BEFORE THE UNITED STATES DEPARTMENT OF JUSTICE

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| UNITED STATES OF AMERICA,<br>Plaintiff,<br>v.<br>MICROSOFT CORPORATION,<br>Defendant. | Civil Action No. 98-1232 (CKK) |
| STATE OF NEW YORK *ex rel.*<br>Attorney General Eliot Spitzer, *et al.,*<br>Plaintiffs,<br>v.<br>MICROSOFT CORPORATION,<br>Defendant. | Civil Action No. 98-1233 (CKK) |

**DECLARATION OF JOSEPH E. STIGLITZ AND JASON FURMAN**

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## I. QUALIFICATIONS

Our names are Joseph Stiglitz and Jason Furman. Dr. Stiglitz is a Professor at Columbia Business School, Columbia's Graduate School of Arts and Sciences (in the Department of Economics), and Columbia's School of International and Public Affairs. In 2001, Dr. Stiglitz was awarded the Nobel Prize in Economic Sciences. In addition, Dr. Stiglitz serves as a Senior Director and Chairman of the Advisory Committee at Sebago Associates, Inc., an economic and public policy consulting firm.

Dr. Stiglitz previously served as the World Bank's Chief Economist and Senior Vice President for Development Economics. Before joining the Bank, he was the Chairman of the President's Council of Economic Advisers. Dr. Stiglitz has also served as a professor of economics at Stanford, Princeton, Yale, and All Souls College, Oxford.

As an academic, Dr. Stiglitz helped create a new branch of economics – "The Economics of Information" - which has received widespread application throughout economics. In the late 1970s and early 1980s, Dr. Stiglitz helped revive interest in the economics of technical change and other factors that contribute to long-run increases in productivity and living standards. Dr. Stiglitz is also a leading scholar of competition policy.

In 1979, the American Economic Association awarded Dr. Stiglitz its biennial John Bates Clark Award, given to the economist under 40 who has made the most significant contributions to economics. His work has also been recognized through his election as a fellow to the National Academy of Sciences, the American Academy of Arts and Sciences, and the American Philosophical Society, as well as his election as a corresponding fellow of the British Academy. He has also been awarded several honorary doctorates.

Jason Furman is a Lecturer in economics at Yale University. In addition, Mr. Furman is a Director at Sebago Associates. Mr. Furman previously served as Special Assistant to the President for Economic Policy at the White House, where his responsibilities included tax policy, the Federal budget, Social Security, anti-poverty programs, and other economic policy issues.

## II. PURPOSE

This Declaration was commissioned by the Computer & Communications Industry Association (CCIA) as an independent analysis of the competitive effects of the Proposed Final Judgment. The views and opinions expressed in this Declaration are solely those of the authors based on their own detailed study of the relevant economic theory and court documents; they do not necessarily reflect the views and opinions of CCIA. In addition, the views and opinion expressed in this Declaration should not be attributed to any of the organizations with which the authors are or have previously been associated.

## III. INTRODUCTION

Competition is the defining characteristic of a market economy. It provides the incentive to produce new products that consumers want, to improve efficiency and lower the costs of production, and to pass on these innovations in the form of lower prices for consumers. In a competitive market, a firm that does not act in the best interests of consumers will be punished and, ultimately, will fail. But when competition is imperfect – or when it is nonexistent as in the

limiting case of monopoly – the incentives to undertake these beneficial actions may be attenuated. In fact, a firm may even face incentives to behave in ways which do not serve the interests of consumers or the economy more generally. Monopoly power may lead a firm to underinvest in innovation, misdirect its investments, or undertake other activities in order to stifle competition rather than to improve products. Costs of production may be excessive because the monopolist has insufficient incentives for efficiency, has incentives to undertake costly measures to deter competition, or undertakes measures to raise rivals' costs. And consumers will face higher prices and fewer choices in the short run; in the long run, the losses to consumers may be even more severe.

In a unanimous decision, the full Court of Appeals for the D.C. Circuit upheld the District Court finding that Microsoft was guilty of violating § 2 of the Sherman Act through its illegal maintenance of a monopoly in the market for Intel-compatible personal computer (PC) operating systems.[1] The Court of Appeals also affirmed numerous findings of fact concerning the consequences of this illegal monopolization for misdirecting innovation, raising rivals' costs, and limiting consumer choice.

The desire to maintain this monopoly, even against potentially superior products, creates a powerful incentive for Microsoft to eliminate or weaken competition that could erode or even eliminate its monopoly. In the mid-1990s, the principal threat to Microsoft's Windows operating system came from the development of the Netscape browser and Java technologies,[2] which allowed programmers to write applications to Netscape and Java, meaning that such programs

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

[2] "The Java technologies include: (1) a programming language; (2) a set of programs written in that language, called the 'Java class libraries,' which expose APIs; (3) a compiler, which translates code written by a developer into 'bytecode'; and (4) a Java Virtual Machine ('JVM'), which translates bytecode into instructions to the operating system." See 253 F.3d at 74, citing Findings of Fact ¶ 73, *United States v. Microsoft Corp.*, 84 F. Supp. 2d 9, 29 (D.D.C. 1999).

would then work on any operating system that would run Netscape or Java. By reducing or even eliminating the cost of producing applications for different operating systems, these technological rivals reduced the barriers to entry for a new operating system and threatened, over the longer run, to erode Microsoft's monopoly in Intel-compatible PC operating systems by allowing competitors to provide superior products at a lower cost.

Microsoft's conduct has effectively eliminated the threat posed by Netscape and Java. Given ongoing rapid technological progress, it is impossible to predict with certainty where the next challenge to Microsoft Windows will come from. The experience in this area, however, suggests that it is likely to come from rivalry at the borders of operating systems, in particular from "middleware" that makes it possible for programmers to write to the "middleware" rather than to the underlying operating system. One such example comes from the increasingly important area of multimedia: streaming media players. Whether the next challenge to Microsoft's operating systems monopoly comes from a multimedia package or another technology, Microsoft will continue to have the same incentives and ability to stifle competition as it displayed against Netscape and Java in the mid-1990s.

The principal goal of any remedy for Microsoft's illegal behavior in this case should be to foster competition and expand choices for consumers. The key to achieving this goal is changing Microsoft's incentives and taking steps to increase competition. A structural remedy, such as splitting up the company, would most directly alter incentives. Where such structural changes are not possible, the remedy should prohibit and regulate the conduct that Microsoft has used in the past *and will have an incentive to use in the future* to eliminate threats from "middleware" products that threaten to limit its monopoly power by usurping some, and perhaps eventually all, of the important functions of the Windows operating system.

The Revised Proposed Final Judgment (PFJ) of November 6, 2001 does not change Microsoft's incentives to undertake anticompetitive acts to stifle consumer choice by thwarting potentially superior products.[3] Furthermore, the PFJ provides few effective prohibitions against future anticompetitive conduct: It alternatively ratifies Microsoft's existing conduct, contains sufficient loopholes to allow Microsoft to circumvent the legislation, and suffers from toothless enforcement procedures that would allow Microsoft to reap the fruits of its monopoly for a significant, and potentially even indefinite, period. In our view, the PFJ would leave intact Microsoft's ability to maintain, and benefit from, its Windows operating system monopoly, while allowing it to continue to limit choices for consumers and stifle innovation.

The PFJ does not even accomplish the limited remedial goals articulated in the U.S. Department of Justice's Competitive Impact Statement (CIS).[4] Specifically, in addition to its loopholes and its inadequate enforcement mechanism, the PFJ is entirely silent on several key findings of the Court of Appeals, including the commingling of applications and operating systems code, the pollution of Java, and the applications barrier to entry more broadly.

The PFJ should be rejected and replaced with a remedy that changes Microsoft's incentives to unfetter the market for competition. At a minimum, a remedy in this case needs to restrain Microsoft's conduct, by restricting the means through which Microsoft can illegally maintain and benefit from its monopoly.

The goal of this Declaration is to analyze the PFJ. It does not propose a detailed alternative remedy. It is important to note, however, that the proposal by the litigating States, while imperfect, is clearly superior to the PFJ in all of these regards. We do not address more

[3] *United States v. Microsoft Corp.*, Revised Proposed Final Judgment, in the U.S. District Court for D.C, November 6, 2001.
[4] U.S. Department of Justice (November 15, 2001), *Competitive Impact Statement* in *United States vs. Microsoft Corp.*

aggressive remedies – such as structural changes to break up Microsoft or impose more extensive limitations on its intellectual property rights – but we note that such broader measures may well be necessary and desirable in order to alter Microsoft's incentives for anti-competitive behavior.[5] We are convinced, however, that the PFJ fails to meet the minimum requirement of an acceptable remedy – that is, it is unlikely to substantially increase competition in the relevant market.

