Stanford Technology Law Review

Network Effects and Antitrust Law: Predation, Affirmative Defenses, and the Case of *U.S. v. Microsoft*

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CITE AS: 2002 STAN. TECH. LAW REV. 4
http://stlr.stanford.edu/STLR/Articles/02_STLR_4

I. INTRODUCTION

¶ 1 The dramatic rise of the high-tech sector of the economy in the 1980s and 1990s created new challenges for antitrust law. As in the days of the Sherman Act's passage, a few firms now dominate crucial aspects of the U.S. economy. Most notable among these new corporate goliaths is Microsoft, whose Windows operating system, depending on market definition, holds an 80 to 95% market share.[1] It is therefore not surprising that the Justice Department has taken a keen interest in the tactics that Microsoft employed to establish and maintain its dominant position. The result has been the most important antitrust litigation since the breakup of AT&T: *United States v. Microsoft Corp.*[2] *Microsoft* is important not only because it involves a leading corporation in a crucial sector of the economy, but because the case has introduced the arguably new concept of network effects into antitrust jurisprudence.

¶ 2 A network is any market in which the consumption of a good by one consumer has a positive impact on the value of that good's consumption by another consumer. A telephone, for example, is only useful to an individual if others have them as well. The more people who have them, the greater the number of possible phone calls one can make, and the more valuable telephones become. The goal of this article is to detail the unique opportunities that networks create for both anti-competitive and pro-competitive practices, and then to apply this analysis to the Microsoft case.

¶ 3 The proposition that network industries require heightened antitrust scrutiny has gained increasing acceptance in both the academic world and the Justice Department.[3] This belief rests mainly on the theory that predation, via predatory pricing, ties, exclusive dealing, or the closure of access to an essential facility, is much easier to achieve in a network. This belief is not universal, however. Some commentators have argued that antitrust law is too blunt a tool to apply rigorously to the high-tech sector,[4] and others have questioned whether network markets are especially prone to anti-competitive behavior.[5] Some scholars have suggested

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* J.D., Yale University, 2001. Ph.D. expected 2002 (Yale, Economics). The author would like to thank George Priest and participants in the Antitrust Seminar at Yale Law School for helpful discussions and suggestions.

[1] *See* U.S. v. Microsoft Corp., 84 F. Supp. 2d 9, ¶ 35 (D.D.C. 1999) (Jackson, J.) [hereinafter *Microsoft Findings of Fact*].

[2] U.S. v. Microsoft Corp., 87 F. Supp. 2d 30 (D.D.C. 2000), *aff'd in part and rev'd in part per curiam*, 253 F.3d 34 (D.C. Cir. 2001).

[3] *See, e.g.*, Carl Shapiro, *Exclusivity in Network Industries*, 7 GEO. MASON L. REV. 673, 677-78 (1999) (arguing that exclusive deals and incompatibilities can impede network competition); Joel Klein & Preeta Bansal, *International Antitrust Enforcement in the Computer Industry*, 41 VILL. L. REV. 173, 178 (1996) (arguing that network effects require heightened vigilance from antitrust enforcers). Note that Klein was head of the Justice Department's Antitrust Division under President Clinton. *See generally*, Daniel S. Evans & Richard L. Schmalensee, AEI-Brookings Institute Joint Center for Regulatory Studies, *Be Nice to Your Rivals: How the Government is Selling an Antitrust Case Without Consumer Harm in United States v. Microsoft*, in DID MICROSOFT HARM CONSUMERS: TWO OPPOSING VIEWS 45, 66-70 (2000), *available at* http://www.aei.brookings.org/publications/books/consumers.pdf.

[4] *See, e.g.*, DAVID B. KOPEL, ANTITRUST AFTER MICROSOFT: THE OBSOLESCENCE OF ANTITRUST IN THE DIGITAL ERA (2001).

[5] *See, e.g.*, Stan Liebowitz & Stephen E. Margolis, *Network Effects and the Microsoft Case*, *in* DYNAMIC COMPETITION AND PUBLIC POLICY, at 190-91 (Jerry Ellig, ed. 2001) (arguing that network markets, such as software products and operating systems, are highly competitive even though some firms have large market shares); Ronald A. Cass & Keith N. Hylton, *Preserving Competition: Economic Analysis, Legal Standards and*

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that network industries are nothing new and that courts have decided cases involving networks in the past no more or less successfully than cases involving standard industries.[6] The aim of this article is not to directly resolve this disagreement. Rather, for the sake of argument at least, this article accepts that network competition provides unique opportunities for anti-competitive strategies. However, network competition also provides some unique *pro-competitive* justifications for practices that have traditionally received antitrust scrutiny, such as tying, exclusive dealing, and low-pricing strategies.

¶ 4 The entire case against Microsoft is a network predation story in the personal computer operating systems market. Microsoft's defense focused mainly on rebutting the claim that Microsoft had market power and arguing that its strategies, such as tying its Internet browser to Windows, did not harm consumers. This article, , considers a number of affirmative defenses premised on the network characteristics of Windows that Microsoft could have offered but did not. This is not to second-guess the attorneys for Microsoft, who may have had good reasons not to present these defenses, but rather to show that network effects can be a double-edged sword in an antitrust case.

¶ 5 The article is organized as follows: Section II discusses the unique character of network markets. Section III examines the opportunities networks present for anti-competitive practices. A variety of practices, including exclusion from an essential facility, tying arrangements, exclusive dealing, and predatory pricing, are considered. The key elements necessary to achieve successful predation are given special focus. Section IV examines the government's case against Microsoft, especially whether or not the necessary conditions for successful predation were present. Finally, Section V develops an affirmative defense based on the presence of network effects for some of Microsoft's more controversial practices.

II. NETWORK EFFECTS

¶ 6 For the purposes of this paper, a network is any market in which one individual's consumption of a good positively affects the value of that good's consumption to another individual. Members of a communication network, for example, derive direct benefits when others join.[7] An individual can derive consumption value from a telephone only because other consumers have telephones as well. Each additional member provides another person with whom to communicate, directly increasing the value of the system to all consumers.

¶ 7 Indirect benefits to other consumers may result from declining average costs. Declining average costs are brought about by economies of scale, or high fixed costs, combined with low or constant marginal costs, which necessitate a customer base of a particular size. For example, video rental stores have high fixed costs. An increase in the number of households with VCRs will spread the costs of complementary products (VCR tapes) over more consumers, which will increase the number of rental establishments and the selection of movies while lowering the movie rental price. Thus, adding another household with a VCR to the market may increase the value of VCRs to other households. Of course, beyond some critical size, expanding a network may bring no benefits at all.

¶ 8 Operating systems are undoubtedly networks. Software products are complementary goods to an operating system and have high fixed costs and low marginal costs of production. Thus, if more software is written for a specific operating system, more consumers may choose that system. As a system adds users, more software developers will write for that system since the costs of production can be spread over more

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Microsoft, 8 GEO. MASON L. REV. 1, 36-37 (1999) (noting while entry barriers may be higher in network markets, payoffs to successful entry are higher as well); Robert A. Levy, *Microsoft and the Browser Wars*, 31 CONN. L. REV. 1321, 1352-58 (1999) (disputing the significance of network effects in the Microsoft case).

[6] *See, e.g.*, Timothy J. Muris, *Is Heightened Antitrust Scrutiny Appropriate for Software Markets?, in* COMPETITION, INNOVATION AND THE MICROSOFT MONOPOLY: ANTITRUST IN THE DIGITAL MARKETPLACE 89-91 (Jeffrey A. Eisenach & Thomas M. Lenard eds., 1999) (arguing that traditional antitrust tools are adequate for analyzing Microsoft's practices); Lawrence J. White, *Microsoft and Browsers:: Are the Antitrust Problems Really New?, in* COMPETITION, INNOVATION AND THE MICROSOFT MONOPOLY: ANTITRUST IN THE DIGITAL MARKETPLACE, *supra,* at 137, 139-148 (arguing that the issues in *Microsoft* are little different from vertical relationships among railroads, a subject that courts have long addressed).

[7] See Michael L. Katz and Carl Shapiro, *Network Externalities, Competition, and Compatibility*, 75 AM. ECON. REV. 424, 424-426 (1985) for a classification and discussion of direct and indirect network effects.

consumers. This is sometimes called a "positive feedback loop."[8] There is a strong communicative component to software and operating systems as well. Individuals write and exchange programs using a specific operating system. The greater the number of individuals who learn to use an operating system, the more portable (and hence valuable) those particular skills become.

¶ 9 The particular problems associated with network industries, are referred to as *network effects* throughout this paper. Network effects can be divided into two categories of primary concern: network size and network entrenchment.

A. Network Size

¶ 10 Since networks increase in value as they increase in size, it is important that they achieve the membership level that optimizes functionality. The value of membership to an individual, however, does not reflect the full social value of joining the network because others in the network derive benefits from adding a new member. This is called a *consumption externality*. Thus, absent a mechanism to internalize consumption benefits external to individual consumers, networks will not be the socially optimal size. Networks may not be optimally sized for another reason: they frequently become dominated by a single firm that will have some incentive to restrict output. Dominance by a single firm is a common result in a declining average cost industry, and a "natural monopoly" is not of particular concern to antitrust law, though it may be to government regulation in general.

¶ 11 To formally demonstrate the consumption externality generated by networks, consider the case where the value of a network good to an individual is some function of the number of other network consumers, say $V_i(n-1)$ where n = the network's population and V_i = individual i's value function or his net benefit from joining the network. Because network effects are positive, V_i is an increasing function of n.[9] An individual n+1 joins the network only if his net benefit (benefits less all costs) to joining, $V_{n+1}(n)$, is positive. The total social benefit derived from individual n+1 joining the network, however, is $V_{n+1}(n) + \Sigma_i \{V_i(n)-V_i(n-1)\}$, where $V_i(n)-V_i(n-1)$ is individual i's valuation of having another member added to the network. The summation term therefore represents the gain to all other members that comes from one additional entrant. The consumption externality results because the new member does not take these values into account in his decision. When $V_{n+1}(n)$ is negative, but the sum $V_{n+1}(n) + \Sigma_i \{V_i(n)-V_i(n-1)\}$ is positive, person n+1 will not join the network even though it would be a benefit to society. Therefore, networks will tend to be too small.[10] The correct social policy, therefore, may be to subsidize network membership to some extent.

¶ 12 This explanation of a network's consumption externalities, however, relies on a static framework and is somewhat misleading. After all, if the network only has value if others are in it, how could networks get started in the first place? No one values a communications network, for example, unless there are other network members. Therefore, if a network begins with zero members, no one will ever join. In a dynamic framework, the story becomes more realistic. Here, the individual's value of the network becomes dependent on his subjective belief regarding the eventual size of the network, and network owners can act so as to influence consumer expectations and network size. Indeed, the economy is replete with examples of thriving networks, some of which were established quickly. Automobiles were adopted even though a network of gasoline stations had to be created simultaneously, and a sufficient number of cars was required before gasoline stations could be made profitable. The telegraph, the telephone, and email have all been created and rapidly adopted despite the obvious network characteristics of these goods.

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[8] *See Microsoft Findings of Fact*, *supra* note 1, ¶ 39.

[9] Network effects are the flip-side of the tragedy of the commons. In that case, the value of one consumer's consumption is decreased by another's consumption via crowding or over-use, and Vi is a decreasing function of n. When making his decision whether or not to enter a public beach, for example, the consumer bases it on whether $V_i(n)>0$. But if the new consumer enters, the welfare of those currently on the beach is decreased by $\Sigma_n \{V_i(n)-V_i(n-1)\}$ due to crowding. If $V_i(n) + \Sigma_n \{V_i(n)-V_i(n-1)\}<0$, social welfare is decreased by the new entrant.

[10] In the case of an indirect network effect caused by declining average costs, an alternate way to describe the network externality is that consumers only consider average costs when making their consumption decisions. When a new consumer buys a VCR, for example, average rental costs decline for other consumers as well. The new consumer, however, is unlikely reckon this larger social saving in his decision calculus absent any attempts by other consumers or the network owner to subsidize him.

1. Consumer Expectations and Coordination

¶ 13 If an individual believes the network will expand to include n other consumers, his valuation of joining the network will be $V_i(n)$ even if no one has yet joined the network. If enough individuals have like expectations, then the network will be set up. Consumers themselves may influence expectations if they can coordinate their actions and find potential members. It is important to note, however, that the externalities detailed above are still present. Even assuming that individuals can coordinate to establish a network, they still do not internalize all of the social benefits to joining, and there may be non-members whose membership would represent a net gain to society. In addition, there is always a risk to consumers that the network will not be viable, and their irretrievable investments in learning and equipment will be lost. For example, consumers who bought Betamax machines instead of VCRs later had nowhere to rent Betamax tapes after video cassettes became the standard technology.

¶ 14 There are a variety of market mechanisms that network owners can use to influence consumer expectations about network size and viability. For example, the network owner may wish to credibly commit to a certain network size by making sunk investments such as building a large factory, advertising, or offering long-term contracts.[11] These actions signal that the network will be large, prices low, and the network long-lived. Consumers will therefore be more likely to join.

2. Network Owners and Network Size

¶ 15 In addition to influencing consumer expectations, network owners may internalize some of the externalities that are present in consumer decision-making. Since the value of the network increases as its membership increases, the network owner has an incentive to directly increase the size of the network over some range.

¶ 16 The network owner may directly increase the size of the network in a variety of ways. Most obviously, a network owner may achieve a larger network size by "penetration pricing."[12] This can be done by offering either a very low price initially or large volume discounts. It has been shown that in the presence of consumption externalities, a monopolist will set a price below the optimal monopoly price in absence of consumption externalities, but that this price will still be higher than the competitive network equilibrium.[13] This result is intuitive. The value of the network is a function of membership size. Decreasing price increases membership, and this in turn increases network demand, which benefits the monopolist. Absent credible threats of entry, however, the network monopolist will not charge the socially optimal price. At some point, the benefits of expanding the network will be exceeded by the lost monopoly profits that result from increased supply.

¶ 17 More subtle methods of expanding the network are also available. For example, a network owner may open the network to other firms if the network effects are sufficiently large.[14] Katz and Shapiro note that, in the case of a software-hardware network, the network owner has an incentive to open the software market to competition, both as a credible commitment not to engage in ex-post hold up, (discussed in greater detail below), and to increase the supply of software, (i.e., complementary products).[15] This strategy will directly increase the size of the network by increasing the benefits of membership, and it will also positively influence consumer expectations about the size of the network and the likelihood of ex-post holdup, thus indirectly increasing network size. Many observers believe that these considerations were the motivation behind IBM's licensing of its personal computer technology to independent PC manufacturers, and that Apple's failure to do so accounts for its loss in the PC wars.[16]

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[11] This could be viewed as a form of bonding. *See* Michael L. Katz & Carl Shapiro, *Systems Competition and Network Effects*, 8 J. ECON. PERSPECTIVES 93, 104-5 (1994).

[12] For a description of penetration pricing strategies see CARL SHAPIRO & HAL R. VARIAN, INFORMATION RULES: A STRATEGIC GUIDE TO THE NETWORK ECONOMY, 273-74 (1999).

[13] *See* Nicholas Economides, *The Economics of Networks*, 14 INT'L J. IND. ORG. 673, 682-83 (1996). Economides makes the classic assumption that the monopolist network owner cannot price discriminate.

[14] *See* SHAPIRO & VARIAN, *supra* note 12, at 10-11; Nicholas Economides, *supra* note 13, at 691.

[15] *See* Katz & Shapiro, *supra* note 11, at 103.

[16] *See* Levy, *supra* note 5, at 1342.

3. Networks and Vertical Integration

¶ 18 Vertical integration may also increase the size of the network. Consider a market with successive monopolies: one a hardware monopolist, the other a software monopolist. Successive monopolies, or two separate monopolies in complementary goods, can result in a contraction of supply greater than if both monopolies were owned by the same firm.[17] Thus, joint monopoly profits will be maximized by joint ownership and joint ownership is socially desirable because it will increase output.[18]

¶ 19 Monopolists in both network and non-network markets will wish to avoid successive monopolies. Network effects, however, enhance these incentives because a successive monopoly will shrink the network. While merger is one solution to the problem of successive monopolies, an alternative solution is for the hardware monopolist to offer his own version of the software in order to increase competition in the software market. Either of these actions would increase the number and lower the price of complementary goods in the network, thereby making the network larger and more valuable.

