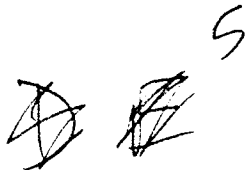
EXHIBIT 6
TO THE COMMENTS
OF RELPROMAX ANTITRUST INC.

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

UNITED STATES OF AMERICA, Plaintiff, v. MICROSOFT CORPORATION, Defendant.	Civil Action No. 98-1232 (TPJ)
STATE OF NEW YORK, ex rel. Attorney General ELIOT SPITZER, et al., Plaintiffs and Counterclaim-Defendants, v. MICROSOFT CORPORATION, Defendant and Counterclaim-Plaintiff.	



Declaration of Paul M. Romer

I, Paul Michael Romer, declare as follows:

I. Qualifications and Scope of Testimony

1. I am the STANCO 25 Professor of Economics at the Graduate School of Business, the Dean Witter Senior Research Fellow at the Hoover Institution, and the Ralph Landau Fellow in the Stanford Institute for Economic Policy Research, all at Stanford University. I have also held the position of Assistant Professor in the Economics Department at the University of Rochester and Professor in the Economics Departments of the University of Chicago and the University of California at Berkeley. I received my B.S. degree in Physics in 1977 and my Ph.D. degree in Economics in 1983, both from the University of Chicago. I am a Fellow of the Econometric Society, a Research Associate at the National Bureau of Economic Research and a former member of the Executive Committee of the American Economics Association.

2. My 1983 Ph.D. thesis and my subsequent papers revitalized the study of economic growth and were the foundation for a body of work known as "new growth theory." My contribution was to formalize a theory in which the rate of technological change is determined by incentives created in the marketplace. This kind of theory lets one trace the effects that social institutions in general, and legal institutions in particular, have on incentives, and thereby on the rate of technological change. Over time, small changes in this rate cumulate into large differences in standards of living. As a result, decisions about the law, and especially about antitrust law as it applies to high technology industries, can be among the most important economic policy decisions that a society makes.

MTC-00030631_0596

3. The Court's decision in this case will profoundly affect the information industry, the most technologically dynamic sector in our economy. Because technological change has been the central concern in my work, the Department of Justice has asked me to evaluate the economic effects of its proposed remedy.

II. Summary of the Analysis

4. In its Findings of Fact, the Court found that Microsoft has a monopoly in the market for PC operating systems that is protected by the applications barrier to entry. By exposing to applications developers APIs which were independent of the Windows operating system and thereby eroding the applications barrier to entry, Netscape's browser and Sun's implementation of Java posed a direct threat to this monopoly. In response to this threat, Microsoft engaged in a series of anticompetitive acts designed to stifle the technological progress and market success of Netscape and Sun. These acts directly harmed consumers by, among other things, denying them the choice of a browserless operating system, foreclosing opportunities by OEMs to make PCs more user friendly, making it more difficult for consumers to obtain competing browsers, and by preventing some software innovations (Intel's platform-level NSP software) from reaching the market. FOF 410.

5. Most importantly, these acts have interfered with the process of innovation in three distinct ways. First, consumers did not get the innovative products that the technology being developed by Netscape and Sun might have delivered. Second, Microsoft's predatory acts had a chilling effect on innovative efforts by all people who might have developed other software technologies that Microsoft found threatening.

MTC-00030631_0597

Third, Microsoft harmed the innovative process because it limited competition, and competitive markets are, on balance, the best mechanism for guiding technology down a path that benefits consumers.

6. The government's proposed remedy will prevent these harms from recurring. The most important element of the remedy is a reorganization that creates independent applications and operating systems companies. It will deprive the operating systems company of some of the tools that Microsoft used to limit competition. It will also create an applications company with the incentive and the ability to lower the applications barrier to entry in the operating system market. The applications company can do this by porting its key applications to competing operating systems and by providing new middleware that other applications developers can use. This could further increase the number of applications available on the competing operating systems and thereby lower the applications barrier to entry. By lowering the barriers to entry, the creation of a separate applications company increases the likelihood of entry in the PC operating system market. Even if actual competition in the market for PC operating systems does not emerge, the increased potential for entry will limit the strategic options available to the operating system monopolist. Furthermore, the presence of this powerful applications company will lead to larger expected payoffs for other innovators in the software industry by providing two independent distribution channels. The presence of these two independent distribution channels will also increase the likelihood that users can choose among alternative technologies on the merits. For all these reasons, a reorganization that introduces a significant competitor will dramatically reduce the likelihood that the harmful acts identified in this case will recur.

MTC-00030631_0598

7. This reorganization returns the software industry part way toward the competitive environment that prevailed before Microsoft took its illegal actions. There is no way to revive the threat posed by the specific technologies that Netscape and Sun were developing, nor to recover the innovative efforts that were deterred by Microsoft over the last five years. The market has moved on. Consumers and applications developers have made investment decisions that are irreversible. This remedy does, however, return us to a point where an important software firm outside of the control of the operating system monopolist has an incentive to lower the applications barrier to entry and to develop new middleware technologies with cross-platform capabilities. This was the state of the software industry in the mid 1990s with the entry and early successes of Netscape.

