

An Economic and Legal Analysis of Physical Tie-Ins

Several recent antitrust suits have included claims that physical tie-ins,¹ a particular form of innovation, have violated the antitrust laws.² These physical tie-in cases, involving the simultaneous marketing of two or more new, physically compatible, complementary products, have all presented similar fact patterns. The defendant manufacturer possessed substantial market power in a primary goods market, and faced competition in a second market for parts, accessories, or other goods physically complementary to the primary product. The defendant introduced a new primary product for which it produced the only physically compatible complementary products. As with any new product introduction, the defendant achieved a temporary monopoly in this new primary product. Because competitors' products in the secondary market were physically incompatible with the new primary product, the defendant also temporarily increased its market power in the secondary market.³

The plaintiffs, who in all cases were competitors in the secondary market, attacked these physical tie-ins on one or both of two grounds. They first contended that the physical tie-in constituted a tying arrangement violative of Section 1 of the Sherman Act⁴ and Section 3 of the

1. The term "physical tie-in" seems to have appeared first in Comment, *Physical Tie-Ins as Antitrust Violations*, 1975 Ill. L.F. 224. The choice of the term "physical tie-in" is unfortunate because it suggests an inaccurate analogy to traditional tying arrangements. See p. 773 & note 89 *infra* (distinguishing physical tie-ins from traditional tying arrangements). Nevertheless, because the term has achieved considerable acceptance, it will be used throughout this Note to refer to introductions of physically compatible, complementary products.

2. *Berkey Photo, Inc. v. Eastman Kodak Co.*, 457 F. Supp. 404 (S.D.N.Y. 1978), *rev'd and remanded*, 603 F.2d 263 (2d Cir. 1979), *cert. denied*, 48 U.S.L.W. 3517 (U.S. Feb. 19, 1980) (Nos. 79-427, 79-499); *California Computer Prods. v. IBM Corp.*, [1979-1] Trade Cases (CCH) ¶ 62,713 (9th Cir. 1979); *Transamerica Computer Co. v. IBM Corp.*, [1979-2] Trade Cases (CCH) ¶ 62,989 (N.D. Cal. 1979); *ILC Peripherals Leasing Corp. v. IBM Corp.*, 458 F. Supp. 423 (N.D. Cal. 1978); *Bell & Howell v. Eastman Kodak Co.*, Civil No. 73-35 (N.D. Ill., filed July 8, 1974), *reported in* 595 ANTITRUST & TRADE REG. REP. (BNA) A-4 (1973) & 674 ANTITRUST & TRADE REG. REP. (BNA) A-9 (1974) (settled); *Telex Corp. v. IBM Corp.*, 367 F. Supp. 258 (N.D. Okla. 1973), *rev'd*, 510 F.2d 894 (10th Cir.), *cert. dismissed*, 423 U.S. 802 (1975); *Argus Photo Co. v. Eastman Kodak Co.*, Civil No. 79-4525 (S.D.N.Y., filed Aug. 27, 1979); *Warner Lambert Co. v. Gillette Co.*, Civil No. 79-1734 (D.N.J., filed June 13, 1979); *GAF Corp. v. Eastman Kodak Co.*, No. 73 Civ. 1893 (S.D.N.Y., filed April 30, 1973); *United States v. IBM Corp.*, No. 69 Civ. 200 (S.D.N.Y., filed Jan. 17, 1969).

3. It is not necessary that the secondary product be new. If the secondary product is not new, then although the innovator is unlikely to obtain a monopoly in that segment of the secondary market, his share of that market nevertheless should increase temporarily.

4. 15 U.S.C. § 1 (1976).

Clayton Act.⁵ Alternatively, they argued that the defendant had violated Section 2 of the Sherman Act⁶ by using the physical tie-in to transfer monopoly power from the primary to the secondary market.⁷

*Berkey Photo, Inc. v. Eastman Kodak Co.*⁸ is the most important physical tie-in case to date.⁹ For the first time, a physical tie-in—Kodak's 110 camera system—was found by a jury to violate Section 2 of the Sherman Act. On appeal, the Court of Appeals for the Second Circuit reversed the holdings concerning the physical tie-ins and remanded several of the claims for retrial. The economic reasoning underlying the decision is obscure, however, and the opinion fails to offer clear guidance as to when a physical tie-in violates the antitrust laws.

An economic and legal analysis of complementary-product introductions is needed because there is a significant danger that incorrect judicial analysis not only would produce incorrect decisions but also would adversely affect innovation.¹⁰ Moreover, neither courts nor economists have yet developed an analysis that captures the essential features of the innovation process in general¹¹ and the effects of physical tie-ins on market structure in particular.

This Note presents such an analysis, and demonstrates that although physical tie-ins may yield significant social benefits, they also may be used for predatory purposes.¹² The Note argues that because of their potential for predatory abuse, physical tie-ins should be tested under

5. *Id.* § 14. The three cases in which these claims have been raised are: *Response of Carolina, Inc. v. Leasco Response Inc.*, 537 F.2d 1307 (5th Cir. 1976) (alleging only § 1 violation); *Telex Corp. v. IBM 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) (alleging violation of both statutes); *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) (alleging violation of both statutes).

6. 15 U.S.C. § 2 (1976).

7. See note 2 *supra* (citing cases).

8. 457 F. Supp. 404 (S.D.N.Y. 1978) (opinion on defendant's motion for judgment n.o.v. and plaintiff's application for equitable relief), *rev'd and remanded*, 603 F.2d 263 (2d Cir. 1979), *cert. denied*, 48 U.S.L.W. 3517 (U.S. Feb. 19, 1980) (Nos. 79-427, 79-499).

9. The district court opinion is discussed in Comment, *Berkey Photo, Inc. v. Eastman Kodak Co.: The Predisclosure Requirement—A New Remedy for Predatory Marketing of Product Innovations*, 10 RUT.-CAM. L.J. 395 (1979). The opinion of the Second Circuit Court of Appeals is discussed in Comment, *Antitrust Scrutiny of Monopolists' Innovations: Berkey Photo, Inc. v. Eastman Kodak Co.*, 93 HARV. L. REV. 408 (1979).

10. See p. 785 *infra*.

11. See Nelson & Winter, *In Search of [a] Useful Theory of Innovation*, 6 RESEARCH POL'Y 37, 41 (1977) [hereinafter cited as *In Search*]; Nelson & Winter, *Neoclassical vs. Evolutionary Theories of Economic Growth: Critique and Prospectus*, 84 ECON. J. 886, 886-90 (1974) [hereinafter cited as *Critique and Prospectus*].

12. A predatory purpose or intent, as ordinarily used, connotes an intent to drive existing competitors out of business, or to discourage the entry of new competitors, or both, by unfair means. See R. BORK, *THE ANTITRUST PARADOX* 144 (1978); cf. Joskow & Klevorick, *A Framework for Analyzing Predatory Pricing*, 89 YALE L.J. 213, 219-20 (1979) (defining predatory pricing).

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Section 2 of the Sherman Act, according to certain rule of reason guidelines derived from the economic analysis presented in this Note. To demonstrate the legal and economic analysis developed here, the framework that is derived is used to analyze the *Berkey Photo* opinion.

I. Economic Analysis of Physical Tie-Ins

Because of the dynamic disequilibrium nature of the innovation process¹³ and of the intertemporal strategic considerations underlying predatory behavior,¹⁴ the most fruitful approach to analyzing the welfare effects of physical tie-ins is to employ the dynamic theories of innovation developed by Joseph Schumpeter.¹⁵ These theories can be integrated with traditional welfare economics theory to weigh the costs and benefits of physical tie-ins in terms of social welfare.¹⁶ First, however, a physical tie-in must be clearly defined.

A. *Physical Tie-In Defined*

The term "physical tie-in" describes a new product system consisting of two or more new complementary goods¹⁷ that are physically com-

13. See pp. 775-77 *infra*.

14. See p. 779 *infra*.

15. 1 J. SCHUMPETER, BUSINESS CYCLES 72-189 (1939) [hereinafter cited as BUSINESS CYCLES]; J. SCHUMPETER, CAPITALISM, SOCIALISM AND DEMOCRACY 72-106 (3d ed. 1950) [hereinafter cited as CAPITALISM]; J. SCHUMPETER, THE THEORY OF ECONOMIC DEVELOPMENT 65-94, 128-56 (1934) [hereinafter cited as ECONOMIC DEVELOPMENT]. See generally Nelson & Winter, *Forces Generating and Limiting Concentration under Schumpeterian Competition*, 9 BELL J. ECON. 524 (1978) [hereinafter cited as *Schumpeterian Competition*] (Schumpeterian theory can best explain competition and innovation); Nelson & Winter, *The Schumpeterian Trade-Off Revisited* (unpublished paper, Yale Univ. Economics Dept., April 1979) (examining Schumpeter's theory of innovation) [hereinafter cited as *Schumpeterian Trade-Off*].

16. Social welfare ordinarily is defined, for purposes of partial equilibrium analysis, as the sum of producers' and consumers' surplus. Producers' surplus essentially is the difference between producers' revenues and their costs, while consumers' surplus is the difference between what consumers would be willing to pay for a particular quantity of a good and what they in fact have to pay for that same quantity. See W. BAUMOL, ECONOMIC THEORY AND OPERATIONS ANALYSIS 497-500 (4th ed. 1977); I. A. MARSHALL, PRINCIPLES OF ECONOMICS 124, 499, 810 n.2, 830-31 (9th ed. 1961). This concept of "social welfare" also has been termed "consumer welfare," see, e.g., R. BORK, *supra* note 12, at 107-09; this latter characterization is rejected here, as it might suggest an exclusive concern with consumers' surplus.

As applied in antitrust analysis, the concept of social welfare is used in evaluating tradeoffs between productive efficiency and trade restriction. See, e.g., R. BORK, *supra* note 12, at 107-15 (examining monopolies); Williamson, *Economies as an Antitrust Defense: The Welfare Tradeoffs*, 58 AMER. ECON. REV. 18 (1968) (analyzing mergers). A similar approach is adopted here, with the modifications that various dynamic factors also are taken into account, and that the focus of analysis is on the maximization of longrun rather than shortrun social welfare.

17. Complementary goods are goods that consumers desire or are required to use together, such as coffee and cream, peanut butter and jelly, or a camera and film. See W.

patible with each other but physically incompatible, at least temporarily, with other existing goods. For clarity of exposition it is convenient to distinguish between primary and secondary markets and primary and secondary goods.¹⁸ For purposes of this Note, the "secondary market" is the one in which the physical tie-in allegedly has injured competition. In general, this market will include one of the two tied products just introduced and existing products that compete with the new secondary good. The "primary market" contains the other half of the new product pair and any other products that substitute for or compete with the primary good.¹⁹

Physical tie-ins must be distinguished from traditional tying arrangements or tie-ins, for they differ in three important respects. First,

NICHOLSON, MICROECONOMIC THEORY: BASIC PRINCIPLES AND EXTENSIONS 82-83 (1972). It actually is necessary for only one of the two complementary goods to be new, though in most cases both will be.

18. The following analysis focuses on the simple case of a physical tie-in involving only two new products, though it can be extended easily to systems introductions involving more than two products.

19. The denomination of primary and secondary markets may appear confusing and arbitrary in particular cases, since exclusionary effects may occur in both markets. In addition, the definitions ignore the possibility that one of the goods may be desired and that the second is purchased merely as an accessory. Cases may arise in which the new product pair is so innovative that there are no existing products that are close substitutes. In such cases, the primary and secondary markets would be limited to those two single goods. An example might be the introduction of the first computer and its associated peripheral devices, such as memories, control units, and printers. In such situations it becomes difficult, if not impossible, to speak of competitive harm in the secondary market, since by definition there is only one initial competitor within the market.

Finally, the characteristics of the product pair or product system introduction may vary in ways that can influence their exclusionary impact. For example, some product pairs, such as a computer system, may involve a once-and-for-all or at least long-term investment, with the result that an initial purchase of both goods from the innovator means that the buyer is unlikely to buy from competitors in the near future. Other product pairs may require continuing purchases of at least one of the products.

