D. Dean Schmalensee's contrary analysis is unreliable

39. Dean Schmalensee testified that Microsoft lacks monopoly power. Refusing to define a relevant market, Dean Schmalensee opined that Microsoft cannot be a monopolist because it does not behave like a monopolist. Dean Schmalensee's analysis is deeply flawed. It is based on suppositions that are contrary to both the evidence and common sense and contradicts his prior writings and testimony.

1. Dean Schmalensee's approach to market definition is flawed

40. Dean Schmalensee testified that there is no purpose for which defining a market in which Microsoft sells operating systems is relevant (Schmalensee, 1/13/99pm, at 37:12-22). The reasons Dean Schmalensee gave for refusing to define a market, and his objections to the market the plaintiffs defined, are not credible and are unreliable.

40.1. First, Dean Schmalensee testified that assessing market share is "not helpful in an industry like software" because "entry is possible from many known and unknown sources" and a software industry is too "dynamic" to apply the traditional tools of antitrust analysis (Schmalensee Dir. ¶ 187). This reason for refusing to define a market is inconsistent with the testimony Dean Schmalensee gave in the Caldera case, his prior writings, and sound analysis.

40.1.1. In the Caldera case, in which Microsoft is being sued by a producer of a rival operating system, Dean Schmalensee defined a market for Intel-compatible desktop operating systems -- the very market he testified here has no purpose.

i. Schmalensee, 1/13/99pm, at 29:9-14.

40.1.2. Dean Schmalensee's refusal to define a relevant market in this case

also conflicts with his prior writings.

i. In a paper entitled "Diagnosing Monopoly Power in Antitrust Cases," Dean Schmalensee wrote that "market share has long been the legal touchstone for deciding whether a firm has market power" and that any weaknesses in that approach "do not make a case for abandoning the traditional concern with market share." GX 2335, at page 1.

ii. In a *Harvard Law Review* article entitled "Another Look At Market Power," Dean Schmalensee quoted an article by Landes & Posner as saying that the "standard method of proving market power in antitrust cases involves first defining a relevant market in which to compute the defendant's market share, next computing that share, and then deciding whether it is large enough to support an inference of the required degree of market power." GX 1514, at 5 . Schmalensee endorsed "the basic approach of Landes & Posner" and said that computing market share "can provide information about the importance of market power, but markets differ considerably and shares should be interpreted in light of evidence on market demand elasticities and other conditions." GX 1514, at 9.

40.1.3. Dean Schmalensee's analysis is, in any event, unsound. Defining markets and assessing shares is appropriate in this case, and Dean Schmalensee's refusal to do so leads to analytic errors.

i. Professor Fisher testified that, although "the question of what is a relevant market in this case, and in most cases, is not a question with very definite answers," it is nonetheless useful because it "is a way of starting to summarize what are the things you have to understand" to determine "the constraints on the alleged monopolist." Fisher, 6/1/99am, at 7:17 - 8:5.

ii. Professor Fisher testified that, because the critical question in this case is whether Microsoft has "monopoly power in PC operating systems" -- the product Microsoft sells -- it is sensible to begin the analysis by determining whether other products can constrain Microsoft's ability to exercise power over PC operating systems; that is, to determine whether PC operating systems are a relevant market. Fisher, 6/1/99am, at 7:23 - 8:10; see also Fisher Dir. ¶¶ 8-9.

iii. By contrast, Dean Schmalensee's refusal to define a relevant market led him to engage in a flawed assessment of barriers to entry. By "not focusing on market definition to begin with," Professor Fisher testified, Dean Schmalensee improperly focused on ease of entry "into the microcomputer software industry" rather than the difficulty of entry into Intel-based PC operating systems. Fisher, 6/1/99am, at 9:3-12. Whether entry into the microcomputer "industry" is easy says nothing about whether it is easy to offer a product that can effectively compete against Microsoft's operating system. Fisher, 6/1/99am, 8:21 - 11:8.

40.2. Second, Dean Schmalensee asserted that the market definition is not useful here because it is "illogical" to exclude other "platform" products that threaten Microsoft's position in operating systems -- including Internet browsers and Java -- and platforms are "too heterogenous" to be a market (Schmalensee Dir. ¶ 336; Schmalensee, 1/13/99pm, at 32:3-17; Schmalensee, 6/23/99pm, at 58:15 - 59:21). This argument is badly flawed.