¶ 20 Network owners may also wish to vertically integrate to overcome standardization problems. By standardizing complementary products, network owners may increase the size of their network by making its product easier to use and the skills required readily transportable.[19] Thus, a network owner may wish to intervene even if the market for complements is competitive. Indeed, economists Michael Katz and Carl Shapiro argue that such vertical integration "may be one of the central responses to the potential inefficiencies of systems (network) markets."[20]

¶ 21 In sum, firms may behave quite differently in the presence of network effects than otherwise. They may adopt low pricing strategies and attempt to influence consumer expectations about network size and viability. Instead of leaving complements to a competitive market, as a classic monopolist may, a network owner may enter the market to increase the supply of the complements and to impose standardization, to the end goal of increasing the size, and hence value, of his network.[21] If the market for complements is not competitive, a network owner has an even greater incentive than a non-network firm to avoid the problems caused by a successive monopoly. Any reduction in the number of network consumers not only costs him business but also makes his product less valuable to the remaining consumers.

B. Sub-optimal Networks

¶ 22 Even if networks manage to achieve the optimal size, another concern about networks remains. It is at least a theoretical possibility that, due to network effects, the best network may not win the initial competition, and a superior network may not be able to dislodge an existing inferior one even if the benefits of adopting the new network exceed the switching costs. Obviously, this concern is greatest in markets that will only support a single network; otherwise the dynamics of competition should continue to favor the superior technology.

¶ 23 These facts alone do not imply a role for antitrust law. Indeed, they may not cause a great deal of consternation if one's confidence in the government's ability to pick winning technologies is no greater than one's confidence in the market's ability to pick winners. Economists have noted the theoretical possibility, however, that an existing network may entrench its position via a variety of anti-competitive practices and that anti-competitive practices could help an inferior network win in the early stages of competition.[22]

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[17] For a discussion of successive (bilateral) monopoly in the antitrust context see, e.g., H. HOVENKAMP, ECONOMICS AND FEDERAL ANTITRUST LAW 196-97 (1985).

[18] *Id. But see* Richard D. Friedman, *Antitrust Analysis and Bilateral Monopoly*, 1986 WIS. L. REV. 873, 900-04 (1986) (arguing that successive monopolies will be motivated to arrive at a solution that maximizes joint profits).

[19] *See* Nicolas Economides & L. J. White, *Networks and Compatibility: Implications for Antitrust*, 38 European Economic Review 651, 657 (1994) (arguing that mergers between vertically related firms in network industries should "have a presumption of beneficial social consequences" in part due to the standardization benefits they might achieve).

[20] *See* Katz & Shapiro, *supra* note 11, at 113.

[21] In general, a monopolist may extract the maximum monopoly if he owns one part of a production process. *See infra* note 40 and accompanying text.

[22] *See, e.g.*, Michael L. Katz & Carl Shapiro, *Antitrust in Software Markets*, *in* COMPETITION, INNOVATION AND THE MICROSOFT MONOPOLY: ANTITRUST IN THE DIGITAL MARKETPLACE, 65, 70, 78 (Jeffrey A. Eisenach & Thomas M. Lenard eds., 1999).

1. Network Competition, First-Mover Advantage, and Tipping

¶ 24 Some have argued that, in the initial stages of network competition, the optimal technology may not win because of the unique importance of marketing and distribution strategies.[23] The triumph of VHS over Betamax and Windows over Apple's operating system are listed as primary though not uncontroversial examples.[24] These concerns are motivated by two unique aspects of network markets: the special advantages that "first movers" have in network competition and the propensity of network markets to "tip".

¶ 25 The result of first-mover advantage is that the first entrant's product need not be superior to the offerings of latecomers to win the market.[25] For example, the first network to establish itself in a new field (i.e. operating systems for personal computers) did not have to deal with barriers to entry that come from a preexisting network. There are no switching costs from moving from one system to another if no system exists. In addition, the first mover will also have the most members initially, and network size confers advantages. If the first mover has a substandard technology, this technology could nonetheless win.

¶ 26 Network markets are also prone to tipping.[26] Tipping occurs when one network has taken such a large portion of the market that competing networks no longer have enough members to be viable. Even though an individual consumer may prefer a competing network's technology, the benefits (due to network effects) from joining a dominant network may swamp these considerations. Thus, marketing techniques, or anti-competitive practices that gain large market share for a network, may "tip" the market in favor of that network.

¶ 27 While concerns about tipping to an inferior system may be valid, one should not overlook the fact that marketing techniques have an intrinsic value as well. Network effects mean that significant benefits are conferred when network membership increases. If one firm has a technically inferior system, but finds a way to put that system in the hands of millions of consumers so as to take advantage of network effects, more value may be generated than if the superior system had become dominant but less widely distributed. Society would like to have the technically superior system be both dominant and widely distributed, but if its owners fail to establish such a network because of lack of foresight, the second-best option may be the inferior, but widely distributed technology.

2. Lock-In and Ex-Post Holdup

¶ 28 After a network becomes dominant, switching to a new network may be expensive because retraining and retooling are required. Even if switching costs are low for an individual, switching in the presence of network effects may require a level of coordinated action by consumers that may be difficult to achieve, especially if there are many members. Thus, consumers may be locked into a substandard network, and network owners can exploit this situation.

¶ 29 The most famous example of a sub-optimal network (though not one that concerns anti-competitive practices) is the standard layout of typing keyboards in which the top left-hand letters spell "QWERTY."[27] If a new keyboard arrangement, such as the Dvorak arrangement, would improve typing speeds, a switch may be a net gain to society. Due to network effects, however, it may not be worthwhile for one typist to switch by himself. He may be able to type faster on his own, but his skill would no longer be transportable. In addition, he would have to use a special keyboard, which may be too expensive to manufacture for just one person. Therefore, if typists cannot coordinate, the sub-optimal technology is left in place. Other examples of sub-optimal standardization include the adoption of VCR technology over Betamax and the adoption of

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[23] See Stanley M. Besen & Joseph Farrell, *Choosing How to Compete: Strategies and Tactics in Standardization,* 8 J. ECON. PERSPECTIVES 117, 118-119 (1994) and S. J. Liebowitz & Stephen E. Margolis, *Network Externality: An Uncommon Tragedy,* 8 J. ECON. PERSPECTIVES 133, 147-48 (1994) for some suggested examples of suboptimal standardization due to network effects.

[24] See *Besen & Farrell,* supra *note 23, at 118*, in *COMPETITION, INNOVATION AND THE MICROSOFT MONOPOLY: ANTITRUST IN THE DIGITAL MARKETPLACE, 55-58 (Jeffrey A. Eisenach & Thomas M. Lenard eds., 1999).*

[25] For a discussion of first-mover advantage, see Dennis C. Mueller, *First Mover Advantages and Path Dependence*, 15 INT'L J. IND. ORG. 827 (1997).

[26] For a general discussion of tipping and networks see Mark A. Lemley & David McGowan, Legal Implications of Network Economic Effects, 86 Cal. L. Rev. 481, 495-500 (1998).

[27] *See* Paul A. David, *Clio and the Economics of QWERTY*, 75 AM. ECON. REV. 332 (1985).

MS-DOS in the early 1980s over other possible operating systems.[28] All of these examples of locked-in networks have been vigorously disputed.[29]

¶ 30 Once consumers are locked into a system, they may be subjected to ex-post hold up by the network owner, meaning that the network owner will try to extract more rent after his product is dominant. For example, the network owner could lower his price in the initial stages of competition in order to gain market dominance, but later raise the price at least as much as any switching costs and perhaps even more if switching requires coordinated action by consumers. Network members might anticipate ex-post hold up, however, and hence reduce their willingness to pay for membership at the start. This is why firms may wish to find a way to credibly commit to low future prices, perhaps by licensing technology as IBM did. Network owners, however, will not always find it advantageous to adopt open standards or license technology, and ex-post hold up then becomes a concern.

¶ 31 Engaging in ex-post holdup, however, is not a riskless undertaking. It will deter network expansion as prices rise and consumers anticipate holdup. In addition, it will encourage entry by increasing potential profits and the number of people willing to switch networks. The emergence of competition may be especially worrisome to a network owner, given the propensity of one or only a few networks to dominate the market.

III. NETWORKS AND ANTITRUST

¶ 32 There is a clear theoretical possibility that networks may not be large enough and substandard technologies may be left in place too long. This alone does not concern antitrust law. The purpose of antitrust law is to protect consumers from anti-competitive actions by firms, not to pick technological winners.

¶ 33 However, network effects afford firms unique opportunities to harm their rivals. The entrenchment of a sub-optimal technology by anti-competitive actions is undoubtedly an appropriate sphere for antitrust intervention. Such intervention, however, must take into account the possible pro-competitive explanations for a firm's actions. A variety of strategies enable network owners to internalize consumption externalities. These strategies benefit consumers. A pro-consumer antitrust law should therefore punish the entrenchment of inferior networks, but also craft protections for business strategies that internalize consumption externalities.

¶ 34 We can perhaps draw some tentative conclusions regarding networks and antitrust from the nature of network markets described above. First, network effects imply large market share, and this large share may not only be beneficial to consumers but essential to the existence of the network.[30] When a network depends solely on economies of scale, such as an automotive network, the economy may be sufficiently large to support dozens of firms. On the other hand, when the network is purely communicative, a single technology may become dominant. This is certainly true in the case of fax machines, telephones, and other communication equipment. To be of maximum value, a fax machine must be able to communicate with other fax machines. Therefore, the market will eventually achieve a certain degree of standardization. If one firm has intellectual property rights in the standard technology, then it will dominate the market. This market share, however, may be quite fragile.[31] If a new and better technology is introduced, it may unseat the old standard and capture the whole of the market. In addition, while entry into network industries may be riskier and more difficult than in a normal industry, the payoffs are higher as well.[32] Thus, network effects mean that

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[28] *See* Liebowitz & Margolis, *supra* note 23, at 147-48.

[29] *See id.* at 146-48. Liebowitz and Margolis dispute almost all of the central facts in the QWERTY story in *The Fable of the Keys*, 33 J. L. & ECON. 1 (1990).

[30] *See* Besen & Farrell, *supra* note 23, at 118.

[31] *See* David S. Evans & Richard Schmalensee, *A Guide to Antitrust Economics of Networks*, ANTITRUST, Spring 1996, at 38.

[32] For a detailed discussion, see Cass & Hylton, *supra* note 4, at 36-37.

a single firm may dominate the market, but that its dominant status may be fleeting. Liebowitz and Margolis, for example, document wide swings in market shares for a number of software products.[33]

¶ 35 Second, consumption externalities imply that activities undertaken by the network owner to expand the network are generally pro-competitive. These activities include credibly committing to network size and price and the disciplining of the market for complements. By expanding the network, the network owner improves not only the welfare of those who are brought into the network but also increases the value of the network to current users.

¶ 36 Third, activities undertaken by the network owner that contract the network are likely to be anti-competitive. The starkest example of this may be when a network owner denies a potential competitor access to his network, perhaps by the introduction of an incompatibility.[34] Since expanding the network benefits its members, the network owner likely has an anti-competitive reason for denying a new member access. Denying access to a potential competitor is a form of predation; the network owner incurs a cost (forgone revenue from access fees) to eliminate a rival in the hopes of retaining future monopoly rents.

¶ 37 Fourth, there is a broad category of activities that can either be pro-competitive or anti-competitive. These activities may be ambiguous because they may expand the network, which looks pro-competitive, while simultaneously excluding rivals, which is predatory. Tying, exclusive contracts, and low-pricing strategies fall into this category. In addition, when complementary products are also potential substitutes, any disciplining of the market for complements becomes ambiguous, since the network may use this strategy to eliminate a possible future rival.[35]

A. Predation and Networks

¶ 38 A firm can prey on its rivals only if it can impose disproportionate costs on them. The damages inflicted on the rival firms must be disproportionate because the predatory activity in general is costly to the predatory firm.[36] Examples of predation include foreclosing essential facilities, the construction of barriers to entry through ties or exclusive contracts, and predatory pricing.

1. Foreclosing an Essential Facility

¶ 39 The paradigmatic example of an essential facility is a transportation network with a bottleneck owned by a rival firm. In *U.S. v. Terminal Railroad Ass'n of St. Louis*,[37] the Supreme Court held that the Sherman Act prevented the railroads owning a vital bridge from denying competitor railroads access to that bridge.[38] Further, the Court provided that access had to be granted on equal terms.[39]

¶ 40 As a general rule, however, it is not in the interest of the owner of the bottleneck to exclude his rivals. Rather, economic theory suggests that the owner of an essential facility should grant competitors access but charge a super-competitive price.[40] This is the familiar result that a firm need not own the whole industry, but merely have monopoly control over a vital portion of the chain of production, to extract the full monopoly

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[33] Liebowitz & Margolis, *supra* note 5, at 178-89.

[34] A colorable argument even exists for permitting the exclusion of possible competitors from the network. The competitor may not be interested in investing and expanding the existing network, and hence may just free ride off of the network owner's previous investments. Barring such free riders may increase the size of the network. For a discussion of this possibility, see David A. Balto, *Networks and Exclusivity: Antitrust Analysis to Promote Network Competition*, 7 GEO. MASON L. REV. 523, 538-43 (1999).

[35] For a more complete discussion of this possibility, see Katz & Shapiro, *supra* note 22, at 55-58.

[36] Without disproportionate damages, the firm hurts itself as much as it hurts its rival. If both have equal access to capital markets, the predating firm has little chance of destroying his rival. *See* ROBERT H. BORK, THE ANTITRUST PARADOX: A POLICY AT WAR WITH ITSELF 147-48 (1978).

[37] 224 U.S. 383 (1912).

[38] *Id.* at 411-12.

[39] *Id.*

[40] *See* David Reiffen & Andrew N. Kleit, *Terminal Railroad Revisited: Foreclosure of an Essential Facility or Simple Horizontal Monopoly?* 33 J. L. & ECON. 419, 420 (1990). The authors conclude that the Terminal Railroad Association behaved like a horizontal monopoly and allowed others into the network, but at a super-competitive price.

rent. An empirical examination of the pricing and ownership structure in *Terminal Railroad* suggests that the bridge owners' behavior comported with this economic theory.[41]

¶ 41 A leading modern case on essential facilities is *Otter Tail Power Co. v. United States*.[42] In *Otter Tail Power*, a vertically integrated power supplier that owned power lines and competed in the retail and wholesale markets refused to allow some municipalities to use its power lines to purchase electricity. The Supreme Court held that this refusal violated the Sherman Act.[43] Otter Tail's strategy was profitable, however, because as a regulated monopoly it could collect a higher return by gaining control of the retail market.[44] Therefore, in order to collect monopoly rents on its sales of electricity, Otter Tail used its ownership of a network (the power lines) to foreclose retail competition. Thus, the exclusion of rivals in *Otter Tail* was made profitable at least in part by the regulatory framework.

¶ 42 It may well be profitable to exclude a rival in other circumstances, however. An operating system platform may be an essential facility because it represents a large installed base on which a rival must build. If a competitor (or potential competitor) needed access to the network itself, the network owner could conceivably protect her monopoly by denying access. Thus, by excluding potential rivals from accessing the operating system, the operating system owner can foreclose competition.[45] While the dominant firm forgoes collecting monopoly rents on the entrant's usage and increasing the value of his network by expanding it, it prevents future competition that may jeopardize its market share entirely.

¶ 43 To understand concretely how a network owner may benefit from excluding a rival from an essential facility, consider the case in which the network owner creates some incompatibilities, which is subtler than an outright ban on access.[46] Consider two competing networks, components of which may be imperfect substitutes for each other. An example is two competing firms that manufacture both hardware and software. Suppose firm A makes its software incompatible with the hardware of firm B. If Firm A's software is preferred by enough consumers, the number of users of B's hardware may decline sufficiently such that B's hardware is no longer a viable network, and the market tips in favor of A. This situation is similar to Atari's complaint against Nintendo when, by contract and technological barriers, Nintendo required video game developers to make their products only for Nintendo systems.[47]

¶ 44 In order to recoup its losses from making its software incompatible, the market must tip in favor of firm A. If its attempt to tip is unsuccessful, then the predatory firm stands to lose a great deal. First, by introducing incompatibilities, the predatory firm has reduced consumers' willingness to pay since consumers had previously bundled the product in a way that was best for them. Second, the predatory firm risks shrinking its network by introducing incompatibilities, making its network less valuable. Finally, by denying access to other firms, the predator loses the opportunity to charge them access fees.

