfect) cooperation occurs; but with an increase in the

30 J. W. Friedman and A. C. Hogatt, An Experiment in Non-cooperative Oligopoly, Vol. 1: Supplement to Research in Experimental Economics (1980).

31 Information in Dolbear et al., note 29 supra, did not have a measurable effect. Subsequent experiments suggest that the pay-offs used in this experiment were so small (5 cents' difference in profits between Cournot equilibrium and monopoly) that the influence of any variables would be hard to detect. Nevertheless, the data tend to be very close and just above the Cournot equilibrium, and the qualitative influence of other variables is consistent with those of later studies.

number of firms, it vanishes almost completely and the Cournot model is very accurate by comparison. Friedman and Hoggatt conjecture what Stoecker convincingly demonstrates--that experience makes a difference. "New and inexperienced faces" can cause market prices to deteriorate.

Thus, for the posted-price institution a pattern is emerging. The institution seems to foster higher prices in general. Furthermore, under appropriate basic economic conditions and market structures, it can foster collusion in the sense that the joint maximizing model is an accurate predictor of pricing patterns.

D. Advance Notification and Price Protection

The Federal Trade Commission's current challenge to industry practice in the antitrust compound industry has drawn attention to the competition impact of institutions.³² One of the practices challenged by the Commission still assures customers a minimum of 30 days' notice of price increases. List prices are quoted in terms of delivered prices with the same price prevailing, regardless of transportation costs. In addition, contracts of the five largest sellers typically include a "price protection" clause

³² Ethyl Corp.; FTC Dkt. No. 9128 (complaint issued May 31, 1979). The respondents are Ethyl Corp., E. I. du Pont de Nemours Co., PPG Industries, Inc., and Nalco Chemical Company. Antiknock compounds are added to gasoline to reduce engine knock and raise gasoline octane rating. The writer was a consultant to the Federal Trade Commission's Bureau of Competition trial staff on matters including Ethyl.

which guarantees (i) that the seller will sell to no one at a price less than the price quoted the buyer, and (ii) the seller will meet any lower price in the market or release the buyer from the contract.

The industry structure is characterized by two large sellers of equal size (about 35 percent of the market each) and two small sellers of apparently equal size. A long-run declining demand (due to a reduction in lead use in gasoline) and existing excess capacity discourage entry. Eight large buyers account for more than half of the sales, and small buyers account for the rest.

Plott³³ has explored markets with these properties. Each agent was assigned an office. Sellers were able to post prices by means of a digital electronic display system such that price announcements were made known immediately to all market agents. Orders were placed through the telephone system. Price increases required advance notice, and all transactions were made at advertised prices (the buyer-protection clause precludes discounts). The industrial structure was as described above, with the market demand and supply functions as shown in figure 3.

The major conclusion of this study is that these practices, when combined with the industrial structure, cause prices to be higher. Figure 8 gives average prices during each of 17 trading periods. Market institutions were a simple telephone market

³³ Plott (1981), note 17 supra.

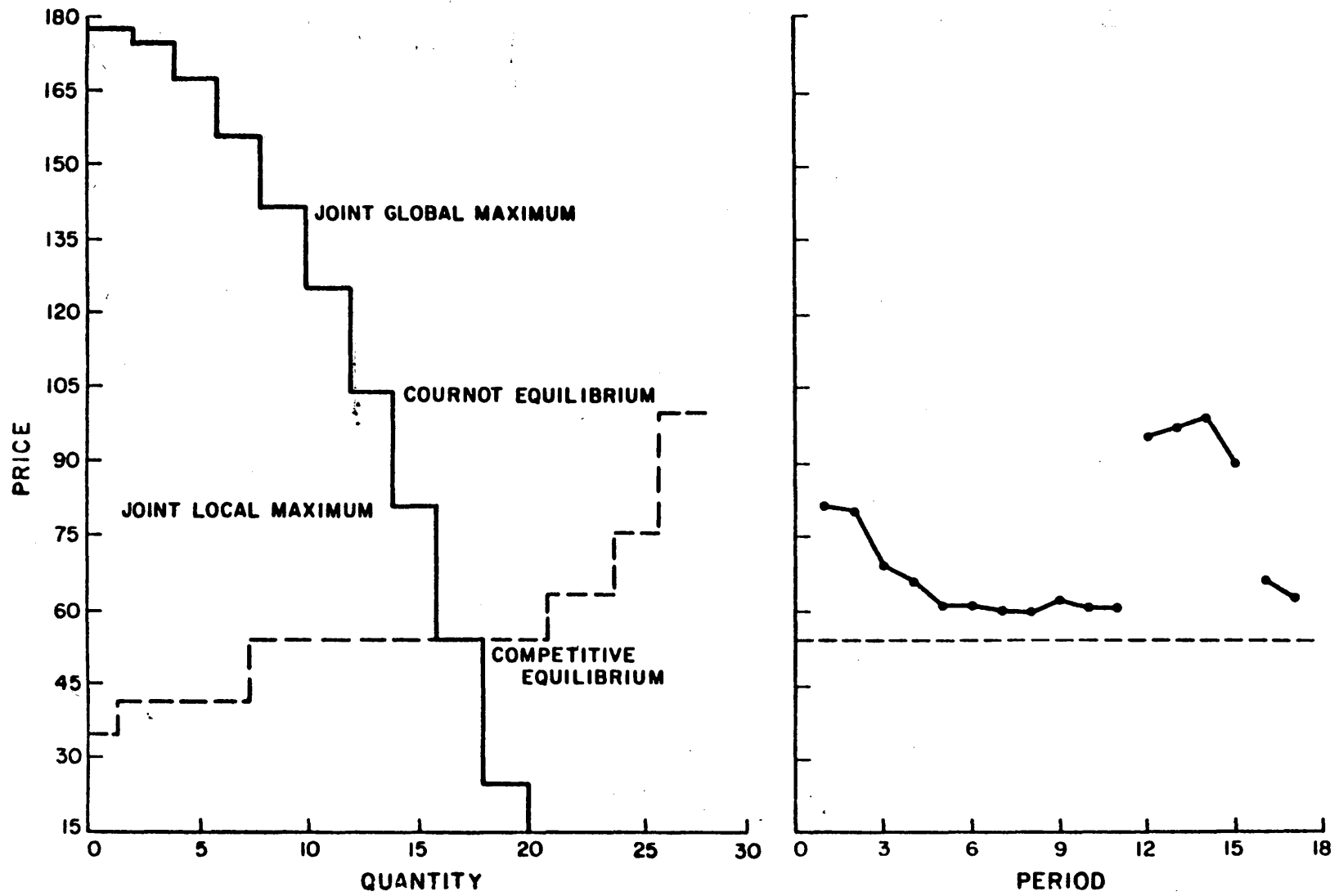


FIGURE 8
PARAMETERS AND AVERAGE PRICE PER PERIOD

during the first 12 periods. As can be seen, the prices begin to decay toward the competitive equilibrium. The practices were imposed for periods 13 through 16. As can be seen, prices jump immediately to near the Cournot equilibrium. When the practices were removed (periods 16 and 17), prices immediately fell. These data are representative of the pattern of findings from 22 experimental markets.

The theoretical explanation of this phenomenon has some support. Notice given sufficiently in advance of the deadline for advance notification provides a signal to other sellers. If the notice involves a price sufficiently far in the future, it induces no current business loss. Only a single price is involved, so the signal is uncomplicated, with minimal dimensions over which disagreement can occur. Other sellers know that if they do not increase prices before the deadline, the original firm will rescind the proposed price increase. Thus, other sellers do not have the option of "underselling" and acquiring a larger market share. The Nash strategy for such firms is to match the proposed price if a uniform industry price at the higher level will increase the firm's profits and do nothing otherwise. On the downside, due to the homogeneous nature of the product and institutionalized price protection, price cuts will be matched; as a result, the incentive to cut prices depends upon the anticipated share of demand increase due to lower price levels. This model predicts that prices will certainly be at Cournot levels, if not higher.

These instructions seem to have an effect on buyers similar to that of the posted-price institutions. Buyers do not anticipate discounts because the institutions discourage, if not prevent, them. Furthermore, since any price concessions must be offered to all, buyers can see that price concessions can be costly to the seller and thus have less expectation of winning them. Therefore, the buyers seem to have less "counterspeculation" than in, say, the telephone markets alone. These institutions appear to remove one source of buyer pressure for reduced prices while at the same time easing the problem of price coordination for the seller and eliminating the advantages of price cuts.

IV. EXTRAMARKET COMMUNICATION

Communication which facilitates price coordination could conceivably take many forms. Many industrial organization scholars feel that collusion is easy and takes little more than recognition of a harmony of interest. Others feel that collusion cannot be achieved without contracts, surveillance, and sanctions. In this section we will review forms of communication which can carry an offer of collusion. First discussed will be cases in which such signals must be conveyed within the context of the market itself. If agreements evolve, they must be facilitated in terms of actions without the aid of ordinary language. Following

that, the results of two studies, which were designed to study organized collusion, will be summarized.

A. Signals

Is it possible for competitors such as sellers to form an alliance without the aid of language? Can such alliances occur in the absence of any signals, threats, et cetera, in the sense that the context itself suggests collusion? The best answer to this question appears in the data of Stoëcker.³⁴ Fouraker-and-Siegel-format, perfect-information, duopoly experiments³⁵ were conducted with experienced participants.³⁶ Out of 50 markets (lasting 10 periods each), 37 achieved a rather stable (end-of-period effects cause some ambiguity in interpretations) equilibrium at or near the joint maximum. Nineteen of the 37 markets attained this coordinated equilibrium with no signals or "learning." It occurred with the first price choice with both competitors choosing the maximum, and for the most part, the systems stayed there. Thus, in this context, in which the harmony of interest could be clearly ascertained with no room for ambiguity or confusion, some duopolies needed no means of communicating intentions at all. For a subset (18) of these 50 duopolies, the joint maximum was not the

³⁴ Stoëcker (1980), supra note 26.

³⁵ The industrial organization analog is a duopoly with a homogeneous product, posted-price markets with simulated buyers, and publicly known profits and prices.

³⁶ The subjects had participated in at least one other duopoly experiment.

individual maximum, given equal prices. Of these, 13 achieved stable equilibrium near the joint maximum, and of the 13, there were 4 which attained the equilibrium with the first move. Since these duopolists had 20 prices to choose from, it would be difficult to ascribe these coordinated actions to chance.

Within other industrial structures and market institutions thus far explored, the existence of any one of (i) a harmony of interest, (ii) a recognized attempt to collude, or (iii) even a "focal point" is not a sufficient condition for collusion. Market signals occur constantly in oral double auctions. After a contract, when the market is open for bids or offers, the bidding will sometimes start with a clearly unacceptable bid (e.g., a 1-cent bid or something far below any previously accepted price), and it will often be followed by similar bids from other buyers, who are indicating a willingness to keep prices low. When this happens, sellers are not passive. Such bids may be answered by an equally ridiculous set of offers from sellers, indicating that the other side can play that game too. However, even if there is no answer, the sellers do not sell. They simply wait (counter-speculate), as the competition between buyers slowly works the bids into the previously accepted range. Signals such as these never seem to work in the double-auction institution--or if they do, the effectiveness is not immediately obvious.

Both the Plott and Uhl³⁷ and the Isaac and Plott³⁸ as well as the Smith and Williams³⁹ experiments are interesting in this respect. The former involved a set of middlemen who bought and sold in spatially separated markets. The latter two papers involve a price ceiling (floor) slightly above (below) the equilibrium. The harmony of interest in the first study and the "focal points" in the second two studies were obvious, yet the markets converged to near the competitive equilibrium with no signs of implicit collusion or conscious parallelism of actions. In these studies with four sellers and in the oral auction institution, there was no sign of the coordination possibilities demonstrated by Stoecker.

Hoggatt, Friedman, and Gill⁴⁰ and Friedman and Hoggatt⁴¹ provide the only attempts to model the signaling phenomenon. In part, signals are viewed as attention-getting devices. Most of the work is an attempt to identify a signal as something distinct, buried in the masses of data of the ordinary searching and competing price decisions. Within the posted-price institution, high or

37 Plott and Uhl (1981), note 7 supra.

38 M. R. Isaac and G. R. Plott, "Price Controls and the Behavior of Auction Markets," Am. Econ. Rev. (forthcoming).

39 V. L. Smith and A. W. Williams, "On Nonbinding Price Controls in a Competitive Market," Am. Econ. Rev. (forthcoming).

40 A. C. Hoggatt, J. W. Friedman, and S. Gill, "Price Signaling in Experimental Oligopoly," 66 Am. Econ. Rev. 261 (1976).

41 Friedman and Hoggatt (1980), note 30 supra.

low prices have an immediate effect on profits; so, as one might expect, signals occur rarely relative to other decisions. Signals are identified as a type of "pulse" in which an abrupt change of behavior occurs for a brief period (a sudden large price increase or decrease), followed by a return to the original levels.

Friedman and Hoggatt have attempted to develop models which will relate this activity to overall price changes and/or price levels. As of this writing, they have a reasonable characterization of the phenomenon but feel it happens so infrequently in their data that the implications cannot be ascertained.

Data generated in a "semiposted-price" market provide some insights into how signaling might occur and be useful. The institution is a market with advertising (by an electronic digital display system) with a stipulation that all sales are at advertised prices. A "price war" has reached a low point in period 5 (figure 9). Notice the existence of advertising before period 5 opens. Prices cave soon after the market opens, and continue downward during the period, with almost all transactions (not shown) made at the low prices. Buyers seemed to be counter-speculating until prices fell. The period ends; but signaling begins with very high prices being advertised when it costs nothing to do so, before period 6 begins. The period starts, and price cutting begins immediately; but the sellers who signaled high prices meet price cuts this time, rather than cutting below. As a result, the speed of price decay is reduced; and in the end,

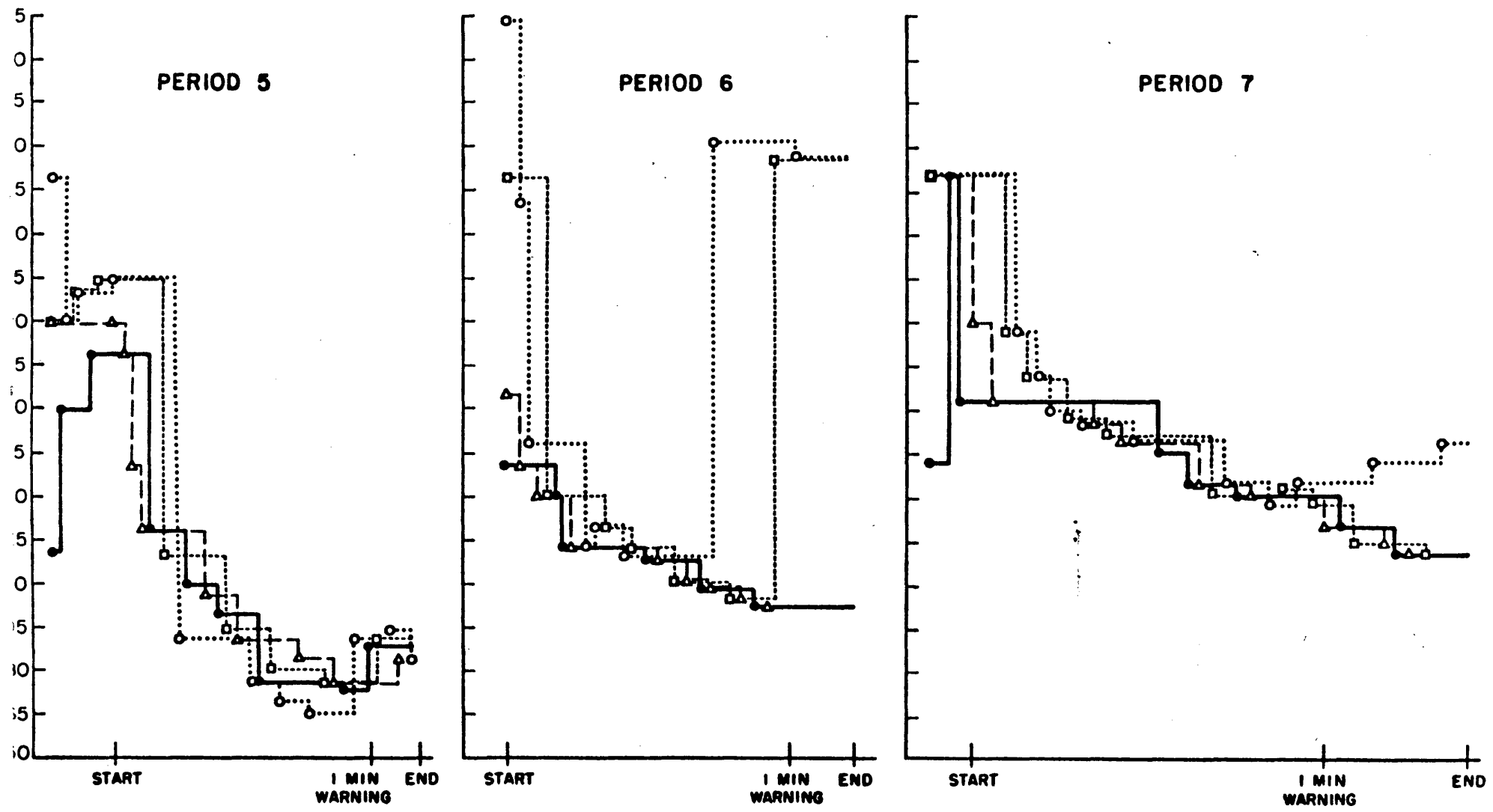


FIGURE 9

●, △ large sellers
○, □ small sellers

transactions occur at somewhat increased prices. Notice that the two signaling individuals have their prices high before the period ends (having limited capacity, they have sold out and can now signal with little cost incurred). Prior to period 7, all advertised prices are at a high level, and the decay is less. This process continues as prices creep upward for several periods. Of course these data are not demonstrations that price signals can affect prices, but they are certainly suggestive of how it might happen. They are also typical of a general tendency for signals to occur through channels and at times when such communication is not costly.

B. Auction Markets

The effectiveness of preperiod discussions by sellers (buyers) on prices in a double auction market was explored by Isaac and Plott.⁴² The four sellers (buyers) were allowed to talk freely between periods while the buyers (sellers) left the room to get the next period's demand (cost) functions. No side-payments or profit-sharing discussions were allowed.

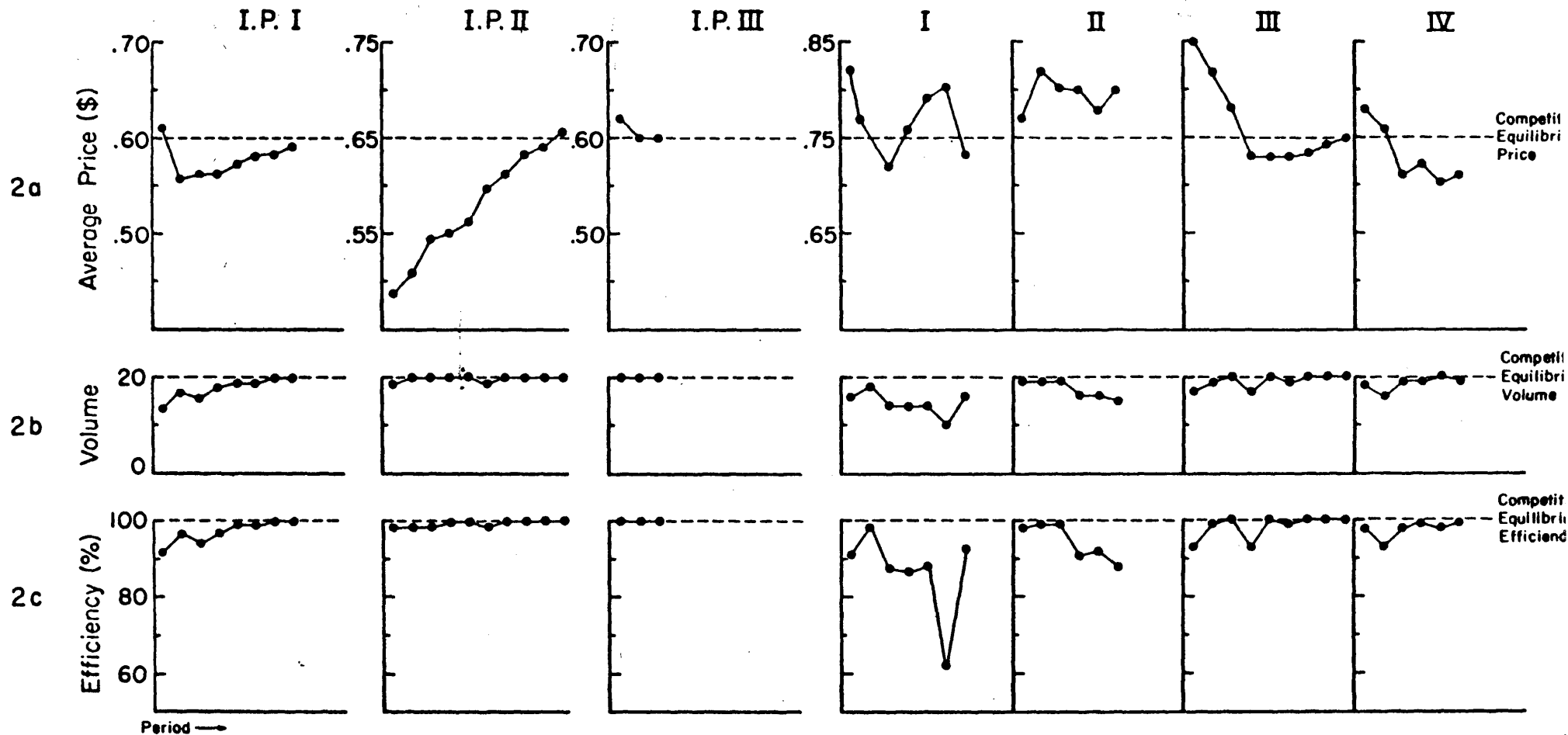
The study asked the following questions. Do traders discuss collusion when given the opportunity? Can the traders formulate some sort of agreement? Once formulated, do they stick to it?

⁴² M. R. Isaac and C. R. Plott, "The Opportunity for Conspiracy in Restraint of Trade: An Experimental Study," J. Econ. Behavior and Organization (forthcoming).

Can the consequences of the conspiracy be detected in the industrial conduct?

The answer to the first two questions is yes. The answers to the second two are not without qualifications. Data in figure 10 provide a comparison with the oral double auction when no collusion is present (the first three experiments), with those in which there is a seller's conspiracy (the fourth and fifth), and with a buyer's conspiracy (the sixth and seventh). The top charts are the average prices each period. The middle charts are the per-period volumes, and the bottom charts are the efficiencies.

In order to see the effects, it is important to notice the near-monotone convergence of all three measures in the first three nonconspiratorial markets. Prices, volume, and efficiency--all three move monotonically to the competitive equilibrium levels. This does not happen in the conspiracy markets. In each of the four experiments with conspiracy (with the possible exception of experiment III), at least one of these measures exhibits some erratic behavior in the sense of a movement away from equilibrium. In this sense the conspiracy might be detectable from market data, but experiment III indicates the difficulty. Notice in experiment III there is a strong tendency toward the competitive levels, even though there is an active conspiracy.



AVERAGE PRICE, VOLUME, AND EFFICIENCY PER PERIOD

FIGURE 10

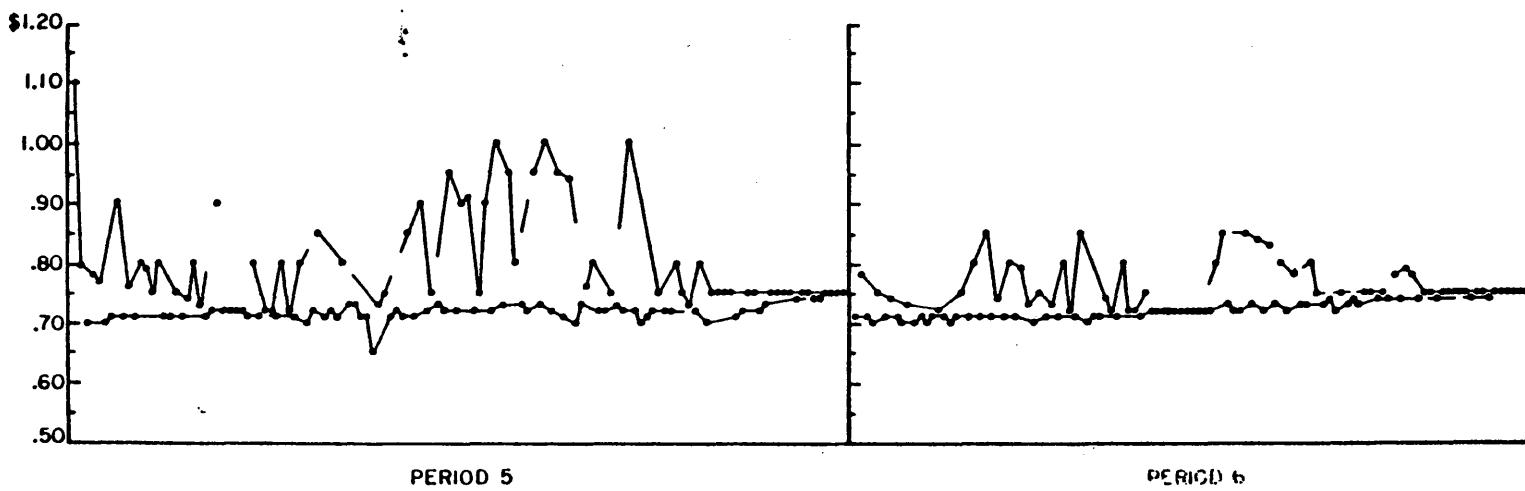
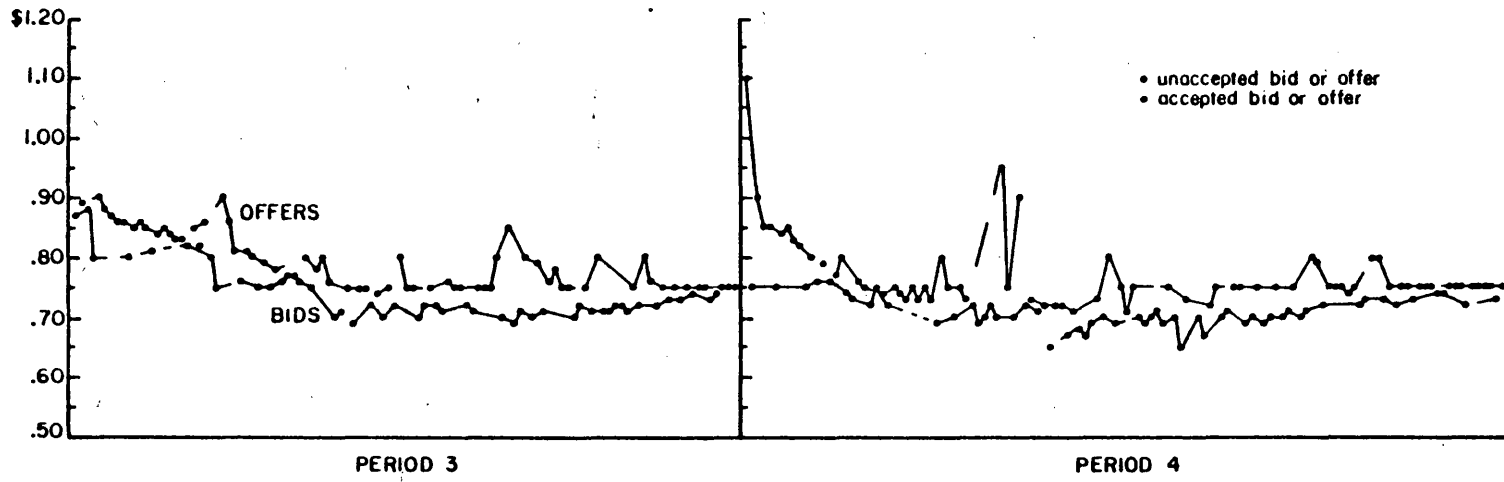
Source: R. Mark Isaac and Plott, Charles R. "The Opportunity for Conspiracy in Restraint of Trade: An Experimental Study." Journal of Economic Behavior and Organization 2, forthcoming.

Figure 11 will help explain what is happening. Shown there is the sequence of bids, offers, and contracts from experiment III. This experiment involved the dramatic reduction in prices in period 4 as a result of a successful buyers' conspiracy.

Some general discussion began after period 3. Note that, unlike period 3, the buyers in period 4 did not rush to accept high seller offers. In period 3, five of the first six trades were offers between 83 cents and 88 cents. In period 4, no offers were accepted until they reached 73 cents. In period 5, the 10th bid was at 72 cents. Between periods 5 and 6 the sellers agreed to try to hold the price at 71 cents. In period 6, the first 27 bids were all either at 70 cents or 71 cents, with several intervening offers at 72 cents ignored. The 28th bid broke the agreement, and there were 10 immediate trades at 72 cents.

Of particular interest in this context are the high offers in period 5. These are interpreted as signals by sellers in an attempt to get other sellers to hold out. Frequently, however, they are made by sellers who have already sold and now have only high-cost units which they do not expect to sell. The cost of signaling to them is low. Nevertheless, the fact that the nonconspirators are not simply passive is obvious.

The difficulty these conspirators have in substantially affecting market conduct seems to be related to the market institutional environment. As the Smith results reviewed above demonstrate, even a perfect conspiracy (monopoly) has difficulty



EXPERIMENT III PERIODS 3,4,5 AND 6
ALL BIDS AND OFFERS

FIGURE II

Source: R. Mark Isaac and Plott, Charles R. "The Opportunity for Conspiracy in Restraint of Trade: An Experimental Study." Journal of Economic Behavior and Organization 2, forthcoming.

in the double auction. Add this property of auction markets to the fact that oligopolists can have difficulty in achieving coordination even under the most favorable conditions, as was discussed above. Perhaps, then, it is not surprising that the industrial structure used in the Isaac and Plott experiments (four buyers and four sellers) would make successful conspiracy difficult.

C. Posted Prices

If the market institutions are the posted price and the industrial structure is duopoly, a completely different picture emerges. Friedman⁴³ studied posted prices of duopolies with asymmetric payoff functions. Perfect information existed in the sense that each competitor knew all previous price choices and payoffs (up to a scalar transformation on occasion). Competitors were allowed to transmit two written messages before privately making a price decision. These messages were made in sequence, with the same individual initiating contract for each of up to 25 periods (although most were from 6 to 14). In his data, collusive agreements were attained in over 75 percent of all decisions made; and of the collusive agreements, 75 percent were Pareto optimal relative to the pair (no side payments were allowed). The ability to make such agreements increases with experience. Once a

⁴³ J. W. Friedman, "An Experimental Study of Cooperative Duopoly," 35 Econometrica 399 (1967); J. W. Friedman (1970), note 27 supra.

collusive agreement has been attained and successfully implemented, the probability of another successful agreement is .96.

Extramarket communication does have implications for market conduct. Perhaps this is no surprise for those who have observed industry for years, but these studies demonstrate the truth of the proposition for those who have not had the benefit of such observation or believe that the "competitive drive to defect" is so strong that collusion is impossible. However, the implications in terms of conduct cannot be divorced from both industrial structure and the market institutional environment.

V. CLOSING REMARKS

Experimental studies demonstrate clearly that market institutions and practices can influence market performance. Variables traditionally classified as aspects of industrial structure are also of demonstrable importance. Furthermore, rather standard mathematical models are able to capture much of what can be observed behaviorally.

Three models do well: the competitive equilibrium, the Cournot model, and the monopoly (joint maximization) model. Some tendency exists for the error of the model to be sensitive to structural and institutional variables (e.g., posted prices tend to be higher than prices under oral double auctions); but generally speaking, when a model applies, it does so with reasonable accuracy.

Interestingly enough, while experimental studies demonstrate that it is possible to model economic processes, they have also uncovered a problem in determining the conditions under which a model will be applicable. An interaction exists among variables which has not been fully explained. It is not the case that competitors are capable of collusive activity when merely recognizing a harmony of interests. It is also not the case that competitors cannot collude in the absence of direct communication and the enforcement of agreements. Competitors seem to be willing to collude (so the rivalistic hypotheses⁴⁴ advanced in the early experimental studies can be safely dropped); but some industrial structures and market institutions make it easy, while others make it almost impossible (in the sense that successful collusion has never been observed). Even a monopolist has difficulty within certain market institutions. Existing theory does not tell us exactly why this occurs, but the data suggest that one key is the behavior of the buyers. The data also suggest that market performance is very fragile with respect to these underlying variables, and that "slight" changes (from four to two firms, or from price posting to some other institution) can switch a market from "competitive" to "collusive" or vice versa.

⁴⁴ This hypothesis maintained that competitors will attempt to maximize relative profits, thereby transforming the market into a zero-sum game.

One major question which experimental studies have not addressed is the evolution of the market institutions themselves. What type of market institutional environment might one expect for a given industrial structure? The data suggest the nonneutrality of the marketing practices, so one might expect that self-interested individuals who realize the relationships and have an opportunity to affect market institutions would do so. To the extent that market institutions are part of market conduct, industrial organization economists have a clear interest in this question. Perhaps the reason that this issue has not been addressed reflects the fact that the independent influence of institutions is only now being realized. No doubt this void will be filled as theory is developed which will suggest what one should look for in an experimental environment.

The studies reviewed above were all designed and executed to answer reasonably specific questions generally related to basic science. Sometimes applied scientists dismiss the experimental results and methods as being irrelevant and inapplicable. In the remaining paragraphs, four of the most common sources of skepticism will be discussed.

The first argument is a claim that "real" businessmen do not behave as do the subjects in these experiments. Stated like this, the argument is not a criticism of experimental methods--it is a hypothesis about behavior in different subject pools and is thus a call for more experiments (with businessmen subjects). Similarly,

arguments that the monetary amounts involved were too little (or too much) are simply demands for more experiments. The fact of the matter is, however, that a variety of subjects and payment levels have been used. The Hong and Plott⁴⁵ study, for example, used employed adults. To date, no subject pool differences have been reported.

The next three arguments derive from the fact that naturally occurring phenomena are inherently more complex than are laboratory processes. The first argument is that the laboratory environment is artificial. Exactly why is not articulated, but with this argument, the word is used many times and preferably loudly. It probably results from a gestalt view that there are so many important variables that they cannot be enumerated and that they interact in ways that are necessarily precluded in the laboratory.

This argument, notice, is not an argument against experimental methods in economics: it is an argument against experimental methods in general. The physical scientists must deal with it and so must the economists. Since the assertion cannot be falsified, the only answer lies in experimental work that has been helpful in generating successful models and points of view regarding more complex processes. As applied researchers find the data from experiments useful in shaping their own hypotheses and beliefs, this argument becomes less important.

⁴⁵ Hong and Plott, supra note 16.

The second argument is more specific in that it notes that naturally occurring processes do not occur in isolation. Industries are embedded in a larger social context. Businessmen have social relationships and friendships. They also know that their decisions while with one firm may affect their possibilities for changing firms.