8. In support of the basic strategy of creating independent companies, the remedy prohibits specific acts that could frustrate the creation of the separate companies or undermine their independence. It also prohibits acts that Microsoft has used and that the new operating systems company could use to exclude potential competitors. Until the reorganization is completed and the applications company has had a chance to change the structure of the operating systems market, the operating systems monopoly will persist. The company that controls this monopoly could limit the access to final users by the new applications company or any other software developer. These prohibitions apply only for a limited period of time. Ultimately, the remedy relies on the market forces created by the reorganization to curb anticompetitive behavior.

9. When I evaluate the potential costs and benefits of this remedy, my overriding concern is the effect that it will have on the rate of innovation. Information processing is a pervasive activity in our economy. Even small changes in the rate of innovation in this

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area can, over time, lead to large productivity gains and big improvements in the standard of living. Because of the rapid progress in microprocessors, memory chips, data storage systems, and communications networks, the hardware infrastructure for information processing is vastly more powerful than it was just ten years ago. It takes innovative software products like the browser to harness this power and put it to use throughout the economy. By creating conditions that encourage increased competition in the operating system market, this remedy will increase the rate of innovation in the software industry and thereby increase the rate of growth for the economy as a whole. The lasting stream of benefits that can be expected to follow from this remedy will substantially outweigh any temporary costs that it might involve.

10. My detailed analysis of the remedy is divided into four sections. The next section, Section III, expands on the harm to innovation caused by Microsoft's actions. Section IV looks in detail at the effects that the reorganization will have on the incentives and behavior of the successor companies and on competing firms. Section V shows how the conduct provisions of this remedy support the independence of the two successor companies and prevent specific anticompetitive acts identified in this case from recurring. Section VI examines the benefits and costs of the remedy both for society as a whole and for Microsoft's shareholders. Section VII presents my conclusion.

III. How Microsoft Has Undermined Innovation

11. The Court identified a reduction in the rate of innovation as the most serious harm that flowed from Microsoft's illegal acts. FOF 411-412. This reduction can take several forms. The first type of harm arises because consumers were deprived of new types of

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software or received them only with a lag. Innovative efforts at Netscape and Sun were directly impeded by Microsoft's actions. As a result, applications developers who could have written programs that were complements with the Netscape browser or Java also faced substantially reduced incentives to do so. It is impossible to know with certainty the types of applications that might have developed had innovation continued with full force on both fronts. We do know, however, that some types of applications forecast by the advocates of the browser and the Java virtual machine are finally emerging. For example, companies are only now bringing to market server-based applications accessed via a browser that substitute for traditional desktop productivity applications. In the absence of Microsoft's actions, it is likely that this class of applications would be farther down its development path.

12. The second type of harm springs from the message Microsoft sent to developers of potentially competitive software. In the browser wars, Microsoft showed that it had the power to reduce the return Netscape and Sun earned on their investments in innovative technologies and that it was willing to use this power. This reduces the expected profits that outside innovators can expect to earn from developing technologies that threaten to create additional competition for Microsoft's operating system monopoly.

13. Historically, people working outside of the dominant firms in the software industry have been responsible for the development and commercialization of many of its most important innovations. Notable examples include email, the electronic spreadsheet, the word processor, the window based-graphical user interface, the web browser, user friendly handwriting recognition on a handheld device, and instant messaging. This pattern is not unique to software. In many industries, new entrants are a critical source for

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the innovations that take technology in fundamentally new directions. Although they may not innovate themselves, dominant firms sometimes learn how to exploit the new innovations that do arise.[1] Because outsiders are such an important source of innovative energy, Microsoft's threatening message reduced the rate of innovation in the software industry as a whole.

14. The third and final type of harm is the most familiar and fundamental. Microsoft has harmed the innovative process because it has limited competition, and competitive markets are, on balance, the best mechanism for guiding technology down a path that benefits consumers. No system of comprehensive central planning, neither one controlled by a government, nor one controlled by the managers of a single firm, can hope to be as robust and reliable a mechanism as competition among many actual and potential firms for purchases by final users. Before the breakup of AT&T, engineers described the advantages of having a single firm that produced all the telephone desksets that connected to the telephone network. Since the breakup, consumers have benefited from the wider range of choice and more rapid innovation in the handsets that competition made possible.

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[1] According to one Microsoft insider, this has been the pattern at the company: "and let's face facts. innovation has never been microsoft's strong suite. we're much better at ripping off our competitors. For example, we did not invent either ASP [active server pages] or IE, we bought them!" RX8

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IV. Analysis of the Reorganization

A. General Characteristics of the Proposed Reorganization

15. The proposed remedy creates two companies that sell different types of software (operating systems and applications) with minimal overlap in the product lines that each company would offer immediately after the reorganization takes effect. Over time, however, each company would be free to develop any new type of software product, including the types of software products supplied by the other company.