Examples may clarify the terminology. In the late 1960s, IBM introduced a new generation of computers, the "370 line," which consisted of both new central processing units (CPU's) and new related peripheral devices, such as memories, control units and printers. Various competing manufacturers of peripheral equipment brought suit alleging that these new CPU's, which were incompatible with their competing products, combined with IBM's dominance in the CPU market to injure competition in the market for peripheral devices, the secondary market, and to increase IBM's power in that market. *ILC Peripherals Leasing Corp. v. IBM Corp.*, 458 F. Supp. 423 (N.D. Cal. 1978); *Telex Corp. v. IBM Corp.*, 367 F. Supp. 258 (N.D. Okla. 1973), *rev'd*, 510 F.2d 894 (10th Cir.), *cert. dismissed*, 423 U.S. 802 (1975). Similarly, Kodak's introduction in 1972 of the 110 pocket instamatic camera system was challenged by a competing manufacturer and photo-processor, Berkey Photo, who alleged that the new camera system was introduced for the purpose of leveraging Kodak's monopoly power in the film market, the primary market, into increased market power in the secondary camera market. *Berkey Photo, Inc. v. Eastman Kodak Co.*, 603 F.2d 263, 279 (2d Cir. 1979), *cert. denied*, 48 U.S.L.W. 3517 (U.S. Feb. 19, 1980) (Nos. 79-427, 79-499). In addition, Berkey alleged that the 110 camera system permitted Kodak to increase its power in the film market. In this case, film would be the secondary market and cameras the primary. *Id.* at 293.

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they differ in the nature of the tie. The tie in a physical tie-in results from the physical compatibility of the new products with each other and their initial physical incompatibility with competing products. With traditional tying arrangements, however, there need be no physical relation between the tied products. Rather, the source of the tie is some contract, agreement, or understanding that requires a purchaser buying a good from a particular seller to buy another good from the same seller.²⁰ Second, physical tie-ins and traditional tying arrangements differ in who determines their duration. The time period of a tying arrangement is defined by the initial parties and is potentially permanent,²¹ while a physical tie-in lasts only as long as it takes a competitor to develop a compatible product. Finally, because of their differing duration, the reasons for creating traditional tying arrangements and physical tie-ins differ.²² These three differences make it inappropriate to apply the economic and legal analysis of traditional tying arrangements to physical tie-ins.²³

B. *Benefits of Physical Tie-Ins*

Innovation and technological progress are the primary sources of longrun increases in consumer welfare,²⁴ and it is the rate of innova-

20. For example, a manufacturer of tabulating machines may lease his machines only on condition that the lessee agree to purchase all of his tabulating cards from the lessor for as long as he leases the machine. *IBM Corp. v. United States*, 298 U.S. 131, 134 (1936).

21. For example, a manufacturer of salt-dispensing machines may sell only on condition that the buyer agree to purchase all his future salt requirements from the seller. *International Salt Co. v. United States*, 332 U.S. 392, 394 (1947).

22. Robert Bork offers five possible explanations for the creation of traditional tying arrangements: (1) evasion of price regulation, (2) price discrimination, (3) nondiscriminatory measurement of use, (4) economies of scale, and (5) technological interdependence or the protection of goodwill. R. BORK, *supra* note 12, at 376. In addition, where the tied goods can be used in variable proportions, there is a further possible explanation: (6) increased monopoly profits. See W. BOWMAN, *PATENT AND ANTITRUST LAW* 76-88 (1973).

Although reasons (4), (5), and (6) possibly would explain the creation of a physical tie-in as well, especially if the firm is prevented by law from employing a traditional tying arrangement, the chances of achieving for an extended period any of these objectives by means of a physical tie-in would appear to be small, because the tie of a physical tie-in is of uncertain duration and is terminated by the first competitor who develops a compatible imitation. It appears much more likely that the true basis for a firm's creating a physical tie-in is to be found in terms of the technological requirements of the product or in terms of the firm's predatory intent.

23. For discussions of the law and economics of traditional tying arrangements, see 3 P. AREEDA & D. TURNER, *ANTITRUST LAW* ¶ 733 (1978) [hereinafter cited as AREEDA & TURNER]; BOWMAN, *Tying Arrangements and the Leverage Problem*, 67 *YALE L.J.* 19 (1957); Markovits, *Tie-Ins, Leverage, and the Antitrust Laws*, 80 *YALE L.J.* 195 (1970).

24. These factors contribute far more to consumer welfare than does the elimination of allocative inefficiencies. See 2 AREEDA & TURNER, *supra* note 23, ¶ 407 at 284; F. SCHERER, *INDUSTRIAL MARKET STRUCTURE AND ECONOMIC PERFORMANCE* 346 (1970); J. Markham, *Concentration: A Stimulant or Retardant to Innovation in INDUSTRIAL CONCENTRATION: THE NEW LEARNING* 253-54 (H. Goldschmid, H. Mann, & J. Weston eds., 1974).

tion that largely determines the rate of technological progress.²⁵ Physical tie-ins, a form of innovation,²⁶ may confer both direct and indirect benefits on consumers. The direct benefits may derive from the product pair itself, which may better satisfy consumer preferences directly if it is totally new, if it is better in all its characteristics than existing products, if it is physically equivalent to but less expensive than existing products, or if it constitutes a new combination of characteristics that was previously unavailable.²⁷ Alternatively, it may benefit consumers by serving as a more efficient input in other production processes.²⁸ On the other hand, if the physical tie-in represents merely a redesign of the coupling or compatibility of the two products, there may be no direct benefit to consumers.

Physical tie-ins may also confer indirect benefits. Most important, physical tie-ins, like other forms of innovation, tend to engender further innovation.²⁹ In addition, they may increase employment by

25. See 2 AREEDA & TURNER, *supra* note 23, ¶ 407a at 284.

26. The term innovation is used broadly here. It is not restricted to major inventions, but rather includes any material modification of existing products or the introduction of any new product.

27. The following example illustrates this point. Assume that only two types of automobiles are available to consumers—Rolls-Royces and Volkswagens. Further assume that consumers are concerned with only two characteristics of these automobiles—gas economy and comfort. Consumers will be made better off if the two manufacturers introduce new models with improved gas economy and comfort, which are sold at the old prices, or if they simply lower the price on existing models. Moreover, some consumers, at least, will be made better off if a third manufacturer introduces a new model automobile that lies somewhere between the Rolls-Royce and Volkswagen in terms of gas economy, comfort, and price. See Lancaster, *Allocation and Distribution Theory: Technological Innovation and Progress*, 56 AMER. ECON. REV.: PAPERS & PROC. 14, 20-22 (1966) [hereinafter cited as *Allocation and Distribution Theory*]. See generally Lancaster, *A New Approach to Consumer Theory*, 74 J. POL. ECON. 132 (1966) (more mathematical treatment).

28. It is possible that the benefits of a physical tie-in may be due solely to one of the two complementary products. For example, IBM might develop a new computer line consisting of an improved CPU and new interface, but for which the peripheral devices have no advantages over existing peripherals. In such a case, it might be appropriate to consider whether the change in interface was necessary for the improvements in the CPU. In most cases, however, both products will contribute to the benefits consumers receive. For example, Kodak could not have offered the 110 pocket instamatic camera, which fits into a shirt pocket, if it had not developed the smaller 110 film cartridge.

29. Competitors have an incentive to imitate and to improve upon the innovation so that they can share in the temporary monopoly gains accruing to the new products and so that they can regain any business that may have been lost as a result of the innovation. See 1 BUSINESS CYCLES, *supra* note 15, at 100-01, 131; Kamien & Schwartz, *Market Structure and Innovation: A Survey*, 13 J. ECON. LITERATURE 1, 27-31 (1975). Moreover, the physical tie-in may serve as a general example of the profits that might be made through innovation and of the losses that might be suffered should competitors innovate first. See CAPITALISM, *supra* note 15, at 84-85, 90; Kamien & Schwartz, *supra*, at 30. Finally, the physical tie-in may also encourage further innovation by providing new technical information that others can use in developing further innovations. See *In Search*, *supra* note 11, at 56-60; R. Nelson, R & D, Knowledge, and Externalities 4, 15-18 (1977) (Working Paper 787, Institution for Social and Policy Studies, Yale University).

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creating new demands or by increasing demands for existing products.³⁰ Although most of the benefits of physical tie-ins are difficult to measure,³¹ they can be significant³² and should be considered in determining the legality of tie-ins under the antitrust laws.

C. *Costs of Physical Tie-Ins*

The primary cost of a physical tie-in is that it may exclude competitors in the secondary market or deter potential competitors from entering that market, which may result in the welfare losses associated with monopoly.³³ Analysis of these potential costs is complicated, however, because physical tie-ins generally involve the creation of new products and markets (or submarkets), changes in the pattern of consumer demands, and temporary disequilibrium in one or more markets. These temporary disequilibrium effects of physical tie-ins, which society should tolerate, must be distinguished from possible permanent effects on market structure.³⁴

30. BUSINESS CYCLES, *supra* note 15, at 145; ECONOMIC DEVELOPMENT, *supra* note 15, at 230.

31. The first difficulty arises from problems associated with measuring the direct benefits to consumers of a new product. Although some progress has been made in applying consumers'-surplus analysis to the question of product differentiation, see Schmalensee, *Entry in the Ready-to-Eat Breakfast Cereal Industry*, 9 BELL J. ECON. 305, 319-21 (1978); Spence, *Product Differentiation and Welfare*, 66 AMER. ECON. REV.: PAPERS AND PROC. 407 (1976), economists have yet to develop a theory of demand that adequately encompasses the introduction of new products and the resulting evolution in demands and consumer preferences.

Second, it is even more difficult to measure the beneficial externalities of a particular innovation—*i.e.*, the extent to which it spawns further innovation and the benefits yielded by those subsequent innovations—since this requires both a prediction of the innovations that might subsequently be developed and an estimation of the innovations that would have been developed in the absence of this new innovation.

32. See F. SCHERER, *supra* note 24, at 346-47; Markham, *supra* note 24, at 252-54.

33. The most widely recognized welfare loss associated with monopoly is a consequence of the restriction of a monopolist's output, which results from his ability to raise his price above the level that would result in a competitive market. Although such an output restriction may yield the monopolist a gain in producers' surplus, this gain is always outweighed by the loss in consumers' surplus. See R. POSNER, *ANTITRUST LAW: AN ECONOMIC PERSPECTIVE* 8-11 (1976); F. SCHERER, *supra* note 24, at 13-14, 400-04. In addition, it has been argued that monopolists, because they are sheltered from the rigors of competition, are more likely to incur higher costs through inefficient operation and to innovate less. See *United States v. Aluminum Co. of America*, 148 F.2d 416, 427 (2d Cir. 1945); 2 AREEDA & TURNER, *supra* note 23, ¶ 403c at 272; F. SCHERER, *supra* note 24, at 13, 35-36, 405-08; Williamson, *Dominant Firms and the Monopoly Problem: Market Failure Considerations*, 85 HARV. L. REV. 1512, 1514-22 (1972). *But see* R. POSNER, *supra*, at 15-16 (monopolists will seek to minimize costs and maximize profits in order to grow and to increase their chances of survival in a world of uncertainty); Schumpeterian Trade-Off, *supra* note 15, at 5-8 (monopolists will tend to innovate more because they can better appropriate the gains from innovation; also, society will benefit more from innovations introduced by monopolists, since they will be introduced throughout the market, rather than being limited to share of the market possessed by the innovating firm).

34. See pp. 776-77, 788 *infra*.

1. *Schumpeter's Dynamic Theory of Innovation Competition*

Joseph Schumpeter's theory of competition and the role of innovation provides a framework for analyzing the social costs of innovation.³⁵ The basic tenets of Schumpeter's theory are: (i) the introduction of any new product will cause a departure from competitive equilibrium such that the innovator enjoys monopoly gains and competitors suffer losses;³⁶ (ii) these gains and losses generally will be only temporary and will be eliminated as competitors adapt and imitate;³⁷ and (iii) innovators often will attempt to transform their temporary monopoly power into a permanent monopoly position.³⁸ Schumpeter argues that since innovation is "the powerful lever that in the long run expands output and brings down prices,"³⁹ the social gains arising from innovation far outweigh the losses due to temporary deviations from the model of perfect competition.⁴⁰ It is competition through innovation, not competition in the sense of the static competitive market model, that maximizes longrun consumer welfare.⁴¹

Temporary monopoly profits should be tolerated, Schumpeter argues,⁴² not only because they are the natural result of the innovation process, but more importantly, because they provide the necessary incentive for firms to innovate.⁴³ Schumpeter recognizes, however, firms' natural tendency to try to transform their temporary monopoly gain into permanent monopoly power, which might result in losses to society. Thus, he does not advocate eliminating all antitrust regula-

35. See note 15 *supra* (citing sources).

36. ECONOMIC DEVELOPMENT, *supra* note 15, at 131-32; *Schumpeterian Competition*, *supra* note 15, at 524. Schumpeter emphasizes that "the introduction of new methods of production and new commodities is hardly conceivable with perfect—and perfectly prompt—competition from the start," and that "perfect competition is and always has been temporarily suspended whenever anything new is being introduced . . . even in otherwise perfectly competitive conditions," CAPITALISM, *supra* note 15, at 105.