This argument suggests that behavior in very complex environments may follow different laws than those which govern behavior in relatively simple situations. This is an excellent reason for being careful in any attempt to extrapolate behavior from a laboratory to a complex industry. Notice, however, that it is not an argument against experimental methods. It is an argument for a particular type of experiment--one in which the complexity of the experimental environment is gradually increased similar to those of a given industry. If complications destroy the applicability of models, it might be possible to identify the precise complications which cause the problem and adjust the model accordingly. In a sense, this program of increasing complexity is exactly how experiments are proceeding.

The final criticism also relies on the complexity of naturally occurring processes. How is one to know if the elasticity of demand and costs used in an experiment or the particular market institution are those of the industry? If the results of the laboratory experiments are to be applied, shouldn't these be "right"? The answer to these types of criticisms are still more

experiments under varying parameters. With a wide range of parameters explored, the question collapses into a judgment about parameters and not about the experimental methods.

All of these arguments should make one cautious about extrapolating results generated from laboratory processes to naturally occurring processes. This type of extension must be dealt with artfully in the physical sciences as well as in economics. It is the most difficult task that any researcher faces. Experiments are simply an additional source of data and experience that one adds to other sources in making judgments about how the world works.

An easier task involves a somewhat negative approach, placing the burden of proof on those who advocate theories. General theories apply in special cases. They should therefore be expected to work in the simple laboratory environments; and if they do not, or if a competing theory works better, the burden of proof is on the advocate to tell us exactly why we should not judge him to be wrong. By adopting this point of view, researchers can use data from laboratory economics to reduce the size of the set of competing ideas.

THEORY, EXPERIMENT, AND ANTITRUST POLICY

Vernon L. Smith*

I. Introduction

I attended this antitrust conference with the expectations of a consumer, hoping to learn much about the insightful contributions of the "new" industrial organization to antitrust policy. It has long been evident that industrial organization (IO) was replete with interesting experimental questions and the "new" IO proffered the hope of being even more challenging. It is my understanding, from conversations and a little reading¹ that there were two primary deficiencies in the "old" IO: (1) Methodologically it consisted of industry studies with little if any theoretical foundation, or where microeconomic theory was applied, it was mostly elementary-textbook partial equilibrium theory, inappropriately or inadequately adapted to IO questions. What was missing

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¹ E. g., R. Nelson, "Goldschmid, Mann and Weston's Industrial Concentration: The New Learning," 7 Bell J. Econ. 729 (Autumn 1976).

was the more sophisticated analysis made possible by mathematical economics, game theory, new developments in information economics, the new work on contracts and incentives, and so on. (2)

Sociologically, the "old" IO consisted of two (essentially political) schools--the Chicago school and the Harvard school. The problem here, it is said, is that one school is probusiness, the other is antibusiness; and in each case the analysis is colored, if not actually bent, by these predilections. What, it is said, is needed is a more objective, dispassionate, and deeper analysis of IO-type questions. Since I have never been identified with either the Chicago or the Harvard schools of thought, I came to the conference with some right to claim a clean conscience, if that be important.

II. General Comments

So, on December 15, 1980, 6 months after the conference, without benefit of a copy of the paper assigned to me for comment, and with a reminder just received that I signed a contract to deliver a written comment in return for the payment I accepted for my conference expenses (I am an inveterate signer of contracts that I have not read), and being further informed that I may have to return the money, what can I say about what I have learned from the conference? For me the conference was stimulating and valuable. Whether the sum of such private benefits covers the taxpayers' loss I could not even guess. I learned much, but not what I

expected to learn. I think I have learned that in the "new" IO what has changed are the names of the principals, and the form and complexity of the analysis. By and large, my impression is that the principals turn out to be monopolophobes, as darkly suspicious of business practice as any member of that "old" IO school on the East Coast. The "new" IO is at least as inciteful (whether or not it is at least as insightful) as the old.

On Outlawing Explicit Agreements and Horizontal Mergers

There seems to be general agreement among many in both the "old" and "new" IO camps that antitrust action is justified as welfare-improving where it can be shown that explicit agreements or "conspiracies" have occurred with respect to price or marketing arrangements, and in the case of horizontal mergers. I wish I could share in this general agreement, but I see so many exceptions to these dicta that they become very thin reeds on which to base any case for antitrust. Where firms have declining marginal cost, institutional arrangements preventing price from falling below average cost may be an important part of the attempt to create property right systems that allow the price mechanism to do its work. What are the alternatives? If conspiracies are prohibited, microtheory alleges that the long-run equilibrium is monopoly. We could introduce governmental regulation, but is there anyone left who believes that regulation is the answer to anything except perhaps an industrial plea for protection? There are historians who have reported that the ICC Act was written by

lawyers for the Pennsylvania Railroad. The response of the securities industry to the SEC decision to eliminate Government-sanctioned minimum brokerage fees was to propose a Federal-Reserve-type regulatory scheme for itself. Beware of businessmen bearing the gift of regulation!

But surely horizontal mergers should be illegal. Why? If there are scale economies, can it be shown that the ex post merger industry will be less rather than more competitive, with higher rather than lower prices? If there are no scale economies, entry is likely to be cheap, and made more attractive if ex post merger prices are raised. Horizontal merger is the primary mechanism through which "exiting" firms have their useful assets reallocated, and their useless assets (including managers) discarded. Are Chrysler assets to be prevented from such reemployment? Would the current bailout of Chrysler (financed involuntarily by taxpayers) have been avoided much earlier by merger if it had not been for antitrust strictures (also financed involuntarily by taxpayers)?

I suspect that abolishing all import restrictions and tariffs would do more to foster a competitive discipline than the total of antitrust decrees and complaints covering conspiracies and horizontal mergers. But even if this guess is wrong, it is transparent that tariffs and import restrictions are a means by which the right hand of Government (the U.S. Treasury, Customs Division) creates unproductive work for its left hand (the FTC and the Department of Justice, Antitrust Division), to say nothing of the

"investment" cost to industry of lobbying for "trigger-price" mechanisms and anti-"dumping" laws. That these problems are created by political realities in a representative democracy without explicit constitutional protection of the right to free contracts of exchange does not excuse us as professional economists for copping out with second-best arguments that may not even be nth-best.

Even if there are individual cases in which one can demonstrate convincingly that antitrust can reduce welfare losses due to conspiracy agreements or horizontal mergers, there remains the question: Are the benefits of antitrust greater than the costs? The tragedy of this conference is not that this question fails to be answered, but that it is not even asked.

What is Predatory Pricing?

One of the perennial "old" IO antitrust problems which has been examined with greater sophistication by the "new" IO is the problem of "predatory" pricing. The main unsolved problem here, as I see it, is to define it. Combining the word "predatory" with the word "pricing" does seem to attract a measure of brow-furrowing attention--try it next time you visit your brother-in-law--but does it define anything that yields common recognition?

If I understand the argument rightly, when a businesswoman--say, Olive Ann Beech--appears to improve her competitive position vis-a-vis her rival, Cessna, or responds to a new entrant such as Lear Jet by lowering her price, this need not be an occasion for

professional rejoicing. She may in the first case be dedicated to a policy of driving out her competitor to establish a monopoly, or in the second case be trying to make the new entrant so uncomfortable that he will reconsider his entry decision. Surely it takes a devious, if not vindictive, mind to put that construction on the simple competitive (?) act of reducing one's price. But if there are minds that so interpret price cutting, then we have to admit that there may be minds that willfully engage in "predatory" price cutting. So how do we decide objectively whether the act of lowering price was a rejoicingful act of good old competition, or a naughty antisocial act of "predatory" pricing? Well, let's see if there was an exit of firms from the industry and a subsequent increase in price. That doesn't help, because the textbooks make it clear that the function of exit is to reduce long-run excess supply and raise price so that markets will clear. Well, suppose a businessman had a strong demand and was operating profitably before he lowered his price? That doesn't help either. Maybe he was just greedy for more profits and hoped to increase demand. You can't put him in jail for that. Yes, but suppose that after lowering his price he started losing money and did not recoup his losses until ex post exit and a price increase. Now that does look suspicious. But maybe he just made a mistake--underestimated the elasticity of demand and/or economies of scale--and then was competitively locked into a lower price until the other firm lost

heart and exited. The defense of our predatory price-cutter might be, "I did a dumb thing! If economists make forecasting errors, why can't I?"

The problem with the problem of "predatory" pricing is that it can only be defined in terms of the intentions in the mind of the economic agent, and this by definition is not a well-defined problem. How do we as economists observe intentions? It turns out, as I understand it, that intentions are what lawyers and judges get into in predatory pricing cases. This is exactly what economic "analysis" of predatory pricing would lead one to expect. One of the things I learned at this conference is that all the action is with the lawyers, because it is the lawyers who have to deal with the issues (such as intentions) as they are manifested in the courtroom. They are also well aware of the bread-and-butter effect of Government antimonopoly strictures and complaints in swelling corporate legal staffs concerned with figuring out how to avoid the pitfalls of Government complaints and still satisfy consumers, workers, and stockholders. At Kodak I assume that the in-house advice now is, "don't put anything in writing."

III. Industrial Organization and Experimental Economics

Plott has written a useful review of those studies of experimental markets that impinge in some way on IO questions. Generally, I have no disagreement with either the selection or the treatment of the topics chosen and will limit my comments to

only three areas in which I will offer some alternative interpretations, or some extensions, to the fine treatment of the subject by Plott.

Posted-Offer Pricing

The institution of posted-offer (take-it-or-leave-it) pricing is the institution most familiar to all of us in retail markets (with a few exceptions, such as new and used automobiles). Experimental research in this area falls into two broad classes:

(i) Real, payoff-motivated buyers are free to reveal, through their purchases, as little or as much of their "true" (induced) demand as they choose. In these experiments, sellers (and buyers) have information only on their own cost (demand) conditions.

(ii) Dummy buyers are programmed to reveal their individual demands at the lowest of the set of active (a positive quantity is available) price offers (or, where the product is not homogeneous, demand is subject to cross-price elasticity effects). In these experiments, sellers have complete information on their own profit potential but may or may not have this information for their competitors.

Very few of the published studies use experiments conducted under condition (i), and Plott has summarized them all. A very large number of experiments have used condition (ii), and Plott has summarized some of the more extensive of these studies.

The paucity of experiments under (i) make generalization tenuous. I have become particularly aware of this fact from the

30-odd experiments we (Don Coursey, Mark Isaac, Jon Ketcham, and Arlington Williams) have conducted as part of a general study of posted-offer pricing. The results reported in our first working paper,² summarized in preliminary oral form at the FTC conference, suggest that with experienced subjects, posted-offer prices converge just as rapidly as double-auction prices to the C.E. price, in a design with symmetric consumer and producer surpluses. In experimental designs with the property that consumers' surplus greatly exceeds producers' surplus and in which there were only two viable intramarginal sellers, price "signaling" was frequent on the part of the extra-marginal firm (as I suggested at the conference, such sellers have a zero opportunity cost for "signaling" high prices). This "signaling" led to sporadic increases in prices. However, both the "signaling" and the increase in contract prices declined with subject experience. This is the opposite of the behavior summarized by Plott in the studies by Friedman-Hoggatt³ (absence of extramarket communication),

² J. Ketcham, V. Smith, and A. Williams, "The Behavior of Posted Offer Pricing Institutions," presented at the Southern Economic Association Meetings, Washington, D.C., November 5-7, 1980.

³ J. Friedman and A. Hoggatt, An Experiment in Non-cooperative Oligopoly, Supplement 1 to Research in Experimental Economies, Vol. 1, ed. V. Smith (1980).

Stoecker,⁴ and Friedman⁵ (with extramarket communication). But these latter results reported by Plott are all obtained under the dummy buyer condition (ii) and the condition of perfect information in which all sellers know their own cost and demand (profit), conditional upon the posted prices of other sellers. Hence, complete profit information on the part of sellers, and passive, predictable, simple maximizing behavior on the part of buyers seem to be the conditions that yield collusive behavior. Since these conditions are not likely to be realizable in field environments, it is important to guard against thinking that these results are transferable to the field without corroborating field evidence. It is a wise businessman who can tell you what would be his profit, given his own and his competitor's prices. The limitations of these experiments reflect the limitations of the theory that motivated their design; namely, theory that assumes perfect revelation of demand by buyers and perfect knowledge of profit functions by sellers.

Advance Notification and Price Protection

"Most-favored-nation" contracts promise a buyer advance notice of a price increase and guarantee (i) that the seller will not discriminate against the buyer by selling at a lower price to

⁴ R. Stoecker, Experimentale Untersuchung des Entscheidungsverhaltens im Bertrand-Oligopol (1980).

⁵ J. Friedman, "An Experimental Study of Duopoly," 35 Econometrica 399 (October 1967).

anyone else, and (ii) will match any lower price in the market. Such contracts provide an obvious incentive for sellers to follow a leader's advance announcement of a price increase. On the downside, any seller considering a cut in price to obtain a new buyer knows that the buyer's current supplier has the contractual right to hold the buyer's business by matching the price cut. Hence, no seller is well motivated to consider a price cut.

This is a well-defined contractual arrangement, with clearly specified incentive effects, and is thereby naturally suited for experimental examination. Plott's study is an important new contribution to the growing literature on the experimental study of the incentive properties of market institutions. The results clearly establish the price advantage to sellers of offering most-favored-nation contracts to buyers.

What is not established by the experiments is that most-favored-nation contracts are "bad" and that the Government should intervene to prevent them. There is a yawning gulf between economic science and economic policy that is particularly well illustrated by this case. Nothing could be more subtly dangerous to the fabric of freedom than for there to be widespread professional misunderstanding of the complex issues involved in going from scientific results such as these, to policy prescriptions.

1. To begin with first principles, it should be noted that most-favored-nation contracts did not arise exogenously in society as they do in an experiment; namely, by experimenter imposition.

Such contracts, as is the case with all price institutions and their supporting property-right systems, arise by a process of trial-and-error filtering and refinement, which we only dimly understand and barely perceive. This hypothesis about price institutions is fully verified by the fact that we live and participate in an elaborate pricing system invented by none of us, invented by no FTC or Department of Justice bureaucrat--indeed, invented by no one--and, astonishing as it may seem, it coordinates the activities of an entire country without anyone being in charge. Most-favored-nation contracts are part of the societal invention we have named "the pricing system." From the experimental evidence, we know what is the immediate effect of those contracts on efficiency and the relative buyer/seller surplus. But what is the function of such contracts as part of the pricing system within a historical economic process?

2. From the point of view of the "old" IO, at least some aspects of these contracts might appear to be "good." Condition (i) promises no price discrimination. That looks like good, solid, "old"-IO, Clayton Act compliance. Indeed, might not Clayton Act prohibitions against price discrimination be the origin of this contractual "innovation"? Did the "old" IO antitrust help to create work for the "new" IO antitrust?

3. A most-favored-nation contract is indeed a contract, signed by a buyer as well as a seller. Before declaring such

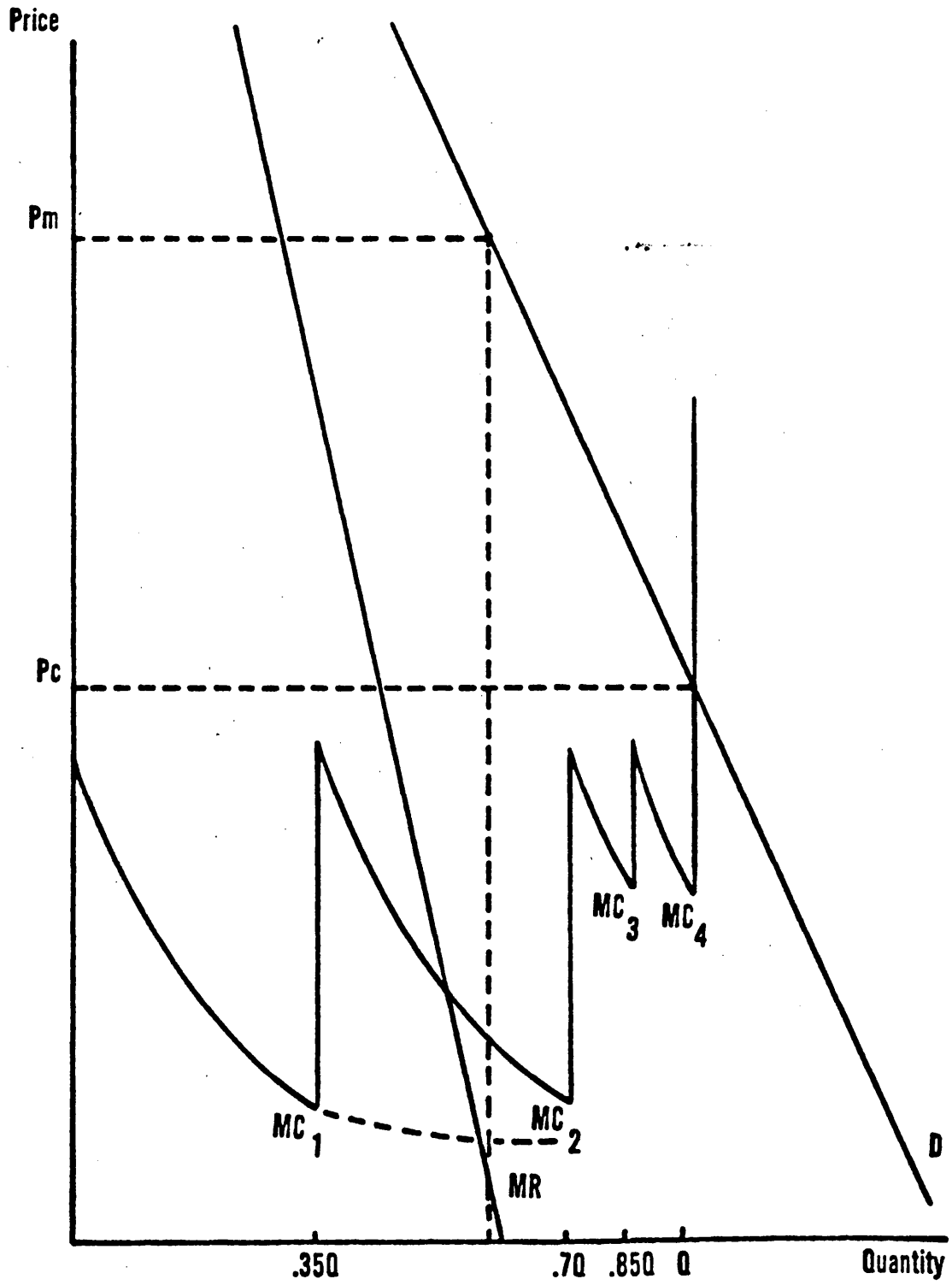
contracts to be bad on the basis of the experimental evidence, it is necessary first to show that there are not benefits that exceed the cost of what might appear to be a short-run reduction in competition. That such benefits may occur is at least suggested by the fact that buyers freely enter into such contracts. Why do buyers voluntarily enter into such contracts if they are contrary to the buyer's self-interest (I assume buyers are not coerced or threatened with mafia-like physical harm, which calls for a different remedy)? Because of ignorance? If so, the remedy is simple. Just send Exxon and the other ethyl consumers copies of any theoretical and experimental papers that expose the distributional effects of these contracts. Another appropriate policy would be to publish the results in the Oil and Gas Journal or journals read by contract lawyers. If the interventionist spirit has to be vented, let it be limited to requiring all such contracts to carry a warning label stating that signing this contract may be hazardous to your pocketbook. Or do buyers, like me, sign contracts they don't read? Then no remedy is called for. Let them, like me, bear the consequent costs.

Or is the hypothesis false, with buyers obtaining benefits not yet transparent to the monopolophobes? After all, most-favored-nation contracts must have existed well before any economist thought they might be bad. Do the benefits lie hidden in night, awaiting some "new" new IO light?

4. Let's speculate on possible private or social benefits from these contracts. The field paradigm is a market with four firms--two each with 35 percent of the ethyl market and two each with 15 percent of the market. Suppose marginal cost declines to capacity--the case alleged to be typical in the engineering process industries, if not most manufacturing--and assume that any of the firms could supply the entire petroleum industry as did the Ethyl Corporation before its patent so inconveniently expired. Assume that the use of most-favored-nation contracts has permitted the industry to achieve, a la Plott, a stable Nash-Cournot equilibrium price, P_c , at a 35-35-15-15 split of the market, as shown⁶ in figure 1. Let the Government now declare such contracts null and void. Lots of reactions might ensue, but the one I would bet on is the one predicted by the Plott experiment; namely, that prices would fall. One obvious scenario is heavy losses by all four firms, with #3 and #4 in figure 1 hightailing it out of the industry first. If #1--say, Ethyl--has the "deepest pocket," it might be the lone survivor. Clearly this would call for an FTC complaint charging Ethyl with "predatory" pricing leading to the monopoly price P_m (except that I doubt that Exxon and company would stand still for P_m).

⁶ Figure 1 might be interpreted as depicting either short- or long-run marginal cost conditions. To construct a Nash-Cournot contract equilibrium may require short-run marginal cost to be rising. Clearly--and I have not seen the original Plott study--the theoretical and empirical interpretation of most-favored-nation contracts is important to the whole analysis.

Figure 1



So what was so bad about the original "contract" equilibrium? Price is now higher than before, to the detriment of buyers, and we have the deadweight loss from a new FTC complaint.

5. Another benefit to buyers might be the insurance value of having more than one source of supply. After all, the opportunity to switch to an alternative supplier is there, even if the incentives do not encourage it. Are buyers paying an opportunity cost insurance premium in the form of a higher, contract-induced price? Buyers such as the airlines have expressed concern about being dependent on a sole source of aircraft supply (Boeing). This concern has been strong enough for some airlines to delay their orders for the new generation of Boeing jets, in the expressed hope that a Boeing competitor would make it to the starting line.⁷ Could Boeing's competitors have been "saved" by some variety of most-favored nation-contract, enthusiastically signed by the airlines? Or does the aircraft industry differ from the ethyl lead industry in ways unknown to us but which make most-favored-nation contracts welfare-reducing in the former, but welfare-improving in the latter?

⁷ V. Zonana, "Boeing's Sale To Delta Gives It Big Advantage Over U.S. Companies," Wall Street Journal 103 (November 13, 1980): 1. I am indebted to Mark Isaac for this reference.

Double-Auction Conspiracies

In commenting on the Isaac-Plott⁸ experimental study of conspiracies, I would like to emphasize a few technical considerations that underpin the problem of interpreting experimental work.

In any experimental study, one is looking for and trying to measure the effects of one or more control variables on one or more observable outcomes or dependent variables. For me the difference between a pilot experiment and a research experiment is that in the former case the experimenter may be vague about how to design the controls and/or how to measure the effect and/or what to expect from the experiment. Where there is a theoretical proposition to be tested (e.g., that a single seller or a successful producer's cartel will achieve the monopoly profit), "what to expect" is defined by the theory. But often the phenomena of interest involve a vague "theory," conjectures, and/or some empirical regularity discovered in field data or pilot experiments. The fact that there is vagueness should never stay the design and execution of experiments. Theory without measurement is a dream as inadequate as measurement without theory. But the more the hypotheses and measurements of an experiment are well defined in advance by theory or previous data, the more convincing

⁸ M. Isaac and C. Plott, "The Opportunity for Conspiracy in Restraint of Trade," J. Econ. Behavior and Organization (forthcoming).

will be the falsification outcomes of an experiment. The reason for this is simply that an ex post examination of the data of an experiment will always yield hypotheses suggesting unique, unusual, or unlikely events in comparison with a control experiment. One replicates research and control experiments to avoid such pitfalls and to strengthen the credibility of the case for saying that the occurrence of a particular event is unlikely not to be attributable to the particular treatment applied in the research experiment. In measuring the effects of the "opportunity to conspire" on double-auction trading, two criteria might be used: (i) Does the conspiracy have an identifiable effect on such measures as price, volume, and efficiency? (ii) Does the conspiracy permit conspirators' profit to approach the monopoly (or monopsony) level or at least to be increased significantly above its competitive level? Under criterion (i), Plott states that "it is important to notice the near monotone convergence of all three measures (average price, volume, and efficiency) in the first three nonconspiratorial markets. This does not happen in the conspiracy markets." What is unclear is whether this different pattern of price-quantity-efficiency behavior is attributable to the "conspiracy" treatment, or to sampling variability among subject groups. The three nonconspiratorial experiments show widely differing patterns of convergence behavior. This suggests high sampling variability. Is this variability high enough to include outcomes similar to those observed in the four conspiracy

experiments? With such small samples, it is difficult to reject this hypothesis. Rejection of this hypothesis is made especially difficult by the fact that the reported study⁹ specified no a priori hypotheses, based on theory or previous independent results, about differences in the pattern of prices, quantities, and efficiencies as between the two treatments. The seven experiments are conducted; then one asks, "Can we identify a difference?" Ex post, one can always identify observed difference, since what it is that is different is variable. When one is free to search among many recorded events, each of small probability, it is likely that one will find one or more such event(s). In this case, "near-monotone convergence of all three measures" is ostensibly the event that differs between the two treatments. The qualification "near" is important, since literally the mean price, quantity, and efficiency behavior of two of the three control experiments (I.P.I, I.P.II) fail to meet the criteria. If one drops the monotone specification and takes "convergence" as the criterion, one (I.P.I) in three control and none in four research experiments qualify. If the criterion is "near convergence," it looks like all three control and one (III) in four research experiments qualify. If we take "nearness" to the competitive equilibrium (C.E.) price in period 6 (the smallest number of periods run in the conspiracy treatment) as the measure, then all

⁹ Isaac and Plott, note 8 supra.

four of the conspiracy experiments do as well as or better than one (I.P.II) of the controls, and one (III) of the conspiracies does as well as or better than two (I.P.I, I.P.II) of the controls. The point is not that the Isaac-Plott conclusions are wrong, but that they are uncertain and slippery, given the small sample and an ex post search for observational differences. The question can only be clarified by running a new set of experiments once the issue of measuring performance is settled. The power of the experimental methodology is that this is always feasible and relatively inexpensive.

Criterion (ii) is a well-defined a priori natural measure of the effect of the "opportunity to conspire" and is more likely to be of general interest, particularly to IO scholars, than criterion (i). Surely everyone supposes that the objective of conspiracy is to achieve monopoly (monopsony), or at least to improve profits relative to the C.E. Suppose we define

$$M = \frac{\pi - \pi_c}{\pi_m - \pi_c}$$

as our index of conspiracy effectiveness, where π is the observed total profit of conspirators in some period or periods, π_m is theoretical monopoly (or monopsony) profit, and π_c theoretical C.E. profit. I assume that most IO scholars would find M an acceptable measure of how well a conspiracy is doing. If $M = 0$, we have the competitive result. $M < 0$ (> 0) implies conspirators

are doing worse (better) than at the C.E. At $M = 1$ we have the single-price monopoly outcome, while $M > 1$ implies some discriminatory monopoly profit.

Table 1 presents the value of M in each trading period of the Isaac-Plott experiments. I have added an "s" ("b") to each of the conspiracy experiment numbers to identify it as a seller (buyer) conspiracy, and an "x" to any experiment that used experienced double-auction subjects. The data of table 1 are very revealing. There are many periods in which conspirators receive less than the C.E. profit (π_C). By the final period, the two sellers' conspiracies are receiving profits that are less than or slightly above competitive profits, and no higher than seller's profits in two of the three experiments with no conspiracy. Overall, relative to the control experiments in which buyer's profit performance was high, the buyer conspiracies were not as effective as the sellers' conspiracies. Relative to the competitive model, IVb is effective in achieving and maintaining the monopoly outcome (periods 3 through 6). This last case is particularly interesting in that Isaac and Plott¹⁰ report that this experiment differed from the other three in that the conspiratorial discussions were shorter and did not involve specific strategies. Consequently, the experimental group showing the weakest attempt to conspire achieved the strongest conspiracy effectiveness. This kind of

¹⁰ Isaac and Plott, supra note 8, at 23.

Table 1
Index of Conspiracy Effectiveness, M*

Period	Experiment Number	Conspiracy				No Conspiracy		
		Isx	IIs	IIIbx	IVb	I.P.I ⁺	I.P.II ⁺	I.P.IIIx ⁺
1		.51	.27	-1.29	-.49	.65	-2.24	.25
2		.17	.89	-.93	-.42	-.56	-2.01	.01
3		-.57	.66	-.52	1.09	-.57	-1.49	0
4		-.34	.21	-.12	1.04	-.46	-1.38	
5		.04	.11	.31	1.04	-.41	-1.23	
6		-.66	.08	.24	1.18	-.29	-.74	
7		-.42		.18		-.24	-.54	
8				.09		-.14	-.26	
9				.03			-.14	
10							.08	
All periods		-.18	.37	-.22	.60	-.25	-1.00	.09

*M is computed from the profits reported in table 3 by Isaac and Plott (1980).

⁺M is computed for the sellers in the control (no-conspiracy) experiments.

"s" refers to seller conspiracy

"b" refers to buyers' conspiracy

"x" refers to the use of experienced subjects

internal inconsistency raises strong doubts concerning the monopoly effectiveness of the treatment "opportunity to conspire." Could it be that a group of conspirators will be more effective the less they attempt to conspire? Finally, note that the two experienced groups (Isx, IIIbx) exhibit overall measures of M closer to the competitive outcome than either of the inexperienced groups, which hardly inspires confidence in the longevity of a conspiracy's effectiveness in double-auction trading.

IV. Economics and Social Engineering

None of us, as economists, are capable of having invented the pricing system. Like language, it is a creature of society and history. It existed for millenia before anyone had an inkling as to what might be its function.

A mere 100 years has passed since Jevons, Menger, and Walras laid the foundation for modern economic analysis. We have only the meagerest of insights into how and why decentralized pricing processes perform their coordination work with such remarkable stability and flexibility. This state of our knowledge has important implications for professional conduct; namely, that we proceed with great caution in translating what it is that we think we know into policy prescriptions and that we refrain from pretending to understand more than we can demonstrate. To proceed incautiously and pretentiously is harmless in a circle of academic economists trying out ideas, but dangerous where there is the prospect of affecting economic policy, such as antitrust, to be

implemented by the police power of the State. It is far better that we do nothing than to prescribe iatrogenic cures for alleged economic ills. Recall that we once thought regulation was the answer to the monopoly problem. Some were so pretentious as to believe that macroeconomics could "fine-tune" the economy and that we had a tradeoff choice between unemployment and inflation.

But to say that we do not understand enough to justify enforced tinkering with the price system does not mean that we know nothing. So how is what we think we have learned to become a useful part of the system? The avenue is that by which any new institution of contract becomes part of the pricing system; the institution is adopted and survives in the presence of whatever alternatives are freely available. I think experimental economics has great potential to help create a better--or better functioning--market system. Any new contractual form, public-good decision mechanism, or bidding procedure shown to be superior to accepted alternatives in an experimental context is a candidate for field application. The test is the market survival test. If, as alleged, the device would create net new surplus, then someone or some organization will risk its use and profit thereby. Is there any measure of value, including that of institutions, except that which is derived from opportunity cost? Every inventor with an idea for a perpetual motion machine--or a means of tapping the power of the sun--is convinced that it would work if someone (usually the State) would just apply sufficient resources. Which

of these models is to be our model for the adoption of proposed new policies or institutions?

For those of us brought up in the rationalist tradition, it is very difficult to accept the principle that the unconscious, even uneducated minds of many have created exchange institutions that a group of us professionals may be unable consciously to improve upon by enforced application of additional rules or restrictions. There are many reasons why the world succeeds while we fail, but the most important consideration seems to be that societal inventions do not have to anticipate their own mistakes. Survivability depends only on voluntary acceptance within the context of opportunity cost. Hence, flaws in the original institutional "design," revealed by new information, lead either to modification or death. This process does not depend upon someone having discovered the flaws and then convincing others by rational arguments to change the rules. Change occurs while the causes remain wholly invisible to the principals, and partially invisible even to science.

I think this conference will fail to the extent that it has sought new rules based on a new understanding of why the old rules may have failed. But I think the conference will succeed to the extent that we learn that the problem resides in the attempt to find and impose rules. Our knowledge is much too inadequate--perhaps inherently inadequate--to engage in this kind of social manipulation.

On the other hand, the view that effective competition is likely to emerge even in markets with only a few strong sellers is supported by a significant recent study by John Kwoka of our Bureau of Economics.¹⁴ Kwoka looked at the impact on industry profit margins of the size distribution of leading sellers and found that a large third firm had a substantial depressing effect on profit margins. With only two firms, as in the duopoly experiments described above, unusually large profit margins were earned. But where a third firm had a significant share of industry sales, profit margins were markedly lower. Although econometric studies such as this inevitably have limitations, Kwoka's study does provide further evidence, consistent with the posted-price oligopoly experiments described above, that effective coordination may be difficult to maintain when there are three or more substantial rivals in a market.

To this point we have been discussing posted-price experiments. In contrast to the results of these experiments, in the double-oral-auction experiments Plott reviewed, he found little or no evidence of effective conscious parallelism. Rather, the nearly universal pattern was that these markets converged to the competitive equilibrium, even when the number of sellers was as

¹⁴ Kwoka, "The Effect of Market Share Distribution on Industry Performance," 61 Rev. Econ. & Stat. 101 (1979).

few as three or four.¹⁵ Since the convergence was more rapid than in the case of the posted-price experiments reviewed above, it does not appear that the tendency of later-period price competition to break out is the explanation. Rather, several significant inhibiting factors appear to be at work. First, unlike posted-price experiments (where buyers behaved passively and like perfect competitors), the buyers in double-oral-auction markets behaved aggressively and may have possessed some monopsony power. This power seemed to show up quite clearly in oral-auction experiments involving a single seller. When the monopolist faced a small number of active buyers, prices tended to be lower than when the monopolist faced a passive buyer programmed to act like a perfect competitor.¹⁶ Thus, one explanation for the significant price competition that appeared in double-oral-auction markets may be that buyer market power neutralized any market power that sellers possessed.

A more likely explanation, however, may be that sellers did not possess market power at all. After all, prices converged rapidly to competitive equilibrium in these experiments, and it may be too much of a coincidence that buyer market power so quickly and so neatly compensated for seller market power. Moreover, the lack of seller market power could plausibly be attributable both

¹⁵ Plott I, p. 546.

¹⁶ Ibid., pp. 539-40.

to the presence of a third or fourth strong seller in the market and to the pricing flexibility inherent in double-oral auctions. Professor Plott has pointed out that the double-oral institution is particularly conducive to price cutting:

The temptation for defection exists with almost every bid and offer. If the trading is not going well, it is easy to panic. If other conspirators accidentally get more than their "fair share," it is easy to retaliate On the other side of the market participants recognize the break in prices and encourage further breaks by responding naturally with a strategy of waiting momentarily for a better deal.¹⁷

Perhaps the most likely explanation for the double-oral-auction experimental results, therefore, is that as few as three or four sellers are simply unable to coordinate their actions in the face of active, negotiating buyers. These results might have been different if the sellers had shared a strong personal commitment to cohesion, nurtured through long years of contact and friendship at trade association meetings--what Scherer would call a conducive industry social structure¹⁸--but at least with these participants the experimental results cast doubt on the power of conscious parallelism to achieve lasting effective coordination in many circumstances.

¹⁷ Isaac and Plott, supra note 1, at 32-33.

¹⁸ Scherer, supra note 7, at 225-27.

