MICROSOFT: A REMEDIAL FAILURE

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I. INTRODUCTION

The *Microsoft* case is unquestionably the most visible antitrust case since the breakup of AT&T twenty-five years ago. Looking back some six years since the district court's Final Judgment was entered in November 2002, and some ten years since Microsoft's illegal conduct took place, what do we learn from the *Microsoft* case about the efficacy of antitrust law regarding monopolization?

Each era has its landmark antitrust case. And each such case is a creature of the competitive context in which it arose. The *Standard Oil* case[1] grew out of the enormous consolidations, the trusts, that accompanied the shift from local or regional markets to national markets. The *Alcoa* case[2] arose in the context of unprecedented scale economies in basic manufacturing, at a time when manufacturing was king. The *AT&T* case[3] took place at the boundary between competition and regulation, at a time when regulation was giving way to competition in a number of sectors of the economy. The *Microsoft* case[4] involved the relatively young software industry just as it was facing the "Internet Tidal Wave."[5] In such

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[1] Standard Oil Co. of N.J. v. United States, 221 U.S. 1 (1911).

[2] United States v. Aluminum Co. of Am., 148 F.2d 416, 422 (2d Cir. 1945).

[3] United States v. ATT, 552 F. Supp. 131, 160–66 (D.C. Cir. 1982), *aff'd sub nom.* Maryland v. United States, 460 U.S. 1001 (1983).

[4] New York v. Microsoft Corp., 224 F. Supp. 2d 76 (D.D.C. 2002) (*D.D.C. States Remedy 2002*), *aff'd sub nom.* Massachusetts v. Microsoft Corp., 373 F.3d 1199 (D.C. Cir. 2004) (entering Final Judgment in the district court case brought by the various Litigating States).

[5] *See* Memorandum from Bill Gates to Executive Staff and direct reports (May 26, 1995) (memo titled "Internet Tidal Wave" and labeled "Microsoft Confidental"; filed as Government Exhibit 20) [hereinafter *Internet Tidal Wave Memo*], *available at* http://www.usdoj.gov/atr/cases/exhibits/20.pdf.

a dynamic environment, could antitrust protect innovation, or was antitrust either unnecessary or too slow to play a useful role?

With so much ink spilled during the past decade over the *Microsoft* case, this is hardly the time or place to offer a grand evaluation of its significance for antitrust. Instead, I offer here a much more targeted analysis, growing out of my role as an economic expert for the Litigating States, i.e., the States that sought tougher remedies than the district court eventually entered as the Final Judgment in November 2002.[6]

The remedial phase of the case, which took place in district court in 2002, was governed by the June 2001 *Microsoft III* decision by the Court of Appeals for the District of Columbia.[7] In addition to determining which aspects of Microsoft's conduct violated the antitrust laws, the appeals court identified remedial goals that the district court should pursue on remand and gave guidance regarding remedy. Citing the Supreme Court, *Microsoft III* stated that a remedies decree in an antitrust case must seek four objectives:[8]

1. "unfetter a market from anticompetitive conduct"

2. "terminate the illegal monopoly"

3. "deny to the defendant the fruits of its statutory violation"

4. "ensure that there remain no practices likely to result in monopolization in the future."

In this article, I address the following specific question: Did the Final Judgment achieve the remedial goals listed by the court of appeals?

I argue below that the answer to this question is a resounding "no." While many commentators have remarked that antitrust law operates slowly in monopolization cases, making it very difficult for the law effectively to protect competition in industries subject to rapid technological change, my analysis points to an additional challenge for the law: the need to fashion forward-looking remedies in cases where liability for monopolization has been found. As explained below, the remedy in the *Microsoft* case failed primarily because it looked backward, at the technological threats facing Windows in the mid-1990s when Microsoft's viola-

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[6] *D.D.C. States Remedy 2002,* 224 F. Supp. 2d 76.

[7] United States v. Microsoft Corp., 253 F.3d 34 (D.C. Cir. 2001) (*D.C. Circuit 2001*). In the text, this case is referred to as *Microsoft III.*

[8] *Id.* at 103 (quoting from United States v. Ford Motor Co., 405 U.S. 562, 577 (1972) and United States v. United Shoe Mach. Corp., 391 U.S. 244, 250 (1968); also citing to United States v. Grinnell Corp., 384 U.S. 563, 577 (1966)).

tions occurred, and not forward to the technological threats facing Windows five to ten years later.[9]

I discuss how the appeals court interpreted these remedial goals and provide commentary on this interpretation. Given certain identified weaknesses in the causation evidence, *Microsoft III* questioned whether remedial goal (2), to "terminate the illegal monopoly," was appropriate in this case. I entirely agree with this assessment, and therefore focus on the remaining remedial goals (1), (3), and (4). As a shorthand for these goals, I refer to them collectively below as the goal of "restoring competition."

I offer an economic framework for restoring competition in this case and in others where "exclusionary conduct is aimed at producers of nascent competitive technologies."[10] This framework revolves around the idea of lowering entry barriers to promote competition. Lowering entry barriers does not mean picking winners or engineering the market; it means imposing conditions that make it easier for potential entrants to overcome those barriers. In the *Microsoft* case, this means imposing conditions that lower the applications barrier to entry. Inevitably, to promote competition and benefit consumers, these conditions also will benefit actual or potential competitors to Windows.

Following the principles developed, I show that the Final Judgment was simply not designed in a manner likely to achieve remedial goals (1) and (3). I identify errors in economic reasoning by the district court that appear to have led the court to accept an inadequate remedy.

II. HOW THE COURT INTERPRETED THE REMEDIAL GOALS

Judge Jackson had originally entered a remedial order requiring Microsoft to submit a proposed plan of divestiture, splitting Microsoft into an "Operating Systems Business" and an "Applications Business."[11] The court of appeals vacated this order for three independent reasons: failure to hold an evidentiary hearing on remedies, failure to provide adequate reasons for the decreed remedies, and revisions of Microsoft's liability.[12] Regarding liability, *Microsoft III* states:

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[9] While the events of the past six years have confirmed this conclusion, the inadequacy of the remedy could be seen back in 2001 when the Justice Department and Microsoft announced their settlement. *See, e.g.,* Timothy F. Bresnahan, *A Remedy that Falls Short of Restoring Competition*, Antitrust, Fall 2001, at 67.

[10] *D.C. Circuit 2001,* 253 F.3d at 103.

[11] *Id.* at 99.

[12] *Id.* at 98.

> Of the three antitrust violations originally identified by the District
> Court, one is no longer viable: attempted monopolization of the
> browser market in violation of Sherman Act § 2. One will be remanded
> for liability proceedings under a different legal standard: unlawful ty-
> ing in violation of § 1. Only liability for the § 2 monopoly maintenance
> violation has been affirmed—and even that we have revised.[13]

The court of appeals gave guidance to the district court regarding the appropriate remedy. "On remand, the district court must reconsider whether the use of the structural remedy of divestiture is appropriate with respect to Microsoft, which argues that it is a unitary company."[14] *Microsoft III* observed that most antitrust cases in which divestiture was ordered involved companies formed by mergers and acquisitions, and emphasized the "logistical difficulty" of splitting up a unitary company.[15]

The instructions in *Microsoft III* regarding how the remedy should be handled on remand reflect skepticism regarding whether the structural remedy of divestiture is appropriate. The decision makes clear that the strength of the remedy should be influenced by the evidence on causation: "In devising an appropriate remedy, the district court also should consider whether plaintiffs have established a sufficient causal connection between Microsoft's anticompetitive conduct and its dominant position in the OS market. 'Mere existence of an exclusionary act does not itself justify full feasible relief against the monopolist to create maximum competition.'"[16]

Regarding causation, the evidence did not establish that Microsoft's monopoly would have been eliminated if not for Microsoft's illegal conduct. To the contrary, the Findings of Fact stated: "There is insufficient evidence to find that, absent Microsoft's actions, Navigator and Java already would have ignited genuine competition in the market for Intel-compatible PC operating systems."[17] The court of appeals rejected Microsoft's argument that this finding was fatal to *liability* for monopoly maintenance, stating:

> To require that § 2 liability turn on a plaintiff's ability or inability to
> reconstruct the hypothetical marketplace absent a defendant's an-
> ticompetitive conduct would only encourage monopolists to take more
> and earlier anticompetitive action. We may infer causation when exclu-

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[13] *Id.* at 103–04.

[14] *Id.* at 105.

[15] *Id.* at 106.

[16] *Id.* (quoting 3 PHILLIP E. AREEDA & HERBERT HOVENKAMP, ANTITRUST LAW: AN ANALYSIS OF ANTITRUST PRINCIPLES AND THEIR APPLICATION ¶ 650(a), at 67 (1996)).