37. BUSINESS CYCLES, *supra* note 15, at 105; ECONOMIC DEVELOPMENT, *supra* note 15, at 131.

38. CAPITALISM, *supra* note 15, at 88-92.

39. *Id.* at 85.

40. Antitrust commentators generally have ignored this insight. For example, while Professors Areeda and Turner recognize that a "satisfactory rate of innovative activity . . . depends upon significant departures from the assumptions of perfect competition, and . . . [that] there are inevitable time lags of varying duration, before rivals can learn and copy the details of the innovator's new product," they fail to develop the implications of this observation, but consider instead the question of whether large firms or firms possessing monopoly power are better innovators than smaller or less powerful firms. 2 AREEDA & TURNER, *supra* note 23, ¶ 407a at 284-85.

41. CAPITALISM, *supra* note 15, at 85; F. SCHERER, *supra* note 24, at 346.

42. CAPITALISM, *supra* note 15, at 87-91.

43. *Id.* at 87-88, 90; see Kamien & Schwartz, *supra* note 29, at 14. This principle that temporary monopoly provides the necessary incentive for innovation also underlies the patent law. See p. 789 *infra*.

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tion.⁴⁴ Schumpeter's theory suggests that in analyzing the costs of a physical tie-in, the relevant issue is not whether the tie-in confers temporary monopoly power, but the magnitude of these temporary monopoly gains and whether, and how quickly, these gains will be eroded.⁴⁵

2. *The Possibility of Longrun Exclusionary Effects*

Under certain conditions, a physical tie-in may increase the innovator's longrun market power. This is demonstrated by the following simple, though extreme, example. Assume the following conditions hold:⁴⁶ (i) the innovator is the dominant firm in both primary and secondary markets; (ii) significant barriers to entry exist,⁴⁷ but because of existing and potential competition, the innovator practices limit pricing in both markets;⁴⁸ (iii) the physical tie-in replaces the

44. CAPITALISM, *supra* note 15, at 91.

45. This distinction between temporary and persistent monopoly power is similar to the traditional economists' distinction between shortrun and longrun monopoly power. Shortrun monopoly power is generally defined as the power of a firm to raise its price above its marginal cost, while longrun monopoly power generally implies the additional power to restrict competition or to exclude competitors. A firm may have the shortrun power to control its price without having any longrun power to restrict competition. Schmalensee, *On the Use of Economic Models in Antitrust: The Realemon Case*, 127 U. PA. L. REV. 994, 1005 (1979). Although frequently overlooked by judges deciding antitrust cases, this distinction is central in determining whether a particular firm has violated the antitrust laws. *Id.*

46. As argued below, these conditions are sufficient, but not necessary, for a physical tie-in to have a longrun exclusionary effect.

47. Professor Stigler has defined a "barrier to entry" as a "cost of producing (at some or every rate of output) which must be borne by a firm which seeks to enter an industry but is not borne by firms already in the industry." G. STIGLER, *THE ORGANIZATION OF INDUSTRY* 67 (1968). Although there is considerable disagreement, the following are frequently mentioned as barriers to entry: (1) legal limitations, such as patents and trade secret protection; (2) possession of an essential or superior resource, such as a raw material; (3) advertising and established buyer preference for brand names; (4) product differentiation; (5) higher capital costs for new entrants, resulting from greater uncertainty as to their probable success; and (6) increased costs resulting from the entrant's inexperience in producing for that market. See AREEDA & TURNER, *supra* note 23, ¶ 409 at 298-306; F. SCHERER, *supra* note 24, at 230. *But see* Posner, *The Chicago School of Antitrust Analysis*, 127 U. PA. L. REV. 925, 945-46 (1979) (under Stigler's definition, only (5) above could be considered a barrier to entry, and in practice such higher capital costs would pose no great obstacle to entrants).

Economists, approaching the problem of entry in a dynamic context, have emphasized recently that firms already in a market have certain strategic advantages, such as excess capacity, product differentiation, advertising, and innovation, which they can employ to intimidate and deter the entry of potential rivals. Although such strategic advantages may not fall within Stigler's definition, they do pose obstacles to potential entrants. See Levin, *Technical Change, Barriers to Entry, and Market Structure*, 45 *ECONOMICA* 347 (1978); Salop, *Strategic Entry Deterrence*, 69 *AMER. ECON. REV.: PAPERS AND PROC.* 335 (1979).

48. The concept of "limit pricing" is based on the observation that if a monopolist or a group of collusive oligopolists sets a price that maximizes shortrun profits and thus earns some monopoly profit, this might attract new rivals into the market, which will result in

innovator's existing products;⁴⁹ (iv) competitors must incur significant fixed development costs equal to those already incurred by the innovator in order to imitate the new complementary secondary product;⁵⁰ and (v) the innovator's and imitator's variable costs of production are equal.⁵¹

Given these conditions, the exclusionary effect of the physical tie-in can be shown by considering the effect of the tie-in on existing competitors in the secondary market and on potential entrants into that market. Existing competitors will be affected in three ways. First, the demand for competitors' incompatible, complementary secondary products will drop as consumers shift to the new products.⁵² Second, to

an eventual reduction in price and corresponding erosion of monopoly returns. Clark, *Toward a Concept of Workable Competition*, 30 AMER. ECON. REV. 241, 247-48 (1940). In such concentrated markets it is recognized that existing firms that seek to maximize profits over the longrun and to maintain their market shares might set prices just low enough to make entry unprofitable. If the market exhibits economies of scale or barriers to entry, the existing firms may still be able to earn some monopoly profits even at this limit price, though profits will be lower than those obtained at the shortrun profit-maximizing price. See F. SCHERER, *supra* note 24, at 219-24.

49. A physical tie-in that replaces the innovator's existing products rather than supplementing the existing product line will exacerbate the loss in demand and consequent revenue loss that secondary-market competitors will experience. See note 52 *infra*. In contrast, manufacturers of competing primary goods and secondary goods compatible with those competing goods may experience an increase in demand if buyers of the innovator's previous product pair fail to adopt the new product pair.

50. These costs include the costs of researching and designing new compatible complementary products, the costs of retooling plant and equipment in order to produce these new goods, and the losses arising from inventories of now obsolete goods. See Comment, *supra* note 1, at 224; Note, *Innovation Competition: Beyond Telex v. IBM*, 28 STAN. L. REV. 285, 296 (1976). The assumption that the lump-sum costs imposed on innovators equal those imposed on competitors was made merely for purposes of illustration. In practice, the innovator is likely to experience higher costs of development than imitators because it often is easier to copy than to invent. See Schumpeterian Trade-Off, *supra* note 15, at 6.

51. Variable production costs are assumed equal because there is no obvious way, *a priori*, to tell whether variable costs will be higher for the innovator or imitator or how these costs will compare to the variable costs of producing the earlier products.

52. To the extent that the new complementary product pair or system offers advantages over existing products, buyers are likely to purchase the new products when otherwise they would have purchased the old (of course, some entirely new purchasers may enter the market as well). As a result, the demand for existing primary and secondary products will drop, and competitors producing secondary products that are incompatible with the new primary product will suffer a revenue loss. The drop in demand for previously compatible secondary products will be exacerbated if the innovator stops selling his previous primary and secondary products at the same time that he introduces his new products, since buyers then will be deprived of the choice of purchasing the earlier primary products for which competitors produce compatible complements.

In some cases, the tie-in may affect competitors' revenues even before it is formally introduced. If the innovator announces that he has developed an improved product pair before he is ready to offer it on the market, potential buyers may postpone their purchases until the new products are available. As a result, a competitor's newly developed secondary

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the extent that competitors attempt to imitate the new secondary products in order to offer goods compatible with the new primary goods, they will incur higher fixed costs proportionate to output than are incurred by the innovator, and hence proportionately higher unit costs.⁵³ Third, and most important, the tie-in may signal secondary-market competitors that another tie-in could be introduced, should they compete too vigorously.⁵⁴ As a result of these three effects, some competitors may be driven out of business, and the remaining competitors, because of their economic injuries or because of their fear of further physical tie-ins, may compete less vigorously. The tie-in also will tend to discourage potential rivals from entering by raising barriers to entry⁵⁵ and by signaling potential competitors of the innovator's power to make their products obsolete by simply introducing another physical tie-in. Because the physical tie-in simultaneously disciplines or eliminates existing competitors and deters the entry of new competitors, the overall result will be that the innovator is able to raise

product may be made obsolete even though no alternative is yet available. Moreover, while such an early announcement can result in earlier demand decreases for competitors, it need not reduce competitors' imitation lag time, as an announcement is unlikely to contain sufficient technical information to aid competitors in imitation. Note, *supra* note 50, at 293-94; cf. *ILC Peripherals Leasing Corp. v. IBM Corp.*, 458 F. Supp. 423, 440 (N.D. Cal. 1978) (plaintiff Memorex contended that IBM's "phased announcements" of new products "made it more difficult for Memorex to keep pace").

It should be emphasized, however, that these revenue losses of competitors are private costs and not relevant social costs, see A. C. PIGOU, *THE ECONOMICS OF WELFARE* 188-90 (4th ed. 1932), except to the extent that they result in a subsequent increase in market concentration and hence in an increase in the social costs of monopoly.

53. This result follows directly from the assumptions that the innovator is the dominant firm in the secondary market, and that the lump-sum costs and variable costs to innovator and to imitator are equal, since the innovator, having a larger output over which to spread the lump-sum costs, consequently will have lower average or unit costs. See Areeda & Turner, *Predatory Pricing and Related Practices Under Section 2 of the Sherman Act*, 88 HARV. L. REV. 697, 732 (1975). In addition, it is generally true that the more quickly a competitor attempts to develop a compatible secondary product, the higher will be his costs of imitation. See Kamien & Schwartz, *supra* note 29, at 8. Thus competitors are forced to undertake rapid but expensive imitation if they wish to compete immediately with the new secondary product, or to suffer prolonged reduction in demand and revenue if they continue to attempt to sell their existing products.

54. See Joskow & Klevorick, *supra* note 12, at 214-15; Williamson, *Williamson on Predatory Pricing II*, 88 YALE L.J. 1183, 1185 (1979).

55. The physical tie-in may directly strengthen entry barriers by raising the fixed costs associated with entering the market, see note 53 *supra*, and possibly by making it more difficult for new entrants to produce, at a competitive cost, commodities currently desired by consumers (*i.e.*, by raising the costs of inexperienced producers relative to those of experienced producers), see Arrow, *The Economic Implications of Learning By Doing*, 29 REV. ECON. STUD. 155 (1962); Hirsch, *Manufacturing Progress Functions*, 34 REV. ECON. & STATISTICS 143 (1952). In addition, the tie-in may indirectly increase barriers to entry by raising the cost of capital to new entrants because of lenders' greater uncertainty as to the entrant's probable success. See 2 AREEDA & TURNER, *supra* note 23, ¶ 409 at 303-05.

his limit price and restrict supply,⁵⁶ thus causing the traditional welfare losses associated with monopoly.⁵⁷

3. *Factors Determining the Likelihood of Longrun Exclusionary Effects*

Although the above example demonstrates that under certain conditions a physical tie-in can have a longrun exclusionary effect on competition, it will not always have such an effect. The result will depend on the characteristics of the primary and secondary markets⁵⁸ and of the tie-in itself.

Among these relevant market characteristics, the most important is the innovator's prior market power in the primary and secondary markets. Because market power cannot be measured directly, it is necessary to consider such indicia as market share, barriers to entry,

56. The use of physical tie-ins to increase longrun market power is similar in many ways to the use of predatory pricing. In both cases the effectiveness of the strategy will depend on the characteristics of the market involved. Furthermore, both forms of behavior, when employed in a predatory manner, will result in a drop in demand and a loss of revenue to competitors. In the case of predatory pricing, the shift in demand results from the predator's lower price relative to his competitors. If the competitors attempt to meet the lower price they will suffer revenue losses and possibly absolute losses due to their lower price. With physical tie-ins, the drop in demand results from the introduction of a new primary product that is incompatible with competitors' secondary products. If competitors attempt to develop compatible products, they will suffer the costs of imitation as well as the costs of obsolete inventories. Both forms of predatory behavior also may be used in a strategic manner to raise barriers to entry and to signal competitors of threatened repeated actions. Finally, both forms of behavior, if effective, permit the predator to increase his market share and raise his limit price. See Baumol, *Quasi-Permanence of Price Reductions: A Policy for Prevention of Predatory Pricing*, 89 YALE L.J. 1, 2-3 (1979); Williamson, *Predatory Pricing: A Strategic and Welfare Analysis*, 87 YALE L.J. 284, 292-93 (1977).