Direct Communication and Other Facilitating Practices

In these circumstances, therefore, effective oligopolistic coordination may be possible only where the sellers resort to direct, private communication among themselves or utilize some other facilitating device such as price signaling or product standardization. Given the number and strength of the factors that inhibit oligopolistic coordination, however, one might wonder how effective such facilitating devices might be. The experimental results reviewed by Professor Plott cast some light on the impact of several of these devices.

Several experiments have focused on the role of direct, private communication. When it is permitted in posted-price duopoly experiments, impressive records of coordination were recorded.¹⁹ But conscious parallelism may be partly or fully responsible for these results, since it appeared to be effective in achieving coordination in some posted-price duopoly experiments. It seems more convincing, therefore, that in double-oral-auction markets, which otherwise behaved quite competitively, direct communication tended to elevate prices noticeably. In these markets, however, both buyer market or negotiating power and the corrosive influence of the auction institution (described above) exerted downward pressure on prices even in the presence of direct conspiracy. These pressures also tended to result in sporadic price

¹⁹ Plott I, pp. 577-78.

fluctuations as agreements broke apart, were later rebuilt, and then eroded again.²⁰

The impact of facilitating practices other than direct communication was not directly tested in any of the experiments reviewed. Yet it seems possible to draw some reasonable inferences from the data presented. For example, Professor Plott observed frequent instances of price signaling in double-oral-auction markets but found that such signaling had little or no impact.²¹ These results do not mean, of course, that signaling could not facilitate oligopolistic coordination in some settings, for double-oral-auction markets seem to exhibit strong tendencies toward price competition that are not present in every market or institutional structure. When buyers are passive and prices cannot be changed quickly, for example, signaling may enhance coordination. This hypothesis is suggested by posted-price experiments in which greater knowledge of rival prices and profits was found to facilitate coordination.²²

The tendency of double-oral-auction markets, where prices are flexible, to exhibit more price competition than posted-price markets, where prices are sticky, suggests that so-called "price protection" or "most-favored-nation" clauses may have some

²⁰ Ibid., pp. 570-72.

²¹ Ibid., pp. 567-68.

²² Ibid., p. 556.

anticompetitive impact. These clauses basically require a seller who grants a discount to any buyer to grant equivalent discounts to all his customers. Such clauses may even require the seller to pay a penalty to his other customers.²³ These clauses may have a variety of procompetitive and anticompetitive aspects. For example, they may protect smaller buyers from discriminatory discounts. But by inhibiting pricing flexibility through penalties levied on individual deviations from posted prices, they may also deter price competition. The contrast noted above between the results of double oral auctions and those of posted-price experiments suggests that such inhibitions on price flexibility may have a significant adverse effect on price competition.

Experimental Evidence in Antitrust Cases

Thus, the experimental results reviewed by Professors Plott and Scherer indicate that prohibitions on overt conspiracy (as one might expect) and on certain facilitating practices may have a significant procompetitive impact (assuming no significant efficiency losses). Moreover, the experimental results also suggest that conscious parallelism is likely to be effective only in limited circumstances. It might seem, therefore, that experimental results such as these could provide useful--and admissible--evidence in antitrust cases involving horizontal coordination or collusion.

²³ See Scherer, supra note 7, at 163-64.

In addressing the admissibility of experimental evidence in such cases, it seems important to distinguish two classes of experiments. First are those that are not performed for the case at hand but have become part of the body of experimental literature; for example, the experiments reviewed by Professor Plott. In my view, an economic expert should be able to rely on such experimental evidence when presenting his or her opinion in an antitrust case, just as an expert would now rely on other forms of empirical work, such as sample surveys, statistical studies, and industry histories.²⁴ The inferences that can properly be drawn from experimental studies are, as Professor Plott has noted, dependent upon a variety of theoretical and methodological considerations. But the same kinds of potential weaknesses are also present in other forms of empirical work. Professor Scherer, for example, devotes an entire chapter in his new text to the theoretical and methodological hurdles involved in estimating price-concentration relationships through statistical studies.²⁵ The

²⁴ It seems useful to point out that the Supreme Court itself, particularly in merger cases, has frequently relied on economic articles that contain empirical as well as theoretical analysis. For a collection of Warren Court merger cases citing economic works, see Procter & Gamble Co. v. FTC, 358 F.2d 74, 68 (6th Cir., 1966), rev'd 386 U.S. 568 (1967). More generally, moreover, the Federal Trade Commission has indicated that in the absence of a showing to the contrary, it may be presumed that articles written by apparently qualified experts in reputable scientific journals are respectable authorities that may be admitted into evidence or used on cross-examination. Sinkram Inc., 64 F.T.C. 1243 (1964).

²⁵ Scherer, supra note 7, at ch. 9.

strengths and weaknesses of all these forms of empirical evidence--including experimental studies--could presumably be brought out through direct and cross-examination of the expert. Moreover, although experimental economics may be less well established than the other forms of empirical economic research just noted, the number of experimental articles published in recent years is significant and apparently growing.²⁶ Accordingly, the field is probably sufficiently well established that many industrial organization economists would now be willing to rely to some extent on the experimental literature.²⁷

Thus, although no cases have apparently ever addressed the question, it seems to me that an economic expert at trial would probably be allowed to rely--"for what it's worth"--on the experimental evidence in the experimental literature.²⁸

²⁶ See generally Plott I; Plott II; Scherer, supra note 7, at 164-65. In addition, a casual review of the issues of several prestigious economic journals over the last few years uncovered almost a dozen articles on experimental economics.

²⁷ Professor Scherer, for example, states in his text that as a result of the published experimental literature, "we are better able to understand the conditions facilitating and impeding solution of the pricing problems faced by real-world oligopolists." Scherer, supra note 7, at 164.

²⁸ Federal Rule of Evidence 703 provides:

The facts or data in the particular case upon which an expert bases an opinion or inference may be those perceived by or made known to him at or before the hearing. If of a type reasonably relied upon by experts in the particular field in forming opinions or inferences upon the subject, the facts or data need not be admissible in evidence.

(footnote continues)

The second class of experiments--those performed specifically to test hypotheses arising out of an ongoing case--presents a more difficult question because they are both more dramatic and probably less reliable. As a result, although not likely, it is possible that courts will rule that such experiments are too prejudicial to be admitted. Suppose, for example, that the plaintiff offered the results of a series of experiments that seemed to show that relief would have precisely the significant procompetitive impact plaintiff had predicted in pretrial papers. Suppose further that the most obvious methodological weaknesses in these experiments had been eliminated by conducting enough of them to control for the seemingly most important disturbing influences. Such a series of experiments or simulations would present rather dramatic evidence of the strength of plaintiff's case. Yet it is possible that these results overstate or misrepresent the likely impact of the proposed relief. In general, economic experiments--like experiments in the physical sciences--are neither so reliable

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As indicated in text, it appears that published experimental results would probably now be considered "facts or data . . . of a type reasonably relied upon by [industrial organization] experts . . . in forming opinions or inferences upon the subject," and thus would be considered proper bases for their testimony even if not admitted into evidence.

If experimental evidence were ruled to be either admissible or a proper basis for expert testimony in several courts, it seems likely that scholars would devote more attention to such studies and that their number and quality would consequently improve. In turn, the probability that other courts would rule experimental evidence admissible or a fit basis for an expert's opinion would increase.

nor so complete that they can precisely simulate more complex real-world situations. And of course, economic experiments are not as well developed as most forms of experimentation in the physical sciences. Moreover, the reliability of a particular series of experiments is always somewhat suspect when they were performed explicitly for the case at hand and presumably were introduced only because the results were favorable to the party financing them.

Under these circumstances, the issue, of course, is whether the positive probative value of experiments performed for a particular antitrust case outweighs their possible prejudicial impact.²⁹ Such impact could, of course, be reduced by judicial instructions on the weight to be given to experimental evidence or by cross-examination designed to reveal the inherent weaknesses of particular experiments or experimental evidence in general. If

²⁹ Federal Rule of Evidence 403 states (in part):

Although relevant, evidence may be excluded if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury

McCormick indicates that the question is one of weighing the probative value of the evidence from experiments versus the dangers of misleading the jury (who may attach exaggerated significance to the tests), unfair surprise, and, occasionally, undue consumption of time. McCormick, McCormick on Evidence, 2d ed. (1972), p. 485. Accord, 2 Wigmore, Evidence § 443 (1940 Supp. 1979).

Of course, as these authorities imply, the danger of prejudicial impact may be reduced if the trier of fact is a judge rather than a jury.

such steps are taken, most courts may conclude that the probative value of the experimental evidence outweighs its possible prejudicial impact.³⁰ Some courts may still decide, however, that, somewhat like lie detector tests in many jurisdictions, individual experiments designed for specific cases in litigation will not be admitted into evidence on the grounds that their possible misleading effect upon the decisionmakers outweighs their possible evidentiary value.³¹

³⁰ Although sample surveys designed to establish particular facts in the case are generally less likely to be prejudicial than experiments that attempt to simulate the proposed relief, it is worth noting that sample surveys prepared for a particular case are frequently admitted into evidence. See, e.g., United States v. Columbia Pictures Corp., 25 F.R.D. 497 (S.D.N.Y. 1960); United States v. J. I. Case Co., 101 F. Supp. 856 (D. Minn. 1951).

³¹ Lie detector tests are generally inadmissible, even though their accuracy seems to be fairly high, because courts believe that juries will tend to regard them as infallible. See, e.g., People v. Sinclair, 21 Mich. App. 255, 175 N.W.2d 893 (1970); People v. Leone, 25 N.Y.2d 511, 155 N.E.2d 696 (1969).

ANTITRUST IMPLICATIONS OF THE RECENT
EXPERIMENTAL LITERATURE ON COLLUSION

John B. Kirkwood*

In a collection of papers,¹ Professor Plott has reviewed much of the recent experimental literature on collusion and explored some of the advantages and disadvantages of the experimental method. In my comments on these papers, I would like to assess, in a preliminary way, the implications of this experimental evidence for antitrust enforcement. Although it is not determinative, this evidence does seem to me to provide further insight into two important antitrust issues:

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Peter Koenig reviewed the substantive antitrust analysis in these comments and researched the procedural question discussed. In addition, both Heather Kirkwood and Professor Plott offered several thoughtful comments.

¹ C. R. Plott, "Some Results from Experimental Markets" (this volume) ("Plott I"); C. R. Plott, "Experimental Methods in Political Economy: A Tool for Regulatory Research," Cal. Inst. of Tech. Social Science Working Paper, Dec. 1979 ("Plott II"); M. R. Isaac and C. R. Plott, "The Opportunity for Conspiracy in Restraint of Trade: An Experimental Study," Cal. Inst. of Tech. Social Science Working Paper, April 1979.

- (1) Can "conscious parallelism" (that is, the mere recognition of mutual interdependence) result in supracompetitive prices in an oligopoly without the use of direct, private communication or other facilitating devices?
- (2) Conversely, can direct, private communication among competitors or other facilitating devices significantly enhance oligopolistic coordination?

In addition, the potential contribution of experimental evidence to the resolution of these substantive antitrust issues raises the following procedural question: Should experimental evidence be admissible in an antitrust case? I will address this question briefly at the end of my comments.

Conscious Parallelism

It is often asserted by respected antitrust authorities² as well as by advocates of increased antitrust enforcement³ that the leading sellers in a highly concentrated industry may sometimes achieve monopoly pricing and output restriction simply because of their common perception of their mutual interest in avoiding competition. In contrast, those who doubt the significance or

² E.g., III P. Areeda and D. Turner, Antitrust Law (1978), pp. 59-60.

³ E.g., M. Green, The Closed Enterprise System (1973), p. 7.

prevalence of this phenomenon point to the numerous obstacles which must be overcome in order to achieve effective coordination.⁴ For example, to formulate a joint strategy, the leading sellers must overcome inevitable differences in perceptions, costs, and market shares, while avoiding antitrust sanctions for direct, private communication. Because of these and other inhibiting factors, many authorities argue that the development and enforcement of effective oligopolistic coordination can rarely (if ever) occur without some overt steps to facilitate it.⁵

The experimental results reviewed by Professor Plott help choose between these competing hypotheses. In certain instances it does appear that effective noncompetitive cooperation has been achieved through pure conscious parallelism. In the posted-price duopoly experiments reviewed by Professor Plott, for example, supracompetitive prices were generally established and maintained when the sellers accumulated extended experience trading in the same market.⁶ Professor Scherer reports similar results from a similar experiment:

⁴ E.g., O. Williamson, Markets and Hierarchies (1975), ch. 12.

⁵ E.g., Blechman, "Conscious Parallelism, Signaling and Facilitating Devices: The Problem of Tacit Collusion Under the Antitrust Laws," 24 N.Y. L. Sch. L. Rev. 881 (1979).

⁶ Plott I, pp. 526-31.

L. B. Lave administered numerous repetitions of a Prisoners' Dilemma game to subjects isolated and unable to communicate formally. He found that through repeated experience, three-fourths of the players learned to cooperate in choosing the strategy pair that maximized their joint payoff.⁷

Thus, the experimental results reported by Plott and Scherer seem to indicate that pure conscious parallelism can sometimes produce effective oligopolistic coordination. It is important to stress, however, that these experiments evidently involved (a) only two sellers (b) with substantial experience trading in a market (c) where prices were posted (that is, sellers' prices were announced and could not be changed during a trading period in response to buyer pressures, disappointing sales, etc.).⁸

⁷ F. Scherer, Industrial Market Structure and Economic Performance, 2d ed. (1980), p. 164.

⁸ Since prices were posted in these experiments, one might argue that they throw little or no light on the conscious-parallelism issue. One could contend that posted pricing is itself a facilitating practice or that the temporary pricing inflexibility caused by posted pricing in these experiments is ordinarily achieved in actual markets through facilitating practices. There is support for both arguments. See Plott II, pp. 20-21, pp. 620-22 infra. On the other hand, in some circumstances it would appear that structural features of the market rather than particular facilitating practices can cause some temporary pricing inflexibility. For example, a manufacturer selling a broad line of products to 20,000 retail outlets may not make frequent, detailed changes in his price list--simply because of the transaction costs involved in revising and distributing it. Of course, the manufacturer may announce across-the-board price changes simply by sending a short telegram to his customers. Yet even this step has some transaction costs, and it does not permit changes in the relative prices of particular items offered. Similarly, although the manufacturer may negotiate secret discounts with his largest customers, it is unlikely to be cost-effective for him to engage in individualized negotiation with his smallest accounts. Accordingly, in this
(footnote continues)

In many market or institutional settings, however, inhibiting factors reduce or eliminate the power of pure conscious parallelism to produce effective oligopolistic coordination. Even in the posted-price experiments reported by Professor Plott, for example, various market structure variables played a significant inhibiting or facilitating role depending upon their value. In these experiments, price levels--and thus the effectiveness of coordination--seemed to depend upon such structural characteristics as the number of competitors, the symmetry of their demand and cost constraints, and the degree of knowledge that the market affords about rivals' prices and profits.⁹ This, of course, is

(footnote continued)

market structure, transaction prices to particular buyers (especially the smallest) are likely to be less flexible for longer periods of time than in a market structure characterized by fewer buyers and a narrower product line. Thus it seems to me that in some circumstances, temporary pricing inflexibility can represent a structural rather than a behavioral feature of a particular market, and that posted-price experiments, as a result, have some relevance to the conscious-parallelism question.

In discussing this issue, I have assumed that posted pricing facilitates oligopolistic coordination by reducing pricing flexibility. Posted pricing can also promote coordination by increasing the amount of information available about rivals' prices. Although a complete treatment of the issue would therefore consider availability, I have focused on pricing flexibility because it seems to be the stronger effect in the experiments reviewed. In the double-oral-auction experiments discussed below, which exhibited considerably greater competitiveness than the posted-price experiments discussed above, prices were not posted; but bids and offers were publicly announced throughout each trading session. Thus, the reduced competitiveness exhibited in the posted-price experiments seems to have been due more to the pricing inflexibility introduced by posted pricing than to its effects on the availability of information about rivals' prices.

⁹ Plott I, pp. 536-39.

precisely what Professor Scherer's extensive analysis of the dynamics of oligopolistic coordination would lead us to expect.¹⁰

The inhibiting role played by the number of sellers in the market is worth additional comment. In the posted-price experiments, monopoly prices were achieved or approximated when there was only one seller--as we would expect--and when there were only two.¹¹ When the number was increased to four, however, Professor Plott states that the typical pattern was that "prices started high and then began a slow drift to near the competitive equilibrium."¹² These results suggest, of course, that pure conscious parallelism may not ensure durable coordination even when the number of sellers is as few as four. It is not entirely clear, however, that this is the correct explanation. The tendency for prices to deteriorate in the reported experiments as the experiments neared their end might be explained to some extent by the noted tendency of price competition to break out in the final periods of experiments when the potential for retaliation is reduced (and eventually eliminated). For example, in the Lave experiment noted above, Professor Scherer points out that "on the last trial (after which punitive retaliation for uncooperative behavior was impossible) double-crossing was common."¹³

¹⁰ Scherer, supra note 7, at chs. 5-8.

¹¹ Plott I, pp. 536-39.

¹² Ibid., p. 537.

¹³ Scherer, supra note 7, at 164.

I V. R O U N D T A B L E D I S C U S S I O N

OFFICIAL TRANSCRIPT OF PROCEEDINGS

before the

FEDERAL TRADE COMMISSION

In the Matter of:

STAFF SEMINAR ON ANTITRUST ANALYSIS

Roundtable on Predatory Practices

Place: Washington, D.C.

Date: Friday, 6 June 1980

PARTICIPANTS:

George Hay
Paul Joskow
Alvin Klevorick
Janusz Ordover
Frank Easterbrook
Don Turner
Josh Greenberg

CHAIRMAN:

Robert Pitofsky

P R O C E E D I N G S

MR. SALOP: Before I turn the session over to Commissioner Pitofsky, I thank you all for coming. I think this has been a real success and I hope you will all agree.

I would like to thank Pat Cahill, without whose help this would not have taken place. I would like to thank Congress for allowing it to take place; and especially I would like to thank you all.

I think you all deserve a round of applause for yourselves. We should do this again next year.

COMMISSIONER PITOFSKY: Thank you. It is a pleasure to be here. I tried to get in yesterday, but it was so crowded I was left in the back there.

I think it has been an exceptional program. I will move it along by introducing the eminent people on this panel briefly.

Let me say for the record that while I am present here, of course, and will listen with great interest, my mind will be as empty or full at the end of this session as it is now. I do not mean to imply if I ask questions of participants any view about any pending case that might presently be before the Commission.

Starting on my far left--your right--we have Donald Turner, formerly Assistant Attorney General in charge of antitrust and

professor of law at Harvard Law School. He is currently of counsel to the Washington law firm of Wilmer and Pickering.

As many of you know, Don Turner a few years ago coauthored an article on predatory pricing that has attracted some attention here and there.

(Laughter.)

COMMISSIONER PITOFSKY: Next to Don is George Hay, former head of the Economic Policy Office at the Department of Justice and currently professor of law and economics at Cornell Law School.

Next are Paul Joskow and Alvin Klevorick. Paul is professor of economics at MIT and Alvin is professor of economics at Yale.

Again, as most of you know, they published a paper a few months ago in the Yale Law Journal and offered a two-tier framework for analyzing predatory pricing cases.

To my right is Frank Easterbrook, professor of law at the University of Chicago Law School.

Next is Janusz Ordover, professor of economics at New York University and coauthor with Robert Willig of a paper delivered yesterday.

Finally, on my far right, Josh Greenberg, who is a partner in the New York law firm of Kaye, Scholer, Fierman, Hays and Handler and adjunct professor of law at the New York University Law School. I thought Josh would be the only member of the panel who had ever seen the inside of a trial court.

But I found out last night that Don Turner took George Hay's deposition a few days ago, which put them both in court.

My thought is that we would begin this discussion with very brief introductory statements, and then questions, comments, and so forth from the panel.

I would hope that we will keep remarks to somewhere between 5 and 10 minutes and then we will open it up to a more free-wheeling discussion. I also thought we could start off with George Hay attempting, if that is possible, to frame the question here; that is, to indicate what the competing considerations are and something about the influential literature. We would then turn it over to Don Turner, who is responsible for so much of the followup literature that has occurred in this field.

Do you want to start out, George?

MR. HAY: While the words "predatory pricing" have been uttered frequently during the past 2 days, the breadth and richness of the papers would surprise anyone who expected simply a review of the standard predatory pricing literature. I will therefore attempt to impose some sort of organizational overview for the papers presented.

I suppose the early roots of industrial organization in this area can be traced to a variety of episodes in business history involving big firms "beating up" smaller firms. Attempts to think systematically about those episodes did not give rise to a lot of fancy theory but certainly to a "gut feeling," at least, that

these efforts to acquire and consolidate market power were dangerous.

However, it ultimately became apparent that simple policy prescriptions were to be had only at considerable peril. This dilemma is best appreciated by framing what I might call the fundamental paradox of monopoly. Think of it as a situation in which you start with one firm having 70 percent of a market and a second with 30 percent, and the first firm does something--a price cut for example--and expands its share to 80 percent.

The paradox--which was adequately presented by Jim Liebeler at the conference--is: How can a firm profitably expand market share without at the same time benefiting consumers? Hence, to prohibit that expansion in order to "protect" the smaller rival can result in net social loss.

Rather than address the issues directly, the response of the economics literature when this paradox was first presented was to think of a special case in which gains to consumers from aggressive behavior on the part of large firms were more questionable. In the context of our example, this would occur if the aggressive behavior did not result in an 80/20 split of the market but rather caused the smaller firm to be driven out of the market totally.

There is, arguably, a considerable difference between the two cases. In the second case we have changed the basic structure of the market to one of single-firm monopoly, and while the aggressive

tactics of the monopolist might have provided temporary benefits to consumers, these benefits may fade in the longer run and be replaced by consumer losses. Thus, this special case, if you will, was seen as a way out of the basic paradox.

This is not to suggest that the special case was regarded as leading unequivocally to antitrust prosecution. Indeed, numerous cautions or qualifications were raised about the need for deep pockets and entry barriers, and--most bluntly--whether, regardless of the theory, anticompetitive predatory pricing had ever occurred (or would ever occur).

Moreover, suppose it does happen. What rules are you going to use to take care of it? Aren't you going to make a lot of mistakes? Aren't you going to scare off the desirable price cuts? In this vein, it's important to be aware that policy actions may often be taken not when the incidents are completed and one firm has succeeded in eliminating the other but rather when it has just begun to cut prices and may be up to only 80 or 85 percent. In terms of the papers discussed at this conference, I associate these concerns with Areeda and Turner, Joskow and Klevorick, and Ordover and Willig. All recognize the possible anticompetitive impact of a change in the structure of the market but worry about the overall efficacy of the tools we might use to deal with the problem.

A second basic paradox in the traditional industrial-organization literature is associated with so-called limit pricing. How can a firm maintain its 100-percent market share without doing things which benefit consumers? The problem here differs from the

predatory pricing situation in that the monopolist has to act continuously to keep out new entry in order to maintain its market share, rather than engaging in a one-time blitz against a smaller rival.

A number of papers discussed at this conference, including that presented by Richard Gilbert and earlier papers by Spence, Salop, and others, are aimed at a way out of this paradox by trying to find behavior that has the effect of excluding entry without necessarily and simultaneously benefiting consumers. Examples would include--to take an extreme example--a simple threat to blow up the plant of a new entrant and (from the Gilbert paper) some kind of preemptive patenting. However, while these examples may provide a theoretical solution to the limit-pricing paradox, we still have the same kinds of practical enforcement concerns that we discussed earlier. Preemptive patenting may be a real problem in fact as well as in theory, but what kinds of rules are you going to set up to deal with it?

The final problem area dealt with at the conference appears to present a situation in which the very early concerns of industrial organization economists about the dangers of market power that falls short of total monopoly is reappearing--updated and modified--in the work of Porter and Spence. To illustrate, I return to the first example I used, where one firm starts with 70 percent and expands to 80 percent of a market. What seems to come out of the presentations of Spence and Porter is the possibility

that not withstanding the failure of the dominant firm to achieve total monopoly, expansion of market share--by increasing the market power that is arguably connected with market position--may be disadvantageous to long-run competition. Hence, the act of going from 70 to 80 percent may give a firm some sort of irrevocable (or at least difficult-to-overcome) market power which it can then exploit to raise prices (or to cut further into the share of its smaller rivals). Perhaps this is what the old-style case-study-type economists were trying to tell us.

However, we should recognize that there is further content to Spence's message. While it may be true that there are long-term competitive costs associated with aggressive actions that do not lead to single-firm monopoly, there may also be competitive benefits that go beyond the obvious short-run gains from the lower prices (or product improvement) used to expand market share. The benefits I have in mind are the cost savings that Spence associates with larger cumulative volumes and the experience curve.

Once again, in working out the theory here we must keep an eye on the practical considerations. Suppose there is a theoretical problem. What are you going to do about it, and what are the implications of the rules you set up for the behavior of other firms?

COMMISSIONER PITOFSKY: Don, have you been led to amend any of the thoughts you and Phil had concerning the old old economics--the experience curve, or anything else?

MR. TURNER: I would say that all of the subsequent material that appeared since we wrote the original article on predatory pricing has been enlightening in various respects.

I might say that Phil Areeda and I were astounded at the way this brought the economists out of the woods. I think they owe us a great debt of gratitude for giving them something to write about.

What it precipitated was a series of really quite good articles, going at the problem in a basically theoretical way, setting up new models, more complicated models, and endeavoring on the basis of those to offer solutions different from the one that Phil Areeda and I had proposed.

Of course, all of this literature has been very interesting. In the end--and I have not checked with my coauthor lately, so I can only give my own views--in the end, I think I remain of the opinion that though no rule or set of rules would command either universal theoretical support or universal support from those who are dealing in other than theory, I think we are still basically right. I have not been convinced by anything that I have read that the problem is of such magnitude that it warrants a complex solution, with all of the complications and litigation that that imposes, with all of the stimulus to litigation by firms

who feel aggrieved by competitors' price cuts and all the social costs that that creates.

I still disagree with Bob Bork and possibly Frank Easterbrook, who believe that there should be no rules whatsoever. I think dominant firms in particular should be aware that certain kinds of extreme tactics are going to get them into trouble, and this is on the whole a rather salutary check.

But having said that, it seems to me that the rule on predatory pricing should be no more severe than the one that we proposed. As Phil and I conceded in our original article, that is no perfect rule. It may let some egregious acts escape the net. However, even if you had the time and you had the resources after the fact to look back and figure out what was really going on, our own judgment was/is (and my judgment still is) that all in all, the gains that would be achieved by attempting to capture what I, in my own judgment, would feel would be relatively few cases, simply are not worth it.

Let me just very briefly elaborate on that. I think it is generally conceived now that the problem, if any, is with markets in which there is single-firm monopoly or single-firm dominance. My impression of our industrial history is that instances of durable single-firm monopoly or durable single-firm dominance are relatively rare. They just don't last all that long.

The market eventually takes care of those problems, either through technological change, new entry, or what-have-you.

I think by and large any egregious behavior that monopolists or single firms may engage in will have relatively short-term effects, at worst.

So I don't view the dimensions of the problem as really being all that serious.

As for durable single-firm monopoly--durable single-firm dominance--if you are really concerned about that, that can be dealt with as a separate problem. Phil Areeda and I have suggested--not without our critics on that score as well--that where you get a significant durable monopoly, there ought to be open to the Government procedures for equitable relief without regard to fault.

I think if that option were available in the antitrust arsenal, the problem that we have been talking about would be even more serious than it probably is anyway.

George Hay, I think, put the views together very well, and the things I am saying, I think Ordover and Joskow have said. Judgment as to what the appropriate rule should be here depends on one's estimate of probabilities, and those estimates are just very hard to get at and establish with any degree of satisfaction.

How likely is it that a monopolist will deliberately sacrifice the substantial current revenues that would be sacrificed by going below average cost to drive out or exclude competitors? How likely is it that the policy would be successful? How likely is it that the result will be a net welfare loss?

Finally (and of course Phil Areeda and I and others have stressed this), what are the likely social costs of litigation and deterrence to beneficial price cutting or beneficial pricing that would result from a loose rule or one that is terribly hard to implement or to litigate? And we of course feel that those potential costs are quite great and that all in all they would exceed what would be gained from more refined tests.

One final simple point--and I think none of us want to bicker over details today--is that I sense that in the way the debates have been going on (particularly in the courts, most recently in Transamerica), there has not been complete agreement but rather a general consensus that if you get chronic excess capacity, a dominant firm ought to be subject to no more severe strictures than smaller competitors. If you have chronic excess capacity, some is doomed to be eliminated anyway. Marginal-cost pricing is the competitive result and that is the vehicle by which the shakeout takes place.

Sure, the shakeout may be of more efficient rather than less efficient firms, but we can't do much about that.

The main battleground as I see it is over dominant-firm pricing in a situation of short-run excess capacity--and indeed that is the only situation in which under the Areeda-Turner test a monopolist could lawfully price below average cost. He has got to have excess capacity, or if he priced below average cost the demand would be such that his marginal costs would be way above that.

That really seems to me to be where the main battleground is. If you are talking about short-run excess capacity, in a cyclical period, the chance that marginal-cost pricing is going to actually bankrupt people is reduced. The chance that the bankrupt assets will be withdrawn from the market is reduced. All of the feared adverse consequences are much less probable.

Although I try to be openminded and continue to be openminded, I am still unconvinced that this subject deserves complicated treatment and I am still unconvinced that dominant firms should be subject to severe prohibitions on pricing that competitive firms are not only permitted to do but are expected to do.

COMMISSIONER PITOFSKY: Thank you. Professor Easterbrook?

MR. EASTERBROOK: Yesterday I put myself close to Bob Bork on this question. I suppose I have to plead guilty to Don Turner's accusation, but I wanted to spend most of my time today asking what would happen if this is a mistake, and if there are indeed some cases in which it is profitable for a firm to engage in predation.

I continue to adhere to my statement of yesterday that it is not worthwhile to talk about predation unless you have found something that reduces the amount of efficiency in the market. Some things could raise barriers and raise profits as they increase productive efficiency in the market. They are probably not worth worrying about at all.

But assume that there are cases of profitable predation, capacity expansion, or pricing strategies, and so on. That proves, I think, that something exists. Proof of existence is not a proof that anybody ought to be worried about the phenomenon.

One of the great bugaboos in antitrust law from time to time has been the theory of second best. Perhaps all of us should go home and stop worrying about antitrust enforcement, because alleviating a monopoly in any one area of the economy will simply make things worse. People have not been too worried about second best, by and large, because of the conclusion that the problem is not serious, and, if it is serious, we don't know what to do about it. So we ignore it in our daily work.

I think one can say much the same thing about predation, although I am going to argue that from from a slightly different point of view. If the phenomenon exists, we still want to pick an optimal level of enforcement. When I say optimal level of enforcement, I mean that we have to make two kinds of judgments.

The first kind of judgment that needs to be made is the penalty that would be imposed on predators. The second kind of judgment we would want to make is what the costs of collecting those penalties are and whether those costs are greater than the penalties we set out to collect; because, I take it, we maximize the welfare of the entire economy if we minimize the sum of the predation costs and the enforcement costs.

My first suspicion is that the amount of penalty we would want to collect from predators is probably quite small. Penalties must be constructed to make violations unprofitable, when profit is viewed ex ante. The ideal penalty in an antitrust case is the loss of the profit that the violator expects to make when he begins his process of violation. We may have to add to this the welfare loss the violation causes, but attempting to add this could produce overenforcement because of the treble damages available to private plaintiffs. Most likely, given that problem, the ideal penalty is simply the loss of the monopoly profit.

But if you think, as I do, that most cases of attempted predation have been failures and that failed predators end up paying out of their own pockets a substantial amount, the ex ante profits from predation are probably quite small. The penalty, then, also is small, even when the predator succeeds. That is the first half of what I think we ought to be looking at.

The second half is the cost of imposing these penalties. Areeda-Turner and Joskow-Klevorick both have asked the very important question whether the test yields false positives, in which we falsely identify as predation things that aren't predation. The Joskow-Klevorick article is a very useful attempt to compare false positive losses with false negative losses. But I think false positives and false negatives are not the end of the story. If you want to minimize the sum of error costs and the costs of administering the entire system, you have to look in

other directions as well. There is no point in spending more than the optimal penalty in order to collect it.

What are the costs of administering the system? One is administrative costs: running enforcement agencies and so on. Another is the legal costs. One paper distributed yesterday showed 31 predation cases in the last 5 years. I would not be surprised if on the average they cost \$5 to \$10 million for litigation--which is a small figure for a large case, a large figure for a small case. We are talking about some \$300 million in direct legal costs within the last 5 years. The figure is even larger if you count the cost of litigation in cases that were settled and so escaped mention in the survey. Then we have the cost of risk itself. That is, people don't know how a predation case will come out. And if firms are risk-averse, the very creation of risk is the source of disutility.

The fact that risk exists would show up in higher marginal costs of selling products. It increases the cost of doing business and the cost of what we all pay. The cost of false positives also increases the marginal cost of production and imposes a particular penalty on firms that dare to cut price. Finally, there is one very large cost of administering a rule against predation: the costs of whatever devices replace what the legal system succeeds in suppressing.

My proposition, one that I give without the slightest empirical foundation, is that the administrative costs are so high that the optimal level of enforcement is zero.

Now, having said that (and I repeat, without a shred of evidence supporting it), I suppose I am obliged to justify my position. I justify my position by calling on my status as a lawyer to play a lawyer's trick on you. My lawyer's trick is the allocation of the burden of persuasion. Although there is no evidence for me, there is also no evidence against me. And I think the burden of persuasion rests on the advocates of intervening in the market. Since the evidence is scarce, anyone with the burden of persuasion fails. But since the growth of firm A or the exit of firm B very probably is due to efficiencies, I think we need a very good reason to justify the allotment of substantial resources to market intervention.

I hope there will be time to pay some attention to this aspect of the predation problem before we are done.

COMMISSIONER PITOFSKY: Thank you. Whom should we turn to next? Professor Joskow?

MR. JOSKOW: What I would like to do is to make some general comments relating to the conference and what I think the implications are for predatory pricing and other related issues, and to raise very briefly a couple of issues that we did not have a chance to address in our paper.

Someone once told me--a noneconomist who knew economics--that there are two kinds of economics: trading economics, which is the economics that economists trade between each other; working papers, things they write in journals, things they talk about at

the American Economic Association meetings, the slicing up they do of one another in talking about theoretical and empirical work they are doing, et cetera.

A second kind of economics is talking economics. It is the kind of economics that economists present in public forums, in Op Ed page articles in the New York Times, and in the Wall Street Journal.

Some of the ideas that we trade among one another grow and mature and eventually become accepted and part of talking economics. Some of the things that we trade among ourselves die on the vine. Some ideas that appear to have died are resurrected later for further consideration.

In a sense, I think that is why one gets this notion of the "old learning" and the "new learning" and the "old new learning," et cetera. One of the things that I found interesting about this conference and the idea behind it was that it represented an effort to get economists who are working on the areas of economic theory and empirical work that are at least in part still the domain of trading economics to talk to people who are in the business of trying to use economics and economic models to work on real public policy problems.