[17] United States v. Microsoft Corp., 84 F. Supp. 2d 9, ¶ 411 (D.D.C. 1999) (Findings of Fact).

sionary conduct is aimed at producers of nascent competitive technologies as well as when it is aimed at producers of established substitutes. Admittedly, in the former case there is added uncertainty, inasmuch as nascent threats are merely *potential* substitutes. But the underlying proof problem is the same—neither plaintiffs nor the court can confidently reconstruct a product's hypothetical technological development in a world absent the defendant's exclusionary conduct.[18]

The court of appeals went on to note that "the District Court made ample findings that both Navigator and Java showed potential as middleware platform threats."[19]

While interpretation of legal decisions is not my comparative advantage, it seems clear to me that the court of appeals was troubled by a mismatch between the causation evidence and the remedy entered by the district court: the evidence did not establish that Netscape and Java already would have overthrown Microsoft's monopoly, yet the district court had entered a remedial order calling for the breakup of Microsoft into two companies.[20] Hence *Microsoft III* concludes its section on how remedy should be addressed on remand by stating: "While we do not undertake to dictate to the district court the precise form that relief should take on remand, we note again that it should be tailored to fit the wrong creating the occasion for the remedy."[21] The district court subsequently interpreted this as follows: "In effect, the appellate court appears to have identified a proportionality between the severity of the remedy and the strength of the evidence of the causal connection."[22]

After *Microsoft III* was handed down, it seemed clear that a breakup of Microsoft was no longer in the cards. But that still left a wide range of possible remedies. A minimal "sin no more" remedy would prohibit Microsoft from engaging in the same (or closely similar) conduct in the future. How much further a remedy could or would go was more difficult to assess. *Microsoft III* emphasized that the appropriate remedy should depend upon the strength of the causation evidence, which was

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[18] United States v. Microsoft Corp., 253 F.3d 34, 79 (D.C. Cir. 2001) (*D.C. Circuit 2001*).

[19] *Id.* at 79.

[20] The Justice Department had previously argued that its proposed breakup of Microsoft was not out of proportion to the causation evidence because it did not involve creating two operating system companies. Instead, it was designed to create a powerful new potential entrant into the operating system market, namely the applications company. However, the Court of Appeals clearly considered that remedy unjustified given its scaled back liability findings, especially since the District Court had not conducted an evidentiary hearing on remedy.

[21] *D.C. Circuit 2001,* 253 F.3d at 107.

[22] New York v. Microsoft Corp., 224 F. Supp. 2d 76, 101 (D.D.C. 2002) (*D.D.C. States Remedy 2002*).

inevitably murky, given that the conduct involved stifling a threat from a nascent technology. The battle over remedy would revolve around how far to go, if at all, beyond a mere proscription of the illegal conduct.

There was, however, a consensus that the remedy should "restore competition." In addition to the passages cited above, the court of appeals spoke of the problem of "how a court goes about *restoring* competition to a dramatically changed, and constantly changing, marketplace."[23] The Department of Justice articulated the goal of restoring competition: "The goals of the government were to obtain relief that stops Microsoft from engaging in unlawful conduct, prevent any recurrence of that conduct in the future, and restore competition in the software market."[24] Assistant Attorney General Charles James stated: "An antitrust remedy for a Section 2 violation must stop the offending conduct, prevent its recurrence, and restore competition."[25] The Justice Department's economic expert indicated that a remedy should be evaluated based on whether it is sufficient to "restore competitive conditions."[26] Microsoft's economic expert also articulated the goal of restoring competition: "To the extent that past illegal acts have injured competition, the remedies should work to restore the prospects for consumer welfare to the level that would have existed absent the illegal acts."[27] I now explore what "restoring competition" means in this case.

III. RESTORING COMPETITION FROM NASCENT TECHNOLOGIES

A. THE *MICROSOFT* FACT PATTERN

The *Microsoft* case fits into a fact pattern that is unusual if not unique in the annals of major Sherman Act Section 2 monopoly maintenance cases. The essence of the fact pattern was this: A company achieves a monopoly position legally, by competing on the merits. This company identifies a threat to its monopoly position based on emerging new technology. When identified, this nascent technology has not yet matured

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[23] *D.C. Circuit 2001,* 253 F.3d at 49.

[24] Press Release, U.S. Dep't of Justice, Department of Justice and Microsoft Corporation Reach Effective Settlement on Antitrust Lawsuit (Nov. 2, 2001), *available at* http://www.usdoj.gov/atr/public/press_releases/2001/9463.htm.

[25] Charles A. James, *The Real* Microsoft *Case and Settlement*, ANTITRUST*,* Fall 2001, at 58.

[26] Declaration of David S. Sibley at ¶ 3, Appendix C to Memorandum of the United States in Support of Entry of the Proposed Final Judgment, United States v. Microsoft Corp., No. 98-1232 (D.D.C. filed Feb. 27, 2002), *available at* http://www.usdoj.gov/atr/cases/f223700/223738c.pdf.

[27] Direct Testimony of Kevin M. Murphy at ¶ 159, New York v. Microsoft Corp., No. 98-1233 (D.D.C. Apr. 12, 2002), *available at* http://www.microsoft.com/presspass/download/legal/RemediesTrial/Murphy.pdf

into a full-fledged substitute for the monopolist's product. But the monopolist fears that it may do so in the foreseeable future, due to powerful changes taking place in the industry. The monopolist engages in conduct that eliminates the threat, and that conduct is found to constitute illegal monopoly maintenance.

It is not a coincidence that this fact pattern arose in the context of the software industry in the 1990s. Three features of the software industry at that time combined to produce this fact pattern.

First, software is highly malleable, allowing the features of any given software product to evolve and expand. Microsoft often made this point when arguing about its need to have the freedom to add new features to its operating system. Microsoft envisioned how Netscape and Java, as platform software, could evolve into a serious threat to Windows.

Second, network effects can be very powerful for platform software. Microsoft has understood this point very well. Indeed, network effects fueled the dominance of Windows. Microsoft has long understood the importance of nurturing a group of developers who will write to the Windows platform, making Windows more attractive to final users, hence making it even more attractive for developers, in a virtuous cycle of positive feedback. The district court and the court of appeals embraced the importance of network effects under the rubric of the "applications barrier to entry" into the desktop operating system market.[28]

Third, the rise of the Internet starting in the mid-to-late-1990s created the prospect that established patterns of software usage on personal computers would be disrupted. Microsoft's course of conduct arose after Bill Gates wrote his "Internet Tidal Wave" memo and the company shifted its strategy in recognition of the force of the Internet.[29] In particular, personal computers were transformed from stand alone devices into networked devices (i.e., clients) opening up the possibility that

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[28] *See, e.g.*, *D.C. Circuit 2001*, 253 F.3d at 55. The D.C. Circuit Court describes the applications to barrier as follows:

> Considering the possibility of new rivals, the court focused not only on Microsoft's present market share, but also on the structural barrier that protects the company's future position. *Conclusions of Law*, at 36. That barrier—the "applications barrier to entry"—stems from two characteristics of the software market: (1) most consumers prefer operating systems for which a large number of applications have already been written; and (2) most developers prefer to write for operating systems that already have a substantial consumer base. *See Findings of Fact* at 30, 36. This "chicken-and-egg" situation ensures that applications will continue to be written for the already dominant Windows, which in turn ensures that consumers will continue to prefer it over other operating systems.

Id.

[29] *Internet Tidal Wave Memo, supra* note 5.

more and more of them could access applications and content from remote computers (i.e., servers).

While I have not done a systematic search, I am not aware of other major monopolization cases that fit the basic fact pattern described above. Nonetheless, some elements are fairly common in Sherman Act Section 2 jurisprudence. For example, the pattern in which a monopolist over one product gains control over an adjacent, complementary product is common in antitrust. This conduct, which is typically characterized as monopoly leveraging or tying, can affect competition in the adjacent market. But the *Microsoft* remedy did not involve these issues, because the court of appeals had thrown out the attempted monopolization liability finding and remanded the tying case without any finding of liability. It is true, however, that this same type of conduct also can reduce competition in the core, monopoly market under a traditional "two-level entry" theory of raising entry barriers. This theory was much closer to the monopolization finding in *Microsoft III* and is directly relevant to the extent that the complementary product (Netscape and/or Java) would enable cross-platform software and, thus, aid the entry of another product into the operating system market. The more unusual aspect of the *Microsoft* case was the prospect that the complementary product would, over time, actually transform itself into a direct competitor. This type of transformation is easier to envision with malleable software than with physical products.

B. IMPLICATIONS FOR REMEDY

Stripped to its essence, the harm to competition resulting from Microsoft's illegal conduct was the elimination of *potential* competition associated with Netscape and Java riding the Internet Tidal Wave. Microsoft did not eliminate any *actual* competitor. How does one "restore competition" in this situation? Put succinctly, how does one "restore potential competition"?

Economists have long studied potential competition and the closely related concept of barriers to entry. The analogy evoked by the term "barriers to entry" is very useful. The operative economic principles can be nicely illuminated by comparing Microsoft's Windows monopoly to a sturdy coastal fortress in which prisoners are held captive. The fortress walls and other battlements correspond to the applications barrier to entry, and the prisoners inside the walls represent the customers in the monopolized market. Pursuing this analogy farther, consider the following allegory:

> A sturdy coastal fortress faces attacks from time to time. These attacks come from various directions; some benefit from the element of sur-

prise. In our analogy, these attacks correspond to new technologies that emerge and threaten Windows. Due to its extensive battlements, the fortress is difficult to overcome. These defenses correspond to "natural" entry barriers that arise quite apart from Microsoft's illegal conduct. Only rarely does a serious attack come that truly challenges the fortress defenses.

