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Debunking Predatory Innovation

Joseph Gregory Sidak*

Since 1975, when the debate over monopolistic predation began to boil in courts and universities, most discussion has focused on predatory pricing.[1] And although the allegation of "predatory innovation" arose in some well-known litigation involving Kodak and IBM,[2] lawyers and economists have produced little credible work explaining how this phenomenon can occur, let alone how it should be identified and remedied if deemed to threaten consumer welfare.[3] This is not surprising: A legal rule defining predatory innova-

*A.B. 1977, A.M., J.D. 1981, Stanford University. Associate, O'Melveny & Myers.

This Article builds on the earlier work of Frank H. Easterbrook and has benefited from his comments, as well as from those of H. Douglas Galt, Warren G. Lavey, Brian E. Lebowitz, Patrick Lynch, A. Mitchell Polinsky, Richard A. Posner, Steven C. Salop, Matthew L. Spitzer, Donald F. Turner, and Malcolm E. Wheeler. This Article was written for the most part before I became associated with O'Melveny & Myers and, in the writing of this Article, I have not received any financial support from either the International Business Machines Corporation or the Eastman Kodak Company, which O'Melveny & Myers has represented in several of the antitrust cases discussed here.

1. The controversy over predatory pricing began with Areeda & Turner, Predatory Pricing and Related Practices under Section 2 of the Sherman Act, 88 Harv. L. Rev 697 (1975). See also Note, *Telex v. IBM*: Monopoly Pricing under Section 2 of the Sherman Act, 84 Yale L.J. 558 (1975). For blow-by-blow references to the subsequent literature, see Easterbrook, Predatory Strategies and Counterstrategies, 48 U. Chi. L. Rev. 263, 263 n.1 (1981). Of course, some lawyers and economists dismiss predatory pricing as inherently unprofitable and therefore self-deterring. See R. Posner, Antitrust Law: An Economic Perspective 184-96 (1976); Easterbrook, supra, at 264-304; McGee, Predatory Price Cutting: The Standard Oil (N.J.) Case, 1 J.L. & Econ. 137 (1958). For the purposes of argument in this Article, I will assume that predation can be profitable and that a firm therefore could rationally undertake a predatory strategy. By making this assumption, I of course do not assert that it is correct.

2. Foremost Pro Color, Inc. v. Eastman Kodak Co., 703 F.2d 534 (9th Cir. 1983); California Computer Prods., Inc. v. International Bus. Machs. Corp. (CalComp), 613 F.2d 727 (9th Cir. 1979); Berkey Photo, Inc. v. Eastman Kodak Co., 603 F.2d 263 (2d Cir. 1979), cert. denied, 444 U.S. 1093 (1980); Transamerica Computer Co. v. International Bus. Machs. Corp., 481 F. Supp. 965 (N.D. Cal. 1979), aff'd and modified on other grounds, 698 F.2d 1377 (9th Cir. 1983); ILC Peripherals Leasing Corp. v. International Bus. Machs. Corp. (Memorex), 458 F. Supp. 423 (N.D. Cal. 1978), aff'd sub nom. Memorex Corp. v. International Bus. Machs. Corp., 636 F.2d 1188 (9th Cir. 1980) (per curiam), cert. denied, 452 U.S. 972 (1981); Telex Corp. v. International Bus. Machs. Corp., 367 F. Supp. 258 (N.D. Okla. 1973), rev'd on other grounds, 510 F.2d 894 (10th Cir.), cert. dismissed, 423 U.S. 802 (1975). In all of these cases the plaintiff was an aggrieved competitor. Recently, one district court granted the defendant summary judgment in a suit by a consumer under section 2 claiming that the defendant had extracted excessive profits by designing a technological tie-in. Rapid Print, Inc. v. Minnesota Mining & Mfg. Co., 1980-81 Trade Cas. (CCH) ¶ 63,787, at 78,198 (D. Mass. 1981).

3. See Halverson, The Relationship of Antitrust Policy and Technological Progress, 1975 Wash. U.L.Q. 409; Note, Aggressive Innovation and Antitrust Liability, 53 S. Cal. L. Rev. 1469

tion—if there is to be any rule—is even more problematic to articulate than the optimal predatory pricing rule, for it must balance public policies discouraging monopolistic predation against not only those policies encouraging aggressive competition but also those encouraging innovation.[4]

Now, just when the predation kettle appeared to be simmering again on the back burner, Professors Ordover and Willig have argued that "even genuine innovations—new products that in some ways are superior to existing products in the eyes of both engineers and consumers—are in some circumstances anticompetitive."[5] To deal with this perceived antitrust problem, Ordover and Willig propose a model of predatory marketing of product innovations that is flawed in theory and unworkable in practice.

Both the existing law on predatory innovation[6] and the Ordover-Willig model are primarily concerned with the problem of "predatory systems rivalry" through technological tie-ins.[7] Part I describes first the phenomenon of systems rivalry and then the circumstances under which Ordover and Willig believe it may give rise to an antitrust problem. Parts II and III argue that the Ordover-Willig model overlooks many of the efficiency-enhancing characteristics of technological tie-ins. Many of the points raised have been made by earlier commentators with respect to contractual tie-ins. One major weakness of the Ordover-Willig model is that, by failing to explore the economic similarities between contractual and technological tie-ins, it overlooks the efficiency-enhancing characteristics common to both.[8]

Part II argues that Ordover and Willig have underestimated the importance of price discrimination as a motive for systems rivalry, and that they

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(1980); Comment, Antitrust Scrutiny of Monopolists' Innovations: *Berkey Photo, Inc. v. Eastman Kodak Co.*, 93 Harv. L. Rev. 408 (1979); Note, *Berkey Photo, Inc. v. Eastman Kodak Co.*: The Predisclosure Requirement—A New Remedy for Predatory Marketing of Product Innovations, 10 Rut.-Cam. L. Rev. 395 (1979); Note, Innovation Competition: Beyond *Telex v. IBM*, 28 Stan. L. Rev. 285 (1976); Comment, Physical Tie-Ins as Antitrust Violations, 1975 U. Ill. L.F. 224, 231. The most critical analyses appear in Easterbrook, supra note 1, at 304–14, and Note, An Economic and Legal Analysis of Physical Tie-Ins, 89 Yale L.J. 769 (1980) [hereinafter cited as Note, Economic and Legal Analysis].

4. In this sense "predatory innovation" poses a similar tradeoff to that found in research joint ventures among competitors, although there the antitrust concern is of course not monopolistic predation but horizontal collusion. See Brodley, Joint Ventures and Antitrust Policy, 95 Harv. L. Rev. 1523, 1570–73 (1982).

5. Ordover & Willig, An Economic Definition of Predation: Pricing and Product Innovation, 91 Yale L.J. 8, 8 (1981). An earlier version of the Ordover-Willig paper appeared as An Economic Definition of Predatory Product Innovation, *in* Strategy, Predation, and Antitrust Analysis 301 (S. Salop ed. 1981). In sharp contrast, Professors Areeda and Turner oppose as unworkable any rule proscribing predatory innovation. 3 P. Areeda & D. Turner, Antitrust Law ¶ 718a (1978); see also P. Areeda, Antitrust Law ¶¶ 738.1–.4 (Supp. 1982); Easterbrook, supra note 1, at 305–06. But see Pittman, Predatory Investment: *U.S. v. I.B.M.* (Economic Policy Office, Antitrust Div., U.S. Department of Justice, Discussion Paper No. 82-5, Oct. 15, 1982) (endorsing Ordover-Willig analysis and claiming to have found "predatory investment" by IBM in its marketing of the 360/90 computer) (on file at the offices of the Columbia Law Review).

6. See infra notes 97–101 and accompanying text.

7. I will use the term "technological tie-in" rather than "physical tie-in," a term criticized for its vagueness. See Note, Economic and Legal Analysis, supra note 3, at 769 n.1.

8. Professor Easterbrook, supra note 1, at 307–09, has outlined such a theory in broad brush.

have overlooked the beneficial consequences of a price discrimination strategy.[9] Part III discusses other socially desirable characteristics of technological tie-ins, and argues that the Ordover-Willig model fails to consider how the decision to invest in innovation is constrained by legal and economic factors that limit an innovator's ability to exclude others from free-riding on his creation of new information. Part IV discusses various possible antitrust standards for technological tie-ins, and concludes that a rule of per se legality is at least preferable to any rule of reason yet proposed, and probably the socially optimal rule for predatory innovation.

I. The Ordover-Willig Model

A. *Systems Rivalry*

A "system" consists of components that must be used together to form a final product. For example, a central processing unit and at least one peripheral unit are needed for many computer systems, and a camera must be used with film in order to take photographs. Although a system may have many components, it is convenient to confine discussion to two-component systems, and I will refer to one component as the main unit and the other as the auxiliary unit.

If a given main unit and auxiliary unit can be used together, they are said to be "compatible." Buyers will be able to assemble a complete system from a main unit and an auxiliary unit made by different manufacturers so long as the two components are compatible. Not uncommonly, however, a firm will purposely redesign its main unit so that it is incompatible with the auxiliary units of other firms. Buyers who wish to purchase the firm's main unit will therefore also have to purchase its auxiliary unit. The resulting situation resembles an old antitrust phemonenon, the tie-in. A contractual tie-in occurs when a seller will sell one product only if the buyer also buys a second product.[10] By contrast, purchases of a technologically-tied product result from that product's unique compatibility with, and complementarity of demand to, the tying product; no explicit buyer consent is necessary.[11] Moreover, the producer's technological tie-in does not last for a contractually prescribed period, but only until another firm can imitate the technologically-tied product. Innovations that result in technological tie-ins have given rise to litigated

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9. I do not discuss either design strategies or price discrimination strategies that do not depend on the complementarity of two or more technologically related products.

10. Northern Pac. Ry. v. United States, 356 U.S. 1, 5-6 (1958). For an exhaustive restatement of the law of tie-ins, see ABA Antitrust Section, Monograph No. 8, Vertical Restrictions upon Buyers Limiting Purchase of Goods from Others 1-63 (1982) [hereinafter cited as ABA Monograph]. See also T. Baker, The Supreme Court and the Per Se Tying Rule: Cutting the Gordian Knot, 66 Va. L. Rev. 1235 (1980).