40.2.1. It is Dean Schmalensee's analysis that is illogical. By his reasoning, one could never define a market -- even if it included all of the products (like PC operating systems) that are substitutes for and compete against one another -- as long as there are complements for those products (like browsers or other platform software) that other firms could use to develop new or strengthen existing substitute products.

i. Under Dean Schmalensee's reasoning, it would be illogical not to place in the same relevant market:

(1) an oil refiner in California and a railroad company that is planning on building a new line into California, if the railroad could threaten the oil refiner's position by facilitating the entry into the California market of oil refined in other States. Fisher, 6/1/99am, at 15:13 - 17:21 (giving example of producer of bulky commodity); or

(2) a manufacturer of automobiles and a producer of methanol, if methanol threatens the automobile manufacturer's position by facilitating the development of cars that run on methanol. Fisher, 6/1/99am, at 16:5-12.

ii. In these examples, as Professor Fisher testified, a product (like railroads or methanol) is properly not included in the relevant market -- because it is not a reasonable substitute for products in the market (oil and automobiles) -- even though it threatens to increase competition within that market because it is an important complement that can facilitate growth or entry by products that compete with products in the market. Fisher, 6/1/99am, at 15:7 - 18:11. By contrast, under Dean Schmalensee's reasoning, defining a market in such circumstances would not be a useful enterprise. Schmalensee, 6/22/99pm, at 25:7 - 26:7. Dean Schmalensee's position is untenable because, for example, a market for oil refining plainly can be defined even though railroads may threaten an oil refiner's market power. Fisher, 6/1/99am, at 15:7 - 18:11.

40.2.2. Although platform products such as Netscape and Java are complements to operating systems, they are not substitutes for operating systems. Thus, even though they pose a threat to Microsoft's dominant position in the personal computer operating system market, they are not in that market.

i. See supra II.B.1.; ¶ 19.1.

ii. Dean Schmalensee conceded, "conceptually, there is a difference, and an important difference" between operating systems and platforms. Schmalensee, 6/21/99am, at 20:7-10. "An operating system operates the computer...runs the disk drive, runs the printer, manages the interfaces and so forth." Schmalensee, 6/21/99am, at 20:4-6. By contrast, a "platform" exposes "a set of APIs" that can "be used by other software developers." Schmalensee, 6/21/99am, at 19:15.

iii. Thus, although "operating systems, typically, are platforms" and "many platforms are operating systems" Schmalensee, 6/21/99am, at 20:7, platforms cannot fully substitute for operating systems; see also Gosling Dir. ¶ 8.

iv. Java and Internet browsers threaten Microsoft's position in operating systems, not because they can develop into another operating system, but rather because the platform they supply could erode the applications barrier to entry and facilitate the entry and expansion of another operating system. Schmalensee, 1/13/99pm, at 35:5-12 (agreeing that "middleware" is a competitive threat to Windows even though a firm supplying middleware is "not a potential entrant into the business of supplying operating systems that would compete with Microsoft").

v. Just as a railroad cannot threaten a monopoly oil refiner unless there is another oil refiner whose entry the railroad can facilitate, so Java and Internet browsers cannot threaten Microsoft's position in operating systems unless there are other operating systems on which those "middleware" products can be run. Fisher, 6/1/99am, at 18:5-11 ("In the present case, the growth of the Netscape browser or the widespread use of original Java might have perfectly well have broken down the applications barrier to entry and allowed other operating systems to compete. But it would be the other operating systems that were then on the market, not . . . either Netscape, the browser market, or Sun because of Java."); Schmalensee, 6/23/999am, at 57:14 - 58:3 (conceding that, at present, an operating system is essential to access web-based applications).