Some attacks may weaken the fortress defenses, even though they do not succeed in breaching the walls of the fortress. These attacks correspond to new technologies that lower the barriers to entry without offering a direct substitute for Windows. Navigator and Java were in this category. Attacks of this type soften up the fortress defenses. After one such attacking force weakens the fortress defenses, others have an improved chance of breaching the walls. After one technology lowers the applications barriers to entry, substitute operating systems have a better chance of succeeding in offering sufficient applications to challenge the dominance of Windows.

In this setting, imagine a pair of particularly vigorous and coordinated surprise attacks, propelled by the waves of a powerful storm, which threaten to greatly damage the fortress walls. These attacks correspond to the dual threats posed by Navigator and Java, riding the Internet Tidal Wave. The Findings of Fact make clear that Navigator and Java were in the process of weakening the defenses of the Windows fortress.[30] Microsoft viewed the Netscape/Java/Internet threat as the greatest it had faced in years, if ever. Fearing for their lives, the defenders of the fortress resort to prohibited defensive tactics. These tactics correspond to Microsoft's illegal acts.

Carrying the analogy a step further, we may suppose that the surprise attackers who were improperly impeded were especially threatening because they encroached from a novel direction—by sea—using unprecedented naval weapons, and because they were propelled by a powerful storm. As we know, the exciting features of the browser and Java, which had never been encountered before, captured the imagination of users and developers and enjoyed considerable momentum just as the Internet Tidal Wave began transforming PCs from stand alone devices to networked devices.

After staving off the surprise attack using illegitimate methods, the generals in command of the fortress move to develop their own large naval force, and to install sea-facing artillery. After impeding Navigator and Java, Microsoft improved its own browser, Internet Explorer, which soon achieved a commanding lead over Navigator in usage. As warfare shifts from land to sea, the generals, now admirals, fortify nearby islands, making their main fortress stronger than ever. None of these tactics are prohibited, but they make it far less likely that any surprise attack will come from the sea in the future. Perhaps the next successful attack will need to deploy a novel strategy, such as attacking by air.

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[30] *D.C. Circuit 2001,* 253 F.3d at 77–79.

While analogies always have their limits, this fanciful story really does capture some of the basic economics underlying entry barriers and restoring competition in a monopoly maintenance case where the illegally stifled threat came from nascent technology. Restoring competition requires taking affirmative steps to lower the barriers to entry. Merely prohibiting the illegal tactics already used would not be sufficient to achieve this end.

How does this approach line up with the remedial goals listed in *Microsoft III*? There is no question that a remedy should prevent the monopolist from continuing to engage in the illegal practices or their close cousins. That corresponds to remedial goal (4) above, to "ensure that there remain no practices likely to result in monopolization in the future." As discussed above, remedial goal (2), to "terminate the illegal monopoly," is not appropriate with this fact pattern.

That leaves remedial goal (1), to "unfetter the market from anticompetitive conduct," and goal (3), to "deny to the defendant the fruits of its statutory violation." While the precise interpretation of goal (1) may be subject to debate, as noted above, there is a consensus that the remedy should "restore competition." Therefore, I interpret goal (1) to mean that the remedy should ensure that the market is as competitive as it would have been, if not for the violation. However, the degree of competition if not for the violation is unknown and unknowable. Since the goal of antitrust policy is to promote competition to the benefit of consumers, I implement this idea immediately below to mean that competition leaves *consumers* at least as well off, on a going-forward basis, in a probabilistic sense, as they would have been if not for the violation. I interpret goal (3) in the obvious manner: that Microsoft not profit from its illegal conduct.

C. FORMAL ECONOMIC MODEL

The Appendix develops a formal model of entry threats that captures these ideas. The model involves a monopolist who faces a steady stream of entry threats. Any one threat is unlikely to succeed but will inject significant competition into the market if it does. In this context, an especially strong threat emerges and is illegally stifled. The assumed goal of the remedy is to restore potential competition by raising the going-forward threat of successful entry. The remedy is sufficient to "restore competition" if the quantum by which the entry threat is raised is sufficient to make consumers equally well off, on a going-forward basis at the time the remedy is put into effect, as they would have been at the

time of the violation, if not for the illegal conduct. The model contains two key parameters.[31]

The first key parameter, denoted by p, represents the baseline level of entry threats faced by the monopolist. This parameter measures the probability, in any given year, that successful entry will take place, ending the monopoly. The expected duration of a monopolist facing a baseline threat level of p per year is $1/p$ years. So, a value of $p = 0.05$ corresponds to an expected duration of twenty years.

The second key parameter, h, represents the probability that the illegally stifled entry threat, in particular, would have proved successful. While the courts may not be accustomed to thinking in terms of probabilities, there is no coherent alternative in this situation. As noted by the court of appeals, "neither plaintiffs nor the court can confidently reconstruct a product's hypothetical technological development in a world absent the defendant's exclusionary conduct."[32]

The strength of the remedy is measured by the enhanced level of entry threats, $q > p$, that the remedy must enable to restore competition. With some inevitable simplifications, but reasonable ones in my view, the model calculates the level of q necessary to restore competition in terms of the underlying parameters, p and h and δ (the annual discount factor), and how many years the remedial order lasts, T.

Table 1 in the Appendix shows how the strength of the remedy, as measured by the ratio q/p, depends upon the baseline entry threat, p, and the strength of illegally stifled entry threat, h, assuming that the remedial order lasts indefinitely. For example, if the baseline entry threat is $p = 5$ percent per year and the illegally stifled entry threat had a 20 percent chance of ending the Windows monopoly, then an indefinite remedial order would need to make entry 150 percent as likely as under the baseline, or $q = 7.5$ percent per year.

As a general principle, the shorter the duration of the remedy, the stronger it must be to restore competition. A remedy lasting only one year would need to replicate the entry threat that was stifled. With the parameters just used, that would require elevating the entry threat during that year to 20 percent. The Appendix shows how to compute the necessary strength of the remedial order, q, for any given duration T. With the parameters just used, a remedial order lasting five years would require $q/p = 1.88$, which corresponds to a threat level of 9.4 percent per

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[31] The model also includes a parameter for the annual interest rate, which is taken to be around 10 percent.

[32] *D.C. Circuit 2001*, 253 F.3d at 79.

annum, nearly twice the baseline level. A remedial order lasting ten years would require $q/p = 1.62$, slightly more than the $q/p = 1.5$ associated with a remedial order that lasted indefinitely. None of these calculations factor in any lag between when the order becomes effective and when the enabled entry threats arise.

D. Additional Considerations

While the approach just described is a reasonable way to implement the notion of "restoring competition" in a situation involving entry threats, there are several considerations that it did not address. I consider those now.

First, the approach just described does not fully make consumers whole because they have been denied the benefits of competition during the interim period between the violation and the imposition of the remedy. A stronger injunctive remedy would be needed to make consumers whole. However, damages awards can compensate consumers for interim harm. We now know that Microsoft paid several billions of dollars in damages in cases related to the government's case. My analysis is consistent with the dual role of government and private antitrust cases: the damages in private cases can compensate consumers for interim harm, while the injunctive remedies associated with the government's case can restore competition.

Second, and related, the notion of "restoring competition" developed here says nothing about disgorgement of ill-gotten gains, either for equity purposes or for deterrence purposes. This relates to remedial goal (3) above, to "deny to the defendant the fruits of its statutory violation." More specifically, the notion of "restoring competition" used above does not account for the time lag between when the unusually strong threat to the monopoly was illegally eliminated and when the decree is imposed. For this reason, "restoring competition" may not effectively deter illegal conduct that maintains a monopoly. Any notion of deterrence would have to insure that Microsoft did not profit from its illegal conduct. The remedy discussed here may not be sufficient for this purpose. But private antitrust cases, and the damages remedy in those cases, enter into the deterrence calculus and may be sufficient for this purpose.

Third, the approach to remedy does not address the private or social costs of raising the probability of entry. Certainly, efforts to restore competition should try to avoid introducing inefficiencies into the operations of the monopolist itself. In this respect, remedies that involve the disclosure or licensing of intellectual property rights are especially well-suited to the goal of efficiently restoring competition. Knowledge assets,

such as copyrights and patents, have the special feature that one party can use them without taking away the ability of others to do the same. For precisely this reason, mandatory disclosure and licensing of existing intellectual property rights is a highly efficient way of restoring competition, to the benefit of consumers.[33]

E. Calibration to the *Microsoft* Fact Pattern

The formal economic model just developed reflects a very robust point: restoring competition requires more than a mere proscription of the illegal conduct if one concludes that the threat from Netscape, Java, and the Internet that Microsoft illegally stifled was relatively rare and/or unusually strong. The Findings of Fact are clear on this point. While there was uncertainty about what would have happened if not for Microsoft's illegal conduct, the court of appeals stated: "the District Court made ample findings that both Navigator and Java showed potential as middleware platform threats."[34]

Applying the framework of the model described above, two key parameters are needed to calibrate the model to the *Microsoft* fact pattern: the baseline threat level, p, and the strength of the illegally stifled threat, h. These are not parameters one can estimate with any precision using economic data; as the court of appeals stated, "neither plaintiffs nor the court can confidently reconstruct a product's hypothetical technological development in a world absent the defendant's exclusionary conduct."[35] Nonetheless, the model presented above is extremely valuable for thinking about the strength needed in any remedy designed to restore competition: the *Microsoft* case is about potential entry, about what *might* have happened. It is not about the elimination of an actual competitor or what *would* have happened had Microsoft not engaged in illegal monopolization. In essence, an appropriate remedy cannot "turn back the clock" and recreate what would have happened; instead, it must "cure the ill effects of the [monopolist's] illegal conduct" and recreate the environment for competition to occur.[36]

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[33] Of course, to the extent that liability findings are made in error, any remedy, including those involving the disclosure or licensing of intellectual property, can create adverse long-term incentives.