11. See Foremost Pro Color, Inc. v. Eastman Kodak Co., 703 F.2d 534, 542-43 (9th Cir. 1983). For example, replacement parts for a complicated machine are complementary to, and uniquely compatible with, the machine in the sense that other firms could not imitate the parts without substantial investment in research and development. For an explanation of complementarity, see infra text accompanying note 33.

allegations of predatory innovation;[12] and it is such innovations with which Ordover and Willig are primarily concerned.[13]

B. *Ordover and Willig's Analysis*

Ordover and Willig argue that redesign of systems components to achieve incompatibility with the components of rivals may be predatory even when the new design is a genuine technological improvement that consumers value. Predation has occurred, they argue, when a firm can be shown both to have had a predatory motive and to have made a predatory profit sacrifice.[14]

1. *Predatory Profit Sacrifice.* Predation, most generally defined, is conduct by which a firm attempts to increase its own profits not by permanently improving its own performance but by injuring its competitors.[15] For its conduct to be predatory, a firm must at a minimum sacrifice short-run profits in hopes of driving its rivals out of the market so that the firm may recoup its lost profits through eventual monopoly pricing. Most commentators believe that predation occurs only if, in the course of driving out rivals, a firm actually incurs short-run losses.[16] Ordover and Willig maintain, however, that even a strategy that merely produces a temporary reduction in profits may be predatory.[17] They suggest that the proper inquiry in cases of alleged predation is whether a firm's conduct would have maximized its profits even if its rivals had remained in the industry. If not, they argue, the conduct must have been motivated by a decision to drive out competitors, and thus gain eventual monopoly profits.[18]

Ordover and Willig then outline a two-stage process for determining whether a dominant innovating firm has made a profit sacrifice, the first stage consisting of an examination of the firm's post-innovation pricing[19] and the

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12. See infra notes 97–101 and accompanying text.

13. Ordover and Willig also propose models for analyzing predatory pricing, Ordover & Willig, supra note 5, at 15–21, and predatory introduction of a single product, id. at 22–30, but they believe their analysis of predatory innovation to be the most original aspect of their theory, id. at 8, and indicate that their analysis of single-product innovation is of lesser practical importance and is primarily given because it is "necessary to the development of tests for predatory systems rivalry," id. at 23.

14. Id. at 31.

15. See generally L. Sullivan, Handbook of the Law of Antitrust § 43 (1977).

16. The most widely accepted test for predatory conduct is that proposed by Areeda & Turner, supra note 1, which applies primarily to pricing. Under the Areeda-Turner standard, prices are predatory only if they are below the lower of short-run average variable cost or short-run marginal cost. Id. at 713.

17. Ordover & Willig, supra note 5, at 9–10, 13–15.

18. "[P]redatory behavior is 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." Id. at 9–10 (footnotes omitted). See also id. at 13–15. Ordover and Willig emphasize the "competitive circumstances" stipulation, id. at 10, but, as Professor David Scheffman has pointed out, it is unclear what Ordover and Willig mean by this. See Scheffman, Comments on "An Economic Definition of Predatory Product Innovation," *in* Strategy, Predation, and Antitrust Analysis 397, 405 (S. Salop ed. 1981).

19. With respect to the dominant firm's post-innovation pricing, Ordover and Willig assert:

> The innovator's behavior is free of profit sacrifice only if he offers to provide his rivals with the necessary compatible components at compensatory prices, in preference to

second stage consisting of an examination of the firm's research and development investment decision.[20]

2. *Predatory Motive.* Ordover and Willig argue that a firm has a motive for predatory systems innovation if three conditions are met. First, the market for the auxiliary unit must be horizontally concentrated, and entry and reentry into the market must be difficult.[21] Second, the allegedly predatory firm, or "incumbent," must have some monopoly power in the market for the main unit.[22] Third, the incumbent must be unable to set prices on the monopolized main unit so as to extract the available monopoly profit.[23]

Ordover and Willig point to two situations in which the third condition is met. First, a less efficient competitor in the market for the monopolized main unit may prevent the monopolist from charging the full monopoly price on the main unit.[24] Second, if not all buyers use the main unit and auxiliary unit in the same proportions, no single monopoly price on the main unit will extract all available monopoly profits. If, however, the firm can force buyers to purchase both its main unit and auxiliary unit, and can price the auxiliary unit above marginal cost, it will be able to price discriminate between various buyers, and increase its monopoly profits considerably.[25] Ordover and Willig believe price discrimination to be the less common of the two motives for predation.[26] Their analysis of tie-ins motivated by price discrimination will be

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> making far fewer sales at higher prices or to making the components unavailable. The prices of old components are compensatory if they cover the cost of supplying the old component and yield the same incremental profit as the displaced cross-elastic sales of new and other components, assuming the rival remains viable in the systems market.

Ordover & Willig, supra note 5, at 31. The "compensatory price" proviso is particularly curious. If consumers find the new component superior to the old, they will have a higher reservation price for it than for the old component; so unless the marginal production cost of the new component is appreciably higher than that of the old component, a price cannot be "compensatory" without also being so high as to induce consumers to switch entirely to the new product system. Thus, as Professor Easterbrook has noted, when the producer offers the old component at a compensatory price he will sell none, thereby incurring an inventory cost or tying up productive capacity in the manufacture of a component that no one wants. These costs obviously decrease the return to innovative activity. Easterbrook, Comments on "An Economic Definition of Predatory Product Innovation," *in* Strategy, Predation, and Antitrust Analysis 415, 446 (S. Salop ed. 1981); cf. Ordover & Willig, supra note 5, at 45 ("Of course, the compensatory price for [the compatible component of the new system introduced by the dominant firm] may be above its actual price . . . .").

20. With respect to the dominant firm's research and development investment decision, Ordover and Willig assert that "R&D expenses are not predatory if they are less than the anticipated additional net revenues made possible by the innovation, given a compensatory price" for the prior generation of a component manufactured by the dominant firm. Ordover & Willig, supra note 5, at 48–49.

21. Id. at 9–13.

22. Ordover and Willig do not state this requirement explicitly, but it is implicit in their references to would-be predators as the "dominant firm." See, e.g., id. at 30. It is generally agreed that a firm lacking market power cannot profit from a predatory strategy. See Landes & Posner, Market Power in Antitrust Cases, 94 Harv. L. Rev. 937, 952–55, 974 (1981); Schmalensee, Another Look At Market Power, 95 Harv. L. Rev. 1789 (1982).

23. Ordover & Willig, supra note 5, at 31.

24. Id. at 38–40.

25. Id. at 38.

26. Id.

the major target of my criticism, and the rather compressed explanation just given will be expanded in Part II.

II. Tie-Ins of Components Used in Variable Proportions

Ordover and Willig acknowledge that technological tie-ins might be motivated by the desire to price discriminate,[27] but they apparently assume that most systems components are used in fixed proportions, thus making price discrimination impossible.[28] This assumption is puzzling, for virtually all litigated allegations of predatory innovation have involved tie-ins of inputs used in variable proportions.[29] Presumably because they overlook this, Ordover and Willig never work through the effects on social welfare of an innovating monopolist's strategy of price discrimination through a technological tie-in. Therefore, they fail to consider that such a strategy is likely to enhance social welfare, primarily because it tends to induce the monopolist to increase output to the socially optimal level that would obtain under competitive conditions, thus eliminating the deadweight loss of a single-price monopoly strategy. They also overlook the function that price discrimination through tie-ins may perform in allocating risk. Thus, the theoretical results that Ordover and Willig derive regarding the desirability of tied-in product innovations are immediately suspect.

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27. This insight into the economic motivation for tie-in sales is commonly attributed to Professor Aaron Director. See Director & Levi, Law and the Future: Trade Regulation, 51 Nw. U.L. Rev. 281, 291–92 (1956); see also W. Bowman, Patent and Antitrust Law: A Legal and Economic Appraisal 76–88 (1973) [hereinafter cited as W. Bowman, Patent and Antitrust Law]; Bowman, Tying Arrangements and the Leverage Problem, 67 Yale L.J. 19, 23–24 (1957) [hereinafter cited as Bowman, Tying Arrangements]. Judge (later Justice) Lurton clearly recognized this price discrimination function of tie-ins before the turn of the century. See Henry v. A.B. Dick Co., 224 U.S. 1, 26, 32 (1912); Heaton-Peninsular Button-Fastener Co. v. Eureka Specialty Co., 77 F. 288, 296 (6th Cir. 1896). Unfortunately, by 1917 the Supreme Court had already mislaid this insight. See Motion Picture Patents Co. v. Universal Film Mfg. Co., 243 U.S. 502, 516–17 (1917). But see id. at 519–20 (Holmes, J., dissenting); USM Corp. v. SPS Technologies, Inc., 694 F.2d 505, 510–12 (7th Cir. 1982) (Posner, J.).

28. Ordover and Willig do not explicitly say that variable proportion tie-ins are uncommon, but the scenario that is the entire focus of their analysis involves a fixed proportion tie, Ordover & Willig, supra note 5, at 38–49, and they suggest that price discrimination is not an important motive for tie-ins. Id. at 38.

29. See Foremost Pro Color, Inc. v. Eastman Kodak Co., 703 F.2d 534 (9th Cir. 1983); *CalComp,* 613 F.2d 727 (9th Cir. 1979); Berkey Photo, Inc. v. Eastman Kodak Co., 603 F.2d 263 (2d Cir. 1979), cert. denied, 444 U.S. 1093 (1980); Transamerica Computer Co. v. International Bus. Machs. Corp., 481 F. Supp. 965 (N.D. Cal. 1979), aff'd and modified on other grounds, 698 F.2d 1377 (9th Cir. 1983); *Memorex,* 458 F. Supp. 423 (N.D. Cal. 1978), aff'd, 636 F.2d 1188 (9th Cir. 1980) (per curiam), cert. denied, 452 U.S. 972 (1981); Telex Corp. v. International Bus. Machs. Corp., 367 F. Supp. 258 (N.D. Okla. 1973), rev'd on other grounds, 510 F.2d 894 (10th Cir.), cert. dismissed, 423 U.S. 802 (1975).

One of the few cases involving a fixed-proportion technological tie-in is Automatic Radio Mfg. Co. v. Ford Motor Co., 272 F. Supp. 744 (D. Mass. 1967), aff'd, 390 F.2d 113 (1st Cir.), cert. denied, 391 U.S. 914 (1968). Ford changed its dashboard design so that a radio could not be installed without the dealer first purchasing from Ford a compatible dashboard plate with holes to accommodate the radio. Even this case may be viewed as involving inputs used in variable proportions, since cars may either have a radio or not have one (while they must have a radiator); but in any case, this small variation makes price discrimination seem unlikely as a motive.

A. *Perfect Price Discrimination*

1. *How Tie-Ins Make Price Discrimination Possible.* A firm that successfully price discriminates manages to make all consumers pay the most they are willing to for a given product. A tie-in can be used to price discriminate, but only if (1) the tying firm possesses market power in the tying product market,[30] (2) the tied and tying product (a) are used in variable proportions and (b) are complementary, and (3) the willingness of consumers to pay for a system depends, at least to some extent, on the number of times they intend to use it.