In certain situations, a physical tie-in may be more effective than predatory pricing in imposing greater losses on competitors than are incurred by the predator. If the predator has a large market share and the costs of imitation are high, then a physical tie-in may impose proportionately greater unit costs on competitors than on the predator, and this disparity will increase as the predator's market share increases. See pp. 778-79 *supra*. Moreover, the shift in demand toward the predator's new product may actually result in an increase in shortrun profits. With predatory pricing, on the other hand, the larger the predator's market share, the greater will be his absolute losses, especially to the extent that his market share increases as a result of his below-cost pricing. See R. BORK, *supra* note 12, at 149-52.

57. See note 33 *supra*.

58. Considerable uncertainty will inevitably attend any inference of "long-run market outcomes from observable short-run behavior and short-run market conditions." Joskow & Klevorick, *supra* note 12, at 217. Nevertheless, the structure of the market and the nature of the conduct will significantly determine the probability that such a longrun increase in concentration can occur. Moreover, market structure will influence the relative size of the social costs resulting from any increase in market concentration. Finally, since the structure of the market will determine the potential private gain from any attempted predatory behavior, examining market structure can aid in estimating the likelihood that a firm would engage in predatory actions. *Id.* at 223-35.

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profit margins, and the elasticity of demand.⁵⁹ The most important of these is the innovator's primary market share, for if there are other sizeable primary-product manufacturers that produce goods for which the secondary-market manufacturers produce compatible complementary goods, the secondary-market competitors will not suffer as large a displacement of business and consequent revenue loss. Moreover, to the extent that there are comparable competing primary and secondary goods, the innovator's ability to raise prices and restrict supply is reduced.⁶⁰

The innovator generally must also have a large secondary market share for welfare losses to occur, since without a large secondary market share he would be unlikely to have sufficient capacity to produce all compatible secondary goods formerly supplied by competitors.⁶¹ In addition, he would be producing fewer units over which he could spread the fixed costs of developing the new product and retooling for its production, and thus would have little or no cost advantage over his rivals.

Other factors determining market power in the secondary market are also relevant. First, if barriers to entry in the secondary market are low, the innovator would be unable to raise his price without inviting the entry of new competitors who could produce compatible secondary products.⁶² Second, if the market elasticity of demand in the secondary market is high, the triangular welfare losses resulting from monopoly

59. 3 AREEDA & TURNER, *supra* note 23, ¶¶ 801-807 at 290-94; P. AREEDA, *ANTITRUST ANALYSIS*, ¶¶ 228-241 at 195-203 (2d ed. 1974).

60. P. AREEDA, *supra* note 59, ¶¶ 233-240 at 198-203; Schmalensee, *supra* note 45, at 1010-12.

61. This may be illustrated by the following example. Suppose IBM controlled 100% of the CPU market but only 25% of the market for peripheral equipment. If it introduced a new CPU, which it produced at full capacity, it would be unable to produce a corresponding output of peripheral equipment unless it previously had been operating at only 25% capacity in peripherals, which is unlikely. To the extent that IBM had to expand its capacity for producing peripheral equipment, competitors would have additional time to develop compatible peripheral equipment, with the result that IBM most likely would be thwarted in its attempt to obtain complete control over production of peripherals. *Cf. Berkey Photo, Inc. v. Eastman Kodak Co.*, 603 F.2d 263, 280 (2d Cir. 1979), *cert. denied*, 48 U.S.L.W. 3517 (U.S. Feb. 19, 1980) (Nos. 79-427, 79-499) (Kodak in 1965 pre-disclosed information concerning its new Super-8 movie films to competing movie-camera manufacturers because of its small share in that market). The above argument will not hold, however, if the innovator has excess capacity in some other area of production that can be converted quickly to the production of the new secondary products. Thus, in the above example, IBM would have little trouble gaining at least a temporary monopoly in peripherals if it had sufficient excess capacity in the production of CPUs and if this capacity could be shifted quickly to producing the new peripheral equipment.

62. Low entry barriers thus ensure that the monopoly power an innovator gains as a result of his innovation will only be temporary. See 2 AREEDA & TURNER, *supra* note 23, ¶ 409 at 298-306; F. SCHERER, *supra* note 24, at 219-22.

would be less.⁶³ Third, the size and nature of competitors also affects the innovator's market power and his ability to exclude secondary-market competitors by means of a physical tie-in. To the extent the competitors are large, financially strong, and innovative, they would be better able to weather the temporary losses caused by the innovation and to imitate and adapt more quickly. Thus, a few strong competitors, in contrast to many weak competitors, might prevent a tie-in from having any permanent effect.

In addition to the factors affecting the innovator's market power, the dynamic characteristics of both markets are relevant to the analysis. To the extent that demand is growing in the secondary market, new entrants as well as existing competitors, lured by the prospect of increasing profits, are more likely to resist the innovator's efforts to gain monopoly power in the secondary market.⁶⁴ Moreover, competitors in the secondary market are more likely to be able to produce complementary products for other primary product manufacturers if demand is growing in the latter market. Similarly, if both markets exhibit high rates of innovation, then it is likely that any monopoly power acquired by the innovator could be supplanted easily by a competitor's subsequent innovation.⁶⁵

Finally, the characteristics of the physical tie-in itself must be considered. If the physical tie-in is an addition to the innovator's product line rather than a replacement for existing products, the shift in demand from competitors' secondary products to the innovator's new product should be less severe.⁶⁶ In addition, the time required for imitation, and the competitors' cost of imitation relative to the innovator's cost of development, may be relevant.

63. See Joskow & Klevorick, *supra* note 12, at 226-27.

64. This argument resembles that underlying the theory of limit pricing, since in both cases new rivals are attracted into the apparently profitable market. See note 48 *supra*.

65. This conclusion may not hold, however, when the innovator consistently has been the leader in innovation. Moreover, to the extent that the innovation is significant and involves a technology exhibiting a "natural trajectory" (*i.e.*, where subsequent innovations build from or grow out of the initial innovation), *In Search*, *supra* note 11, at 56-60, the original innovator has the advantage of being the first to possess the relevant knowledge and thus may gain a headstart in developing further innovations. Nevertheless, since in both these situations society is likely to benefit from further innovation, such expected benefits should be weighed against any probable increase in market concentration.

Finally, while there is reason to believe that markets exhibiting a high rate of innovation have a tendency toward greater concentration, see Schumpeterian Trade-Off, *supra* note 15, at 9, this does not mean that the innovator, rather than one or more rivals, will gain dominance. In fact, when imitation is relatively inexpensive, imitation may prove the more profitable strategy. *Id.* at 6, 17, 20, 30-32, 39.

66. See note 52 *supra*.

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D. *Weighing Costs and Benefits*

1. *Evaluating the Particular Tie-In*

The practical difficulties involved in measuring the social costs of the temporary monopoly that arise from innovation⁶⁷ make any assessment purely speculative. Thus, it seems reasonable, following Schumpeter, to ignore these costs and simplify the welfare economic analysis by only weighing the expected longrun costs of increased monopoly against the social benefits of the physical tie-in.

The factors discussed above not only will determine the probability that a longrun increase in concentration will occur, but also will indicate the relative size of the resulting costs of monopoly.⁶⁸ If an evaluation of these factors suggests that no longrun increase in market concentration will result from the physical tie-in, then the physical tie-in must yield a net social benefit greater than or equal to zero, and no further weighing need be done. If, however, the evaluation suggests the likelihood of increased longrun market concentration as a result of the tie-in, then it becomes necessary to weigh these expected welfare losses against the potential benefits of the physical tie-in. This second-stage balancing will be even more speculative than the first stage, however, because the potential benefits are harder to measure.⁶⁹ Nevertheless, two indicators may be used to estimate benefits from the tie-in itself: first, whether the physical tie-in is less costly or more efficient than existing products, and second, whether the physical tie-in offers a distinctively new combination of features that was previously unavailable.⁷⁰ In addition, the innovator's past performance in terms

67. These difficulties stem in part from the dynamic disequilibrium nature of the temporary monopoly state. More important, however, are the difficulties in determining what state should be compared with this temporary monopoly. If consumer welfare before the introduction of the physical tie-in is compared with that immediately after the introduction, it will most likely be true that consumers have benefited from the tie-in, despite its being offered at a monopoly price. Such an empirical comparison could not actually be performed, however, as the partial equilibrium approach of consumers' surplus analysis would be inadequate in this context, and no feasible general equilibrium approach to such a weighing has yet been developed. If, on the other hand, a welfare comparison were made between the tie-in sold at a monopoly price and the tie-in sold at a competitive price, it would be necessary to consider further whether the tie actually would have been introduced at the same time in the latter case, or whether it might have been delayed or never introduced at all. As a practical matter, this comparison of the timing of the tie-in introduction would, of course, be impossible, because of the difficulty in evaluating incentives. Given these difficulties in welfare analysis, and given that any costs of the temporary monopoly are likely to be small relative to longrun effects, it seems best to ignore these temporary disequilibrium effects.

68. See note 58 *supra*.

69. See note 31 *supra*.

70. See p. 774 *supra*.

of innovation should be examined to determine the likelihood that he will continue to develop socially beneficial innovations in the future.⁷¹

Three examples will illustrate how this weighing can be done. First, assume that the innovator has a small market share in both markets, that new competitors can easily enter the secondary market, that imitation costs are low, and that the physical tie-in is significantly cheaper or better than existing products. Because of low entry barriers and the innovator's small market share, no significant increase in market concentration will result,⁷² yet consumers will have benefited from the innovation. The physical tie-in is clearly socially beneficial and should be legal.

Second, suppose that assumptions (i)-(v) of the example in the previous section hold. These assumptions imply that there is a significant, positive expected cost of monopoly resulting from the physical tie-in. If the further assumption were made, (vi) that the physical tie-in is not a different, more efficient, or cheaper product mix, but rather involves merely a change in the coupling or compatibility of the components, then it follows that the physical tie-in represents a net cost to society, and should be held unlawful.⁷³

Finally, retain assumptions (i)-(v) of the previous example, but alter assumption (vi) so that the physical tie-in represents a significant improvement over the innovator's and competitor's existing products. In addition, assume that the creator of the tie-in has been the leader in innovation in these markets. In this example, the weighing is more difficult because both significant social costs and social benefits result from the tie-in, neither of which can be measured with any great ac-

71. While past innovative performance is not a perfect predictor of future performance, it may suggest that the innovator has certain special talents or advantages in research and development that should not be discouraged. On the other hand, such an investigation of previous innovations may reveal repeated introductions of nonbeneficial tie-ins, used to obtain shortrun monopoly profits.

72. This follows for two reasons. First, competitors are not likely to be injured significantly, since their per-unit costs of imitation should not be significantly higher than the innovator's original cost of development. See note 53 *supra*. Second, if the innovating firm has, for example, only a 5% share of the secondary market, it is unlikely to have sufficient excess capacity to preempt the market entirely. In the time it would take for the innovating firm to develop such capacity, competitors should be able to develop and market compatible secondary products. See p. 781 *supra*.

73. If there were merely temporary rather than longrun monopoly effects, a physical tie-in involving only a change in the coupling or compatibility of the physical complements and thus providing no new benefits to consumers should be held legal even though it would still represent a net cost to society. The reason the antitrust laws should not condemn these cases is that they are likely to be rare and a contrary holding may have significant adverse effects on incentives to innovate. These incentive effects are discussed at p. 785 *infra*.

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curacy. The welfare analysis appears inconclusive, yet the tie-in should be held legal for another reason: the possible disincentives for innovation caused by holding a physical tie-in illegal.

2. *Incentive Effects in Developing a Legal Rule*

The analysis so far has focused only on the costs and benefits to society of particular physical tie-ins. In formulating a legal rule governing physical tie-ins, however, it is necessary to focus not only on the social costs and benefits of particular tie-ins but also on the way in which a particular legal rule will affect incentives for innovation.