[34] *D.C. Circuit 2001,* 253 F.3d at 79.

[35] *Id.*

[36] This key distinction is explained by the U.S. Supreme Court in *United States v. Ford Motor Co.*, 405 U.S. 562, 573 n.8 (A court may "'do more than return the market to the *status quo ante*'" and must direct its remedy "to that which is 'necessary and appropriate in the public interest'" or that "will '*cure the ill effects* of the illegal conduct'") (citations omitted).

The model presented above does not pre-ordain any particular strength or duration for the remedy: those depend upon the two key parameters p and h noted above. However, for plausible values, which is to say reasonably low values of p and moderate values of h/p, it is clear that a remedy must significantly raise the entry threat level to restore competition. This conclusion is especially strong if the remedy will last only five years. For example, with $p = 0.05$ and $h = 0.10$, one needs $q/p = 1.28$ if the remedy lasts only five years. This result is not sensitive to the level of the baseline threat; it is driven predominantly by the ratio h/p.[37] This tells us to focus on this factual question: Was the illegally stifled threat unusually strong?

The Findings of Fact make it clear that the threat posed by Netscape, Java, and the Internet in the mid-to-late-1990s was significantly stronger than the threats routinely faced by Windows, in part, because the strength of the Internet Tidal Wave caught Microsoft somewhat by surprise. Based on this line of reasoning, any remedy must significantly lower entry barriers to achieve the goal of restoring the appropriate environment for competition.

Microsoft had argued at the liability phase that threats were ever-present, i.e., p was large, so Microsoft did not have any real monopoly power, notwithstanding its market share. The district court had soundly rejected that argument in its ruling that Microsoft was a monopolist. The court of appeals sustained this ruling. Microsoft argued at the remedial phase that the threat posed by Netscape and Java was impotent, but Microsoft's view was inconsistent with the Findings of Fact and with *Microsoft III*, as the district court subsequently ruled.[38]

The fact that Microsoft greatly feared the threats from Netscape and Java is highly significant at the remedy phase. Contemporaneous business judgments about entry threats by executives knowledgeable about the market, with substantial money on the line, are generally more reliable than stories spun later by advocates in an adversarial proceeding. The Findings of Fact clearly established that the stifled threat was unusually strong; in my model, this corresponds to a moderate to large value of h/p. The inescapable conclusion is that affirmative steps were needed

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[37] For example, if the baseline threat level is twice as high, $p = 0.10$, and if one retains the assumption that the stifled threat was twice as strong as the average threat, so h/p remains 2.0, one needs $q/p = 1.31$.

[38] "Although [Microsoft's economic expert on causation] has protested any assertion that his analysis ignores, contradicts, or second-guesses the findings of the appellate court, the Court disagrees." New York v. Microsoft Corp., 224 F. Supp. 2d 76, 151 (D.D.C. 2002) (*D.D.C. States Remedy 2002*).

to restore competition. Merely proscribing the illegal conduct would not be nearly sufficient.

Economic analysis indicated that an effective remedy would involve efficient ways of affirmatively lowering the barriers to entry. Based on this line of reasoning, I testified in support of a number of the remedial provisions put forward by the Litigating States. My support was focused on the provisions that would have affirmatively lowered entry barriers into the market monopolized by Microsoft without creating inefficiencies. This approach also was forcefully advocated by a distinguished group of economists and former antitrust enforcement officials, who stated: "It is our recommendation that the Court cast a wide net, looking for rules or actions that will increase competition today by lowering entry barriers."[39] However, the district court did not accept any of these provisions designed to lower entry barriers, choosing instead to enter the judgment negotiated between Microsoft and the Justice Department, which was joined by the Non-Litigating States.

IV. FAILURE OF THE FINAL JUDGMENT TO RESTORE COMPETITION

The Final Judgment entered by the court in the *Remedy Decision*[40] was essentially the same as the settlement reached between the Justice Department and Microsoft. This settlement contains provisions aimed at preventing Microsoft from blocking the distribution of middleware through the OEM channel and from limiting the ability of end users to invoke non-Microsoft middleware. The prohibitions covered most but not all of the conduct that the court of appeals had found to be illegal.

The sole provision going beyond the mere proscription of the illegal conduct that had any prospect of affirmatively lowering entry barriers involved the disclosure and licensing on reasonable terms of APIs (application programming interfaces), communications protocols, and other technical information for the purpose of interconnecting with Windows. These requirements can be found in Sections III.D and III.E of the Final Judgment.[41] Only Section III.E goes beyond middleware. Under the framework developed above, one can ask whether these pro-

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[39] Brief of Professor Timothy Bresnahan, Professor Richard Gilbert, Professor George Hay, Dr. Bruce Owen, Professor Daniel Rubinfeld, and Professor Lawrence White as Amici Curiae at ¶ 21, New York v. Microsoft Corp., No. 98-1233 (D.D.C. filed June 13, 2002), *available at* http://www.stanford.edu/~tbres/Microsoft/economists_amicus_brief.pdf.

[40] *D.D.C. States Remedy 2002*, 224 F. Supp. 2d 76.

[41] *Id.* at 268–69.

visions were broad enough and strong enough to lower entry barriers sufficiently to restore competition.

A. The Court Took a Narrow View of Remedy

The district court erred in not requiring that the remedy be sufficiently strong to restore competition.[42] After recounting the portion of *Microsoft III* that expresses skepticism about a breakup of Microsoft given the causation evidence, the district court states:

> In this regard, the "causal connection between Microsoft's exclusionary conduct and its continuing position in the operating systems market" was established "only through inference." 84 F. Supp 2d at 106–07. Given these circumstances, as the parties concede, it does not seem to be a valid objective for the remedy in this case to actually "terminate" Microsoft's monopoly. Rather, *the proper objective of the remedy in this case is termination of the exclusionary acts and practices related thereto which served to illegally maintain the monopoly.*[43]

The district court leaps here from the perfectly sensible premise that terminating Microsoft's monopoly is not a suitable remedy to the unjustified conclusion that the remedy should do no more than prevent Microsoft from continuing to engage in the illegal acts. The court gives short shrift to the other remedial goals identified in *Microsoft III*, namely to "unfetter [the] market from anticompetitive conduct" and to "deny to the defendant the fruits of its statutory violation," i.e., to actually *restore competition.*[44] The district court's error appears to stem from an unstated belief that competition would naturally and inevitably be restored by preventing Microsoft from continuing to engage in its illegal practices. This view would be correct *if but only if* the illegally stifled threat was no greater than the threats that regularly arise. In the formal model, if $h = p$, then a remedy with $q = p$ is sufficient to restore competition.[45]

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[42] The *Remedy Decision* was upheld on appeal, under an "abuse of discretion" standard. Massachusetts v. Microsoft Corp., 373 F.3d 1199, 1230 (D.C. Cir. 2004) ("There is more than one way to redress Microsoft's having unlawfully raised the applications barrier. And it was certainly within the district court's discretion to address the applications barrier to entry as it did, namely, by restoring the condition in which rival markers of middleware may freely compete with Windows.").

[43] *D.D.C. States Remedy 2002*, 224 F. Supp. 2d at 101 (emphasis added). The court later states: "Accordingly, the Court finds unpersuasive Microsoft's argument that Plaintiffs are entitled to no more than a simple proscription against the conduct found to violate the antitrust laws." *Id.* at 148.

[44] United States v. Microsoft Corp., 253 F.3d 34, 103 (D.C. Cir. 2001) (quoting from United States v. Ford Motor Co., 405 U.S. 562, 577 (1972), and United States v. United Shoe Mach. Corp., 391 U.S. 244, 250 (1968)).

[45] As noted above, in this case no additional injunctive remedy is needed to restore competition on a forward-looking basis, but damage awards are required to make con-

Without this factual predicate, the claim that a simple proscription against the offending conduct will restore competition is incorrect. A "sin no more" remedy cannot make up for the stifling of an unusually strong threat.[46]

The Findings of Fact unquestionably identified the threat from Navigator, Java, and the Internet as an unusually potent one that Microsoft feared:

> The exponential growth of the Internet represents an inflection point born of complementary technological advances in the computer and telecommunications industries. The rise of the Internet in turn has fueled the growth of server-based computing, middleware, and open-source software development. Working together, these nascent paradigms could oust the PC operating system from its position as the primary platform for applications development and the main interface between users and their computers. . . .
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> . . . .
>
> The actions that Microsoft took against Navigator hobbled a form of innovation that had shown the potential to depress the applications barrier to entry sufficiently to enable other firms to compete effectively against Microsoft in the market for Intel-compatible PC operating systems. . . . There is insufficient evidence to find that, absent Microsoft's actions, Navigator and Java already would have ignited genuine competition in the market for Intel-compatible PC operating systems. It is clear, however, that Microsoft has retarded, and perhaps altogether extinguished, the process by which these two middleware technologies could have facilitated the introduction of competition into an important market.[47]

As I explained in my Direct Testimony, threats to Windows of this magnitude were rare:[48]

> Even Microsoft recognizes that such inflection points are infrequent. According to the direct testimony of Mr. Maritz, there have been four inflection points during the past twenty years: (1) the shift from mainframes to PCs in the early 1980s which was the enabling event for

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sumers whole for the harm to competition that has already taken place and to deny Microsoft the fruits of its statutory violation.