There is a great virtue in doing this. It helps those of you who are in the public policy arena, are practicing attorneys, are implementing the antitrust laws to gain some insight into the way economists are now thinking about some of these problems, and

it gives those of us who are working on certain theoretical and empirical problems some sense of their real-world importance. I welcome the opportunity to have this kind of exchange, and I think it is something that can be very valuable.

There are two areas of recent development in economics--trading economics--that appear to be especially relevant to issues coming up now in antitrust law. One area is the economics of product quality, variety, selection, information, and behavior of firms characterized by increasing returns. Another area is the dynamics of firm and industry behavior, factors affecting entry decisions, the rate of entry, financing capabilities, market signaling, experience curves, et cetera.

Why are people working on these kinds of problems at the present time? People get their kicks from different things. Some people work on the economics of marriage and the economics of sex and the economics of the family and estimate curves for chimpanzees. Other people are dissatisfied with looking at abstract markets and appealing to the mysterious invisible hand, the mysterious potential entrant, and really want to try to understand some of the details of the way markets operate, why we have different kinds of products, and what kinds of dynamic characteristics markets have, to try to sketch out in more detail how the "machine" works. The two areas of work I referred to are responses to the latter set of interests. There was some comment made yesterday about how these lines of inquiry are not very

productive. I disagree with this view. I think the reason that we have had this conference is that the kinds of issues that economists have been working on in these areas do have some relevance to problems that arise in the area of predatory behavior and in other areas that have been of interest to the Federal Trade Commission, to private litigants, and to the Justice Department. What has been going on here should be taken in that spirit. It is essentially impossible to answer any of the questions that were raised here about the probabilities and the costs of different legal rules, and it is essentially impossible to prove or disprove the kind of argument that Don Turner was making, until we get some models of how we think these markets work, start to do some empirical work to try to see which of the theories have some weight, and ultimately try to estimate what kinds of benefits and costs there might be associated with different kinds of behavior.

It seems to me that in the end the ultimate answer to the question of whether we should have no policy with regard to predatory behavior, or a stricter policy, or a looser policy, is going to necessarily have to wait until we understand better what is going on in these markets. I believe that this kind of research represents a productive effort, and perhaps at some point we will in fact be able to meet the burden of persuasion that was proposed here.

What I was struck with when I first read a number of the predatory pricing cases--especially the private cases--was that most of them appeared to be without much merit. Why were they without merit? When you look at the markets that the alleged monopolizations were occurring in, they simply did not have the structural characteristics conducive to monopolization. I just couldn't conceive of there being a public policy rationale for having an antitrust intervention in the sand market in a particular area, or that someone could monopolize the market for rocket fuel purchased by one single buyer, the United States Government, that would no longer be going to purchase the product after a certain date.

That is not to say that all of the cases were totally without merit, but in a number of them it was implausible to me that there could possibly be a monopoly problem in those markets. That is one characteristic of these recent cases that was not discussed sufficiently yesterday morning.

The interpretation of the interest of the courts in the Areeda-Turner rule might be that it is an easy way of disposing of these cases. The thing that troubled me about this motivation for using the A-T rule was that it was not obvious to me that all future cases were going to be silly and that the application of this apparently simple per se rule could lead to serious welfare losses when applied to markets in which monopoly power is a potentially serious problem.

I became somewhat concerned about the development of a set of legal institutions that in fact worked very well when applied to silly cases but might be bad rules when faced with legitimate instances of monopoly or monopolization.

This is what motivated the kind of approach that Al and I took in our paper in the Yale Law Journal. We essentially wanted to recognize that there was uncertainty, that you make errors, that there was not going to be any perfect rule. We try to look at what we do know about the way markets work, to separate the wheat from the chaff and to try to somehow focus our attention on those kinds of markets where it is at least reasonably plausible that a monopoly problem could arise. That is really the motivation for the kind of two-tier test that we proposed. The basic idea is to try to quickly dispose of those cases that arise in market contexts where there aren't the kinds of structural characteristics that make predatory pricing a likely vehicle for monopolization. In the remaining markets we would apply a more comprehensive rule-of-reason analysis of dominant-firm behavior than proposed by Areeda and Turner.

We indicated in our paper that we were perfectly willing to accept, in the context of our framework, the ultimate conclusion that the set of cases which satisfied the criteria for going into what we called the second behavioral tier would be very small or even zero. I suspect that individuals' perceptions of how large that set is depend on their empirical knowledge and perceptions

about the structure, behavior, and performance of industrial markets in the United States. I probably believe that the set is larger than does Don Turner. Others may think it is smaller.

What we wanted to do was to establish a framework which could incorporate empirical guesses as well as future empirical information and theoretical information that would develop in the future. The economy is changing. We are learning more about it all the time, and I think the kind of work people are doing now theoretically and empirically is important for understanding monopoly problems. All of this work can be incorporated in the kind of framework that we present.

There are three areas I will touch on briefly that I think need further attention. One is intent. Intent has gotten a bad name in a lot of these articles, and it was mentioned yesterday that intent is a lawyer's concept, not an economist's concept. I think intent is an economist's concept also, but one of the problems that economists have in communicating with lawyers is that we use the same words to mean different things. In our paper we indicate some sympathy with the problems of litigation in which you spend an enormous amount of time going through the Xerox copies of the records that were produced on discovery, reading what people had written in the margins, et cetera, to try to find just those words that might convince--especially a jury--that there was some evil intent. I am sympathetic to that problem, and I really don't think that the kinds of colorful phrases often

relied on by plaintiffs--especially when they are made by people who are not in primary management decisionmaking positions--should play an important role in these cases.

On the other hand, in the end we are trying to understand what the purpose was of various activities that a particular firm is engaged in. And it seems to me that some kind of structured inquiry that looks at intent is desirable. To the extent that conscious plans, long-run plans of monopolization, can in fact be developed from the documentary record, they should be presented. But I think that plaintiffs should be constrained to focus on a few basic questions.

First, is the behavior likely to make it more difficult for firms to enter a market--especially a market already characterized by some degree of monopoly power? Can such behavior lead to equally efficient rivals, though perhaps smaller or newer rivals exit from the market? Is such behavior likely to lead to higher prices in the long run than would occur without such behavior? I think it is unlikely such information is going to be found in any sophisticated firm's files. But to the extent that that kind of information does become available, I don't think it should be ignored.

Let me next turn to the use of cost-based tests in antitrust cases. I think that all of the articles have underestimated the difficulty, in the litigation context, of accurately estimating the relevant economic costs of production.

I don't want to argue here about whether there should be marginal costs or average total costs or average variable costs. My own experience--not in the antitrust context but in the public-utility context--is that even when you have the absolute best information about an electric utility (for example, a good model of its technology, extremely good data, the cooperation of the firm involved), it is very hard to come up with marginal cost estimates that are without some uncertainty and that cannot be challenged in one way or another. I think that in the end we must recognize that there are all kinds of problems with estimating costs--especially in multiproduct industries. It seems to me, if one is serious about giving the plaintiff a chance, if we are to use cost-based rules in antitrust cases, you must give the plaintiff some leeway in using the available cost figures and manipulating them. I know in the Transamerica case there was a lot of back-and-forth as to how much one could manipulate them. If you take a very, very strict view, that the plaintiff must use whatever costs the defendant's accountants come up with, in the end we probably might as well not waste our time, because it is going to be very hard to satisfy any kind of cost test, even when predation is a reality.

On the other hand, it is probably ridiculous to think of tarring and feathering a defendant if you find that he's dropped his price a tiny bit below some measure of cost. I think you have to do some sensitivity analysis, and you have to incorporate other information about the market to understand what is going on.

Finally, let me indicate that one of the motivations for at least some of the interest of lawyers in this area has been that many cases are private damage actions. Unlike Government actions and actions by the FTC, private damage actions are motivated by the goal of money damages. Unfortunately there has been very little discussion in any of the literature concerning how you estimate damages in the context of the rules for liability that have been proposed. The rules that have been developed have been silent on how one transforms a rule of liability into a rule of damage computation. If we are going to continue to allow these kinds of suits, and if we are going to allow private attorneys general to bring them, we will have to come to grips with the issue of damages; and I think that is a hole that exists in the current literature. Thank you.

COMMISSIONER PITOFISKY: I am hoping to move along to the give-and-take here. Professor Klevorick, do you want to make some opening statements?

MR. KLEVORICK: Let me just add a little bit to what Paul has said. I do not think that he meant to give the impression that we regarded our article as the last word on predatory pricing, though I can assure you all that the editorial board of the Yale Law Journal hoped it was. They were fearful that the journal would become known as the "Yale Law Journal of Predatory Pricing."

We do think that we said most of what we had to say about predatory pricing in the article. Hence, with regard to predatory pricing, I do not really want to take this opportunity to try to persuade Don Turner or Frank Easterbrook, each of whom has read the article carefully, that he has misread us in certain ways. But perhaps I will leave that for later discussion.

What I would like to stress this afternoon is a point, which we observed and mentioned at the outset of our paper, concerning the general nature of strategic behavior. I want to mention this again because I think it relates very well to a number of the discussions that arose in several of the papers that were presented at this conference. I have in mind particularly Mike Porter's this morning, Mike Spence's, and Rich Gilbert's yesterday.

The basic point is that strategic behavior is a general phenomenon, and pricing is only one aspect of strategic behavior. In particular, among the sources of implementation costs we mentioned in the article (when we discussed the cost of implementing any particular rule or approach) were the strategic adaptations that any rule or approach to predatory pricing would in fact engender. Hence, in taking account of the enforcement costs about which Frank spoke, one wants to be very careful to recognize not only the lawyers' cost, the judicial system's cost, the agency costs and the like, but also the fact that any announced policy will in fact lead the firms themselves to adapt. And these may be beneficial adaptations or they may in fact be welfare-loss-inducing adaptations.

This observation also relates to the points made in the Porter and Spence papers about the firm as a portfolio of activities. Those papers should lead us to question the sharp distinction in some of the paradigms with which George Hay started. Specifically, drawing a sharp contrast between entry and exit on the one hand and patterns of expansion or contraction on the other is not necessarily the best way to approach the problem of dominant-firm behavior. Rather, it is more helpful to view dynamics in such markets as a continuum of activity and focus on degrees of expansion or contraction. For example, one ought not to worry so much about whether we have a firm on the fringe or outside the industry that is about to enter as opposed to a small firm in the industry that is expanding. To the extent it has market power, a dominant firm can use that power to deter entry of a new competitor or to diminish the rate of expansion of an existing competitor.

Mike Porter's comments this morning about the firm's portfolio of activities also seem to tie in very well with the example, which Paul and I used several times in our article, about a firm signaling from one market to another and the importance of taking account of the interrelationships among markets that a firm serves, whether those markets are distinguished by geography, product, or time. Once one recognizes, as Porter emphasized, the importance of considering the entire portfolio of firm activities, one must question the usefulness of considering one market in

isolation and focusing on anything like "pure" entry deterrence which is operative in a single market alone. The firm's actions in one market are bound to have effects on other (geographical or product or temporal) markets it serves.

With regard to antitrust policy toward strategic behavior in general, I would argue that the two-tier approach that Paul and I suggest for structuring the rule of reason in the predatory pricing case applies again. In any particular case, structural issues should be confronted first, to ascertain whether the given situation is like many of the cases which Paul talked about a few minutes ago in the predatory pricing context, where the market situation does not really call for any concern or worry. There is no point in getting into a large discovery enterprise and getting into a large behavioral inquiry when the structure of the market suggests that there is, in fact, no problem.

The distinction, I think, however, between the predatory pricing area and strategic behavior more generally is the complexity of the behavioral inquiry that would have to be undertaken. With regard to nonpricing behavior, there really is nothing like--or at least in my thoughts about it, I have not been able to come up with anything like--the kind of cost-based rules which different participants have put forth in the pricing discussion or the sustained-price rule Baumol put forth in his contribution on the subject.

The discussion of Mike Porter's paper and Mike Spence's paper indicates, I think, quite clearly the reason why we cannot have much hope for structuring this behavioral inquiry in quite as neat a way as I think it is possible to do in predatory pricing. This is the situation at the present moment. But the future work of Spence, Porter, and others--and perhaps the kinds of experiments Plott and Smith discussed--may provide a sufficiently better understanding of behavior so that we will be able to develop a more structured behavioral inquiry. I must say, though, that I am not optimistic about this in the near term.

As we have tried to argue in the article, our approach is consistent with other general approaches to the monopolization cases. The principal difference is our broadening of the notion of what ought to be looked at in terms of structure and our use of that broadened view of structure--of the set of structural issues--to enable a cutting short of many of the cases that would otherwise go forward. That is, we expand the set of structural factors but also give consideration and resolution of those factors lexicographic priority. The kind of inquiry we envision is feasible, and it is consistent with the approach taken in several recent cases. In particular, the inquiry in the two-tier approach is not very far from what Commissioner Pitofsky (at my right) did in his concurring opinion in the Borden case.

Furthermore, adoption of our approach would have an effect on the enforcement side, which Frank Easterbrook was pointing out

before. Our approach would affect the bringing of suits and the assessment as to whether they were unworthy or unmeritorious private litigation, because the issues that would have to be defined in the first tier--the issues that would have to be proved with regard to structure--would in fact be placed forward.

Finally, I think it is important that we not lose sight of the overall goal in this attempt to structure a rule or an approach to predatory pricing or similar behavior. What motivates us is a concern with long-run social welfare optimization, a point that Mike Scherer, in his original comment on the Areeda-Turner paper, brought home loud and clear. If one wants to talk about specific rules and using specific rules, the nature of the enterprise is then to consider particular market structures and to try to understand which rules work best for which markets. To carry on this enterprise, we need to enrich our analyses of particular market structures with the kind of work that Spence and Porter have done. We have to try to "map" from structural characteristics of a market to the rule or standard that is most conducive to a socially optimal outcome.

One of the principal lessons that Paul and I tried to emphasize in our paper is: one rule will not work for all markets, and the work we have to do is to learn what rules work for what kinds of markets. Our two-tier approach is a specific application of that principle. It says there are some markets for which you ought just to say that firms can do anything they please, and you

ought to go on with specific behavioral inquiries only in those markets where there are signs that there are severe problems of monopoly or monopolization and therefore large social problems.

COMMISSIONER PITOFISKY: Thank you. Professor Ordoover?

PROFESSOR ORDOVER: The discussion around this table well summarizes the theme of the conference. Those who go last usually get preempted. So I will try to keep my remarks short rather than expand output.

The way I understand the discussion during the last few days is the following: I think there is a certain agreement, however weak, amongst the participants and also in the legal literature, that anticompetitive behavior does involve some sort of sacrifice of profits with an intent--I don't use that word in the legal sense--and for the purpose of obtaining additional monopoly gain.

That agreement does not translate into the same conclusion about antitrust policy toward predation. Some--I assume Frank Easterbrook and Professor Bork in Antitrust Paradox--suggest that it is unlikely that a firm will ever engage in that kind of behavior, given its costs and benefits. The costs always outweigh the benefits, because no one can ever succeed with a predatory tactic in driving out a rival. And even if one succeeds, new entrants will soon whittle away the monopoly profit.

A somewhat weaker version of that argument is that whereas it is possible to imagine situations in which anticompetitive behavior, involving the aforementioned sacrifice of profits, might

occur, it would be ill-advised for us to engage in trying to prevent it, for a variety of reasons.

I think that Professor Easterbrook's discussion tried to bring out those reasons why there may be significant costs in attempting to stop what looks like competitive behavior; for example, price cutting, introduction of new products, or expansion of capacity. In fact, what legal intervention may accomplish is merely to prevent or to forestall competitive interactions in the marketplace, and of course none of us would like to accomplish that.

Given the probability of error and given the low probability of anticompetitive behavior, the best rule is no rule; for interjecting any kind of legal rules into the marketplace will harm efficiency. Professor Willig and I do not necessarily agree with this position--I at least feel that it is worthwhile to try to understand what anticompetitive behavior implies. What does that phrase "sacrifice of profit for additional monopoly gain" imply in terms of behavior of competitors in the marketplace? Once you are able to understand and characterize competitive behavior, you may want to inquire whether the observed behavior does or does not merit antitrust inquiry--i.e., whether or not it is competitive or anticompetitive.

I believe that there are instances in which such anticompetitive behavior does occur, and in fact is profitable to the

incumbent. (Of course, entrants are not immune from charges of anticompetition of behavior and thus predation.)

I think there are two reasons why we are having problems with isolating anticompetitive behavior in reality.

First of all, because of the pathbreaking article by Professors Areeda and Turner, we have focused our analysis on price cutting in a single product line--from my standpoint a very contrived market situation. It is conceivable--I would like to raise that as a point for future discussion--it is conceivable that in a somewhat more complicated market situation characterized by multiproduct firms or multimarket firms, predatory price-cutting--whatever the definition of that will be after 2 days of analyzing the matter--may in fact occur.

This brings me to just a very brief comment on what Paul Joskow's earlier remark: I think that we cannot judge whether predation did or did not occur in a number of those cases that might to us look foolish; in part, we did not have a predation rule which was fashioned to deal with the circumstances encountered in those cases.

Hence one cannot judge from the available evidence whether in fact predation did or did not occur, because the evidence that was being presented was presented to argue for or against the Areeda-Turner rule. Now another rule might have given a different result, and then we would be back where we started.

Secondly, I would suggest that there are anticompetitive strategies other than pricing that firms can engage in. And as Bill Comanor said yesterday, we do seem to have a cornucopia of strategies which may look like anticompetitive strategies.

To exemplify, I think it's very difficult for us to carefully and thoroughly analyze the anti-IBM cases without really coming to grips with the possibility of predatory manipulation of products to the disadvantage of competitors. It is plausible that IBM's alleged anticompetitive behavior did not involve predatory price-cutting; in fact, it might have involved something quite opposite: predatory price increases in components that competitors most needed to buy.

Thus, in the area of systems competition, it would not be wise for us to focus on comparisons of prices to costs, because in that contest that is no longer the only issue. I think we should try to branch out from predatory price-cutting on a single product to more complex scenarios. As Bob Willig tried to demonstrate yesterday, the Areeda-Turner rule is quite powerful, but it must be modified for different scenarios. And perhaps different comparisons and analyses will have to be undertaken as well.

COMMISSIONER PITOFISKY: Josh, how does this all translate into a trial lawyer's brief, and/or what is your reaction?

MR. GREENBERG: It is very important for you here in this room to understand that there are a lot of people out there listening to you.

Counsel are a very important control in the pricing decisions in the large corporations. When Al Dougherty makes his statement to the NARD, he sends a signal that says, "the Robinson-Patman Act lives!"

So, too, if FTC lawyers say, "Well, we have primary line injury. Areeda and Turner are just two Harvard law professors-- and who knows about marginal costs and what-have-you."

Then the lawyer goes to that marketing staff and says, "We need something in addition as a safety margin."

Reported cases are not the issue. That is the least of it. Antitrust in America is done in law offices. I may break up more mergers in a month than you do in a year.

(Laughter.)

COMMISSIONER PITOFSKY: That is not saying much.

MR. GREENBERG: With respect to pricing, it is very important that you be sensitive to the signal you send out to America.

The next thought is that Don Turner and Phil Areeda, in their article, gave an intellectual base for the courts to find legality where a competitor challenged aggressive pricing. Whatever the theory, in all the cases the defendant won. What is at stake is the policy judgment; to quote from the Supreme Court of the United States, "The more general purpose of the antitrust laws is of encouraging competition between sellers." That comes from the A&P case in the last term. To go back to my prior

thought, counsel needs something to say, "You can go ahead and price aggressively." Literally 99 times out of a hundred, you are above average cost. Forget marginal cost. No, you are above average cost. I now say, "Let it fly. Forget about primary line."

As for pricing under marginal cost, I turn to Professor Spence's brilliant quote in his paper, which says, "It depends." That is it. One of the problems that I have with Areeda and Turner is some of the statements that if you are under a certain amount, then it should be illegal. For example, I think the article does not pay proper attention to meeting competition needs.

What else is a monopolist supposed to do in this situation? You have to meet competition, and indeed this is recognized in Telex and several other cases.

Next, let us consider the litigating situation. By quantifying the concept of intent, Areeda and Turner gave a tool for summary judgments in litigation.

Next, just a footnote to the issue of intent. I have never been much impressed by it. Intent may mean that some low-level person wrote a stupid piece of paper. Recently, for a case I argued in the Court of Appeals, I said that no case ever turns on intent. When you are all finished, it turns on intent. There is a lot of conversation about it. But I would very much like to see some sort of quantification--to return to my first point--so that

counsel can go out and say, "Go out there and try us like crazy, because I think that is what is good about this country."

COMMISSIONER PITOFSKY: I hope we can proceed now in a kind of free-wheeling way. As presiding official here, let me start off.

I think it is an indication of the influence of the Areeda-Turner article that almost every court--and indeed almost every speaker here--starts with that as a base for analysis. It should be somewhat comforting to its authors that the piece can be attacked from both the left and the right--and has been here--both by those who want more vigorous enforcement against alleged predatory behavior and those who think that the danger is exaggerated.

Let me take the point of view for the moment of those who want more vigorous enforcement. The theme that I see in that literature most frequently is that the Areeda-Turner rule is just great in a static market in a static world. One product, one market, one point in time--fine. All we need say is that you ought not to sell at less than average variable costs.

But what about a more complex world and more complex strategies? For example, take a company that sells in 10 markets, recognizes entry in one by a new challenger, and realizes that that challenger, if it succeeds in one, will go to two; if it succeeds in two, it will go to three. It drops its prices--but above costs--perhaps in circumstances in which the challenger

has not achieved its optimal level of efficiency--and drives that company out of the market, and then raises its prices up again.

That is the scenario. Why shouldn't that kind of behavior be challenged? What would the difficulties be of a world which took that kind of a dynamic aspect of strategy into account and found a violation even though the company is considerably above variable costs?

MR. TURNER: Bob, it is a little hard to answer that in a simple way without sort of recounting all the predicates upon which we took our position to begin with.

I think you know--again, it is a rather crude summary--but what I think your question raises is: Is it not more probable that invidious behavior would be engaged in in that kind of a scenario than when you are dealing with a single-product single market?

Now, I would have to concede that it is perhaps somewhat more likely the relative costs to the firm relative to its overall operations are less than the costs would be in your cutting price in the only market you have and the only market which you sell in. The question then is, "Well, what can make this--does this really suggest that somewhat different rules should be applied, that it should be treated as a differentiated case, that it is a difference enough to warrant a change?"

Now, in that, as I say, we are getting down to kinds of probabilities that neither you nor I, I think, can make a close

assessment of. It is analogous in a way to the general charge that has been leveled against conglomerates: that with multi-products, they are much more prone to engage in predatory behavior in one of the product lines than they would be if that was their only product line. The charge has been repeated for years, and yet, to the best of my knowledge, the proposition is devoid of empirical support. And if it is devoid of empirical support with respect to behavior of conglomerates, I question whether the case you described, which is really of the same general order, would be one in which the probabilities of that kind of behavior would be greater.

Again, you have to concede, sure, it would seem to be greater; the question is, How much and how likely is it? And analytically, it may not be all that different from a single-product, single market case. The typical problem of the new entrant, in its market dominated by a single firm, is that it comes in initially as rather small, probably with higher costs, particularly if there are learning curve problems to be overcome; and you can see there that the large firm might engage in predatory behavior, knock the firm out before it gets to the point where it can provide effective competition.

I don't think, functionally, that there is all that much difference between the two cases. I, quite frankly--although I can't go as far as Bob Bork or Frank Easterbrook--I am much more sympathetic to their position than I am to those who would

advocate a much more severely expensive prohibition in pricing or other kinds of predatory areas.

If I had to pick between no rule and some of the rules that have been proposed, I would opt for no rule.

MR. EASTERBROOK: I agree entirely with Don Turner on that one. Arguments about strategic predation are overblown. The idea, I take it, is that a given firm operates in a cascade of markets, and that if it only puts on enough of a predatory show in the first market it will be able to prevent people from competing in any market.

It seems to me that is the strategic equivalent of Napoleon's promise to fall on his sword if the Russians don't surrender. The promise to lose a great deal of money in Market 1--probably much more money than your new entrant is losing in Market 1--in order to convey the message that you will be willing to do the same thing in Market 2 and Market 3 and Market 4, is incredible. The message you convey is, you have a strategy that can succeed if and only if you never again have to carry it out. Once you have conveyed the message, and rivals know that the strategy can succeed only if not executed, you have also conveyed the message to somebody else that now is that right time to enter Market 2. Everybody knows that your predatory threat is profitable only if it is not carried out. That is the perfect time to enter.

It seems to me, for this strategy and for many other strategies, that rivals have available counterstrategies that leave the incumbent with much less profit than if it never announced the strategy at all. If the incumbent commits itself to the strategy irrevocably, it will lose even more.

COMMISSIONER PITOFSKY: I am not sure I follow that. I take it the strategic aspect of this is the view of the entrenched company that by beating off the challenge in any one market, you can preserve very high prices and high profits in nine others.

Now, I am perfectly willing to accept that--the suggestion that that is right--and to suggest that in some circumstances, a company even in that situation won't attempt predation, won't attempt exclusion; but where it does, where in a situation like that it does lower its price and put its operating price back up again, what is the cost of an antitrust policy which would say that that is conduct which we think ought to be declared illegal?

MR. EASTERBROOK: I have two answers. One concerns standard cost of any antitrust policy about predation: in addition to administrative costs, the costs of false positives, which may be very high. But the second answer is: I do not see why the entrant would drop out of Market 1, or why no one would come into Market 2, in response to the incumbent's strategy, even if I give you a case in which a firm has a monopoly in 10 markets. I am not acquainted with any such firm.

We started with the hypothesis that if the incumbent capitulated in Market 1, then the entrant would be able to come into Markets 2 through 10 in the future. That is why the incumbent thought predation worthwhile. Entrant's incentive to stay in Market 1 despite any campaign of predation therefore is the profit it could expect to make in Markets 1 through 10. Those expected profits are probably very much greater than the losses that the incumbent is capable of inflicting on the entrant in Market 1. Meantime, in Market 1, where the incumbent is pre-dating, the incumbent (which presumably has the larger market share) is losing money hand over fist, much faster than the entrant. My proposition is that the entrant simply will not drop out of Market 1. It has a much greater incentive to stay.

MR. JOSKOW: That presumes a level of staying power that may not exist in some real-world situations. It must be 8 or 9 months ago I saw one of these detailed reports--the Boston Consulting Group or a similar group did this for a company--which laid out a variety of long-run strategies they might engage in. It was very fancily done--looked at cash flows, cash flows of competitors, calculated present value of future profits, et cetera.

One of those strategies was clearly not a welfare-maximizing strategy. Prices were going to be higher in the long run as competitors were driven from the market. I asked myself the question, "Would that be illegal?" They were not dropping their

price below average variable costs. There was some indication that the strategy called for dropping price below average total cost. I don't know if the firm followed that strategy, but if it did, it was something that was undesirable from a welfare point of view. At least in principle, I would like to have some way of keeping that from happening.

You are right, the costs establishing a rule to do that in a small number of cases may be very high. But I think that we must at least ask, Is there a way of constraining such behavior so we don't impose those kinds of false positives? It is the question we have to ask.

MR. EASTERBROOK: I am at a serious factual disadvantage, so I will bow out on that one.

MR. ORDOVER: You are trying to undermine the strategic behavior models by giving incorrect examples. If Napoleon had contracted to be pushed onto his sword, that contract would not be breached. Maybe that would be a correct threat.

(Laughter.)

MR. ORDOVER: I think the kind of analysis that we need to go into is to try to understand what are the credible threats. Thus, when the original limit pricing literature was being undermined by the "new new" learning in antitrust, one of the stimulants behind that research was to try to explain why those kinds of behaviors which seemed to be exclusionary behaviors were in fact not.

I think that the proper way to analyze this is whether or not in the instant case there exists a set of strategies which constitute credible threats. If in the instant case killing an entrant in Market 1 does not reduce the probability of entry in other markets, then most likely that strategy will not pay off.

I think one cannot prejudge the issue by simply saying, "Well, entry will occur in Markets 2 through 10." I think someone has to prove whether it will or will not occur.

I grant you that it is not an easy task to prove that kind of case. The lawyers tell us, as they seem to be saying through many of the sessions, that they cannot prove anything in court; everything seems to be so complicated. Then perhaps we should go back to per se rules and get it over with.

I thought there was excitement in the air from Chicago and elsewhere, that finally we were going to abandon per se rules and turn to rules of reason. Now that we are trying to introduce rules of reason based perhaps on imprecise economic analyses, we are being told that they cannot be implemented because doing so is too difficult.

So, I would like some guidance from the lawyers as to what in fact can be done in the courtroom, and maybe we can start fashioning rules with that in mind. At this moment, I am quite confused as to what can be done, because I think that that seems to be an issue which we may want to try to resolve.

MR. HAY: I think one of Frank's earlier points is probably more relevant to the controversy. He said he doesn't know of very many markets where a firm has a monopoly in 10 markets and sees single-firm entries. But there may be lots of markets in which firms have big, but not 100-percent, market shares. There may be lots of markets in which they have already four or five rivals and new entrants. There may be lots of times when the new entrant is not killed off but simply has its expectations frustrated.

I think there are two problems in thinking about such situations. One is that a lot of the economics that have been used so far is really ill equipped to deal with these particular kinds of problems. That is why I liked some of the discussion this morning and some of the discussion yesterday of Spence talking about market position.

The second point, it seems to me, has to do with a whole other set of issues having to do with the entrants. Rules like Areeda-Turner's are very nice. They are very nice for the Court because the Court presumes that it can get something like cost data and can say ex post: Did the dominant firm do anything bad, or not? Rules are nice for the dominant firms because it knows its costs, and it can say, "Ex ante, if I do this, will I be in trouble or not?"

The only trouble with rules is that they are not helpful for the entrants. They see a high price, think they can produce at

something less than that price, but have not the foggiest idea what the dominant firm's costs are, Line of Business data notwithstanding. They think they are doing everybody and themselves a big favor by coming into the business, and all of a sudden they get bopped.

I can be ultimately persuaded by Areeda and Turner that the administrative costs of dealing with that problem are so severe we ought to leave it alone. I could well imagine another conference where we can model entrants' behavior such that if the Areeda-Turner model is the rule, you will have very little entry, because entrants don't know what to expect if they enter.

MR. TURNER: I am puzzled by that comment. First, I am puzzled that entrants typically come into a market not having the foggiest idea of what the costs of the incumbent firms are. I would suppose that is damned foolishness. I don't think that most people who are in markets come in with that kind of abysmal lack of information.

Second, of course, they never know for sure, and the effect of a rule like ours or, say, an average-total-cost rule, is to put them at the mercy of a price cut that the incumbent can make when they come in.

But then it seems to me that to say that there is something wrong with the rule is to say that you want to impose on the incumbent a price floor well above its costs as an umbrella to facilitate entry. And it seems to me that to reach a conclusion

that that is wise policy involves a factual judgment that I don't think we can make at this point.

To get back to that question of what a lawyer can prove in court, it takes about 4 hours to go over all the issues there. I think the short of it is that some of the papers have presented certain kinds of highly relevant economic issues, relevant in the sense that they bear upon what theoretically a good rule would be, that are simply not satisfactorily determinable in the court litigation.

Economists themselves often have to conduct year-long industry studies in order to get information that is close to what they think would be satisfactory. You simply can't expect the legal process, on a case-by-case basis, to handle that array of data that is going to present those kinds of problems.

One that Klevorick and Joskow recognized when they were fooling around, I think mistakenly, with the idea of above-average cost being predatory is proof that the price cut, though well above average costs, was profit-sacrificing. As I recall, they agreed it probably was not determinable, and that drew them to using the Baumol proposal as a sort of proxy/substitute. It is interesting to me that people who think the rule is too favorable to dominant firms go to rules that are inevitably going to be more complicated than ours.

The interesting thing to me is that they are going in the opposite direction from that taken by enforcement agencies in other important areas of antitrust law in the past. Take horizontal mergers; I thought enforcement agencies were generally strongly wedded to the proposition that the basic rule should be dependent upon market shares and that a whole array of economically relevant factors with regard to construction of the market or the characteristics of the individual firm should be disregarded because it is impractical to take them into account and still have an effective antimerger policy.

I don't, for example, sense any great enthusiasm among the enforcement agencies for General Dynamics and some of the cases that have come down since then, because those are in the direction of unwinding the simplicity of the market-share rule. Now, if that is so with respect to horizontal mergers, precisely the same problems come up when you are talking about predatory pricing. And I am just a little bit puzzled as to why the same considerations are not brought to bear.

COMMISSIONER PITOFSKY: Well, I would have to agree that the complexity of this area is the cost, and that the long run--one of the great virtues, and perhaps a dispositive virtue, of the Areeda-Turner approach--is that people know (about as well as they can know in an area like this) where the line is.

Let me ask Don one more question. On the Joskow-Klevorick two-tier approach, which would look at the nature of entry

barriers--before you can get into all this stuff, how does that fit with your own approach? Does that disturb your own analysis?

MR. TURNER: The proposition of a screening device to cut out cases in which the probability of adverse welfare effects is small, I fully agree. That part of it I like.

I guess the problem I have with the way it was formulated--and they may in fact recognize some of the difficulties themselves--is that the first tier is hardly a clear test. They want to consider an array of structural factors of which market share is simply one--is the industry technologically active or not, what is the size distribution of other firms, and the like. And if you are going to have a clean first-tier screening device, I think it would be better to have it simpler than that.

Incidentally, if I heard you right, you suggest that creation of that first-tier will be a deterrent to private litigation. That isn't the way I see it. It seems to me that the reasons that compel private litigation now in the predatory pricing area would not decline to any great extent if they thought they had a fighting chance to get over the first hurdle. As Josh Greenberg suggested, an awful lot of these suits end up in settlement, and it is a terrible nuisance to the defendant.

In view of the enormous costs of litigation and likelihood of settling for something other than paying the amount, I don't think that that will serve anyone very well. The general idea of a screen I agree with. I guess my problem is that once you get past that, I am not persuaded by the Joskow-Klevorick approach.

COMMISSIONER PITOFSKY: May I suggest a short break at this point? Why don't we adjourn until about 3:55, and then we will pick it up at this point.

(Brief recess.)

COMMISSIONER PITOFSKY: Let's continue. I wanted to expand the discussion to some extent. As we all know, predation does not necessarily, or I expect even usually, occur in the form of price cuts. It may occur through other forms of behavior-- increases in capacity, innovation, and production, ways in which price announcements are handled, and so on.

Don Turner, it turns out, has to leave to catch a plane to Europe. Since he is leaving early and since he has something he would like to say on the question of alleged predation by innovation, let's start with him.

MR. TURNER: I read or skimmed through in the time I had available both Mike Porter's and Spence's papers and the Ordovery-Willig paper.

In substance, what the economist is saying is that there are a variety of strategies available to a dominant firm to maintain its dominance, of which severe price cutting is only one. The firm can also engage in high-level product changes, high-level product improvement.

It can deliberately maintain excess capacity and the like.

Now, that does indeed have a significance that a couple of the panelists have pointed out, that there are alternatives that are available, so that in preventing predatory pricing you may not have accomplished much. And, in fact, you may have cost the economy something if you divert firms from one form of aggrandizement to another. The thing that disturbs me the most is the prospect--I hope it isn't too serious a prospect--that antitrust law would indeed launch in any major way into an evaluation of product strategies or of capacity levels.