Market power is necessary because, without it, no firm can charge more than the market price without losing all its customers. Even a complete monopolist, however, will not be able to extract the maximum price consumers are willing to pay—the "reservation price"—if not all consumers have the same reservation price for the product and the monopolist must charge a single price for that product. Suppose, for example, that a firm is a camera monopolist, and for the moment make the somewhat unrealistic assumption that all costs of camera production are fixed, so that the marginal cost of producing cameras is zero. There are seven buyers in the camera market, B_1 through B_7: B_7 is willing to pay \$28 for a camera; B_6 will pay \$24; B_5 will pay \$20; B_4, \$16; B_3, \$12; B_2, \$8 and B_1, \$4. As column (8) of the Table on the following page illustrates, if the camera monopolist must charge a single price to all buyers, it will maximize its profits at a price of \$16. At this price, output will be four cameras, and monopoly profits will be \$64. This profit corresponds to the shaded area *bced* on Diagram 1. Even this optimal single-price strategy, however, does not capture all available willingness-to-pay. B_7 was willing to pay \$28 but only paid \$16; to raise the price to \$28, however, would have lost more revenue on sales to B_1 through B_6 than would have been gained in sales to B_7. B_1 was willing to pay \$4, which is above the marginal cost of zero, but to lower the single price to \$4 would have lost more profits through the price reduction to B_4 through B_7 than it produced in sales to B_1 through B_3.

The camera monopolist could increase its profits substantially if, instead of charging a single price to all buyers, it could charge each buyer his reservation price. If the camera monopolist could thus price discriminate between buyers, it would produce seven cameras instead of four, and its profits would be the sum of each buyer's individual reservation prices, or \$112. This profit corresponds to the shaded triangle *acf* on Diagram 2.

There are obvious difficulties, however, in trying to discern directly how much each individual buyer is willing to pay for a product. The same price discriminating result can be reached through a tie-in (whether technological or contractual) between cameras and some product, such as film, which is complementary to, and used in variable proportion to, cameras.[31]

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30. For an analysis of the determinants of market power, see Landes & Posner, supra note 22, at 944–51.

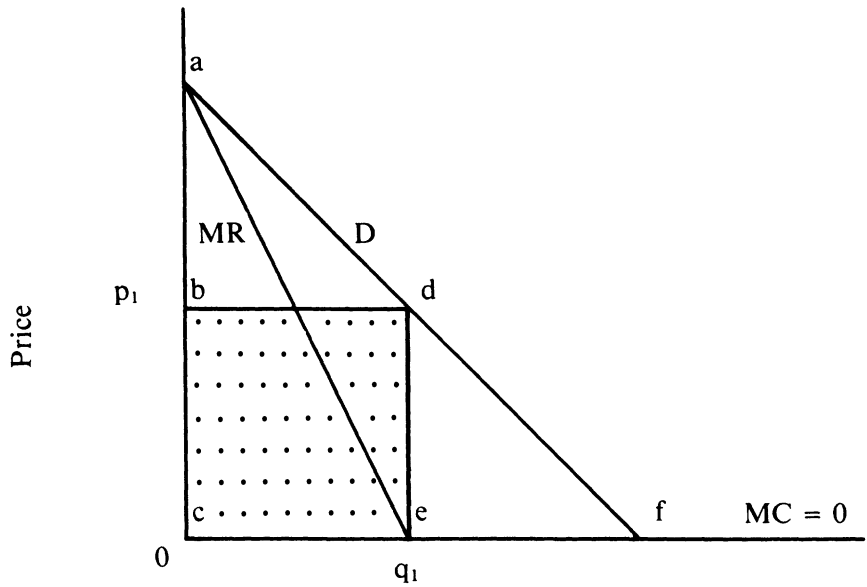
31. See, e.g., Berkey Photo, Inc. v. Eastman Kodak Co., 603 F.2d 263 (2d Cir. 1979), cert. denied, 444 U.S. 1093 (1980); cf. International Bus. Machs. Corp. v. United States, 298 U.S. 131

TABLE

Single-Price Monopoly Strategy

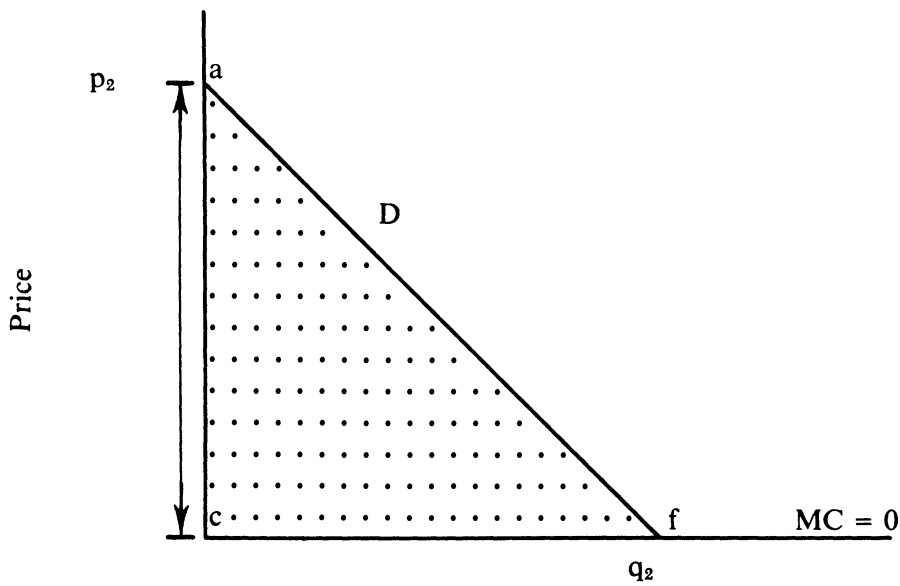
(1) Buyer #	(2) # of Finished Film Rolls Desired	(3) Total Reservation Price	(4) Reservation Price, camera, for P_{film} = \$1 i.e. (3) − [\$1 × (2)]	(5) Total # of cameras purchased at P_{camera} = (4)	(6) Total Revenue for P_{camera} = (4) i.e. (4) × (5)	(7) Total Cost at MC_{camera} = 0	(8) Total Profit i.e. (6) − (7)
B_7	7	35	28	1	28	0	28
B_6	6	30	24	2	48	0	48
B_5	5	25	20	3	60	0	60
B_4	4	20	16	4	64	0	64
B_3	3	15	12	5	60	0	60
B_2	2	10	8	6	48	0	48
B_1	1	5	4	7	28	0	28

□ = profit maximizing point



Single-Price Monopoly Strategy

DIAGRAM 1



First-Degree Price Discrimination

DIAGRAM 2

Two goods are often complementary if they are generally used in combination with each other as inputs for some end product.[32] The components used in a system are generally perfectly complementary goods, for each component is used only in conjunction with the other: cameras are useless without film, and central processing units are useless without peripherals. If two goods are complements, then as the price of one rises, the demand for and price of the other falls. Because of the perfect complementarity of systems components, each consumer has a single reservation price for a package containing the desired amounts of both components, and he is indifferent between various packages with the same total price but with different prices assigned to each component. His reservation price for each component thus depends entirely on the price charged for the other.[33]

A tie-in of complementary inputs will not increase a monopolist's profits if the two tied inputs are used in fixed proportions. Any increase in the price of one input will reduce, in the exact amount of the price increase, the price that consumers are willing to pay for a package containing the necessary amount of the other input. Since the two inputs are used in fixed proportions, each gain on a sale of the marked-up component will be exactly offset by a corresponding price reduction on sales of the other.

But if two complementary components are used in variable proportions, there will be no one-to-one matching of gains and losses, and price discrimination will be possible if the ratio demanded by different buyers varies with the buyer's intensity of use. Returning to the previous example, suppose that all buyers value the finished photographs taken from a single roll of film at $5. Not all buyers, however, want to take the same number of photographs: B_7 wants to take seven rolls worth, B_6 wants to take six rolls worth, and so on. Suppose cameras and film are the only inputs needed to produce finished photographs, so each buyer is willing to pay $5 times the number of finished rolls he desires for a package containing a camera and the appropriate number

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(1936) (tabulating cards and business machine). A more timely example is the IBM Selectric typewriter and its carbon-ribbon cartridges.

32. See generally Samuelson, Complementarity, 12 J. Econ. Lit. 1255 (1974).

33. The relation between complementarity and tying was first explored by commentators criticizing the "leveraging" theory of tie-ins that had been used by courts in antitrust cases. Director & Levi, supra note 27; see also Markovits, Tie-ins and Reciprocity: A Functional, Legal, and Policy Analysis, 58 Tex. L. Rev. 1363 (1980); Markovits, Tie-ins, Reciprocity, and the Leverage Theory—Part II: Tie-ins, Leverage, and the American Antitrust Laws, 80 Yale L.J. 195 (1970) [hereinafter cited as Markovits, Tie-ins—Part II]; Markovits, Tie-ins, Reciprocity, and the Leverage Theory (pt. 1), 76 Yale L.J. 1397 (1967) [hereinafter cited as Markovits, Tie-ins—Part I]; Burstein, A Theory of Full-Line Forcing, 55 Nw. U.L. Rev. 62 (1960); Bowman, Tying Arrangements, supra note 27; see also Posner, The Chicago School of Antitrust Analysis, 127 U. Pa. L. Rev. 925, 926, 929 (1979); Hirsh v. Martindale-Hubbell, Inc., 674 F.2d 1343, 1349 n.19 (9th Cir.), cert. denied, 103 S. Ct. 305 (1982); USM Corp. v. SPS Technologies, Inc., 694 F.2d 505, 510–12 (7th Cir. 1982) (Posner, J.).

Despite this sustained attack on the theory, several recent commentators conclude that leveraging is a plausible result of a technological tie-in. See Scheffman, supra note 18, at 413; Note, Economic and Legal Analysis, supra note 3, at 801; Ordover & Willig, supra note 5, at 31 n.59 (citing R. Posner, supra note 1, at 173–74; Easterbrook, supra note 1, at 308).

of rolls: B_7, for example, will pay \$5 × 7, or \$35, for a package of seven rolls of film and a camera.