The remainder of this Declaration contains five sections. First, it presents a brief discussion of the modern theory of competition, focusing on its relation to innovation. Second, it summarizes the relevant facts and legal conclusions relating to Microsoft. Third, it outlines what an effective remedy in this case should entail. Fourth, it examines the PFJ and highlights its deficiencies in comparison to this effective remedy. Finally, the paper concludes with a brief discussion of practical measures that could provide a more effective remedy.

## IV. THE MODERN ECONOMIC THEORY OF COMPETITION AND MONOPOLY

This section presents a brief overview of the modern economic theory of competition and monopoly. The theory of competition has evolved rapidly in the last few decades, due in part to the natural evolution of economic thought and in part to the issues raised by the "new economy" (such as the importance of network effects and rapid innovation). Given the vast literature on the topic, this discussion is necessarily selective and focuses on the most relevant issues for Microsoft's monopoly of the market for operating systems for Intel-compatible PCs. This theoretical background motivates the conclusions about the PFJ.

[5] Restrictions on intellectual property rights have been used as a remedy in past antitrust cases, for example IBM's 1956 tabulating machines case, in a manner that is both effective and largely without adverse effects.

**A. Acquisition of a monopoly**

The traditional view of monopoly is that in specific industries, like public utilities, increasing returns to scale create a situation in which luck or initial success will eventually lead to one firm that can maintain its monopoly by controlling an entire market and thus benefiting from the lower average costs of production that result from the larger scale of production. This aspect of the traditional view is still salient in the software market. Producing a software program has high fixed costs in the form of investments in research and development but, once this investment has been made, virtually no marginal cost from producing additional units. As a result, the larger the scale of production, the lower the average cost. By itself, these increasing returns to scale will provide a powerful force for consolidation.

The modern view of monopoly has added an additional effect that can strengthen the advantages enjoyed by the lucky or initially successful firm: network effects.[6] Network effects arise when the desirability of a product depends not just on the characteristics of the product itself but also on how many other people are using it.

Network externalities may be direct: as a user of Microsoft Word, I benefit when many other people also use the program because it is easier to share Word files. Network externalities may also be indirect: I am more likely to purchase a computer and operating system if I know that more software choices are currently available (and will be available in the future) for this system. An operating system with a larger set of existing (and expected) compatible applications will be more desirable. This indirect network effect has been called the "applications barrier to

[6] For an overall survey, see Michael Katz and Carl Shapiro (1994), "Systems Competition and Network Effects." *Journal of Economic Perspectives*, 8:2, 93-115. For a specific application to Microsoft, see Timothy Bresnahan (2001), "The Economics of the Microsoft Case." Mimeo available at http://www.stanford.edu/~tbres/Microsoft/The_Economics_of_The_Microsoft_Case.pdf.

entry."[7] The main reason that consumers demand a particular operating system is its ability to run the applications that they want. In developing applications, Independent Software Vendors (ISVs) incur substantial sunk costs and thus face increasing returns to scale. This motivates ISVs to first write to the operating system with the largest installed base. Because "porting" an application to a different operating system will result in substantial additional fixed costs, a firm will have less incentive to produce the application for operating systems with a smaller installed base, and may do so with a delay or forgo porting completely.

The applications barrier to entry can skew competition for an extended period of time and ensure that any monopoly power, once established, will tend to persist. In choosing a PC and an operating system, consumers make a large fixed investment. In addition, because a considerable amount of learning is associated with the use of operating systems and associated applications, and because files created under one applications software program may not be easily or perfectly transferable to others, there are large costs associated with switching. As a result, consumers will evaluate, among other factors, the current existence of compatible applications and the likely number of future compatible applications.[8] The current number of compatible applications is likely to depend directly on the past and current market share of the operating system. A consumer's reasonable evaluation of the prospects for the continued support of his or her favorite applications and the development of new applications is also likely to be based on current market share. As a result, increased market share indirectly increases the desirability of an operating system.

Empirically, this applications barrier to entry is dramatic. At its peak in the mid-1990s, IBM's operating system, OS/2 Warp, had 10 percent of the market for operating systems for

[7] Franklin Fisher, "Direct Testimony of Franklin Fisher" in *United States v. Microsoft Corp.*
[8] Nicholas Economides (1996), "The Economics of Networks." *International Journal of Industrial Organization*, 14:2.

Intel-compatible PCs and ran approximately 2,500 applications. In contrast, Windows supported over 70,000 applications.[9] Establishing a new operating system that effectively competes head-to-head with Windows would require the hugely expensive task of attracting ISVs to port thousands or even tens of thousands of programs to the new operating system, a process with a substantial fixed cost and, in the absence of a large guaranteed market, little scope to benefit from economies of scale. Particularly important to the applications barrier to entry is the availability of applications providing key functionalities, such as office productivity. Microsoft's dominance in this area, and its choice about whether or not to port its Microsoft Office program to alternative operating systems, can add a new and even higher level to the applications barrier to entry.

With this barrier to entry, a monopoly once established may be hard to dislodge. Anticompetitive practices early in the competitive struggle can lead to a market dominance that can persist, even if the anticompetitive practices which gave rise to the monopoly position are subsequently prohibited. These hysteresis effects are reinforced by switching costs. Learning a language or a program interface may involve significant costs. Users must therefore be convinced that an alternative program is *substantially* superior if they are to be induced to incur the learning and other costs associated with switching to an alternative product. These "lock in" effects make it more difficult to dislodge a firm that has established a dominant position, even when it is technically inferior to rivals.

This perspective has two important policy implications. First, it is imperative to address anticompetitive practices as quickly as possible. Delay is not only costly, but it impedes the restoration of competition even in the longer run. Second, prohibiting the practices that gave rise

[9] Findings of Fact, ¶ 40 and ¶ 46, 84 F. Supp. 2d at 20, 22.

to the monopoly may not suffice to restore competition. Stronger conduct, and possibly structural, remedies may be required.

**B. Potential for competition**

In the most simplistic view, a monopoly once attained is permanent. Increasing returns to scale and network externalities make the monopolist impregnable – any new entrant can be priced out of business by the monopolist – which can then go back to charging the monopoly price for the product.

In contrast to this simplistic static view, the economist Joseph Schumpeter presented a dynamic vision of technological change giving rise to a series of temporary monopolies. In his vision, the most successful firm in a winner-take-all contest would become a temporary monopolist, benefiting from the rents that this monopoly confers – a process necessary to justify incurring the sunk costs in research and development required to obtain the monopoly in the first place. But, in the Schumpeterian vision, this monopoly would eventually be toppled by entry as a newly innovative entrant displaced the monopolist with a superior product, thus reaping the benefits of increasing returns to scale and network externalities.[10]

The real world likely lies somewhere between these two views. A monopoly is not a fixed part of the economic landscape. But the downfall of a monopoly is not inevitable. In fact, more recent economic research strongly indicates that Schumpeter's conclusion was wrong; when restraints on anticompetitive conduct are absent, a monopoly can take steps to ensure that it is likely to be perpetuated.[11] These steps can suppress the overall level of innovation and have

[10] Joseph Schumpeter (1942 / 1984), *Capitalism, Socialism and Democracy*. Harper Collins, New York.
[11] See, among other references, Richard Gilbert and David Newbery (1980), "Preemptive Patenting and the Persistence of Monopoly." *American Economic Review* 72(3), pp. 514-526 and Partha Dasgupta and Joseph Stiglitz (1980), "Uncertainty, Market Structure and the Speed of R&D," *Bell Journal of Economics*, 11(1), pp.1-28.

other high social costs.[12] Significant network effects combined with switching costs, as discussed above, represent one way in which a firm can perpetuate its market power.

Understanding this point is central to understanding what motivated the actions of Microsoft in promoting Internet Explorer and restraining Netscape and Java, and also to understanding the motivations of a conduct remedy to improve competition. Network externalities are not a "fixed factor" in the economic landscape. They depend, at least in part, on decisions by the monopolist. A monopolist has substantial resources at its disposal to strengthen barriers to entry and thus to maintain and strengthen its monopoly power. Exclusionary conduct by the monopoly can be used to prevent a reduction in the barriers to entry or even affirmatively to raise them even higher. Java and Netscape would have reduced the monopoly power of Windows by allowing a greater variety of programs to function on a greater variety of operating systems. The social benefits from such innovation were likely significant, but Microsoft would have experienced significant losses from the innovation through the erosion of its monopoly power.

Similarly, this same point can provide the rationale for structural or conduct remedies that can potentially reduce barriers to entry and thus increase competition in part, or all, of the market. The fundamental idea is that Microsoft acted as it did because it was afraid that Netscape and Java would reduce the applications barrier to entry and thus undermine its operating systems monopoly. By preventing this anticompetitive behavior, and indeed promoting competition, a conduct remedy could have precisely the opposite effect, creating the conditions for the dynamic, innovative Schumpeterian competition that would otherwise be absent in this market.