2. Tying in a Network Market

¶ 45 The legality of bundling products for sale is a muddled area of law. A sufficient statement of the law, for our purposes, is that two requirements must be met for per se antitrust liability. First, the tied products must be sufficiently distinct.[48] After all, almost all products are tied in some sense. What is a manufactured good other than a product of many component parts tied together? Second, there must be sufficient market power in the tying good to generate a danger that monopoly power may be extended into the market of the tied

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[41] *See id.* at 437.

[42] 410 U.S. 366 (1973).

[43] *Id.* at 377.

[44] *See id.* The district court noted that 90% of Otter Tail's revenues came from its retail market, *United States v. Otter Tail Power Co.* 331 F. Supp. 58 (1971). *See also* Allen Kezsbom & Alan V. Goldman, *No Shortcut to Antitrust Analysis: The Twisted Journey of the "Essential Facilities" Doctrine*, 1996. COLUM. BUS. L. REV. 1, 6-7 (1996).

[45] This possibility is explored in Katz & Shapiro, *supra* note 22, at 65.

[46] See, for example, Nicholas Economides & L.J. White, *Networks and Compatibility: Implications for Antitrust*, 38 EURO ECON. REV. 651 (1994) for a discussion on how the introduction of incompatibilities in a network industry can increase monopoly rents for the network.

[47] See Shapiro, *supra* note 3, at 676-677 for a discussion of Nintendo's strategies and their effect on its competitors.

[48] *See, e.g.*, Jefferson Parish Hospital District No. 2 v. Hyde, 466 U.S. 2, 21 (1984) (holding that by definition a tying arrangement cannot exist unless two separate products are involved).

product.[49] If these two factors are met, then the tie is per se illegal. Otherwise, the tie is analyzed under the rule of reason.[50] What constitutes a distinct product is a difficult question. For example, circuits are split over whether diagnostic software and computer repair services constitute separate products for antitrust purposes.[51] What constitutes sufficient market share to demonstrate market power is always a murky issue, but it appears that a 30% share is the minimum required for a per se illegal tie.[52]

¶ 46 The classic criticism of the Supreme Court's tying jurisprudence is that a monopoly has no incentive to extend its market power over complementary goods because it can collect the full monopoly rent up front, just as the monopoly owner of an essential facility may.[53] To bundle a product together with one that consumers prefer less than its alternatives could only decrease firm profits by driving down consumer demand.

¶ 47 There are a number of pro-competitive reasons for a tie as well, beyond the obvious economies in production and distribution that a tie may produce. First, a tie may control quality.[54] For example, a manufacturer may tie the sale of repair services and parts to the purchase of its machine in order to ensure that it is maintained properly and that the firm's reputation for quality is protected. Second, a tie may help share the risk of a product purchase or provide information to consumers about product value.[55] Third, a tie may stimulate demand for complementary products.[56] Finally, a tie may aid in price discrimination by measuring the intensity of use.[57] While price discrimination has ambiguous consequences for consumer welfare[58] and may invoke liability,[59] it is not always (or even in general) anti-competitive.[60]

¶ 48 The presence of network effects, however, throws a wrench in the standard critique of the Supreme Court's tying jurisprudence. Each of the pro-competitive explanations for tying continues to exist in a network industry. Network effects, however, create a plausible anti-competitive purpose behind a tie. Similar to foreclosing an essential facility, a network firm may use a tie as a strategic device to foreclose competition. This may actually be accomplished in much the same way as the introduction of an incompatibility.

¶ 49 Consider again the example of two competing producers of hardware and software. Firm A produces a hardware product that is preferred by a large majority of consumers, but it still faces competition from Firm B in both hardware and software. Firm A decides to tie its hardware sales and software sales together. Now,

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[49] *See, e.g.*, Eastman Kodak Co. v. Image Technical Services, Inc., 504 U.S. 451 (1992). *Kodak* reinforced the rule that market power in the tied product had to be illegal to invoke antitrust liability. Kodak had tied the sale of parts to its repair services, *id.* at 458. Because it lacked monopoly power in the market for copiers, Kodak claimed that its tie was not illegal, *id.* at 466-7. The Supreme Court upheld the court of appeal's reversal of summary judgment in favor of Kodak, holding that there was a genuine issue of fact over whether or not purchasers of copiers had been locked in to the capital good purchased from Kodak, giving Kodak power in the aftermarket, *id.* at 477.

[50] *See Jefferson Parish*, 466 U.S. at 16.

[51] *Compare* Data General Corp. v. Grumman Systems Support Corp., 36 F.3d 1147, 1179 (1st Cir. 1994) (affirming summary judgment because no evidence was introduced to show that consumers would buy the products separately) *with* Service & Training, Inc. v. Data Gen. Corp., 963 F.2d 680, 684-5 (4th Cir. 1992) (reversing summary judgment that diagnostic software and repair services were separate products).

[52] In *Jefferson Parish*, the Court found that a market share of 30% was insufficient to confer market power, 466 U.S. at 26-29. Lower courts have followed this standard. *See, e.g*, Grappone, Inc. v. Subaru of New England, 858 F.2d 792, 797 (1st Cir. 1988) (noting that defendant did not have a 30% share in overturning jury decision against the defendant); Western Power Sports, Inc. v. Polaris Indus. Partners, 744 F. Supp. 387, 399 (W.D. Pa. 1992) (holding that a 31% share is insufficient market power in a tying case); M. Leff Radio Parts, Inc. v. Mattel, Inc., 706 F. Supp. 387, 399 (W.D. Pa. 1988) (holding 30% market share insufficient market power in a tying case).

[53] *See supra* notes 40, 41 and accompanying text.

[54] *See, e.g*, BORK, *supra* note 36, at 379-81.

[55] *See* J. Gregory Sidak, *Bundling in Software Industries*, 18 YALE J. ON REG. 1, 8-9 (2000).

[56] Stimulating demand for complementary products may be profitable by itself. *See* Steven J. Davis & Kevin M. Murphy, *A Competitive Perspective on Internet Explorer*, 90 AM. ECON. REV. 184, 184-5 (2000). In addition, it may aid price discrimination. *See* Benjamin Klein, *Microsoft's Use of Zero Price Bundling to Fight the "Browser Wars," in* COMPETITION, INNOVATION AND THE MICROSOFT MONOPOLY: ANTITRUST IN THE DIGITAL MARKETPLACE, 227-30 (Jeffrey A. Eisenach & Thomas M. Lenard eds., 1999); Sidak, *supra* note 55, at 15. Richard Schmalensee points out in his direct testimony for Microsoft that Microsoft may have charged a zero price for the Explorer browser, but this was because it was deriving revenue from ancillary sources, such as sales of software linked to Explorer and web advertising, Direct Test. of Professor Richard L. Schmalensee on behalf of Microsoft Corp. at ¶ 248, (D.D.C 1999) (No. 98-1233) [hereinafter *Schmalensee Direct Testimony*].

[57] *See* John L. Peterman, *The International Salt Case*, 22 J. L. & ECON. 351 (1979).

[58] *See* HAL R. VARIAN, MICROECONOMIC ANALYSIS 248-53 (3d ed. 1992).

[59] Section 2(a) of the Robinson-Patman Act, 15 U.S.C. §§ 13-13b, 21a (1994), prohibits price discrimination by a seller when it would tend to lessen competition.

[60] After all, price discrimination generally increases output, even though it transfers wealth from consumers to producers. The Robinson-Patman Act is limited to situations in which price discrimination would lessen competition, *id.*

some consumers who want the preferred hardware manufactured by Firm A have to purchase a software product that they prefer less.

¶ 50 In a normal market, the only effect of this policy would be to reduce the profits of Firm A. Firm A has attached a good some consumers prefer less than alternatives to its product, and this must reduce their willingness to pay. Regardless of its market power, a reduction in demand will reduce the profits of a firm.

¶ 51 In a market with network effects, however, Firm A has the possibility of recouping its short-run losses. By bundling the sale of its hardware and software, Firm A may detach enough customers from Firm B to destroy its viability as a network, tip the market, and thus gain a monopoly.[61] Recall that for each customer that A peels off from B, B loses more than just the revenue from that customer, because the total value of his network is a function of the size of its customer base. This strategy is not quite the same as the introduction of an incompatibility, since a consumer could still purchase the competing software. The value of purchasing the competing software is reduced, however, by the required possession of an imperfect substitute.

¶ 52 Such a strategy is no doubt extremely risky. First, the tying firm must forgo short-run profits. Second, by decreasing the value of his product, he may shrink his own network as well as his rival's. An often-cited example of a network industry that decided to fully integrate its hardware and its software (in this case, an operating system) is Apple. There is now a consensus that Apple's approach was a failure. This is not to suggest that an anti-competitive motive was behind Apple's integration of its hardware and operating system, but rather that competition in network industries is difficult to predict, even for market insiders. It may well be difficult for a network owner in a rapidly changing market to guess the relative demands and scope of network externalities present with sufficient accuracy to engage in the kind of anti-competitive strategic behavior described above.

¶ 53 While network effects give rise to a plausible anti-competitive explanation for tying, they also provide an additional pro-competitive explanation. Tying a new product to a popular existing one helps expand the new product's range of distribution. This distribution mechanism could overcome the barriers to entry created by network effects, since network products, to be successful, must win a significant following. Two lower court opinions about network industries and ties provide judicial support for this analysis.

¶ 54 In *United States v. Jerrold Electronics Corp.*,[62] a district court examined a tie of maintenance and installation services in the sale of television antenna networks. In the early days of television, many cities surrounded by hills were cut off from television transmissions.[63] Jerrold Electronics developed a system whereby a single, large antenna would be installed at a high elevation, and then cables would carry the signal to subscribers below.[64] The network effects of such a system are obvious. Not only are the consumers connected to an explicit network of cables, but this also a case of declining average costs. A critical mass of consumers is required to support the large fixed costs of the installation of the antenna and wiring; the more consumers in the network, the lower the per-capita cost.

¶ 55 Jerrold Electronics defended the tie of its equipment to installation and services mainly by arguing that it was a mechanism for quality control. The court was sympathetic to this argument, but ruled that the reasonableness of the tie eroded over time after the business became established and outside expertise increased.[65] Thus, the court was particularly willing to accept the tie when it was partly necessary to create the system in the first place, holding that this result "is based primarily on the fact that the tie-in was instituted in the launching of a new business with a highly uncertain future."[66] Underpinning the overall analysis, therefore, was the belief that the tie may have made the uniquely challenging business possible.

¶ 56 Though not addressed specifically by the court, our previous discussion of networks lends support to the court's analysis. By tying its equipment, services and installation of the system, Jerrold Electronics may have

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[61] This result assumes, of course, that new entry will be difficult after Firm B leaves that market. This is probably a safe assumption given that we have already had to presume significant network externalities given that Firm A has sought to tip the market.

[62] 187 F. Supp. 545 (D.C. Pa. 1960), *aff'd per curiam*, 365 U.S. 567 (1960).

[63] *See id.* at 550-52.

[64] *See id.*

[65] *Id.* at 556-57.

[66] *Id.* at 556.

signaled to wary consumers that it would be protecting quality and that long-term service would be offered. Economies of scale were crucial, and positively influencing consumer expectations likely increased the scope of the network.

¶ 57 A more recent case that touches on ties and networks is *Grappone, Inc. v. Subaru of New England, Inc.*[67] In *Grappone*, a Subaru car dealer alleged that Subaru had violated antitrust laws because it required its dealers to purchase a certain amount of spare parts along with their automobile orders.[68] The First Circuit Court of Appeals overturned a jury verdict in favor of Grappone. Finding that the tie did not affect a sufficient amount of the market to require per se analysis, the court analyzed the case based on the reasonableness of the tie.[69] The court noted that the tie helped to develop and maintain sales of the autos and that a lack of spare parts had been an impediment to Subaru's entrance into the U.S. market.[70]

¶ 58 While the court did not explicitly address the concept of network effects, its reasonableness analysis fits in well with network theory. Automobile distribution and maintenance has undeniable network features. The more Subaru cars that are sold, the more mechanics there will be to repair them and the easier it will be to find spare parts. The more mechanics and spare parts that are available, the more people will be willing to purchase Subaru cars, creating a positive feedback loop. A critical level of sales is necessary in order for a system of dealers and repair shops to exist, and vice versa. An automaker therefore has an incentive to make sure that its dealer and service network is adequately maintained. Individual dealers, such as Grappone, however, may have an incentive to free-ride off of the investments of other dealers in services and spare parts inventories. After all, it is costly for an individual dealer to maintain these services, but the value of his automobile franchise will increase if other dealers provide adequate services. Subaru, however, has an incentive to prevent free-riding and to make sure that its dealer network is functioning well.

3. Exclusive Contracts in a Network Market

¶ 59 A second anti-competitive strategy unique to network industries may be the use of exclusive agreements.[71] A rival network may require a critical number of users to enter the market, and this user base may be denied if a sufficient number of potential users are bound by exclusive contracts.[72] Even though the users would each be better off if a superior technology was offered, if they cannot coordinate their actions (a crucial assumption), each has an incentive to sign an exclusive contract for a discount.[73] The dominant firm is more than compensated for the discount because it maintains its monopoly position.

¶ 60 Exclusive contracts, however, may also be useful to networks for pro-competitive reasons.[74] The courts have long addressed exclusive contracts under the lens of the rule of reason because of the pro-competitive purposes they may serve.[75] For example, exclusive contracts may help firms engage in long-term planning by fixing prices and fixing future supply, which reduces the risk to the supplying firm of incurring fixed costs in

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[67] 858 F.2d 792 (1st Cir. 1988).

[68] *Id.* at 793-94.

[69] *Id.* at 797-98.

[70] *Id.* at 799.

[71] *See generally*, Shapiro, *supra* note 3.

[72] For a formal economic model describing how exclusive contracts can be predatory, see Phillip Ahgion & Patrick Bolton, *Contracts as a Barrier to Entry*, 77 AM. ECON. REV. 388 (1987).

[73] Operating Systems present a possible circumstance in which purchasers could coordinate. OEMs have a strong incentive to package their computers with the best operating system available so as to maximize sales. If Windows has truly locked in an inferior system, a few of the large OEMs could agree to switch the operating systems they install on their computers to the new, superior system. This may overcome possible barriers to entry caused by network effects. Antitrust law may be an impediment to such cooperation, however, because it has the characteristics of a group boycott. A joint venture that cuts out a supplier brings with it antitrust risk. In United States v. Columbia Pictures Ind., Inc., 507 F. Supp. 412 (1980), aff'd mem., 659 F.2d 1063 (2nd Cir. 1981), four major Hollywood studios, Columbia, Universal, Paramount, and Twentieth Century-Fox, entered into an agreement by which they would show their movies exclusively on a jointly owned premium television channel for a nine-month window before redistributing their films to other pay channels, such as HBO or Showtime, id. at 420. The district court held that the motion picture distribution arrangement was a per se unlawful group boycott Id. at 428-29. Columbia Pictures, however, may no longer be good law. It was decided prior to Northwest Wholesale Stationers, Inc. v. Pacific Stationery & Printing Co., 472 U.S. 284 (1985), in which the Supreme Court held that "not every cooperative activity involving a restraint or exclusion will share with the per se forbidden boycotts the likelihood of predominantly anticompetitive consequences." Id. at 295.

[74] Shapiro acknowledges this, and opposes any per se restrictions on exclusive contracts, *supra* note 3, at 678.