Before the tie-in, film was sold in a competitive market at a price, equal to marginal cost, of \$1 per roll. This situation produced the demand curve given earlier, and summarized in column (4) of the Table. B_7, for instance, was willing to pay \$35 for his package, and had to pay \$7 for seven rolls of film, and was thus willing to pay \$28 for a camera. The camera monopolist can produce the same result as if it price discriminated along this demand curve by tying the sale of its camera to a purchase of its film. After the tie, the camera monopolist will "sell" cameras for their marginal cost of zero, and charge \$5 for a roll of film. All buyers will accept the tie-in, even if film remains available in the competitive market: to buy film on the market would leave a buyer without a camera, and the price for the total package is no more than the \$5 per finished roll that each buyer is willing to pay. Each buyer will, however, pay his full reservation price: B_7, for example, instead of paying \$16 + \$7, or \$23, for his package, will pay \$35. There will also be more buyers: B_1 was unwilling to pay \$16 + \$1 for a single finished roll worth only \$5 to him, but will pay the \$5 asked under the tie-in. The number of film rolls sold will be the maximum possible, 28; the camera monopolist's profits will be the revenues it receives (\$5 × 28, or \$140) minus its cost of production (\$1 × 28), which equals \$112, or the same result as under a strategy of direct price discrimination.

This strategy is known as metering based on intensity of use, and is a variety of price discrimination called a two-part tariff.[34] If the firm is able to capture all available monopoly profits, it has achieved a result known as first-degree Pigouvian price discrimination.[35]

2. *Technological Tie-Ins.* This strategy of price discrimination based on intensity of use requires the producer to price its auxiliary unit above marginal cost. There is, however, no reason to believe that entry into the auxiliary unit market is difficult or that the minimum efficient plant size is prohibitively large; so there is no reason to believe a priori that the producer has any appreciable market power over the auxiliary unit.[36] Thus, to be able to price its auxiliary unit above marginal cost, the producer must incorporate into the design of its auxiliary unit information related to the design of the main unit, the product over which the producer has some degree of pre-existing and enduring market power.

Except for the possibility of competition through imitation in the case of a technological tie-in, it is immaterial for the purpose of approximating

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34. See Schmalensee, Monopolistic Two-part Pricing Arrangements, 12 Bell J. Econ. 445 (1981); Oi, A Disneyland Dilemma: Two-Part Tariffs for a Mickey Mouse Monopoly, 85 Q.J. Econ. 77 (1971).

35. See F. Scherer, Industrial Market Structure and Economic Performance 315-17 (2d ed. 1980); A. Pigou, The Economics of Welfare 240-46 (1st ed. 1920).

36. For example, the market for computer peripherals has many sellers. See sources cited infra note 82.

perfect price discrimination whether the seller contractually or technologically enforces the tie-in. In either case the tied product must be used in variable proportion with the tying product if sales of the tied product are to meter the demand for the tying product accurately.[37] By virtual necessity, therefore, this metering process requires some inherent technological relationship between the tied product and the tying product: If Winchester introduced a new squirrel gun, it could no doubt better monitor the intensity of use by tying the sale of a unique bullet than by tying the sale of chewing tobacco.[38]

3. *Welfare Effects of Price Discrimination.* From the perspective of social welfare, perfect price discrimination generally cannot be criticized, for it increases social welfare by increasing output to the level that would result from a competitive market.[39] This may be seen by comparing Diagrams 1 and 2. In the single-price monopoly strategy illustrated in Diagram 1, triangle *def* represents deadweight loss that results from the fact the monopolist's output is q_1. This loss is eliminated at the price discriminating output q_2 illustrated in Diagram 2.

The only cost that must be balanced against this gain is the transactions cost of metering. As I will argue later, however, a technological tie-in is likely to be a relatively efficient metering device.[40]

Ordover and Willig thus seem mistaken in asserting that a strategy of price discrimination will meet either their test for predatory profit sacrifice or their test for predatory motive. Ordover and Willig screen profit-sacrificing predatory conduct from nonpredatory behavior by their "continued viability" premise, which asks whether "a practice would be unprofitable without the exit it causes, but profitable with the exit."[41] If, however, a rival exits the market when the innovating firm is exploiting market power by a strategy of price discrimination, that exit cannot be the result of a predatory sacrifice of profit and thus seems unlikely to threaten consumer welfare.[42]

It also seems unlikely that price discrimination exhibits a predatory motive. Contrary to what Ordover and Willig assert,[43] the objective of this

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37. Telser, A Theory of Monopoly of Complementary Goods, 52 J. Bus. 211, 223 (1979).

38. See id. at 212 n.1. See also Burstein, The Economics of Tie-In Sales, 42 Rev. Econ. & Statistics 68, 71 (1960). It is important to emphasize that for a tie-in to function as a metering device, the two products must be complements. But, as Professor Schmalensee has shown, commodity bundling by a monopolist may also be a strategy for extracting additional consumer surplus when two products are not complements at all, but rather display a negative relation between their reservation prices. See Schmalensee, Commodity Bundling by Single-Product Monopolies, 25 J.L. & Econ. 67 (1981). Schmalensee's analysis builds on Professor Stigler's classic article, United States v. Loew's, Inc.: A Note on Block Booking, 1963 Sup. Ct. Rev. 152. See also Adams & Yellen, Commodity Bundling and the Burden of Monopoly, 90 Q.J. Econ. 475 (1976); Baxter, Legal Restrictions on Exploitation of the Patent Monopoly: An Economic Analysis, 76 Yale L.J. 267, 322-29 (1966).

39. See O. Williamson, Markets and Hierarchies: Analysis and Antitrust Implications 11-13 (1975).

40. See infra notes 46-48 and accompanying text.

41. Ordover & Willig, supra note 5, at 9.

42. I thank Douglas Galt for pointing out this argument to me.

43. Ordover & Willig, supra note 5, at 35 ("Although . . . injuries to rivals may be incidental to socially beneficial product innovation, they are the primary motivation for predatory product innovations.").

strategy seems unlikely to be the elimination of competitors in the auxiliary unit. Rather, its objective is to prevent arbitrage by purchasers of the total product system. If the purchaser of the producer's main unit does not also buy the producer's auxiliary unit, the producer will forego supracompetitive profits on the sale of its main unit, the only product over which it enjoys any enduring market power. If this arbitrage persists, the producer will have to abandon its price discrimination strategy and resort to a single-price monopoly strategy, which both reduces profits and causes deadweight loss, for it implies a lower output and a higher average price for main units.

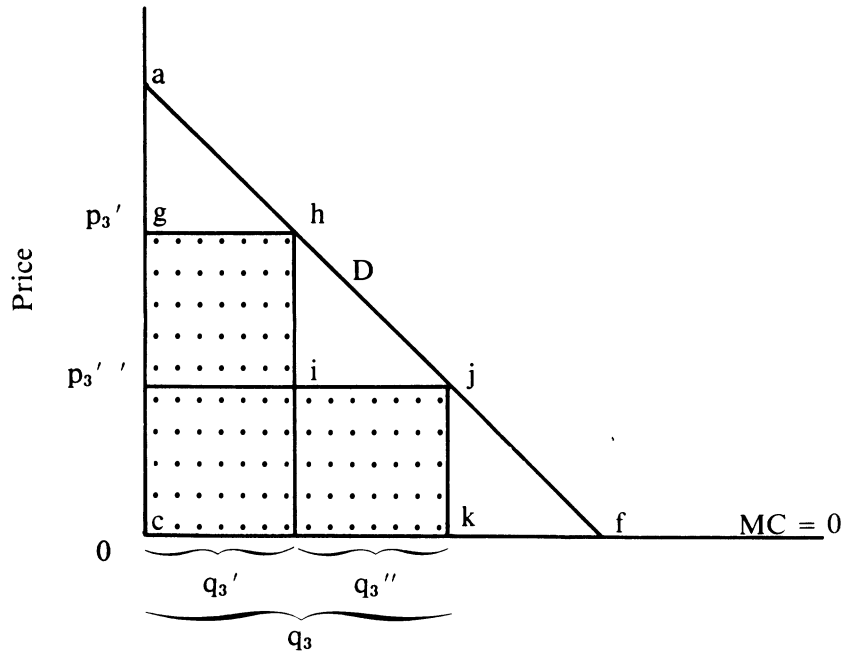
B. *Imperfect Price Discrimination*

Three common obstacles generally make first-degree, or perfect, price discrimination impossible, although less perfect (but still profitable) price discrimination may be achieved. Even imperfect price discrimination, however, will generally have socially desirable results.

The first impediment to perfect price discrimination arises from the fact that buyers may place different values on the final output, and thus on the main unit, for reasons unrelated to intensity of use. For example, one camera user may be a commercial photographer who can make a great deal of money from selling the finished pictures, while another may be an amateur who simply wants to take home snapshots. A metering strategy will not be able to price discriminate between the different valuations they place on a single photograph, although it will still capture any differences based on intensity of use.

Second, if the marginal cost of the main unit exceeds zero, the firm will probably not maximize its profits by giving away main units and selling auxiliary units at a price equal to the value each buyer places on a single use. Purchases of auxiliary units by low intensity users may not cover the cost of giving those users the main unit; even when these losses are more than offset by profits on sales of auxiliary units to high intensity users, it may be more profitable to avoid these losses by pricing the main unit at or near its marginal cost. But if any price higher than zero is charged for the main unit, different buyers will generally have different reservation prices for the auxiliary unit even if they place the same value on a single use. If, to return to the previous hypothetical case, cameras are sold for \$5, then B_7 will pay up to (((\$5 × 7) − \$5) ÷ 7), or \$4.28 for a roll of film, while B_6 will pay (((\$5 × 6) − \$5) ÷ 6), or \$4.17. Thus, no single price on an auxiliary unit such as film will capture all available willingness-to-pay.

The third impediment to perfect price discrimination will arise if the technologically-tied product can only be consumed in large, discrete portions rather than small increments. For example, the number of punch cards that a consumer buys meters his intensity of use of a computer system more accurately than does the number of plug-compatible peripheral devices. The smaller the increment of the tied product, the better the tied product can measure the consumer's intensity of demand; as that increment becomes smaller, the monopolist comes closer to approximating a continuous distribu-



Second-Degree Price Discrimination

DIAGRAM 3

tion of consumers' reservation prices. Thus, it is more accurate to characterize the price discrimination strategy present in the case of computer peripherals as one of second-degree Pigouvian discrimination, in which consumers cannot be segregated by their reservation prices into infinitesimally small groups but rather must be segregated into larger and cruder groups.[44] Second-degree price discrimination is illustrated by Diagram 3. The welfare effects of second-degree Pigouvian price discrimination are ambiguous, since the strategy does not completely eliminate deadweight loss when the monopolist switches from a single-price to a multi-price strategy and correspondingly expands output. This may be seen by comparing Diagrams 1 and 3. The net effect of second-degree price discrimination on consumer welfare depends on whether the empirical determination of the sum of the resulting deadweight loss triangles (*agh*, *hij*, and *jkf* in Diagram 3) exceeds the single deadweight loss triangle (*def* in Diagram 1) that would exist under a single-price strategy.[45] However, it

44. See F. Scherer, supra note 35, at 316.

45. See id. at 320; Note, Rethinking Antitrust Damages, 33 Stan. L. Rev. 329, 334 n.20 (1981).

should be noted in defense of second-degree price discrimination that the transactions costs necessary to monitor consumer compliance—which I discuss in greater detail below—are unlikely to exceed those under first-degree price discrimination and may well be less.