Whatever those difficulties are--and they are clearly very severe--in formulating appropriate roles for predatory pricing and getting the requisite proof, it seems to me that once you move off into product innovation and capacity levels and the like, you are hopelessly at sea.

I really at the moment see no prospect for the law to be able to handle those satisfactorily. And not only that; particularly with respect to product changes, it seems to me the law, if it intervenes at all, should only do so in a very clear case.

Take the single-product case: dominant firm, single product, and there is a new entry or there are existing small competitors, and the dominant firm brings out a new product which expands its market share, expands it competitively, or even knocks out the new entrant because it is a better product. The market has determined it is a better product--perhaps consumer-goods cases, where there is a possibility of what is called persuasive advertising.

I am appalled at the prospect of getting the law into the business of second-guessing the innovator, trying to decide whether the product is indeed an improvement or not, whether it was really in the consumer interests that that improved product be put on the market when it was.

Now, related to that, simply as a practical matter--and Josh, I'm sure, would back me up on this--from the experience I have had on matters of this kind in any corporation that does its job right, when making decisions as to whether to conduct a certain line of R. & D. or not or, when new products evolve, whether to market them or not, you will find all sorts of contrary points of view in the in-house documents. That is what a good corporation asks for.

It goes to its salespeople, it goes to its engineers, it goes to its production people and tries to get as much information as it can bearing on whether it would be profitable to market this product or not. You will get different views.

One engineer will say, "I don't think this a significant improvement at all." The other will say, "It is a very distinctive improvement."

The salesman will say, "I don't think it is worth enough to put out the new product. I don't think consumers will buy it." Another will say, "They will." The top management makes the decision about whether to bring it out or not.

I do not myself see how it is feasible or appropriate for judges and juries in subsequent litigation to try to second-guess on these issues. I mean, if you turn it on documentary evidence, the plaintiff will always have a case in the sense that he can point to some document that backs up his point of view.

Moreover, in highly technical equipment, the relevant factual determinations are highly sophisticated. If you are talking about computers, copiers, electronic equipment generally, to throw to a jury or even to a judge the question of whether this product was an improvement or not, it seems to me, is folly. I can only think of one instance in which a court held a certain product change was designed simply to hurt competitors, and that was a case where the product was degraded rather than improved in terms of actual performance.

If I were to do anything in that area at all--and this has been suggested in some of the cases; the judges have been confronting these problems and properly have been very skeptical--it seems to me the most it should ever be is that the defendant wins unless there is simply no serious dispute over whether the product was an improvement or not, or less restrictive than some other alternative. In other words, I would say that whatever my skepticism is in the whole predatory pricing area--and I am pretty skeptical--it is tripled in spades when you get into the product innovations, and the courts generally simply shouldn't intervene.

MR. ORDOVER: I would agree and disagree. I think that you suggest a dangerous route, because there are ways--many, in fact--of causing an exit of an entrant or a competitor by a product introduction.

MR. JOHNSON: I can see that.

MR. ORDOVER: I see two analytical errors that you have committed. I would like to comment on those briefly.

First of all, I think it is not necessary to ask engineers whether a product is or is not an improvement. I think that is quite irrelevant. The product may or may not be an improvement from an engineering standpoint. I think that engineering evidence doesn't prove very much.

I think, also, that it is not true--I think you are almost quoting Judge Kauffman here--that the mere fact that the market accepts the product proves that the product is superior in the economic sense or that for the reason of engineering superiority, the antitrust inquiry should end. If I were to first cause an exit of my competitor and then introduce a new product, the product would be accepted also. Surely that would not prove that the new product is superior to the one that it replaced.

I think the important question is whether the product would have been accepted by the market and the innovation would have yielded a positive incremental profit if the rival were to remain a viable competitor. I would ask whether a firm would have engaged in that particular research and development program,

whether it would have introduced the product into the market, if it had not anticipated or expected that subsequent to the introduction of a new product with its concomitant price structure, the exit would occur. That is, I think, the essential question to ask. An analogy might help: the fact is that consumers like lower prices; yet not all of us are objecting to scrutinizing low prices for possible anticompetitive effects. Why shouldn't we scrutinize new, possibly superior products for their anticompetitive effects? New products also have price attached to them. They also have costs attached to them. Yet, because new products apparently are superior in some technological or engineering sense, they are to be immune from antitrust scrutiny. I think that is not a correct stance to take.

I presume, Don, that you would say that one would want to check whether the new product was priced above the average variable cost.

I think that such a test is probably inadequate also: if I were to commit resources, R. & D., and perhaps new capacity, to bring forth a new product, why would I not expect recovery of the full expense after introduction? If I can expect full recovery of my costs and a positive incremental profit only if rivals exit and subsequently raise prices, I see no difference between that strategy and an ordinary price cut.

MR. TURNER: I think maybe you didn't quite understand my argument or I don't understand yours, one of the two. Of

course products and price are two sides of the coin. I mean, you could in effect cut a price by increasing the value of the product. That would be, in a sense, a price cut. I don't dispute that. What I disputed was to put--my point is that whatever the difficulties are in evaluating a price cut, they become much, much greater when you move into the other dimensions. And you know, presumably the entrant exits or the small competitors are damaged because a new product sells better. At least you have the consumer judgment.

COMMISSIONER PITOFSKY: I am not sure what it means. I have never been sure what it means to say the innovation is successful only because it means the exit of your competitor.

Suppose you build a mousetrap for a dollar and you sell it for \$2 you have 50 percent of the market. Now you build a better mousetrap, and you build it for \$1.10 and sell it for \$2; and you have 100 percent of the market. It is a losing proposition unless you encourage the exit of the competitor. If it costs more to sell, but it drives the other fellow out of business, would that be predatory?

MR. ORDOVER: The point I was trying to make was that simply because a product is technologically superior and finds market acceptance, it is not necessarily superior in an economic sense. The new product may find market acceptance only because--and may raise a firm's overall profit only because--it was preceded by a predatory destruction of another product; i.e., the product marketed by the competitor. I think that is the relevant

issue to examine with a predation test. For example, such a predation test may inquire whether the innovator was prepared to sell to rivals old versions of the product at compensatory prices. I would agree, however, with Professor Turner, that in product innovation cases, the standard of proof is much more complicated.

MR. TURNER: Anticipating future costs is of course somewhat speculative, but you can make a stab at it. The trouble with product innovation is that it is much more speculative as to what its success will be, and the firm may calculate that the product introduction would be profitable even if there was no complete exit. They don't really know. I mean, it is always a guess as to how a new product will sell. And at the absolute outside, it seems to me the standard of proof ought to be that it is clear from the documentary evidence that they knew or expected that this would be profitable only after driving out competition. I don't see where we will get that.

I would love to continue with this, but I think I will have to run.

COMMISSIONER PITOFSKY: Josh, did you have something to say?

MR. GREENBERG: One must make a cost/benefit analysis. If a company makes a new product, it is "terrible."

The difficulty is that it is an ordinary commercial act. "Antitrust scrutiny" means you get lawyers into the act. When

a certain number of lawyers say, "That is dangerous. Therefore you ought not to do it." To give something "antitrust scrutiny" means that the Nation is going to end up without some product innovation.

It is my judgment that things like product innovation, namely a normal commercial act, should be free of antitrust scrutiny.

To return to pricing, one of the things that was done with the Areeda-Turner article by the Justice Department Report which came out in 1977 was to say that selective discounts are an ordinary commercial act, a non-evil deed. The great danger at bottom is that so many brilliant people try to regulate the market by means of antitrust laws.

We have, all of us, talked about how wonderful deregulation will be. To replace administrative regulation with the regulation of antitrust is to end up in the same place.

MR. JOSKOW: I don't really think there is as much disagreement as is appearing here. I think the presumption that everybody at this table has is that we want to encourage new products. We want to encourage process innovation, and we want to encourage low prices. I don't think there is any question of that.

The critical question is: Are there situations--admittedly in a very small number of cases--in which we want to scrutinize behavior in some way? I believe that there are--especially

pricing behavior in certain markets. I think we would all be horrified by the notion that we would set up some kind of commission that would approve all product innovations. I understand the danger, and I am sympathetic to Don Turner's notion that to the extent we are going to scrutinize new innovations, it is going to have to be very, very narrowly defined. Until we can define it more carefully, we probably ought to stay out of it.

MR. GREENBERG: What we need from intellectuals is the same thing the bar and the Nation got from Areeda and Turner, and that was a way of getting out of a lawsuit challenging what ought to be legal. By saying that sales above certain costs are always legal, that enables a motion for summary judgment to get out of the case fast. What we need with acts like aggressive pricing and product innovation is a rule so that we don't have to litigate the case in depth.

COMMISSIONER PITOFSKY: Don suggested a rule. You would not have to litigate unless it is absolutely clear that the product was not an innovation, which I must say will almost always be the case. Someone will always write a memo saying, "Sure was a terrific idea."

MR. EASTERBROOK: The problem of trying to figure out whether innovation is predatory was related to the problem raised by Mike Spence and others. If you are trying to determine whether a price is predatory, you are worried about a price/quantity pair. You are dealing in a two-dimensional space. If you then deal with

any of the other things that have been talked about, you are in n-dimensional space.

We are having trouble figuring what a proper model is, what predation looks like, in two-dimensional space. It seems to me entirely beyond the capabilities of courts and probably beyond the capabilities of economists to do it in n-dimensional space.

My earlier proposition is that it is not worth doing in two-dimensional space. And that is true in spades as the number of dimensions multiplies.

COMMISSIONER PITOFISKY: What do you do in the situation--I have no particular case in mind, of course--the situation in which a company announces a new product or a new model and there is a memo that indicates, "There isn't a chance in the world we will get this model out by January first, but it certainly will hold our customers in place between now and January first." That is a kind of "innovation by announcement." It is a variation on what we have been talking about. Do you have problems thinking of that as predatory behavior?

MR. EASTERBROOK: I have a great deal of trouble thinking about that as predatory behavior. I have no trouble at all thinking about that as fraud.

(Laughter.)

MR. EASTERBROOK: Fraud is redressed by standard doctrines of tort and contract law, to which I would be content to leave it.

COMMISSIONER PITOFSKY: A question from the floor?

VOICE: In that case, who is being defrauded, and what are the damages? I mean, because what we are concerned with is that the other firms in the market are being hurt, but they are not the ones that would be subject to the fraud.

MR. EASTERBROOK: I am not concerned with hurt done to other firms. Consumer welfare is the centerpiece; damage to other firms is troublesome only if it hurts consumers in the end. At all events, it is not clear what the damages would be if you thought about the case in antitrust terms rather than tort or contract. In a standard fraud case, I take it, plaintiff argues that it would have changed the claim that you are going to sellers between now and January first because someone else was offering better quality, lower prices, or whatever. After you were done showing that you stayed with supplier number one only because of his fraud, you would get the difference in value. I don't know whether there would be any different measure of damages in an antitrust case, and I don't see any reason to run a fraud claim in the antitrust model, which involves proof of market definition, monopolization, and on and on.

VOICE: Just a different person?

MR. EASTERBROOK: Well, the issues are very different.

MR. ORDOVER: I think that preannouncement issue seems like a red herring. I think in the hypothetical you posited, one might want to ask, for example, the question whether the rival had

been damaged to such an extent that he exited before the new product was introduced. Can the rival show that his exit was directly attributable to the loss in sales because prospective consumers were waiting for the new product to be brought to the market? Frankly, however, I would not worry about making pre-announcements. And neither would I impose any rule on the firm when it should or should not preannounce. I think that is not a central issue in the area of predatory product innovations.

To me, in Berkey or in the IBM cases the more important question would have pertained to the prices that were charged on components that competitors of IBM or Kodak needed to conduct their businesses. The question whether rivals were prepared to introduce compatible products at the time Kodak introduced the new camera or IBM introduced a new CPU is not relevant to the finding of possible predation. They have--the competitors--to my mind, no cause to complain that they were at a disadvantage in terms of coming up with a new product or with products compatible with those of the innovator.

I think it is important that they did not have that time: otherwise IBM and other innovating firms would find themselves at a disadvantage in terms of introducing new products to the market and recouping their R. & D. investments.

I think the major issue in this type of situation is the availability and the price of the components that the competitors need. I think it is a somewhat complicated matter, and I don't

think we have time to discuss it extensively. But I think the preannouncement problem is somewhat secondary. Questioning the timing of preannouncements goes right against an idea of firms needing the temporary quasi-monopoly to stimulate innovation. I don't think we should be very concerned with preannouncements. We should be concerned, however, about the consequences of refusing to sell the old models of complementary components at compensatory prices.

COMMISSIONER PITOFSKY: You have all been very patient. We will turn to questions from the audience now.

MR. HAY: One quick comment--or perhaps a question--directed to Bob or Josh. One of the reasons many of the economists have been hesitant to adopt the Areeda-Turner rule (or rules which have emanated from it) is that it is easy to think of horrible potential situations in which the rules seem to be obeyed and you get a dramatic terrible result. I wonder if that may reflect a misunderstanding of exactly the way the court is likely to treat a rule.

Generally, we think of it the other way around. You have got rules which generally tend to prohibit things which economists think are desirable. Let's take (purely for example) a vertical restriction, which even for somebody with a small market share might have been thought illegal prior to the GTE-Sylvania decision. Lo and behold, somebody does it anyway. They increase their market share--and surprise, surprise! The court says: Well, that is okay.

I suspect that even if courts adopted the Areeda-Turner rules as a general matter but confronted a case like any of us have been talking about--the horrible monopolist drops his price yet remains above average variable cost, kills the only other firm in the market, raises his price back up to seven times his previous level--it is likely that the courts are not going to be totally deaf to listening to the facts of that particular case. Yet, the effect of the rule would be to tell lawyers: Look, if you don't have a pretty terrific case, let's not waste everybody's time.

Most of the economists are able to think of extreme hypothetical situations and might be much more comforted to learn that rules would not bind courts to the point that they would be unable to take on the extreme case. I guess I toss it out as a question to Josh or Bob, how they would think the Areeda-Turner rules in fact would work, assuming that became "the law."

MR. GREENBERG: As terrible as it may sound, your hypothetical case has to slip through. That person is going to be done in, both by the competition and the lawsuit.

I come back to what we said before about cost/benefit analysis, because we make a judgment--it is my judgment and it is clearly Don Turner's judgment--that vigorous pricing is good, on balance, for the Nation. We want to encourage that vigorous pricing. The way we do so is by saying: If you are above X, above something, you are home free.

It is, if you will, a per se rule. It has the problems of all per se rules, which is that there is always a funny little case somewhere where somebody is done in. We have the same problem in horizontal price-fixing cases, but the Chief Justice Stone, back in 1927, said you've got to have this rule because it is administratively convenient.

There should be a rule where above some level it is per se legal; and underneath that level, it would have to be litigated, so that you could deal with all of the facts.

MR. JOSKOW: You would accept the claimant's notion that to stay in business you have to totally cover your costs, and average total costs would seem to make some common sense to you?

MR. GREENBERG: Fine. But one person says marginal costs, another person says average total costs.

MR. JOSKOW: But what is being implemented by the courts? It is the difference between what is essentially the variable-cost concept and a full-cost concept. The difference between those two might in fact be quite large. That is what some of the argument in this debate has essentially been over, as to what that floor should be and how it could be, when you use a commonsense notion like that, that there could be a floor that is far below that.

I have little problem with a commonsense approach which asks: What does it take for firms of equal efficiency to be able to compete based on product quality and price? Perhaps it is that

kind of question that George is referring to. If, in fact, the Areeda-Turner rule is just being used to dispose of cases we agreed should be disposed of, and when problem cases come up it will be modified to look at other things or look at pricing behavior differently, perhaps some of us would be less concerned. But if it is going to become a mechanical application of a per se average-variable-cost rule, I am quite concerned about it.

MR. GREENBERG: Every economist is "concerned" about per se rules.

MR. KLEVORICK: I do not think that is the argument. The argument goes to your point that for the reasons you have given and the reasons that we have all taken quite seriously--namely, for effective business decisionmaking--firms need to know what it is that they can do, and it is important not to interfere with the process of decisionmaking any more than is socially desirable; it is advantageous to have a bright-line rule. That is in fact the per se rule: to have a bright line that says, yes, this is okay, and something beyond this is not; or dividing the universe of possibilities, with the understanding that we are going to raise questions about actions in one set, but not about actions in the other.

George Hay said that what economists are concerned about is that we can take the Areeda-Turner rule and think of some horror stories. Your response to Hay was: Well, what is going to happen is that your horrible case is going to slip through. The argument

at the moment is, even if you want to have a bright-line rule with that product, even if you restrict your purview to that, then you still want to choose the best among the bright-line rules. And the argument that is being made, and that Joskow was just making again, is that it is not just Hay's little horrible case that is at stake; but rather that we are not convinced (or at least these economists are not convinced) that it is some obscure, unimportant set of circumstances in which you would get cases that would slip through the Areeda-Turner net. That is where the argument comes in.

MR. GREENBERG: That is just a basic difference between you and me, because my clients don't know what the future has in store.

MR. KLEVORICK: Your gut feeling of what the bright line should be--reflected in your quip before about pricing below average total cost and making it up on volume--is that common sense is pricing to cover average costs. The realm we are talking about is the realm between Areeda and Turner's average variable cost and your average total cost. That is where the argument is emerging.

MR. GREENBERG: I want to emphasize an important point that I don't think Areeda-Turner, as I recall it, handles satisfactorily. That is the whole issue of meeting competition. It is terribly important, to the businessperson. What do you do? Do you sit back and not react? I think the action of reaction is what we expect.

COMMISSIONER PITOFSKY: As I recall their position, it's that if the fellow you are meeting is himself selling at predatory prices, complain to the FTC; if he is not, agree to meet him yourself, and if you are equally efficient you will not be below your own average variable costs.

MR. GREENBERG: I don't think that is sufficiently helpful.

MR. ORDOVER: The way we started talking about anti-competitive behavior and its relation to the notion of sacrificing profits gives us some guidance as to the correct cost-based price floor. The predation rule should promote competitive behavior. It is conceivable that in a particular circumstance competitive behavior may take us all the way down to the average variable cost.

I don't know why anybody would want to compete by going below that, other than for reasons of cost of reentry, which cost may be significant. The way I see it, the problem with the Areeda-Turner rule is whether or not that particular rule stops competitive behavior in some circumstances.

It is conceivable that it may. To discover those circumstances when it does, we must focus on the meaning of competition: What will be the result of competition in that particular market? If competition takes us below marginal costs, fine.

I should add that I don't understand why we are interpreting the Areeda-Turner rule as positing the average variable cost price floor. I thought that theirs was a marginal cost rule. However,

it is likely that average variable cost may be the relevant floor, and it probably would be if the capital is truly sunk and there is substantial excess capacity.

COMMISSIONER PITOFSKY: Thank you.

Let me turn to the audience. Steve, indicate your name and speak quite loudly, so the transcriber can get your question.

MR. SALOP: I am Steven Salop.

I would like you to return to this question of fraudulent preannouncement. There seem to be two answers. One is that there are fraud laws against it. The other answer appears to be that there are other questions that are more important for antitrust. But it seems to me that it could be an important competition issue. From what Mr. Easterbrook said, it would be called "predatory fraud." Is that the right way to interpret your answer?

MR. EASTERBROOK: I am not sure what predatory fraud is, but I can think of a broad variety of socially disadvantageous things that are handled by particular statutes. Going out and shooting your competitor is handled by the murder statute. Defrauding someone is handled by fraud rules. It is not clear to me why we would want to collect all things that reduce social welfare under the heading of the antitrust laws. The antitrust law is encumbered with a great deal of baggage.

MR. SALOP: I guess I am trying to understand how predatory practices work, more than exactly what this statute or that statute covers. I was wondering whether you believe that sort of practice could in fact be predatory, whatever statute you cover it with?

MR. EASTERBROOK: Perhaps we have some disagreement about what we mean by predatory. I am perfectly willing to concede that action of that sort may be welfare-reducing, and therefore it should be unlawful and we should seek an optimal-damages remedy to prevent that kind of conduct. I am not sure what is added by asking the question whether it is predatory or not. Once we agree that it's something that we ought to prevent, that takes care of it.

COMMISSIONER PITOFSKY: Rich?

MR. ROSEN: Rich Rosen.

First, I am sorry I don't live in Josh Greenberg's neighborhood, where people are cutting prices all the time.

I want to turn to the question of innovation. Are we really talking about--I take it there was considerable concern from the panel about a policy that would discourage--are we really talking about a large number of cases where we have limited a proposed rule to dominant firms and we are not talking about the act of introducing new products, but rather the manner or strategy by which it is introduced, which could include preannouncement or making the things noncompatible or raising the temperature of processing film so that nobody else's film can be processed?

Aren't those strategies worth deterring by some sort of rule that would examine the mode of introducing new products? And isn't the alternative to deterrence efficient entrants--or smaller firms?

COMMISSIONER PITOFISKY: Josh--Do you want Josh to answer it, or anybody?

MR. ROSEN: Anybody.

COMMISSIONER PITOFISKY: I introduced the hypothetical about a preannouncement because in many situations it can be fairly clear that a product is introduced or announced long before it is ready for the market. But you raise the question of introducing a product with a scientific or technological characteristic which makes it incompatible with another product.

Obviously, they will say it is a better product this way. They will say: We realized it has a side consequence that would make it more difficult for those that sold add-ons to work with our product, but we still felt it was a better product.

The other side will say: No, you obviously engineered this thing to injure us. And Don Turner would say the courts are simply not equipped to deal with that kind of issue.

MR. ROSEN: I was suggesting something along the lines of what Willig and Ordoover proposed. Was there a less restrictive alternative available? Did the company consider any strategies which could have worked, which would have been profitable but which would have been less exclusionary?

MR. ORDOVER: I think what Willig and I suggest is a notion of an alternative strategy which does not forestall introduction of the product but welcomes it, on the condition that the firm is willing to sell the components needed by a competitor who is willing to buy them at compensatory prices.

We do not have time to explain the notion of compensatory prices--I hope some day we will have it in print. The basic idea is as follows: If the intent behind the introduction of a new product was not to disadvantage the competitor, cause his exit from the market, and gain additional market power--if that were not the intent--then the innovator ought to have been willing to sell the old models of the components at compensatory prices; i.e., prices which maintain his total profit. At those prices, the innovator is indifferent between selling the new product or systems and selling the old components.

Thus, our solution does not stop innovations or hamper the innovating process. Rather it insists that firms which have market power provide components at compensatory prices to its competitors. Now, those prices may turn out to be very high. So be it. In fact, they may be so high that no one, no competitor, would like to purchase components at compensatory prices.

Because compensatory prices may be so high as to choke off all effective demand, perhaps we should have a different, weaker rule. But we could not have produced a weaker rule, because our rule is a logical derivation from the definition of predation that

we have initially posited. We must leave it to those who are more willing to regulate product innovation than we are to make the rule more lenient for competitors.

We are not lenient. In fact, we are very strict, inasmuch as we are not putting any a priori ceilings on compensatory prices. We do provide some guidance how such prices are to be calculated. We also insist that complementary products ought to be available at those prices, subsequent to the introduction of a new system.

MR. EASTERBROOK: I think, though, that there is an idea here that one can find an alternative strategy that does not discourage innovation but nonetheless gives the competitor due process of law, not preempting his market share.

Take the case of the firm that is making buggies for horses and decides that it would be a good idea to innovate and introduce the automobile. And one could argue that instead of introducing the automobile, which will put buggy-whip manufacturers out of business--

MR. ORDOVER: --Out to pasture--

(Laughter.)

MR. EASTERBROOK: One could suggest delay of a year to give buggy-whip manufacturers a chance to retool to make engines which would go with the new products. One could argue with any interval in which to offer buggies for sale.

There are two things going on. One is carrying an inventory of buggies, and the other possibility is to delay introduction of the car and to take one additional year of risk, one additional

year of postponed return on investment and R. & D. in the car, which will reduce the attractiveness of cars. I take it that sometime in the future this will show up in higher costs of cars.

But I don't understand how all of this can be done for free. If it is not done for free, it discourages the innovation.

COMMISSIONER PITOFSKY: Yes?

JUDITH GELMAN: My name is Judith Gelman. Everyone is concentrating on the cost rule or what the innovation itself looks like. At least three of the people up there have expressed that there is a first tier to the whole process, which is whether the market makes predation possible. It seems to me that the more stringent cost or the less stringent cost rules go along with--they go along with having the first tier in it.

I don't quite understand why you are being so concerned about the fact that nobody would be able to price if you have to look around and say entry is easy or predation is not possible. Why is that not a sufficient first tier?

MR. JOSKOW: Well, I agree with you. I don't think anyone here is making a fundamental challenge to the workings of the capitalistic system and suggesting that we require that before you can introduce your new product or before you can lower your price, that someone--any potential competitor or existing competitor--has to have due process of law, that you have to prove beyond a shadow of a doubt some set of things.

We are talking about a small corner of the economy in which monopoly problems may be a serious issue. I guess we are talking about even a narrower corner when we are talking about certain kinds of product changes that may or may not be real innovations. The question we are grappling with is: Is there some way of distinguishing between welfare-promoting innovations and changes in products that are likely to be harmful?

I think the answer we are coming up with is that there is no obvious practical way of doing that. If you do it sloppily, you are likely to cause more harm than good. Quite frankly, looking through the cases, I have only seen one set of alleged product innovations that struck me as being something at least worth scrutinizing more carefully. These were some of the alleged product manipulations in some of the private computer cases. I am not saying that the issue should have gone one way or the other, but at least the case that was made was something that struck me as being something that one might want to scrutinize closely. It wasn't obvious that the changes were improving the quality of the product. It also was not obvious to me that it was behavior that would be engaged in except by a firm with monopoly power selling in markets for two complementary products. I have not run across another case in which product changes struck me in that way.

JUDITH GELMAN: I guess I didn't make myself clear. It seems to me that one of the things Mr. Easterbrook and Mr. Greenberg were concerned about was that if you have this rule--

this cost rule--people may not price competitively; and yet, if you have this first tier, that says in most industries, if there is a possibility of entry--repeated entry--predation doesn't make sense. And then you can price without fear of being accused of predation.

If you accept a first tier, if that is part of your rule, it seems to me you can accept a much more stringent second-tier rule.

MR. EASTERBROOK: I think there is an assumption behind your question that the application of the first tier of the test leads to a determinate result at low cost. It does not. But the result is uncertain, and the stuff of litigation is uncertainties.

Plaintiff or defense counsel might look at some things and say: "We have looked at the criteria in the tests and taken a look at the industry; if the case were presented to 10 judges, 1 would find predation and 9 would not." The 1-in-10 chance is enough to support years of litigation.

Hundred-million-dollar lawsuits with enormous amounts spent on defense will produce very costly settlements. I don't think it's possible just to say that just because there is a filter, one can therefore be unconcerned about the results, or that the filter could be applied with greater certainty.

COMMISSIONER PITOFISKY: Jack?

MR. KIRKWOOD: My name is Jack Kirkwood. I was going to approach by asking Josh for a judgment, to probe the concept--of course, the old rule used to be the average total cost, so that

we are sort of going back, too, as George pointed out. But basically it was a basic average-cost rule.

One purpose of having different rules is to get rid of the cases we really think ought not to be brought. There are two different filters that can be used. One to be used to screen is an average-variable-cost screen. If your price is above average variable cost, it is per se legal. The other screen is, there are no entry barriers, to simply simplify the first-tier analysis. I realize there are difficult judgments about either one, but in some markets you ought to say entry is easy and sometimes you ought to be able to say we are clearly above average variable cost, but in others there will be difficulties.

What do you think will be easier for you, if you had to choose between the two standards, in terms of throwing out cases that people think really shouldn't be brought?

MR. GREENBERG: There is no doubt at all that if you have some level that has to be passed, whether it be average total cost, average variable cost, entry barriers, or names beginning with "A," it is something that lets a certain number of companies continue to do what they want to do.

COMMISSIONER PITOFSKY: It is a very interesting question. Neither concept is easily defined to the point that you can advise with confidence. I do suspect, however, as time goes on and we sort out a few of the accounting conventions, and assuming the average variable costs or "marginal costs" rules remain dominant, there is one thing about average-cost rules, and

that is that the books and records are in the hands of the party that has to make the decision, unlike situations in which he must define the relevant market and the heights of entry barriers, which may be extremely difficult.

MR. GREENBERG: There are some problems with cost-based rules. But typically the client has an idea of what its costs are.

MR. EASTERBROOK: I am highly skeptical that the accountant's books would contain much that would be interesting to a court trying to apply a cost-based test. We have experiences in the Robinson-Patman cases where a court tries to figure out the cost of a particular product. The accountants' books are useless. They don't contain much on how to apportion joint costs. They don't hold very much the economists would find interesting on depreciation with respect to advertising, telling us whether we should treat advertising as an expense or as an investment and depreciate it, and if so, at what rate.

The other side of the Joskow and Klevorick screen looks at barriers to entry, and they are also not self-evident, even if you accept the Stigler definition of barrier to entry, which is an absolute higher cost facing an entrant than the costs of a firm that is in the market. We have had long and loud debates about what definition to use and how to apply it. And if you define barrier to entry the way the Supreme Court did in FTC v. Procter & Gamble (the Clorox case) as any sort of efficiency, we are in for endless problems.

MR. HAY: Anyone who thinks that the Areeda-Turner rule is that the price has to be above average variable cost is mistaken. The rule is that the plaintiff has to prove that the price is below average variable cost. Those are two very different rules.

To say that the monopolist knows what its costs are, putting aside Frank's disagreement, doesn't solve the problems at all about whether that is a decent test or not.

COMMISSIONER PITOFISKY: Bert?

MR. FOER: I would like to get back on the dynamic level for a minute with a hypothetical about the experience curve.

You have a rapidly growing industry which has a couple of independent firms in it, pricing at somewhere around their costs (however defined). A new firm enters: it is a diversified firm operating on a portfolio theory that it will price down the experience curve such that the price it is going to charge will also be far, far below its current costs (however defined); but hopefully, by gathering a lot of experience, heavy volume at some point in the future, it will not only recoup its costs but will be pricing above costs and will be making a profit in the future.

This drives out the independent firms that don't have that deep pocket. They say it's superpredatory pricing. The question is, Is experience a defense?

COMMISSIONER PITOFISKY: You mean, are the efficiencies generated by moving down the experience curve which allows you, at the end of the process, to sell above costs--is that a defense?

MR. FOER: Yes.

MR. ORDOVER: In this particular case you may still invoke the Areeda-Turner test; i.e., you can still compare prices to that current marginal cost which reflects the future cost reductions resulting from current output. If you posit the type of learning-by-doing model that, I gather, Mike Spence developed, those externalities translate into a constant marginal cost, given the optimal path of output. Furthermore, the Areeda-Turner test proposes to compare prices to the reasonably anticipated marginal costs. Hence, learning by doing.

Following this idea, Willig and I developed a set of cost-based price floors for a multiproduct firm, which allow for cross-elasticities on the revenue side. You may think of products marketed at different points in time as being complementary on the cost and revenue side. That perhaps might be the way to handle the cross-elasticities that you posited. That is a pretty complicated way of going about it, but that might be the best we can do.

MR. JOSKOW: I don't think there's a simple answer. You have got to try to look at whether what is driving the firm's strategy really is this learning curve, which is obviously speculative, or whether it is the ultimate prospect of no longer having any of these competitors in the market.

COMMISSIONER PITOFISKY: Suppose it is both.

MR. JOSKOW: You have to ask which is more credible. After reading some of the experience-curve literature, I am quite skeptical about the results.

As I indicated on the first day, I think much of that work incorrectly entangles changes in input prices, technological change, and all kinds of exogenous factors yielding a spurious correlation between unit costs and cumulative output. I would accept it as a potential defense only with some skepticism and try to look at the validity of the learning-curve assumptions and the outcomes that are going to occur as results of those other firms retreating from the market. In the end, the trier of fact would have to use his judgment as to how those things balance out.

COMMISSIONER PITOFISKY: As a matter of fact, if I am not mistaken, the precise facts you put--a price cut currently below your costs that turns out not to be below your costs, because unexpectedly you sold a much greater volume, as in the IBM case--and if they don't settle the case and we all live long enough--we may see the Supreme Court wrestle with your question.

I think one more question, because we are running out of time.

VOICE: The talk today by Mike Porter raised the interesting point of Procter & Gamble's infringement suit against Johnson & Johnson, I think--as a strategic variable, if you like.

It would suggest that the antitrust suits--antitrust statutes themselves, including the ability to bring predation cases--may simply be viewed by corporations as yet another strategic variable in this constellation Porter talked about. Do you think it is good public policy to expand the firm's strategy?

MR. ORDOVER: I agree with what Josh Greenberg--what he said at lunch. It is not very likely that such practices will occur. I agree with him, for once.

COMMISSIONER PITOFISKY: On that note of agreement, thank you very much. I do want to thank our panelists; they did an extraordinary job today.

(Applause)

(Whereupon, at 5:00 p.m., the hearing was adjourned.)

A P P E N D I X

D u P o n t D e c i s i o n

UNITED STATES OF AMERICA
BEFORE FEDERAL TRADE COMMISSION

In the Matter of)
)
E.I. DuPont de Nemours & Company,)
a corporation)
)
)
)

Docket No. 9108

OPINION OF THE COMMISSION

By Clanton, Commissioner:

Introduction

In challenging the legality of an expansion strategy adopted and carried out by respondent, E.I. DuPont de Nemours & Company ("DuPont"), in its titanium pigments business, this case addresses issues that are fundamental to antitrust policy. The complaint, issued April 5, 1978, charges DuPont in a two-part count with unfair methods of competition and unfair acts and practices by using its dominant position in an attempt to monopolize the production of titanium dioxide pigments ("TiO₂") in the United States, in violation of Section 5 of the Federal Trade Commission Act, as amended, 15 U.S.C. §45. Administrative Law Judge Miles J. Brown (ALJ) dismissed the complaint and complaint counsel appeal.

The many events that compose the expansion strategy at issue span the years 1971 to 1978. As might be expected, these events are highly relevant to the issue of liability and, for that reason, must be set out in some detail, especially in view of the allegation that the expansion plan is unreasonable, and therefore unlawful, only

if assessed in its entirety. The actual occurrence of much of this conduct is largely uncontroverted, but the parties vigorously contest the legal consequences of these events. 1/ (ID 5)

Respondent and the Market

DuPont is a Delaware corporation with its principal place of business at 1007 Market Street, Wilmington, Delaware. In 1976, DuPont had sales exceeding \$8.3 billion, assets exceeding \$7 billion and net income exceeding \$459 million. It is engaged in the manufacture and sale of diverse chemical and related products, among them pigments and dyes including titanium dioxide pigment. During the period in question, DuPont's TiO2 production was the responsibility of its Pigments Department, and in 1976, DuPont's total domestic shipments of TiO2 amounted to \$257 million. (IDF 1-3, 6)

There is no dispute about the product and geographic markets at issue in this case. As there are no practical substitutes for the product, TiO2 constitutes a distinct product market. The United States as a whole is the relevant geographic market for purposes of this case. (IDF 5)

TiO2 is a white chemical pigment used in the manufacture of such products as paint and paper to make them whiter or opaque. In manufacturing TiO2, there are two basic processes: the "sulfate" process and the "chloride" process. Essentially, the sulfate process involves the reaction of sulfuric acid with relatively low-grade feedstock (ilmenite ore or titanium slag), while the chloride processes entail the reaction of chlorine either with a high-grade titanium ore (rutile ore or synthetic rutile) or with lower grades of feedstock (principally ilmenite ore). During the relevant time frame, only DuPont used the latter chloride process. (ID 5)

1/ The following abbreviations will be used in this opinion.