[75] *See* Standard Oil Co. v. United States, 337 U.S. 293 (1949).

production.[76] This reasoning has led the Supreme Court to adopt a rule of reason approach to exclusive contracts.[77] Of course, these pro-competitive justifications continue to apply to network industries. In fact, given the large sunk costs and low marginal costs present in networks, an entrant may especially benefit from exclusive contracts that permit it to gauge the level of demand with some certainty. The Supreme Court has echoed this argument by noting that exclusive contracts may help an entrant "establish a foothold against entrenched competitors." [78]

¶ 61 There is an additional rationale for exclusive contracts in a network setting. By signaling to other potential consumers the viability and scope of the network, exclusive contracts reduce the risk to network consumers of undertaking the unrecoverable costs of buying any durable goods associated with the network and learning the network's technology. Thus, in a network, an exclusive contract may reduce investment risks for both the consumer and the producer.

¶ 62 In *Standard Oil Co. v. United States*, the Supreme Court held that an exclusive or requirements contract may be anti-competitive under reasonableness analysis if it forecloses too much of the market.[79] The Court later refined this standard in *Tampa Electric Co. v. Nashville Coal Co.*,[80] which remains perhaps the leading case on exclusive dealing. *Tampa Electric* held that rule of reason analysis required a determination of whether the exclusive dealing arrangements significantly impeded the ability of others to enter or to remain in the market.[81] Four concurring Justices in *Jefferson Parish Hospital District No. 2 v. Hyde*[82] also held, "Exclusive dealing is an unreasonable restraint on trade only when a significant fraction of buyers or sellers are frozen out of a market by the exclusive deal."[83]

¶ 63 Thus, the current state of antitrust jurisprudence is well equipped to deal with the potential challenges of network industries and exclusive contracts. If network industries use exclusive contracts to foreclose a sufficient portion of the market to make entry impossible, an antitrust violation has likely occurred. If a network has used exclusive contracts to make its own existence viable or to enter a market, no antitrust violation should be found.

4. Predatory Pricing

¶ 64 The logic behind predatory pricing is the same with or without network effects. The predatory firm sets its prices low enough to run its competitors out of business. After other firms are gone, the predatory firm then raises its price to recoup its previous losses. In general, successful predation is possible only if several conditions are satisfied.[84] First, lower prices must impose a disproportionate burden on the victimized firm.[85] In other words, the targeted firm must either lose more money than the predatory firm as a result of lower prices, or the target must have less access to capital markets and therefore be unable to cover a period of losses. Second, in order recoup its losses from charging a lower price, the predatory firm must be reasonably certain that it can prevent entry after it raises prices.[86] Thus, there must be significant barriers to entry, or else potential competition will prevent the predatory firm from extracting monopoly rents after its victims fold.

¶ 65 Economic theory has also shown that pricing strategies by dominant firms may signal potential competitors that entry will be punished and hence unprofitable, or may misguide potential competitors into

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[76] See *id.* at 306-7 for a judicial analysis of the pro-competitive reasons behind exclusive (or requirements) contracts.

[77] *Id.*

[78] *Id.*

[79] *Id.* at 309. The Court ultimately held that the contracts at issue foreclosed 67% of the market, which was too great to withstand antitrust scrutiny, *id.* at 314.

[80] 365 U.S. 230 (1961).

[81] *Id.* at 328.

[82] 466 U.S. 2 (1984).

[83] *See id.* at 45 (O'Connor's concurring opinion). The majority analyzed the restrictions in *Jefferson Parish* as though they were a tie, *id.* at 18-21.

[84] These conditions are detailed at length in BORK, *supra* note 36, at 144-59.

[85] *See id.*

[86] The Supreme Court recognized this requirement in *Zenith Radio Corp. v. Matsushita Electric Ind. Co.* 475 U.S. 574, 589 (1986), holding that the burden of proof had not been satisfied because the plaintiff did not show how the defendant could have expected to recoup its losses.

believing that there are no economic profits to be earned in the market.[87] A recent study of predatory pricing cases does not, however, support the notion that firms charged with predatory pricing were actually engaged in either straightforward predatory pricing or signaling.[88] Indeed, few credible examples of actual predatory pricing exist, which means that the benefits to prosecuting predatory pricing are likely quite small.[89]

¶ 66 Most scholars agree that antitrust law should be wary of punishing firms that cut prices.[90] The conditions required for predatory pricing to be successful are rare and attacking firms that aggressively cut prices can damage competition. If antitrust laws are used in this fashion, courts could become an unwitting cartel enforcement mechanism. The Supreme Court in *Zenith Radio Corp. v. Matsushita Electric Industrial Co.* endorsed a cautionary approach.[91] The Court worried explicitly about the effect of predatory pricing litigation on pro-competitive conduct,[92] and required that, to survive summary judgment, the plaintiff must show that the defendant would likely succeed in driving out competition and have the ability to recoup short-run losses after predation.[93]

¶ 67 The legal test for predatory pricing, as proposed by Areeda and Turner[94] and as adopted by a number of circuits, is greatly complicated by network effects.[95] The Areeda-Turner test holds that pricing below marginal costs should be presumed to be anti-competitive conduct.[96] Firms that price below marginal cost incur losses, and must anticipate recouping these losses later. Absent a pro-competitive explanation such as promotional pricing, Areeda and Turner argue, the most likely story is one of predatory conduct.[97]

¶ 68 Networks, however, may find it in their interest to charge extremely low—or penetration—prices for pro-competitive reasons. In general, penetration pricing rapidly expands the size of the network and increases its value, benefiting both the network owner and consumers. Indeed, as described above, without penetration pricing it may be impossible for networks to form at all. Areeda and Turner's test for predation permits a "promotional price" defense, which is similar to the concept of penetration pricing.[98] Unlike short-term promotional prices, however, penetration prices will often result in the elimination of competition given the tendency of a single network to dominate the market. As a result, "promotional pricing" and predation in network markets will be observationally equivalent to the finder of fact.

¶ 69 Another complicating factor is determining costs for a network firm. Examining short-run marginal costs or approximating them with average variable costs as Areeda and Turner suggest[99] is clearly not a valid

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[87] *See, e.g.*, Paul Milgrom & John Roberts, *Limit Pricing and Entry under Incomplete Information: an Equilibrium Analysis*, 50 ECONOMETRICA 443 (1982); David Kreps & Robert Wilson *Reputation and Imperfect Information*, 27 J. ECON. THEORY 253 (1982).

[88] *See* JOHN R. LOTT, ARE PREDATORY COMMITMENTS CREDIBLE? WHO SHOULD COURTS BELIEVE?, 18-60 (1999) (finding that firms that were charged with predatory pricing do not have the characteristics one would expect of a predatory firm, such as being closely held or having management compensation depend on long-run outcomes).

[89] *See* Gary S. Becker & Kevin M. Murphy, Rethinking Antitrust, WALL ST. J., Feb. 25 2001, at A22. Becker and Murphy write: "In fact, there is very little empirical evidence to support theories of predatory behavior and we know of no historical example where economists are in broad agreement that predatory behavior led to consumer harm." An old survey of predatory pricing cases has found little evidence that accused firms regularly priced below cost *See* Roland L. Koller, *The Myth of Predatory Pricing* 4 ANTITRUST L. & ECON. REV. 105 (1971). A famous example of alleged predatory pricing by Standard Oil has been debunked. *See* John McGee, *Predatory Price-Cutting: the Standard Oil (N.J.) Case*, 1 J. L & ECON. 137(1958). There are contrary views, however. *See, e.g.,* Elizabeth Granitz & Benjamin Klein, *Monopolization by "Raising Rivals's Costs: The Standard Oil Case*, 39 J.L. & ECON. 1 (1996); David Gabel, *Competition in a Network Industry: The Telephone Industry, 1894-1910*, 54 J. ECON. HIST. 543 (1994).

[90] Indeed, if firms can use antitrust law against price-cutting competitors, the law may be perverted into a cartel enforcement mechanism. For cautionary notes on predatory pricing, see generally, BORK, *supra* note 36, at 144-159.

[91] 475 U.S. 574 (1986). The basic holding of *Matsushita* was later reinforced in *Brooke Group, Inc. v. Brown & Williamson Tobacco Corp.*, 509 U.S. 209 (1993).

[92] *See Matsushita*, 475 U.S. at 593-94 (noting that price cuts are often "the very essence of competition").

[93] *Id.* at 589. The court was particularly skeptical of the predation charge because the alleged length of the conspiracy made recovery implausible and the large number of firms involved in the conspiracy.

[94] Phillip Areeda & Donald F. Turner, *Predatory Pricing and Practices Under Section 2 of the Sherman Act*, 88 HARV. L. REV. 697 (1975).

[95] *See, e.g.*, Kelco Disposal, Inc. v. Browning-Ferris Indus., 845 F.2d 404, 407 (2d Cir. 1988), *aff'd on other grounds*, 492 U.S. 943 (1982); William Inglis & Sons Baking Co. v. ITT Continental Baking Co., 668 F.2d 1014, 1036 (9th Cir. 1981), *cert. denied*, 459 U.S. 825 (1982); International Air Industries v. American Excelsior Co., 517 F.2d 714, 724 (5th Cir. 1975), *cert. denied*, 424 U.S. 943 (1976). *Cf.* MCI Communications v. AT&T, 708 F.2d 1081, 1122-23 (7th Cir.), *cert. denied*, 464 U.S. 891 (1983) (listing a number of pro-competitive reasons why a firm would charge below short-run marginal costs and advocating assessing predatory behavior based on long-run average costs).

[96] *See* Areeda & Turner, *supra* note 94, at 712.

[97] *Id.* at 712-15.

[98] *Id.* at 713-15.

[99] *Id.* at 716-18.

approach in a network industry. Many networks will have declining marginal costs and, in the case of software, near zero average variable costs. Thus, networks could justify a low price by pointing to low marginal costs or the claim (probably true) that costs will decline or that value will increase as they expand supply.[100] It is a challenge for courts to distinguish predatory pricing in a normal market. Network effects complicate the cost analysis and also provide unique justifications for charging low prices over a long period.

¶ 70 As unlikely as predatory pricing is, there are several reasons why network effects may make predatory pricing more likely. Predatory pricing requires expanding supply. This is costly to a normal industry for two reasons. Prior to the predatory scheme, the firm was presumably charging the short-run profit-maximizing price. When it expands supply and lowers its price, it is forgoing short-run profits in the hopes of capturing more profits in the future. This activity will be especially costly in the short run if the firm is producing in the increasing portion of its marginal cost curve. Thus, as it expands supply and captures a large share of the market, the firm's average unit costs are increasing. Its supposedly victimized competitors, however, will have reduced their supply and, if marginal costs are increasing, may actually have reduced their average unit cost. This reasoning has led some commentators to argue that predatory pricing is unlikely—it will be very difficult for a firm to inflict disproportionate costs on its rivals in such circumstances.[101]

¶ 71 An expansion of supply for a network industry is less costly to the predatory firm for two reasons. First, many network industries are declining cost industries. Software, for example, has high fixed costs and low marginal costs that are constant over a wide range of supply. This means that the predatory firm does not increase its costs as its supply expands and its rivals do not benefit from cost savings. Indeed, in a network the predatory firm's rivals are clearly harmed by a contraction in sales beyond mere lost revenue. Second, expanding supply beyond a short-run profit-maximizing point has the potential to yield future benefits due to network externalities that increase the product's value as supply increases. There may be substantial uncertainty as to the optimal size of the network, and expanding output possibly brings benefits beyond those of merely eliminating competition. This will increase the expected payoff of any attempt at predation and mix the motivations behind low prices.

¶ 72 The other crucial element to predatory pricing is the ability to foreclose entry after rivals have been driven from the market. As discussed above, networks have a variety of unique opportunities to foreclose entry via exclusive contracts and the introduction of incompatibilities. In addition, a winning network will find a number of natural barriers to entry protecting its market share, such as switching costs and the requirement that rivals enter on a large scale. Without any special anti-competitive actions on the part of the successful predatory network, consumption externalities require that a potential entrant capture enough of the market to be viable. An entrant, therefore, will have to introduce a product superior enough to overcome any switching costs faced by members of the dominant network, and enough members will then have to switch to make the new network viable.

B. Networks and the Gains to Predation

¶ 73 Extremely risky tactics such as predatory pricing may be more common in a network market because of the tendency of a single network to dominate the market, greatly increasing the stakes.[102] Since the potential gains are so large and the losing firm may be annihilated, a network firm may be more willing to take risks to become dominant. Predatory pricing, technological incompatibilities, and exclusive contracts are both risky and costly to the firm engaging in them. The prize, however, may be an overwhelming market share and the rents that go along with it. This is true whether or not the market is in the early stages of competition and many firms are competing or whether a dominant firm has already arisen. To a dominant firm, the

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[100] This is not unlike the critique of the Areeda-Turner test for predation: that firms will build excess capacity and hence lower their marginal costs to avoid a predation charge. It will be difficult for courts to distinguish whether the excess capacity is there for legitimate business reasons or if it is there to ward off potential competitors. *See* F. M. Scherer, *Predatory Pricing and the Sherman Act: A Comment*, 89 HARV. L. REV. 869 (1976).

[101] *See, e.g.*, BORK, *supra* note 36, at 149-52.

[102] *See* Besen & Farrell, *supra* note 23, at 119 (noting that network sponsors will compete fiercely to have their products become the standard because the potential gains are so large).

establishment of a competing network may not mean merely the loss of market share (as in another industry), but the loss of the entire market if the technological or market conditions will only support one network.

C. Summation

¶ 74 Antitrust scrutiny of network industries is fraught with tensions. The key challenge for antitrust law is to reconcile the two competing concerns about networks: network size and inferior network entrenchment. On the one hand, we want networks to grow to a socially optimal size, which may mean that a single firm gets a 100% market share. On the other hand, we want to avoid the possibility that a monopoly position becomes entrenched by anti-competitive conduct. Antitrust law is normally wary of large market shares, but large market shares are a natural consequence of network effects. The drive for market share will also lead networks to a variety of practices that have ambiguous implications for competition—penetration pricing, exclusive contracts, and ties are all potentially pro-competitive or anti-competitive depending on whether they are used to internalize network externalities or merely entrench a monopoly position. Note that activities that would entrench a technology while at the same time shrinking the network (such as the exclusion of individuals from the network) are therefore the most difficult to defend.

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¶ 75 The existence of network effects clearly complicates antitrust analysis. While networks may provide more opportunities for predation, they also provide some unique defenses to practices, such as tying, that have traditionally received antitrust scrutiny. The basic challenge for antitrust law in network industries, therefore, is little different than it is regarding any other industry. Outside of naked price-fixing, antitrust law must distinguish when an activity, such as an exclusive contract, is anti-competitive and illegal and when it is pro-competitive and permitted.

¶ 76 Whether or not behavior is anti-competitive will depend heavily on the nature of the network and the market in which it operates. Thus, it is particularly illuminating to consider what is now the leading antitrust case involving network effects, *United States v. Microsoft Corp.*[103]

¶ 77 Before delving into the government's theory of the case, a little must be explained about the market for operating systems.[104] Microsoft owns the Windows operating system and a number of popular software programs that run on Windows. An operating system is a software program that runs the computer by assigning memory and allotting tasks. It also supports other software programs via its application program interfaces ("APIs"). Instead of constantly having to write new routines to perform basic tasks, programmers can call on APIs, thus reducing the costs of software writing. A software program designed to run on Windows will not run on other operating systems. Microsoft's Windows is the dominant operating system, loaded onto over 90% of Intel-compatible personal computers and 80% of personal computers in general.[105] Windows supports the greatest number of software applications of any operating system by far.[106] The operating system is generally installed at the factory by the original equipment manufacturers ("OEMs").

¶ 78 Most observers, including Microsoft's own economics expert witness, Richard Schmalensee, Dean of the Sloan School of Management, agree that the market for operating systems is a network market.[107] For every additional person who knows how to use Windows and to operate its various standard programs, the knowledge becomes more portable and hence more valuable. Firms that use Windows find it easier to hire and train employees, and workers who know Windows can more easily find jobs. Most importantly, software development is characterized by high fixed costs and low marginal costs. Therefore, a critical mass of potential users is needed in order to write a software program that is profitable. An additional software

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[103] 87 F. Supp. 2d 30 (2000), *aff'd in part and rev'd in part per curiam*, 2001 U.S. App. LEXIS 14324 (D.C. Cir. 2001).

[104] For Judge Jackson's findings of the technical issues involved in the Microsoft case, see *Microsoft Findings of Fact*, *supra* note 1, ¶¶ 1-17.