[46] The Final Judgment defines a class of software, "non-Microsoft middleware," for which certain provisions apply. Besides browsers, this includes e-mail clients, instant messaging, and media players. The prospect that these categories of software would evolve into a serious platform threat to Windows was remote in 2001, and no such evolution has taken place in the intervening six years.

[47] United States v. Microsoft Corp., 84 F. Supp. 2d 9, ¶¶ 60, 411 (D.D.C. 1999) (Findings of Fact).

[48] Direct Testimony of Carl Shapiro ¶ 21, New York v. Microsoft Corp., No. 98-1233 (D.D.C. Apr. 5, 2002).

Microsoft itself ;[49] (2) the shift to a Graphical User Interface (MS-DOS to Windows) in the late 1980s;[50] (3) the shift from 16-bit to 32-bit operating systems in the early 1990s;[51] and (4) the Internet, during the mid- to late-1990s.[52]

The district court apparently assumed that a remedy enjoining Microsoft from continuing to engage in the conduct found illegal would restore competition, or at least come close to doing so. The court of appeals later upheld this approach, under an abuse of discretion standard.[53]

As explained above, this assumption is generally not justified in a market subject to network effects: monopoly power in such markets can be durable, and competition, once suppressed, can fail to take root. In this case, the assumption was not justified if Microsoft stifled an unusually strong threat and if future threats were unlikely to come from middleware. The Findings of Fact established that the stifled threat was unusually strong. And even the Justice Department acknowledged that future middleware threats as strong as Netscape and Java might never arise again.

Nonetheless, this unjustified and mistaken assumption, combined with the presence of the provisions involving communications protocols that went beyond middleware, evidently led the district court to believe that no stronger remedy was needed. As a result, a leading antitrust scholar, heavily cited in *Microsoft III*, after listing the remedial goals in *Microsoft III* wrote several years ago:

> At this writing, there is little reason to believe that the consent decree that the government negotiated with Microsoft will achieve any of these goals. If so, the *Microsoft* [*III*] case may prove to be one of the

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[49] Direct Testimony of Paul Maritz ¶ 14, United States v. Microsoft Corp., No. 98-1232, (D.D.C. Jan. 20, 1999).

[50] *Id.* ¶ 15.

[51] *Id.*

[52] *Id.* ¶ 16. Mr. Maritz also lists one possible inflection point prospectively: the move to "information appliances" and "set top boxes." *Id.* ¶ 17. Another Microsoft witness, Mr. Gordon Eubanks, the President and CEO of Oblix Inc., cites the same list of "major changes" over the past twenty years. Trial Transcript at 26, United States v. Microsoft Corp., No. 98-1232 (June 16, 1999 a.m. session) (testimony of Gordon Eubanks), *available at* http://cyber.law.harvard.edu/msdoj/transcripts/0616a.doc.

[53] "Rather, the fruit of its violation was Microsoft's freedom from the possibility rival middleware vendors would pose a threat to its monopoly of the market for Intel-compatible PC operating systems. The district court therefore reasonably identified opening the channels of distribution for rival middleware as an appropriate goal for its remedy." Massachusetts v. Microsoft Corp., 373 F.3d 1199, 1233 (D.C. Cir. 2004).

great debacles in the history of public antitrust enforcement, snatching defeat from the jaws of victory."[54]

Sadly, this conclusion remains at least as valid as I write this.

The district court declined to frame the remedy issue in terms of reducing barriers to entry. The district court's approach is seen most clearly in its unequivocal rejection of two remedies proposed by the Litigating States: open source Internet Explorer and a requirement that Microsoft auction the right to port Microsoft Office to another operating system.

> First and most striking, the theory pursuant to which Plaintiffs propose these provisions ignores the theory of liability in this case. The divestiture provisions serve to directly benefit non-Microsoft operating systems, in particular Linux and Apple. It is well recognized that the theory of liability in this case concerns Microsoft's response to cross-platform applications, not operating systems, that displayed the potential to offer platform services such that their popularity would greatly simplify the porting of applications *en masse* from operating system to operating system. *See Microsoft*, 346 U.S. App. D.C. 330, 253 F.3d 34. . . . The district court did not conclude that Microsoft engaged in any anticompetitive action which directly hindered these operating systems' ability to compete with Windows; instead, that difficulty existed as a function of the *applications* barrier to entry. The harm—if any—to competing operating systems is indirect, arising from the unfulfilled potential of middleware to reduce the applications barrier to entry. Given these facts, it is difficult to understand what role the bolstering of particular operating systems will play in redressing anticompetitive conduct directed at middleware.
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> Similarly antithetical to the goal of the remedy in this case is the fact that the divestiture remedies relevant to IE and Microsoft Office proposed by Plaintiffs will provide significant benefit to competitors, but have not been shown to benefit competition.[55]

I find it striking that the district court doubted that these remedies would benefit competition in the relevant market: they clearly would have reduced the applications barrier to entry and directly benefitted consumers. Plus, as I pointed out in my testimony, suitable remedies involving the licensing of extant intellectual property can be very efficient and do not harm innovation.[56] The district court did not seem to appreciate that remedial provisions can simultaneously help competi-

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[54] HERBERT HOVENKAMP, THE ANTITRUST ENTERPRISE: PRINCIPLE AND EXECUTION 298 (2005) (citations omitted).

[55] New York v. Microsoft Corp., 224 F. Supp. 2d 76, 185 (D.D.C. 2002) (*D.D.C. States Remedy 2002*).

[56] Shapiro Testimony, *supra* note 48.

tors to Windows, such as Apple and Linux, and promote competition to the benefit of consumers: "Rather than rectify injury to consumers caused by diminished competition, Plaintiffs' proposed divestitures of IE and Office merely serve to shield Microsoft's competitors from the rigors of the marketplace."[57]

I also find peculiar the court's statement that lowering the applications barrier to entry facing the two operating systems most likely to pose a threat to Windows in the foreseeable future, Apple and Linux, "ignores the theory of liability in this case."[58] Indeed, Microsoft was found liable for stifling middleware threats that promised to lower the applications barrier to entry. Perhaps these proposed remedies were stronger than justified based on the causation evidence, but they certainly fit closely with the theory of liability in this case.

Instead of looking broadly for ways to lower the applications barrier to entry, the district court directed its discussion of remedy around the issue of "middleware," since that was the category of threat posed by Netscape and Java that Microsoft illegally stifled. The district court thus considered whether various technologies are sufficiently similar to middleware to warrant inclusion in the remedy, delving deeply into the definition of "middleware."[59] But the economic underpinning for this entire approach is dubious at best. From an economic perspective, *for the purpose of restoring competition*, the relevant question is not one of technological proximity, but rather which technologies constitute the most likely threats to the Windows monopoly in the foreseeable future.

Consider, for example, the following hypothetical: A monopolist illegally stifles a nascent threat based on adjacent Technology A. Time passes, and Technology A ceases to be a threat, either because the monopolist comes to control Technology A or due to broader changes in technology.

With this fact pattern, a remedy preventing the monopolist from stifling future threats based on Technology A will have little or no effect on the entry barriers protecting the monopolist in the future. Restoring competition requires looking more broadly—to other technologies that are likely to pose threats to the monopolist in the foreseeable future. While courts prefer to impose remedies that are as tightly linked to the violations as possible, that link necessarily must be weaker in industries where technology, and hence the relevant conduct, is changing rapidly.

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[57] *D.D.C. States Remedy 2002,* 224 F. Supp. 2d at 185.

[58] *Id.*

[59] *Id.* at 105.

This is an important way, not widely appreciated, in which antitrust law faces special challenges in markets subject to network effects and rapid technological change, quite apart from the ways that have been widely and repeatedly identified in the context of the *Microsoft* case.

Remarkably, the Justice Department acknowledged that future threats to Windows would likely come from sources other than middleware. Assistant Attorney General Charles James stated: "The interim remedies had also been based upon a trial record developed largely in 1998 and 1999. The industry had changed significantly since then. . . . [T]he character of potential middleware platforms had largely changed. It is unclear whether another general middleware threat like the browser will ever again emerge."[60] Nonetheless, the Justice Department accepted, and the district court approved, a remedy directed almost entirely at middleware.

Looking back five years later, we now know that no middleware product emerged during the 2002–2007 time period that constituted a serious platform threat to Microsoft.[61] Indeed, no such threat has emerged over the ten-year time period 1997–2007. This observation supports the conclusion that threats as strong as Netscape and Java are rare. Furthermore, Microsoft's monopoly has proven highly durable. Evidence presented at trial showed that Microsoft's market share in the relevant market had been more than 90 percent from 1991 through 2001. Microsoft's market share has remained above 90 percent from 2001 through 2006.[62] This observation supports the conclusion that the general threat level facing Windows remains low.