C. *Risk Allocation*

A strategy of price discrimination may have desirable welfare effects other than tending to reduce deadweight loss by increasing output to the competitive level. Ordover and Willig do not consider the possibility that, because of limited information and risk aversion, consumers might actually favor a pricing strategy for a new product system that would discriminate on the basis of intensity of use. For some products, especially brand new ones, a consumer will be uncertain how strongly he really demands the product, so that ex ante the producer cannot accurately ascertain the price elasticity of demand for the new system and thus would have trouble identifying a single profit-maximizing price. This is especially true for a product system that embodies nonobvious or nonintuitive information: the consumer can only fully evaluate the product's utility to him ex post by actually using the system.[46] And, of course, for any product system embodying technical information this ex post revelation of preferences is delayed by the normal phenomenon of learning by doing.[47]

Thus, if the manufacturer is less averse to risk than his customers[48] tie-ins can function as a risk-sharing device: the manufacturer of the new product system bears the risk that the system will fail to meet the customer's needs and expectations; if so, the dissatisfied customer can cut his losses by not buying any more of the technologically tied product. It is a fortunate coincidence that a strategy of pricing a main unit near marginal cost and extracting consumer surplus through the sale of auxiliary units priced above marginal cost both maximizes profit for the innovator and minimizes risk for the consumer.[49]

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46. See Markovits, Tie-ins—Part I, supra note 33, at 1408–11. This phenomenon is similar to the problem of drafting an efficient contract for the submission of a novel idea, which of course in the absence of the contract becomes appropriable. See, e.g., Aronson v. Quick Point Pencil Co., 440 U.S. 257, 259 (1979) ($750 advance plus 5% of sales, convertible to 2-½% if patent application denied). It is merely another example of Professor Arrow's general insight that "there is a fundamental paradox in the determination of demand for information; its value for the purchaser is not known until he has the information, but then he has in effect acquired it without cost." K. Arrow, Economic Welfare and the Allocation of Resources for Invention, *in* Essays in the Theory of Risk-Bearing 144, 152 (1970).

47. See, e.g., Hirsh, Firm Progress Ratios, 24 Econometrica 136 (1956).

48. Professor Markovits postulates that the well-financed manufacturer "will frequently be less averse to taking risks than his (weighted) average customer." Markovits, Tie-ins—Part I, supra note 33, at 1409–10.

49. Of course, there are other ways of allocating risk between the producer and the consumer. For example, IBM could (and does) market its peripherals on month-to-month leases, which would reduce the cost to the consumer of extricating himself from the commitment to purchase a durable good that turned out to be a lemon. See Burstein, supra note 33, at 69–72.

III. Welfare Considerations Common to Fixed and Variable Proportion Technological Tie-Ins

A. *Protecting Product System Performance*

A tie-in is an efficacious means by which to price discriminate or allocate risk only if customers use the tied product in variable proportion to the tying product.[50] But a tie-in also can be used to ensure proper performance of a product system, and the usefulness of this quality-control function—which is intended to preclude the consumer's use of the possibly inferior or incompatible components of a rival producer—does not depend on whether the tie-in is of fixed or variable proportion. Ordover and Willig acknowledge that a producer needs "to maintain the system's reputation for quality,"[51] yet their formal model of predatory innovation ignores the incentive this concern produces to create or perpetuate a technological tie-in for reasons wholly unrelated to a motive of monopolization.

This quality-control function is especially important when the consumer has a limited understanding of how the system works and thus might erroneously blame the producer of the system for a malfunction caused by an inferior or incompatible component manufactured by a competitor—who will consequently escape the full cost of consumer dissatisfaction and hence the full retribution of the marketplace.[52] This problem of imprecise market retribution (really, a free-rider problem) is aggravated when the substitution of the inferior complementary product is made by a distributor or franchisee who then resells the product package to ultimate consumers.[53] Under such circumstances a technological tie-in may, as an economic matter, be necessary to protect the producer's reputation and goodwill;[54] as a legal matter, it may be necessary to protect a trademark from abandonment under the Lanham Act because the producer's lack of quality control has "cause[d] the mark to lose its significance as an indication of origin."[55] In the extreme case, where a competitor's defective component causes the system to malfunction and thereby causes personal injury or consequential economic injury, the producer

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50. The Ninth Circuit recently acknowledged this economic principle in Hirsh v. Martindale-Hubbell, Inc., 674 F.2d 1343, 1349 (9th Cir.), cert. denied, 103 S. Ct. 305 (1982).

51. Ordover & Willig, supra note 5, at 34.

52. See Akerlof, The Market for "Lemons": Quality Uncertainty and the Market Mechanism, 84 Q.J. Econ. 488 (1970); cf. Teflex Indus. Prods., Inc. v. Brunswick Corp., 293 F. Supp. 106, 110 (E.D. Pa. 1968) ("Although there have been no examples presented by either side of specific incidents of engine failure resulting from the plaintiff's [compatible] instruments malfunctioning, there is ample indication that if and when this may occur, the delineation of responsibility between the plaintiff and defendant regarding who will ultimately bear the liability is far from clear, thus resulting either in customer dissatisfaction, or in the defendant assuming a disproportionate share of the liability, rather than jeopardize its consumer goodwill.").

53. See Markovits, Tie-ins—Part I, supra note 33, at 1459-60.

54. Professor Easterbrook, supra note 1, at 310-11, elaborates on this quality-control function of technological tie-ins. See also R. Bork, The Antitrust Paradox 379-81 (1978); T. Baker, supra note 10, at 1257-58, 1277-78; W. Bowman, Patent and Antitrust Law, supra note 27, at 27-28.

55. 15 U.S.C. § 1127 (1976).

of the original system might face liability even though the harm did not result from any defect in his own product.[56]

Another quality-control function of tie-ins is to prevent the consumer from substituting among complementary inputs in a manner that produces for a particular product application a nonoptimal ratio between the tied and tying products. For example, if IBM has a monopoly over mainframe computers and charges a supracompetitive price for the mainframe, and if the sale of peripheral devices is not tied to the sale of mainframes, then a consumer would have the incentive to minimize his cost of data processing by substituting relatively more peripherals for mainframes, even though his ultimate mix of components might not yield optimal performance. By shifting the locus of non-marginal-cost pricing from the tying product to the tied product, the producer can enhance efficiency by removing the incentive for the consumer to buy the two products in nonoptimal proportion to one another.[57]

The quality-control function of tie-ins is not a novel idea. Courts have long recognized the protection of product quality to be a limited affirmative defense to the per se rule against contractual tie-ins.[58] And if this defense has changed at all in recent years, it has broadened in light of the Supreme Court's reasoning in *Sylvania* that some restraints of trade may be reasonable if they eliminate free-rider problems that tend to reduce product quality.[59]

B. *Transactions Costs*

1. *The Inefficiency of Contractual Tie-Ins.* Because Ordover and Willig ignore or understate the welfare-enhancing characteristics of tie-ins, they never consider why a technological tie-in might be more efficient than a contractual tie-in in achieving these welfare gains. Even if contractual tie-ins were legal, a producer would still use a technological tie-in to price discriminate or to protect product performance if the technological tie-in cost less to create than the present value of the recurring expenditures necessary to moni-

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56. This motive perhaps explains, for example, Cessna's policy of discouraging its dealers from selling Cessna planes without factory-installed Cessna avionics. See Fontana Aviation, Inc. v. Cessna Aircraft Co., 617 F.2d 478, 479-80 (7th Cir. 1980). See also Continental T.V., Inc. v. GTE Sylvania Inc., 433 U.S. 36, 55 n.23 (1977).

57. See Blair & Kaserman, Vertical Integration, Tying, and Antitrust Policy, 68 Am. Econ. Rev. 397 (1978). This phenomenon resembles the problem of fixing patent royalties on the basis of end-product sales rather than on the basis of the buyer's use of the patented input. See R. Posner & F. Easterbrook, Antitrust: Cases, Economic Notes and Other Material 815-17 (2d ed. 1981); see also Lipsky, Current Antitrust Division Views on Patent Licensing Practices, 50 Antitrust L.J. 515, 518-19 (1982).

58. See United States v. Jerrold Elecs. Corp., 187 F. Supp. 545, 560-61 (E.D. Pa. 1960), aff'd per curiam, 565 U.S. 467 (1961) (service contracts tied to a new antenna system were lawful during the period of the product's "inception," but violated section 1 of the Sherman Act and section 3 of the Clayton Act after circumstances changed and the quality-control need for compulsory service contracts disappeared).

59. See Continental T.V., Inc. v. GTE Sylvania Inc., 433 U.S. 36 (1977). See also T. Baker, supra note 10, at 1277-78; Posner, The Rule of Reason and the Economic Approach: Reflections on the *Sylvania* Decision, 45 U. Chi. L. Rev. 1, 10-12 (1977).

tor and enforce a contractual tie-in. Suppose Kodak uses the sale of film cartridges to meter demand for a new camera of unique design. The additional cost of designing and manufacturing the camera and cartridge in a uniquely compatible configuration surely is less than the cost of monitoring millions of amateur photographers over a number of years to determine whether they are buying only Kodak film.[60]

Moreover, the additional engineering costs of designing a technological tie-in are fixed costs and, therefore, do not affect the firm's profit-maximizing output level by altering its marginal costs; and as the tying product is made in large production runs, the average fixed cost of the product design may become trivial. In contrast, monitoring and possibly litigating purchasers' compliance with a contractual tie-in provision surely exhibits constant if not increasing marginal costs that result in a lower profit-maximizing output level. The same analysis holds for technological tie-ins intended to make a product system "idiot proof" by making the components compatible only with other components of the same producer, although here the positive marginal cost of not using a technological tie-in consists of processing customer complaints, issuing refunds, and investing more in advertising and point-of-sale services to educate the consumer in the product's correct use.

Thus, even if contractual tie-ins were legal, a producer would use a technological tie-in whenever the consumer's use of the tied product was not conducive to monitoring. Monitoring might be costly for any of a number of reasons related to the costliness of information. Perhaps, for example, the tying product is purchased by millions of households or has a long useful life and an active secondary market. Of course, what is relevant is the cost of the monitoring activities not in absolute dollar terms but rather (in the case of price discrimination) as a percentage of the expected discounted stream of additional revenues from successfully price discriminating rather than charging a single price, or (in the case of quality control) as a percentage of the expected discounted revenues that would be lost if disgruntled consumers stop buying the product and begin maligning its quality. Thus, IBM can spend more dollars monitoring the use of a $1 million central processing unit than can Kodak in monitoring the use of a $25 camera. Of course, some monitoring costs, such as labor and transportation, are fixed with respect to the price of the tying product. Because these costs comprise a larger percentage of the derivable price-discrimination revenues from a camera than a computer, it quickly becomes prohibitive for Kodak to engage in monitoring.