[105] *Microsoft Findings of Fact*, *supra* note 1, ¶ 35.

[106] *See id.* ¶¶ 40, 47 (noting that over 70,000 software applications are compatible with Windows, whereas roughly 12,000 are compatible with Apple's operating system.

[107] *See* Evans & Schmalensee, *supra* note 3, at 66-70.

program written for the operating system makes that system more valuable and hence draws in more individuals, allowing more software to be written. This is often referred to as a positive feedback loop, and it creates what the government called the "applications barrier to entry."[108]

¶ 79 Netscape's main product is Navigator, which is an Internet browser that permits users to view web pages. It began distribution in 1994 and soon dominated the market.[109] Microsoft developed its own browser, Internet Explorer, which was first offered in 1995. Offered at a zero price and coming pre-installed on all Windows machines, Microsoft's Explorer came to control roughly 60% of the browser market, with Netscape taking the rest.[110] Java, owned and developed by Sun Microsystems, is a programming language developed to run software applications independent of the underlying operating system.[111]

¶ 80 Both Java and Netscape have their own APIs on which programmers may call. Thus, Microsoft executives were genuinely concerned that Java or Netscape might eventually undermine Windows' dominance of the operating system market because Java and Netscape's technology may eventually allow software to run on several different operating systems at the same time.[112] Such an advance would destroy the positive feedback loop that makes Windows so valuable. This is the so-called "middleware" threat, and it provides the motive for Microsoft's alleged anti-competitive behavior. The charges against Microsoft are involved and complex. This article therefore focuses on the key aspect of the government's case: the claim that Microsoft aimed to destroy or marginalize Netscape and Java and to preserve its operating system monopoly.

A. The Government's Case

¶ 81 The government's case against Microsoft can be summarized succinctly. Microsoft, the government argued, has a monopoly in operating systems, and it has undertaken to preserve that monopoly by the means of illegal exclusive contracts, incompatibilities, and illegal ties that foreclose possible competition from Netscape and Java.[113] Microsoft has therefore violated Section 1 of the Sherman Act, which prohibits contracts that restrain trade. It has also violated Section 2's prohibition against monopolization because it has maintained its monopoly of the operating systems market through illegal means and attempted to monopolize the browser market.[114]

¶ 82 The district court accepted almost the whole of the government's case. It held that Microsoft's tie of its browser to the operating system was illegal per se,[115] that Microsoft illegally tried to exclude Netscape[116] and Java[117] from the operating system market, and that Microsoft illegally attempted to monopolize the browser market.[118] The Court of Appeals for the D.C. Circuit largely upheld the district court's finding that Microsoft illegally protected its operating system monopoly through exclusionary practices,[119] although it rejected the predatory pricing claims.[120] This preserved the core of the government's case. The court of appeals,

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[108] *See Microsoft Findings of Fact*, *supra* note 1, ¶ 31. Despite the fact that most observers agree that positive feedback loops exist in software, Microsoft's expert witness, Richard Schmalensee, denied in his testimony that there exist significant barriers to entry in the computer platforms market, *see Schmalensee Direct Testimony, supra* note 56, ¶¶ 95–97.

[109] *Microsoft Findings of Fact*, *supra* note 1, ¶ 72.

[110] Schmalensee argued that Microsoft had a 50% share of the browser market. *See Schmalensee Direct Testimony, supra* note56, ¶ 289. Judge Jackson found that the actual market share of Internet Explorer was greater than 60 percent, *Microsoft Findings of Fact*, *supra* note 1, ¶ 372, and likely to continue to increase, *id.* ¶ 373.

[111] For a general overview of Sun Microsystems and Java, see *Microsoft Findings of Fact*, *supra* note 1, ¶¶ 73-77.

[112] *See Microsoft Findings of Fact*, *supra* note 1, ¶¶ 72, 75.

[113] *See Microsoft*, 87 F. Supp. 2d at 35.

[114] *See id.* In addition, the government alleged that Microsoft met with Netscape in 1995 in order to divide markets. *See Microsoft Findings of Fact*, *supra* note 1, ¶¶ 82-87. Microsoft has vigorously disputed the facts of this meeting, and it does not strike me as plausible that Netscape would agree to a division of markets that would shut it out of the most lucrative market (Windows machines) without receiving compensation. No such compensation was alleged.

[115] *Microsoft*, 87 F. Supp. 2d at 47-51.

[116] *Id.* at 39.

[117] *Id.* at 43-44.

[118] *Id.* at 45-46.

[119] 2001 U.S. App. LEXIS 14324 at 58, 69-70, 84.

[120] *Id.* at 75, 96.

however, reversed the per se analysis of the tying claims and remanded them for reasonableness review[121] and also reversed the Section 2 liability for attempted monopolization of the browser market.[122]

1. Microsoft's Predatory Actions

¶ 83 To protect its operating system monopoly, the government alleged, Microsoft attempted to destroy its two main potential rivals, Netscape and Sun Microsystem's Java language. To combat Netscape, the government claimed that Microsoft developed its own browser, Internet Explorer. Then, in order to foreclose Netscape from the browser market, Microsoft tied Explorer to Windows by preventing OEMs from removing Explorer from the Windows operating system,[123] and Microsoft persuaded Apple to install Explorer on its own operating system.[124] Later, Microsoft made Explorer difficult for consumers to delete in its Windows 98 operating system by integrating Explorer into the system.[125] In addition, Explorer was set as the default browser so that it launched at times when the computer user had not requested it.[126] Finally, Microsoft entered into a number of agreements with Internet access providers ("IAPs"), independent software vendors ("ISVs") and Internet content providers ("ICPs") to exclusively promote Explorer.[127] By reducing Netscape Navigator's market share through these practices, Microsoft was able to reduce the threat that Netscape posed to Windows.

¶ 84 To combat the threat of Java, the government alleged that Microsoft created a Java implementation for Windows that was incompatible with other operating systems and then tricked programmers into using this Windows version of Java.[128] This is similar to the incompatibilities story told above: a dominant system forecloses competition by making a popular software product only compatible with its hardware.

¶ 85 Note that the consumer harm discussed so far is entirely prospective, as it is unclear how close Netscape or Java were toward developing a rival operating system.[129] The government claimed, however, that Microsoft's browser marketing practices caused present consumer harm. Judge Jackson held that Microsoft's practices harmed consumers "in ways that are immediate and easily discernible" by finding that the browser tie harms consumers who wish to purchase a Windows machine without a browser or wish to use a different browser.[130] Including an unnecessary browser, Judge Jackson held, decreases system performance.[131] Microsoft, however, did not wed consumers or the OEMs to a particular browser. Consumers and OEMs were still free to install Netscape Navigator, which was free via downloads and over 100 million mass mailings per year.[132] The computer speed argument may have been salient ten years ago, but processing speeds and cheap memory make such costs negligible today. There is little support for the argument that Microsoft's IE distribution strategy hurt consumers in absence of the predation story. Indeed, Robert Fisher, the government's expert witness, agreed with this point on the witness stand.[133] Since present Microsoft practices cause no harm, the whole of the government's case rests on the predation story.

2. Intent

¶ 86 The government largely relied on statements made by Microsoft executives and corporate memos and e-mails to show that Microsoft's actions were the acts of a predator, as opposed to merely an aggressive

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[121] *Id.* at 125.

[122] *Id.* at 124.

[123] *See Microsoft Findings of Fact*, *supra* note 1, ¶¶ 202-3.

[124] *See* 87 F. Supp. at 42-43.

[125] *See Microsoft Findings of Fact*, *supra* note 1, ¶¶ 164-170.

[126] *See id.* ¶ 171.

[127] *See Microsoft Findings of Fact*, *supra* note 1, ¶¶ 305-8, 340. Microsoft had an exclusive contract with America Online, the largest IAP. *See Microsoft Findings of Fact*, *supra* note 1, ¶ 289.

[128] *See Microsoft Findings of Fact*, *supra* note 1, ¶ 388.

[129] Judge Jackson admitted this himself. *See Microsoft*, 87 F. Supp. 2d at 43.

[130] *Microsoft Findings of Fact*, *supra* note 1, ¶ 409-10.

[131] *Id.*

[132] R. Vol. 1 at 28, *Microsoft* (No. 98-1233) (opening statement of John Warden).

[133] R. Vol. 35 at 29. Fisher has publicly backed away from this statement. *See* Fisher & Rubinfeld, *supra* note 3, at 6.

competitor. Many of these documents reveal that Microsoft executives were indeed worried about the possibility that the Windows operating system network could be eroded by middleware.[134]

¶ 87 Intent, however, is a thorny issue in Section II monopolization cases. In *U.S. v. Aluminum Co. of America*,[135] one of the most famous monopolization cases, Judge Learned Hand held that specific intent was not necessary to make out a Section 2 violation.[136] Rather, intent could be gathered from whether or not monopolization was a likely result of the defendant's actions.[137]

¶ 88 The modern trend, however, has decreased the importance of intent to monopolize, but instead has focused on the methods used to acquire a monopoly. In *Aspen Skiing Co. v. Aspen Highlands Skiing Corp.*,[138] the Supreme Court held that to support a monopolization charge, the firm must have excluded its rivals on "some basis other than efficiency."[139] Some circuit courts have suggested that the intent to gain a monopoly is irrelevant, indeed, that the desire to win market share is a hallmark of competition.[140] The methods employed in acquiring market share are the issue. In predatory pricing cases, for example, some circuits have held that intent is irrelevant, arguing that statements about aggressive price cutting such as "we will not be underbid" can spring from pro-competitive or anti-competitive purposes and hence have no evidentiary value.[141] Other circuits, however, have still looked to intent in predatory pricing cases.[142]

¶ 89 The concerns of Microsoft management about maintaining large market share and their stated desire to destroy rivals does not evidence anti-competitive intent in its dealings with Netscape and Java. In fact, it is not surprising that market share is a constant worry to network owners given the nature of network competition. After all, the value of the network declines rapidly as market share begins to erode. If antitrust policy is to be pro-consumer, the issue should be whether or not Microsoft maintained its market share by harming consumers.

B. Microsoft's Defense

¶ 90 Microsoft's defense focused on three points. First, Microsoft argued that no consumer harm resulted from any of its browser distribution practices.[143] If consumers wished to use Netscape instead of Internet Explorer, they were free to install Netscape, which remained widely available via downloads and mass-mailings.[144] Second, Microsoft rebutted the argument that it had monopoly power and presented expert testimony that the price it charged for Windows was well below the monopoly price.[145] Finally, Microsoft argued that it approached its browser and Java the way it did for technical reasons. Microsoft claimed that it embedded Internet Explorer into its operating system to improve functionality,[146] and it wrote a Windows version of Java because it worked better with Windows, not to undermine Java.[147] For the sake of pursuing

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[134] *See, e.g.*, *Microsoft Findings of Fact*, *supra* note 1, ¶¶ 72, 388.

[135] 148 F.2d 416 (2d Cir. 1945).

[136] *Id.* at 432. In a subsequent case, the Supreme Court ruled that, if a monopoly were consciously acquired, it was not necessary to prove intent, U.S. v. Grinnell Corp., 384 U.S. 563, 576 n.7 (1966).

[137] 148 F.2d at 432.

[138] 472 U.S. 585 (1985).

[139] *Id.* at 605.

[140] *See* Ill. ex rel. Burris v. Panhandle E. Pipe Line Co., 935 F.2d 1469, 1481 (7th Cir. 1991) ("Section 2 forbids not the intentional pursuit of monopoly power but the employment of unjustifiable means to gain that power."); Ocean State Physicians Health Plan v. Blue Cross & Blue Shield, 883 F.2d 1101, 1113 (1st Cir. 1989) ("desire to crush a competitor, standing alone, is insufficient to make out a violation of the antitrust laws.").

[141] *See* A.A. Poultry Farms, Inc. v. Rose Acre Farms, Inc., 881 F.2d 1396, 1401-02 (7th Cir. 1989), *cert. denied*, 494 U.S. 1019 (1990) ("If courts use the vigorous, nasty pursuit of sales as evidence of a forbidden 'intent,' they run the risk of penalizing the motive forces of competition."); Morgan v. Ponder, 892 F.2d 1355 (8th Cir. 1989); Barry Wright Corp. v. ITT Grinnell Corp., 724 F.2d 227, 232 (1st Cir. 1983).

[142] *See, e.g.*, McGahee v. N. Propane Gas Co., 858 F.2d 1487 (11th Cir. 1988), *cert. denied*, 490 U.S. 1084 (1989).

[143] *See* Direct Testimony of Dr. Robert Muglia on Behalf of Microsoft Corp. ¶¶ 47–60 (D.D.C. 1999) (No. 98-1233).

[144] *See Microsoft Findings of Fact*, *supra* note 1, ¶¶ 146-47.

[145] *See Schmalensee Direct Testimony*, *supra* note56, ¶ 163. Microsoft charged OEMs about $45 for its Windows operating system, or about 5% of the cost of a PC, which most commentators agree is a much lower price than Microsoft would charge if it had a standard monopoly. *See, e.g.*, Klein, *supra* note 56 at 228, *in* COMPETITION, INNOVATION AND THE MICROSOFT MONOPOLY: ANTITRUST IN THE DIGITAL MARKETPLACE, (Jeffrey A. Eisenach & Thomas M. Lenard eds., 1999).

[146] For a summary of Microsoft's position, see generally Evans & Schmalensee, *supra* note 107.

[147] *See* Evans & Schmalensee, *supra* note 107, at 58-61 for a description of Microsoft's rebuttal to the claims that it attempted to exclude

the development of a network defense, I forgo much analysis of these technical arguments. Microsoft also offered an intellectual property defense for some of its restrictive agreements, but neither the district court nor the court of appeals took it seriously.[148]

1. Microsoft's Browser Development and Distribution Strategy

¶ 91 Microsoft tried to justify the development of its own browser as a profitable, pro-consumer business undertaking. Microsoft introduced evidence that Internet Explorer would pay for itself if it increased Windows sales by a small percentage.[149] This argument, however, does not explain Microsoft's dealings with Apple and the IAPs. Apple's operating system is perhaps the main competition against Windows, so it is difficult to see how inducing Apple to accept Explorer would increase Windows sales. In addition, if Microsoft was interested in increasing Windows sales, it should have encouraged the IAPs to choose the best Windows browser, whether it was made by Microsoft or not. If Explorer was the best browser, Microsoft should have explained why the IAPs would not have chosen it on their own. In the end, Microsoft never convinced Judge Jackson that it spent several hundred million dollars to develop a product that it offered at a zero price for pro-competitive reasons. Indeed, Franklin Fischer views Microsoft's massive investment in its browser as evidence that its conduct was predatory.[150]

¶ 92 After developing its browser, Microsoft aggressively distributed it by tying it to Windows and by entering into a number of exclusive contracts with ICPs, ISVs, and IAPs. Microsoft's main defense to these practices was that consumers were not harmed. This demurrer did not persuade either Judge Jackson or the court of appeals.[151] By focusing solely on the absence of consumer harm in discrete practices and largely ignoring the network effects so evident in computing and software markets, Microsoft missed some key opportunities for an affirmative defense. For example, when confronted with the fact that Microsoft tied Explorer to Windows, Schmalensee defended Microsoft by appealing to antitrust tying law concerning separate products and arguing that the district court misunderstood the nature of the good in question.[152] This argument, while perhaps legally correct, did nothing to alleviate the fears that Microsoft had undertaken a concerted effort to shore up its Windows operating system to the detriment of consumers.

¶ 93 Microsoft did offer some affirmative defenses to its browser distribution practices. First, Microsoft suggested that it was merely trying to boost Window's sales by offering consumers a "best of breed" tie.[153] This is merely a version of the standardization argument outlined above. Under this logic, Microsoft was simply trying to choose the best browser for the consumer and hence offer the consumer the best package available.

¶ 94 This argument rests largely on the presumption that Explorer was a superior product and consumers would have been unable to figure this out on their own. There was, however, no evidence that consumers would not gravitate toward the best browser eventually via the dynamics of competition—after all, both browsers were basically free to users. Judge Jackson found that there was only "equivocal" support for the notion that Explorer was the best browser or likely to remain so.[154] In addition, the "best in breed" argument does not help explain Microsoft's dealings with Apple or the IAPs. Apple, as a separate operating system, actually competed against Windows. Why would Microsoft try to improve the Apple operating system's functionality? In addition, IAPs and ICPs presumably should have been expert enough to choose the best browser without help from Microsoft.[155]

Java from the market.