16. The internet browser is the most important product in the initial overlap in the product lines. To handle this case, the government's proposal gives the applications company the intellectual property associated with Internet Explorer and the developers who worked on it. However, because Microsoft has placed code that supports browsing in operating system files that contain code that supports non-browsing features of the operating system, the operating system company will receive a license to use and distribute the parts of the code for Internet Explorer that are shipped with the Windows operating system product. FOF 164.

17. The reorganization creates two powerful software companies with roughly similar strategic assets. They will each have annual revenue of more than $8 billion and annual profits of more than $3 billion.[2] This is much larger than the revenues and profits for

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[2] To be specific, according to Microsoft's 1999 10K filing, the Windows Platforms division, which corresponds roughly to the proposed operating systems company, had revenue of $8.5 billion. The Productivity Applications and Developer division and the Consumer, Commerce and Other division together had revenue of $11.2 billion. Total profit for the entire company was $7.8 billion. Microsoft does not publish profit figures by division, but as a very rough guide, we can assume that profits are proportional to revenue. This would imply profits of $3.4 billion for the Windows Platforms division and $4.4 billion for the remaining units.

MTC-00030631_0603

other companies that specialize in selling software for the PC. For comparison, Novell, Adobe, Intuit, Symantec, Rational Software, Corel, and Macromedia together had total revenue of $3.8 billion and total profit of $0.9 billion in the most recent year. As the Court has found, the Windows operating system has a market share that has been increasing over time and that has reached the level of 95% in recent years. FOF 35. They also have a comparable presence among users. According to one market analyst, Microsoft's Office suite captures 95% of the revenue in the office productivity suite business. RX37. Microsoft's CEO Steve Ballmer recently claimed that about 80% of all the electronic information in most companies is stored in Microsoft Office documents. RX14.

18. After the reorganization is fully implemented, the operating systems company will control the Windows user interface. The applications company would control the user interfaces presented by the Office applications. Hence, each company has a powerful means of presenting final users with choices about new software products. For example, if they were promoting alternative browsers, the operating system company could put an icon that starts its browser on the desktop. The applications company could put a choice on its View menu that lets a user view a document using its browser.

19. Each company will have products that present applications programming interfaces that can be used by ISVs. The operating systems company can continue to offer all of the APIs presented by its desktop and server operating systems. On the desktop, the applications company will control the APIs supported by Internet Explorer and by Office. These APIs are already widely used. Declaration of E. Felten, ¶ 36. For example, Microsoft claims that there are 2.5 million developers who use Office as a

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platform for building applications. RX38. On the server, the programs controlled by the applications company expose APIs and communications interfaces that let them be linked together as building blocks in large server side applications. For example, a corporate developer building an e-commerce application can have the application company's web server application, IIS, capture data from a customer and then transfer it to its database application, SQL Server.

B. The Emergence of Competition in the Operating System Market

20. By freeing the applications company, this remedy will reduce the barrier to entry faced by a new operating system company. As separate entities, the applications and operating systems companies will each have an incentive to compete with the other, or at least to encourage other firms to do so. The applications company will perceive both the opportunity to take revenue away from the operating system company and the threat that the operating system company will take revenue away from it. This opportunity and threat will create incentives for the applications company to write versions of its applications that run on other operating systems. By itself, this will lower the applications barrier to entry protecting the Windows operating system. The opportunity and the threat will also create incentives for the applications company to develop its products into full-featured, cross-platform middleware products that other applications developers can use to develop programs that run on multiple operating systems. This will further reduce the barrier to entry.

21. This reorganization places the operating system monopolist in a competitive situation comparable to that which prevailed in the mid 1990s. At that time, Netscape had

MTC-00030631_0605

access to a large fraction of desktops and had an incentive to develop its browser into a critical piece of middleware on the PC. The reorganization recreates this situation with the applications company in the role played by Netscape.

22. To see why incentives drive these two companies toward this outcome, even though they start from positions where they are not direct competitors, it is useful to look in more detail at the threats and opportunities that each company will perceive when they are separate.

23. The best outcome for the operating systems company would be one in which it maintains a dominant position in the operating systems market and also captures some (or all) of the profits from the sales of applications. If the operating systems company cannot achieve this goal, the next best outcome would be to retain its dominance of the operating systems market and to induce enough competition in the Windows applications business to increase innovation in applications. This will increase demand for the operating system because, as the Court found, applications are critical complements to the operating system. FOF 37. To complete this three-way classification, the worst possible outcome for the operating systems company would be one in which it faces direct competition from companies offering alternative operating systems and in which the applications company maintains a dominant position as an applications vendor for the various operating system platforms.

24. The ranking of outcomes for the applications company is exactly the reverse. It understands that the operating system company has an interest in driving down prices for Windows applications and trying to capture some of the revenue from the applications

MTC-00030631_0606

business. The applications company will therefore recognize that it would be a risky strategy for it to continue to write applications only for the Windows operating system.