2. *The Infeasibility of Licensing.* The mere possession of some market power by an innovating firm and the desire to exploit that market power fully through price discrimination does not mean that that particular firm must be the one that actually monitors the intensity of use. Rather than discriminating among consumers according to intensity of use, the innovating firm could extract all possible monopoly rent for the system by licensing design informa-

60. Judge Bork alludes to this problem of transactions costs. R. Bork, supra note 54, at 380.

tion to competitors in the auxiliary unit market.[61] Various licensing strategies are possible, but they carry with them their own problems that may make them less desirable than a technological tie-in.

IBM could, for example, simply license to peripheral manufacturers the design for a new interface between its mainframe and its peripherals. As a first approximation, the royalty would equal (1) the present value of the monopoly rent that IBM would expect to receive by pricing its mainframe at marginal cost and pricing its peripherals above marginal cost,[62] minus (2) the discounted present value of the monitoring costs of a tie-in. But in a market with growing demand or rapid technological change, IBM could easily underestimate its expected profits because of the difficulty in ascertaining either the willingness of consumers to pay for the system or the cost of monitoring. Thus, IBM could not easily compute the appropriate royalty to charge.[63]

Alternatively, IBM could charge each licensee a unit charge on each compatible peripheral device it sold or a percentage of the revenues from sales of peripherals.[64] (And, of course, IBM would choose to do so if its rivals could manufacture peripherals more efficiently and could prevent unauthorized disclosure of IBM's trade secrets.) But this licensing strategy risks antitrust liability because it might appear to facilitate horizontal price fixing by requiring the contemporaneous exchange of disaggregated output data between competitors.[65] To reduce this antitrust risk IBM could, of course,

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61. See McGee, Patent Exploitation: Some Economic and Legal Problems, 9 J.L. & Econ. 135, 138-43 (1966).

62. In other words, the present value of the full reservation price, or willingness-to-pay, for data processing by means of an IBM system, less the cost of the mainframe and peripherals.

63. For a similar argument with respect to contractual tie-ins that franchisors impose on franchisees, see T. Baker, supra note 10, at 1280.

64. In 1973, Bell & Howell alleged that Kodak had used its market power over film to attempt to monopolize the market for movie and still cameras in violation of § 2 of the Sherman Act. See Complaint in Bell & Howell Co. v. Eastman Kodak Co., No. 73-35 (N.D. Ill. filed Jan. 4, 1973). In settlement of the antitrust suit, Kodak agreed to predisclose film and cartridge specifications to Bell & Howell at least 18 months before Kodak's introduction of new products. Bell & Howell agreed to pay Kodak a $10,000 "Proprietary Data License Fee" and "disclosure related sales payments of not more than one percent (1%) of the total net sales of all Modified Cameras and Modified Projectors sold by Bell & Howell during the first 18 months after the Introduction Date by Kodak or Bell & Howell, whichever occurs first, of a Modified Camera or Modified Projector for use with the Modified Cartridge or Modified Film which is the subject of the relevant Disclosure Program." Approved Agreement of Settlement at 16, Bell & Howell Co. v. Eastman Kodak Co., No. 73-35 (N.D. Ill. July 8, 1974).

65. See United States v. General Elec. Co., 272 U.S. 476 (1926) (patent licensing as possible cartel-management device); see also R. Posner & F. Easterbrook, supra note 57, at 276-77; Priest, Cartels and Patent License Arrangements, 20 J.L. & Econ. 309, 326-30 (1977); cf. United States v. United States Gypsum Co., 438 U.S. 422 (1978) (contemporaneous price verification among competitors). This appearance would be inaccurate: IBM would never tolerate cartel pricing by licensees in the peripheral market, for a price increase there would reduce the demand for its technologically tying product, its mainframe computer. To the contrary, IBM would want to impose a price ceiling on its licensees and retain the economic ability to underprice them, were they to fix the price of peripherals above the level that would maximize IBM's profit from the joint sales of mainframes and peripherals.

This incentive to prohibit monopolistic pricing by licensees is just another side of the argument that leveraging is unprofitable to any producer with pre-existing market power in the

stipulate that its licensees remit payment on a noncontemporaneous basis—say, once every six months—and that they do not disclose information regarding their royalty payments to any firm other than IBM. This licensing arrangement, however, would then have the disadvantage of precluding IBM from assessing on a contemporaneous basis the demand for (and changes in the demand for) its data processing system.

Either licensing strategy would relieve IBM of the cost of monitoring the intensity of consumers' use of the tying product, but would also impose on IBM a new cost—that of monitoring and enforcing licensee compliance with IBM's quality standards. As mentioned earlier, market retribution for a malfunctioning computer system will fall disproportionately on IBM, since ultimate consumers have limited knowledge with which to diagnose whether the failure of the product system has resulted from IBM's faulty workmanship or from that of an independent contractor for the peripheral. Indeed, the fact that IBM chooses to manufacture peripheral devices itself is prima facie economic evidence that an integrated manufacturing operation is less costly—taking into account the protection of IBM's goodwill—than licensing independent contractors to produce these components according to exacting specifications.[66]

If licensing were cheaper than designing a technological incompatibility and were not threatened with possible antitrust liability, at least two salutary effects would result. First, the rapid dissemination of essential trade secrets would obviate reverse engineering of essential mainframe designs by peripheral manufacturers—cost savings that would be summed over all such manufacturers. Second, a change in the division of labor would occur such that a licensee's competitive success would depend on how efficiently it could manufacture the peripheral rather than on how quickly or faithfully it could reverse engineer that product. But if, on the other hand, licensing is costly, antitrust enforcement problematic, and the enforceability of such licensing provisions subject to doubt under the law of contracts or trade secrets or patents, then IBM's most efficient means for preventing free riders from appropriating the profits from its product developments or reducing the reliability of—and hence demand for—its data processing product system is to impose a technological tie-in and simultaneously create an information asymmetry by declining to predisclose or license proprietary designs.

C. *The Chilling Effect on Innovation*

The most glaring deficiency in the Ordover-Willig model is its cavalier treatment of the chilling effect that its proposed test would have on innovative

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tying market if complementarity of demand exists between the tied and tying products. The incentive is similar to the joint-product serial monopoly problem in Albrecht v. Herald Co., 390 U.S. 145 (1968). *Albrecht* involved distributors' unauthorized price increases for newspaper subscriptions, whose demand is complementary to the demand for newspaper advertising. See R. Posner, supra note 1, at 157-61.

66. See R. Posner & F. Easterbrook, supra note 57, at 808-09; see generally Coase, The Nature of the Firm, 4 Economica (n.s.) 386 (1937).

activity. Innovation is the creation of new information. But information, unlike a sandwich, can be simultaneously consumed by many persons. Moreover, once propietary information is disclosed, its value to its finder diminishes because the appropriability of information makes it impossible for the innovator to prevent simultaneous consumption by others. Thus, simultaneous consumption and nonexcludibility make it difficult for the innovator to capture for himself all the benefits flowing from the discovery of new information—and of course these two factors also encourage others to free ride on the innovator's labor.[67]

In the absence of enforceable property rights in information, innovative activity will be a very risky investment, and it will be unlikely that resources will be committed to the discovery of new information in the optimal fashion—that is, "until the expected marginal social benefit . . . equals the marginal social benefit in alternative uses."[68] Of course, the patent system exists to establish such enforceable property rights, but it is well recognized that patent protection is often unavailable and therefore cannot be counted on with certainty ex ante when the innovator is deciding whether to undertake an investment in innovative activity.[69]

Ordover and Willig fail to recognize that in an environment in which the return to investment in innovation is very uncertain ex ante—in large part because the scope of the legal right in the information yet to be discovered cannot be predicted—a technological tie-in functions, in conjunction with trade secret law, as a backup to patent protection. Thus, the possibility that an innovator can use a technological tie-in to extract the exclusive benefit from his new information for some limited time (until reverse engineering occurs) reduces the risk ex ante of undertaking the investment in innovative activity. In this sense, technological tie-ins dovetail with the intended purpose of state trade secret law, articulated in *Kewanee Oil Co. v. Bicron Corp.*,[70] to permit "the individual inventor to reap the rewards of his labor"[71] and to create incentives conducive to "the subsidization of research and development and to increased economic efficiency within large companies through the dispersion of responsibilities for creative developments."[72] Thus, by providing a means to counteract the free-rider problem in new information, technological tie-ins probably reduce the risk of undertaking investment in innovative activity and almost certainly increase the innovator's expected return from developing new products that, while valuable to consumers, nonetheless fall short of the requirements of nonobviousness, novelty, and utility necessary

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67. See generally Kitch, The Law and Economics of Rights in Valuable Information, 9 J. Legal Stud. 683 (1980).

68. K. Arrow, supra note 46, at 161.

69. See Kewanee Oil Co. v. Bicron Corp., 416 U.S. 470, 493 (1974); Goldstein, Kewanee Oil Co. v. Bicron Corp.: Notes on a Closing Circle, 1974 Sup. Ct. Rev. 81, 92.

70. 416 U.S. 470 (1974).

71. Id. at 493.

72. Id. at 482.

for patentability.[73] While Ordover and Willig pay lip service to the risk of chilling innovative activity,[74] they do not include anywhere in their model a variable that reflects the expected social cost from forgone innovation that would result from exposing technological tie-ins to antitrust scrutiny.

The risk of chilling innovative activity seems particularly high under a test as complex as that proposed by Ordover and Willig, for complex tests lead of course to costly litigation. How many millions would have to be spent litigating the analytical details of the Ordover-Willig model before clear and predictable rules emerge is anyone's guess. Even the Areeda-Turner test for predatory pricing has proven to require extensive litigation simply to implement a rule that turns on one economic variable, short-run marginal cost; and even with this one variable a more easily measurable proxy must be used, short-run average variable cost.[75] Consider, in contrast, the number of economic variables that would have to be estimated to apply just one part of the Ordover-Willig test: "the requisite R&D investment must be scrutinized for the underlying motive by comparing the anticipated costs of the innovation with its anticipated incremental net revenues, calculated on the premise that the rival has continued access to necessary preexisting components" at compensatory prices.[76] Just this one computation would require knowing the innovator's expected R&D costs, its expected marginal revenues, its expected marginal cost of continuing to sell an outdated component after the introduction of the new system, and the likelihood that its rival would not go out of business in the meantime for some unexpected reason. Thus, while the Ordover-Willig model may seem on first impression to be a bright-line algorithm for defining predatory innovation, the difficulty in measuring the variables that it requires would make litigation very costly and would invite litigators to turn the courtroom into a colloquium on applied econometrics.