[148] The court of appeals held that Microsoft's intellectual property defense for its restrictive licenses "borders upon the frivolous," 2001 U.S. App. LEXIS 14324 at 58, and the district court also gave it little weight, 87 F. Supp. at 40-41.

[149] *See* Direct Testimony of Paul Maritz on Behalf of Microsoft Corp. at ¶ 293, (D.D.C 1999) (No. 98-1233).

[150] *See* Fisher & Rubinfeld, *supra* note 3, at 19.

[151] Although the court of appeals relieved Microsoft of liability for product design decisions (i.e. the integration of Internet Explorer into the operating system), holding that the government must rebut any offered justification and demonstrate that the anti-competitive effects outweigh it, *Microsoft* 2001 U.S. App. LEXIS 14324 at 72.

[152] Evans & Schmalensee, *supra* note 107, at 72-3.

[153] *See Microsoft Findings of Fact, supra* note 1, ¶ 194.

[154] *See id.* ¶ 195.

[155] This analysis assumes, of course, that there are no coordinated action problems or switching costs that would keep the ISVs and

2. Did Microsoft Possess Monopoly Power?

¶ 95 Despite its control of at least 80% of the operating system market, Microsoft consistently asserted at trial that it did not possess monopoly power. Using traditional techniques, Microsoft's expert economics witness, Richard Schmalensee, estimated that Microsoft should be able to charge at least 16 times its actual price for Windows if it were a monopoly, and concluded that Microsoft therefore had little market power.[156] Schmalensee bolstered this argument by pointing to the potential competition Microsoft faced from other operating systems (such as Linux) and by claiming that the barriers to entry in the operating systems market are low.[157] Thus, Microsoft engaged in what economists call *limit pricing* which means that prices are cut to the point at which entry is deterred. In general, a monopolist may only extract monopoly profits up to the point where entry by other firms becomes profitable. If there are many potential entrants and low barriers to entry, limiting pricing could even reach the competitive result.

¶ 96 The belief that operating systems are networks actually bolsters the potential competition story. While networks may have high barriers to entry, the effect of entry is especially disastrous for the dominant firm. If network effects mean that a dominant firm will take the bulk of the market, an entrant could completely destroy the market value of the dominant firm. Thus, a dominant network firm has a strong incentive to price so as to deter entry. In the case of a network, this may mean pricing close to the value of the system plus switching costs.

¶ 97 Limit pricing is, of course, pro-competitive since it means lower prices.[158] It may also be socially optimal. Insofar as switching costs are not increased by the conscious effort of the network monopolist, they represent true social costs to abandoning the system. In addition, a new entrant may have to develop its own system from scratch, and this is socially wasteful if it duplicates existing technologies (which may be protected as trade secrets or intellectual property).

¶ 98 Robert Fisher, the government's expert, argued that the low price for Windows had a variety of explanations apart from Schmalensee's theories about potential entry. Among these were Microsoft's concerns about keeping a large installed base (part of the network effects story), increasing demand for its complementary products, and discouraging piracy.[159] Of course, a portion of Microsoft's low-pricing strategy may be directly attributable to network effects. As we have seen, network effects will make the network owner perceive her demand as more elastic. Price increases decrease the number of users, which in turn decreases the value of the network. If this is the full story, Microsoft's low-pricing strategies for Windows and Explorer are decidedly pro-consumer. Social welfare increases when network owners expand their installed base and supply complementary goods. A possible anti-competitive explanation for low prices, however, is that they are the result of predation, either in the form of predatory pricing or payments to the OEMs and others for their participation in predatory exclusive contracts. Fisher argues that these factors are at work as well, although he does not attempt to establish what price Microsoft should charge in the absence of its alleged predation.[160]

¶ 99 In the opinion of the district court, Microsoft's monopoly power was demonstrated mainly by Microsoft's large market share and the applications barrier to entry.[161] This was buttressed by an admission

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IAPs wedded to a less desirable browser—which may not be true in the presence of network effects. Since Microsoft did not offer a defense based on network effects, however, such a point was not made.

[156] *See Schmalensee Direct Testimony, supra* note 56, ¶ 163.

[157] Evans & Schmalensee, *supra* note 107, at 66-70.

[158] While limit pricing reduces prices, low prices may also be used by incumbent firms as a strategy to deter entry as mentioned in our discussion of predatory pricing, *see supra* text accompanying notes 87-89. As a practical matter, it would be difficult to distinguish between predatory pricing and limit pricing. Using a formal economic model, Paul Milgrom and John Roberts conclude that limit pricing has a weak potential to misinform entrants and is therefore pro-consumer, *Limit Pricing and Entry under Incomplete Information: an Equilibrium Anlaysis*, 50 ECONOMETRICA 443, 457-58 (1982). *But cf.* Greg LeBlanc, *Signaling Strength: Limit Pricing and Predatory Pricing* 23 RAND J. OF ECON. 493, 505 (1992) (showing that a firm may combine limit pricing with predatory pricing strategies to deter entry though not conducting an investigation of consumer welfare effects).

[159] *Id.* at 14.

[160] *Id.*

[161] 87 F. Supp. 2d at 36-37.

by a Microsoft executive that he did not consider competitors' prices when deciding what to charge for Windows.[162] In the end, the court of appeals accepted the entirety of the district court's analysis.[163]

¶ 100 Whether or not Microsoft possessed monopoly power is important to the government's case. If Microsoft lacked monopoly power, any pro-consumer explanations for its allegedly illegal activities appear much stronger. After all, these activities are only anti-consumer because Microsoft was allegedly trying to shore up its monopoly position. Ultimately, an empirical evaluation of Microsoft's market power is fraught with difficulties due to network effects. The expert witnesses did not tackle the issue of what pricing strategy would be optimal for a network monopoly in Microsoft's position, given its concerns about increasing network value and deterring entry and piracy. Fischer's argument that Microsoft's Windows pricing is consistent with monopoly power is almost entirely heuristic—he does not crunch numbers and show that the price of Windows is best explained by predatory conduct and is not merely disciplined by potential entry, piracy, and other pro-competitive concerns. The government's other economic expert witness, Frederick Warren-Boulton, was similarly vague.[164]

¶ 101 Ultimately, focusing on market power in the case of networks is somewhat beside the point. Even if Microsoft earns little rent from its Windows operating system, it still may have strong incentives to commit predatory acts because the consequences of a superior technology entering the market are so disastrous.[165] Thus, consumer harm does not so much come from Microsoft's ability to earn a great deal of monopoly rent on its products, but from its attempt to shield its own inferior technology from competition so that it may continue to earn rent, however low.

C. Did Microsoft's Behavior Satisfy the Conditions for Network Predation?

¶ 102 From the previous discussion of network effects, one can isolate a number of key facts that the government should have shown to prove that Microsoft's actions were predatory. First, the government should have shown that Microsoft "tipped" or was at least attempting to tip the market for browsers. Second, assuming that Microsoft tipped or attempted to tip the market, the government should have shown that the tipping was the result of anti-competitive conduct by Microsoft, such as the exclusion of Netscape and Java by incompatibilities, illegal ties, exclusive contracts, or predatory pricing.

1. Did Microsoft Tip the Market?

¶ 103 A network predator must tip the market in his favor, leaving competitors either marginalized or eliminated. Microsoft allegedly excluded Netscape from a significant portion of the market via its exclusive arrangements with OEMs, IAPs, ISVs and ICPs that provided highly favorable treatment to Microsoft's Explorer browser.[166] In addition, Microsoft persuaded Apple to install Explorer exclusively, thereby removing yet another possible distribution mechanism for Netscape Navigator.[167]

¶ 104 There is, however, little empirical support for the argument that Microsoft tipped the market for Internet browsers. Microsoft managed to gain a 60% market share at the time of the trial, undoubtedly aided by its exclusive contracts, but Microsoft did not achieve a great deal of penetration in the important academic and corporate browser markets, which still heavily favored Netscape.[168]

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[162] *Microsoft Findings of Fact*, *supra* note 1, ¶ 55.

[163] *Microsoft*, 2001 U.S. App. LEXIS 14324 at 24.

[164] Warren-Boulton admitted during the trial that his analysis could not take these diverse factors into account. "Court: Now, does the market test (for monopoly power) tell you what price for an operating system without a browser would have been, would likely have been, if Microsoft didn't have the anticompetitive incentive that you've described to preserve its operating system monopoly? Warren-Boulton: No." R. Vol. 22 at 5.

[165] This may be why Microsoft did not make great use of the network effects in the potential competition story since network effects both reduce market power and give stronger incentives for predatory and other risky anti-competitive behavior.

[166] *See* 87 F. Supp. 2d at 53-54.

[167] *See id.* at 42-43.

[168] *See Schmalensee Direct Testimony, supra* note 56, ¶ 539.

¶ 105 In addition, Explorer's market share was extremely precarious and relied at least partly on Microsoft's contract with America Online, the leading Internet access provider.[169] During the trial, America Online announced that it would purchase Netscape Navigator for $4.2 billion in stock.[170] Such a purchase price suggests that significant value remained in Nestcape despite Microsoft's alleged predation. More importantly, if America Online were to later switch its default browser to Navigator, Microsoft's share of the browser market would plummet.[171] While Netscape suffered substantial losses in 1997 due to Microsoft's challenge,[172] Netscape managed to post a profit and record revenues in the fourth quarter of 1998—just as the trial began.[173]

¶ 106 Could Microsoft have even hoped to tip the market in its favor? Even though the government's case hung heavily on the bad intent of Microsoft as evidenced by internal memos, Judge Jackson noted that Microsoft's executives never "expressly declared acquisition of monopoly power in the browser market to be the objective…"[174] If Netscape represented a threat to Microsoft because of the possibility it would become an operating system as well, Netscape stood to make substantial profits. In addition, if Netscape Navigator were a superior browser, profit potential existed for an Internet access provider who could purchase Navigator and supply it as its browser of choice. Therefore, Netscape would have responded to any predation attempt by seeking a strategic partner who could support the Netscape network. AOL, of course, is just such a partner.[175]

¶ 107 Microsoft was able to effectively compete with Navigator because Microsoft's relationships with OEMs and its control of Windows provided a mechanism by which Explorer could be introduced on a large scale. AOL provides just such an opportunity for Netscape Navigator. Far from destroying Netscape, Microsoft's introduction of Internet Explorer may have merely forced it into a strategic partnership with a firm that could ease its distribution, aid in development, and otherwise reduce costs. Richard Schmalensee makes a similar point in his written testimony.[176] It is hard to believe that Microsoft would have ignored this possibility when it calculated the likelihood of successful predation. In fact, AOL has recently begun a partnership with Gateway Computers, a large OEM, to offer an Internet-based machine that runs on Linux, another operating system.[177]

¶ 108 Ultimately, Judge Jackson concluded that although Microsoft may not have actually "tipped" the market, it succeeded in retarding competition[178] and "[m]ost harmful of all" it conveyed a message to other potential competitors that it would harm firms that chose to compete against it.[179] This saved Microsoft from Section 1 Sherman Act liability for some of its exclusive contracts, because Microsoft did not exclude Netscape from a sufficient percentage of the market.[180] However, the court found Microsoft liable under Section 2 for

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[169] *See id.* ¶ 541.

[170] See AULETTA, WORLD WAR 3.0: MICROSOFT AND ITS ENEMIES (2001) at 117-18, 173-76 for details about the acquisition and its effect on the trial. The value of the stock swap, when consummated, actually was closer to $10 billion. *See* Evans & Schmalensee, *supra* note 107, at 57.

[171] Much the same point was made by Schmalensee in his testimony. *See Schmalensee Direct Testimony, supra* note56, ¶ 550. Fisher & Rubinfeld counter this analysis by arguing that the value to AOL for challenging "Microsoft's monopoly power in operating systems must be far less than the value to Microsoft of preventing that challenge." Fisher & Rubinfeld, *supra* note 3, at 31. This argument does not comport with the idea that there are substantial rents to be earned in the operating systems market. Nor do Fisher & Rubinfeld offer a reasonable explanation for AOL's purchase of Netscape, since AOL continued to rely on Explorer after the merger. It would seem that Fisher & Rubinfeld think that AOL paid $4.2 billion for a white elephant. More plausible explanations are available: AOL may foresee potential profit in Navigator as an operating system, or AOL may want to develop a browser of its own. In addition, AOL's continued use of Explorer, even though it owns Netscape, is evidence of Explorer's superiority as a browser.

[172] *See* Kara Swisher and David Bank, *Netscape Estimates a Large Fourth-Quarter Loss*, WALL ST. J., January 6, 1998, at A3 (reporting that Netscape lost $85-$89 million in the fourth quarter of 1997 due to competition from Microsoft).

[173] *Netscape Reports Record Revenue of $162 Million for Fourth Quarter Ending October 31, 1998*, M2 Presswire, November 24, 1998.

[174] *Microsoft*, 87 F. Supp. 2d at 45.

[175] Sun Microsystems is a member of this partnership as well and contributed $1.25 billion toward AOL's purchase of Netscape. *See* David Bank, *Sun Details its Pledges to AOL-Netscape*, WALL ST. J., February 11, 1999, at B7.

[176] *Schmalensee Direct Testimony, supra* note56, ¶¶ 538-40.

[177] *See* Alec Klein, *For AOL and Microsoft, It's High-Tech Noon*, WASHINGTON POST, June 8, 2001, at A1.

[178] *Microsoft Findings of Fact*, *supra* note 1, ¶ 411.

[179] *Id.* ¶ 412. It is unclear whether or not an alleged attempt at predation, which was ultimately unsuccessful, would deter future competitors or make Microsoft appear more vulnerable.

[180] *Microsoft*, 87 F. Supp. 2d at 53-54.

monopolization of the operating system market because its agreements in general (including the non-exclusive ones) "rendered Netscape harmless as a platform threat and preserved Microsoft's operating system monopoly"[181] despite the fact that Netscape still had an enterprise valued at $4.2 billion, had found a strategic partner, and had controlled as much as 40% of the market. Judge Jackson does not reference any evidence that Netscape's threat as an operating system had been eliminated or reduced by its loss of market share.

¶ 109 The court of appeals upheld the district court's conclusions about the exclusionary impact of Microsoft's dealings with OEMs,[182] IAPs,[183] and ISVs,[184] but not ICPs.[185] The court of appeals acknowledged Judge Jackson's conclusion that Netscape and Java did not have sufficient APIs to constitute operating systems, nor were they likely to in the near future.[186] It held nonetheless that Microsoft may have attacked a nascent threat to its operating system monopoly and that such an attack was a clear violation of the Sherman Act.[187] The court of appeals inferred Microsoft's anti-competitive intent from Microsoft's failure to offer pro-consumer justifications for its actions.[188] This analysis, however, seems incomplete. Like the district court, the court of appeals failed to analyze whether Microsoft had in fact shrunk Netscape's market share such that it diminished Netscape's threat to Microsoft's operating systems monopoly, nor did the court examine the impact of the Netscape/AOL merger on Netscape's viability. Given the vitality of both companies and the strategic alliances they formed, it is doubtful that their threat to Windows was reduced by Microsoft's actions in the browser market.

2. Did Microsoft Exclude Netscape from Windows and Apple?

¶ 110 Both the district court and the court of appeals found that Microsoft excluded Netscape from Windows machines by requiring OEMs to install Explorer along with Windows.[189] Microsoft also allegedly strong-armed Apple into making Explorer the default browser in Apple's operating system.[190] (Pro-consumer justifications for these actions will be discussed below.) Windows is undoubtedly an essential facility for software developers.[191] If software is not Windows compatible, it is excluded from 80 to90 percent of the PC market. Since software development is characterized by high fixed costs and low marginal costs, such an extensive foreclosure would prevent cost-spreading and would likely be fatal.