[12] Joseph Stiglitz (1987). "Technological Change, Sunk Costs, and Competition." *Brookings Papers on Economic Activity*, 3, pp. 883-937.

In understanding the monopoly in the operating systems market, and how it fits into the overall PC platform, it is useful to introduce some issues specific to this area. Timothy Bresnahan, a Professor of Economics at Stanford University and a former Deputy Assistant Attorney General and Chief Economist at the U.S. Department of Justice Antitrust Division, formulated the concept of "Divided Technical Leadership."[13] The concept is that although each aspect of the platform is dominated by a single company, different companies dominate different "layers" of the platform: "At one stage, all of IBM and Compaq (computer), Microsoft (OS), Intel (CPU), Netware (networking OS), WordPerfect and Lotus (near-universal applications) participated in technological leadership of the PC platform."[14] In a situation of divided technical leadership, according to Bresnahan, competition comes from two sources: "(1) firms in one layer encouraging entry and epochal change in another layer and (2) rivalry at layer boundaries."[15] To the degree that divided technical leadership is absent, because for example Microsoft controls many of the layers (operating system, office applications, networking, browsers, etc.), competition will be restricted. Any measures to facilitate divided technical leadership, even if they leave the monopoly at any given layer intact, will facilitate competition and thereby benefit consumers in the form of greater innovation, more choices, and lower prices.

**C. Consequences of monopoly**

Traditional economic theory suggests that the principal consequence of a monopoly is to raise prices and restrict production. This combination has two consequences. First, higher prices allow the monopolist to capture some of the surplus previously enjoyed by consumers. Second,

[13] Timothy Bresnahan and Shane Greenstein (1999), "Technological Competition and the Structure of the Computer Industry." *Journal of Industrial Economics*, 47(1): pp. 1-40 and Bresnahan (2001).
[14] Bresnahan (2001), p. 5.
[15] Bresnahan (2001), p. 6.

restricted production results in a deadweight loss for society, the so-called "Harberger triangle," to the extent that the value placed on the forgone consumption by consumers exceeds its cost to producers.[16]

Over the last few decades, economists have substantially enhanced this traditional theory and explored other ways in which market power imposes social costs. The modern view is that when competition is imperfect, firms try to maintain and extend their market power by taking actions to restrict competition. In the world of perfect competition, the source of success for firms is producing innovations that benefit consumers and reduce prices. In the world of imperfect competition, an additional – and perhaps paramount – source of success is the effort to reap monopoly profits, capture rents, deter entry into the market, restrict competition, and raise rivals' costs.[17]

Under the new view, the social costs of monopolies go well beyond the "Harberger triangles" that result from higher prices and restricted output. In fact, even if the monopolist is not currently restricting output, the steps taken to maintain the monopoly will result in substantial economic inefficiencies and costs to society. These costs may be far larger than the monopoly profits and far larger than the Harberger triangles. These social losses reflect higher costs of production (both for the firm and its rival), limited or distorted investment in innovation, a restricted set of potentially inferior choices for consumers, and, in the long run, higher prices.

[16] Arnold Harberger (1954), "Monopoly and Resource Allocation," *AEA Papers and Proceedings,* 44: 77-87.
[17] Partha Dasgupta and Joseph Stiglitz (1998), "Potential Competition, Actual Competition and Economic Welfare." *European Economic Review*, 32: 569-577. For an extended discussion and additional references see Joseph Stiglitz (1994), *Whither Socialism*, MIT Press, Cambridge.

**D. Monopolies and innovation**

The information technology industry is characterized by a rapid rate of technological change. As the modern theory of competition and monopoly underscores, it is important to focus not just on the static issues that affect consumers today, but also on how the mixture of monopoly, competition, and the intellectual property regime affects the pace and direction of innovation.

Schumpeter emphasized that monopolies would provide both the incentives and the means for innovation. According to Schumpeter, the fear of losing monopoly rents would drive a monopolist to continue innovating and these monopoly rents – or the promise of further monopoly rents in the future – would provide the financing for these innovations. Schumpeter's vision contains elements of truth: the threat of competition may induce monopolists to invest more in innovation than it otherwise might. But the pace of innovation may be even higher if the incumbent's monopoly power were curtailed. Monopoly power could lower the pace of innovation for four reasons.

First, previous innovations are inputs into any subsequent innovation. Monopoly power can be thought of as increasing the cost of one of the central inputs into follow-on innovations. Standard economic theory predicts that as the cost of inputs into any activity increases, the level of that activity falls.

Second, with more substantial barriers to entry, the threat of Schumpeterian competition and therefore the incentives to innovate are diminished. In the extreme case, if a monopoly could ensure that there were no threat of competition, it would no longer have to innovate. A monopolist's anticompetitive actions to raise barriers to entry will reduce its future incentives to

innovate; similarly measures that increase competition will increase the Schumpeterian incentive.

Third, innovation itself may be misdirected in order to secure a monopoly by deterring entry and raising rivals' costs. In operating systems, for example, the development of alternative proprietary standards and the construction of non-interoperable middleware are examples of innovations that could potentially strengthen monopoly power.

Fourth, the incentives of a monopoly to innovate are limited.[18] Since a monopolist produces less than the socially optimal output, the savings from a reduction in the cost of production are less than in a competitive market. Also, a monopolist's incentives to undertake research will not lead it to the socially efficient level. Rather, its concern is only how fast it must innovate in order to stave off the competition – a level of innovation that may be markedly lower than socially optimal. Consider, for example, a simple patent race in which a monopoly incumbent can observe the position (at least partially) of potential rivals. The monopolist's incentive is to move out in front of the potential rivals by just enough to convince them that they cannot beat the monopolist. Given those beliefs, the rivals do not engage in research, and the monopolist can then slow down its research to a lower level (since it no longer faces a viable threat).

In short, monopolization not only harms consumers by raising prices and reducing output in the short run, but may reduce innovation in the long run. These long-run harms, which are especially important in innovative industries, may substantially exceed the short-run costs to consumers.

[18] Kenneth Arrow (1962), "Economic Welfare and the Allocation of Resources for Invention." In *The Rate and Direction of Inventive Activity,* Princeton University Press, Princeton: pp. 609-625.

## V. FACTS AND LEGAL CONCLUSIONS RELATING TO MICROSOFT

In its decision, the Court of Appeals affirmed the District Court's overall judgment, albeit on a narrowed factual and legal basis. The Court of Appeals concluded that "Microsoft violated § 2 of the Sherman Act by employing anticompetitive means to maintain a monopoly in the operating system market."[19] In addition, the Court of Appeals overturned the lower court's judgment that Microsoft violated § 2 of the Sherman Act by attempting to monopolize the web browser market. The Court of Appeals remanded the decision on whether the tying of Internet Explorer to Windows violated § 1 of the Sherman Act and indicated that tying should be evaluated under the rule of reason, rather than under a *per se* rule; the U.S. Department of Justice chose not pursue this issue further. The Court of Appeals also vacated the District Court's Final Judgment, in part because of the narrowed scope of the judgment on the conclusions of law.

The current task in this case is to develop a remedy that addresses the central finding of the Court of Appeals: the monopolization of the operating systems market. This judgment was based on findings of fact and conclusions of law in three areas: Microsoft has monopoly power in the relevant market, Microsoft behaved anticompetitively, and Microsoft's anticompetitive behavior contributed to the maintenance of its monopoly. These are briefly discussed in turn.

### A. Monopoly power

Monopoly power is the power to set prices without regard to competition. It can be inferred by the combination of market share in the relevant market and significant barriers to entry. The District Court found that Microsoft's share of the worldwide market for Intel-compatible PC operating systems exceeded 90 percent in every year of the 1990s and has risen to

[19] 253 F.3d at 46.

more than 95 percent in recent years. Microsoft did not dispute these facts, but instead argued that the relevant market was broader and should include all platform software (e.g., servers, handheld devices, Macintosh computers, etc.). The Court of Appeals, however, rejected Microsoft's attempt to broaden the definition of the market, agreeing with the District Court that these other platforms were not "'reasonably interchangeable by consumers for the same purposes.'"[20]

In addition, the Court of Appeals affirmed the finding that Microsoft's dominant market share was likely to persist. This conclusion was based on the substantial barriers to entry, including increasing returns to scale and the applications barrier to entry discussed above. As a result, according to the Court of Appeals, "Because the applications barrier to entry protects a dominant operating system irrespective of quality, it gives Microsoft the power to stave off even superior new rivals. The barrier is thus a characteristic of the operating systems market, not of Microsoft's popularity."[21]

**B. Anticompetitive behavior**

The Court of Appeals found numerous instances where Microsoft behaved anticompetitively through exclusionary conduct that harmed consumers, had an anticompetitive effect, and had either no "procompetitive justification" or an insufficient "procompetitive justification" to outweigh the harm. These actions, according to the Court of Appeals, had the intention and effect of preserving or increasing the applications barrier to entry. The Court of Appeals upheld most of the general categories of anticompetitive behavior originally found by

[20] 253 F.3d at 52, quoting *United States v. E.I. du Pont de Nemours & Co.*, 351 U.S. 377, 395 (1956).
[21] 253 F.3d at 56.

the District Court, but overturned some of the District Court's specific findings in these areas.