40.2.2A. To support its argument that middleware like Netscape's browser and Java should be included in the relevant market, Microsoft acknowledges that such middleware poses a threat to its operating system monopoly. As Microsoft explains, "If enough applications are written to middleware capable of running on several operating systems, that middleware can become the leading software platform, sharply reducing the value of the underlying operating system." MPF ¶ 135. But Microsoft fails to note -- though Dean Schmalensee conceded at trial -- that middleware is only a threat to Windows' role as a platform; it does not replace or eliminate the need for, in Microsoft's words, an "underlying"

(MPF ¶ 135) operating system. Schmalensee, 1/13/99pm, at 35:5-12.

i. **See supra** Part II.D.1.; ¶ 40.2.2**.**

40.2.3. There is no evidence that Java and Netscape constrain Microsoft's ability to exercise monopoly power today. Thus, even if the market should, as Dean Schmalensee improperly insists, include "every significant constraint" on "the alleged monopolist" (Schmalensee, 6/24/99pm, at 60:10-20), Java and Netscape should not be included in the market.

i. Dean Schmalensee conceded that what he characterizes as Microsoft's existing competitors are not a significant constraint on its ability to exercise market power. Schmalensee, 1/14/99am, at 23:5-18, 24:16-21.

ii. Dr. Warren-Boulton testified that, "under the particular economic conditions in this market, I would not expect the prospect of such a threat" to Microsoft's monopoly "in the future to significantly affect current pricing by Microsoft." Warren-Boulton, 11/19/98pm, at 33:6-14.

40.2.4. Microsoft's argument that the price it can charge for Windows is constrained by other, non-operating system platform software, including "a number of forms of 'middleware'" (MPF ¶ 91, 134-41), is inconsistent with the evidence.

i. All middleware requires the user to have an operating system underneath it to run the hardware. Middleware is not a substitute for an operating system. See supra ¶¶ 40.2.1 - 40.2.2.

ii. The same limitation is true for web-based applications (MPF ¶¶ 146-47). Dean Schmalensee conceded that users of web-based applications must access them through a browser, and today any device that runs a browser must have an operating system. Schmalensee, 6/23/99am, at 51:12 - 53:1, 57:14 - 58:3. Dean

Schmalensee had no opinion on whether anyone would ever produce a device that could run a browser without an operating system; he testified that he thinks a device that functions only as a browser would be "an unlikely thing to market." Schmalensee, 6/23/99am, at 58:4-17.

40.3. Third, Dean Schmalensee asserted that market share is not useful in an industry characterized by significant intellectual property protection and low marginal costs (Schmalensee, 1/20/99pm, at 63:21 - 65:4). This argument ignores both the relevant issue -- whether Microsoft's conduct is constrained by competition from others -- and the importance of other entry barriers.

i. Professor Fisher testified that "the applications barrier to entry protects Microsoft" "independent" of its intellectual property rights in Windows. Fisher, 6/2/99am, at 14:24 - 15:4. Although a copyright-protected movie cannot prevent new movies from being written, the applications barrier to entry inhibits the entry and expansion of other Intel-based PC operating systems. Fisher, 6/2/99am, at 13:20 - 15:4.

2. Dean Schmalensee's opinion that Microsoft lacks monopoly power because of low barriers to entry is flawed

41. Dean Schmalensee testified that Microsoft lacks monopoly power because "Microsoft does not have the protection of substantial barriers to entry" (Schmalensee, 1/14/99am, at 8:22 - 9:9). Dean Schmalensee's reasons for finding the absence of economically meaningful barriers to entry are flawed and inconsistent with the evidence.

a. Dean Schmalensee is wrong that the applications barrier to entry is low

42. Dean Schmalensee asserted that "the facts are inconsistent" with the existence of a high applications barrier to entry (Schmalensee, 6/22/99pm, at 56:9-12). But the evidence is to the contrary.

42.1. Dean Schmalensee conceded virtually all of the critical facts that underlie the

applications barrier to entry.

i. Dean Schmalensee conceded that operating systems seeking to substitute for Windows face a "chicken-and-egg problem . . . . Consumers will not use an operating system if there are not enough applications written to it. ISVs will not write applications software for an operating system unless they expect enough customers to use that operating system." Schmalensee Dir. ¶ 100; Schmalensee, 6/23/99pm, at 58:10 - 59:24.

ii. Dean Schmalensee conceded that most applications are "written for Windows first and sometimes only" for Windows. Schmalensee, 1/13/99pm, at 61:22 - 62:4.

iii. Dean Schmalensee conceded that Windows has a much larger stock of applications than are available for other PC operating systems and "that the rich set of applications available for Windows contribute significantly to the attractiveness of that platform, and that . . . by itself gives it an advantage over other platforms." Schmalensee, 1/19/99am, at 50:3-12.

iv. Dean Schmalensee conceded that "to attract as much attention as Microsoft attracts, for a brand new entrant, might require" spending more than Microsoft does. Schmalensee, 1/14/99am, at 16:10-25.