B. MICROSOFT COMMUNICATIONS PROTOCOL PROGRAM

The district court did not entirely confine its attention to middleware. Quite reasonably, the district court required that any remedial provisions not directly involving middleware be shown to lower entry barriers: "While the Court does not fault Plaintiffs' general approach in looking beyond the relevant market to search for the new nascent threats, the Court is unable to conclude that Plaintiffs have established that all of these technologies have the capacity to increase competition within the

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[60] James, *supra* note 25, at 61.

[61] The issue did arise of whether Google Desktop qualified as "non-Microsoft middleware" under the Final Judgment, but Google Desktop does not appear to be a serious platform threat to Windows.

[62] California Group's Report on Remedial Effectiveness at Exhibit 1, New York v. Microsoft Corp., No. 98-1233 (D.D.C. filed Aug. 30, 2007) [hereinafter *California Group Report*], *available at* http://www.naag.org/assets/files/pdf/antitrust.2007-08-30_Filed_CA_Group_Effectiveness_Report.pdf.

relevant market."[63] The court, however, concluded that servers had the capacity to increase competition in the relevant market: "[S]erver operating systems provide a platform which 'competes' with Microsoft's PC operating system to host applications for the PC, much in the way traditional middleware provides a platform and, thereby, competes with Microsoft's PC operating system. . . ."[64]

One can fairly ask whether the remedial provisions relating to server operating systems, Section III.E in the Final Judgment, was strong enough to restore competition. Section III.E was potentially useful, although quite limited by design with the language drawn favorably for Microsoft. There was no reason to believe, in 2002, that this provision was nearly strong enough to lower entry barriers sufficiently to restore competition.[65]

Unfortunately, the last six years have confirmed the inadequacy of Section III.E, and the Microsoft Communications Protocol Program (MCPP) established under it. The California Group of plaintiffs identified a number of serious shortcomings with the MCPP, including its royalty requirements and other license provisions that make it unworkable for open-source products based on Linux, a key rival to Microsoft in the server market.[66] While these claims may be disputed, there appears little doubt that the MCPP has not been working effectively. Microsoft admitted in May 2006 that its technical documentation "wasn't really meeting anyone's needs."[67] As a result, the district court extended Section III.E for an additional two years. Even with this extension, however, experience over the past six years is not encouraging regarding the ability of Section III.E to lower the applications barrier to entry. According to the California Group:

> The disclosure provisions of the Final Judgment have failed to achieve any competitively meaningful results. Based on the information available to the California Group, including the responses to its MCPP licensee survey, there are 29 MCPP licensees of whom 13 actually have shipped product. Nine of these 13 licensees have self-described these MCPP products as being complements to Windows servers. Accordingly it would appear that the principal competitive effect of MCPP products has been to promote the diffusion of Microsoft technology

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[63] *D.D.C. States Remedy 2002,* 224 F. Supp. 2d at 106.

[64] *Id.* at 129.

[65] *See, e.g.,* Bresnahan, *supra* note 9, at 67–71.

[66] *California Group Report, supra* note 62.

[67] Transcript at 39, New York v. Microsoft Corp., No. 98-1233 (D.D.C. May 17, 2006). Microsoft indicated that the shortcomings of its documentation resulted from Microsoft not having the right resources or processes in place.

into mixed networks rather than to provide alternative platforms that the Court identified as the remedial purpose of § III.E.[68]

C. EVALUATING THE EFFECTIVENESS OF THE FINAL JUDGMENT

Sadly, it appears that the *effectiveness* of the Final Judgment will be evaluated based on whether Microsoft has *complied* with its terms. That is certainly Microsoft's position—unopposed by the Justice Department:

> Rather, the Final Judgments were designed to remedy the 12 acts found to be anticompetitive by this Court and the Court of Appeals and provide additional relief consistent with the theory of liability pursued by the Plaintiffs. The goal was to eliminate the foreclosure effects of practices found to be anticompetitive so that free market forces could prevail, and so it is with regard to those specific practices that the efficacy of the Final Judgments must be assessed. The relevant question is whether the acts have stopped.
>
> For the foregoing reasons, the Final Judgments have been effective in eliminating the practices found by this Court to be anticompetitive.[69]

This approach may well be appropriate for determining whether Microsoft "has engaged in a pattern of willful and systematic violations," as required under Section V.B of the Final Judgment for extending the term of the decree.[70] But it should not be confused with an evaluation of the effectiveness of the Final Judgment at restoring competition.

Looking back after six years, the Final Judgment has achieved precisely what it was designed to do: prevent Microsoft from continuing to engage in the conduct that had been found to be illegal. The Final Judgment has done nothing significant to affirmatively restore competition. Thus, in my view, the remedy in the most prominent antitrust case of our era has failed.

Furthermore, while extending the Final Judgment would probably not make much difference in the market, given its narrow scope and weak provisions, the reasons given by the court for limiting the remedy to five years have not held up well under the test of time. The court stated:

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[68] *California Group Report, supra* note 62, at 8.

[69] Microsoft's Reports Concerning the Final Judgments at 12, United States v. Microsoft Corp., No. 98-1232 (D.D.C. filed Aug. 30, 2007), *available at* http://www.microsoft.com/presspass/download/legal/SettlementProceedings/08-30MSFTReportConcerningFinalJudgments.pdf; Report Stating the Position of the United States on the Recently-Filed Motions to Extend the States' Final Judgments, United States v. Microsoft Corp., No. 98-1232 (D.D.C. filed Oct. 19, 2007), *available at* http://www.usdoj.gov/atr/cases/f227000/227010.pdf.

[70] *D.D.C. States Remedy 2002,* 224 F. Supp. 2d at 274.

> Imposing a remedy in this case is not unlike trying to shoe a galloping horse. Were the Court to impose a ten-year term, it is likely that, by the latter half of the term, the market will have long since sent the horse to pasture in favor of more advanced technology.[71]

There is no indication, as of late 2007, that Microsoft's monopoly power is significantly diminished, much less that Windows has long since been sent to pasture in favor of more advanced technology. As noted above, the market share of Windows in the relevant market remains above 90 percent. Furthermore, Windows has made substantial inroads in the server market.[72]

The effectiveness of the remedy should not just be judged by whether or not Microsoft's monopoly has persisted. After all, even if potential competition had been fully restored, that potential competition might not have led to actual competition. But the recent evidence generally confirms the predictions made by myself and others seven years ago that threats to Windows from middleware were unlikely, over a five-year period, to rise to the level of the threat illegally stifled by Microsoft. Likewise, the recent evidence generally supports the predictions made more than five years ago that the most serious threats to Windows in the years ahead would likely come from servers along with remote applications. Unfortunately, the Final Judgment has done little, if anything, to lower the entry barriers facing these threats.

V. CONCLUSION

While the district court failed to insist on a remedy that would restore competition, the root cause of the problem was the willingness of the Justice Department to accept a remedy that was inadequate to restore competition. In an extremely complex case such as this one, the district court naturally looks to the Antitrust Division of the Justice Department, with its grand tradition of fighting to protect competition, for sophisticated economic analysis and for help designing what will inevitably be a complex conduct remedy. Certainly, state attorneys general also fight to protect competition, but the Antitrust Division commands greater resources and had a special role to play in this case as the lead plaintiff

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[71] *D.D.C. States Remedy 2002,* 224 F. Supp. 2d at 184.

[72] According to the *California Group Report, supra* note 62, at Exhibit 4, the share of Windows in worldwide server operating system shipments grew from 44 percent in 2000 to 73 percent in 2006. While I am not in favor of assessing the effectiveness of the remedy based on market shares and I do not necessarily endorse the particular measure used in Exhibit 4, the district court's prediction that technology would change so much within five years that Windows would be displaced by other more advanced technologies clearly has not been borne out.

going back to 1998. But, in my view, the Justice Department dropped the ball during the remedy phase of the case. Perhaps the change in leadership at the Antitrust Division had a major impact on how the Division handled the case during the remedy phase. As the wags said at the time the settlement between the Justice Department and Microsoft was announced: "If you liked the case, you'll hate the settlement. If you hated the case, you'll like the settlement." In the end, due to the Justice Department's lack of follow-through, the settlement ended the case "not with a bang but a whimper."[73]

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[73] T.S. ELIOT, THE HOLLOW MEN (1925), *reprinted in* T.S. ELIOT, COLLECTED POEMS 1909–1962, 82 (1963).

APPENDIX: RESTORING POTENTIAL COMPETITION

This Appendix develops a precise economic definition of "restoring competition" in a monopoly maintenance case and applies the resulting theory to the *Microsoft* fact pattern. As explained in the text, the goal of restoring competition is interpreted to mean that consumers, on a going-forward basis, are no worse off as of the time the remedy is entered than they would have been, at the time of the violation, if not for the illegal conduct.

Consider a company with a monopoly that faces various potential threats to its monopoly position. In this situation, there is no *actual* competition in the sense of currently available substitute products. Rather, competition takes the form of *potential* substitutes emerging. The extent of competition can thus be measured according to the *probability* that a sufficiently attractive substitute will emerge so that the monopoly power is ended.