ID	-	Initial Decision page number
IDF	-	Initial Decision Finding number
Tr.	-	Transcript page number
CX	-	Complaint Counsel's exhibit number
RX	-	Respondent's exhibit number
CAB	-	Complaint Counsel's appeal brief
RAB	-	Respondent's answering brief
CRB	-	Complaint Counsel's reply brief
Tr.OA	-	Transcript of Oral Argument page number

A brief background on these two processes is helpful. The sulfate process was the first developed and used by all producers, including DuPont. It is a "batch" process, not affording the economies of large scale inherent in the "continuous flow" operation of the chloride processes. In the post-World War II period, DuPont developed chloride technology and began applying it to the relatively abundant low-grade ilmenite ore for commercial purposes. By 1952 DuPont's first ilmenite chloride facility was fully operational at Edge Moor, Delaware, where it also had a sulfate facility. In 1958, DuPont opened a second ilmenite chloride TiO₂ plant at New Johnsonville, Tennessee. While DuPont was building chloride process TiO₂ plants in the 1950's, other producers continued to build only sulfate plants. (1D 5)

In the late 1950's, abundant rutile ore deposits were discovered, and from 1960 to 1970, all TiO₂ plants constructed, including DuPont's Antioch, California, plant, were designed to use rutile ore in a chloride process. Until the late 1960's, the overall costs of production of TiO₂ were essentially equal among the various combinations of processes and ores. Although DuPont alone possessed the technology (principally know-how) to make the chloride process commercially viable using ilmenite ore, the relative costs of rutile and ilmenite were such that no production process conferred a significant cost advantage. (ID 5-6) So long as rutile ore was plentiful, a high-grade rutile chloride plant yielded a better return on investment than a comparable low-grade ilmenite process plant, due to the relative costs of ores, chlorine, waste disposal and initial investments (which were lower for the high-grade ore plant). (IDF 17)

DuPont's development of the ilmenite chloride process through the transition from the laboratory stage to commercial production unquestionably proved to be a difficult and notable technological achievement. Although DuPont developed this process in small operating units, the small-scale production technology could not be readily transferred to larger-scale commercial production. Thus, new techniques had to be devised to adapt the chloride process to increasing scales of operation. (IDF 16)

Around 1970, a world-wide shortage of rutile sent its price soaring. Also at about that time, federal environmental regulations imposed costly pollution abatement requirements upon sulfate TiO₂ producers, threatening to close down some of the sulfate capacity. As a result, DuPont's ilmenite chloride process left it holding a substantial cost advantage (unit cost of about 16¢/lb) over its competitors (about 21¢/lb). (ID 6, CX 28E)

It was DuPont's decision in 1972 to exploit this advantage and to increase its market share that gave rise to the complaint in this case. From 1972 to 1977, DuPont expanded its capacity and increased its market share from approximately 30% to 42%, and it presently forecasts that it will achieve a 55% share by 1985. Since 1970, no TiO2 competitor has added new production capacity. (ID 6)

The Allegations

The complaint charges DuPont with an attempt to monopolize the TiO2 market by the adoption and implementation of a strategy or plan to expand its domestic TiO2 production capacity to capture substantially all of the growth in domestic demand for TiO2 through the mid-1980's. Crucial to the plan was DuPont's undisputed cost advantage over its rivals in production of TiO2, which stemmed both from economies of scale and from DuPont's unique technological ability to use lower-grade (and lower cost) ilmenite ore. In this respect, complaint counsel contend that DuPont's cost advantage was "fortuitous," conferred upon it accidentally by the increases in the price of rutile and the costs of waste disposal in the sulfate process.

As alleged, DuPont's growth strategy consists of three inter-related elements: a) expansion of capacity by construction of a large-scale plant; b) exploitation of its cost advantage by pricing its products high enough to finance its own expanded capacity, yet low enough to discourage rivals from expanding; and c) refusal to license its cost-saving ilmenite chloride technology with which rivals could learn to take advantage of the economies of scale inherent in the low-grade ore technology. In addition, the allegedly strategic behavior of DuPont consisted of premature expansion of its TiO2 capacity and exaggerated announcements of its expansion intentions, all for the primary purpose of preempting competitors' expansion plans.

Complaint counsel contend that this conduct amounted to exclusionary and anticompetitive behavior insulating DuPont's cost advantage from competitive erosion since the ilmenite chloride technology actually changes as the scale of operation increases and, without large-scale operations, no competitor will be able to reduce or eliminate DuPont's cost advantage through "learning-by-doing" ilmenite chloride technology. The inevitable result of this strategy, according to complaint counsel, will be to give DuPont the power to raise prices at will, restrict output and prevent competition. (ID 43) Indeed, complaint counsel argue that DuPont's expansion plan "made no sense unless it results in a monopoly." Tr.OA 17.

DuPont admits that it sought to capitalize on its cost advantage in order to capture or serve the major portion of the growth in demand for TiO₂ well into the 1980's. (RAB 12) Even so, it denies that the cost advantage was "fortuitous," claiming instead that it was due to its costly innovations in low-grade ilmenite chloride technology in earlier years. It further denies that its capacity expansion had any purpose other than to satisfy the expected increase in demand for TiO₂. DuPont also denies that it engaged in an unlawful strategic pricing strategy, contending that its pricing during the period was attributable to market forces beyond its control. (RAB 27) Indeed, DuPont asserts that complaint counsel failed to prove that its prices were not profit-maximizing under the prevailing economic conditions. Id.

Furthermore, DuPont claims that it was under no duty to license its ilmenite chloride technology to any competitor, and contends that its competitors, all large corporations engaged in TiO₂ manufacture, are not prevented from developing their own low-grade ore technology or constructing large scale plants if they choose to make such investments. (RAB 28) Finally, DuPont points to its failure to achieve the anticipated growth in its market share and denies that it could attain monopoly power in the TiO₂ market. (RAB 43 et seq.)

We proceed now to a fuller exposition of the events giving rise to this case.

The Strategy

Prior to its switch to a more aggressive growth strategy, DuPont had some limited TiO₂ expansion plans underway. Specifically, respondent sought to expand its sales from 218 thousand tons per year ("MT") in 1971 to 301 MT in 1976, including an increase in the chloride capacity at New Johnsonville from 141 MT to 196 MT, which would make it the world's largest TiO₂ plant. ^{2/} At that time, DuPont's pricing policy was to maintain prices, except to cover inflation, until 1986 in conjunction with its conversions and expansions. (CX 22A) Its share of the TiO₂ market stood at 30%. (CX 21)

^{2/} As background, it should be noted that in 1971 DuPont had both sulfate and chloride process plants. But because of the increasing costs of the sulfate process, in 1971 the Pigments Department recommended exclusive reliance on the chloride process and conversion of sulfate capacity at Edge Moor to ilmenite chloride production. (CX 15)

In early 1972, however, DuPont noted that significant changes had occurred or were occurring in the TiO₂ market, including the fact that National Lead ("NL") and PPG were shutting down rutile chloride plants due to price erosion during the recession, that NL had ceased making "extended pigment," thus taking even more product off the market, and that the industry had little reserve capacity, although demand was recovering from the recession. (CX 21) Later that year, DuPont became further aware of its advantageous position when its Development Department formed a Task Force to improve the performance of the Pigments Department. The Task Force focused on the coming decline of sulfate capacity, DuPont's expanded scale and its 5¢/pound cost advantage over its competitors, the rutile supply problems of competitors, the waste disposal differences between sulfate and chloride, and the fact that competitors could technically convert to ilmenite but that at their scales of production it was too expensive and risky to do so. ^{3/} (CX 23) The Task Force reported those developments to the Executive Committee and predicted that DuPont could capture all of the anticipated increase in demand (from 713 MT in 1971 to 1000-1100 MT in 1980) and attain a market share of 56% by 1980 and perhaps 65% by 1985.

In light of these apparent long-run opportunities, DuPont decided in 1972 to launch the more aggressive expansion strategy. It attributes its decision specifically to a) recovery of the economy from the recession, b) a surcharge on imports, c) the impending and actual decrease in sulfate and rutile chloride capacity throughout the industry and d) DuPont's cost advantage in using ilmenite together with the scale economies achieved through expansions at Edge Moor and New Johnsonville. (RAB 11) Complaint counsel contend that no exogenous market change led to the reassessment, but that DuPont simply sought to prevent competitive expansion and attain monopoly power. Although the documentary record reveals little about the reasons leading DuPont to rethink its strategy, complaint counsel are correct in asserting that the principal market changes justifying the growth strategy mostly occurred prior to DuPont's adoption of its earlier, more moderate expansion program.

^{3/} DuPont believed that the basic ilmenite chloride patent technology had been disclosed in scientific literature, but its competitors continued to use the rutile chloride process. In DuPont's view, they were reluctant to shift to ilmenite technology because they shied away from ilmenite waste disposal problems and they lacked sufficiently large-scale plants to justify the expense of conversion. (CX 16A-F)

The initial terms of the new expansion plan called for upgraded capacities of 167 MT for Edge Moor (from 110) and 228 for New Johnsonville (instead of 196), and for a third ilmenite chloride plant at "Site X," originally envisioned as two lines commencing at staggered times, with a capacity range between 110 and 380 MT. (CX 26F, H, CX 38L, CX 50B, H)

While such capacities were large for the industry, from the outset, DuPont's expansion plans appeared to involve plants of optimally efficient scale. DuPont's estimate of the increase in demand between 1972 and 1980 was 330 MT, which DuPont characterized as equivalent to "three fully developed JV-type [New Johnsonville] lines" (110 MT each). (CX 34I, CX 26D-E) Later planning documents retained 110 MT as a benchmark capacity in the proposal for a 110 MT line by 1980 at Site X and an "innovative" second line of 220 MT there in the indefinite future. (CX 38L) Throughout the planning period 1972-73, DuPont's technological applications improved and the plan was revised to expand New Johnsonville to 252 MT (two lines). With the increase in the optimal scale of the JV-type line to 126 MT, the planned capacity of the future single line at Site X increased to 130 MT. 4/ (CX 26H, CX 54A) There is no evidence that DuPont planned to build excess capacity or that its plans to fulfill the foreseen demand with new and expanded plants were inconsistent with scale economies.

As mentioned above, the Task Force expected the remainder of the industry to suffer a net loss of capacity. DuPont's estimate of its competitors' 1972 capacity was 480-505 MT, which included 160 MT of sulfate capacity that was expected to be shut down due to environmental difficulties. (CX 26M) DuPont anticipated a limited expansion of competitors' chloride capacity before 1980, which would replace some of the lost sulfate production. Specifically, DuPont expected Kerr-McGee to gain a net increase of 50 MT (chloride), while expansion by others was less certain. 5/ In no event was competitive chloride expansion expected to exceed 110 MT by 1980, compared to the projected loss of 160 MT of sulfate capacity. The 1972 appropriation request for the expansion of New Johnsonville noted that PPG and NL were abandoning chloride plants due to unfavorable economics, that Cabot had transferred its chloride plant to Gulf & Western, that remaining industry capacity was oversold and that industry expansion was necessary to meet forecast demand. (CX 29H-I)

4/ The capacities of 167 for EM and 252 for JV were the "desired practical limits" of those plants; expansions to those limits were actually begun in May, 1974. (CX 54C)

5/ Expansions of 25 MT by American Cyanamid and 35 MT by SCM were assigned low (10%) probabilities, (CX 213B) and apparently expansions by other firms were even less likely.

Complaint counsel accuse DuPont of perpetuating these discouraging conditions for competitors by pricing in a manner that made it unattractive for other firms to invest in new capacity. While pricing to generate funds for expansion was an integral part of the 1972 strategy, discouragement of competitive expansion did not appear as an express element of the strategy until 1975, at least in presentations to the Executive Committee. 6/ As for DuPont's individual pricing decisions throughout the period 1972-1977, there is some additional evidence to suggest that those decisions took account of the effect upon competitive expansion. At the same time, the record indicates that respondent's pricing strategy underwent periodic adjustment due to variations in market forces, including cost inflation and amended demand forecasts.

Complaint counsel cite several events that allegedly reveal DuPont's pricing policy to prevent competitors from earning sufficient funds to expand. In one such instance, Kerr-McGee increased its TiO2 price by 3¢ in June, 1972, an action that DuPont personnel understood to be related to the desire of certain competitors to expand. Complaint counsel contend that it was DuPont's unilateral refusal to follow the price increase, not market forces, that prevented the price hike. However, DuPont proved unable to prevent an increase -- because of a lack of excess capacity, DuPont could not force a roll-back of prices to its level, and two-tier pricing resulted. (RAB 25) Although the documents show that the expansion-inducing effects of the increase played a role, other market-related reasons influencing DuPont's decision were that: a) DuPont's larger customers had price protection (a firm price) until the end of the year, b) there was uncertainty about federal price controls, c) an increase would stimulate imports, d) an increase during a shortage looked like gouging, and e) DuPont's price was already higher than some competitors'. (CX 28)

Subsequently, DuPont increased its prices on four separate occasions in 1974. (CX 3, #196-200) The record fails to show whether DuPont led all of these increases, although in its brief respondent states that it led the last one, which had to be partially rescinded. (RAB 27) In January, 1975, after these four increases, DuPont, citing market softness, again refused to support a competitor's 5¢ increase, and all competitors rolled back their prices. (CX 3, #201-09) However, six months later, DuPont led another, lesser price increase of 3.5¢, which competitors followed. (CX 3, #210-14) This time DuPont thought the increase was a compromise

6/ Express elements of the 1972 strategy were to a) price to generate funds for expansion, b) decide the configuration of production facilities (a third site was needed), c) increase the mineral supply and d) decide on a waste disposal method. (CX 27F)

level for restoring earnings in the face of rapidly rising costs without shrinking demand. (RX 2B) Due to excess capacity and discounting, this latter increase was only partially successful. Nevertheless, complaint counsel cite this sequence of events as evidence of DuPont's power to control prices and its policy of restricting competitors' revenues.

Two other pricing patterns were discussed. In both 1976 and 1977, competitors led increases but, when DuPont raised its prices by a lesser amount, the competitors rescinded to the smaller increase. In 1976, DuPont cited the effects of the price hike on its customers and on imports, while in 1977 DuPont believed that the smaller increase would help it keep its market share; would minimize substitution of "extenders" for TiO₂, would be more palatable to customers, and would approximate recent cost increases. (CX 161)

While an interest in discouraging expansions by competitors could be inferred from the totality of the pricing policies and conduct, substantial alternative reasons attributable to external market forces were also evident, and neither of the explanations is necessarily inconsistent with what occurred in each instance. In reviewing the strategy, the 1975 Task Force inferred that, from the outset, the pricing policy had the dual purpose of providing cash for expansion and limiting competitors' ability to expand. On the other hand, as we discuss further below, it appears that independent market factors may have led DuPont and competitors to price at levels below the expansion-inducing (or limit) price that would have prevailed under more favorable market conditions.

Complaint counsel also contend that DuPont strategically announced its intentions to build new capacity and actually began such expansions prematurely, for the primary purpose of preempting and discouraging competitors' expansion opportunities. (CAB 15) For example, in July, 1974, an appropriation request was made for the "partial design, a construction cost estimate, and cancellation charges on long-term delivery equipment" for a 130 MT chloride plant at DeLisle, Mississippi. (CX 3, #114) DuPont also described this action as a decision "to authorize funds for a preliminary engineering study into a third TiO₂ chloride" plant. (CX 3, #126) By comparison, the press release of July 16 declared that DuPont planned to construct a plant on a site then under option and that it had authorized expenditure of \$8 million for a "detailed design and order of long delivery equipment." (CX 159F) Complaint counsel argue that DuPont's announcement of this appropriation, among others, was both premature and exaggerated. The ALJ found that such announcements were necessary to inform customers and the DeLisle community of DuPont's plans. (ID 41) While a "detailed design" suggests more of a commitment than a "preliminary engineering study," this disparity in the announced scope of DuPont's intentions does not seem sufficient to mislead

sophisticated corporate managers, especially since the amount of expenditure was disclosed. In addition, DuPont's customers were anxious to know whether DuPont would supply their anticipated increased needs. Furthermore, DuPont had encountered environmental resistance in its first choice of sites, and because of the time required to license such a facility, it was reasonable to give early notice to the community, to licensing authorities and to customers. For these reasons, it appears that the scope and timing of DuPont's announcements of its intentions regarding DeLisle were related to legitimate business considerations.

Complaint counsel also allege that DuPont's decision on the timing of DeLisle's start-up amounted to another of the strategic decisions aimed at preventing competitive expansion, and that DuPont eventually decided to bring DeLisle on-stream "early." (CAB 37) Yet complaint counsel acknowledge that an accelerated start-up would not result in oversupply. *Id.* From the outset, the start-up of DeLisle was planned to coincide with the increase in demand that the economic recovery of the late 70's was expected to bring. The Pigments Department emphasized the advantages of proper timing in urging the Executive Committee not to delay the start-up:

Although this action (reaming out existing facilities and delaying the start-up until 1981) reduces cash needs during 1975-1978, it has serious long run implications At a later date, it would be impossible to regain this momentum because the lack of major activity by DuPont in the interim would prompt competition to implement their own expansion plans. Therefore, sell-out of a DeLisle-type plant would require about ten years rather than the desired 3-4 years . . . [since] DuPont would be facing the prospect of competing on a "me-too" basis.
(CX 71F)

This document and other Task Force memoranda indicate that the decisions regarding the commencement of production at DeLisle were consistent with both a desire to respond to market opportunities and a desire to expand before competitors expanded.

We also note that there are no allegations that the size of the DeLisle proposal was excessive or inconsistent with optimal scale economies. When the DeLisle plans were first assembled, the equipment specifications from New Johnsonville were used, yielding a projected capacity of 130 MT. By 1975, DuPont had recalculated the capacities of the equipment for use at DeLisle, taking improvements into account, and up-graded the projected efficient capacity to 150 MT. (CX 113J) The plans for a second line at DeLisle were later postponed indefinitely.

In 1975, a general economic recession led the DuPont Executive Committee to reevaluate about ten capital projects, and a slump in TiO2 sales in particular led it to review the DeLisle construction plans. The Pigments Department found its DeLisle project competing for funds with several other corporate projects. To make its case for the DeLisle project, the Task Force devised two alternative ten-year TiO2 business strategies -- one an aggressive "growth" plan calling for completion of DeLisle and aiming toward 60% of the market, the other a "maintain" strategy aimed at a 43% share with no new plant until 1985. (CX 91) To convince the Executive Committee not to abandon or delay DeLisle, the Task Force focused on the long-run profitability of the TiO2 business with the added capacity and a larger market share. Much attention in the parties' briefs is devoted to the extent to which the Executive Committee was exposed to and adopted the plans and recommendations of the reconstituted TiO2 Task Force.

In attempting to estimate the effect of TiO2 prices on DuPont's ability to sell out DeLisle within three or four years of the plant's opening, the Task Force performed the following calculations: price that would trigger competitive expansion, price that would trigger imports, price at which TiO2 substitutes occur, price that will sink any firm. (CX 85B) The express pricing goal under the "growth" strategy was to price as high as possible to generate expansion funds without a major competitive expansion or foreign entry. Under the "maintain" strategy, the pricing policy would be "to balance profit with limited competitive expansion and foreign entry." 7/ (CX 113P) The documents indicate the Task Force's belief that if DeLisle were delayed one year, competitive expansion was unlikely (CX 101), but that if DeLisle were abandoned, Kerr-McGee, SCM and American Cyanamid might expand. (CX 108) However, in its presentation to the Executive Committee, the Task Force predicted that any delay of DeLisle would stimulate others to expand. In turn, it was argued, such expansion would preclude DuPont from attaining full capacity within the four-year period thought necessary to make DeLisle economically viable. (CX 116I)

The Task Force also prepared several comparative long-range projections of the price and profit expectations under the two proposed strategies, projections that are referred to in the briefs as the "welfare analysis." These projections showed that, while TiO2 prices would be lower in 1980 under the growth plan than under the "maintain" strategy, after 1984 the prices, and thus the

7/ The return on investment in TiO2 was significantly higher for DuPont than for its competitors. DuPont documents describe the TiO2 business as a profitable one for itself but a marginal one for competitors. (CX 182E) While DuPont's operative return on investment was 29% in 1972, its estimates of competitors' returns were as follows: Kerr-McGee and American Cyanamid, 8%; SCM and Cabot, 3%; NL Industries, 12%. (CX 26M) The projected return on the DeLisle project was also higher than that for DuPont's overall TiO2 operations. The projected net return on the DeLisle project by the third year of operation (1981) was 17% while the projected net return on DuPont's entire TiO2 business for the third year was 15%. (CX 133N)

total profitability out to 1992, would be higher under the expansion plan. The welfare analysis itself contains no explanation of the different price assumptions used, but other documents referred generally to the value of a larger market share. (CX 116J)

Complaint counsel argue that the welfare analysis shows that DuPont knew that it would recoup any sacrifice of short-run profit by higher long-run prices which, they contend, would result from DuPont's higher market share and future monopoly power over price. Complaint counsel also contend that, because the Executive Committee chose to build DeLisle despite the fact that the third-year rate of return was lower than that in the "maintain" strategy projection, the upper management of DuPont must have looked beyond its normal three-year investment evaluation period and intended a predatory, short-term sacrifice of profits. By complaint counsel's calculations, DuPont will reap \$387 million more between 1975 and 1992 under the growth strategy than it would under the "maintain" plan.

DuPont responds that the two tables of projected market variables called the "welfare analysis" do not mean what complaint counsel claim they do. According to the testimony of Mr. Clark, the Pigments Department's manager for research and development, the planning period for the DeLisle project ran only to 1985. The projected price in that year would be higher for the "growth" strategy than for the "maintain" strategy, in the judgment of the Task Force, because of the following scenario: If DeLisle were delayed, prices would first rise, reflecting a shortage. However, competitors would eventually bring on new capacity in an uncoordinated manner, resulting in overcapacity. Prices would then fall or at least stabilize despite rising costs for a period of years. By 1985, the overcapacity would cause prices to drop 2¢/pound below the projected level under the growth strategy, due to excess capacity. Mr. Clark's testimony is that the projection of prices beyond 1985 was a purely mechanical application of factors to produce DuPont's uniform investment evaluation benchmark, the investor's method rate of return, for the full period of depreciation (13 years). (Tr. 1286-91, 1455-59) Mr. Clark explained that while the 2¢ differential in 1985 resulted from Task Force judgment about the scenario, the computer simply escalated the numbers out to 1992 in the same relationship as they stood in 1985. Mr. Clark also vigorously denied that anticipation of larger market share played any role in the projections. (Tr. 1299, 1323, 1385, 1468)

From the documentary evidence, it seems reasonable to infer that the Task Force projections were used in the presentation to the Executive Committee and that the Committee was aware of the conceptual, if not the actual, projected price differential between the two strategies, despite testimony that the differential was not a factor in the DeLisle decision. 8/ While the 1992 projections do not appear to

8/ Mr. Shapiro, DuPont's chairman, testified that while the short-run profitability of reaming out and expanding New Johnsonville exceeded the short-run profitability of building DeLisle, output from New Johnsonville would be inadequate to meet demand and DuPont would have to build another plant anyway, so it was more efficient and economical to proceed with DeLisle. (Tr. 799)

reveal any specific assessment of the factors that would affect prices beyond 1985, the projections nevertheless indicate that DuPont would gain some pricing advantage if it built DeLisle and thereby prevented a period of overcapacity. But, weighed in its context, the "welfare analysis" reveals little about the extent to which DuPont would exercise its market power.

In addition to the projected price differential, several other factors were discussed by the Task Force in preparation for the presentation to the Executive Committee. One topic presented to the Committee was the retention of DuPont's TiO2 customer base, while a topic apparently dropped from the written presentation was the preemptive impact upon competitors of DuPont's announcements of its expansion plans.

As for customer relations, DuPont believed that

[a] portion of our market share growth over the past years stems from bringing on additional capacity at times when it was needed. Another portion resulted from the expectation on the part of customers that we would continue to expand to meet their growth needs. (CX 118A)

By 1975, DeLisle had already been announced and customer expectations established. Having created such expectations, DuPont believed it had much to lose from reversing itself on DeLisle, especially its credibility as a supplier. To delay construction of DeLisle would be seen by customers as unwillingness to meet their future needs. To cancel would be worse, in the view of the Task Force, since competitors had been discouraged from expansion because of DuPont's "announced and well-publicized intentions." (CX 118A) DuPont would gain "an image of having forestalled competitive expansions on a false premise," and would thereafter be the least favored supplier. Id.

Such Task Force speculation about the preemptive nature of the announcements about DeLisle, as contrasted with the expansion itself, did not go beyond the Pigments Department. While the Task Force observed, in the draft of its presentation, that its well-publicized expansion plans had made competitors hesitant to expand, (CX 113F) there was nothing explicit about preemption of competitive expansions in the written discussion before the Executive Committee. (CX 116H) Nevertheless, it is reasonable to infer from the overall presentation that the Executive Committee clearly understood the full effects of such a large expansion. The Committee was told that the pricing structure had reportedly kept competitors from expanding; and it was also made aware of DuPont's scale advantages, customer expectations, the pricing structure, the political and environmental value of a new chloride production site and the differential in projected prices between the alternative strategies. After the presentation, the Executive Committee decided to continue

as planned with construction of the 150 MT DeLisle plant, to commence operation in 1979. 9/

This decision was believed to have

signalled DuPont's intention to compete strongly for the increased needs of domestic industry into the early eighties. Customers, concerned about future shortages, and most competitors, aware of the many problems they face, appear to have accepted this. (CX 140H, CX 120U)

Even so, throughout the rest of the period, the Task Force remained concerned that, due to unanticipated slumps in demand, the strategy, which it continued to follow, would not yield sufficient revenues for DeLisle. In fact, however, between 1972 and 1977, DuPont's profit objectives were almost met, by its own account, by keeping its prices high, causing the Task Force to recommend a program of lower prices to encourage consumption of TiO₂. (CX 182F)

As originally conceived, the growth strategy did not call for DuPont to take market share or existing sales away from competitors; rather, the plan was to capture the forecast growth in demand. As it turned out, over the course of the strategy, DuPont did take some market share from its competitors. Despite DuPont's early forecasts and expectations, between 1972 and 1977 there was no net increase in total demand for TiO₂ and competitors' sulfate plants did not close. While it fell well short of its earlier market share goals, DuPont nevertheless increased its sales over the period by 80 MT, at the expense of competitors.

By late 1977, no competitive expansion was foreseen. The final injection of funds for the start-up of DeLisle was being fine-tuned to coincide with the anticipated economic recovery at which the output was aimed. (CX 196H, CX 159B)

9/ In examining the role of the Task Force, we have reviewed respondent's arguments that it should not be held accountable for the brainstorming of lower-level management. It is clear, however, that the Task Force constituted much more than a "think tank" operation. It was specifically set up to develop a long-range plan for the Pigments Department and its basic recommendations were consistently followed by the Executive Committee. Moreover, the Task Force's periodic reassessment of the 1972 strategy, and its revisions, leave little doubt as to senior management's endorsement of the basic elements of the growth strategy. (CX 178, 180, 182).

Summary of Facts

We have here a remarkably clear blueprint of DuPont's plan to capture all or most of the increased demand for TiO₂ after 1972. Although DuPont has fallen somewhat short of its 1972 market share goals -- 51.8% planned vs. 43% actual for 1978 -- it nevertheless has continued to follow the early strategy. The principal setbacks resulted from a slowdown in demand growth and the continued operation of sulfate plants that DuPont thought would be closed due to pollution problems. These circumstances also forced DuPont to cancel (or at least indefinitely postpone) a second line at DeLisle. As to much of the evidence there is little dispute about the precise events that occurred or the sequence of these events. Where the parties diverge sharply is over the inferences to be drawn from DuPont's conduct and, more specifically, over the justifications offered in defense of the expansion and pricing decisions.

As for the expansion program, the record is quite clear that DuPont's plans left little room for competitors, with the possible exception of Kerr-McGee, to expand by 1980. At the same time, it is also clear that DuPont did not seek to drive competitors out of the market, although the effect of capturing all growth would inevitably be to reduce the market share of other competitors and, arguably, the value of that share. There is no evidence to indicate that DuPont's 1972 estimate of 1980 demand was unreasonable or exaggerated; indeed, a TiO₂ shortage existed in 1972 and the economic downturn of the mid-70's had not yet materialized. Had DuPont expanded only its existing facilities to their "desired practical limits" (Edge Moor from 55 to 167, New Johnsonville from 141 to 252, and Antioch from 28 to 50), its addition of capacity would have fallen short of the projected 1980 increase in demand by about the amount of the projected capacity of DeLisle's first production line. 10/

Complaint counsel do not contend that DuPont overbuilt its capacity relative to anticipated demand; rather they argue that respondent met its growth objectives only by preempting competitive expansion through strategic announcement and start-up of the DeLisle plant as well as pricing to deter competitive growth. As examples of strategic timing, complaint counsel cite DuPont's 1974 announcement of its plan to build DeLisle, which occurred before funds were actually appropriated, and the 1975 recommendation to the Executive Committee urging that start-up of DeLisle not be delayed for two years (despite a market slump) because of competitive ramifications.

10/ That takes into account the 1972 projection that there would be a net loss of roughly 60 MT due to shutdown of sulfate plants. Because those shutdowns never occurred and demand growth slowed, the DeLisle plant was brought on stream later than originally anticipated.

On the other hand, as the law judge noted and complaint counsel recognize, there were legitimate business reasons for DuPont to provide as much notice as possible of its expansion plans. (ID 21, 41, CAB 36) DuPont had encountered strong environmentally related resistance in its attempts to locate what eventually became the DeLisle plant, and, in fact, the firm abandoned its first choice of sites in Georgia. Thus, early notice and clearance of a site was logical, and the period required for licensing such a facility appeared substantial. In addition, as the record indicates, there were customer-related reasons for providing adequate advance notice about capacity expansion and for not abandoning publicly announced expansion plans. In short, although DuPont systematically took account of the impact of its decisions on competitors, we cannot find that respondent timed the announcement and start-up of its DeLisle plant in a way that was unrelated to market growth, lead time and other legitimate business considerations.

It should also be emphasized that the significant scale economies achieved by DuPont in its ilmenite chloride process made it feasible for respondent to try and capture growth left unmet after expansion of its existing plants through construction of a large, efficient-size plant. Other than Kerr-McGee, with its contemplated 50 MT addition, DuPont appeared to be the firm most interested and capable of significant expansion before 1980. As market conditions changed throughout the period, DuPont revised both the size of the DeLisle plant and its start-up date to take account of the adjusted estimates of demand. While DuPont's original plans for its new plant site included a second line of 220 MT capacity, and while the press release announcing the first appropriation for DeLisle stated that the single-line plant was planned with expansion in mind, the second line at DeLisle was never formally announced to the industry and, indeed, quickly disappeared from the TiO₂ strategy.

As DeLisle neared completion, and after \$142 million had been spent on the project, DuPont considered whether to delay or to accelerate its start-up. The final infusion of capital was to be timed so that completion coincided with the anticipated resurgence of demand. The costs already sunk as well as customer expectations were legitimate business reasons for DuPont to proceed with completion as urged by the Pigments Department in late 1977, even if it meant that the plant might lie dormant for a year.

On the pricing side, two interrelated issues are involved: DuPont's influence over price and the rationale for both the firm's individual pricing decisions and its overall pricing strategy. Central to complaint counsel's case is the allegation that DuPont deliberately sought to deter competitive expansion, and simultaneously effect its own expansion plans, by using its cost advantage to price at a level that would make it unattractive for competitors to enlarge their capacity.

In support of their position, complaint counsel rely on Task Force statements as well as four instances where DuPont forced a rollback in competitors' price hikes by refusing to go along. Respondent obviously disputes these contentions, claiming that independent market forces influenced its specific pricing decisions and that the Executive Committee did not adopt the Task Force pricing recommendations.

The evidence of DuPont's cost advantage and its pricing behavior clearly indicates that it exercised some degree of price leadership in the industry. For example, internal company documents reveal DuPont's own belief in 1975 that if price increases were to occur it would have to lead the way. (CX 99A) Moreover, DuPont's ability to force a rollback of price hikes in early 1975, to initiate successfully a lesser price increase several months later, and to force further rollbacks in 1976 and 1977, points strongly to the conclusion that respondent had a measure of power over price.

It is true, of course, as respondent contends, that other factors influenced industry pricing between 1972 and 1978, factors which suggest that DuPont did not have unfettered control over prices. Because of a shortage, DuPont was unable to roll back prices in 1972, thereby creating a two-tiered pricing structure. DuPont's actions in forcing price rollbacks in later years can be explained, as respondent contends, by independent market forces such as excess capacity, customer reaction and the threat of imports. Customers, for example, could reduce their consumption of TiO₂ to some extent through the use of extenders. And, as long as excess capacity existed, competitors had an incentive to increase sales by discounting in order to reduce fixed costs. By DuPont's own account, it gained market share early in the slump through aggressive pricing but suffered a slippage later when prices were kept too high. (CX 182C) Thus, there were some constraints on DuPont's pricing decisions, but that does not detract from the fact that respondent enjoyed significantly greater freedom than its rivals to influence industry pricing.

As for the Task Force recommendations concerning deterrent or limit pricing, it is hard to reach any conclusion other than that such an objective was part and parcel of the overall growth strategy. To be sure, the 1972 plan presented to the Executive Committee did not expressly refer to a limit pricing policy. Nevertheless, that objective was viewed by the Task Force in 1975 as an element of the plan and later Task Force reports reiterated this feature. (CX 91H, 76D) Had the Executive Committee rejected such an approach, it seems highly unlikely that it would have surfaced in later reports. But, having found that such a pricing strategy existed, it is quite another thing to ascertain how it affected specific pricing decisions. In fact, in light of the other market factors affecting DuPont's specific pricing decisions, it is impossible to discern from the record the degree to which DuPont looked to competitors' expansion plans in making those decisions. There is no evidence, however, that DuPont priced below its costs and complaint counsel do not attempt to make such a showing.

In view of the pricing evidence, it is quite probable that complaint counsel's and respondent's seemingly contradictory positions are, in fact, not inconsistent. As noted earlier, DuPont had performed several calculations of pricing parameters, including the limit price above which competitors could be expected to bring in new capacity. But, because general economic forces kept demand below anticipated levels and put downward pressure on TiO₂ prices during the period in question, DuPont and its competitors may well have been pricing in an area below the limit price, i.e., the price that, in the growing market of 1972, would suffice to deter competitive expansion. In such a situation, DuPont apparently would be less concerned about the critical expansion-inducing price and more concerned with short-term market share gain or loss, especially as it affected the efficient utilization of existing capacity. This is not to suggest, of course, that DuPont's pricing responses in 1975-77 had no impact on competitors' expansion plans. To the extent rivals were denied price hikes by DuPont, their profits undoubtedly suffered, thereby making it even less likely that new expansion would be contemplated. What the evidence does suggest, however, is that the pricing decisions of DuPont during this period may well have reflected short-term market conditions more than long-term strategic considerations. 11/ Nevertheless, while DuPont did not have absolute control over price and was constrained by market forces beyond its control, there is persuasive evidence that it was able to exert its influence over the prices of competitors and that it sought to do so for the dual purpose of generating sufficient funds for its own expansion and depriving competitors of sufficient funds to expand. This pricing behavior is analyzed below in light of current standards of predation and exclusionary conduct.