25. One of the key advantages protecting the application company's $10 or $11 billion stream of revenue are the switching costs that users would face if they tried to adopt a competing set of applications. These users would have to learn the new interfaces presented by any new applications. They would also have to convert the large amounts of data that are stored on desktops and on servers in Microsoft Office file formats. See Declaration of E. von Simson, ¶ 4a. Right now, any user who wanted to switch operating systems would have to incur the large costs of switching applications. If, however, the new operating system runs the applications that the user currently uses, the costs of switching to the new operating system will be relatively low compared to the costs of switching applications. Hence, the applications company will have an incentive to write versions of its applications that run on an alternative operating system. It will also want the providers of complementary applications to support the alternative operating system. To reduce the porting costs for ISVs, the applications company will have an incentive to develop its applications into middleware that ISVs can use and to sell tools that programmers can use to write cross-platform software.

26. The applications company's defensive strategy of porting its applications and developing them into full-featured middleware products can be converted into an offensive strategy that takes revenue from the Windows operating system company. Just as the operating systems company can gain by encouraging innovation in applications, the applications company can gain by encouraging innovation in a critical complement

MTC-00030631_0607

that it does not own, the operating system. It can do this by offering its own operating system or by supporting an open source operating system such as Linux.

27. Among all existing or potential applications vendors, the newly created applications company would be uniquely positioned to implement the kind of strategy outlined above. From a defensive point of view, it has a much stronger incentive to take acts that protect its current revenue stream. In principle, the newly created applications company should be willing to spend up to the present discounted value of this stream, a sum that could be worth anywhere from $40 to $100 billion dollars, if doing so would successfully protect this income stream from attack. In addition, the existing applications already possess much of the functionality that would be required for these applications to serve as middleware that offers a complete set of APIs to developers. No other applications vendor has such a powerful combination of assets – an incentive to protect its existing revenue stream, wide availability on user desktops, and existing middleware functionality – for bringing competition to PC software.

C. Advantages of a Second Company Even in the Absence of Operating System Competition

28. Even if the inherent rivalry between the operating systems company and the applications company does not lead to actual competition in the operating system market, the threat that each company poses to the other will profoundly change the dynamics in the software industry. To illustrate this point, it is useful to consider how events might have turned out if the separation into an operating system company and an applications company had taken place just before Netscape commercialized the web browser. Imagine

MTC-00030631_0608

that neither company had yet taken any steps to threaten the other. In particular, the applications company had not yet written versions of its products for other operating systems; the applications barrier to entry into the operating system market had not been reduced; no competition in this market had materialized.

29. Imagine that in this hypothetical scenario, Netscape is initially able to distribute its browser freely and achieves wide market penetration. Then, both the operating system and the applications company perceive the threat presented by the Internet and the browser. The key difference in this scenario is that this new threat is superimposed on top of the underlying threats and opportunities that the applications and the operating system companies present to each other.

30. In this situation, it is likely that one company would work with the new entrant in an attempt to gain an advantage over the other. Either company could consider forming an alliance with Netscape, giving it an important distribution channel that reaches many final users. This strategy might be well worth adopting if it increased the likelihood that one incumbent would be able to displace the other. The applications company could use the Netscape browser as part of its strategy for developing full-featured cross platform middleware.[3] The operating system company could use the Netscape browser as a way to

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[3] There is evidence that Office developers were required to support IE preferentially over competing browsers. In a January 1997 email, Bill Gates made clear his priorities: "In one piece of email people were suggesting that Office had to work equally well with all browsers and that we shouldn't force Office users to use our browser. This is wrong and I wanted to correct this." GX351 Later, in July 1997, Paul Maritz noted in an email to Gates and other executives that the Office group (consistent with Gates' comment in January 1997) was going to target certain features of Office for IE, but "this was hard decision for them (based on IE's current market share)." GX514.

MTC-00030631_0609

move quickly to a position where it is the dominant vendor of a new type of applications suite that relies on more server-side computing or a user interface based on the browser.

31. Looking ahead from today, rivalry between the two companies will be particularly important when transforming new technologies like the browser arise. In coming years, portable devices, wireless communications and voice recognition may obsolete many deeply embedded assumptions about when, where, and how users access digital information. At the same time, improvements in the bandwidth of fiber optic data communications networks and the extension of these networks ever closer to the desktop may narrow the gap between the capacity of the pipe that connects two different computers and the pipe that connects components located inside the case of a single computer. Either one of these developments, and especially the two of them together, could lay the foundation for new software innovations as powerful as the browser and the Web.

32. Take for example, the Palm operating system, the first operating system that could recognize handwriting and run for an acceptable period of time on a small battery powered handheld device that fit comfortably in a shirt pocket. This new product, which was not developed by any of the leading players in the computer industry, has already brought very significant benefits to consumers. As it evolves wireless links with the Internet and tighter links with mobile phones, an entirely new window of opportunity opens up. As voice recognition software becomes more powerful, the window opens up into an entirely new world of unexplored possibilities.

33. As an integrated company that controls both the Windows operating system and the Office productivity suite, Microsoft has a powerful set of tools that it is using to

MTC-00030631_0610

influence the path of competition in this new space. It is developing a substitute operating system, Windows CE, that competes with the Palm operating system. It has further indicated a willingness to change the details of its Office applications to favor devices that run Windows operating systems, even if doing so disadvantages its customers who now rely on the Palm Pilot. "

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" RX1 (Bill Gates to senior Microsoft executives, July 11, 1999).