In practice, a variety of threats to the monopoly may arise; some are stronger than others. The summary measure of the strength of these threats in the current year—and thus the current extent of (potential) competition—is the probability that the monopoly will be ended by such a threat in the current year. If the monopolist complies with the antitrust laws, this probability is denoted by p. For simplicity, we treat this "baseline threat rate" as a constant over time. Note that the end of the monopoly only means that an effective new competitor arrives on the scene, not that there are suddenly many suppliers in the market or that an unconcentrated market structure results. For the purposes of calibration, the expected duration of the monopoly is $1/p$ if the probability each year that the monopoly ends is p.

Any given level of p can arise in various ways. For example, $p = 0.05$ could arise if one threat emerges each year that has a one-in-twenty chance of ending the monopoly. Or $p = 0.05$ could arise if there is a 20 percent chance each year of a threat arriving, and if each such threat that does arrive has a 25 percent chance of ending the monopoly (since 0.2*0.25=0.05). One can think in terms of the *arrival rate* of threats and the *success rate* of threats that do arrive. Nothing in this analysis constrains the number of threats that arrive in a given year. The analysis also allows for the possibility that a strong threat may emerge due to a confluence of factors (such as Netscape, Java, and the Internet together). The variable p is a summary measure reflecting the arrival rate and success rate of threats, aggregated over a one-year time period.

Each year that the monopoly is intact, consumers enjoy consumer surplus S_M.[74] Without loss of generality, we normalize this value to zero. When the monopoly ends, consumer surplus rises to S^* which is the (flow) value to consumers from competition rather than monopoly. Again for simplicity, we treat this flow as a constant over time. Future profits and surplus are discounted using the interest rate $r > 0$; the corresponding annual discount factor is $\delta = 1/(1 + r) < 1$. The expected present discounted value of consumer surplus in the presence of competition is $S^*/(1 - \delta)$.

A. Monopoly Facing Steady Threat Level

In this context, we use the expected present discounted value (EPDV) of the consumer surplus as our measure of the extent of competition. Call $S(p)$ the EPDV of consumer surplus if the threat level is a constant p per year. This value is defined recursively by the equation

$$S(p) = p \frac{S^*}{1 - \delta} + (1 - p)[0 + \delta S(p)].$$

Solving for $S(p)$ we get

$$S(p) = \frac{S^*}{1 - \delta} \times \frac{p}{1 - \delta + \delta p}.$$

The first term represents the surplus consumers would enjoy if the monopoly were certain to end this period. The second term discounts this to reflect that probability that the monopoly will actually end. The second term is greater than p since the monopoly might end in later periods, even if it does not end next period.

In similar fashion, we can calculate the EPDV of monopoly profits, $V(p)$. Calling the (flow) monopoly profits π and normalizing the competitive profits at zero, we have $V(p) = p^*0 + (1 - p)[\pi + \delta V(p)]$. Solving gives

$$V(p) = \pi \frac{1 - p}{1 - \delta + \delta p}.$$

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[74] This is the level of consumer surplus in the presence of various entry threats. To the extent that such potential competition affects the current flow of consumer surplus (rather than just the probability that the monopoly ends), these will be higher than the surplus consumers would receive if the monopolist faced no such threats whatsoever. If the flow of consumer surplus depends positively on the magnitude of the threats currently faced (a feature I do not model explicitly), a stronger remedy is required to restore competition.

B. Monopoly Facing Unusually Strong Current Threat

Suppose now that the monopolist faces an unusually strong threat in the current year, such as Microsoft faced circa 1996 from the Internet combined with Netscape and Java. Suppose that this threat will end the monopoly with probability $h > p$. This unusually strong threat is good news for consumers, raising the expected discounted value of consumer surplus to

$$h \, \frac{S^*}{1-\delta} + (1-h) \, \delta S(p).$$

Suppose that the monopolist, observing this unusually strong threat, engages in illegal conduct to eliminate that threat. Assuming that the monopolist does not persist in this behavior, expected discounted consumer surplus equals $\delta S(p)$.[75] Comparing this to the expression above, the illegal conduct has caused consumer surplus to fall by

$$h \, \frac{S^*}{1-\delta+\delta p}.$$

C. Harm to Consumers

Since monopoly causes deadweight losses, we know that $S^* \geq \pi$.[76] Therefore, the illegal conduct has caused consumer surplus to fall by at least

$$h \, \frac{\pi}{1-\delta+\delta p}, \text{ which equals } hV(p) \, \frac{1}{1-p},$$

which is at least as large as $hV(p)$.

This gives us a measure of the harm to consumers from the illegal conduct. For example, if the present discounted value of the monopoly profits is $100 billion and the unusual threat would have toppled the monopoly with a 10 percent probability, then the harm to consumers is at least $10 billion. If the baseline threat level p is high, as was claimed by Microsoft, then the harm to consumers is a larger fraction of the present discounted value of the monopoly profits. For example, if $p = 0.2$, then the harm to consumers with these numbers is at least $12.5 billion.

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[75] If the behavior persists, consumer surplus falls even further and a stronger remedy than the one derived below is needed to restore competition.

[76] We are assuming here that the potential entrants earn zero economic profits and that entry is efficient.

D. RESTORING COMPETITION

We model the remedy as a court order that will increase the annual threat probability from its baseline level of p to the higher level of q during the term of the order. We now ask how large q must be in order to restore competition to the pre-violation state. Restoring competition is defined here as lowering entry barriers sufficiently that consumers are no worse off, going forward, than they would have been had the monopolist not acted illegally.[77]

In the current model, this translates into the question of how high q must be in order for the EPDV of consumer surplus to be as large as it would have been had the monopolist not acted illegally. Denote by $S(q,T)$ the EPDV of consumer surplus if the entry probability of q lasts for T years, after which conditions return to the baseline probability of p. Restoring competition means choosing the remedy terms and duration, (q,T), so that

$$S(q,T) = h\,\frac{S^*}{1-\delta} + (1-h)\,\delta S(p).$$

We now calculate the level of q necessary to restore competition under the assumption that the remedy lasts indefinitely. This requires a level of q that satisfies

$S(q) = h\,\dfrac{S^*}{1-\delta} + (1-h)\,\delta S(p)$. Substituting for $S(p) = \dfrac{S^*}{1-\delta}\,\dfrac{p}{1-\delta(1-p)}$,

gives $\dfrac{q}{1-\delta(1-q)} = \dfrac{h(1-\delta)+\delta p}{1-\delta(1-p)}$. Solving for q, we get $q = \dfrac{h-\delta(h-p)}{1-\delta(h-p)}$.

Expressed in comparison with the baseline entry level, we get

$$\frac{q}{p} = 1 + \frac{h-p}{p} \times \frac{1-\delta(1-p)}{1-\delta(h-p)}.$$

This is the fundamental formula for restoring competition with a perpetual decree. The proportional increase in entry probability, $(q-p)/p$ is the product of how strong was the stifled threat relative to the normal threat, $(h-p)/p$, and the last term in this equation, which is less than unity.

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[77] As noted in the text, a stronger remedy would be needed to also compensate consumers for the loss of consumer surplus they suffered during the interim period. Damage awards can play that role.

Table 1 reports q/p for a range of value of p and $h > p$ using the formula given above. The Table has been produced using an annual discount rate is $\delta = .09$, which corresponds to an annual interest rate of 11 percent. Higher rates of interest place greater emphasis on current payoffs relative to future payoffs and, thus, would imply stronger remedial provisions because the remedy acts over time, and the strong threat that was eliminated was immediate.

TABLE 1: REQUIRED STRENGTH OF REMEDY (q/p)

Baseline Entry Threat (p)

p	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10
h-p										
0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.01	1.11	1.06	1.04	1.03	1.03	1.03	1.02	1.02	1.02	1.02
0.02	1.22	1.12	1.09	1.07	1.06	1.05	1.05	1.04	1.04	1.04
0.03	1.34	1.18	1.13	1.10	1.09	1.08	1.07	1.07	1.06	1.06
0.04	1.45	1.24	1.18	1.14	1.12	1.11	1.10	1.09	1.08	1.08
0.05	1.57	1.31	1.22	1.18	1.15	1.13	1.12	1.11	1.11	1.10
0.06	1.69	1.37	1.27	1.22	1.18	1.16	1.15	1.14	1.13	1.12
0.07	1.81	1.44	1.32	1.25	1.22	1.19	1.17	1.16	1.15	1.14
0.08	1.94	1.51	1.36	1.29	1.25	1.22	1.20	1.19	1.17	1.16
0.09	2.07	1.58	1.41	1.33	1.28	1.25	1.23	1.21	1.20	1.19
0.10	2.20	1.65	1.47	1.37	1.32	1.28	1.26	1.24	1.22	1.21
0.11	2.33	1.72	1.52	1.42	1.35	1.31	1.28	1.26	1.25	1.23
0.12	2.47	1.79	1.57	1.46	1.39	1.35	1.31	1.29	1.27	1.26
0.13	2.60	1.87	1.62	1.50	1.43	1.38	1.34	1.32	1.30	1.28
0.14	2.75	1.95	1.68	1.54	1.46	1.41	1.37	1.34	1.32	1.30
0.15	2.89	2.02	1.73	1.59	1.50	1.45	1.40	1.37	1.35	1.33
0.16	3.04	2.10	1.79	1.64	1.54	1.48	1.44	1.40	1.38	1.36
0.17	3.19	2.18	1.85	1.68	1.58	1.52	1.47	1.43	1.40	1.38
0.18	3.34	2.27	1.91	1.73	1.62	1.55	1.50	1.46	1.43	1.41
0.19	3.50	2.35	1.97	1.78	1.66	1.59	1.53	1.49	1.46	1.44
0.20	3.66	2.44	2.03	1.83	1.71	1.63	1.57	1.52	1.49	1.46
0.21	3.82	2.53	2.10	1.88	1.75	1.66	1.60	1.56	1.52	1.49
0.22	3.99	2.62	2.16	1.93	1.80	1.70	1.64	1.59	1.55	1.52
0.23	4.16	2.71	2.23	1.99	1.84	1.74	1.68	1.62	1.58	1.55
0.24	4.34	2.81	2.30	2.04	1.89	1.79	1.71	1.66	1.62	1.58
0.25	4.52	2.90	2.37	2.10	1.94	1.83	1.75	1.69	1.65	1.61
0.26	4.70	3.00	2.44	2.15	1.98	1.87	1.79	1.73	1.68	1.64
0.27	4.89	3.10	2.51	2.21	2.03	1.92	1.83	1.77	1.72	1.68
0.28	5.08	3.21	2.58	2.27	2.09	1.96	1.87	1.80	1.75	1.71
0.29	5.28	3.32	2.66	2.33	2.14	2.01	1.91	1.84	1.79	1.75
0.30	5.48	3.42	2.74	2.40	2.19	2.05	1.96	1.88	1.83	1.78