Finally, as with the expansion-detering price issue, respondent also attempts to insulate its Executive Committee from association with the long-run welfare considerations developed by the Task Force in 1975 for the purpose of comparing the "growth" and "maintain" strategies. While the Executive Committee did not set prices, it was certainly aware of the basis for the Pigments Department pricing decisions. It also seems clear from the presentations to the Executive Committee that it knew that under the prevailing price structure competitors had not come forward with expansions. Finally, in connection with its decision in 1975

11/ In addition, because of DuPont's cost advantage, it is quite logical to assume that the cost pressures inducing respondent's competitors to raise prices did not affect DuPont as severely. In the oligopolistic TiO₂ market, DuPont's competitors might have hoped and expected that other firms would go along with price hikes, even in the face of slumping demand, and such action might appear rational. But, in view of DuPont's lower costs, its refusal to go along with the price increases seems consistent with explanations that are not based solely on deterrence considerations.

not to delay DeLisle, the record demonstrates that the Committee received information showing a price differential between the two alternative strategies (CX 116M), and it was aware that the long-run superior profitability of the DeLisle alternative became apparent only after the third year of projection. However, it appears that the projected superiority of the DeLisle alternative was based, to a considerable degree, on the higher sales volume and the avoidance of excess industry capacity associated with that alternative. The presentation to the Executive Committee did indicate that a higher market share had "value," but that term had several meanings (Tr. 1455, 1468), and it is not clear what DuPont personnel concluded about such value. From the welfare analysis we can tell that if DeLisle were delayed, uncoordinated competitive expansions might drive the price of TiO₂ down for a period of time, perhaps at some temporary social cost because of inefficient capacity utilization, whereas if DeLisle were built DuPont would probably enjoy an even greater degree of price leadership. But the predictions of the Task Force do not reveal the extent to which DuPont would attempt to exercise its market power in the future.

In sum, the facts show rather unequivocally that DuPont, with a 30% market share in 1972 and a substantial cost advantage over its rivals, sought to exploit this opportunity by embarking on a long-term expansion project to capture the demand growth anticipated over the following decade. In pursuing this objective, DuPont foresaw that this plan would significantly enhance its market share, possibly giving the firm a 65% share by 1985. In addition, DuPont took into account the impact of its actions on expansion by competitors, with particular emphasis on the effects of its pricing decisions and the competitive consequences of delaying DeLisle when the market turned downward in the mid-1970s. At the same time, DuPont's pricing and construction decisions were also influenced by intervening market factors. Lastly, DuPont refused to license its technology, preferring instead to reap the rewards of its low cost technology by direct application rather than by sharing it with competitors.

Whether this conduct violates the antitrust laws is the critical issue to which we turn next.

Legal Discussion

Complaint counsel argue that DuPont's output expansion, its timing of that expansion, its pricing policies and its refusal to license technology were carried out with the objective of attaining a monopoly share of the TiO2 market, and that the plan, if not already successful, is close to the mark. In urging a finding of liability, complaint counsel rely principally on traditional attempted monopoly analysis, and they contend that DuPont's conduct was unreasonably exclusionary, using a rule-of-reason approach.

It is alleged that this expansion program is unlawful only if taken in its entirety. Complaint counsel admit that no one element of the aforementioned conduct in DuPont's strategy is sufficiently unreasonable to be unlawful if taken independently. Rather, their theory is that the elements combine to create an unreasonably exclusionary effect, thereby constituting an attempt to monopolize and an unfair method of competition under Section 5 of the FTC Act. ^{12/} Complaint counsel stress that DuPont's expansion plan "made no sense unless it results in a monopoly" (Tr.OA 17), and that its conduct foregoes short-run profits and is profit-maximizing in the long run "only if competition is stifled and monopoly can be achieved." (CRB 36) (emphasis in original)

This case raises fundamental questions about the extent to which dominant firms may aggressively pursue competitive opportunities, especially where they enjoy some form of cost or technological advantage over their rivals. More specifically, the crucial issue facing us is not whether such firms may legitimately compete or capitalize on their advantages, but whether those opportunities are exploited in an unreasonable fashion. In other words, how much latitude should be afforded a major, well-established firm when it seizes a competitive edge and attempts to enhance significantly its market position? In the context of this case the question is not so much whether DuPont had the right to expand but whether it did so by measures that went beyond what were justified by its cost advantage.

a) Section 2 Standards

We begin our discussion by focusing on Section 2 of the Sherman Act, 15 U.S.C. §2, which makes it unlawful for any person to monopolize, or attempt to monopolize, any part of

^{12/} Complaint counsel also contend that §5 can reach practices not covered by §2 of the Sherman Act. (CAB 41-42) However, the case was tried principally under a §2 theory and we shall approach the issues from that perspective.

the trade or commerce among the several states. ^{13/} Section 5 of the Federal Trade Commission Act empowers the Federal Trade Commission to prohibit certain unfair methods of competition, and that section has been construed to cover conduct that violates either the prohibitions of the Clayton Act and the Sherman Act or conduct that could lead to unreasonable restraints on competition if not prohibited. FTC v Brown Shoe, 384 U.S. 316, 321 (1966); FTC v Cement Institute, 333 U.S. 683 (1948).

The classic definition of the offense of attempt to monopolize is set forth in Swift & Co. v United States, 196 U.S. 375, 396 (1905):

Where acts are not sufficient in themselves to produce a result which the law seeks to prevent - for instance, the monopoly - but require further acts in addition to the mere forces of nature to bring that result to pass, an intent to bring it to pass is necessary in order to produce a dangerous probability that it will happen.

As the Supreme Court later indicated, an attempt requires more than intent to do acts that tend toward monopoly; the intent spoken of in Swift is a specific intent to destroy competition or achieve monopoly. Times-Picayune Publishing Co. v United States, 345 U.S. 594, 626 (1953); see also L. Sullivan, Handbook of the Law of Antitrust 135 (1977). ^{14/}

^{13/} There is no dispute as to the relevant product or geographic markets in this case. (IDF 5) The parties are also in agreement that product market shares for purposes of this case are to be determined by domestic shipments of Ti02. (ID 9)

^{14/} Complaint counsel do not allege that DuPont's conduct is designed to destroy its rivals; rather, they urge that destruction of rivals is unnecessary to the success of predatory strategy, Complaint Counsel Appeal Brief, 50, when merely preventing rivals from competing in the short run enables a predator to attain long-run monopoly power. See O. Williamson, Williamson on Predatory Pricing II, 88 Yale L. J. 1183, 1185 (1979). We agree with this position as a general proposition. As the Court observed in United States v Griffith, et al., 334 U.S. 100, 107 (1948), "[t]he antitrust laws are as much violated by the prevention of competition as by its destruction."

As further refined by the courts, the attempt offense includes three principal elements: (1) specific intent to control prices or destroy competition, (2) exclusionary or anticompetitive conduct, and (3) a dangerous probability of success. E.g., California Computer Products, Inc. v. IBM Corp., 613 F.2d 727, 736 (9th Cir. 1979); Pacific Engineering & Production Co. of Nev. v Kerr-McGee Corp., 551 F.2d 790, 791 (10th Cir. 1977); Central S. & L. Ass'n of Chariton, Iowa v Federal Home Loan Bank Board, 422 F.2d 504, 508 (8th Cir. 1970); Merit Motors, Inc. v Chrysler Corp., 417 F. Supp. 263, 269-270 (D.D.C. 1976), aff'd., 569 F.2d 666 (D.C. Cir. 1977). These criteria, however, are not mutually exclusive but rather are interrelated to the extent that evidence of conduct may shed light on intent and the probability of success; conversely, evidence of a respondent's purpose may reveal the extent to which there are legitimate business justifications underpinning the respondent's conduct. See Janich Bros., Inc. v America Distilling Co., 570 F.2d 848, 853 (9th Cir. 1978), cert. denied 439 U.S. 829 (1978); Transamerica Computer Co., Inc. v IBM Corp., 481 F. Supp. 965, 989 (N.D. Cal. 1979).

With respect to the "dangerous probability" issue, there is conflict in the law as to what degree of market power, or proximity to monopoly status, need be shown before a finding of liability can be made. Compare Greyhound Computer Corp., Inc. v IBM Corp., 559 F.2d 488, 496, 504 (9th Cir. 1977), 15/ and Kearney & Trecker Corp. v Giddings & Lewis, Inc., 452 F.2d 579, 598 (7th Cir. 1971), cert. denied 405 U.S. 1066 (1972), with United States v Empire Gas Co., 537 F.2d 296, 305 (8th Cir. 1976), cert. denied 429 U.S. 1122

15/ In fact, the Ninth Circuit has essentially dispensed with the dangerous probability requirement as an independent element of the attempt offense, saying instead that the probability of success is important only as evidence of specific intent. That appears, however, to be a minority view among the circuits, and for purposes of our discussion we assume that some showing of a dangerous probability of success is required.

(1977). 16/ Suffice it to say, the evidence here of DuPont's leading position in 1972, its substantial cost advantage, its price leadership, and the existence of substantial scale economies indicates that respondent was on the verge of achieving monopoly power and that even the more stringent "dangerous probability" test appears to have been met. That is also the view of the ALJ. (ID 44)

We turn next to the issue of "specific intent," an elusive aspect of the attempt offense. In this connection, it seems important to bear in mind what the attempt doctrine does not proscribe. As Areeda & Turner put it:

"specific intent" clearly cannot include . . . the mere intention to prevail over one's rivals. To declare that intention unlawful would defeat the antitrust goal of encouraging competition on the merits, which is heavily motivated by such an intent. P. Areeda & D. Turner, Antitrust Law ¶822a at 314 (1977) (footnote omitted)

Similarly, Professor Cooper observes that:

Plainly, then, the "specific intent" required in attempt cases is not simply a subjective intent to prevail in the market. Instead, it is the intent to indulge in means that are in some sense untoward. Cooper, Attempts and

16/ The recent report of the National Commission for the Review of Antitrust Laws and Procedures expresses concern about construing the "dangerous probability" standard too stringently, so that liability attaches only if the respondent or defendant has a near-monopoly share of the market. Instead, the Commission, citing the Kearney decision, urged a balancing approach that gives less weight to market power considerations where the challenged conduct is clearly anticompetitive. National Commission for the Review of Antitrust Laws and Procedures, Report to the President and the Attorney General 145-49 (January 22, 1979). We share some of these concerns and note that if market share is the governing factor, DuPont had only about a 30% market share in 1972 when it embarked on its expansion program. Yet, the evidence clearly reveals DuPont's capability and desire to increase its market share to levels that, at least, approach monopoly proportions. While we ultimately cannot find DuPont's conduct to be unreasonable, our disposition of this matter should not depend upon a showing that DuPont's market position exceeded some magic market power (as measured by market share) criterion.

Monopolization: A Mildly Expansionary Answer
to the Prophylactic Riddle of Section Two,
72 Mich. L. Rev. 373, 395 (1974) (footnote
omitted) 17/

We highlight the intent issue because complaint counsel in their appeal and reply briefs make much of the documentary evidence concerning DuPont's 1972 goal of capturing a 56% market share by 1980 (and possibly 65% by 1985) and other statements indicating DuPont's awareness of the potential effects on competitors of its expansion plan. (CAB 44-45; CRB 22) It is argued that these documents demonstrate a "specific intent" to exclude competition and gain a monopoly. In fact, complaint counsel contend that this evidence of intent (together with a dangerous probability of success) is sufficient to establish liability even without looking to conduct. But intent is a barren issue without consideration of the means contemplated for acquiring monopoly power. It is simply unrealistic to divorce conduct from intent. Even the broad language of Alcoa, 18/ which complaint counsel quote (CAB 43), focuses primarily on Alcoa's conduct and its effect on competition. And, of course, that was a monopolization case, which involves the less demanding general intent test.

As a general matter, it seems unwise to find that a firm has the requisite specific intent for anticipating the exclusionary consequences of successful competitive behavior which leads, or may lead, to a monopoly, so long as that behavior is reasonable. To suggest otherwise would be to proscribe all acts in which firms

17/ Even Professor Sullivan, who rejects an overly restrictive interpretation of Section 2, has this to say about specific intent:

It also seems clear that an intent to monopolize could not be inferred merely from conduct consistent with efficient competitive responses, such as merely expanding to meet new opportunities. Even though such conduct would, on the most sweeping view of the law, suffice for the offense of monopolization if monopoly power were in fact achieved, such conduct does not warrant an inference of specific intent to monopolize. L. Sullivan, Handbook of the Law of Antitrust, 136 (1977) (hereinafter cited as Sullivan).

18/ United States v Aluminum Company of America, 148 F.2d 416 (2d Cir. 1945).

conjure up some thoughts of achieving monopoly irrespective of the actual character of the means employed to gain that end. Perhaps the relationship between intent and conduct is best characterized by the court in Transamerica:

More than an intent to win every sale, even if that would result in the demise of a competitor, is required before it can be concluded a defendant has the type of exclusionary intent condemned by the antitrust law. Intent and conduct are closely related; and there must be some element of unfairness in the conduct before an anticompetitive intent can be found, as distinguished from the benign intent to beat the opposition. (citations omitted) 481 F. Supp. at 1010.

There is no doubt that intent can shed light on questionable conduct and the justifications for the conduct. ^{19/} But the crucial issue is whether DuPont's conduct represents legitimate competitive behavior or an unreasonable effort to propel the firm into a dominant position in the TiO2 market. That is the issue to which we address the bulk of our discussion.

We come now to the critical element of an attempt to monopolize for purposes of this case: the reasonableness of DuPont's conduct in formulating and executing its expansion strategy. Few antitrust issues of late have sparked more interest and debate than has the subject of predation and strategic deterrent behavior. At stake is the extent to which dominant firms should be permitted to compete aggressively, and the standards by which conduct should be deemed predatory (and therefore unreasonable). These issues

^{19/} As Judge Friendly observed in Buffalo Courier-Express, Inc., v Buffalo Evening News, Inc., 601 F.2d 48, 54 (2d Cir. 1979), in discussing the relationship between intent and conduct:

The intent alone is not sufficient, although, of course, it may give color to the acts. Similarly, acts alone are insufficient, although they may evidence intent.

have received extensive discussion in recent court decisions and economic literature, 20/ and complaint counsel's case draws heavily from this debate.

Central to complaint counsel's definition of predation is the notion that a firm in trying to discipline or destroy competition will sacrifice short-term gain for long-term competitive advantage. Professor Sullivan provides a good summary of this point in the following excerpt from his treatise:

the predator seeks not to win the field by greater efficiency, better service, or lower prices reflective of cost savings or modest profits. The predatory firm tries to inhibit others in ways independent of the predator's own ability to perform effectively in the market. Its price reduction or predatory expenditure is calculated to impose losses on other firms, not to garner gains for itself; indeed, the predation is likely to involve present losses to the predator, or at all events to foreclose profits which could currently be earned, detriments which are accepted by the predator as the cost of freeing itself for the future from the competition it now faces. Sullivan at 111.
(footnotes omitted) (emphasis added)

20/ Areeda & Turner, Predatory Pricing And Related Practices Under Section 2 of the Sherman Act, 88 Harv. L. Rev. 697 (1975); Scherer, Predatory Pricing and the Sherman Act: A Comment, 89 Harv. L. Rev. 868 (1976); Areeda & Turner, Scherer on Predatory Pricing: A Reply, 89 Harv. L. Rev. 891 (1976); Scherer, Some Last Words On Predatory Pricing, 89 Harv. L. Rev. 901 (1976); Williamson, Predatory Pricing: A Strategic And Welfare Analysis, 87 Yale L. J. 284 (1977); Spence, Entry, Capacity, Investment and Oligopolistic Pricing, 8 Bell J. of Econ. 534 (1977); Williamson, Williamson On Predatory Pricing II, 88 Yale L. J. 1183 (1979); Schmalensee, On the Use of Economic Models In Antitrust: The ReaLemon Case, 127 Pa. L. Rev. 994 (1979); Baumol, Quasi-Permanence of Price Reductions: A Policy for Prevention of Predatory Pricing, 89 Yale L. J. 1 (1979); Joskow & Klevorick, A Framework for Analyzing Predatory Pricing Policy, 89 Yale L. J. 213 (1979).

This description seems sound, but the short-term/long-term dichotomy can only be carried so far, for otherwise, any action by a monopolist to compete by ways that are not profit-maximizing in the short-run would be suspect. 21/

It is within this context that we review the relevant judicial precedent and economic literature. Although no case has dealt directly with the unique combination of activities present here, several decisions have touched on various aspects of the conduct engaged in by DuPont. These involve cases of alleged monopolization as well as attempted monopolization. It is, of course, axiomatic that the duty imposed on a monopolist may not be incumbent on a lesser firm, even a substantial industry leader. Nevertheless, a review of the principles governing conduct by monopolists is desirable for two reasons. First, the standards for judging attempts to monopolize are derived in part from the standards applicable to the completed offense. Second, the courts have historically been suspicious of excessive market power in the hands of private firms and have interpreted the offense of monopolization to include conduct by companies whose market shares fall far short of 100 percent control. As such, the range of permissible behavior for monopolists and non-monopolists cannot always be sharply differentiated, especially at the margin. In view of these factors and DuPont's close proximity to monopoly status, an examination of some of the relevant monopoly decisions seems particularly pertinent.

It should be noted at the outset that we are not dealing here with conduct that amounts to an unlawful restraint under Section 1 and, as such, an attempt to monopolize under Section 2. See United States v Columbia Steel Co., 334 U.S. 495, 525 (1948); United States v Griffith, 334 U.S. 100, 106 (1948); United States v United Shoe Machinery Corp., 110 F. Supp. 295, 342 (D. Mass. 1953). Rather, we are concerned with single-firm conduct, the lawfulness of which is more ambiguous and depends on a variety of factors including the market position of the respondent, the structure of the industry, the nature of the conduct (and alternatives to such conduct), and the effect of the conduct on competition. Thus, we agree with complaint counsel that it is appropriate to employ a rule of reason-type approach for judging the lawfulness of DuPont's behavior.

21/ Sullivan, in distinguishing between legitimate and unlawful behavior, further suggests that predatory conduct is likely to seem "odd," "jarring" or "unnatural." "It will not strike the informed observer as normal business conduct, as honestly industrial." Sullivan at 111-12.

Such an approach is reflected even in the far-reaching, landmark decision in United States v Aluminum Company of America, 148 F.2d 416 (2d Cir. 1945) ("Alcoa"), the progenitor of the cases on exclusionary expansion, as well as complaint counsel's theory here. In that case Alcoa, with its 90 percent market share, confronted rivals with repeated increases in capacity in anticipation of demand, thereby excluding competitors from profitable opportunities to grow. In condemning this action and finding that Alcoa was not the "passive beneficiary of a monopoly," Judge Hand nonetheless concluded that not all monopolies were proscribed by Section 2. In addition to natural monopolies and those created by "force of accident," he cited the situation where "[a] single producer may be the survivor out of a group of active competitors merely by virtue of his superior skill, foresight and industry." Id. at 430. Thus, Judge Hand felt that some evaluation of the justifications for the monopolist's behavior and the resulting market structure was called for, although, as applied to Alcoa, he believed that its capacity expansions were not "inevitable" and that they did not reflect the actions of firms "who do not seek, but cannot avoid, the control of a market." Id. at 431.

In United Shoe Machinery, Judge Wyzanski pointed out that Section 2 clearly covered common law restraints of trade and clearly did not cover market control captured solely through superior skill and intelligence. As to the intermediate case, he observed that the legislative history was silent as to the legal consequences of monopolies which reflect neither of the above causes but stem rather from "some practice which without being predatory, abusive, or coercive was in economic effect exclusionary." 110 F. Supp. at 341.

Relying heavily on the legal tests set forth in Alcoa and Griffith, Judge Wyzanski found that United Shoe's practices were exclusionary and not economically inevitable. In so doing he elaborated on the exception to liability for monopolization formulated by Judge Hand:

the defendant may escape statutory liability if it bears the burden of proving that it owes its monopoly solely to superior skill, superior products, natural advantages, (including accessibility to raw materials or markets), economic or technological efficiency, (including scientific research), low margins of profit maintained permanently and without discrimination, or licenses conferred by, and used within, the limits of law, (including patents on one's own inventions, or franchises granted directly to the enterprise by a public authority). Id. at 342.

Applying this to United Shoe's leasing practices, Judge Wyzanski determined that:

they are not practices which can be properly described as the inevitable consequences of ability, natural forces, or law. They represent something more than the use of accessible resources, the process of invention and innovation, and the employment of those techniques of employment, financing, production, and distribution, which a competitive society must foster. They are contracts, arrangements, and policies which, instead of encouraging competition based on pure merit, further the dominance of a particular firm. In this sense, they are unnatural barriers; they unnecessarily exclude actual and potential competition; they restrict a free market. Id. at 344-45. (emphasis added)

Turning briefly to Griffith, there is language in that case that could be construed to proscribe virtually any monopoly, however acquired or maintained. ^{22/} Yet, the Court went on to emphasize that it is the "exercise" or "use" of monopoly power to foreclose competition or gain a competitive advantage that is unlawful, thereby suggesting that for a violation to exist there must be something more than the exercise of inherent competitive advantages, such as technological advantages. The facts of that case required little analysis of competitive trade-offs as the practices at issue there -- concerted efforts by film exhibitors to utilize monopoly power in some markets to gain exclusive distribution rights in other markets -- revealed significant competitive harm with little or no offsetting justifications. Indeed, the Court called these practices a "misuse of monopoly power" and found violations of both Sections 1 and 2 of the Sherman Act. 334 U.S. at 108.

Finally, in the most recent Supreme Court monopoly decision, United States v Grinnell, 384 U.S. 563 (1966), the Court restated the test for monopolization as one which, in part, proscribes the "willful acquisition or maintenance of that power as distinguished from growth or development as a consequence of a superior product, business acumen, or historic accident." Id. at 570-71. However,

^{22/} As put by the Court, "monopoly power, whether lawfully or unlawfully acquired, may itself constitute an evil and stand condemned under §2 even though it remains unexercised. For §2 of the Act is aimed, inter alia, at the acquisition or retention of effective market control. See United States v Aluminum Co. of America, 2 Cir., 148 F.2d 416, 428, 429." United States v Griffith, 334 U.S. 100, 107 (1948) (footnote omitted). In citing Alcoa, it is not clear whether the Court was endorsing Judge Hand's test or embracing a somewhat different formulation.

as in Griffith, the Court was not called upon to draw any subtle distinctions between permissible and impermissible monopoly conduct, since the tactics employed there to attain market control, primarily a series of acquisitions, constituted a rather clear case of unjustified behavior, which might have given rise to a separate violation under Section 7 of the Clayton Act.

Thus, these decisions reflect at least a general judicial willingness to weigh the relative competitive virtues and evils of dominant firm behavior even in the monopoly context. With the exception of Alcoa, however, the facts of the other cases and the broad principles set forth therein provide only the most general sort of guidance in analyzing the lawfulness of DuPont's activities. As noted above, Grinnell and Griffith involved factual situations where there was little doubt about the anticompetitive nature of the challenged behavior. United Shoe raised more difficult issues, but as the court noted there, the leasing system in question, while not an unusual marketing tool, heightened entry barriers substantially and introduced no significant competitive efficiencies or other benefits.

As for Alcoa, it superficially at least provides a much closer analogy to the facts of this case. But there are differences, not the least of which is the fact that Alcoa was a monopolist that had maintained its hold over the market through repeated additions to capacity over a long period of time. ^{23/} Moreover, the circumstances and justifications surrounding those increases in output are not detailed. In light of more recent precedents and literature on exclusionary conduct, discussed below, Alcoa leaves unanswered a number of important questions that are especially relevant in the context of the attempt case now before us. ^{24/}

For example, Alcoa reveals nothing about the scale economies inherent in Alcoa's expansions, nor does the decision specifically address whether Alcoa's additional output conformed to demand

^{23/} Areeda & Turner in their treatise suggest that a better rationale for the holding in Alcoa would have been to construe Section 2 to outlaw persistent monopolies, subject to certain efficiency defenses such as economies of scale or superior skill. P. Areeda & D. Turner, Antitrust Law at ¶623b. Whether Section 2 of the Sherman Act or Section 5 of the FTC Act reach that far is an issue we need not decide here.

^{24/} For a general critique of the Alcoa decision, see P. Areeda & D. Turner, Antitrust Law at ¶608; Sullivan at 95-97.

estimates or resulted in excess capacity. Furthermore, while the court condemned Alcoa's repeated additions to capacity as preemptive and preservative of monopoly, it gave unclear signals about other aggressive conduct engaged in by the firm, some of which it found to be reasonable and justified by legitimate business reasons. 25/ Whatever may have been the proper result under the facts in Alcoa, we believe these issues need to be explored in greater depth in the context of an attempt to monopolize, such as we have here.

The attempt cases encompass a wide variety of challenged conduct and the courts have employed various approaches in assessing the reasonableness of defendants' actions. See generally Hawk, Attempts to Monopolize -- Specific Intent as Antitrust's Ghost in the Machine, 58 Cornell L. Rev. 1121 (1973). For example, where the conduct at issue reveals a clear purpose to destroy competition, with no countervailing business justifications, the Supreme Court has had little difficulty in declaring such behavior predatory. Thus, in Lorain Journal Co. v United States, 342 U.S. 143, 153 (1951), the sole newspaper in the market incurred liability for attempting to monopolize by its refusal to accept advertising orders from merchants who patronized a competing radio station. By contrast, in Times-Picayune Publishing Co. v United States, 345 U.S. 594, 627 (1953), the Court found no attempt to monopolize in conduct that was "predominantly motivated by legitimate business aims." The defendant, a newspaper publisher with a monopoly morning paper and an evening paper facing competition, adopted a unit pricing plan requiring advertisers to purchase advertising in both its papers, a practice which allegedly foreclosed the competing

25/ It is instructive to note that the Government sought to show that many of Alcoa's transactions, "neutral on their face, were not in fact necessary to the development of Alcoa's business, and had no motive except to exclude others and perpetuate its hold upon the ingot market." Specifically, the Government attempted to prove that Alcoa bought up bauxite deposits and water-power sites "not for the purpose of securing an adequate future supply, but only in order to seize upon any available supply and so assure its monopoly." The court viewed the charge as depending entirely upon Alcoa's intent, "for if the purchases provided for the future needs of the business, or for what Alcoa honestly believed were its future needs, they were innocent." 148 F.2d at 432-33. The district court believed the lengthy testimony of Alcoa officials that Alcoa had not purchased the bauxite and water-power sites in order to exclude others, and the reviewing court upheld that belief, even though Alcoa "did buy a number of such sites which it did not fully use." *Id.* at 434. This determination reflects the tension that exists in distinguishing exclusionary behavior from conduct that is undertaken for legitimate, non-predatory business purposes but which may have incidental exclusionary effects.

evening paper from a share of the advertising market. While resting its decision on the absence of specific intent, the Court appeared to draw upon its earlier Section 1 analysis of the advertising plan in finding a proper business purpose. Under that analysis, the Court found the plan reasonable, noting that many other publishers had adopted similar plans and that unit rates substantially reduced overhead costs. *Id.* at 633. On balance, however, the decision provides only limited guidance as to the role and weight to be accorded conduct evidence in evaluating intent, especially where the conduct falls short of a Section 1 violation.

In a case involving allegations of preemptive expansion, American Football League v National Football League, 323 F.2d 124 (4th Cir. 1963), the court determined that the NFL's plans to offer franchises in two new cities in 1960, the same year that the AFL started up, did not constitute an attempt to monopolize. Focusing heavily on the issue of intent, the court found that the NFL had independent business reasons for expanding and had planned to do so even prior to the formation of the AFL. The two-city expansion, according to the court, was simply the implementation of those earlier plans and the NFL would have been "greatly embarrassed" if it had not followed through. *Id.* at 132.

A different result, however, was reached in Philadelphia World Hockey Club v Philadelphia Hockey Club, 351 F. Supp. 462 (E.D. Pa. 1972), a monopolization case, in which the National Hockey League's expansion efforts were cited as evidence of a wrongful intent to monopolize the market for major league professional hockey players. While relying on Alcoa, the court nevertheless recognized that the creation of the WHL and the NHL's expansion drive were "both responses to an increased market for those entering as well as those already in the field." *Id.* at 512. In finding liability the court indicated that it did not rely solely on expansion but took account of other conduct, such as the reserve clause, and statements by the NHL President expressing a clear determination to preserve the NHL as the exclusive major professional hockey league in the United States and Canada. *Id.* at 512-13. Thus, in view of this analysis, it is not entirely clear what the court would have done had it been faced with the kind of growth plan encountered here: expansion that is consistent with demand projections and can be accomplished only through large, efficient-scale operations which have the inevitable tendency of restricting competitors' efforts to expand at scale. 26/

26/ In addition to Alcoa and Philadelphia Hockey Club, complaint counsel also cite Schine Chain Theatres, Inc. v United States, 334 U.S. 110, 119 (1948), as supporting generally their position. But in Schine, the Supreme Court affirmed findings that Schine threatened to open new theatres in towns where competitors refused to sell out or where new entry was planned. It appears that the essence of the activity under scrutiny there -- disciplining rivals rather than responding to long-run market opportunities -- is substantially different in nature from the conduct at issue here.

In Bergjans Farms Dairy Co. v Sanitary Milk Producers, 241 F. Supp. 476 (E.D. Mo. 1965), aff'd 368 F.2d 679 (8th Cir. 1966), the court found an attempt to monopolize from an overall course of conduct that included expansion by acquisition coupled with other restrictive conduct. There, a dairy cooperative that produced 55-60 percent of the raw milk in a market sought to increase the percentage of its milk purchased as higher-priced "Class I" milk by processors and concurrently to exclude other producers from such sales. To accomplish its goal, the cooperative employed price cuts, false pricing announcements, secret discounts, acquisition of a processor and predatory price cuts on processed milk. As an integrated firm, it forced other processors to buy Class I milk from its members, employing such tactics as below-cost sales, price discrimination and subsidization, and price-fixing with retail stores. It is not clear, however, how much weight the court gave to each of the practices, and the conduct, including the nature of the expansion, differs considerably from the behavior of DuPont.

By contrast, internal expansion, without more did not constitute an attempt to monopolize in Hiland Dairy, Inc. v Kroger Co., 402 F.2d 968 (8th Cir. 1968), cert. denied, 395 U.S. 961 (1969). In that case, the plaintiff sought to enjoin Kroger from building a dairy processing plant with the capacity to supply more than 20 percent of total demand, claiming that building the plant constituted an attempt to monopolize and that the expansion would give Kroger power to impose unreasonable restraints on competition. No conduct involving unreasonable restraints was at issue, nor was Kroger a dominant firm in the market. The court distinguished Alcoa, citing the "unique" factors present in that case -- a 90 percent market share and repeated increase in demand -- and concluded that the mere act of building a plant is not by itself unfair or predatory.

In two other recent attempt cases, the practices accompanying internal expansions were not deemed to be sufficiently unreasonable to make out violations of Section 2. In one, the conduct involved unfair claims to advertisers and a promotional giveaway which apparently incurred no losses. Buffalo Courier Express, Inc. v Buffalo Evening News, Inc., 601 F.2d 48 (2d Cir. 1979). And, in another, low pricing to increase demand did not render illegal a firm's doubling of its capacity, since the new capacity was installed in anticipation of its future need and was not to be carried at a loss. Structure Probe, Inc. v Franklin Institute, 450 F. Supp. 1272, 1288 (E.D. Pa. 1978), aff'd mem. 595 F.2d 1214 (3d Cir. 1979).

These cases, like the monopolization cases discussed above, unfortunately are of limited usefulness to the task here. They provide no clear explication of the factors to be considered in assessing the reasonableness of conduct by firms with market power approaching monopoly proportions. For the most part, the courts have couched their decisions in terms of such general considerations as the defendants' conformity with prevailing business norms or the existence of independent economic justifications to support the challenged conduct. Insofar as the expansion cases are concerned, about the most that can be said is that the courts appear to be cautious about condemning expansion by non-monopolists, especially where the expansion is not accompanied by other conduct that is anticompetitive.

In addition to these cases, however, several decisions of late, cited by respondent, address the reasonableness of dominant firm behavior in greater depth. Although these decisions do not involve the kind of output expansion activity present here, they do shed further light on the conduct standards applicable to both monopolization and attempted monopolization cases.

Of particular interest is a series of cases involving the marketing practices of IBM. California Computer Products v IBM Corp. ("Cal Comp"), 613 F.2d 727 (9th Cir. 1979); Greyhound Computer Corp. v IBM Corp., 559 F.2d 488 (9th Cir. 1977); ILC Peripherals v IBM Corp. ("Memorex"), 555 F.2d 1379 (9th Cir. 1977); Telex Corp. v IBM Corp., 510 F.2d 894 (10th Cir. 1975); Transamerica Computer Co. v IBM Corp., 481 F. Supp. 965 (N.D. Cal. 1979). Among the various charges of exclusionary conduct were allegations that IBM lowered prices to drive competitors from the market and preserve its market share, altered its leasing policies in order to frustrate and exclude competitors, and implemented superfluous design changes in equipment to forestall competition.

In finding IBM's actions to be reasonable, the court in Cal Comp concluded that IBM's dominant position in computers resulted initially from technological superiority, and that the firm was entitled to maintain that position through "shrewdness in profitable price competition," which the court characterized as business acumen. 613 F.2d at 742. In addition to finding IBM's price reductions "highly profitable," 27/ the court also found the design changes

27/ While adhering to the Areeda-Turner marginal cost rule as the basic test for predatory pricing, the court nevertheless indicated that under the right circumstances limit pricing might be proscribed, and that pricing above marginal or average variable costs might be condemned when viewed in light of other aspects of the monopolist's conduct. 613 F.2d at 743.

to be cost-saving technical improvements which justified lower prices. According to the court, IBM, even as a monopolist, had the right to redesign products to reduce cost or improve performance, and the firm was under no obligation to predisclose its new technology to competitors. Id. at 744.

Addressing somewhat different leasing and pricing policies in Greyhound, the Ninth Circuit upheld IBM's fixed term leasing plan as a reasonable response to competition, but reversed a directed verdict for the firm on the pricing issues, saying that the evidence showed IBM's actions to be prima facie anticompetitive without legitimate business purpose. 559 F.2d at 505. In reaching this result the court started with the premise that IBM, as a monopolist, "would be precluded from employing otherwise lawful practices that unnecessarily excluded competition from the [market]." Id. at 498. Applying this standard, the court determined that changes in the technological discount offered by IBM would not be economically justified except as a means of inhibiting leasing company competitors. Similarly, the court found that IBM's action in boosting maintenance rates on its new generation of equipment, despite lower maintenance costs, was not competitively justified and had the primary effect of restricting competitors' access to such equipment by stretching out the period required to recoup investment.