¶ 111 Microsoft did not use its ownership of Windows or its arrangements with Apple to make Netscape Navigator unusable, however. It did not make Navigator incompatible with the Windows operating system, nor did it prohibit OEMs from installing Navigator at the plant.[192] Microsoft merely required that Explorer not be removed from its operating system by the OEMs.[193] Microsoft was able to get such favorable contracts because, the government alleges, it was able to "leverage" its Windows operating system with OEMs[194] and its software products with Apple.[195] Fisher suggests that Microsoft "paid" for such preferences by lowering the price of Windows, which helps to explain why Windows' low price was in fact anti-competitive.[196]

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[181] *Id.*

[182] *Microsoft*, 2001 U.S. App. LEXIS 14324 at 63.

[183] *Id.* at 84.

[184] *Id.* at 88.

[185] *Id.* at 85.

[186] *Id.* at 30.

[187] *Id.* at 108-111.

[188] *Id.* at 63.

[189] 2001 U.S. App. LEXIS at 63; 87 F. Supp 2d at 39.

[190] 2001 U.S. App. LEXIS at 93; 87 F. Supp 2d at 42-43.

[191] For a discussion of the essential facilities features of Windows, see Thomas A. Piraino, *An Antitrust Remedy for Monopoly Leveraging by Electronic Networks*, 93 NW. U. L. REV. 1, 50-51 (1998).

[192] *See Microsoft Findings of Fact*, *supra* note 1, ¶ 202, 217.

[193] *Id.* ¶ 202. A possible pro-competitive explanation behind these contracts will be discussed later.

[194] *See id.*, ¶ 213.

[195] *See id.* ¶ 344.

[196] *See* Fisher & Rubinfeld, *supra* note 3, at 11.

¶ 112 Do Microsoft's actions, however, amount to an exclusion of Netscape from an essential facility? In two leading cases, *Otter Tail Power* and *Terminal Railroad*, competitors were denied access to the essential facility (although this is not entirely clear in the *Terminal Railroad* case). No such thing was alleged about Microsoft's behavior regarding Netscape. At most, the government alleged that Microsoft withheld crucial technical support from Netscape for a time to aid its own browser.[197] Netscape is fully compatible with Windows and Apple's operating system.

¶ 113 As discussed earlier, a tie may be used to exclude competition as well. Note, however, that both Netscape and Explorer are offered for free, and Netscape, if preferred by the consumer, is widely available on CD-ROM and via downloads.[198] The consumer incurs no extra cost, except installation time, if they prefer not to use the tied browser.

¶ 114 If Microsoft had in fact somehow made Netscape incompatible with Windows, the government's case would have been much stronger. Under such circumstances, Netscape would have most likely ceased to exist and Microsoft would be hard pressed to provide a pro-consumer rationale for limiting consumer choice. Netscape, however, continued to work well with Windows and was widely available.[199]

3. Did Microsoft Exclude Java from Other Operating Systems?

¶ 115 Microsoft allegedly excluded Java from *other* operating systems by developing a Windows version of Java that would work only on Windows machines.[200] Programmers were allegedly tricked into using this version of Java.[201] This obviously would have reduced the middleware threat that Java posed to Microsoft's Windows monopoly.

¶ 116 Microsoft defended its dealings with Sun Microsystems primarily on technical grounds, arguing that its Windows version of Java was an improvement on Java, not an attempt to foreclose Java from access to Windows, and that its agreements made Microsoft the largest distributor of Java software.[202] The court of appeals accepted the evidence that Microsoft's modifications to Java improved its performance.[203] Microsoft in fact embraced Java, and this action is perfectly consistent with a profit-maximizing network monopoly. Microsoft recognized a superior technology, allowed its owner access to the Microsoft network, and later incorporated the technology into its network. As discussed earlier, the network owner may charge a monopoly price to his potential competitors, but he has an incentive to allow them access.[204]

¶ 117 The story would appear quite different if Microsoft made its network incompatible with Java or denied Java access. Therefore, the alleged deception employed by Microsoft to trick programmers into using its version of Java is difficult to defend. Microsoft's version ran only on Windows, and tricking customers into using a technology that is solely compatible with Windows is akin to the introduction of an incompatibility. During the trial, however, a federal district court in California issued a preliminary injunction in Sun Microsystem's favor in a license dispute over Java compatibility issues.[205]

D. Summary of the Government's Case

¶ 118 The government's case fails on a number of key points. It could not show that Microsoft's actions were presently damaging consumers, so it had to rely solely on the predation story. The predation story, however, requires Microsoft to eliminate or marginalize Netscape. Netscape remained a viable company despite Microsoft's actions and found a strategic partner in AOL to continue its product development. In addition,

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[197] *See Microsoft Findings of Fact, supra* note 1, ¶¶ 90-92.

[198] *See id.* ¶¶ 146-47.

[199] *See id.* ¶ 378.

[200] *See id.* ¶¶ 387-394.

[201] *See id.* ¶ 388.

[202] *Supra* note 130, at 30–31.

[203] *See* 2001 U.S. App. LEXIS at 95-96.

[204] *See supra* notes 40-41 and accompanying text.

[205] Sun Microsystems, Inc. v. Microsoft Corp., 87 F. Supp. 2d 992, 1006-7 (N.D. Cal. 2000).

market share among browsers was heavily dependent on IAPs like AOL, which now owns Netscape. The necessary elements for a network predation story were therefore conspicuously lacking.

¶ 119 Netscape's viability is also evidence that Microsoft did not exclude Netscape from its operating system by requiring OEMs to install Explorer on their Windows machines. Microsoft did not introduce incompatibilities with regard to Netscape, and, while ties may be used to exclude rivals, pro-competitive explanations for this practice will be considered in the next section. The issues involving the exclusion of Java from non-Windows machines are more troublesome, but much of that was made moot during the trial by the issuance of an injunction against Microsoft. In addition, Microsoft's development of a superior Java technology was pro-consumer, as the court of appeals acknowledged.[206]

¶ 120 The obvious question, then, is why did Microsoft lose the trial, and why were much of Judge Jackson's findings upheld on appeal? Schmalenssee's testimony provided a strong argument against predation. However, Microsoft did notoffer a compelling pro-consumer argument explaining why it would develop and distribute Explorer in the manner it did. Microsoft defended its Explorer marketing techniques mainly through technical arguments or demurred by arguing that no consumer harm resulted from them. Ultimately, however, the lack of a pro-consumer theory to explain Microsoft's entry into the browser market and its marketing techniques, combined with "bad intent" shown through internal Microsoft memos, sealed Microsoft's fate. Judge Jackson wrote, "[b]ecause Microsoft achieved this result [the exclusion of Java and Netscape] through exclusionary acts that ***lacked procompetitive justification***, the Court deems Microsoft's conduct the maintenance of monopoly power by anticompetitive means (emphasis added)."[207]

¶ 121 The lack of pro-competitive justifications for Microsoft's practices greatly concerned the court of appeals as well, as a sampling of the court's language with regard to key Microsoft practices aptly illustrates. Regarding the integration of Internet Explorer into Windows, the court noted, "Microsoft proffers no justification for two of the three challenged actions that it took in integrating IE into Windows--excluding IE from the Add/Remove Programs utility and commingling browser and operating system code."[208] The court held much the same regarding the exclusivity agreements:

> [o]f course, that Microsoft's exclusive deals have the anticompetitive effect of preserving Microsoft's monopoly does not, in itself, make them unlawful. A monopolist, like a competitive firm, may have a perfectly legitimate reason for wanting an exclusive arrangement with its distributors. Accordingly, Microsoft had an opportunity to, but did not, present the District Court with evidence demonstrating that the exclusivity provisions have some such procompetitive justification.[209]

The court of appeals' language regarding the Java arrangements was even more powerful:

> Microsoft's conduct related to its Java developer tools served to protect its monopoly of the operating system in a manner not attributable either to the superiority of the operating system or to the acumen of its makers, and therefore was anticompetitive. Unsurprisingly, Microsoft offers no procompetitive explanation for its campaign to deceive developers. Accordingly, we conclude this conduct is exclusionary, in violation of § 2 of the Sherman Act.[210]

V. AFFIRMATIVE DEFENSES

¶ 122 Despite Microsoft's failure to offer one, there is a plausible affirmative defense for the development and distribution of its browser, relying on the existence of network effects in both the operating system market and the browser market. This defense posits that Microsoft broke into the browser market, which is also a network market, in part to enhance the value to consumers of its own Windows network. Microsoft's controversial browser distribution strategy was a mechanism that helped it overcome the natural barriers to

[206] 2001 U.S. App. LEXIS at 96.

[207] 87 F. Supp. 2d at 39.

[208] 2001 U.S. App. LEXIS at 70

[209] *Id.* at 87-88.

[210] *Id.* at 101.

entry that protected the incumbent firm, Netscape. Thus, the tables are turned, and Microsoft is now the entrant, and Netscape is the incumbent network, protected by barriers to entry and first-mover advantage.

A. Why Would Microsoft Build a Browser?

¶ 123 A monopolist wants the price of complements to his monopoly product to be as low as possible. The problems caused by successive monopolies have been detailed earlier.[211] These problems would face any monopolist but are greatly compounded by the presence of network effects. The owner of a network monopoly is damaged even further by the reduced demand for her good that results when a monopoly price is charged for a complementary product, since the value consumers place on the network product is itself a function of demand.[212] In addition, a network owner may want to bring complementary products into his network in order to achieve a beneficial degree of standardization.[213]

¶ 124 A network owner could lower the price of complements in two ways. First, she could buy her competitor so as to avoid the problems of successive monopoly. Second, she could introduce competition in the complements market by offering her own product. Microsoft has used both of these strategies in the past.[214] Examples include Microsoft Word and its competitor Wordperfect and Microsoft Office and its competitor Lotus. Economist Timothy Breshnahan has argued that the competition between Microsoft and Oracle for Database Management Software (DBMS) spurred innovation and therefore was welfare improving (though he does not focus on the network effects story in this argument).[215] After Microsoft entered the market, Oracle reacted in a variety of ways, including improving its software, to counteract the threat.[216] Most interestingly, Breshnahan notes that few other competitors seemed able to offer Oracle a substantial threat or provoke a strong reaction.[217] This is perhaps because Microsoft, as the owner of Windows, is uniquely positioned to compete in the software market. Liebowitz and Margolis also document how Microsoft's entry into other software markets decreased prices and increased quality.[218] Their examples also show that Microsoft hardly dominated every software market it entered, and that the company's market shares swung wildly over time.[219]

¶ 125 Microsoft recognized in the mid-1990s that the Internet revolution would be, in the words of Bill Gates, "a tidalwave."[220] At this point, Netscape Navigator had all but won the browser wars.[221] Given Microsoft's past interventions in the market for software, it is not a surprise that Microsoft decided to make its own browser.

¶ 126 A network owner who offers a competing complementary good, however, does not necessarily want to see her competitors ruined. Indeed, a network owner who introduces her own complementary product may still find it advantageous to support her competitor's product.[222] After all, the network is not necessarily

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[211] *See supra* notes 17-18 and accompanying text.

[212] For a simple model on why a producer may charge a zero price for a complementary good, see Steven J. Davis & Kevin M. Murphy, *A Competitive Perspective on Internet Explorer*, 77 AM. ECON. REV. 184, 184-5 (2000). Davis & Murphy use a simple model with linear demand in a static setting with two complementary products that are produced by the same firm. Under a range of parameter values and with sufficiently low marginal costs, a profit-maximizing firm would charge a zero or even negative price for one of the complements. Davis & Murphy conclude that "[c]omplementary demand gives Microsoft a stronger incentive then its rivals to set low prices, even when it has the same cost structure as rivals and the same degree of market power for particular software products." *Id.* at 185.

[213] *See* Mark A. Lemley, *Standardizing Government Standard-Setting Policy for Electronic Commerce*, 14 BERKELEY TECH. L. J. 745, 746-47 (arguing that there are large benefits to standardization when network effects are present).

[214] See *Schmalensee Direct Testimony, supra* note 56, at ¶ 71 tables 1-2 for a summary of software products that Microsoft has offered, competitors, and market shares.

[215] *See* Timothy F. Breshnahan, *New Modes of Competition: Implications for the Future Structure of the ComputerIndustry, in* COMPETITION, INNOVATION AND THE MICROSOFT MONOPOLY: ANTITRUST IN THE DIGITAL MARKETPLACE, 180-83 (Jeffrey A. Eisenach & Thomas M. Lenard eds., 1999).

[216] *Id.*

[217] *Id.*

[218] Stan J. Liebowitz & Stephen E. Margolis, Winners, Losers & Microsoft: Competition and Antitrust in High Technology, 163-229 (1999).

[219] *Id.*

[220] *See Microsoft Findings of Fact, supra* note 1, at ¶ 134.

[221] *See supra* note 107 and accompanying text.

[222] *See* Economides, *supra* note 13, at 691.

gaining value from the complementary product itself, but from the expansion of the network caused by a competitive market in complements. In addition, preserving a competitive market in complements may reduce consumer fears that ex-post holdup will occur.

¶ 127 Benjamin Klein has suggested that because the price of Internet browsers was already quite low when Microsoft entered the market, Microsoft did not develop Explorer as a possible solution to successive monopoly.[223] Instead, he believes that Microsoft decided that it could most effectively derive revenue from complementary products. Of course, one motivation for Microsoft's move into the browser market may have been the revenues that come from a browser's ability to steer consumers to particular website and the sales of software complementary to the browser.[224] If this is true, then Microsoft's entry created competition for this service and lowered the costs to website promotion, which is pro-competitive.

¶ 128 The successive monopoly explanation is still plausible. First, because of the network effects present in both the operating system and the browser market, the revenue losses associated with successive monopoly pricing will be magnified. Second, monopolists may choose to seek rents in a variety of ways. A monopolist may choose to keep a low price, for example, but invest less in quality and innovation. If Netscape had become the dominant browser and became entrenched because of network effects, it may have been a reasonable choice for Netscape to invest less in research and development and instead to reap profits from the old technology for as long as possible. If Microsoft jump-started innovation by the introduction of its own browser, as it may have in the DBMS market, then it did in fact address a kind of successive monopoly problem, albeit a successive monopoly that was taking profits in the form of reduced quality as opposed to higher prices.[225] Third, while Netscape may not have charged high prices for its browser, it may still have been collecting monopoly rents from ancillary products used by web-site developers or IAPs. If this delayed the development of the web (which Microsoft perceived, though belatedly, to be the next revolution in computing) or reduced the demand for Windows, Microsoft would still have an incentive to intervene and thereby avoid the successive monopoly.

¶ 129 Microsoft never convinced Judge Jackson that it had spent several hundred million dollars to develop a product that it offered at a zero price for pro-competitive reasons. The special concern that a network monopolist has with disciplining the market for complementary goods, increasing innovation, and avoiding the problems of successive monopolies would have provided an affirmative pro-consumer defense for Microsoft's investment in Explorer.

B. Microsoft's Browser Distribution Strategy

¶ 130 Microsoft distributed its browser aggressively, to say the least, and company records clearly demonstrated that Microsoft was obsessed with obtaining a large browser market share.[226] First, Microsoft tied its browser to Windows. The tie was accomplished by prohibiting OEMs from removing Explorer and by making Explorer the default browser on Windows. The OEMs, however, were free to install Netscape Navigator.[227] Microsoft later embedded the browser into its operating system (which Microsoft defended on technical grounds).[228] Second, Microsoft obtained restrictive contracts with IAPs and ICPs to feature Internet Explorer.[229] In addition, Microsoft offered inducements so that ISVs would author their websites with Explorer in mind, so that the web sites would be best viewed through the Explorer browser.[230] Third, Microsoft threatened and cajoled its only significant operating systems competitor, Apple, to make Explorer

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[223] *See* Benjamin Klein, *supra* note 56, at 232-33, *in* COMPETITION, INNOVATION AND THE MICROSOFT MONOPOLY: ANTITRUST IN THE DIGITAL MARKETPLACE, (Jeffrey A. Eisenach & Thomas M. Lenard eds., 1999).

[224] *See id.* at 219.

[225] This is similar to Breshnahan's point about Microsoft and Oracle's competition in the DBMS market. Microsoft's entry into that market seems to have provoked Oracle into improving its product. *See supra* note 215 and accompanying text.

[226] *Microsoft Findings of Fact*, *supra* note 1, at ¶¶ 166, 212, 242.