v. Dean Schmalensee conceded that, because of the absence of sufficient applications available for other operating systems, there is no operating system to which a large OEM presently could switch and that Microsoft could raise the short-term price of Windows. Schmalensee, 1/13/99pm, at 42:16-22, 46:10-12; 6/23/99pm, at 60:9 - 61:4; Schmalensee, 1/20/99pm, at 38:13-17 (agreeing that "if Microsoft were to increase its prices by 10 percent or 15 percent or 20 percent now, it would increase its short-term profits").

vi. Dean Schmalensee conceded that "switching costs and network effects may be larger for some operating systems than for many applications programs." Schmalensee Dir. ¶ 130.

vii. Dean Schmalensee conceded that ISVs will not write to a particular operating system unless they believe the expected return will cover the costs ISVs must sink. Schmalensee Dir. ¶ 105; Schmalensee, 1/13/99pm, at 61:10-13 (stating that the "reasons for not porting or not writing to for particular operating system" are "normally business reasons. You write for an operating system if you think it's likely to be profitable to do so.").

viii. Dean Schmalensee conceded "that the applications programming barrier to entry . . . is something that does, in fact, make it more difficult for people to enter the business of supplying operating systems." Schmalensee, 1/14/99am, at 9:10-18.

42.2. Despite these concessions, Dean Schmalensee argued that the applications barrier to entry is low because there is no evidence that rivals face higher costs to compete effectively than does Microsoft and that any cost disadvantage is not significant (Schmalensee Dir. ¶¶ 105, 132; 1/14/99am, at 16:14-25; 6/23/99pm, at 11:22). The evidence is inconsistent with this argument.

i. As explained, because of Microsoft's massive installed base, the expected return to ISVs from writing to other operating systems is lower than the return from writing to Windows; other operating system vendors thus face higher costs in inducing a large number of ISVs to write to their operating systems. See supra Part II.B.1.(2); ¶ 26.

ii. Because of the collective action problem referred to above, ISVs are very unlikely to write to other operating systems in sufficient numbers to enable those operating systems to become viable substitutes for Windows. See supra Part II.B.3.b.(2); ¶ 27 - 27.2.3.3.

iii. Dean Schmalensee did not analyze "what it would take someone with a hypothetical attractive operating system" to obtain sufficient developer support to duplicate the applications available for Windows. Schmalensee, 1/14/99am, at 14:23 - 15:22.

42.3. In support of his argument that other operating systems do not face a cost disadvantage in attracting ISVs that prevents effective competition against Microsoft in PC operating systems, Dean Schmalensee pointed to the recent success of several niche operating systems, including Linux and BeOS (Schmalensee Dir. ¶¶ 138-40, 158). But the ability of Linux and BeOS in attracting both developer attention and consumer interest has been limited and thus confirms, rather than undermines, the existence of the applications barrier to entry.

42.3.1. BeOS is marketed as a specialized complement to Windows because it lacks the range of applications necessary to substitute for Windows.

i. BeOS's founder, Jean Louis Gassée, stated: "'We don't want to compete directly with Microsoft to be the only operating system on the PC . . . but we can be complementary.'" GX 568 (quoting Gassée). Dr. Warren-Boulton testified that BeOS is a complement, rather than a substitute, for Windows. Warren-Boulton, 12/1/98am, at 45:5 - 49:10.

ii. Thus, BeOS is being loaded by OEMs not instead of Windows, but together with Windows "as a 'dual boot,' letting users switch between the two as needed." GX 568.

iii. Although Dean Schmalensee asserted that BeOS's strategy of becoming a complement to Windows through "dual boot" was merely a stepping stone to challenging Windows (Schmalensee, 1/13/99pm, at 54:8-25), that testimony is undermined by his later testimony that there is no substantial demand for dual boot systems. Schmalensee, 6/23/99pm, at 62:2-23.