The rate of innovation depends significantly on the expected return to innovation,⁷⁴ which in turn depends largely on the size of the expected temporary monopoly profits.⁷⁵ The threat of litigation under an overly broad rule and the attendant potential legal expenses and treble damage fines⁷⁶ could significantly reduce the expected return on innovations and thus chill the incentive to innovate.⁷⁷ Furthermore, such a rule may have serious adverse effects on the form of innovation, as firms attempt to adjust their innovations so as to make them legal.⁷⁸ These incentive effects suggest that in close cases physical tie-ins should be held lawful so that beneficial innovation will not be chilled.

74. The rate of innovation depends both on the level of expenditures on research and development and on the effectiveness of that research and development. Since research and development is costly, its level will depend largely on the expected private return. See W. BOWMAN, *supra* note 22, at 36-37; Nelson, *supra* note 29, at 1-2.

75. The importance of temporary monopoly profits in encouraging innovations has been recognized not only by economists, see, e.g., ECONOMIC DEVELOPMENT, *supra* note 15, at 128-56, but also by Congress in enacting the patent laws, Title 35 U.S.C. (1976), and by the courts, see, e.g., Kewanee Oil Co. v. Bicron Corp., 416 U.S. 470, 481 (1974); Berkey Photo, Inc. v. Eastman Kodak Co., 603 F.2d 263, 283 (2d Cir. 1979), *cert. denied*, 48 U.S.L.W. 3517 (U.S. Feb. 19, 1980) (Nos. 79-427, 79-499).

76. Clayton Act § 4 provides that any private person "injured in his business or property by reason of anything forbidden in the antitrust laws . . . shall recover threefold the damages by him sustained, and the cost of suit, including a reasonable attorney's fee." 15 U.S.C. § 15 (1976).

77. In analyzing the somewhat analogous problem of predatory pricing, Areeda and Turner make essentially the same argument: "extreme care [should] be taken in formulating such rules [against predatory pricing], lest the threat of litigation, particularly by private parties, materially deter legitimate, competitive pricing." Areeda & Turner, *supra* note 53, at 699.

78. An overly broad rule is likely to induce firms to develop new primary goods that are compatible with existing secondary goods in order to avoid suit, even though the resulting system may be less efficient or more expensive than a system developed without such legal constraints. Cf. ILC Peripherals Leasing Corp. v. IBM Corp., 458 F. Supp. 423, 440 (N.D. Cal. 1978) (plaintiff alleging that IBM had acted unlawfully in not designing its new CPU's so as to be compatible with plaintiff's existing peripherals); Telex Corp. v. IBM Corp., 367 F. Supp. 258, 341-42 (N.D. Okla. 1973), *rev'd*, 510 F.2d 894 (10th Cir.), *cert. dismissed*, 423 U.S. 802 (1975) (same).

II. Legal Analysis

If the antitrust laws are concerned at all with economic efficiency, then a sound economic understanding of physical tie-ins is essential for the development of appropriate legal standards.⁷⁹ A principled rule of reason approach to physical tie-ins can be derived from antitrust policies and precedents and the foregoing economic analysis.

A. *The Necessity of a Narrow and Well-defined Legal Standard*

A legal standard governing physical tie-ins should be judged, first and foremost, by how well it distinguishes between tie-ins conferring net social benefits and those imposing net social costs. In addition, it is necessary to consider how the rule influences the activities of firms, especially their innovative activities, and how difficult or costly it is for courts to implement.⁸⁰ Application of these criteria to physical tie-ins suggests that an appropriate legal standard should be narrow and well-defined.

The preceding economic analysis demonstrates that a physical tie-in can impose longrun social costs through increased market concentration only under certain limited conditions. Even then, however, the benefits of the tie-in may exceed its costs. Because of this significant possibility that physical tie-ins will be socially beneficial, any standards for determining their illegality must be drawn sufficiently narrowly that beneficial tie-ins will not be condemned.

A narrow and well-defined rule also would reduce innovative firm uncertainty concerning the legality of its physical tie-ins and thus

79. Schmalensee, *supra* note 45, at 994-95. Although there exists considerable disagreement among commentators concerning the appropriate objectives of antitrust policy, compare, e.g., 1 AREEDA & TURNER, *supra* note 23, ¶¶ 103-113, at 7-33 (economic efficiency and the maximization of consumer economic welfare should be the exclusive goal of antitrust policy) and R. BORK, *supra* note 12, at 7 (same) and W. BOWMAN, *supra* note 22, at 1 (same) with Elzinga, *The Goals of Antitrust: Other Than Competition and Efficiency, What Else Counts?* 125 U. PA. L. REV. 1191 (1977) (equity as well as efficiency considerations are relevant to antitrust policy) and Pitofsky, *The Political Content of Antitrust*, 127 U. PA. L. REV. 1051 (1979) (political values should enter into antitrust policy), even those who advocate the inclusion of noneconomic objectives in formulating antitrust policy, acknowledge that economic considerations should remain of primary importance, see, e.g., Elzinga, *supra*, at 1191-92; Pitofsky, *supra*, at 1075.

80. These criteria underlie the decision-theoretic framework that economists have applied in evaluating legal standards in other contexts. Under this approach, alternative legal standards are evaluated in terms of (a) the probability that they will cause particular types of errors, (b) the costs of such errors, and (c) the costs of implementing the various standards. The standard selected is that which minimizes the sum of the expected costs of error and the cost of implementation. See, e.g., Joskow & Klevorick, *supra* note 12 (applying decision-theoretic analysis in choosing among alternative predatory pricing rules). See generally H. RAIFFA, *DECISION ANALYSIS* (1968).

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would increase its incentive to innovate.⁸¹ In addition, such a standard would reduce the incentives for competitors to bring suit challenging the legality of socially beneficial tie-ins,⁸² which would not only increase innovators' incentives but also would limit the burdens that excessive litigation places on the courts.⁸³

Finally, provided that it is appropriately defined, a narrow, clear standard would reduce the probability of judicial mistakes in analyzing physical tie-ins, a danger particularly acute given the complicated and incomplete data that courts must evaluate to decide physical tie-in cases.⁸⁴ Such mistakes not only place unfair burdens on the immediate parties but also reduce firms' incentives to innovate.⁸⁵

The need for a well-defined legal standard might seem to suggest the use of a per se rule, since such rules often facilitate judicial application⁸⁶ and provide a "brightline" standard by which firms can judge the legality of their actions.⁸⁷ No simple per se rule, however, can distinguish physical tie-ins that are socially beneficial from those that are socially costly.⁸⁸ Consequently, it is necessary to apply the

81. See p. 785 *supra*. An overly strict or vague standard, on the other hand, might induce innovative firms to modify their behavior in order to avoid litigation. Some firms that would have innovated in the absence of the legal rule might decide not to. Others might feel compelled to develop only new products that are compatible with competitors' existing products, which would result in less efficient products or product systems, or to predisclose technical information concerning their new products to competitors, which would lower their expected return from the new products and hence reduce their incentives to innovate.

82. Potential plaintiffs will tend to bring suit only if the expected payoff, in terms of damages received or of improved competitive position, exceeds the significant costs of bringing the suit. A narrow standard will reduce the probability of a plaintiff's winning, and hence the expected payoff, in a suit involving a socially beneficial tie-in. See K. ELZINGA & W. BREIT, *THE ANTITRUST PENALTIES* 76-77, 90-91 (1976).

83. See Joskow & Klevorick, *supra* note 12, at 240.

84. *Id.* at 238-39; cf. Cooper, *Attempts and Monopolization: A Mildly Expansionary Answer to the Prophylactic Riddle of Section Two*, 72 MICH. L. REV. 373, 378 (1974) (arguing that expanding the attempt to monopolize offense by eliminating the requirement of market power will increase the likelihood of judicial errors in complex cases).

85. See p. 785 *supra*.

86. *Northern Pac. Ry. Co. v. United States*, 356 U.S. 1, 5 (1958); F. SCHERER, *supra* note 24, at 439; Joskow & Klevorick, *supra* note 12, at 216, 238; cf. Areeda & Turner, *Scherer on Predatory Pricing: A Reply*, 89 HARV. L. REV. 891, 897 (1976) (criticizing Professor Scherer's rule-of-reason approach to predatory pricing as judicially unmanageable).

87. See *Northern Pac. Ry. Co. v. United States*, 356 U.S. 1, 5 (1958); Joskow & Klevorick, *supra* note 12, at 216, 242. These advantages of a per se rule do not mean that such a rule is necessarily appropriate for evaluating physical tie-ins, however, for they may be outweighed by the costs of inaccuracy if the particular rule fails to take account of important market factors. Cf. Schmalensee, *supra* note 45, at 1016-31 (arguing that no single per se rule can accurately judge alleged predatory pricing); Scherer, *Predatory Pricing and the Sherman Act: A Comment*, 89 HARV. L. REV. 869, 890 (1976) (same).

88. With physical tie-ins, at least three per se rules are possible: (1) physical tie-ins are per se illegal; or (2) they are per se illegal only when the innovator's market share in both primary and secondary markets exceeds a specified percentage, but are per se legal if

“rule of reason” approach of Section 2 of the Sherman Act.⁸⁹ Utilizing the foregoing economic analysis and a strong presumption of legality,⁹⁰ the rule of reason can meet the need for a narrow and well-defined physical tie-in standard.

B. *General Principles for Applying the Rule of Reason*

Economic analysis suggests two basic principles for weighing the costs and benefits of a physical tie-in under the rule of reason. First, because any innovation yields some temporary monopoly gains, and because these gains constitute a necessary incentive for innovation, such temporary monopoly gains should be tolerated.⁹¹ Second, because the

either of the innovator's shares are less than the set limits; or (3) they are per se legal. The weaknesses of these three alternatives are easily seen. The first ignores the benefits that may result from product innovations and the possible effects such a rule would have on incentives to innovate. The second, while somewhat better, fails to take into account, first, that even a firm with a large market share in both markets may not possess any substantial monopoly power because of the characteristics of the markets, and second, that the benefits of the tie-in itself may outweigh any costs resulting from increased market concentration. The last alternative, although it has the advantages of not prohibiting socially beneficial tie-ins and of not adversely affecting incentives, ignores the possibility that a physical tie-in can be used in a predatory manner to effect a longrun increase in the innovator's monopoly power. Thus, the costs of inaccuracy of a per se rule for physical tie-ins are likely to exceed the benefits of simplicity.

89. Although plaintiffs have argued that physical tie-ins are equivalent to traditional tying arrangements and thus can also violate section 1 of the Sherman Act, 15 U.S.C. § 1 (1976), and section 3 of the Clayton Act, 15 U.S.C. § 14 (1976), courts have refused to hold that physical tie-ins are equivalent. *See* note 5 *supra* (citing cases). There are several reasons for continuing to do so. First, for a tying arrangement to violate section 1 of the Sherman Act or section 3 of the Clayton Act, there must be a “contract,” “agreement,” or “understanding” that the buyer or lessee either purchase or lease a second product from the vendor or lessor or agree not to purchase or to lease from any of the vendor's or lessor's competitors. 15 U.S.C. §§ 1, 14 (1976); 3 AREEDA & TURNER, *supra* note 23, ¶ 733 at 257. Physical tie-ins involve no such contract or agreement; a buyer is free to purchase competitors' existing goods and can purchase competitors' compatible secondary goods as soon as they are developed. Comment, *supra* note 1, at 230-31; *cf.* Automatic Radio Mfg. Co. v. Ford Motor Co., 242 F. Supp. 852, 857 (D. Mass. 1965); 272 F. Supp. 744 (D. Mass. 1967), *aff'd*, 390 F.2d 113 (1st Cir.), *cert. denied*, 391 U.S. 914 (1968) (defendant's design changes did not constitute illegal tying arrangement because involved no contractual limitation). Second, to the extent that the firm introducing the physical tie-in continues to offer previous products for sale, competitors have not been excluded from producing complements for the earlier primary products, *cf.* Telex Corp. v. IBM Corp., 367 F. Supp. 258, 347 (N.D. Okla. 1973), *rev'd*, 510 F.2d 894 (10th Cir.), *cert. dismissed*, 423 U.S. 801 (1975) (stating, as a ground for dismissing a physical tie-in claim, that the defendant continued to offer compatible CPU's), and moreover, they are free to offer products compatible with the new primary product as soon as they can develop and produce them. Finally, because the law of tying arrangements has so relaxed the requirement of market power in both the markets for the tying and tied goods, *see* Fortner Enterprises, Inc. v. United States Steel Corp., 394 U.S. 495, 502-03 (1969); *see generally* 3 AREEDA & TURNER, *supra* note 23, ¶ 733 at 257; R. BORK, *supra* note 12, at 366-72, it seems inappropriate for the reasons above, *see* pp. 780-82 *supra*, to judge physical tie-ins by such harsh standards.