In Telex, IBM's redesigned peripheral equipment and accompanying price reductions were judged by a two-fold test: (1) whether the acts were business practices typical of those used in a competitive market, and (2) whether the conduct involved the use of monopoly power. 510 F.2d at 925-26. In finding IBM's conduct to be reasonable, ordinary business behavior, the court felt that a firm such as IBM should be given sufficient latitude to respond to erosion of its lawfully acquired market share. As the court observed:

It would seem that technical attainments were not intended to be inhibited or penalized by a construction of Section 2 of the Sherman Act to prohibit the adoption of legal and ordinary marketing methods already used by others in the market, or to prohibit price changes which are within the "reasonable" range, up or down. Id. at 927.

Two additional district court opinions involving IBM are worth noting. These cases also deal with conduct that is similar or identical to the practices at issue in the aforementioned cases, and both decisions devote considerable discussion to the question of predatory pricing standards. In Memorex, the court concluded that a two-part test should be applied to allegations of exclusionary pricing. If entry barriers are low, the Areeda-Turner marginal or average variable cost standard should hold. If entry barriers are high, the proper measure would be to determine whether prices are below short-run profit maximizing levels -- in other words, the inquiry would focus on whether the defendant is sacrificing current

profits to gain even higher profits in the future. 28/ In addition, the court felt that pricing to meet competition was permissible without regard to costs, thus allowing the dominant firm to match any competitive price offerings irrespective of the entry hurdles facing the would-be challenger. According to the court, IBM's pricing met these tests. 458 F. Supp. at 433.

As for the non-pricing conduct, the Memorex court found that IBM's new product offerings were significant innovations and that its product announcements were not false or misleading.

In Transamerica, after an exhaustive review of the precedents, the court determined that an average cost pricing test was the most defensible from an economic and public policy perspective. 29/ As for design changes, the court looked to see if the changes were "unreasonably restrictive of competition," taking into account the effects on competitors and consumers, technological advantages and intent. 481 F. Supp. at 1003. In finding IBM's conduct generally reasonable, the court had this to say about the general standard for judging the behavior of a monopolist:

Where a monopolist chooses an alternative that does not unreasonably restrict competition, the law is not offended. It is the choice of an unreasonable alternative, not the failure to choose the least restrictive alternative, that leads to liability. Id. at 1022.

28/ In arriving at this position, the court relied on two Ninth Circuit appellate cases involving allegations of attempted monopolization and a Fifth Circuit case dealing with price discrimination under the Robinson-Patman Act. ILC Peripherals v IBM Corp., 458 F. Supp. at 431-32, citing Janich Bros., Inc. v American Distilling Co., 570 F.2d 848, 857 (9th Cir. 1977); Hanson v Shell Oil Co., 541 F.2d 1352, 1358-59 (9th Cir. 1976), cert. denied, 429 U.S. 1074 (1977); and International Air Industries, Inc. v American Excelsior Co., 517 F.2d 714, 723-24 (5th Cir. 1975). These decisions, while largely endorsing the Areeda-Turner test, nonetheless suggest that pricing above average variable or total costs might be deemed to be predatory in situations where new entry is difficult.

29/ In attempt cases, however, the court, citing Janich and Hanson, n. 28 supra, noted that an average variable cost test might be appropriate where independent evidence of specific intent or dangerous probability is lacking. 481 F. Supp. at 989.

One further case deserves consideration. Berkey Photo, Inc. v Eastman Kodak Co., 603 F.2d 263 (2nd Cir. 1979), cert. denied, 100 S. Ct. 1061 (1980). Briefly, the Berkey court found no attempt to monopolize in Kodak's introduction of the "110" camera and no general duty of a monopolist to predisclose its innovations to competitors. Reminiscent of the charges of exaggerated and premature expansion announcements by DuPont were Berkey's allegations that Kodak made false and exaggerated claims about its new film for the 110 camera: the court disagreed, finding the film to be a superior product for which there was a market.

In reaching its decision, the court emphasized that, in the context of a monopolization case, a violation can be found only by showing the use of monopoly power. According to the court,

a use of monopoly power is an action that a firm would have found substantially less effective, or even counterproductive, if it lacked market control. Id. at 291.

While reaffirming the well-established principle that actions proper for a non-monopolist may be improper if engaged in by a monopolist, the court went on to note that:

if an action that gains a firm a competitive advantage is effective because of the company's efficiency, prestige, and innovativeness, and not because of its control over the market, the action is not a use of power. Id. at 291 n. 50. 30/

30/ As examples of actions that may be permissible for firms with market power, the Berkey court had this to say:

a firm that has lawfully acquired a monopoly position is not barred from taking advantage of scale economies by constructing, for example, a large and efficient factory. These benefits are a consequence of size and not an exercise of power over the market. Nevertheless, many anticompetitive actions are possible or effective only if taken by a firm that dominates its smaller rivals. (citations omitted) Id. at 274-75.

These decisions reflect some of the most extensive efforts by the courts in recent years to devise tests for determining whether conduct by monopolists or near-monopolists is unreasonably exclusionary or constitutes legitimate competitive behavior. In so doing, the courts have fashioned a variety of criteria such as a) whether the behavior amounted to ordinary marketing practices, b) whether it was profitable or economically rational, c) whether it resulted in improved product performance or d) whether it would have been effective for a firm without market power. In addition, several of the decisions emphasize that the lawfulness of the practices depends on the market setting (e.g., nature of entry barriers) and the anticompetitive potential of the challenged practices. In particular, the decisions in such cases as Greyhound and Transamerica suggest the importance of weighing the efficiencies and competitive virtues of the practices under scrutiny against their exclusionary characteristics and effects.

There is little doubt that many of these considerations can be of great help in judging the lawfulness of single-firm conduct. Actions that promote innovation or improve efficiency, for instance, should generally be encouraged, not inhibited. But we believe it would be unwise policy, especially in the face of actual or threatened monopoly, to focus solely on the benefit side of the equation while ignoring the adverse effects of dominant firm behavior. For example, a firm's conduct might consist largely of ordinary business practices, yet be highly exclusionary because of the industry structure and the firm's market power. So too, the actions of the would-be monopolist may enhance efficiency or product performance, albeit marginally, although the overall competitive effect is decidedly negative. In a similar vein, there are shortcomings in a test which relies exclusively on determining whether the conduct would have been rational for a smaller firm. On the one hand, it might be logical and necessary for a new or recent entrant to engage in below cost pricing as a means of achieving market penetration. On the other hand, size and efficiency may coalesce so that it is difficult, if not impossible, to ascertain precisely whether an effective marketing tactic owes its success to greater efficiency or the naked exercise of market power. Moreover, behavior that is rational for a firm with little or no market power may nevertheless produce substantial and unnecessary anticompetitive effects when wielded by a firm with considerable market clout.

In the present case, DuPont's conduct appears to be justified by respondent's cost superiority over its rivals, demand forecasts and scale economies. There is no evidence that DuPont's pricing or capacity strategies were unprofitable (regardless of the cost test employed) and, as discussed later, the plant announcements do not appear to be misleading. Yet, that is not the end of our inquiry. As we have suggested, the proper test for measuring the reasonableness of DuPont's conduct takes account of overall competitive effects -- pro and con -- within the relevant market setting. To further explore the factors that should guide our analysis, we turn to the new literature on predatory business strategies.

b) Economic Literature

Complaint counsel draw on recent economic literature in urging that DuPont's conduct should be condemned under a rule-of-reason approach to predation. In the process, they reject the so-called per se marginal cost pricing tests of Areeda and Turner and even the special per se rules advanced by Professor Williamson. Instead, complaint counsel support the approach suggested by Professor Scherer of looking at all relevant market factors affecting long-run welfare in determining whether dominant firm conduct is unreasonable.

Much of the current economic debate stems from the aforementioned effort by Professors Areeda and Turner to develop a set of objective, efficiency-based predatory pricing rules which will serve to deter the most likely abuses of market power and which courts can workably apply. Areeda & Turner, Predatory Pricing and Related Practices Under Section 2 of the Sherman Act, 88 Harv. L. Rev. 697 (1975). Under their proposal, only pricing below marginal or average variable costs would be deemed predatory, except where marginal costs exceed average costs; in the latter case, pricing above average costs would be legal. ^{31/} The principal criticisms of this approach, in the view of a number of commentators, see n. 20 *supra*, are (1) that it focuses only on eliminating equally efficient firms and ignores the social loss from elimination of less efficient firms on the ground that any other standard would chill desirable pricing behavior by firms with substantial market shares; and (2) that it fails to take account of market-place dynamics, especially the ability of dominant firms to prevent even equally efficient firms from entering the market on a viable scale. Although each of these commentators offers a somewhat different solution to the problem, they share the common objective of developing legal criteria that will adequately address the long-run welfare effects of conduct by firms having substantial market power.

Professors Scherer and Williamson, in particular, are both concerned with output decisions by dominant firms which, though not necessarily violating the Areeda-Turner cost-based rules, nevertheless serve to deter effective new entry or expansion by existing firms. Scherer, for example, criticizes Areeda and Turner for overstating the significance of predation in situations where a dominant firm maintains excess capacity and for understating

^{31/} A significant feature of the Areeda-Turner test is the assumption that predation is most likely to occur in situations where the monopolist has excess capacity, *i.e.*, where marginal cost is less than average cost. It should also be noted that these commentators would establish no rule governing possible predatory investment in new capacity, since they believe that monopolists are unlikely to build costly excess capacity simply to deter new entry and that it would be too difficult to determine whether the excess capacity was attributable to strategic reasons or innocent factors, such as unanticipated changes in demand. Areeda & Turner, Predatory Pricing And Related Practices Under Section 2 of the Sherman Act, 88 Harv. L. Rev. 697, 719 (1975).

the entry-detering effects of output expansions beyond optimal levels, in the range where price falls below marginal cost yet exceeds average cost. Scherer, Predatory Pricing and the Sherman Act: A Comment, 89 Harv. L. Rev. 869 (1976). Scherer's concern is that output and pricing in this range might be used to deter new entry by equally efficient firms when minimum efficient scale is large because residual demand cannot accommodate the additional output required for viable entry. For such a strategy to be effective, of course, the prospective entrant must perceive that the dominant firm is unlikely to make room by reducing its output. Even though actual entry by the new firm would drive prices below the Areeda-Turner levels if the monopolist refused to back off, Scherer believes that the entrant might be unwilling to take the risk that enforcement of the antitrust laws would provide it adequate protection. Scherer at 872. 32/

The scenario sketched by Scherer bears a superficial resemblance to the DuPont situation, inasmuch as it is alleged that DuPont's pricing and growth strategy purposefully served to deter existing firms from developing low-cost ilmenite technology by precluding them from learning to operate at large, efficient scale. On closer examination, however, the similarity evaporates. Scherer's model assumes that the dominant firm's output is expanded into the range where its average costs are rising and its prices are below marginal cost. But such conduct is not evident here. DuPont does not appear to be operating, or planning to operate, on the upward segment of its average cost curve, either by building a less-than-efficient size plant or by otherwise expanding output beyond optimum levels. Thus, we are unable to find in this part of Scherer's analysis any cause to deem DuPont's expansion and pricing strategy unreasonable.

Of perhaps greater relevance is Scherer's further recommendation that cost-based tests be replaced by a rule-of-reason analysis for gauging the long-run welfare effects of dominant firm behavior. Under such an approach, Scherer suggests that there may be cases where pricing above marginal cost levels should be deemed predatory because of ensuing long-run welfare losses. Of great significance to us, though, is that even here Scherer recognizes the welfare benefits of expansion consistent with optimal scale economies, a situation characteristic of DuPont's expansion program. To Scherer, the proper way to analyze non-traditional forms of dominant firm predation, such as preemptive output expansion, is by an assessment of such variables as

the relative cost positions of the monopolist
and fringe firms, the scale of entry required

32/ In their reply to Professor Scherer, Professors Areeda and Turner express a willingness to modify their standard slightly so that predation could be established if the dominant firm's prices fell substantially below marginal cost, though still above average cost. Areeda & Turner, Scherer on Predatory Pricing: A Reply, 89 Harv. L. Rev. 868, 894 (1976).

to secure minimum costs, whether fringe firms are driven out entirely or merely suppressed, whether the monopolist expands its output to replace the output of excluded rivals or restricts supply again when the rivals withdraw, and whether any long-run compensatory expansion by the monopolist entails investment in scale economy-embodiment new plant. Scherer, at 890.

Since DuPont, the low-cost producer, is not seeking to displace existing output, ^{33/} or to increase output temporarily to head off competitive expansion, it seems difficult to condemn its expansion efforts, which are directed at capturing future growth in demand. Of course, it can be argued that other TiO₂ producers would eventually achieve cost parity with DuPont (estimated ten years) if they were encouraged to expand to large scale operations. But it seems anomalous to preclude DuPont from competing for this increased demand on grounds that it could do so most efficiently only at a level of capacity and output that inevitably tends to exclude other competitors.

Professor Williamson also emphasizes the strategic aspects of predatory pricing, but he focuses on a somewhat different problem. Williamson, *Predatory Pricing: A Strategic and Welfare Analysis*, 87 Yale L. J. 284 (1977). Specifically, Williamson assumes that dominant firms will respond to cost-based predatory pricing rules, such as the Areeda-Turner test, by deliberately choosing a pre-entry plant scale that enables them to meet new entry by expanding output to levels that remain profitable for them but not for their putative rivals. In short, by building in excess capacity, the established firm can turn back new entry without violating the applicable cost-based pricing standard. Under this scenario, potential entrants are presumed to have access to the same cost-saving technology as the dominant firm, although cost parity may be achieved only with operational experience.

The cornerstone of Williamson's solution to this problem is his output restraint rule, which precludes dominant firms (60% market share) from disproportionately expanding output (above their historical shares of demand) in response to new entry.

^{33/} DuPont's plan, if successful, will, of course, reduce the market share of rivals over time, but that is still considerably different from a program designed simply to substitute DuPont's output for that of its competitors. It should also be repeated that DuPont's increase in market share since 1972 has come largely at the expense of competitors, including imports, due to two factors -- increased capacity provided by expansion of DuPont's existing facilities and a leveling off of demand after 1972. These market share inroads, of course, are attributable to unexpected changes in market conditions.

Such a rule, presumably, would force large firms anticipating entry to set their pre-entry output at higher levels, thereby leading to a more efficient utilization of resources. 34/

On its face, the kind of preemptive expansion addressed by Williamson differs from the DuPont facts. Williamson's concern seems to be with short-term strategic responses by dominant firms that are designed primarily to discipline the behavior of rivals rather than to take advantage of efficiencies in serving long-term demand growth. By contrast, in this matter, we cannot find that DuPont's plan was designed simply or even primarily for the purpose of blocking expansion moves of competitors (although that certainly may have been an effect). Moreover, with respect to Williamson's additional rule for pricing by established firms, which is keyed to full cost recovery, it appears evident that DuPont's pricing also met this standard, there being no suggestion by complaint counsel that DuPont's prices either in the short run or the long run failed to cover costs plus a reasonable return on investment.

Complaint counsel also refer us to an article by Professor Spence for the proposition that investment in new capacity may be a more effective entry-detering device than price cutting. Spence, *Entry Capacity, Investment and Oligopolistic Pricing*, 8 *Bell J. of Econ.* 534 (1977). Spence contends that capacity expansion may be used strategically to deter entry, but his concern is with practices quite different from those in the present case.

The principle of this [Spence] model is quite simple. It is that existing firms choose capacity in a strategic way designed to discourage entry. This strategic purpose is realized by holding excess capacity in the preentry period. This excess capacity permits existing firms to expand output and reduce price when entry is threatened, thereby reducing the prospective profits of the new entrant who operates on the residual demand curve to zero. (emphasis added). *Id.* at 534-35.

34/ This approach has been criticized by Professor Schmalensee for being difficult to apply and for not adequately addressing all forms of predation. Schmalensee generally prefers the Scherer approach, although he suggests that an average cost test may be a more workable standard for judicial application in predatory pricing cases. Schmalensee, *On the Use of Economic Models in Antitrust: The ReLemon Case*, 127 *Pa. L. Rev.* 994, 1029 (1979).

While Spence's model really addresses excess capacity carried by an entire industry, rather than a single firm, we recognize its potential applicability to single-firm behavior; even so, we distinguish the conduct of DuPont. It cannot be said that DuPont built excess capacity to hold in reserve as a means of disciplining existing rivals or deterring new entry. DuPont's original plan conformed to demand estimates, and there is no persuasive evidence that DuPont unreasonably refused to delay or cancel DeLisle in the face of declining demand simply as a way to keep competitors in check. Also, the fact that there is capability for a second new line at DeLisle does not lead us to conclude that DuPont artificially or unreasonably attempted to head off competitive expansion in the context of the Spence model.

In a more recent article, Professors Joskow and Klevorick pull together some of the theories and concepts previously discussed and advance a two-tiered approach to dealing with predatory pricing. Joskow & Klevorick, *A Framework for Analyzing Predatory Pricing Policy*, 89 *Yale L. J.* 213 (1979). They propose that structural conditions determine whether the market is conducive to predation; if it is, a set of behavioral rules would be applied to gauge the legality of the dominant firm's pricing practices. Under their approach, monopoly pricing that fails to cover average total costs would be presumed to be predatory, except in limited circumstances, for example, where excess capacity is attributable to a declining industry. 35/

As for pricing above average costs, Joskow and Klevorick believe that in certain circumstances temporary price cuts by dominant firms to levels above average cost may also be predatory. They propose the following rule:

A price decrease to a point above average total cost would be presumed to be legal unless the price cuts were reversed either fully or to a significant extent within a reasonable period of time -- for example, two years. Id. at 255.

Under this rule, any reversal in price would have to be justified by changes in demand or costs, and the predatory pricing would have to "run its course" before relief would be available. 36/

35/ Professor Posner also advocates an average cost test as the proper basis for assessing the legality of monopoly pricing. R. Posner, *Antitrust Law: An Economic Perspective* 184-96 (1976).

36/ Another commentator, Professor Baumol, advocates a predatory pricing rule that precludes monopolists from rescinding price cuts made in response to the threat of entry for a reasonable period of time. Baumol, n. 20 supra.

Comparing DuPont's strategy with the Joskow & Klevorick approach reveals some obvious distinctions. For one thing, it is not clear whether DuPont, in 1972 or even today, enjoys the kind of entrenched monopoly power that Joskow & Klevorick view as a critical prerequisite to the application of their behavioral standards, although there is evidence that DuPont has some degree of market power. More importantly, as noted elsewhere, there is no allegation of below-cost pricing here, whether the standard is average variable or average total costs. To be sure, these authors offer a separate non-cost standard that looks to temporary price deviations and the circumstances surrounding those deviations, but implicit in their model is a concern for short-run responses to competitive inroads that are divorced from such market factors as new-growth opportunities or superior technology. 37/ When coupled with the demand projections and cost advantages extant here, the DuPont strategy reveals long-term considerations that are of a character considerably different from the short-run price cutting addressed by Joskow & Klevorick.

To summarize, the focus of much of the literature centers on strategic responses to new entry, or, as characterized by Williamson, responses "of a gaming variety -- now it's there, now it isn't, depending on whether an entrant has appeared or perished" Williamson, 87 Yale L. J. at 339. Such behavior hardly typifies DuPont's expansion plan, which contemplated a permanent increase in plant capacity and output. Even as to respondent's pricing objectives -- generating funds for its own expansion while

37/ While the authors downplay the significance of evidence concerning subjective intent, they believe it may be of some value where the evidence clearly indicates (1) that the monopolist plans to increase prices after driving competition from the market, and (2) the price cuts are being used "to increase artificially the difficulty of entering the market." What they mean by this is evidence of long-range plans by a monopolist to preserve its market power through erection of entry barriers or outright elimination of competing firms. In this connection, the authors observe that allegations of predatory pricing are often accompanied by charges that firms have engaged in other non-price forms of predation, such as "'targeted' advertising expenditures, 'false' product announcements and product 'manipulations.'" Joskow & Klevorick, A Framework For Analyzing Predatory Pricing Policy, 89 Yale L. J. 213, 259, n. 92 (1979). But they acknowledge that the issues may not be resolved easily because of the difficulty of distinguishing artificial exclusionary behavior from legitimate responses to competition. Similar issues are involved here inasmuch as DuPont is charged with having developed a predatory scheme that involves interrelated pricing, expansion and announcement practices.

discouraging similar efforts by competitors -- those objectives were consistent with DuPont's cost advantage and undertaken in conjunction with the firm's long-term growth in response to demand projections; they were not undertaken simply as a device to retard entry without regard to independent market forces.

To be sure, the recent literature does not fully address all forms of exclusionary conduct, especially where the actions are of a longer-term nature. To the extent that it does we can find no persuasive basis for declaring DuPont's behavior unlawful. The conduct at issue here, for example, does not appear to be the kind of artificial, entry-barrier raising behavior cited by Professors Joskow & Klevorick. See n. 37 supra. DuPont's actions may make future competitive expansion more difficult, but that effect is not the product of artificially induced conduct that is unrelated to market conditions, cost differences or scale economies.

Thus, although the literature to date on the subject of predation is not exhaustive, nor has it produced a consensus among the commentators, it does provide a valuable framework for looking at the merits of this case. As such, we find no compelling basis in the various analyses for judging DuPont's behavior to be unreasonable.

c) Conclusions

Having reviewed the legal precedents and economic literature on the subject of predation, we believe that the conduct under question should be assessed generally in light of the respondent's market power, the nature of its conduct and prevailing market conditions. As the firm's market power approaches monopoly proportions, the standard for measuring the legality of the firm's behavior would more closely approximate the standard applicable to monopolists.

We recognize, of course, the importance of providing as much guidance to business as possible, so that desirable competitive behavior is not chilled, even by a firm with considerable market power. Nevertheless, some uncertainty in dealing with dynamic market factors is probably unavoidable. No one simple test seems adequate. We suspect, however, that in many instances the challenged conduct can be fairly categorized as clearly legitimate competitive behavior, on the one hand, or as behavior which clearly has little or no redeeming justification, on the other hand. For the gray areas in between, we believe there is no substitute for a careful, considered look at the overall competitive effects of the practices

under scrutiny. 38/ In the absence of a stronger consensus among the courts and commentators as to the lawful parameters of monopoly or dominant firm behavior, we believe that a balancing approach, which takes due account of rational, efficiency related conduct, is best suited to the task at hand. 39/

Recalling Judge Wyzanski's comments in United Shoe Machinery, he observed that the practices at issue there involved

contracts, arrangements, and policies which instead of encouraging competition based on pure merit, further the dominance of a particular firm. In this sense, they are unnatural barriers; they unnecessarily exclude actual and potential competition; they restrict a free market. 110 F. Supp. at 344-45 (emphasis added).

38/ At a more specific level, some of the factors that appear especially pertinent to a proper rule-of-reason type analysis include: (1) the extent to which the conduct enhances efficiency or innovation, including profitability considerations; (2) the extent to which the conduct is a reaction to competitive behavior, demand shifts, new technology or other market conditions; (3) the permanence or reversibility of the challenged actions; (4) the alternatives available to the firm; and (5) the effect of the conduct on entry barriers and rival firm behavior. As we have noted, however, resort to such benchmarks as whether the practices constituted "ordinary" or "typical" business behavior may be of some value, but they can hardly be expected to serve as reliable indicators of competitive effects, especially where market power is substantial and entry barriers high. Even behavior that improves efficiency or technology may still be unreasonable, since the benefits may be only incidental in relation to the adverse effects (e.g., improvements instituted merely as a temporary measure for the purpose of driving competitors out of the market). As we have seen, increases in output, a normal and usually legitimate form of competitive behavior, may be used primarily as an exclusionary tactic.

39/ Professor Cooper also provides some helpful considerations for determining the reasonableness of behavior in attempt cases, Cooper, Attempts and Monopolization; A Mildly Expansionary Answer to the Prophylactic Riddle of Section Two, 72 Mich. L. Rev. 373, 449 (1974)

This characterization, though addressing monopoly behavior, effectively summarizes the kind of approach that remains relevant today for dealing with market power-related conduct. Similar considerations are reflected in the decisions in Greyhound, 559 F.2d at 498 (whether practices "unnecessarily excluded competition") and Transamerica, 481 F. Supp. at 1022 (conduct proscribed which "unreasonably restrict[s] competition").

In applying these principles to the facts of this case, it is useful to restate complaint counsel's fundamental objection to DuPont's growth plan. In essence, complaint counsel contend that it was logical for DuPont to do what it did only if monopoly power could be attained in the future. It is argued that DuPont's construction/pricing/non-licensing policy involved a current foregoing of available profits, that DuPont recognized that it could recoup those profits down the road through high volume and higher prices, and that DuPont's policy only made sense if those excess profits would become available at a later date.

Put differently, DuPont presumably would not have tried to capture all future demand growth, and thereby risked the costs of operating a plant the size of DeLisle at less than capacity, unless it was reasonably assured that other competitors could not expand. DuPont obtained this assurance, it is claimed, not through normal market forces, but rather through its own efforts, as evidenced by the combination of expansion, announcement, pricing and licensing policies. As further proof of the overall strategy, complaint counsel cite to DuPont's pricing forecasts, which it is argued clearly reveal respondent's plan to sacrifice short-term profits for long-term monopoly gains.

We simply cannot accept this analysis. The rationality of DuPont's program hardly seems dependent on its ability to extract monopoly profits in the future. DuPont had a highly efficient process, indeed the most efficient in the industry, and it anticipated expanding market demand. To serve that demand, DuPont enlarged its existing facilities to optimal levels and built a new plant of efficient scale (but not above efficient levels and no larger than necessary to satisfy predicted demand) to serve the market it expected would develop. Given respondent's level of efficiency, expansion of the magnitude undertaken would make sense, regardless of whether the firm would eventually be able to raise prices above competitive levels. Moreover, DuPont's pricing policies were entirely consistent with its cost advantage and apparently (for there is no suggestion that it engaged in predatory pricing) were profitable, even during the '70s when respondent was arguably foregoing additional profits.

Even if DuPont could earn future profits equal to those it was passing up in the mid-1970s only if existing competitors were dissuaded from expanding, it does not necessarily follow that actions leading to that result should constitute an illegal attempt to monopolize. As we have observed, DuPont's ability to pursue its strategy derived from substantial economic efficiencies; it did not stem from below cost pricing, false plant announcements, construction of excess capacity or other plainly anticompetitive conduct. Complaint counsel contend, however, that notwithstanding these efficiencies and DuPont's conceded right to expand, there were less restrictive alternatives available that would have less adverse competitive consequences. In particular, they cite DuPont's own more moderate expansion program -- a program discarded in favor of the more aggressive growth plan in 1972 -- which contemplated only expansion of existing plants. More generally, complaint counsel and their expert witness, Professor Shepherd, urged that DuPont should have pursued any less aggressive strategy than the one it did. In other words, respondent should not have attempted to capture all the growth in the market, thereby making it more difficult for competitors to expand to the scale justified by DuPont's technology.

While it is proper and desirable to consider alternative courses of conduct open to DuPont, we firmly believe the course chosen was not unreasonable. When DuPont conceived its strategy in 1972, its estimates of demand growth and supply shortfall seemed reasonable, and there has been no suggestion to the contrary. In competing for this growth, DuPont realized that even expansion of its existing plants to their practical limits could not satisfy all of the additional demand expected through the early 1980s. A new plant would be required. To build such a plant at efficient scale, afforded by DuPont's developed technology, meant that there would be little, if any, room left for expansion by competitors. Yet, to deny DuPont the opportunity to compete for all of the projected demand growth unduly penalizes its technological success. To require respondent to build a smaller, less efficient plant, or no plant, under these circumstances would be an unjustified restraint on competitive incentives and an unjustified denial of the benefits of competition to consumers.

To be sure, DuPont had another alternative. It could have licensed its technology to competitors, as suggested by complaint counsel, thereby enabling respondent's rivals to close the technological gap more quickly. But, in the context of this case, we can find no basis for concluding that DuPont's refusal to license its technology, whether taken separately or together with the other conduct, was unjustified. There is no evidence, for example, that respondent used unreasonable means to acquire its know-how, or that it joined with others in preventing access by competitors. Complaint counsel cite no authority for the proposition that DuPont should have

licensed its technology, and we are aware of none. 40/ Whatever may be the proper result in other factual settings, we are not persuaded that the refusal to license in this situation provides a basis for liability; in fact, imposition of a duty to license might serve to chill the very kind of innovative process that led to DuPont's cost advantage.

Turning to the pricing options available to respondent, there is, of course, no evidence that DuPont priced below its costs, since the case was not tried on such a theory. As for the issue of limit pricing, the literature discussed previously suggests that predation may occur even in circumstances where prices are above the dominant firm's costs (whether measured by average variable or average total cost). In this respect, it seems clear that respondent sought to price in a fashion that took account of the propensities and abilities of competitors to expand, although the firm's pricing decisions were affected at least in part by independent economic forces, such as demand conditions. Given this situation, it can be argued that these pricing policies went too far, that they transformed an otherwise legitimate method of expansion into an unlawful course of conduct.

We do not agree. DuPont's pricing strategy stemmed from its clear cost advantage over competitors and occurred in conjunction with its long-term plan to capture future market growth, a plan which we have pointed out before was consistent with foreseeable demand and scale economies. Thus, this is not a case where DuPont was attempting solely to preserve its market power through selective, temporary price cuts to deter new entry or expansion by existing competitors. Even complaint counsel do not attack respondent's pricing as an independent violation; rather they argue that it is unlawful as part of a broader pattern of behavior. For our part, even if DuPont's pricing can be characterized as a form of limit pricing, we do not find it to be unreasonable, absent at least some evidence of below-cost pricing,

40/ To the contrary, the recent Berkey and IBM cases suggest that firms (monopolists and non-monopolists) that have achieved success through superior products and business acumen, and not unlawful anticompetitive conduct, are under no duty to license or disclose their technology to their rivals. Berkey Photo, Inc. v. Eastman Kodak Co., 603 F.2d 263 (2d Cir. 1979); California Computer Products, Inc. v. IBM Corp., 613 F.2d 727 (9th Cir. 1979); Transamerica Computer Co. v. IBM Corp., 481 F. Supp. 965 (N.D. Cal. 1979); ILC Peripherals Leasing Corp. v. IBM Corp., 458 F. Supp. 423 (N.D. Cal. 1978). Here, DuPont's refusal to license its technology is not a factor that would make otherwise reasonable behavior unreasonably anticompetitive. And, if the other conduct were itself unreasonable, the refusal to license would add little to the case, except, of course, as a possible basis for remedial action. See also SCM Corp. v. Xerox Corp., 463 F. Supp. 983 (D. Conn. 1978).

in view of the firm's cost advantage, its market position and its legitimate expansion efforts. While there may be circumstances where above cost pricing is unjustifiably exclusionary, those circumstances clearly are not present here.

We also do not find that DuPont's announcements of its early plans to build an unidentified additional facility or its later announcements identifying the DeLisle plant were unfairly exaggerated or misleading threats or signals in the strategic sense suggested by the commentators. Because of the lead time required for obtaining environmental permits and for completing construction, DuPont's early disclosure of its plans appears logical. The documents also reflect DuPont's strong belief that unfavorable customer reaction could be expected if it cancelled or postponed DeLisle for any significant length of time, so that there were disincentives to making false or exaggerated announcements. Had these announcements been false or grossly disproportionate, under circumstances suggesting they served little purpose except to mislead and discourage competition, there might have been a basis for liability. Cf. Bergjans Farms Dairy Co. But that is not the case before us. Moreover, DuPont's decisions to scale back the size of DeLisle and delay its start-up are attributable, in large measure, to unforeseen changes in supply and demand and therefore do not render the otherwise justified announcements unreasonable.

As an additional argument, complaint counsel contend that DuPont's cost advantage is largely fortuitous, owing to technology developed many years before. Without expressly suggesting that the result should be different had DuPont developed the ilmenite process in 1972, complaint counsel nevertheless argue that DuPont's allegedly superior skills and business acumen should be given little weight. More specifically, they contend that DuPont had demonstrated no contemporaneous technological superiority because it has not "recently distinguished itself as an organizational innovator," citing Williamson, Dominant Firms and the Monopoly Problem: Market Failure Considerations, 85 Harv. L. Rev. 1512, 1527 (1972) (emphasis in original). But the point of Williamson's discussion is whether an established monopolist should be able to defend against a charge of monopolization on traditional grounds of business acumen or historic accident, where such causes bear little relationship to the reasons for the firm's continuing dominance. The issues here are considerably different.

We believe it would be anomalous to downgrade the significance of DuPont's technological superiority simply because the fruits were not reaped simultaneously with the discovery of the process. It may well be that DuPont anticipated possible future shortages of rutile and other ores back in the '40s and '50s, even though it could not have anticipated precisely the events that occurred in the late '60s. In any event, DuPont's development of an alternative supply source reflects the kind of skill and foresight that should be encouraged, whether the benefits materialize immediately or at some later date.

With the possible exception of Alcoa, which involved repeated increases in output by a monopolist, there is nothing in the case precedents to suggest that DuPont's expansion program unnecessarily heightened entry barriers or otherwise unreasonably excluded competition. Nor does the conduct appear to be sufficiently similar to the preemptive kinds of expansion described by Professors Scherer and Williamson to warrant condemnation. To the extent that the effects of DuPont's expansion bear any resemblance to those models, a review of factors such as those suggested by Scherer's rule-of-reason approach would still call for a finding of reasonableness. 41/

It may be that DuPont ultimately will achieve a monopoly share of the market. As its share increases, other firms may find it harder to capture the efficiencies enjoyed by DuPont due to the scale economies associated with the ilmenite process. Those effects should be weighed carefully, and we have done so. Antitrust policy wisely disfavors monopoly, but it also seeks to promote vigorous competitive behavior. Indeed, the essence of the competitive process is to induce firms to become more efficient and to pass the benefits of the efficiency along to consumers. That process would be ill-served by using antitrust to block hard, aggressive competition that is solidly based on efficiencies and growth opportunities, even if monopoly is a possible result. Such a view, we believe, is entirely consistent with the "superior skill, foresight and industry" exception in Alcoa and subsequent cases, for those decisions clearly indicate that monopolies may be lawfully created by superior competitive ability. 42/

As we have previously indicated, DuPont engaged in conduct consistent with its own technological capacity and market opportunities. It did not attempt to build excess capacity or to expand temporarily as a means of deterring entry. Nor did respondent engage in other conduct that might tip the scales in the direction of liability, such as pricing below cost, making false announcements about future expansion plans, or attempting to lock up customers in requirements contracts to assure the success of its growth plans. In short, we find DuPont's conduct to be reasonable. Accordingly, we affirm the ALJ's dismissal of the complaint.

October 20, 1980

41/ See discussion of Scherer's criteria at pp. 40-41, supra.

42/ If a monopoly results that proves impervious to competitive inroads and is unjustified by scale economies or other efficiencies, antitrust action in this or some other forum may be warranted, even in the absence of abusive conduct. See note 23 supra; see also Statement of the Federal Trade Commission to the National Commission for the Review of Antitrust Laws and Procedures (Nov. 17, 1978), Report to the President and the Attorney General, 407. That, however, is an issue entirely different from the one before us.