The key instances of this anticompetitive behavior found by the Court of Appeals include:

- **Restrictive Licenses to Original Equipment Manufacturers (OEMs).**[22] Microsoft's Windows license placed restrictions on OEMs that limited their ability to change the look of the Windows desktop, the placement or removal of icons for browsers, or the initial boot sequence. The result was to increase the user share of Internet Explorer, not because of its merits, but because Microsoft limited the crucial OEM channel of distribution for Explorer's chief rival, Netscape.

- **Integration of Internet Explorer into Windows.**[23] Microsoft discouraged OEMs from installing other browsers and deterred consumers from using them by not including Internet Explorer in the Add/Remove programs list for Windows 98 and commingling the operating system and browser code.

- **Agreements with Internet Access Providers (IAPs).**[24] Microsoft engaged in exclusionary conduct to restrict the second main distribution channel for Netscape by offering IAPs, including America Online, the opportunity to be prominently featured in Windows in exchange for using the Internet Explorer browser exclusively.

- **Dealings with ISVs and Apple.**[25] Microsoft further restricted additional outlets for Netscape by providing ISVs with preferential access to information about forthcoming releases of Windows 98 in exchange for their writing to Internet Explorer rather than Netscape. In addition, Microsoft negotiated with Apple to restrict the ability of Macintosh consumers to use Netscape in exchange for continuing to develop and support Microsoft Office for the Macintosh operating system.

- **Polluting Java.** The Court of Appeals also found that much of Microsoft's behavior vis-à-vis Java was an attempt to limit a threat to its operating system monopoly rather than benefit consumers. These illegal actions included entering into contracts requiring ISVs to write exclusively to Microsoft's Java Virtual Machine, misleading ISVs into thinking

[22] The Court of Appeals narrowed the scope of this anticompetitive behavior slightly, rejecting the District Court's finding that Microsoft's restrictions on alternative interfaces was anticompetitive, arguing that the "marginal anticompetitive effect" of Microsoft's license restrictions was outweighed by the alternative, the "drastic alteration of Microsoft's copyrighted work." See 253 F.3d at 63.

[23] The Court of Appeals, however, overruled the District Court in one instance, finding a sufficient justification for the fact that in certain situations Internet Explorer will override user defaults and launch, for example when alternative browsers do not provide the functionality required by Windows Update. See 253 F.3d at 67.

[24] The Court of Appeals found that several inducements offered by Microsoft to encourage IAPs to use Internet Explorer were not anticompetitive. See 253 F.3d at 68.

[25] The Court of Appeals overturned the finding that Microsoft's deals with Internet Content Providers were anticompetitive. See 253 F.3d at 71.

that Microsoft's Java tools were cross-platform compatible, and forcing Intel to terminate its work with Sun Microsystems on Java.[26]

**C. Effectiveness of anticompetitive behavior in maintaining the monopoly**

Finally, the Court of Appeals found that Microsoft's anticompetitive efforts to increase usage of Internet Explorer and Microsoft's Java Virtual Machine at the expense of Netscape and Sun's Java had the effect of increasing the applications barrier to entry and thus helping to maintain Microsoft's monopoly of the market for operating systems for Intel-compatible PCs. This finding is the crucial link to the economics of the case; a monopoly is neither automatically permanent nor automatically transient. Rather, its persistence depends, in part, on the barriers to entry which, in turn, depend on the actions of the monopolist and the regulation of the government. This finding is also crucial to the development of proposed remedies.

Specifically, the Court of Appeals found that although neither Netscape nor Java posed an imminent threat of completely replacing all the functions of the operating system (and thus should be excluded from the definition of the relevant market for the test of monopoly power), they did pose a nascent threat to Microsoft's future dominance of the operating system market. Though not part of the "operating systems market," they clearly affected the nature of competition in this market. Both Netscape and Java established Applications Programming Interfaces (APIs) that allowed developers to write *some* programs to Netscape and Java. These programs would then be able to run on any operating system that runs Netscape or Java. The result would be, at least in one segment of applications, a dramatic reduction in the applications barrier to entry. No longer would software developers have to incur additional costs to run on additional operating systems. As a result, Netscape and Java had the potential to act as a crucial

[26] See 253 F.3d at 74-78. The Court of Appeals, however, found a sufficient procompetitive justification for Microsoft's development of its own version of a Java virtual machine. See *id.* at 74-75.

level of "middleware" between the operating system and the programs, and eventually could "commoditize the underlying operating system," to use the memorable words of then-Microsoft Chairman and CEO Bill Gates in an internal memo.[27]

The Court of Appeals wrote:

> We may infer causation when exclusionary conduct is aimed at producers of nascent competitive technologies as well as when it is aimed at producers of established substitutes… the question in this case is not whether Java or Navigator would actually have developed into viable platform substitutes, but (1) whether as a general matter the exclusion of nascent threats is the type of conduct that is reasonably capable of contributing significantly to a defendant's continued monopoly power and (2) whether Java and Navigator reasonably constituted nascent threats at the time Microsoft engaged in the anticompetitive conduct at issue."[28]

The court answered in the affirmative on both issues.

## VI. OUTLINE OF AN EFFECTIVE CONDUCT REMEDY

The Court of Appeals was clear that the District Court has "broad discretion" to fashion a remedy that is "tailored to fit the wrong creating the occasion for the remedy."[29] In the CIS, the Department of Justice appears to take a minimal view of the goals of a remedy, writing that it should "eliminate Microsoft's illegal practices, prevent recurrence of the same or similar practices, and restore the competitive threat that middleware products posed prior to Microsoft's unlawful undertakings."[30] We believe that the PFJ fails even within the narrow terms that the Department of Justice set for itself.

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[27] *United States v. Microsoft Corp.*, Government Exhibit 20.
[28] 253 F.3d at 79.
[29] 253 F.3d at 105, 107.
[30] CIS, p. 3.

The Court of Appeals appears to provide guidance for a broader remedy, quoting the Supreme Court in saying that the role of a remedies decree in an antitrust case is to "unfetter a market from anticompetitive conduct" and "terminate the illegal monopoly, deny the defendant the fruits of its statutory violation, and ensure that there remain no practices likely to result in monopolization in the future."[31]

One type of potential remedy, imposed by the District Court but vacated by the Court of Appeals, is structural. Such a structural remedy would involve breaking Microsoft into two or more companies with the goal of establishing a new set of incentives that foster competition. Although potentially disruptive in the short run, the goal of a structural remedy is to terminate the monopoly and create the structural conditions to prevent it from re-emerging, without requiring ongoing regulation or supervision by the court or the government. Such structural remedies are particularly suitable when there have been a wide variety of anticompetitive practices in the past and when changing market conditions (such as innovation) provide opportunities for new types of anticompetitive conduct in the future. Structural remedies have the further advantage of fundamentally altering incentives.

A second type of potential remedy relates to conduct or licensing, seeking to prevent anticompetitive conduct and foster competition. A conduct remedy has the advantage of avoiding the dramatic and potentially deleterious changes associated with a structural remedy, but suffers from the defect that it is necessarily complicated and requires at least some involvement of the court and the government in regulating private enterprise. Ideally, a conduct remedy would also be structured to affect incentives: in particular, such a remedy should raise the costs of acting in an exclusionary manner.

[31] 253 F.3d at 103, quoting *Ford Motor Co. v. United States*, 405 U.S.562, 577 (1972).

The remainder of this section discusses an outline of the elements of an effective conduct remedy that seeks to achieve three goals: creating more choices for consumers, reducing the applications barrier to entry, and preventing Microsoft from strengthening its operating systems monopoly by bringing new products within its scope.

**A. Creating more choices for consumers**

A conduct remedy should empower rival computer companies to modify their own versions of the computer experience to appeal to consumers. Not only will consumers benefit from the greater product choice, but entry and competition may be enhanced as consumers learn how to interact with a variety of interfaces. At a minimum, empowering OEMs and possibly ISVs to create more choices for consumers would involve: (1) the right to modify the desktop, the start menu, or other fundamental aspects of the computer experience so that OEMs can market PCs with alternative overall "looks", different software packages (including supplementing, replacing, or removing Microsoft middleware), and to offer lower-priced options with reduced features; (2) adequate information and technical access to develop applications for, and even modifications to, functionalities included with Windows, which would allow ISVs to develop their own bundle of the Windows operating system plus applications (and/or minus Microsoft middleware) that could be marketed either to OEMs or directly to end users; (3) protection from retaliation by Microsoft for engaging in this conduct; and (4) financial incentives to make changes that benefit consumers.