42.3.2. Linux is principally marketed as a server operating system, and its employment as a desktop operating system is confined to specialized tasks because its lacks applications comparable to Windows.

i. The CEO of Red Hat, an important Linux vendor, stated that Red Hat Linux "is almost exclusively being used today to run specialized server computers that distribute data on the Internet or internal corporate networks." GX 1568. He further added: "Just because we exist doesn't mean Microsoft doesn't have a monopoly with desktop machines. It's like a telephone company executive holding up a walkie-talkie and saying this is a competitor to local phone service." GX 1568.

ii. The President and CEO of Caldera, another Linux vendor, testified that Caldera's OpenLinux product does not compete with Windows 95, and that Caldera does not "have the application base to really compete as a desktop" with Windows. Warren-Boulton, 12/1/98am, at 50:4 - 51:15 (play Sparks deposition); see also Warren-Boulton, 12/1/98am,

at 56:17 - 57:16 (to the extent Linux is competing with Microsoft, it is competing in the server market; Caldera does not view itself as a competitor in the desktop market because it does not have the necessary stock of applications).

iii. An IBM executive stated: "The limiting factor for Linux breaking into the desktop area right now is simply the lack of available applications written for the operating system." GX 2091. He explained that "users tend to deploy Linux for smaller, simpler tasks rather than for huge, enterprise-scale transactions." GX 2091. Another IBM executive added that, although "it is technically possible to install Linux on an IBM thinkpad," there "are just not enough applications to make it worthwhile." GX 2091.

iv. Dean Schmalensee conceded that Linux is "not a major competitor today." Schmalensee, 1/13/99pm, at 45:23. Although Dean Schmalensee also asserted that "the majority of sales of Linux" are "for desktops" (1/13/99pm, at 73:18-19), he later contradicted that testimony, conceding that the "bulk" of Linux users "at present are" using Linux on "servers." 6/23/99pm, at 66:5 - 67:5.

v. Although a small number of OEMs are offering Linux on some portions of their line (DX 2434 (reporting that Dell is offering Linux)), a representative of another prominent OEM stated: "We see Linux as a server phenomenon right now more than a desktop phenomenon." GX 2091.

42.3.3. Thus, although Linux and BeOS have attracted some developer attention, consistent with the applications barrier to entry, they have not attracted sufficient developer attention to provide an effective substitute for Windows for a large number of users.

i. As explained, BeOS and Linux have thousands of fewer applications available than Windows. See supra Part II.B.3.b.(1); ¶ 26.1.3.

ii. Dr. Warren-Boulton testified that although BeOS is a viable "specialized" niche operating system, it cannot effectively substitute for users because it lacks the "extraordinary width of applications available . . . on Windows." Warren-Boulton, 11/23/98am, at 18:8-22. Dr. Warren-Boulton further testified that the absence of applications

prevents Linux from gaining substantial market share, and that only the advent of a large stock of cross-platform applications could Linux present substantial competition to Windows. Warren-Boulton, 12/1/98am, at 57:8 -59:4.

iii. Bill Gates reportedly stated regarding Linux: "Like a lot of products that are free, you get a loyal following even though it's small. I've never had a customer mention Linux to me." GX 1378.

iv. Bryan Sparks testified that Linux cannot effectively compete with Windows because it "just" doesn't "have the applications base to really compete as a desktop." Warren-Boulton, 12/1/98am, at 51:12-15 (playing Sparks deposition).

v. An IBM executive explained: "The limiting factor for Linux breaking into the desktop area right now is simply the lack of available applications written for the operating system." GX 2091. Another added that, although "it is technically possible to install Linux on an IBM thinkpad," there "are just not enough applications to make it worthwhile." GX 2091.

vi. Professor Fisher testified that "Linux is going to remain a quite successful niche operating system for some time to come, and it's not in fact going to offer a serious threat to Microsoft." Fisher, 6/3/99pm, at 25:14-17.

vii. An April 1998 internal Compaq study concludes that

GX 1240 (sealed), at 13-15.

42.3.4. The existence of niche operating systems, such as Linux and BeOS, is entirely consistent with Microsoft's possession of monopoly power; and Dean Schmalensee is wrong when he argues that, if the applications barrier to entry is high, other operating systems vendors or vendors of other platform products that also can be complements to Windows are "wasting their time" seeking to attract developers (Schmalensee, 6/23/99am, at 23:16 - 27:10; 1/13/99pm, at 55:1-22).