The factual complexity inherent in implementing the Ordover-Willig test raises a related issue of manageability: summary judgments would be impossible to grant. Consequently, unmeritorious cases could not be swiftly terminated. This problem would raise the expected cost of litigation for any innovating firm with a dominant market position, which in turn would lower the expected return to innovative activity. This problem of summary judgments is exacerbated by the proclivity of federal courts to deny defendants summary judgments in antitrust cases, partly because of a populist notion that antitrust plaintiffs deserve a heightened degree of judicial solicitude and partly because

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73. See 35 U.S.C. §§ 101-103 (1976); cf. Goldstein, supra note 69, at 92 (*Kewanee* Court seemed to recognize that "to eliminate the trade secret system . . . would not produce the salutary effect of stimulating investment only in patentable invention . . . [but] might instead curtail overall investment in innovation, with resulting losses to the development of both unpatentable and patentable subject matter").

74. Ordover & Willig, supra note 5, at 52.

75. Cf. Schmalensee, On the Use of Economic Models in Antitrust: The *ReaLemon* Case, 127 U. Pa. L. Rev. 994, 1044 (1979) ("The apparently simple rules [for predatory pricing] proposed in recent years by several authors are not in fact simple to apply to cases such as *ReaLemon*.").

76. Ordover & Willig, supra note 5, at 49.

of the concern that issues of intent in antitrust cases are often too factually complex to be distilled to undisputed issues of fact.[77] Even if predatory intent could be inferred from predatory conduct under the Ordover-Willig test, the number of computations required to determine whether design conduct has been predatory—and the complexity of those computations—would always lead to factual dispute at the summary judgment stage of litigation. And, of course, for purposes of granting or denying summary judgment it is no consolation to the innovator that Ordover and Willig, as economists, opine that "the danger of excessive litigation is small due to the burden of proof that the standard places on prospective plaintiffs."[78]

IV. A Proposal For a Rule of Per Se Legality

That the Ordover-Willig test would be bad law does not mean that a rule of per se legality for technological tie-ins would be socially optimal. Technological tie-ins have many efficiency-enhancing characteristics, but they may also impose certain costs. The issue is whether these costs exceed these benefits with enough frequency to make a rule-of-reason approach preferable to a rule of per se legality.[79] I will argue that they do not.

Consider the factors relevant to evaluating both fixed and variable proportion tie-ins. First, any technological tie-in will incur enforcement costs. As I argued earlier, however, these are likely to be relatively low.[80] Second, technological tie-ins might raise the cost of entry or cause exit by increasing the scale of investment needed to enter or remain in the auxiliary unit market. This concern is analogous to one raised by contractual tie-ins and vertical mergers: If after vertical integration or a contractual tie-in a dominant firm ceases to sell its main unit separately, competitors—or prospective entrants—in the auxiliary unit market will be forced either to enter the main unit market or to exit—or not enter—the auxiliary unit market.[81] But a technological tie will impose far less significant costs on competitors and prospective entrants. After a technological tie, other firms can reverse engineer the new auxiliary unit, and this process will be considerably less costly than entering the main market would be. Several courts have in fact noted that the costs of reverse engineering are small indeed and seem not to have deterred entry in the

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77. See, e.g., Poller v. Columbia Broadcasting Sys., 368 U.S. 464, 473 (1962). However, some courts have begun to regard the standard of summary judgment to be no different in antitrust cases than in other litigation. See, e.g., Products Liab. Ins. Agency, Inc. v. Crum & Forster Ins. Cos., 682 F.2d 660, 663 (7th Cir. 1982) (Posner, J.).

78. Ordover & Willig, supra note 5, at 50–51.

79. Presumably no one would argue that technological tie-ins should be per se illegal; a change in the interface itself is often a desirable improvement so that a technological tie is sometimes an inevitable result of improved product quality. See, e.g., *Memorex,* 458 F. Supp. 423, 438, 440 (N.D. Cal. 1978), aff'd, 636 F.2d 1188 (9th Cir. 1980) (per curiam), cert. denied, 452 U.S. 972 (1981).

80. See supra notes 60–61 and accompanying text.

81. For a discussion of this problem in the context of vertical mergers, see R. Posner & F. Easterbrook, supra note 57, at 871.

markets at issue.[82] These two relatively insubstantial costs—monitoring costs and the increased scale of investment—must be balanced against the substantial benefits of improved quality control[83] and the social value of the innovation itself.

The considerations unique to variable proportion tie-ins similarly suggest that such tie-ins are on balance likely to enhance efficiency. Most, if not all, variable proportion tie-ins will be used to price discriminate, and a strategy of price discrimination cannot plausibly be predatory.[84] It will, moreover, be likely to benefit risk-averse consumers.[85] Admittedly, price discrimination will generally lead to at least some deadweight loss, since it generally cannot be first-degree price discrimination.[86] Still, the only practicable alternative to price discrimination is a single monopoly price, which will also produce deadweight loss; price discrimination is likely to be the more efficient of the two strategies, unless there is some plausible reason to think that its higher output level will be perversely accompanied by a series of deadweight loss triangles which in aggregate exceed the single deadweight-loss triangle that accompanies a single monopoly price. No empirical basis exists for making such a peculiar theoretical assumption.

It thus seems likely that in most cases the benefits of technological tie-ins will exceed the costs. In these circumstances, a rule of per se legality would have several important and well-known advantages.[87] Under even the best rule-of-reason test, litigation costs will be incurred and uncertainty will be created that may discourage desirable conduct, especially if managers are risk-averse.[88] From an economic perspective, a substantive antitrust rule should minimize the combined social cost of three variables: (1) costs that arise when competitively neutral or efficiency-enhancing behavior is deterred or mischaracterized as injurious to consumers; (2) costs that arise when conduct injurious to consumers is not recognized as such;[89] and (3) costs of litigating

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82. See, e.g., *CalComp,* 613 F.2d 727, 731 (9th Cir. 1979); *Memorex*, 458 F. Supp. 423, 443 (N.D. Cal. 1978), aff'd, 636 F.2d 1188 (9th Cir. 1980), cert. denied, 452 U.S. 972 (1981). The problem of the cost of entry was explored in detail in the district court opinion in Transamerica Computer Co. v. International Bus. Machs. Corp., 481 F. Supp. 965 (N.D. Cal. 1979), aff'd and modified in part, 698 F.2d 1377 (9th Cir. 1983). The district court concluded that while entry into the central-processing-unit market was all but impossible, 481 F. Supp. at 981, entry into the peripheral market remained easy at all times, id. at 978, 981–98; see also *Memorex*, 458 F. Supp. at 431, 433.

83. See supra notes 50-59 and accompanying text.

84. See supra text accompanying notes 42–43.

85. See supra notes 46–49 and accompanying text.

86. See supra notes 44–45 and accompanying text.

87. See, e.g., R. Posner & F. Easterbrook, supra note 57, at 597; Posner, The Next Step in the Antitrust Treatment of Restricted Distribution: Per Se Legality, 48 U. Chi. L. Rev. 6, 22–26 (1981).

88. See generally Block & Sidak, The Cost of Antitrust Deterrence: Why Not Hang a Price Fixer Now and Then?, 68 Geo. L.J. 1131 (1980).

89. Economists refer to false positives as type I errors and to false negatives as type II errors. See Joskow & Klevorick, A Framework for Analyzing Predatory Pricing Policy, 89 Yale L.J. 213, 223 (1979); see also Easterbrook, supra note 1, at 318–19; Schmalensee, supra note 75, at 1018–19

claims under the rule. Thus, if the probability and costs of failing to recognize injurious behavior are small, then there is no point in having courts splitting hairs over conduct that is highly unlikely to reduce social welfare.[90]

The difficulties attendant upon any rule-of-reason test seem particularly acute in the case of technological tie-ins. It should be clear that a truly precise test is impractical. Not only would it be difficult to balance with precision the numerous competing costs and benefits, but it would be virtually impossible to compute with even tolerable accuracy most of the relevant variables. For example, to determine whether price discrimination is efficient it is necessary to know the maximum price all consumers are willing to pay for the system as a whole, yet few things in economics are more difficult to measure than willingness-to-pay. Even if a precise test could be developed, it would of necessity be exceedingly complex. As a result, it would be extremely costly to litigate and would be highly likely to exceed the limits of judicial competence. In reviewing the various proposals for a rule against predatory pricing, Professor Schmalensee has observed that "[e]conomic theory does not seem to be employed by courts in deciding antitrust cases in the way that students of economics are taught to employ it."[91] Courts are concerned with taxonomy. "In antitrust decisions," writes Schmalensee, "the terminology of economic theory is more often used to classify than to analyze."[92]

Perhaps a less precise but more manageable rule-of-reason test might be developed. Professor Turner, for example, has suggested that, if courts choose not to adopt a rule of per se legality, they should at least adopt a rule that the defendant shall receive summary judgment if there is any valid dispute over whether the new product is superior.[93] Thus, under Turner's second-best rule any credible evidence that the product was superior supports summary judgment for defendants, even if other and allegedly weightier evidence points the other way.[94] Commenting on Turner's proposal, Commissioner Pitofsky of the Federal Trade Commission has observed that it would almost always be the case that litigation over product innovation could thus be forestalled, since "[s]omeone will always write a memo saying, 'Sure was a terrific idea.'"[95] If Pitofsky is correct, then such a second-best rule would have the same practical

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n.98. For an application to antidumping law, see Sidak, A Framework for Administering the 1916 Antidumping Act: Lessons from Antitrust Economics, 18 Stan. J. Int'l L. 377, 379-80 (1982).

90. Indeed, Judge Kaufman, who wrote the *Berkey* opinion, subsequently wrote for the Second Circuit that "[e]specially when the costs of a misjudgment are high and the prevalence of the conduct the law seeks to deter is low, simpler rules are preferable." Northeastern Tel. Co. v. American Tel. & Tel. Co., 651 F.2d 76, 88 (2d Cir. 1981), cert. denied, 455 U.S. 943 (1982).

91. Schmalensee, supra note 75, at 996.

92. Id.

93. Letter from Donald F. Turner to the author, at 1 (Oct. 20, 1982) (copy on file at the offices of the Columbia Law Review). Professor Turner has suggested this rule in several speeches, but has not articulated it in detail in print. See, e.g., Roundtable on Predatory Practices, *in* Strategy, Predation, and Antitrust Analysis 623, 678 (1981) (remarks of Donald F. Turner).