34. If the companies were separate, the applications company would try to meet consumer demand rather than support the strategic goals of the operating system company. It might form an alliance with providers of handheld computing devices rather than aid the operating systems company in its effort to handicap and defeat them. For example, it could develop a client application that runs on the Palm Pilot and that communicates efficiently with Exchange, the server program that stores email, calendaring, and task scheduling information. Because of the popularity of the Palm handheld, these features would further solidify the position of Office and Exchange. Doing so would also offer larger potential rewards to the developers of the Palm platform, and would thereby encourage other new entrants to strive to develop equally innovative new products.

35. The separation might also change the dynamics of the competition that is taking place in the server market. Right now, Microsoft is using security protocols that discourage the use of non-Microsoft servers in enterprises that install Windows 2000 on

MTC-00030631_0611

the desktop. See Declaration of R. Henderson, ¶ 49, 119-120; Declaration of E. Felten, ¶ 78-79. If the applications company is successful in creating a viable alternative on the desktop – a competing operating system, a version of Office that runs on it, and a complementary set of applications – these enterprises will have the choice of switching away from the Windows desktop operating system instead of switching to the Windows server operating system.

36. In fact, the discriminatory security features would increase the chances that the competing operating system succeeds. When the operating systems company makes Windows 2000 less attractive to enterprises with non-Microsoft server operating systems, it increases the demand for an alternative desktop operating system. The applications company would therefore see a larger payoff from porting its applications to the alternative. Other applications developers might then try to get an early seat on the new bandwagon. The resulting increase in available applications would further encourage the adoption of the new operating system.

37. Working back, we see that if a separate applications company existed, the operating system company might refrain from introducing these discriminatory security features in the first place. In a world where there is no separate applications company, the discrimination features increase sales of Windows server operating systems without decreasing sales of desktop operating systems. In a world with a separate applications company, this strategy could lead to significantly decreased sales of desktop systems.

38. This counterfactual scenario about the development of the browser and the forward looking hypothetical scenarios about handheld computing and security protocols between the desktop and the server suggest several general points. First, the separation of

MTC-00030631_0612

the applications and operating systems developers into different organizations could increase the rate of innovation that emerges from just these developers alone. The threat that the incumbents pose to the other could induce technological races that spur the rate of innovation achieved on both sides, just as the race with Netscape spurred innovation within Microsoft. FOF 135.

39. Second, the separation would also increase the expected returns to outside innovators. It would create two distinct paths or channels that a technologically successful new entrant could use to reach and maintain contact with final users. Competition between these two organizations would give a new entrant like Netscape or Palm much more bargaining power than it has when it faces a single, monolithic organization. By playing one of the incumbents against the other, the new entrant could therefore expect to extract a much higher return from its innovative effort and early market successes.

40. Finally, even an increased possibility of competition in the market for operating systems could deter an existing monopolist from engaging in some anticompetitive tactics. This benefit arises from the mere creation of the independent applications company. To the extent that the competition becomes real competition instead of potential competition, the monopolist will face even stronger incentives not to engage in socially harmful anticompetitive practices.

V. Effects of the Conduct Provisions

41. In addition to the reorganization, the proposed remedy puts in place a number of prohibitions directed at specific types of conduct. These prohibitions can be separated

MTC-00030631_0613

into two categories – provisions that support the reorganization and provisions that keep the company that controls the operating systems monopoly from engaging once again in the specific types of illegal behavior that Microsoft used before, and that the successor company might use again, to limit entry, restrict competition, depress the rate of innovation, and distort the operation of the market.

A. Provisions Designed to Make the Separation Effective

42. The proposed remedy includes several specific provisions that are designed either to maintain the feasibility of a separation or to ensure that this separation is a true separation into organizations with independent economic interests.

43. Because its most important assets are software and people, Microsoft could take steps that would frustrate the ability of the Court to implement a division of these assets. Microsoft has already demonstrated to the Court its willingness to impose technical linkages on its software code without technical justification in order to achieve certain strategic goals (e.g. binding the browser to the operating system). FOF 175-77. Between now and the time when the reorganization is implemented, Microsoft could use these kinds of tactics to present the court with a *fait accompli* that makes it technically impossible to separate existing applications from the operating system. Thus, Provision 1d of the proposed remedy requires Microsoft to maintain the separation between the operating system business and the applications business that exists on the date of entry of the Final Judgment. It further provides that Microsoft should take no action that makes the separation more difficult.

MTC-00030631_0614

44. Once the companies exist as legally separate entities, it is important that their managers operate them as economically independent entities. Trivially, this requires that one company be prohibited from buying the other (Provision 2b). The covered shareholder provision has the same intent. It ensures that a dominant shareholder cannot force the managers of one company to support the financial interests of the other (Provision 2a). For the two companies to be economically independent, they must not be able to enter into any legal agreement that would require or facilitate collusion between them. The proposed remedy therefore requires that the operating systems company and the applications company file any agreements between them with the Department of Justice (Provision 2c). It also specifically prohibits the two companies from entering into special agreements concerning distribution, discriminatory disclosure of technical information, or discriminatory terms for one to license the other's products (Provision 2b). The Court has found that Microsoft has used these specific acts to limit competition by other firms or to induce other firms to participate in its schemes to limit competition by other firms. FOF 79, 83-89, 95-103.