i. Professor Fisher testified: "It's well-accepted that a firm can have monopoly power with a fringe of competitors." Fisher, 6/1/99am, at 22:4-17. **Microsoft's argument (MPF ¶¶ 186-188) ignores the distinction between an operating system or platform having enough users to attract some ISVs to write to it, on one hand, and having enough users and enough applications to provide a realistic alternative to Windows, on the other hand.**

ii. Professor Fisher further testified that it is not sufficient to overcome the applications barrier to entry "that there may be some ISV's or even many ISV's that will write to operating systems other than Windows" because "what makes the applications barrier to entry so severe" is "the breadth and depth of the numerous applications that are written or Windows." Fisher, 6/1/99am, at 55:15 - 56:19.

iii. Dr. Warren-Boulton testified that the fact firms are porting to Linux shows that they are betting Linux will be profitable, not that Linux will substitute for Windows. Warren-Boulton, 11/19/98pm, at 99:7 - 100:4.

iv. Dr. Warren-Boulton testified that "the existence of fringe competitors that are in the operating system market does not mean in any way that Microsoft does not have monopoly power" because of the applications barrier to entry. Warren-Boulton, 11/19/99am at 19:16 - 20:3.

v. As Dean Schmalensee testified and Microsoft's findings acknowledge, "you write for an operating system if you think it's likely to be profitable to do so." Schmalensee, 1/13/99pm, at 61:10-13**; MPF ¶ 177. Although most ISVs will write first and foremost to the dominant operating system, Windows, some may choose additionally or alternatively to write to other, often**

specialized, platforms if they see a profitably large pool of potential buyers. See supra Part II.B.3.b.(1); ¶ 26.2.3.2**, Part II.D.2.a.; ¶** 42.3**.**

vi. Microsoft misstates plaintiffs position in several respects:

- **According to Microsoft, plaintiffs contend that "ISVs will write only for platforms that enjoy a majority of usership" (MPF ¶ 187; see also ¶ 188). To the contrary, the evidence shows that ISVs' have incentives to write first and foremost to the operating system with the largest share; as Dean Schmalensee put it most applications are "written for Windows first and sometimes only."** Schmalensee, 1/13/99pm, at 61:22 - 62:4**.**

- **According to Microsoft, "plaintiffs suggested that a platform has to have a 'majority' of users to attract sufficient ISV attention to overcome the alleged applications barrier to entry [citing Dr. Warren-Boulton's testimony]. Were this true, platform leadership would be total and perpetual, since by definition, only one platform can have a majority of usership, rendering it unnecessary for the owner of the leading platform to take any action -- procompetitive or anticompetitive -- to maintain its position" (MPF ¶ 186). But Dr. Warren-Boulton never made the "suggestion" Microsoft ascribes to him. Rather, he testified that, absent a very large share of browser usage, Netscape could not develop into a sufficiently attractive platform to challenge Windows, a proposition for which Dr. Warren-Boulton relied in part on Microsoft's own documents. Dr. Warren-Boulton testified that Microsoft believes "that it thinks that it has or will shortly win the browser war in the sense it's critical to it in terms of frustrating a cross-platform challenge."** Warren-Boulton, 11/23/98am, 84:7-11**.**

- **Microsoft further asserts: "Plaintiffs also sought to apply their 'applications barrier to entry' theory to Netscape, asserting that Netscape's Web browsing software could never become a competing platform unless it garnered a majority of users.** Fisher, 1/6/99pm, at 35-36**. Once again,**

plaintiffs offered no evidence to support this assertion." MPF ¶ 195. Professor Fisher, however, did not make such an "assertion." The cited testimony addresses instead the likelihood that Microsoft will gain monopoly power in the browser market. In fact, in the immediately preceding testimony, Professor Fisher expressly declined to identify a minimum share of users or usage that a browser would need to threaten Microsoft's operating system monopoly. Fisher, 1/6/99pm, at 32:7 - 33:1**. Elsewhere in his testimony, Professor Fisher explained: "The real question is not what's going to happen to Netscape or what has happened to Netscape. It's the question of whether IE now has so many users or Netscape so few, relatively few, that the threat to Microsoft's monopoly that was presented by Netscape has effectively been thwarted. I believe that's happened and Microsoft believes it's happened."** Fisher, 1/7/99pm, at 36:21 - 37:4**; <u>see</u> <u>also</u> <u>infra</u> Part VII.A.2; ¶** 359.3**, Part VII.A.4; ¶**371**.**

42.3.5. Any threat Linux and BeOS pose to Microsoft's position is speculative and does not prevent Microsoft from enjoying monopoly power today.