**B. Reducing the applications barrier to entry**

The central goal of Microsoft's illegal conduct was to preserve and strengthen the applications barrier to entry so that the Windows operating system continued to be essential to desktop computing. An effective conduct remedy in this case should take steps to reduce the applications barrier to entry, by creating conditions conducive to more competition and by requiring Microsoft to undertake actions that would lower that barrier. Reducing the applications barrier to entry is consistent with the findings of the Court of Appeals and is central to an effective remedy in this case. Although the Court of Appeals rejected or remanded the District Court's findings of liability for tying and for monopolization of the browser market, both of these actions were central to the Court's finding of liability on the § 2 Sherman Act violation for monopolizing the market for operating systems. The Court found that Microsoft used commingling of code and other exclusionary measures to increase the market share for Internet Explorer and reduce the distribution of Netscape and Java in order to strengthen the Windows monopoly.

There are two specific aspects to reducing the applications barrier to entry: (1) encouraging competition in middleware in a manner that makes it easier for developers to write programs that run on a variety of operating systems, and (2) requiring Microsoft to port its dominant applications to alternative operating systems.

**C. Preventing Microsoft from strengthening its operating system monopoly by bringing new products within its scope**

Microsoft's ability to leverage its Windows monopoly to control other aspects of computing that then reinforce the Windows monopoly is a key part of its strategy of

anticompetitive conduct that formed the foundation for the Court of Appeals ruling. To deal with the anticompetitive practices that are "likely to result in monopolization in the future" requires a remedy that addresses not just areas of past misconduct, but emerging areas as well.

The next section compares the actual agreement to these elements.

## VII. ANALYSIS OF THE PROPOSED FINAL JUDGMENT

The PFJ fails to fulfill even the minimal goals set by the CIS. It does not address many of the proven illegal practices, including commingling, polluting Java, and strengthening the applications barrier to entry more broadly. Furthermore, in our judgment the PFJ would not "restore the competitive threat that middleware products posed prior to Microsoft's unlawful undertakings."[32] Nothing in the PFJ would be likely to resuscitate the conditions of greater "divided technical leadership" that prevailed in the mid-1990s when Netscape and Java both presented a serious threat to Microsoft, which Microsoft suppressed through anticompetitive actions.

The PFJ also falls dramatically short of all three elements of the guidelines that appear to have been endorsed by the Court of Appeals for the D.C. Circuit: it allows Microsoft's illegal monopoly in operating systems to continue and perhaps even be strengthened, it allows Microsoft to keep the fruits of its statutory violation, and it leaves intact all of the incentives – and many of the means – for Microsoft to maintain and extend its monopoly in the future, especially in the important emerging areas of web services, multimedia, and hand-held computing.

[32] CIS, p. 3.

The main impact of the PFJ is to codify much of Microsoft's existing conduct. Where the agreement limits Microsoft's conduct, there are often sufficient exceptions, loopholes, or alternative actions that Microsoft could undertake to make the initial conduct limits meaningless. Even where the limits are binding, Microsoft could still flout the conduct restrictions without fear of a timely enforcement mechanism. Because the Technical Committee[33] is essentially advisory and only has expertise in software design, not law and marketing, the only enforcement of the PFJ is through a full legal proceeding – which would provide enough time for Microsoft to inflict irreversible harm on competition. The time issues are especially important because in a market characterized by increasing returns to scale and network externalities, once a dominant position is established it will be hard to reverse, even if the original abusive practices are subsequently circumscribed.

The fundamental problem with the agreement is that it does not change the incentives that Microsoft faces. All of the illegal anticompetitive actions identified by the District Court and affirmed by the Court of Appeals were the result of rational decisions by Microsoft about how best to enhance its value by maintaining and expanding its monopoly. These same incentives will persist under the PFJ; given these incentives, it impossible to foresee – let alone effectively prohibit – the wide variety of potentially anticompetitive conduct that may result. Indeed, the reason that many economists have argued for the more drastic structural settlement (such splitting up Microsoft) is that such structural changes would alter incentives.[34] Though the Court

[33] The Technical Committee consists of three experts in "software design and programming" – one appointed by Microsoft, one by the plaintiffs, and the third by these previous two. The Committee would have broad access to internal Microsoft documents, source code, etc. It would be responsible for reporting any violations of the PFJ to the plaintiffs. They would not, however, be able to rely on the work of the Technical Committee in Court proceedings. See PFJ, Section IV.B.

[34] See, for example, Robert Litan, Roger Noll, and William Nordhaus (2002), "Comment of Robert E. Litan, Roger D. Noll, and William D. Nordhaus on the Revised Proposed Final Judgment." *United States v. Microsoft Corp.*, Before the Department of Justice. The point is simple: now strategy with respect both to applications and the operating system is designed to maximize total profits, including the monopoly profits. With structural separation,

of Appeals has determined that such a remedy might be too drastic, the imperative in evaluating any remedy is to ascertain its impact on incentives.

The following analyzes the details of the PFJ by comparing it to the principles outlined in the previous section. Our discussion does not aim to be comprehensive, but instead to focus on areas that illustrate or represent important economic aspects of the PFJ. Although the enforcement aspects of the PFJ, in particular the powers of the Technical Committee, are essential to understanding the limitations of the agreement, we only briefly discuss these issues.

**A. Creating more choices for consumers**

In developing a remedy, the court is well aware of its technical shortcomings in deciding exactly what should or should not be included as part of an operating system today – or in the future. Neither should these determinations be made solely by a monopolist. These choices should be made by consumers through the choices they have between different OEMs and ISVs. Stanford Law Professor Lawrence Lessig described this strategy as follows: "To use the market to police Microsoft's monopoly… by assuring that computer manufacturers and software vendors remain free to bundle and support non-Microsoft software without fear of punishment by Microsoft."[35] We agree with Professor Lessig that this should be among the goals of a final judgment and that the current agreement is woefully inadequate in meeting this objective. In our view, this is in fact a minimal objective that mitigates some of the harms to consumers from Microsoft's monopoly position but, by itself, would do little to reduce the applications barrier to entry or facilitate competition in the operating systems market itself.

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applications would be designed and marketed to maximize their own profits, with no regard to how this might affect the profitability of the operating system.

[35] Lawrence Lessig (December 12, 2001). "Testimony before the Senate Committee on the Judiciary."

As noted above, a remedy that turns this overall strategy into a reality requires four different elements: (1) ensuring that OEMs and potentially ISVs have the right to modify the desktop, the start menu, or other fundamental aspects of the computer experience in any way they choose; (2) ensuring that OEMs and ISVs have adequate information and technical access to develop applications for, and even modifications to, Windows; (3) ensuring that they are protected from retaliation by Microsoft for providing alternatives to consumers; and (4) ensuring that they have financial incentives to make changes that benefit consumers. The PFJ is deficient in all four.

*1. Ensuring that OEMs and potentially ISVs have the right to modify fundamental aspects of the computer experience in any way they choose*

The PFJ codifies several new rights for OEMs to modify the desktop or the computer experience, some of which were already voluntarily announced by Microsoft on July 11, 2001 and implemented with the release of Windows XP on October 25, 2001. Specifically, Section III.C of the PFJ prohibits Microsoft from restricting OEMs from "Installing or displaying icons, shortcuts, or menu entries for, any Non-Microsoft Middleware… distributing or promoting Non-Microsoft Middleware by installing and displaying on the desktop shortcuts of any size or shape…" among other actions.

This new required latitude, however, is unduly limited in several respects:

- **New flexibility is quite narrow.** OEMs can only modify the initial boot screen to market IAPs to users, but cannot modify it to uninstall Microsoft middleware or to market middleware that competes with Microsoft middleware (Section III.C.5). Nothing in the PFJ would allow ISVs to acquire licenses to create their own bundles of Windows plus applications to market to consumers or OEMs, a measure that could enhance competition by bringing additional participants with substantial experience in software development into the market. While the benefits to consumers and competition of

allowing ISVs to acquire such licenses are evident, Microsoft would only be harmed to the extent that it reduces its monopoly power. There is no other convincing explanation for these restrictive trade practices.

- **It contains several limitations that limit the overall look of Non-Microsoft Middleware and pace of innovation.** For example, the PFJ requires that the user interface on automatically launched Non-Microsoft Middleware[36] must be "of similar size and shape to the user interface displayed by the corresponding Microsoft Middleware Product", can only be launched when a similar Microsoft product would have been launched, and Microsoft can impose non-discriminatory bans on icons (Section III.C.3). In addition to the fact that these limitation are frivolous, asymmetric, and would seem to serve no purpose other than restricting competitive threats – no such limitations apply to Microsoft – they could also have a severe impact in limiting competition. Specifically, it allows Microsoft to control the pace of innovation in the computer experience, letting Microsoft delay the effective launch of a new type of product until it is ready to compete in that area. Thus both competition and innovation may be impeded.