94. Letter, supra note 93, at 1.

95. Roundtable on Predatory Practices, supra note 93, at 684 (remarks of Robert Pitofsky).

effect as a rule of per se legality—only at a higher cost to society, since a summary judgment could not be granted until both sides had spent considerable sums in pretrial litigation. It seems unlikely that such a rule would be, as Judge Posner has observed of the rule of reason generally, anything more than a "euphemism for nonliability."[96]

Courts in general have disfavored predatory innovation claims. They have recognized that concern over the possibility of monopolization by means of technological innovation must be traded off against the need to protect the incentive to undertake such innovation. Moreover, the judicial recognition of this tradeoff has not depended on how the plaintiff has styled its cause of action—either as a tie-in violating section 3 of the Clayton Act or section 1 of the Sherman Act, or as an attempt to monopolize in violation of section 2 of the Sherman Act.[97] As Judge Kaufman emphasized in *Berkey*, the primary concern has been to protect even a monopolist from its rivals taking a free ride on its investments in product innovation:

> It is the possibility of success in the marketplace, attributable to superior performance, that provides the incentives on which the proper functioning of our competitive economy rests. 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 very likely be vitiated.[98]

Consequently, courts have rejected arguments that an innovating firm has a duty to protect its competitors from the adverse effects of the design change,

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96. Posner, supra note 59, at 14.

97. See Foremost Pro Color, Inc. v. Eastman Kodak Co., 703 F.2d 534 (9th Cir. 1983) (affirming dismissal for failure to state a claim for which relief could be granted of all allegations regarding the introduction of Kodak's 110 photographic system); *CalComp*, 613 F.2d 727, 744 (9th Cir. 1979) (affirming directed verdict for defendant on a single tie-in claim); Berkey Photo, Inc. v. Eastman Kodak Co., 603 F.2d 263, 288 (2d Cir. 1979) (reversing jury verdict against defendant for all claims related to technological tie of new camera and new film); Transamerica Computer Co. v. International Bus. Machs. Corp., 481 F. Supp. 965, 1005-06 965 (N.D. Cal. 1979) (after hung jury, directed verdict for defendant on three out of four technological tie-in claims), aff'd and modified in part, 698 F.2d 1377 (9th Cir. 1983); *Memorex*, 458 F. Supp. 423, 439, 440-41, 443 (N.D. Cal. 1978) (after hung jury, directed verdict for defendant on four out of four technological tie-in claims), aff'd, 636 F.2d 1188 (9th Cir. 1980), cert. denied, 452 U.S. 972 (1981); Telex Corp. v. International Bus. Machs. Corp., 367 F. Supp. 258, 303-07, 346-47 (N.D. Okla. 1973) (judgment for defendant on one of three technological tie-in claims), rev'd on other grounds, 510 F.2d 894 (10th Cir.), cert. dismissed, 423 U.S. 802 (1975); cf. *Berkey*, 603 F.2d at 293-95 (reversing jury verdict for plaintiff and remanding for new trial claims related to photo finishing). But see *Telex*, 367 F. Supp. at 293-96, 345 (judgment for plaintiff on two of three technological tie-in claims); cf. *Berkey*, 603 F.2d at 293-95 (reversing and remanding judgment n.o.v. for defendant on color paper claims); *Transamerica*, 481 F. Supp. at 1006-08 (technological tie-in would have violated § 2 of Sherman Act if defendant had had market power).

98. *Berkey*, 603 F.2d at 281; see also id. at 281-83; *Foremost Pro Color*, 703 F.2d at 542-43, 545; *Memorex*, 458 F. Supp. at 437 (granting plaintiff's request for relief "would remove . . . [defendant's] incentive to invent"); *Telex*, 367 F. Supp. at 347 (a finding of liability would "cast unfortunate doubt on the legality of product innovations in serious detriment to the industry and without any legitimate antitrust purpose"); *Transamerica*, 481 F. Supp. at 1003.

either by predisclosing engineering details of the change,[99] or by choosing the least restrictive alternative design.[100]

Under current law a defendant will almost certainly prevail if it can plausibly demonstrate the superiority of its new product over earlier models.[101] Indeed, *Memorex* may even be read to grant summary judgment to the innovator whenever there is a dispute whether a new design is on engineering grounds superior to its predecessor.[102] On the other hand, the trial court in *Transamerica*, while according great weight to evidence of technological superiority also considered other factors in what comes the closest to an elaborate rule-of-reason test for predatory design conduct. The court weighed four considerations: (1) "the effects of the design on competitors," (2) "the effects of the design on consumers," (3) "the degree to which the design was the product of desirable technological creativity," and (4) "the monopolist's intent."[103] The trial court did not explain either the relative weights to be given these four considerations or the order in which they should be examined, but its own application of the test to the facts before it strongly suggests that it believed design superiority was preeminently important. Even IBM's Mallard project, an interface change found to have been "adopted primarily to preclude . . . competition" by manufacturers of plug-compatible peripherals, was lawful because it was "a superior design, and its effect on competition was negligible"; to impose liability for the Mallard design change "would amount to a punishment for intent alone."[104] The effect on competitors also received a trivial weight that seems to have practical consequence only when the design change utterly fails to improve the performance of the product package in any detectable manner; the court said in dictum that, had IBM possessed monopoly power over the byte multiplexor, its redesign of that product—a design change whose "only purpose . . . and . . . effect . . . was the preclusion of competition"—would have violated section 2 because the design change made the product package "less attractive to users."[105]

Despite their willingness to scrutinize technological tie-ins under a rule of reason that carries a strong presumption of legality, American courts do not seem inclined yet to pronounce technological tie-ins legal per se. Judge Kauf-

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99. *Foremost Pro Color*, 703 F.2d at 545; *Berkey*, 603 F.2d at 279-85; *CalComp*, 613 F.2d at 744; *Memorex*, 458 F. Supp. at 436-37; GAF Corp. v. Eastman Kodak Co., 519 F. Supp. 1203, 1229 (S.D.N.Y. 1981). Justices Rehnquist and Powell, who dissented from the Supreme Court's denial of certiorari in *Berkey*, plainly suggested that they would disfavor an antitrust rule requiring predisclosure: "To one not schooled in the niceties of antitrust litigation, the notion that a statute designed to foster competition requires one competitor to disclose to another, in advance of marketing a product to the general public, its plan to introduce the new product, is difficult to fathom." 444 U.S. 1093, 1094 (1980) (Rehnquist, J., dissenting). The European Economic Community, however, appears to be considering creating a duty of predisclosure. See Wall St. J., Mar. 1, 1983, p. 28, col. 2.

100. *Transamerica*, 481 F. Supp. at 1021-22; *CalComp*, 613 F.2d at 744.

101. *CalComp*, 613 F.2d at 743-44; *Memorex*, 458 F. Supp. at 439, 441, 443-44.

102. 458 F. Supp. at 439, 441, 443-44.

103. 481 F. Supp. at 1003.

104. Id. at 1005.

105. Id. at 1007-08.

man, in two opinions for the Second Circuit, has suggested that a dominant firm may have an obligation to leave an old line of products on the market once a new product is introduced—although his rationale, whether economically persuasive or not, seems linked to the objective of protecting consumer welfare and not competitors.[106] Most recently, Judge Wallace has written for the Ninth Circuit in *Foremost Pro Color* that although technological tie-ins could never be illegal per se, neither could "product innovation [be] immune from antitrust scrutiny."[107]

It frustrates efficient resource allocation and undercuts judicial credibility to have a rule-of-reason test for technological tie-ins which functions as no more than a "euphemism for nonliability," and which finds its justification solely in the fear that an antitrust hobgoblin that is as yet unseen may one day appear. In light of the costliness of litigation over technological tie-ins, the implausibility of predatory strategies, the low probability of other inefficient consequences, and the likelihood that desirable incentives for innovation would be jeopardized by subjecting product innovations to a rule-of-reason scrutiny, it seems preferable from the perspective of maximizing the nation's wealth to have no rule regarding "predatory innovation." Courts should advance from their strong presumptions of legality for technological tie-ins and acknowledge that marketing strategies for product innovations should be per se legal.

CONCLUSION

"Predatory innovation" is an ominous-sounding competitive strategy that probably has little to do with monopolizing component product markets and very much to do with preventing free-rider problems in the marketing of new and desirable products embodying appropriable design information. By

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Telex also gave comparatively substantial weight to the superiority of the design change, 367 F. Supp. at 294–95, 347, although the court also considered the defendant's intent, id. at 294–95; whether a substitute had been left on the market, id. at 347; and whether the two components in fact constituted the "two products" requisite for a tying offense, id. at 347.

Of all the technological tie-in opinions, *Berkey* is perhaps the least concerned with design superiority. Judge Kaufman held that the proper inquiry was whether the advantages to the firm of the technological tie resulted from an exercise of monopoly power, or were merely a benefit of integration. 603 F.2d at 276; see also id. at 283, 292. Judge Kaufman further held that a finding that monopoly power had been exercised could not be inferred from a new product introduction alone, but only from a new product introduction coupled with some associated coercive conduct, such as the withdrawal of a substitute product. Id. at 286 & n.30, 287 & n.39.

106. See *Berkey*, 603 F.2d at 287 & n.39 ("Kodak did not remove any other films from the market when it introduced the new one, [but] the situation might be completely different if, upon the introduction of the 110 system, Kodak had ceased producing film in the 126 size, thereby compelling camera purchasers to buy a Kodak 110 camera."); Northeastern Tel. Co. v. American Tel. & Tel. Co., 651 F.2d 76, 93 n.26 (2d Cir. 1981) ("introduction of a new product may violate § 2 if a monopolist acts to compel customer choice by withdrawing a substitute from the market"); see also *Telex*, 367 F. Supp. at 347 (court mentions the continued availability of old components compatible with components of competitors, but appears to rest holding of nonliability on finding that the two allegedly tied components were in fact one product); see generally P. Areeda, supra note 5, ¶ 738.2e, at 247.

107. 703 F.2d 534, 545 (9th Cir. 1983).

concentrating on the anticompetitive potential of product innovation and by ignoring the relationship of technological tie-ins to this free-rider problem, Professors Ordover and Willig have proposed a legal test for predatory innovation that is seriously deficient in its analysis of the consumer-welfare effects of trying to police innovative activity by dominant firms.

The existing case law does not reach Ordover and Willig's sanguine conclusion that any such test is workable, let alone desirable. To the contrary, courts give the marketing practices that accompany product innovations a strong presumption of legality. This course is sensible and should be extended to its logical conclusion: a rule of per se legality for product innovation.