B. Provisions Designed to Prevent Continued Exploitation of Monopoly Power in the Market for Operating Systems

45. The reorganization that is proposed here will create conditions that make it possible for operating system competition to emerge, but it does not guarantee that this will happen. For some period of time that extends beyond the implementation of the reorganization, the operating systems company will continue to be a monopolist in the market for Intel-based desktop operating systems. The proposed remedy therefore

MTC-00030631_0615

includes specific provisions designed to prevent the operating systems company from engaging in the same anticompetitive acts that it used against Netscape's browser and the Java technology to undermine their competitive potential.

1. Provisions relating to OEMs

46. The Court found that Microsoft used its monopoly control of the operating system market to induce OEMs to participate in its attempts at limiting competition. Among the specific illegal measures taken by Microsoft were:

- making access to technical support or information about new programs contingent on an OEM's support in Microsoft's attempts at limiting competition (FOF 128-129);
- offering reductions in the royalty price for Windows 95 in exchange for this kind of support. (FOF 64, 139, 230-241);
- threatening withdrawal of its Windows license to OEMs if it failed to offer this kind of support. (FOF 203-208);
- refusing to allow OEMs to reconfigure the start-up sequence or the PC in ways that give competitors access to final users. (FOF 209-227);
- binding Internet Explorer to the operating system in order to make it impossible for an OEM that wanted to support a single browser to select a product other than IE. (FOF 175-77, 191, 192).

47. Because OEMs will be a critical distribution channel for the separate applications company in the early years of its existence, the operating systems company will be tempted to use the same kinds of tactics to limit potential competitors, the most important

MTC-00030631_0616

of which will be the newly formed applications company. If the operating systems company could succeed in these efforts, it would undermine the reorganization that is at the heart of this remedy.

48. For this reason, the remedy prohibits, for a limited period of time, specific types of conduct by Microsoft and the successor operating system company. All of these provisions are designed to protect the freedom of an OEM to choose the applications and middleware that it ships with a Windows operating system in response to consumer demand. The first provisions prohibit financial threats and inducements. Provision 3aii (Uniform Terms for Windows Operating System Products Licensed to Covered OEMs) keeps the operating systems company from using changes in the price for an operating system license as a means of punishing an OEM that distributes a product supplied by another firm or from rewarding the OEM for refraining from distributing such a product. Provision 3ai (Ban on Adverse Actions for Supporting Competing Products) keeps the operating systems company from using marketing programs or technical support to achieve the same end.

49. The next set of provisions frees OEMs to configure the PCs that they sell. Provision 3f (Ban on Contractual Tying) prevents the operating systems company from writing licenses for the operating system that require OEMs to distribute any other software products. Provision 3aiii (OEM Flexibility in Product Configuration) lets the OEMs undo choices about such things as the boot sequence, location of icons, and menu choices that the operating system company might use to force the OEM to feature, and therefore to support, applications or middleware supplied by the operating systems company. Provision 3g (Restriction on Binding Middleware Products to Operating

MTC-00030631_0617

Systems) requires that OEMs and end users have the ability to remove end user access to any middleware that the operating system company has included with its operating system software. Provision 3i (Continued Licensing of Predecessor Version) gives the OEMs an alternative way to configure its PCs. It lets them license older versions of the Windows operating system and add new features by adopting software from independent vendors.

2. Provision regarding other distribution partners

50. Microsoft also used its monopoly power to interfere with distribution channels other than OEMs. Among the actions taken by Microsoft were:

- giving valuable consideration (e.g. placement on the Windows desktop, free licenses to software for customizing IE) at no charge to Internet Access Providers (IAPs) who agreed to distribute and promote IE and restrict distribution and promotion of competing browsers (FOF 242-310);
- giving Windows promotion to Internet Content Providers (ICPs) such as Intuit who agreed to restrict distribution of Navigator and payments to Netscape (FOF 311-335);
- threatening to withhold MacOffice from Apple unless Apple distributed IE as the default browser on Macintosh PCs (FOF 341-356).

51. Provision 3e (Ban on Exclusive Dealing), which applies to any contracts with third parties, is intended to prohibit these and similar acts. In particular, it prohibits any agreement that limits the distribution of competing middleware or operating system products.

MTC-00030631_0618

3. Provisions regarding developers and competitors

52. The Court also found that Microsoft used its monopoly power to undermine competing middleware products such as Sun's Java technology and Intel's platform level NSP software. Actions taken against Java include efforts to create incompatibility between its implementation of the Java virtual machine and the Sun implementation (FOF 387-394), inducements to ISVs to refrain from using use or distributing non-Microsoft Java technologies (FOF 395-402), and impeding expansion of Java class libraries (FOF 404-406). Microsoft also threatened to withhold support for Intel's next generation of microprocessors unless Intel agreed to stop developing platform-level interfaces like NSP that might draw support away from interfaces exposed by Windows. FOF 94-103.