- **It is unnecessarily delayed.** Specifically, Section III.H gives Microsoft up to 12 months or the release of Service Pack 1 for Windows XP, whichever is sooner, to provide end users and OEMs a straightforward mechanism to remove icons, shortcuts, or menu entries for Microsoft Middleware Products or to allow OEMs or end users to designate alternative Non-Microsoft Middleware Products[37] to be invoked by the Windows operating system in place of Microsoft Middleware Products.[38] There is certainly no economic or legal justification for this delay and our understanding is that it is technically feasible to carry out these changes in a few weeks time, as demonstrated by Microsoft's July 11, 2001 voluntary agreement to implement elements of this provision. As we have emphasized, there can be significant long-run consequences for competition from even short delays.

- **Microsoft could encourage users to undo changes after 14 days.** The value of the new contractual freedoms is limited by Microsoft's ability to encourage the user to undo all OEM changes after 14 days by allowing a user-initiated "alteration of the OEM's configuration… 14 days after the initial boot up of a new Personal Computer." (Section III.H.3) This provision, in effect, would allow Microsoft to present a message to end users (e.g., "Press 'yes' to optimize your computer for multimedia") that could bias choices toward Microsoft products, regardless of what the OEM had chosen. This provision could therefore greatly reduce the scope and value of the changes that OEMs make.[39]

[36] As defined in Section VI.M.
[37] As defined in Section VI.N.
[38] As defined in Section VI.K.
[39] This provision would allow Microsoft to run the "Desktop Cleanup Wizard" that removes unused shortcuts from the desktop in a non-discriminatory manner. Nothing in our reading of the language of Section III.H.3, however, would limit the power of Microsoft to remove all user access to non-Microsoft middleware or restore access to Microsoft middleware.

*2. Ensuring that OEMs and ISVs have adequate information and technical access to develop applications for, or even modifications to, Windows*

The right to make modifications to Windows will only work effectively if OEMs and ISVs have the knowledge to exercise this right. Microsoft currently releases an enormous quantity of information on the Windows operating system and its APIs, through the Microsoft Developer Network (MSDN) and other means. Indeed, the indirect network externalities supporting the Windows monopoly provide a strong incentive for Microsoft to ensure that as many applications as possible run well on its system. But Microsoft also has an incentive to bolster its operating system monopoly by selectively withholding timely information to impede or delay the development of products that threaten to reduce the applications barrier to entry.[40] In addition, Microsoft has also required anticompetitive actions in exchange for information, as in the "first wave" agreements found illegal by the Court of Appeals.[41]

The PFJ requires disclosure of "the APIs and related Documentation that are used by Microsoft Middleware to interoperate with a Windows Operating System Product" (Section III.D) and specified Communications Protocols (Section III.E).

These requirements, however, are deficient in several ways:

- **Windows APIs are not covered.** In particular, the PFJ does not require the disclosure of the APIs used by Windows. Although Microsoft already has an incentive to disclose Windows APIs, there are circumstances where delay could be more profitable. The consequences of this omission are aggravated by the definition in Section VI.U: "the software code that comprises a Windows Operating System Product shall be determined by Microsoft in its sole discretion." Thus, as middleware gets blended in the operating system, the scope of disclosures could be narrowed.

[40] For example, the District Court found that Microsoft withheld the "Remote Network Access" API from Netscape for more than three crucial months in mid-1995. Findings of Fact, ¶ 90-91, 84 F. Supp. 2d at 33.

[41] These agreements, which were entered into between the Fall of 1997 and Spring of 1998 between Microsoft and several ISVs, provided preferential early access to Windows 98 and Windows NT betas and other technical information in exchange for using Internet Explorer as the default browser. See See 253 F.3d at 71-72.

- **Internet Explorer and other middleware APIs are not covered.** Furthermore, the agreement does not require the disclosure of the APIs used by Internet Explorer. Although the government did not prove that Microsoft was guilty of monopolizing the browser market, dominating this market played a key role in shoring up its monopoly in the operating systems market. As a result, requiring disclosure of the APIs for Internet Explorer and other middleware could play a role both in denying the fruits of that monopoly and reducing this barrier to entry in its operating systems market.

- **Definitions could limit disclosure even further.** The scope of APIs required to be disclosed under the agreement could be potentially limited even further by the control Microsoft has over what is "Microsoft Middleware" and what is the "Windows Operating System Product."

- **Additional loopholes further limit disclosure and ability of non-Microsoft middleware to fully interoperate with Windows.** Section III.J.1 provides a substantial loophole that exempts from the disclosure requirements anything that "would compromise the security of a particular installation,… digital rights management, encryption or authorization systems…" These are all very important technologies for Windows Media Player, Passport, the Internet Explorer browser, and any of the many programs that rely increasingly on security and encryption. In addition to giving Microsoft substantial discretion and blurring the disclosure requirements further, these exceptions would make it impossible for competitors to design middleware that fully interoperated with the Windows operating system, leaving certain features only accessible to Microsoft middleware.

- **Disclosures are not timely.** The disclosures are not very timely, allowing Microsoft enough time to ensure that its products – and products by favored OEMs and ISVs – enjoy a substantial "first to market" benefit in taking advantage of the functionality of the operating system. Microsoft has up to 9-12 months to disclose the APIs and communications protocols. In the case of a new version of the Windows Operating System Product, the PFJ bases the timing of the disclosure on the number of beta testers, effectively giving Microsoft substantial discretion over the timing of the required disclosures through its definition of the term "beta tester" and its control over their number. (Sections III.D and VI.R)

- **Microsoft could cripple rival products.** The PFJ does nothing to prevent Microsoft from deliberately making changes in Windows with the sole or primary purpose of disabling or crippling competitors' software products.

*3. Ensuring that OEMs and ISVs are protected from retaliation by Microsoft for providing alternatives to consumers*

The right to make alterations to the Windows desktop will only be effective if companies are protected from retaliation for exercising it. The PFJ provides some protection against retaliation (Section III.A) and requirements for uniform licensing and pricing for Microsoft Windows (Section III.B). The protections, however, are only partial, in that they omit several important behaviors, still leave substantial scope for Microsoft to retaliate, and contain a very large loophole.

First, the prevention against retaliation only applies to a very specific set of actions that are specified in the PFJ, such as altering the icons on the desktop or promoting an IAP in the initial boot sequence. This rule does not apply to other actions by OEMs, such as the inclusion of third party software that does not fall under the definition of Non-Microsoft Middleware.

Second, there may still be some scope for discrimination and retaliation. Section III.B.3 of the PFJ explicitly gives Microsoft the right to use "market development allowances," for example to provide a pre-license rebate to selected OEMs on the basis of potentially ambiguous joint ventures. Although these incentives would have to be offered uniformly, there still could be some scope for defining them in an exclusionary manner. Furthermore, the relationships between Microsoft and computer companies are very complex and multifaceted, leaving substantial scope for retaliation in aspects not covered by the PFJ, including potentially the pricing of Microsoft Office and the server business.

Finally, Section III.A allows Microsoft to terminate the relationship with an OEM without cause and within a brief span of time simply by delivering two notices of termination. With no ready substitutes for Windows available, this power would give Microsoft substantial

leverage in its relationships with OEMs. Although the OEM would have the option of litigating Microsoft's denial of a Windows license, the text of Section III.A and the lack of "bright line" rules in the PFJ would make this litigation costly and uncertain – and thus an imperfect means of protection against this threat.

*4. Ensuring that OEMs have financial incentives to make changes that benefit consumers*

Even if the three previous conditions were met, they would be economically irrelevant if OEMs did not have financial incentives to take advantage of the new licensing freedoms. The production of PCs is a highly competitive industry with very low profit margins.[42] PCs are virtually a commodity that can be priced based on a limited set of characteristics like processor speed and hard drive size. All of the steps allowed by the PFJ – including installing non-Microsoft middleware or removing user access to Microsoft middleware – entail higher costs for the OEMs both in the costs associated with the initial configuration of the system and in the added costs of end user support.[43] In addition, OEMs may perceive that Microsoft would take additional steps to raise their costs through forms of retaliation either permitted by the PFJ or imperfectly banned. These costs may explain why, to our knowledge, no major computer manufacturer has yet taken Microsoft up on its July 11, 2001 offer to remove access to Microsoft middleware and replace it with non-Microsoft middleware.[44]

As a result, the key source of greater competition and consumer choice in the computer experience – OEMs – would have limited economic basis for promoting such choice. In part this is because the value of some of the new freedoms obtained by the OEMs in the PFJ are limited

[42] For example, the *Washington Post* recently noted that profit margins are in "single digits." See Rob Pegoraro and Dina El Boghdady (January 20, 2002), "Building Creativity Into the Box" *Washington Post.*
[43] In the Microsoft trial numerous industry witnesses testified to the user confusion and added support costs associated with having alternative browsers pre-installed on a computer. See 253 F.3d at 71-72.
[44] Microsoft Press Release (July 11, 2001), "Microsoft Announces Greater OEM Flexibility for Windows."

by loopholes. For example, by allowing Microsoft to bar OEMs from marketing non-Microsoft middleware in the initial boot sequence, the PFJ removes one source of revenue and choice. In addition, allowing Microsoft to encourage users to "voluntarily" revert to the Microsoft-preferred configuration of icons, the Desktop, and the Start Menu after 14 days may reduce substantially the value of this screen "real estate." As a result, the PFJ precludes some of the principal means by which OEMs could be remunerated for providing additional or alternative functionality desirable to consumers.