Extra Strength of Stifled Threat (h/p)

Baseline Entry Threat = p
Stifled Entry Threat = h
Remedial Entry Threat = q
Annual Interest Rate = 11% (Delta = 0.9)
Perpetual Remedy (T = Infinite)

To get a sense of the numbers in Table 1, suppose the baseline threat is $p = 0.05$. This 5 percent threat level corresponds to an expected duration of monopoly of 20 years. If the unusual threat had strength of 20 percent (i.e., $h = 0.20$), then $h - p = 0.15$. Reading from Table 1, $q/p = 1.50$, so the required threat level under a perpetual remedy must be 1.5 times as high as the baseline threat.

One can view the problem slightly differently. Suppose there is a 25 percent chance in any given year of a threat emerging, and that such threats have a 20 percent chance of toppling the monopoly. Under these circumstances, the annual threat rate is $p = 0.05$. Suppose that a threat, in fact, emerged but was illegally eliminated. Then we have $h = 0.20$, giving the same numbers just discussed.

We next calculate the necessary level of q if the decree is of duration T years. We continue to assume a stationary future environment. The level of q actually required to restore competition will be higher, the shorter the duration of the remedial order. At one extreme, Table 1 shows the required value for a perpetual remedial order. At the other extreme, if the remedial order lasts only one year, we need $q = h$ to restore competition.

For any T, the EPDV of consumer surplus can be defined recursively as

$$S(q,T) = q\frac{S^*}{1-\delta} + (1-q)\,\delta S(q,T-1) \text{ along with } S(q,1) = q\,\frac{S^*}{1-\delta} + (1-q)\,\delta S(p).$$

One can solve explicitly for $S(q,T)$ as

$$S(q,T) = \frac{S^*}{1-\delta}\{\frac{q}{1-\delta(1-p)}\,(1-[\delta(1-q)]^T) + \frac{p}{1-\delta(1-p)}[\delta(1-q)]^T\}.$$

Recalling that $S(p) = \dfrac{S^*}{1-\delta}\dfrac{p}{1-\delta+\delta p}$, and that the required level of q solves

$$S(q,T) = h\,\frac{S^*}{1-\delta} + (1-h)\,\delta S(p), \text{ so } S(q,T) = \frac{S^*}{1-\delta}\,\{h+(1-h)\,\frac{\delta p}{1-\delta(1-p)}\},$$

one can calculate q as a function of the parameters (p, h, δ, T). With $p = 0.05$ and $h = 0.2$, so $h/p = 4.0$, and with $\delta = 0.9$, q/p varies with T as follows:

T	1	2	3	4	5	8	10	20	∞
q/p	4.0	2.7	2.24	2.02	1.88	1.68	1.62	1.52	1.5

Table 1, which assumes a perpetual time frame for the remedy, reports the value of $q/p = 1.5$, which corresponds to $q = 0.075$ since $p = 0.05$. With a five-year term, we need $q/p = 1.88$ to restore competition with these parameters.

E. MAKING CONSUMERS WHOLE: ACCOUNTING FOR A LAG TO REMEDY

The strength of the remedy defined above will restore competition in the sense that consumers are as well off on a going-forward basis as they would have been but for the violation. However, that remedy is not sufficient to leave consumers as well off as they would have been but for the violation, because there is a lag from the time of the violation to the time the remedy is imposed.

As discussed in the text, damages in private actions may bridge this gap. But it is far from clear that they will do so. In the case of Microsoft, even if lump-sum damages are awarded to Microsoft's direct customers, the OEMs, there is little reason to believe those awards will be passed through to final consumers since they do not lower marginal costs (and they might well be awarded to companies no longer active in the OEM business). Likewise, private damages awards to actual or potential competitors, such as Netscape and Sun, are unlikely to compensate final consumers for the (probabilistic) loss of competition resulting from the violation. While class actions by indirect purchasers can provide some compensation to final consumers, under the *Illinois Brick* decision those actions are generally prohibited under federal antitrust law.

I now show how strong the remedy must be to make consumers whole, accounting for the lag between the violation and the imposition of the remedy. For this purpose, our measures of consumer surplus in this section are all made as of the date of the violation. I first consider the case where the violation only applies during the single period when the unusually strong threat arose. Then I consider the case in which the violation continues until the remedy is imposed.

As shown above, the level of consumer surplus in the absence of the violation is $h\,\dfrac{S^*}{1-\delta} + (1-h)\,\delta S(p)$. Substituting using $S(p) = \dfrac{S^*}{1-\delta}\,\dfrac{p}{1-\delta+\delta p}$, this becomes $\dfrac{S^*}{1-\delta}\,\{\,h + (1-h)\,\delta\,\dfrac{p}{1-\delta(1-p)}\,\}$.

We now assume that the remedy is imposed after a lag of L periods following the violation. The level of consumer surplus with the violation and a remedy of strength q are given by

$$0+\delta p\,\frac{S^*}{1-\delta}+\delta^2(1-p)\,p\frac{S^*}{1-\delta}+...+\delta^{L-1}(1-p)^{L-2}p\,\frac{S^*}{1-\delta}+\delta^L(1-p)^{L-1}S(q,T).$$

The first term (zero) reflects the violation: entry during the period of the violation is stifled. The second term indicates that entry will occur with probability p in the first period following the violation. The third term reflects that entry will occur with probability $(1-p)\,p$ in the second period following the violation. The penultimate term reflects that entry will occur with probability $(1-p)^{L-2}\,p$ in period $L-1$ following the violation. The last term captures the contribution to consumer surplus if entry does not occur by period $(L-1)$ following the violation, at which time the remedy is imposed.

Adding up of these terms except the final one gives

$$\frac{\delta p S^*}{1-\delta}\,\frac{1-[\delta(1-p)]^{L-1}}{1-\delta(1-p)}\,.$$

For simplicity, here we consider a perpetual remedy, so

$$S(q,T)=\frac{S^*}{1-\delta}\,\frac{q}{1-\delta(1-q)}\,.$$

Therefore, the EPDV of consumer surplus with the violation and the (delayed) remedy is

$$\frac{\delta p S^*}{1-\delta}\,\frac{1-[\delta(1-p)]^{L-1}}{1-\delta(1-p)}+\frac{\delta S^*}{1-\delta}\,[\delta(1-p)]^{L-1}\,\frac{q}{1-\delta(1-q)},$$

which can be written as

$$\frac{\delta S^*}{1-\delta}\Big\{(1-[\delta(1-p)]^{L-1})\,\frac{p}{1-\delta(1-p)}+[\delta(1-p)]^{L-1}\,\frac{q}{1-\delta(1-q)}\Big\}.$$

Equating this to the EPDV of consumer surplus without the violation, introducing the notation $\alpha\equiv\dfrac{\delta p}{1-\delta(1-p)}$ and $\beta\equiv[\delta(1-p)]^{L-1}$, gives

$$h+(1-h)\,\alpha=(1-\beta)\,\alpha+\beta\,\frac{\delta q}{1-\delta(1-q)}.$$ Solving for q then gives

$$q=\frac{1-\delta}{\delta}\,\frac{h(1-\alpha)+\beta\alpha}{(\beta-h)(1-\alpha)}\,.$$

If this expression returns a value of $q > 1$, this means that no remedy imposed after a lag of L periods can be strong enough to make consumers whole.

If the violation continues until the remedy is imposed, then the EPDV of consumer surplus with the violation and the remedy is $\delta^L S(q)$, which equals $\delta^L \dfrac{S^*}{1-\delta} \dfrac{q}{1-\delta(1-q)}$. Equating this to the EPDV of consumer surplus without the violation implies that $h + (1-h)\alpha = \delta^L \dfrac{q}{1-\delta(1-q)}$.

Solving this for q gives $q = \dfrac{1-\delta}{\delta} \dfrac{h(1-\alpha)+\alpha}{(\delta^{L-1}-\alpha)-h(1-\alpha)}$.