90. *See* p. 795 *infra*.

91. *See* pp. 776-77 *supra*.

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overall benefits of a physical tie-in may outweigh its social costs, long-run market effects should not be conclusive of a tie-in's illegality.⁹² Both principles find considerable, though often implicit, support from courts and antitrust scholars.

Both Congress and the courts have recognized the importance of permitting temporary monopolies as an incentive for innovation. Congress, in granting a seventeen-year legal monopoly for patents,⁹³ believed that without such a temporary monopoly there would be insufficient incentives for invention.⁹⁴ Similarly, courts have held that developers of unpatented products have a right to the lead time arising from being first to market the new goods,⁹⁵ on the same ground that the temporary monopoly provides the necessary incentive for such invention. These policy judgments support the principle that the temporary effects of physical tie-ins should be ignored.

Furthermore, it is widely recognized that "§ 2 does not prohibit monopoly *simpliciter*."⁹⁶ This basic principle of the Sherman Act is due in part to the realization that monopoly need not arise only from exclusionary or predatory acts. Monopoly instead may develop from natural economies of scale⁹⁷ or from the monopolist's "superior skill, foresight, and industry,"⁹⁸ which are all socially desirable and therefore not condemned.⁹⁹ In addition, monopoly is often self-correcting; in the absence of restrictive practices, competition will eliminate monopoly power that is not based on greater efficiency.¹⁰⁰ Thus, courts generally condemn monopoly only when it is persistent and the result

92. See pp. 783-84 *supra*.

93. See U.S. CONST. art. I, § 8; 35 U.S.C. § 154 (1976).

94. See W. BOWMAN, *supra* note 22, at 2-3; F. SCHERER, *supra* note 24, at 380.

95. See note 75 *supra* (citing cases).

96. *Berkey Photo, Inc. v. Eastman Kodak Co.*, 603 F.2d 263, 273 (2d Cir. 1979), *cert. denied*, 48 U.S.L.W. 3517 (U.S. Feb. 19, 1980) (Nos. 79-427, 79-499); see, e.g., *United States v. Grinnell Corp.*, 384 U.S. 563, 570-71 (1966); *Standard Oil Co. v. United States*, 221 U.S. 1, 62 (1911) (noting "omission [in Sherman Act §§ 1 & 2] of any direct prohibition against monopoly in the concrete"); *United States v. Aluminum Co. of America*, 148 F.2d 416, 429-30 (2d Cir. 1945). See generally R. BORK, *supra* note 12, at 57; 16 J. O. VON KALINOWSKI, *ANTITRUST LAWS AND TRADE REGULATION* § 8.02[4] at 8-41 (1974).

97. *United States v. Aluminum Co. of America*, 148 F.2d 416, 430 (2d Cir. 1945); 3 AREEDA & TURNER, *supra* note 23, ¶ 621 at 47-50.

98. *United States v. Aluminum Co. of America*, 148 F.2d 416, 430 (2d Cir. 1945); cf. *United States v. Grinnell Corp.*, 384 U.S. 563, 571 (1966) (monopoly "as a consequence of a superior product, business acumen, or historic accident," not unlawful); 16 J. O. VON KALINOWSKI, *supra* note 96, § 8.02[4] at 8-63.

99. *United States v. Aluminum Co. of America*, 148 F.2d 416, 430 (2d Cir. 1945).

100. *Standard Oil Co. v. United States*, 221 U.S. 1, 62 (1911); 3 AREEDA & TURNER, *supra* note 23, ¶ 618 at 41-42; cf. R. BORK, *supra* note 12, at 196-97 (continued existence of monopoly indicates greater efficiency). *But see Williamson*, *supra* note 33, at 1514-22 (arguing that dominance once obtained is unlikely to be eroded).

of exclusionary acts that in no way benefit consumers.¹⁰¹ This policy suggests that even physical tie-ins that lead to longrun increases in market power should not be condemned if they also yield benefits exceeding these costs of monopoly.¹⁰²

Thus it would be consistent with existing antitrust policy and precedents to hold that a physical tie-in is illegal only if (1) the tie-in appears likely to produce a longrun increase in market power, and (2) the costs of increased market power exceed the benefits of the tie-in.

C. *Guidelines for Applying the Rule of Reason*

To implement these principles, specific guidelines are necessary to guide judicial decisionmaking and to reduce firms' uncertainties. A two-level test, based on the foregoing economic analysis, would meet these needs.

At the first level, a court would examine the defendant's market power in both the primary and secondary markets. If the defendant is found to lack monopoly power in the primary market, the case would be dismissed, regardless of the defendant's power in the secondary market. If the defendant is found to possess such power in the primary market but not in the secondary market, the case also would be dismissed, unless the plaintiff could show that the defendant has the capability of quickly acquiring such power in the secondary market. Only if the defendant is found to possess substantial monopoly power in both markets would the court proceed to a second-level, complete rule of reason analysis.¹⁰³

101. *But see* R. BORK, *supra* note 12, at 170-71 (arguing that courts have condemned acts by monopolists as exclusionary and violative of Sherman Act § 2 that are in fact efficiency creating).

102. In apparent support of this principle, Professors Areeda and Turner state:

Our concern about monopoly and the opportunities of rivals must not be allowed to obscure the objective of antitrust law which seeks to protect the process of competition on the merits and the economic results associated with workable competition. Accordingly, non-exploitative pricing, higher output, *improved product quality, energetic market penetration, successful research and development, cost-reducing innovations, and the like . . . are not therefore to be considered "exclusionary" for § 2 purposes even if monopoly results . . .* Antitrust law should not base the imposition of sanctions on the very conduct it would encourage.

3 AREEDA & TURNER, *supra* note 23, ¶ 626b at 77-78 (emphasis added). *See also* R. BORK, *supra* note 12, at 107-10 (monopoly should not be condemned if the gains in efficiency exceed the costs of restricted output).

103. This two-part test finds substantial support, at least implicitly, in the case law. In *United States v. Grinnell*, 384 U.S. 563, 570-71 (1966), the Supreme Court stated that "[t]he offense of monopoly under § 2 of the Sherman Act has two elements: (1) the possession of monopoly power in the relevant market, and (2) the willful acquisition or maintenance of that power as distinguished from growth or development as a con-

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1. *First-Level Analysis*

The first-level test is warranted because economic analysis established that a firm could increase its longrun market power by means of a physical tie-in only if it already possessed substantial market power in the primary market, and if it possessed similar power in the secondary market or the capability of quickly achieving such power in that market.¹⁰⁴ This standard may seem inconsistent with cases holding that

sequence of a superior product, business acumen, or historic accident." *Accord*, *Berkey Photo, Inc. v. Eastman Kodak Co.*, 603 F.2d 263, 274 (2d Cir. 1979), *cert. denied*, 48 U.S.L.W. 3517 (U.S. Feb. 19, 1980) (Nos. 79-427, 79-499); *California Computer Prods. v. IBM Corp.* [1979-1] TRADE CASES (CCH) ¶ 62,713 at 77,974 (9th Cir. 1979).

Procedurally, this two-part test could be implemented by bifurcating the trial on liability, hearing first the question of market power, and then, if necessary, proceeding to the second-stage inquiry. In this respect, the approach suggested here differs from the traditional procedure for trying monopolization claims since the question of monopoly power in both relevant markets is considered separately and prior to a comprehensive examination of all the facts of the case and of the other elements of the monopolization offense. Nevertheless, this test offers two important advantages in evaluating physical tie-ins: it simplifies judicial analysis and conserves judicial resources by avoiding lengthy trials in cases in which the defendant does not possess the requisite market power, and it provides a sound method for screening baseless harassment suits. Alternatively, the entire case could be heard at once, with the judge or jury, by means of special verdicts, deciding the issues in the appropriate order. This, of course, would eliminate some of the special advantages of this two-level approach, however.

This suggested approach also resembles that advocated by Professors Joskow and Klevorick for evaluating predatory pricing claims, *see* Joskow & Klevorick, *supra* note 12, at 242-62. It appears preferable to the Joskow-Klevorick plan, however, both because the first level analysis is in many cases considerably simpler than would be required under the Joskow-Klevorick procedure (for instance, if the defendant possessed a 90% market share in both primary and secondary markets, it would be unnecessary to consider other market characteristics at this first-level inquiry, but rather the court could proceed immediately to the full second-level examination), and because it appears to require less of a departure from existing antitrust precedent.

104. *See* pp. 780-82 *supra*. In determining whether a firm possessed sufficient monopoly power for violation of section 2, courts have relied heavily on the firm's percentage share of the relevant market. When a firm possessed a market share equal to or exceeding 80% of the relevant market, courts have found this alone sufficient to infer monopoly power. *See, e.g.*, *United States v. Grinnell Corp.*, 384 U.S. 563, 571 (1966) (87%); *American Tobacco Co. v. United States*, 328 U.S. 781, 797 (1946) (80%); *United States v. Aluminum Co. of America*, 148 F.2d 416, 424 (2d Cir. 1945) (90%). Conversely, a relatively small share of the relevant market has been held conclusive of a lack of monopoly power. *See, e.g.*, *United States v. E.I. du Pont de Nemours & Co.*, 351 U.S. 377, 399 (1956) (18%); *United States v. Aluminum Co. of America*, 148 F.2d at 424 (33%); *United States v. United Shoe Machinery Co.*, 110 F. Supp. 295, 346 (D. Mass. 1953), *aff'd per curiam*, 347 U.S. 521 (1954) (50%). Between these extremes, market share data has been found inconclusive, and courts have considered additional factors such as the characteristics of the relevant market and the business policies, conduct, and performance of the alleged monopolist. *See* 16 J. O. VON KALINOWSKY, *supra* note 96, § 8.02[3] at 8-32 to 8-41. Continued heavy reliance on market share data appears appropriate in physical tie-in cases, *see* pp. 780-81 *supra*, and in many cases this should be sufficient to make the first-level determination. When such market share data appear inconclusive, the factors discussed at pp. 781-82 would be highly relevant.

If the defendant firm is found not to possess monopoly power in the secondary market,

a firm with monopoly power in one market may be guilty of monopolization if it leverages such power into a second market, even though there is little chance of it achieving monopoly power in the second market.¹⁰⁵ Traditional leveraging theory has been criticized, however, because it implies irrational behavior; a monopolist in general can increase its power in a second market only at the cost of reduced profits in the market it dominates.¹⁰⁶ More important, the leveraging doctrine generally has been applied only when the defendant's action is likely to have a longrun exclusionary effect in the secondary market;¹⁰⁷ with physical tie-ins, exclusionary effects in the secondary market will only be temporary unless the defendant is also dominant in that market and additional conditions hold.¹⁰⁸ Thus, by requiring monopoly power in both markets as a precondition for any illegality, courts not only can limit their inquiries to those cases in which there is a possibility of longrun exclusionary effects, but also can provide a clear standard for innovators and potential plaintiffs as to which physical tie-ins are obviously legal.

2. *Second-Level Analysis*

If a defendant is found to possess the requisite market power to pass the first-level test, a court would proceed to analyze, in depth, the costs and benefits of the allegedly predatory physical tie-in. In evaluating these costs and benefits, a court first should examine the structural characteristics of the primary and secondary markets in order to deter-

but it is alleged that it has the capability of quickly acquiring such power, the plaintiff should be required to show that the defendant firm possesses sufficient excess capacity that could be converted quickly to producing secondary products so that the defendant could supply a dominant share of that secondary market. *See* note 61 *supra*.

105. *See, e.g.,* Northern Pac. Ry. Co. v. United States, 356 U.S. 1, 6 (1958); Times-Picayune Publishing Co. v. United States, 345 U.S. 594, 608-09 (1953); United States v. Griffith, 334 U.S. 100, 107-08 (1948).

106. *See* R. BORK, *supra* note 12, at 140-42; R. POSNER, *supra* note 33, at 173. This result may not hold, however, in cases in which the products produced by the monopolist in the first market may be used in variable proportions with complementary products of the second market to produce a given output or level of satisfaction. In such cases, a monopolist can increase his profits by imposing some form of restriction, such as a tying arrangement; this nevertheless may result in an increase in consumer welfare. *See* W. BOWMAN, *supra* note 22, at 84-88.