[227] *See id.* ¶¶ 202-03.

[228] *See id.* ¶¶ 191-93.

[229] *See Microsoft Findings of Fact*, *supra* note 1, ¶ 242.

[230] *See id.* ¶¶ 337-40.

the default browser on its system.[231] Finally, Microsoft charged a zero price for Explorer--or perhaps even a negative price if one counts the subsidies Microsoft gave to various users.[232] These practices, the government contended, were an attempt to destroy Netscape's market share and thus its potential future threat to Microsoft's operating system monopoly.[233]

¶ 131 Nonetheless, a simple pro-consumer explanation can be offered for Microsoft's distribution strategy. Again, the argument is premised on the existence of network effects. I have thus far spoken of barriers to entry in the operating systems market and the network effects that this market exhibits. Similar effects may also be present in the browser market.

¶ 132 Prior to the introduction of Explorer and for some time thereafter, Netscape dominated the browser market. Market dominance by a single firm after a period of competition is consistent with network effects. In addition, while any browser that meets certain technical specifications can be used to view web pages, web page authors can design their pages with a certain browser in mind to get the best appearance.[234] The more people who use a particular browser, the more web pages will be designed with that browser in mind, and then more people will use the browser. This is similar to the previously discussed positive feedback loop regarding software.[235] Thus, Netscape was itself a network monopoly and had the attendant first-mover advantage. Any potential competitor faced significant barriers to entry because it had to dislodge an existing network and capture a sufficient portion of the market to make its own product viable.

¶ 133 Indeed, Microsoft executives recognized the first mover advantage that Netscape possessed. James Allchin, a Microsoft Executive, wrote an internal memo in December 1996 arguing precisely this point. He wrote:

> I don't understand how IE [Explorer] is going to win. The current path is simply to copy everything that Netscape does packaging and product wise. Let's [suppose] IE is as good as Navigator/Communicator. Who wins? The one with 80% market share. Maybe being free helps us, but once people are used to a product it is hard to change them.[236]

In another memo in January 1997, Allchin continued this argument:

> You see browser share as job 1 . . . I do not feel we are going to win on our current path. We are not leveraging Windows from a marketing perspective and we are trying to copy Netscape and make [Explorer] into a platform . . . [p]itting browser against browser is hard since Netscape has 80% marketshare and we have <20%.[237]

¶ 134 Oddly enough, Judge Jackson cites this memo prominently in his findings of fact as evidence that Microsoft was illegally using its Windows products as "leverage" and perpetrating an illegal tie.[238] The court of appeals also considered Microsoft's attention to market share suspicious.[239] This leveraging strategy, however, may have been nothing more than an attempt to compete with a network industry in a market with significant barriers to entry.

¶ 135 If Allchin's analysis of the market is accurate, Microsoft may have been the firm best positioned to compete against Netscape. In addition to Microsoft's software development resources (making a browser is an expensive proposition), Microsoft also had an easy distribution mechanism because its Windows operating

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[231] *See id.* ¶¶ 341-56. Microsoft's relationships with Apple are particularly interesting. Apple represents Microsoft's main operating system competitor and has over 12,000 software applications written for it (compared with Windows' 70,000 plus). *See id.* ¶¶ 40, 47. Yet Microsoft has shared software (such as Microsoft Office) with Apple and gave Apple a needed capital infusion when it was ailing. *See* AULETTA, *supra* note 170, at 105-06.

[232] *See Microsoft Findings of Fact*, *supra* note 1, ¶ 136.

[233] Fisher, in particular, makes a great deal of the negative price for Explorer *See* Fisher & Rubinfeld, *supra* note 3, at 22.

[234] *Microsoft Findings of Fact*, *supra* note 1, ¶ 311.

[235] *See supra* notes 105, 106, and accompanying text.

[236] *Microsoft Findings of Fact*, *supra* note 1, at ¶ 166.

[237] *Id.*

[238] *Id.*

[239] 2001 U.S. App. LEXIS 14324 at 50-51.

system was installed in the vast majority of personal computers sold.[240] It could therefore enter the browser market on a large scale and gain sufficient market share to become a viable network.

¶ 136 If Microsoft had been willing to tell a network story, its concerns over market share would not have appeared to be diabolical, but instead a natural concern of any firm deciding to compete in a network market. Indeed, Allchin's memo suggests that to have any hope at all in the market, Microsoft had to make the browser free and then find a convenient distribution mechanism. Thus, various Microsoft practices, such as paying IAPs and ICPs to prominently feature Explorer and offering Explorer at a zero price, appear to be pro-consumer, especially when coupled with Microsoft's natural concern about disciplining the market for complementary products.

¶ 137 It is not even clear who, if anyone, tried to foreclose whom from the market. Benjamin Klein argues that Microsoft's bundling of Explorer with Windows was mainly a defensive arrangement designed to prevent "Netscape from foreclosing Explorer from OEM desktops."[241] Klein argues that Netscape had attempted to obtain a number of restrictive contracts with OEMs, and that much of Microsoft's supposed anti-competitive practices were in fact a response to this situation.[242]

¶ 138 The pro-competitive story actually makes sense in light of Microsoft's position as an operating system network versus Netscape, whose core asset was its browser. Microsoft, recall, did not actually obtain exclusive contracts with the OEMs, as is popularly believed. Rather their contracts required that Explorer be installed on all PCs when Windows was installed as well. OEMs were still free to install Netscape Navigator if they so desired. Netscape, however, reportedly sought exclusive contracts.[243] These exclusive contracts may well have foreclosed the market for Microsoft browsers, which would have left Netscape in a monopoly position. Microsoft, however, would still have permitted Netscape to be installed at the plant (although this apparently did not happen often), and it did not make Netscape incompatible with Windows. This is consistent with Microsoft's position as network owner—even though it supplied a complement (Explorer) to its core asset (Windows), it did not want to foreclose competition, which may have made Windows less valuable. If Netscape were the superior browser, OEMs or customers could have continued to install it.

C. Microsoft and the Internet Explorer Access Kit Agreements

¶ 139 In 1996, Microsoft introduced the Internet Explorer Access Kit (IEAK), which IAPs could download from Microsoft directly for no charge. It allowed IAPs to create a customized and automated installation package for consumers in which all settings were pre-configured.[244] IEAK proved popular with IAPs, and Netscape later offered its own product, Mission Control, nine months later but at a price of $1,995.[245]

¶ 140 Judge Jackson was highly suspicious of this business tactic, writing that:

> [By providing IEAK for free, Microsoft] beguiled many small ISPs [Internet Service Providers] that otherwise would not have done so into distributing Internet Explorer to their subscribers. By giving up the opportunity to charge for Internet Explorer, and also by developing the IEAK at substantial cost and offering it at no charge, Microsoft thus increased the flow of Internet Explorer through the crucial IAP channel.[246]

Microsoft thus received no praise for its innovative offering of IEAK, but its actions were instead viewed with suspicion. Oddly enough, Judge Jackson would later write that Microsoft's main crime was the stifling of innovation.[247]

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[240] Indeed, Judge Jackson found that "no other distribution channel for browsing software even approaches the efficiency of OEM pre-installation and IAP bundling," *Microsoft Findings of Fact*, *supra* note 1, at ¶ 145.

[241] *See* Klein, *supra* note 56, at 239, *in* COMPETITION, INNOVATION AND THE MICROSOFT MONOPOLY: ANTITRUST IN THE DIGITAL MARKETPLACE, (Jeffrey A. Eisenach & Thomas M. Lenard eds., 1999).

[242] *Id.* at 219-20.

[243] *See id.*

[244] *See Microsoft Findings of Fact*, *supra* note 1, at ¶¶ 248-9.

[245] *See id.* at ¶ 250.

[246] *Microsoft Findings of Fact*, *supra* note 1, at ¶ 252.

[247] *See id* at ¶ 412.

¶ 141 Microsoft's decision not to charge for IEAK comports well with the good network monopoly story. First, Microsoft was disadvantaged in the market place because Netscape had a large installed base. To increase its market share, Microsoft developed IEAK and offered it for free. This strategy is necessary both to overcome the barriers to entry that Microsoft faced and to increase its browser share to the critical mass necessary to support it in the market. Microsoft's zero pricing of a complementary good is perfectly consistent with a network seeking to enhance the value of its central asset (the Windows operating system and the software that runs on it). The court of appeals found that there was no reason to condemn any of Microsoft's pricing strategies, including the zero price for IEAK.[248]

D. Controlling the OEMs

¶ 142 The government's expert, Robert Fisher, argued that Microsoft's Windows pricing strategy was consistent with the "onerous" restrictions imposed on OEMs that enabled Microsoft to facilitate its predation of Netscape.[249] As we have seen, firms must generally pay for predatory conduct (such as exclusive contracts) but may be more than compensated by preventing the loss of the market in the future. Fisher believed that the low prices charged to OEMs for Windows were consistent with the burdens placed on them by Microsoft's practices.

¶ 143 Fischer's belief that OEMs had been coerced into providing special treatment for Microsoft's browser is crucial to the predation story. While it may be worthwhile for the OEMs collectively to refuse the contracts, coordinated action problems can lead them to take Microsoft's financial inducements so that they accept a worse browser and shore up Microsoft's Windows monopoly, even though that makes them collectively worse off. Thus, Microsoft can damage consumers via the OEM exclusive contracts, and make up for lost revenue because it maintains its monopoly position.

¶ 144 This analysis, however, can be challenged by a pro-competitive explanation for why Microsoft would regulate the OEMs as it did. Microsoft aggressively policed its operating system and prevented the OEMs from making modifications. While it may be profitable for one OEM to customize Windows to some degree to suit a particular set of consumers, if all OEMs do so Windows may become too particularized. Thus, the positive network effects that exist from a standardized product that each person may use no matter what brand of PC he comes across are lost. The OEMs may be too dispersed to negotiate a standardized system, or they may be prevented (by antitrust laws, for example) from coordinating their offerings. Microsoft, as the owner of the intellectual property of Windows, is able to internalize these network effects to some degree and therefore has the proper incentives to seek the appropriate amount of standardization, just as Subaru policed its dealer network in *Grappone*. Microsoft enforces this standardization by restrictive contracts, thus making the OEMs, Microsoft, and consumers better off. This view has empirical support. The news that these "onerous" restrictions might have to be modified during the trial seems to have *reduced* technology stock prices.[250]

¶ 145 Microsoft not only insisted that the OEMs install Explorer with Windows, but also gave the OEMs discounts if they installed Windows on a high percentage of the machines they manufactured.[251] Microsoft also gave discounts to OEMs if a certain number of machines manufactured were sufficiently powerful to support Windows NT (Network) for Workstations (this system allows software to be run remotely from a PC).[252] Judge Jackson interpreted these practices as evidence that Microsoft was attempting to crowd out cross-platform technologies.[253]

¶ 146 Microsoft's discounts to OEMs that installed Windows on a high percentage of machines may have helped Microsoft to stifle piracy. Network effects, however, offer a plausible pro-consumer explanation for both discounting practices. In the case of Windows installation discounts, Microsoft may have simply

[248] 2001 U.S. App. Lexis 14324 at 75.

[249] Fisher & Evans, *supra* note 3, at 14, 23.

[250] *See* George Bittlingmayer, *U.S. v. Microsoft Cui Bono?*, 9 CORNELL J.L. & PUB. POL'Y 9, 25 (1999).

[251] *See Microsoft Findings of Fact*, *supra* note 1, at ¶ 66.

[252] *Id.*

[253] *See id.*

incorporated the value of increasing the Windows network size directly into the price it charged OEMs. By subsidizing the creation of a large number of Windows NT capable machines, Microsoft may have created a sufficient installed base on which to build and maintain its network. Creating more Windows NT-capable machines also makes it easier for the owners of such machines to switch from Windows to the Windows NT system in the future without having to purchase new hardware. By reducing switching costs and creating a larger installed base, Microsoft increased the value of Windows NT to its customers. Due to the consumption externalities present in the network for operating systems, neither the OEMs nor their customers had the appropriate incentives to supply and purchase Windows or Windows NT capable machines at the socially desirable levels.

E. Microsoft's Practices Toward Java

¶ 147 Microsoft's alleged introduction of a Java programming language compatible only with Windows is not in and of itself harmful. The damaging aspect of Microsoft's relations to Java is the allegation that it tricked programmers into using the Windows-only version, thus cementing its Windows monopoly. If this allegation is true, there is no pro-consumer argument available to defend Microsoft's actions.

¶ 148 On the other hand, Microsoft did behave toward Java in ways that a good network should. It did not bar Java from Windows. Microsoft recognized Java as a valuable technology and took steps to incorporate this technology into its network. In fact, as the court of appeals noted, there was ample evidence that Microsoft made Java run even better on Windows.[254] Since Microsoft had to license the technology from Sun Microsystems, Sun Microsystems should have been able to protect itself from any attacks on it by Microsoft, as indeed it seems to have.[255]

F. Summary of a Network Defense

¶ 149 In sum, an affirmative defense was readily available to Microsoft. Microsoft recognized that the Internet was going to become increasingly important and that ultimately browsers would be standard on every PC. As it had done in the past with word processing and other important programs, Microsoft developed its own product and, as any network owner would, still permitted its competition to have access to the network. Microsoft faced stiff barriers to entry in the introduction of its browser, so it offered Explorer at a zero price, tied it to its operating systems, and obtained exclusive distribution contracts with other distributors. Without these arrangements, it may have been impossible for Microsoft to establish its own browser. Microsoft was compensated for these actions because the increased competition in the market for its operating system's complements. Needless to say, the lower prices, increased choice, and larger network size brought about by Microsoft's actions also benefited consumers. Finally, Microsoft did not bar Java from Windows, but permitted access and incorporated a valuable product into its network and may in fact have made it better.

¶ 150 The foregoing has been merely a sketch of an affirmative defense that was available to Microsoft. Whether key elements of this defense could be refuted by some of the over 3 million documents that the government collected in its investigation of Microsoft is left as an open question. Microsoft would have had to admit to its internal documents that demonstrated concern that Netscape's Navigator posed a middleware threat to Microsoft's monopoly. As detailed above, however, given that Netscape found a strategic partner and maintained an enterprise of value of at least $4.2 billion, and given that Internet Explorer's market dominance was highly dependent on the good will of IAPs, including the behemoth AOL, Microsoft had little hope of successfully foreclosing market access to Netscape and in fact did not.

VI. CONCLUSION

¶ 151 An important conclusion of this paper is that the presence of network effects do not necessarily have clear cut implications for antitrust analysis, and strong affirmative defenses are possible when there is a charge

[254] *See supra* note 203 and accompanying text.

[255] *See supra* note 205 and accompanying text.

of network predation. Tying may be used to foreclose competition, or, conversely, it may be used to increase competition by facilitating entry--as may have been the case with Microsoft Explorer. Low pricing may be a sign of predation. Conversely, low pricing, or penetration pricing, may be a prerequisite to competition by allowing the competing firm to build its network to a critical size.

¶ 152 At present, it seems clear that Microsoft has escaped any drastic remedy, such as a break-up.[256] Nonetheless, Microsoft may change a number of the practices discussed here even before a settlement or final order is reached.[257] It is unfortunate that Microsoft did not attempt to offer strong affirmative defenses for its practices. With regard to some issues, such as the exclusive contracts with IAPs and ISVs, the court of appeals had little choice but to sustain Judge Jackson's findings since no alternate pro-consumer explanation was offered by Microsoft.

¶ 153 Because network effects invite a variety of novel business practices, network industries may be subjected to greater antitrust scrutiny. Network effects, however, also provide some unique justifications for practices that have traditionally received antitrust scrutiny. The story of Microsoft is a case in point. The government could not prove present consumer harm, and its only hope of future consumer harm hinged on Microsoft's ability to exclude Netscape and Java from the market. Microsoft did not exclude Netscape or Java, and it is far from clear that Microsoft even wished to do so. Microsoft lost its trial, however, because it was unable to offer a compelling pro-consumer justification for its actions, even though several colorable arguments were readily available.

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[256] *See Microsoft*, 2001 U.S. App. LEXIS 14324 at 196.

[257] Rebecca Buckman, et al., *Microsoft Yields Ground on Windows XP*, WALL ST. J., July 12, 2001, at A3.