The more fundamental problem is that OEMs continue to be required to license a version of Windows that includes middleware like Internet Explorer, Windows Media Player, and Windows Messenger. By not requiring Microsoft to sell a cheaper, stripped-down version of the operating system – excluding many of these added features – the PFJ in effect would require OEMs to pay twice – once for Microsoft's version of the product (as bundled into the price of Windows) and once for the alternative. Such bundling is a particularly invidious way of undermining competition. In effect, it implies that the marginal cost of any item in the bundle is zero, making competitive entry, even for a superior product, impossible. The fact that such entry has occurred is testimony to the superiority of the rival products – consumers are willing to pay substantial amounts for the alternatives. In addition, forced bundling can have adverse effects on consumers, because it uses up memory and storage space, and there is always the possibility that the commingled code will interfere with the performance of other applications.

In summary, under the PFJ, OEMs are not provided the rights, means, protections, or incentives to create alternative choices for consumers. As a result, the lynchpin of the PFJ's strategy for promoting competition would be greatly attenuated.

**B. Reducing the applications barrier to entry**

The applications barrier to entry was central to the Court of Appeals' understanding of this case. It is the principal barrier to entry that protects Microsoft's overwhelming dominance of the market for operating systems for Intel-compatible PCs. Furthermore, the court found that Microsoft engaged in illegal acts to increase the applications barrier to entry, principally by suppressing Netscape and Java at the expense of Internet Explorer and Microsoft's version of Java. Thus, any remedy that is "tailored to fit the wrong creating the occasion for the remedy" must necessarily take affirmative steps to reduce the applications barrier to entry and also prevent Microsoft from engaging in anticompetitive actions to increase this barrier. Unfortunately, the PFJ barely addresses this central issue.

The following discusses two key aspects of the applications barrier to entry: the use of anticompetitive means to reduce the market share of rival middleware (and thus its potential to reduce the cost of porting applications to different operating systems) and the use of decisions about Microsoft Office to influence the prospects of rival operating systems.

*1. Middleware and the applications barrier to entry*

The CIS states that under the PFJ, "OEMs have the contractual and economic freedom to make decisions about distributing and supporting non-Microsoft software products that have the potential to weaken Microsoft's personal computer operating system monopoly without fear of coercion or retaliation by Microsoft."[45] Even if the PFJ did give OEMs this contractual and economic freedom without fear of retaliation, and the previous subsection expressed severe doubts on this point, it still would do little if anything to weaken Microsoft's operating system monopoly.

[45] CIS, p. 25.

Enhancing competition by allowing OEMs and ISVs to provide consumers with a greater variety of choices, the subject of the previous subsection, is in some sense literally superficial. It involves the ability of firms in the computer industry to change the outer appearance of a computer and the way it is perceived and used by users, including the ability and ease of accessing programs that are included with the Windows operating system or added by the OEM or end user. The issues raised by the applications barrier to entry go deeper, to the underlying code in Windows. In particular, although the PFJ allows end users or OEMs to remove user access to Microsoft Middleware, it also allows Microsoft to leave in place all of the programming underlying this middleware. This code could still be accessed by other programs that write to the APIs exposed by the middleware.

The Court of Appeals explicitly rejected Microsoft's explanation for commmingling the code of Windows 98 and Internet Explorer, concluding that it deterred users from installing Netscape, had no substantive purpose, and thus that "such commingling has an anticompetitive effect."[46] Despite this strong finding, no provision in the PFJ addresses this issue.[47]

Netscape and Java represented a very rare challenge to Windows – they offered the opportunity to develop middleware that would allow a wide range of applications to be costlessly transferred between different systems. It is difficult to imagine when, if ever, there will be a challenge of this magnitude again. Nonetheless, some existing middleware – and future middleware that we may not even be able to forecast today – will continue to present challenges to Windows. For example, there is still substantial competition in the market today for multimedia players, with Windows Media Player, RealNetworks RealOne player, and Apple's QuickTime, among others, all offering different versions of similar functionality.

[46] See 253 F.3d at 66.
[47] The Court of Appeals rejected, *per curiam*, Microsoft's petition for a rehearing on this point. Order (D.C. Cir. Aug. 2, 2001).

The treatment of middleware is crucial because the market for middleware, like the market for operating systems, is subject to substantial network externalities. These externalities mean that the desirability of a middleware package increases as the installed user base increases. As with operating systems, such externalities arise for direct reasons (e.g., users can share files in a particular media format) and indirect reasons (writing a program to different middleware, so the dominant middleware will have the most programs associated with it). With regard to indirect network effects, the key point is that the installed base is not the number of computers with shortcuts to the given middleware, but the number of computers with the underlying code permitting the middleware to be invoked by a call from another program. A programmer that wanted to develop, for example, an interactive TV program could still use Windows Media Player regardless of whether or not an OEM or end user had removed the icons or shortcuts that allow easy user access to this program.

By providing no means for OEMs or end users to undo the commingling of code that ties Microsoft middleware to the operating system, the PFJ ensures that Microsoft middleware will have an installed base, in the relevant sense, of nearly the entire PC market. As a result, programmers will find it cheaper to write to Microsoft middleware rather than to rival programs. In this case, ubiquity could trump quality – because the size of a middleware's installed base could be more important than the quality of the middleware program.

Microsoft middleware thus increases the applications barrier to entry in the same manner that promoting Internet Explorer and restricting the distribution of Netscape do. By allowing Microsoft to continue to commingle the code for middleware and its operating system, and preventing OEMs or end users from making real choices, the PFJ contributes to Microsoft's

ability to restrict the market share of its rivals in neighboring "layers" to the operating system, reducing the main form of potential future competition at "layer boundaries."

*2. Microsoft Office and the applications barrier to entry*

As noted above, in the mid-1990s, Microsoft Windows was compatible with more than twenty times as many programs as IBM's OS/2 Warp. This offers a dramatic example of the applications barrier to entry. One crucial feature of Microsoft is that in addition to producing the Windows operating system, it is also a leader in many other applications. Network externalities work here to help create and maintain market dominance. Thus, for a rival operating system to succeed it would need not only to persuade "neutral" software companies to write to it, but also persuade Microsoft itself to port some of its leading applications to the operating system. To the degree that Microsoft produces leading or essential applications, they can use their refusal to port these applications to reinforce their Windows monopoly.

One application, in particular, is especially important to users: Microsoft Office and its associated programs, including Word (for word processing), Outlook (for e-mail and scheduling), Excel (for spreadsheets), and PowerPoint (for presentations). Indeed, Microsoft Office has about 95 percent of the market for business productivity suites.[48]

The Court of Appeals affirmed the District Court's finding that the desire by Apple to ensure that Microsoft continued to maintain and update Mac Office was central to its motivation to enter into an illegal, anticompetitive deal with Microsoft to suppress Netscape and promote Internet Explorer. In addition, Microsoft does not currently have a version of Office that operates on Linux, the primary alternative to Windows in the PC operating system market. Withholding or simply threatening to withhold Microsoft Office from other operating systems is

[48] Richard Poynder (October 1, 2001). "The Open Source Movement." *Information Today*, 9:18.

a powerful way in which Microsoft can use anticompetitive means to reduce the desirability of rivals while also extracting concessions or exchanges that help support the Windows monopoly of PC operating systems.

The PFJ, however, does not address any issues relating to the pricing, distribution, or porting of Microsoft Office. This considerable loophole has been used by Microsoft in the past. In the future, Microsoft will have the same incentives to use this loophole again. In addition, it may be necessary to examine additional Microsoft applications that can be used to reinforce the Windows monopoly. Given the difficulty of undoing a monopoly of this sort, once established, it is particularly appropriate to reach beyond remedies that are narrowly circumscribed.

**C. Preventing Microsoft from strengthening its operating system monopoly by extending it to encompass additional products**

The Court is charged with fashioning a remedy that "ensure[s] that there remain no practices likely to result in monopolization in the future." Some of the most important newly emerging areas are multimedia, networking, web services, and hand-held computing. Microsoft is already making substantial investments in these areas with its .NET strategy, Microsoft Passport, MSN, Windows Messenger, Windows Media Player, and the Pocket PC operating system.