53. The Court's findings demonstrate how varied Microsoft's anticompetitive behavior has been in the past. Since the trial, new and unexpected acts such as the discriminatory security protocol built into Windows 2000 (described earlier in paragraph 35) have already come to light. This reaffirms how many possible anticompetitive tactics are available and how difficult it will be to anticipate the precise form of future tactics. Therefore, the proposed remedy includes two provisions that prohibit anticompetitive behavior in general terms. Provision 3f (Ban on Contractual Tying) lays down a blanket prohibition against contracts that are designed to limit competition. Provision 3c (Knowing Interference with Performance) prohibits actions that are designed to degrade the performance of competing middleware on the Windows platform.

54. The remedy also contains a provision that makes it possible for ISVs, OEMs, and independent hardware vendors (IHVs), to uncover and ameliorate a wide range of illegal

MTC-00030631_0619

acts. Provision 3(b) (Disclosure of APIs, Interfaces and Technical Information) requires that Microsoft disclose to these third parties all interfaces they need to make their products interoperate effectively with the Windows operating system.

55. Finally, if the operating system company could use these kinds of agreements with third parties to discriminate against hardware and software vendors who support the middleware strategy of the new applications company or any other middleware vendor, it could impede the development of operating system competition. Provision 3d (Developer Relations) prohibits them from doing so.

4. General comments

56. Under the proposed remedy, all of these conduct provisions apply only for a limited period of time. Specifically, they are in force until three years after the reorganization becomes effective, roughly the time it would take for one of the successor companies to complete one product cycle. This limitation is appropriate because the most reliable and most effective mechanism for preventing anticompetitive acts is market competition that erodes, or at least threatens to erode, the monopoly power that lies at the heart of the problems identified in this case. The conduct provisions support the reorganization in its vulnerable early years of life. They raise the probability that the reorganization will introduce competition into the market for operating systems. This means that the conduct provisions will have a social value that is much higher if they are used in combination with the reorganization than if they are used alone.

MTC-00030631_0620

VI. Costs and Benefits of the Proposed Remedy

A. Benefits of the Remedy

1. More innovation

57. As the discussion has already suggested, the most important benefit for society that will be created by this remedy will come from faster innovation. Some of the benefit will arise because constraints will be lifted from the creative developers working in the applications group. They will no longer be under the control of an operating system monopolist whose highest priority is to maintain this monopoly. See above footnote 3. The reorganization will free them to respond to consumers and adopt new technologies even if they encourage competition for the desktop operating system.

58. Some of the additional innovation will arise because of the race that threatens to breakout between the applications and operating systems companies. Much of this innovation may be of an incremental form, but it can still be very valuable to consumers. This kind of race will spur the developers in both the successor companies, just as the threat from Netscape spurred innovation at Microsoft as a whole. FOF 135.

59. Finally, this remedy will significantly increase the returns that outside innovators, the potential new entrants, can hope to earn if they develop and commercialize a powerful new technology like the browser. Because outsiders have been a critical source of innovative energy for the software industry, this change in expected returns has the potential to generate large benefits for society. One of the key lessons from the economics of technological change is the recognition that even in an undistorted market, innovators earn a private return on their efforts that is lower than the social return. As a result, too little innovation takes place. This problem becomes much worse when a

MTC-00030631_0621

powerful player like Microsoft further depresses the return to outside innovators through the tactics that it uses to maintain its monopoly.

2. Price changes

60. If competition emerges in the market for operating systems, this should have the usual effect of reducing the price for the operating system. Symmetrically, more competition for office productivity applications, which could emerge, should also lead to reductions in prices for these products.

61. These price changes will reduce the extent to which consumers are exploited by Microsoft. If so, they will lead to a large gain for consumers and to a corresponding reduction in the profits Microsoft derives from its exploitation. One of the purposes of the antitrust laws is to prevent sellers from using monopoly power to achieve this kind of transfer of wealth from producers to consumers.

reverse ?

62. We also know that monopoly pricing leads to reductions in social welfare to the extent that it causes some people who might be willing to pay more for a good than it costs to produce it are deterred from making a purchase. In a market where a monopolist can charge different consumers different prices, few such buyers may be deterred. In practice, we know that Microsoft currently charges different prices for academic institutions, small and large businesses, people who do and do not buy the Access database program as part of the Office suite, who do or do not buy the operating system as part of a package from an OEM, who do or do not buy the program as an update to a competitive program, who use the Office productivity suite instead of the less complete Microsoft Works package, and who do or do not buy a Microsoft provided technical

MTC-00030631_0622

support contract, to name just a few examples. As a result, there is reason to believe that the reduction in output resulting from Microsoft's monopoly pricing may, on net, be relatively small. Moreover, current changes in technology mean that in the future, software vendors will be better able to use fine-tuned pricing mechanisms such as software rental or purchases of specific services from an application service provider. In competitive markets these mechanisms could bring important benefits to consumers. In markets that are under monopoly control, they may further reduce the number of willing buyers who are deterred but increase the exploitation of consumers.