107. For example, in a tying-arrangement case like International Salt Co. v. United States, 332 U.S. 392 (1947), a seller could through contract or agreement require a buyer of product *A* to continue to purchase all of his requirements of a second product *B* from the same seller. Similarly, in United States v. Griffith, 334 U.S. 100 (1948), the defendant motion picture theater chain could pay a higher price in markets in which it possessed monopsony power in return for lower prices in markets in which it faced competition, in order to drive out competitors in the latter markets.

108. *See* pp. 776, 780-82 *supra*.

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mine the probability that longrun costs will be imposed.¹⁰⁹ In addition to the structural characteristics discussed earlier, various trend data should be examined. The trend in market shares, both before and after the introduction of the tie-in, should be considered, especially with respect to the secondary market.¹¹⁰ This will help the court determine whether the physical tie-in has significantly increased the defendant's share, and if so, whether this increase has been maintained or whether it has eroded as competitors developed compatible complements.¹¹¹ The trend in the number and size of competitors in the secondary market also should be reviewed, as well as the competitors' past performance in terms of innovation and imitation.¹¹² Finally, the size and trend of the defendant's profits should be analyzed to determine the persistence of the profits resulting from the physical tie-in.

The physical tie-in itself should be scrutinized in two ways. First, the court should consider whether the tie-in constituted a significant innovation¹¹³ or whether it was simply a redesign of existing products. Second, it is relevant whether the physical tie-in represents an addition to the defendant's line of products or is a replacement for previous products.¹¹⁴ When possible, however, the court should refrain from second-guessing the defendant's engineering decisions through con-

109. The market characteristics, discussed previously, determine not only the probability that longrun market concentration could occur, but also the likelihood that a firm would be induced to attempt to increase its market power (since these factors affect the size of the expected monopoly profits) and the expected social costs resulting from any increase in longrun market power. See note 58 *supra*.

110. See 3 AREEDA & TURNER, *supra* note 23, ¶ 804 at 292; Schmalensee, *supra* note 45, at 1030; cf. United States v. E.I. du Pont de Nemours & Co., 353 U.S. 586, 596 (1957) (anti-competitive effect of du Pont's acquisition between 1917 and 1919 of 23% of General Motors stock, considered in light of 1946-1947 market share data).

It is arguable that market-share trends should be considered in the first-level analysis. Including such information at this early stage would have the advantages of increasing the accuracy of the first-level inquiry, and, in cases in which the temporary increase in the defendant's market share was shortlived, of making the second-level inquiry unnecessary. Nevertheless, it is recommended that trends in market shares be considered in the second-level analysis for two reasons: first, inclusion of such data would necessarily complicate the first-level analysis, yet it is unclear how frequently such added information would eliminate the need for the second-level inquiry; and, second, explanation and understanding of data on market share trends may often be possible only in light of other information that would be offered only at the complete second-level inquiry.

111. See p. 776 *supra*.

112. See p. 782 *supra*.

113. See p. 783 *supra*.

114. If the tie-in represents only an addition to the defendant's line of products and the defendant continues to produce his previous primary products, the costs to competitors, for instance, in the form of obsolete inventories, would be reduced. A new product supplanting a previous product should not be conclusive of predation, however, since the new product may represent a general improvement over the old. Some evidence of such improvements, however, should be required.

sideration of possible alternative designs. To do otherwise not only would enmesh the courts in technical inquiries beyond their competence, but also would impose an excessive burden on firms to consider numerous alternative designs in order to weigh their possible adverse effect on competitors.¹¹⁵

The defendant's intent and conduct are also significant.¹¹⁶ Some inference of intent may be gleaned from the timing of the announcement of the new products and of the actual introduction of those products into the market.¹¹⁷ In addition, the defendant's pricing strategy for the new primary and secondary products may be important. To the extent the defendant prices his secondary product in a predatory manner, competitors will have more difficulty in developing compatible secondary products and in selling them at a price that will yield an adequate return. Unusually low pricing also may be relevant in determining the defendant's intent.¹¹⁸ Finally, the previous record of innovations in the relevant markets should be considered to determine whether the defendant firm generally has been a leader in innovation or whether it has tended to copy competitors' innovations. Evidence that the defendant has been a consistent innovator should

115. See *Response of Carolina, Inc. v. Leasco Response, Inc.*, 537 F.2d 1307, 1330 (5th Cir. 1976); *ILC Peripherals Leasing Corp. v. IBM Corp.*, 458 F. Supp. 423, 440-41 (N.D. Cal. 1978); *Telex Corp. v. IBM Corp.*, 367 F. Supp. 258, 347 (N.D. Okla. 1973), *rev'd*, 510 F.2d 894 (10th Cir.), *cert. dismissed*, 423 U.S. 802 (1975).

There is one possible exception to the above rule. When it is clear that one of the new products could have been made compatible with existing complementary products as well as the new complementary product at little or no increase in cost, it is reasonable to inquire into the defendant's reasons and justifications for restricting the compatibility of the new product. See, e.g., *Berkey Photo, Inc. v. Eastman Kodak Co.*, 603 F.2d 263, 288-89 (2d Cir. 1979), *cert. denied*, 48 U.S.L.W. 3517 (U.S. Feb. 19, 1980) (Nos. 79-427, 79-499) (for 18 months, Kodak restricted new Kodacolor II color print film to 110 film format). This should not be conclusive of illegality, however, as there may be justifiable reasons for initially restricting the product (e.g., Kodak justified its initial restriction of Kodacolor II film to the 110 format on the grounds that it wanted to restrict distribution of the new film "until the defects . . . were eliminated," and chose the 110 format because "the advantages of the new film were most useful for small cameras." 603 F.2d at 288 n. 42.)

116. Although the monopolization offense of section 2 requires no showing of a specific intent to monopolize, *United States v. Aluminum Co. of America*, 148 F.2d 416, 432 (2d Cir. 1945); *accord*, *United States v. Griffith*, 334 U.S. 100, 105 (1948), evidence of intent nevertheless may be relevant in determining the legality of a particular course of conduct, *Chicago Bd. of Trade v. United States*, 246 U.S. 231, 238 (1918); *accord*, *United States v. United States Gypsum Co.*, 438 U.S. 422, 436 n.13 (1978); *Berkey Photo, Inc. v. Eastman Kodak Co.*, 603 F.2d 263, 288 (2d Cir. 1979), *cert. denied*, 48 U.S.L.W. 3517 (U.S. Feb. 19, 1980) (Nos. 79-427, 79-499). See generally 3 AREEDA & TURNER, *supra* note 23, ¶ 626a at 73-76.

117. See note 52 *supra*.

118. Because lower prices on the physical tie-in sometimes will be simply a necessary response by the innovator to the lower prices or new products of competitors, it appears reasonable to apply the usual tests for predatory pricing to the new products. See generally Joskow & Klevorick, *supra* note 12.

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weigh in favor of the legality of the physical tie-in.¹¹⁹

These guidelines for applying the rule of reason are intended to allow a defendant ample opportunity to justify the tie-in. Nevertheless, because this weighing of costs and benefits necessarily involves rough estimates and because of the concern that the legal rule not inhibit innovation, this rule should be combined with a strong presumption of legality.¹²⁰ Thus, unless the costs clearly outweigh the benefits, the tie-in should be held lawful.

III. *Berkey Photo*: A Tentative Step in the Right Direction

*Berkey Photo, Inc. v. Eastman Kodak Co.*¹²¹ is the leading case on physical tie-ins. It is the first case in which a physical tie-in was found at trial to violate Section 2 of the Sherman Act, and the only case in which a district court and an appellate court extensively analyzed the problem. The *Berkey* opinion by the Court of Appeals for the Second Circuit is the most comprehensive and insightful discussion of the problem to date. Nevertheless, the court avoided extensive analysis of some issues by deciding them on narrow grounds, gave ambiguous answers to others, and committed one serious policy error. Applying the analysis advanced in this Note to the facts of the *Berkey* case illuminates both the failings in the *Berkey* court's reasoning and the value of the proposed approach.

A. *The Facts of Berkey*¹²²

In 1972 Kodak introduced the 110 camera system, consisting of the new 110 pocket instamatic camera and a new and smaller film format

119. When imitation costs are low and innovation costs are high, it may be more profitable for a firm to adopt a strategy of imitation rather than innovation. In such situations, the rate of innovation in the market will be determined by the few firms that continue to invest in research and development and to attempt to innovate. Schumpeterian Trade-Off, *supra* note 15, at 39-40. It would be counterproductive in such cases to attack those few firms pursuing the less profitable, but socially more beneficial, innovation strategy. In other market situations, one firm consistently may be an innovation leader, either because of economies of scale in research and development, *see* R. NELSON, M. PECK, & E. KALACHEK, *TECHNOLOGY, ECONOMIC GROWTH AND PUBLIC POLICY* 68 (1969), or because of natural trajectories in the development of the relevant technology, *see* note 65 *supra*. Again, it would be undesirable to hinder the innovation leader.

120. *Cf.* Schmalensee, *supra* note 45, at 1031 (courts deciding predatory pricing cases should combine use of the rule of reason with strong presumption of legality in order to avoid condemning or stifling desirable competitive pricing).

121. *Berkey Photo, Inc. v. Eastman Kodak Co.*, 457 F. Supp. 404 (S.D.N.Y. 1978) (opinion on defendant's motion for judgment n.o.v. and plaintiff's application for equitable relief), *rev'd and remanded*, 603 F.2d 263 (2d Cir. 1979), *cert. denied*, 48 U.S.L.W. 3517 (U.S. Feb. 19, 1980) (Nos. 79-427, 79-499).

122. The following summary of the facts is not intended to be complete. Other violations of the Sherman Act were alleged at trial but will not be discussed here because they are not relevant to the issue of physical tie-ins.

compatible with the new camera.¹²³ At the same time, Kodak introduced a new color print film, Kodacolor II, which was the only color print film available for use in the 110 camera and which, for eighteen months, was available only in the 110 format.¹²⁴ The introduction of the new camera, new film format, and new color print film constituted the first physical tie-in of the *Berkey* case.¹²⁵

The new Kodacolor II film required a new photofinishing process using different equipment and chemicals. Consequently, photofinishers competing with Kodak's photofinishing division were unable to process the Kodacolor II film until they had purchased new equipment and received instruction in and supplies for the new process, which for some time were only offered by Kodak.¹²⁶ Sales of the equipment and chemicals thus could be viewed as being physically tied to the sale of Kodacolor II film. This was the second tie-in of the *Berkey* case.

Berkey Photo, one of Kodak's competitors in the manufacture and sale of cameras and in photofinishing, alleged that Kodak had used these two physical tie-ins to monopolize all four relevant markets.

B. *The Second Circuit Opinion*

Writing for the Court of Appeals for the Second Circuit, Chief Judge Kaufman considered sequentially each of the four relevant markets and the associated allegations of monopolization and attempted monopolization.

Berkey made three separate, though related, arguments supporting its claim that Kodak used the first tie-in to monopolize the camera market.¹²⁷ Berkey's first claim, focusing on the introduction of the new camera and new film format, asserted that Kodak had breached a duty to pre-disclose its new film format to competitors so that they could have compatible cameras on the market in time for the new format's

123. 603 F.2d at 279-81.

124. *Id.* at 276-78. Kodak stated at trial and on appeal that it had developed the new film out of a concern that existing color films were too "grainy" to provide acceptable prints from such small negatives. *Id.* at 277. Kodak's justification for initially restricting the new film to the 110 format was that the film involved a "radically new technology," and that consequently Kodak wanted "to introduce it on a limited scale in order to test its technical performance before attempting to substitute it for Kodacolor X, Kodak's largest selling film." Brief for Eastman Kodak at 30.

125. Although the introduction of the three new products made up but one physical tie-in, plaintiff Berkey developed separate arguments challenging the legality of the new camera and new film format on the one hand, and of the new camera and new film on the other.

126. 603 F.2d at 290-91.

127. *Id.* at 279.

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actual introduction.¹²⁸ The Second Circuit dismissed this argument and held that as a matter of law, Kodak had no duty of predisclosure.¹²⁹ In so holding, the court reaffirmed the right of innovators to enjoy their temporary monopoly profits¹³⁰ and relieved dominant firms of the uncertainty they would have faced with a contrary ruling. The court failed, however, to discuss the separate argument that Kodak, even though it had no duty to predisclose the new camera and format, might nevertheless have violated Section 2 because of the exclusionary effect of the system's introduction on competitors.¹³¹ The court thus left unanswered the basic question of whether, and under what conditions, a physical tie-in might violate the antitrust laws.