The recently released Windows XP is characterized by substantial integration between all of these features; indeed the seamless integration is one of Microsoft's chief selling points for Windows XP. Microsoft has marketed Windows XP (standing for "experience") on the basis of its seamless integration between the Internet, multimedia, and the computer. For example, on the day it was released, a Microsoft press release announced, "Windows XP Home Edition is

designed for individuals or families and includes experiences for digital photos, music and video, home networking, and communications."[49]

Like Internet Explorer, these new areas present new opportunities for Microsoft to leverage its monopoly in the operating system to dominate other markets. In addition, Microsoft could use its strong or dominant position in these new markets to erect new barriers to entry that prevent potential competitors from offering products and services with part or all of the functionality provided by Windows. For example, if Passport is successful then a rival operating system would not just need to persuade other developers to write for it, but would also need to develop its own version of Passport and convince numerous e-commerce sites to use it. If the rival operating system failed in any of these steps, its attempts to establish itself could be seriously curtailed. The PFJ, however, does not address any aspects of these important emerging barriers to entry.

## VIII. STEPS TO IMPROVE THE PROPOSED FINAL JUDGMENT: THE LITIGATING STATES' ALTERNATIVE

The goal of this Declaration is to explain why we believe that the PFJ is deficient and why the Court should exercise its discretion to fashion a remedy in this case that would promote competition and benefit consumers. We do not propose an alternative remedy or provide an exhaustive analysis of any other proposals. Our analysis of the shortcomings of the PFJ, however, can be illustrated and strengthened by a selective comparison of some of the provisions

[49] Microsoft Press Release, "Windows XP is Here!" 10/15/01.

in the PFJ with the proposal transmitted to the court by the nine litigating States and the District of Columbia on December 7, 2001.[50]

Many of the issues in the "Plaintiff Litigating States' Remedial Proposals" are technical and involve loopholes, some of which were discussed above including stronger anti-retaliation provisions and a broader definition of middleware that could not be manipulated by Microsoft. In addition, this proposed remedy makes an important change in enforcement: it proposes a Special Master, rather than requiring new legal proceedings to enforce the judgment. None of these important issues are discussed here. Instead, we focus on selected areas in which the litigating States' proposal illustrates some of the principal economic points identified in the preceding analysis.

**A. Fostering competition through OEMs and reducing the applications barrier to entry**

The litigating States proposal would require Microsoft to license a cheaper version of Windows that does not include commingled code from added middleware.[51] In addition, the proposal would require Microsoft to continue to license older versions of its operating system without raising its prices. This would have two effects. First, it would more effectively promote competition and consumer choice by allowing OEMs to ship computers with a wide range of alternative middleware, thereby allowing consumers to choose between different versions or

[50] *United States v. Microsoft Corp.*, "Plaintiff Litigating States' Remedial Proposals," in the U.S. District Court for D.C, December 7, 2001.

[51] The Court of Appeals overturned the District Court, finding that Microsoft could not be held liable for the fact that in certain situations, like updating Windows or accessing help files, Internet Explorer overrides the user's default browser settings and opens automatically. This implies that the complete removal of HTML-reading software is impossible. But Windows could be shipped with, for example, a stripped-down browser that performs essential system functions. Most of the functionality of Internet Explorer, however, is not necessary for the examples Microsoft invoked. This is analogous to the way in which Windows is shipped with a stripped-down text editor, Notepad, but not with a full-fledged word processor.

different price-feature combinations. The lack of financial incentives for OEMs to take advantage of the more liberalized licensing rules is one of the principal deficiencies in the PFJ.

Moreover, such a provision would provide Microsoft with better incentives; only if it produced an operating system which performed substantially better would it be able to sell its new releases. It would at least attenuate its ability to use new releases as a way of extending its market power. Some have advocated even stronger measures to ensure Microsoft faces pro-consumer, pro-competition incentives, including requiring Microsoft to release all of its Windows source code and requiring the free distribution of its operating system after 3 to 5 years.

Second, this provision would directly address the Court of Appeals finding that Microsoft's commingling of code was anticompetitive. By disentangling the middleware from the operating system, this proposal would allow greater competition in middleware – and thus ultimately in operating systems – by reducing the network externalities that benefit Microsoft middleware at the expense of potentially superior products.

**B. Internet Explorer browser open source and Java distribution**

Two of the fruits of Microsoft's monopolization of the operating systems market are the dominance of the Internet Explorer browser and the destruction of Java as a viable competitor. The anticompetitive measures that helped achieve these goals protected a crucial "chink in the armor" of the Windows operating system. The PFJ does nothing to "deny the defendant the fruits of its statutory violation."[52] Furthermore, it does not enhance the ability of competitors to interoperate with Internet Explorer because it includes no disclosure requirement for the Internet Explorer APIs.

[52] 253 F.3d at 103, quoting *United States v. United Shoe Mach. Corp.*, 391 U.S. 244, 250 (1968).

The litigating States propose to remedy these deficiencies by requiring Microsoft to publish the source code and APIs for Internet Explorer and freely license them to competitors. In addition, their proposal would require Microsoft to distribute a Sun-compatible version of Java Virtual Machine with all future operating systems. The result would be to decrease the applications barrier to entry and promote competition.

**C. Cross-platform porting of Office**

As discussed in the previous section, Microsoft Office is one of the most crucial applications for many users. The existence of this application for a particular operating system is one key factor in the demand for the operating system. The litigating States' proposal would remove the ability of Microsoft to either threaten to withhold Office or actually withhold Office by requiring Microsoft to continue to port Office to Macintosh. In addition, the proposal would require Microsoft to auction off licenses to ISVs that would provide them with the entire source code and documentation for Office in order for them to port the product to alternative operating systems. Although we draw no conclusions about the particular rules proposed by the litigating States, this proposal would clearly reduce Microsoft's ability to deliberately raise the applications barrier to entry.

**D. Mandatory disclosure to ensure interoperability**

The PFJ requires some disclosure to ensure that Microsoft is not able to withhold certain information to illegally benefit Microsoft Middleware at the expense of Non-Microsoft Middleware. The disclosures are limited in scope and timing. The litigating States' proposal is substantially broader.

Of particular importance, the litigating States' proposal recognizes that "nascent threats to Microsoft's monopoly operating system currently exist beyond the middleware platform resident on the same computer" and thus the States' proposal requires timely disclosure of technical information to facilitate "interoperability with respect to other technologies that could provide a significant competitive platform, including network servers, web servers, and hand-held devices."[53] In doing this, the proposal would reduce the ability of Microsoft to use its dominant position in operating systems to eliminate emerging threats at the boundary of this "layer" of computing.

## IX. CONCLUSION

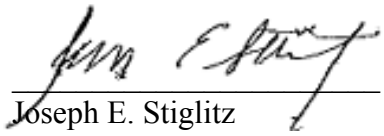
The Revised Proposed Final Judgment agreed to by the U.S. Department of Justice, the Attorneys General of nine States, and Microsoft Corporation is critically deficient. The overall aims of the PFJ are laudable – to increase competition and reduce Microsoft's ability to maintain its monopoly at the expense of consumers. But the PFJ will not succeed in achieving these goals. It does not change any of the incentives faced by Microsoft to undertake anticompetitive actions. It restrains these anticompetitive actions only with highly specific and exception-ridden conduct requirements. And it has an insufficient enforcement mechanism.

The interest of consumers in a greater range of choices, lower prices, and greater innovation would be served by rejecting the PFJ and replacing it with a more effective conduct remedy. A remedy for this case should recognize that the monopoly power created by Microsoft's past anticompetitive, illegal practices is likely to persist, and that it will therefore be likely to continue to enjoy the fruits of its illegal behavior, unless there are far stronger remedies

[53] Litigating States, pp. 10-11.

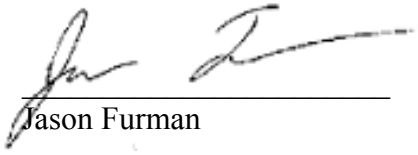
than those in the PFJ. The new remedy should change Microsoft's incentives. It should restrict Microsoft's ability to repeat its past, or develop new, anticompetitive practices. It should provide OEMs and ISVs with the means and incentives to stimulate genuine competition in the provision of platforms. And it should take whatever steps are possible to reduce the applications barrier to entry so that there is greater scope for genuine competition in the market for PC operating systems.

I, Joseph E. Stiglitz, declare under penalty of perjury that the foregoing declaration is true and correct. Executed on January 28, 2002.



Joseph E. Stiglitz

I, Jason Furman, declare under penalty of perjury that the foregoing declaration is true and correct. Executed on January 28, 2002.



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