B. Costs of the Remedy

63. There are several potential types of cost associated with this remedy. The costs that concern us most are costs to society. However, to assess whether the remedy is disproportionately punitive, one must also look at the costs from the point of view of Microsoft shareholders.

1. Corporate reorganization

64. There are real costs such as legal fees, moving expenses, marketing and promotional expenses that are associated with a corporate reorganization that creates independent business units. In the ordinary course of business, firms voluntarily incur such costs. Any reasonable calculation of these one-time costs will show that these are very small compared to the value to society of the increased innovation that can reasonably be expected to follow from the reorganization.

MTC-00030631_0623

65. This reorganization does means that people who used to work for the same legal entity now work for different legal entities. However, any communication that could take place between two people when they worked for the same firm can still take place when they work for different firms. If, for example, close communication between operating systems developers and applications developers is critical to the success of each, both the operating systems company and all of the applications companies, not just the new one created by this reorganization, will have an incentive to make sure that this communication still takes place. Whether this takes direct phone or email contact, or face-to-face meeting in one person's workplace, or even in offsite retreats, the companies involved will have a large incentive to make sure that these lines of communications remain in place. The only change, and this presumably is a change that will benefit society as a whole, is that the information flows back and forth to applications developers will now treat all developers symmetrically and will remove any preferential treatment that Microsoft applications developers may now receive.

2. Conduct provisions

66. With two major exceptions, the conduct provisions do not force Microsoft to undertake any act. These exceptions aside, the conduct provisions prohibit Microsoft and the successor companies from breaking the law, from taking actions that made it easier for it to break the law in the past, or from taking actions that could be used to conceal illegal acts in the future. Assuming that Microsoft and the successor companies intend to comply with the law, these prohibitions should not impose undue costs on their legitimate business activities.

MTC-00030631_0624

67. The first exception is the mandate that Microsoft continue to license, on the original terms, the previous operating system product after the release of a major new operating system product. See Provision 3i. The direct cost to society from this provision is virtually zero because the code already exists. If there are additional costs associated with technical support for users of the old operating system, Microsoft is free to charge for any technical support that it, rather than the OEM, provides.

68. The second exception is the requirement that Microsoft disclose all the information about APIs and interfaces that other developers need to be able to interoperate with its operating systems. Microsoft has extensive experience with the process of designing interfaces to its operating system in ways that make them useful and easy to understand for outside developers but that still protect any intellectual property associated with the internal workings of the operating system. Based on this experience, it should, at reasonable cost, be able to provide this information about all the interfaces that it uses.

3. Costs imposed on Microsoft shareholders

69. A reasonable benchmark for estimating the costs of this remedy to Microsoft shareholders is to compare what their wealth will be after the remedy has been imposed to the wealth that they would have possessed if the company had never engaged in any illegal acts. By this standard, this remedy may not impose any costs at all on the shareholders. In the mid 1990s, the Netscape browser and the Java virtual machine posed a very serious threat that the stream of monopoly profits that Microsoft collected from its operating system business would be lost. Because it did break the law, it was able to

MTC-00030631_0625

preserve and increase these profits up until the present. If it had obeyed the law, some of this profit might have been lost to operating system competition. The company could therefore be worth less than the combined companies will be worth after the reorganization. Said another way, even if the top executives at Microsoft had known that the course of action that they were about to undertake would lead, with certainty but also with a delay of between five and eight years, to the imposition of the remedy outlined here, they may still have elected to follow their anticompetitive course of action. The gains from defeating the immediate threat and from postponing the emergence of operating system competition by five or more years would have exceeded the low costs to shareholders associated with the eventual imposition of this remedy.

70. Of course, the position of the Microsoft shareholders would be better still if the company were able to violate the antitrust laws. However this additional gain to shareholders imposes large costs on society as a whole. It is precisely these social costs that antitrust law is intended to prevent.

VII. Conclusion

71. In any assessment of the net costs and benefits associated with this proposed remedy, one simple fact stands out. Because it will raise the rate of innovation for the economy as a whole, the remedy creates a stream of benefits that will persist and grow far into the future. There is genuine uncertainty about the exact magnitudes of the benefits and any costs. But any reasonable calculation shows that the expected benefits overwhelm the costs.

MTC-00030631_0626

72. Because it will encourage competition and innovation in the vitally important software industry, it is my opinion that this remedy will have a profoundly beneficial effect on our economy.

I declare under penalty of perjury that the foregoing is true and correct. Executed on April 27, 2000 in Washington, D.C.

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Paul M. Romer

MTC-00030631_0627

72. Because it will encourage competition and innovation in the vitally important software industry, it is my opinion that this remedy will have a profoundly beneficial effect on our economy.

I declare under penalty of perjury that the foregoing is true and correct. Executed on April 27, 2000 in Washington, D.C.

Paul M. Romer

MTC-00030631_0628