Berkey's second and third arguments related to Kodak's simultaneous introduction of the 110 camera and Kodacolor II film, which, Berkey claimed, permitted Kodak to leverage its monopoly power in the film market into the camera market. With respect to its second argument, Berkey asserted that the success of the 110 camera was in large part due to its being marketed with the new Kodacolor II film, and contended that "because Kodacolor II was not necessary to produce satisfactory 110 photographs and in fact suffered from several deficiencies, these gains were unlawful."¹³² The court dismissed this claim as well.

128. Berkey contended that Kodak forfeited its right to profit from any camera-format innovations without predisclosure, because Kodak, with a monopoly in the film, had refused to make film available for formats other than those for which it made compatible cameras, thereby preventing other camera manufacturers from introducing cameras in new formats. *Id.*

129. *Id.* at 285. Requiring predisclosure of all technical information, the court noted, would stifle innovation, while requiring limited predisclosure would give firms too little guidance as to what must be disclosed. *Id.* at 281-82. In addition, the court found the alleged duty of predisclosure without precedent; therefore, "it would be inappropriate to hold that Kodak should spontaneously have recognized a duty to release advance information of its new products to its competitors." *Id.* at 285. Finally, noting that a firm with a much smaller share of the film market also could have introduced the new camera and new format, Judge Kaufman concluded that "the ability to introduce the new format without predisclosure was solely a benefit of integration and not, without more, a use of Kodak's power in the film market." *Id.* at 283. This last passage is ambiguous, for it might be interpreted as saying that physical tie-ins are per se legal, or, more narrowly, that physical tie-ins that are merely additions to the innovator's line of products are per se legal.

130. *Id.* at 283 (citing *ILC Peripherals Leasing Corp. v. IBM Corp.*, 458 F. Supp. 423, 437 (N.D. Cal. 1978) for proposition that depriving an innovating firm of its lead time would remove its incentive to invent).

131. This argument, along with the additional argument that Kodak had excluded competing camera manufacturers by refusing to market film in formats compatible with their cameras, had been made by Berkey's counsel both in brief, Post-Argument Brief for Berkey Photo, Inc., at 3-6, and at oral argument, Transcript at 69-73. The Second Circuit only addressed the latter argument, which it dismissed on the ground that Berkey had not sued Kodak for its refusal to sell film. *Id.* at 284.

132. *Id.* at 286. Berkey apparently emphasized the deficiencies of Kodacolor II in order, first, to show that the new product introduction was "primarily exclusionary and

Judge Kaufman observed that, although the earlier film, Kodacolor X, may have proved adequate in the 110 format, it was wrong to fault Kodak for attempting to design a superior product.¹³³ Furthermore, Judge Kaufman stated that whether a judge or jury finds a product inferior is irrelevant, so long as market success was not coerced.¹³⁴

Finally, Berkey argued, somewhat contradictorily, that by restricting Kodacolor II to the 110 film format for eighteen months, Kodak forced those wishing to use "the remarkable new film" to buy a Kodak 110 camera.¹³⁵ The court avoided full consideration of this issue by dismissing the claim on the narrow ground that Berkey had failed to prove any damages because it had offered no evidence that customers had in fact bought a 110 camera in order to use the new Kodacolor II film.¹³⁶

anticompetitive" and not "a form of honestly industrial competition, designed to produce something more attractive for the customer," see *Berkey Photo, Inc. v. Eastman Kodak Co.*, 457 F. Supp. 404, 416 n.12 (S.D.N.Y. 1978), *rev'd and remanded*, 603 F.2d 263 (2d Cir. 1979), *cert. denied*, 48 U.S.L.W. 3517 (U.S. Feb. 19, 1980) (Nos. 79-427, 79-499), and second, to avoid the holding of *United States v. Grinnell Corp.*, 384 U.S. 563 (1966), that a monopolist's acquisition or maintenance of monopoly power by means of a "superior product" is lawful, *id.* at 570-71.

133. 603 F.2d at 286.

134. *Id.* at 287. In addition, the court stated that the question of product quality has little meaning, since a "product that commends itself to many users because superior in certain respects may be rendered unsatisfactory to others by flaws they consider fatal." *Id.* at 286-87.

Although the court is correct in recognizing the difficulties inherent in any judicial analysis of product quality and in stressing the importance of market acceptance in the evaluation of product quality, a judge or jury must nevertheless make an independent inquiry into the question of quality in two important instances. First, in evaluating the benefits conferred by a physical tie-in, whether the tie-in merely supplements or replaces the existing product line is important. When a new product pair merely supplements or expands upon an existing product line, the choice offered consumers has been increased. If this product pair proves successful, it must better satisfy at least some consumers' wants than do existing products. In this case, market acceptance should be given great weight. When a new product supplants one or more existing products, however, it becomes impossible to compare the quality of the products in terms of consumer demand. Since consumers do not have a choice among all the possible alternatives, they easily could have preferred the product pair that was replaced. See generally *Allocation and Distribution Theory*, *supra* note 27. A new product supplanting existing products should not *ipso facto* be held illegal, however, since it may be better in many or all respects than the earlier products it replaced. Such a determination, however, should be made by the finder of fact who considers the physical attributes and prices of the products involved.

A second instance in which a judge or jury should consider the question of product quality occurs when it has been alleged that the primary product has been unnecessarily restricted so as to be compatible only with the new secondary product, in order that the innovator's monopoly power in the primary market can be transferred to the new segment of the secondary market. In this case, the tie-in should be held to be a form of illegal leveraging only if the new primary product is in fact superior to existing primary products and if there exists no reasonable justification for the restriction in compatibility. See *Berkey Photo, Inc. v. Eastman Kodak Co.*, 603 F.2d 263, 288-89 (2d Cir. 1979), *cert. denied*, 48 U.S.L.W. 3517 (U.S. Feb. 19, 1980) (Nos. 79-427, 79-499).

135. 603 F.2d at 288.

136. *Id.*

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Berkey further alleged that Kodak illegally had bolstered its monopoly in the film market through various exclusionary means, including its introduction of the 110 camera system, the first tie-in.¹³⁷ The Second Circuit remanded this claim for retrial on other grounds,¹³⁸ without explaining how the same film and camera tie-in could be illegal in the film market after the court had already held it legal in the camera market.¹³⁹ Moreover, the court failed to provide any guidance as to how the legality of this particular tie-in should be determined on retrial.

Finally, with respect to the markets for photofinishing equipment and services, Berkey sought damages for lost photofinishing profits and for overcharges by Kodak on photofinishing equipment, apparently on the theory that Kodak had unlawfully used its film-photofinishing tie-in in transferring its monopoly power in the film and camera markets to secure an unfair advantage over its photofinishing competitors.¹⁴⁰ The Second Circuit held that it was unclear whether these effects were attributable to Kodak's innovation or to its monopoly power, and reversed and remanded the claim for retrial.¹⁴¹

The Second Circuit's *Berkey* opinion contributes several important insights to the physical tie-in issue, including its holding that even monopolists have no duty to pre-disclose technical information concerning product innovations to competitors, and its emphasis on the importance of the innovator's lead time as an incentive for innovation. The court failed, however, to answer the most important question: under what conditions can physical tie-ins violate the antitrust laws? The opinion at one point seems to suggest that they are per se legal,¹⁴² yet at other times suggests that liability could be found.¹⁴³ Furthermore, under the rule of reason principles advanced in this Note, the *Berkey* court committed a serious error in remanding, rather than dismissing, the claim that Kodak used its film-photofinishing tie-in to bolster its position in the photofinishing market. The court found that "Kodak did not monopolize or attempt to monopolize the photo-

137. *Id.* at 293.

138. *Id.* at 298-99.

139. Under the analysis of this Note, *see* pp. 771-84 *supra*, it is of course possible for a physical tie-in to have permanent exclusionary and unlawful effects in one market and not in the second. But, if the Second Circuit is saying that the camera, film, and film format tie-ins are per se legal with respect to the camera market, *see* note 129 *supra*, it would appear inconsistent to hold that it is potentially illegal with respect to the film market.

140. 603 F.2d at 290-91.

141. *Id.* at 291-92.

142. *See* note 129 *supra*.

143. *See* 603 F.2d at 290-91.

finishing or equipment markets,"¹⁴⁴ and thus should have dismissed the claim.

C. *Hypothetical Application of the Guidelines to the Berkey Facts*

The facts contained in the Second Circuit's *Berkey* opinion are insufficient for a complete application of the guidelines advanced in this Note. It is possible, though, if the plaintiff's failures of proof and the actual disposition of the claims are ignored, to use the *Berkey* case to show generally how the guidelines might be applied by a judge or jury.

Consider first the introduction of the 110 camera system, the first physical tie-in. Berkey alleged that Kodak had illegally used this first tie-in to bolster its monopoly power in both the film and camera markets. Since the jury at trial found Kodak to possess monopoly power in both the camera and film markets,¹⁴⁵ this first tie-in would pass the first-stage inquiry. At the second stage, it would be necessary to consider the likelihood that Kodak could increase its longrun market power in either the camera or film markets by means of this first tie-in, and then to weigh this expected cost against the benefits of the new products. In evaluating the expected social costs of Kodak's increased market power, it would be particularly important to examine whether any persistent increase in Kodak's share of the film and camera markets results from the introduction of the 110 system, though the other factors discussed previously also should be considered.¹⁴⁶ In measuring benefits, the rapid and large growth in sales of 110 cameras and film suggests that, as the Second Circuit observed, consumers believed the 110 system had significant advantages over existing cameras and formats.¹⁴⁷ This strong consumer acceptance of new products that merely supplemented Kodak's existing product line should weigh heavily in favor of the legality of the camera-format introduction with respect to both the camera and film markets.

The legality of Kodak's initial restriction of its new Kodacolor II film to the 110 format and hence to the 110 camera is more doubtful. Berkey alleged that Kodak imposed this restriction solely for the purpose of leveraging its monopoly power in the film market into the

144. 603 F.2d at 291. In addition, the court had earlier noted that in 1970 Kodak's photofinishing division had held only 17% of the market. *Id.* at 271.

145. 603 F.2d at 279, 293.

146. With regard to the camera market, Kodak's subsequent and precipitous decline in market share in 1976, *see id.* at 273 n.11, should weigh heavily against its alleged monopolization of the camera market.

147. *Id.* at 286-87.

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camera market.¹⁴⁸ Since this restriction involved the camera and film markets, both of which Kodak dominated, the court would have to proceed to a complete second-level evaluation. At the second-stage inquiry, possible longrun exclusionary effects would again be considered in estimating potential social costs. In examining the benefits of the tie-in, however, the examination would focus not on the advantages of Kodacolor II, but rather on Kodak's justifications for restricting the new film to the 110 format when it could easily have cut it to fit other formats as well. This restriction of Kodacolor II to the 110 format should not be held unlawful, however, if any of the following facts were shown: that no persistent increase in Kodak's power in the camera market resulted,¹⁴⁹ that the new Kodacolor II film did not offer any advantages over existing Kodacolor X that would increase the demand for Kodak's 110 cameras, or that Kodak had socially justifiable reasons for the restriction.¹⁵⁰

Berkey also claimed that the new equipment and chemicals required for processing Kodacolor II constituted a second unlawful physical tie-in. This claim would not pass the first-level test, since the jury at trial found that Kodak did not possess monopoly power in either the photofinishing or photofinishing equipment markets,¹⁵¹ and, therefore, the claim should be dismissed.

Conclusion

Physical tie-ins may be used in a predatory manner to increase an innovator's longrun market power in one or more markets, and, as a result, they should be subject to the scrutiny of Section 2 of the Sherman Act. Nevertheless, because physical tie-ins can benefit consumers and can have longrun adverse effects on market structure only under limited conditions, and because overly strict regulation may adversely affect the incentive to innovate, a narrow and well-defined legal standard is required. This Note provides such a standard, something the Second Circuit failed to do. The guidelines recommended here for applying the rule of reason would focus not on the possible temporary effects on competition, but rather on the weighing of the benefits of the tie-in against any probable longrun anticompetitive effects.

148. *Id.* at 288-89.

149. *See* note 146 *supra*.

150. *See* note 134 *supra*.

151. 603 F.2d at 275, 291.