i. The CEO of Red Hat, a leading Linux vendor, stated: "We are absolutely not a viable competitor" to Windows "at this time. We have every intention of being one, but how long will that take? Realistically, it will be 20 years." GX 1568.

ii. Dean Schmalensee conceded that Linux is not a significant constraint today on Microsoft's ability to exercise power and cannot predict when it will exert such a constraint. Schmalensee, 1/13/99pm, at 52:25 - 53:8; 1/14/99am, at 23:16-25. He conceded that he had made no estimate of how many PCs have Linux preinstalled now or will have Linux preinstalled in the future. Schmalense, 6/23/99pm, at 65:17-24. Dean Schmalensee testified that he didn't "pretend to be able to forecast" whether there will be substantial demand for Linux in the future. Schmalensee, 6/23/99pm, at 73:7-12.

iii. Dr. Warren-Boulton testified that: "I have absolutely no evidence that Microsoft's pricing" of Windows "is constrained by perceived or actual

competition" including "the availability of Linux." Warren-Boulton, 11/19/98pm, at 96:20 - 97:1.

42.4. Dean Schmalensee is wrong that, even if other operating system vendors face substantially higher costs than Microsoft faces today, that does not amount to an entry barrier because an entry barrier exists only if the costs to a rival operating system today are higher than the costs Microsoft incurred when it entered (Schmalensee, 6/22/99pm, at 62:8-20).

42.4.1. For one thing, this definition of a barrier to entry contradicts the approach to entry barriers taken by Dean Schmalensee elsewhere in his testimony and in his prior writings.

i. Dean Schmalensee described as "broadly consistent" with his definition of barriers to entry the proposition that a barrier to entry is any factor that "permits a firm already in the market to earn returns above the competitive level while deterring others from entering." GX 1516; Schmalensee, 1/14/99, at 6:17 - 7:19. And he testified that a barrier to entry exists if there are factors that "disadvantage . . . firms that otherwise would be capable of competing efficiently." Schmalensee 1/21/99am, at 33:2-5; 6/22/99pm at 70:3-24 (testifying that a barrier to entry exists if the rival cannot "attract the resources to expand and to become competitive").

ii. Dean Schmalensee previously wrote that: "In general, a clear signal of low barriers is provided only by effective, viable entry that takes a nontrivial market share . . . ." GX 1513 ((Richard Schmalensee, *Ease of Entry: Has the Concept Been Applied Too Readily*, 56 ANTITRUST L.J. 41, 42 (1987)).

42.4.2. Moreover, successful entry into PC operating systems is much more difficult today than 15 years ago. The network effects that underlie the applications barrier to entry are much larger today than when Microsoft entered because PC penetration (the percent of potential PC users who already use PCs) is higher and Microsoft is a well-established incumbent with a dominant

market share.

i. Professor Fisher testified: "When Microsoft won the network battle, when Windows became the dominant operating systems, there were . . . many fewer P.C.'s, and there was no incumbent operating system of equal power and importance. There were, of course, other operating systems to fight and there were other operating systems to, as it were, overcome. One of them, of course, was Microsoft's own operating system, DOS. The cost after . . . after Microsoft's victory . . . of persuading ISV's to build such a stock rather than write for Windows has got to be much more substantial than it was for Microsoft to persuade them" to write for Microsoft operating systems "in the first place." Fisher, 6/1/99am, at 53:6 - 54:1. In other words, "the economy of scale" that underlies the applications barrier to entry "is bigger now." Fisher, 6/1/99am, at 54:2-10. See also Fisher, 6/1/99am, at 56:14 - 58:18 (Although there might be some incentive for ISVs breaking into the market to write for new operating systems, that is not enough to induce ISVs in general to write to other operating systems such that they can substitute for Windows.)

ii. Demonstrating the increased penetration of PCs, Microsoft's own documents show that its shipments of operating systems rose from 11.4 million units in 1990 to 51.9 million units in 1996. GX 439.

iii. Dr. Warren-Boulton testified that, when Microsoft entered the operating system market, the applications barrier to entry was not comparable to that which potential entrants face today. He explained: "[C]ompare the difficulty there with the difficulty today where you are faced with an incumbent with tens of thousands of API's, a huge stock of applications--trying to play catch-up at that point, it's just very difficult." Warren-Boulton, 11/24/98am, at 48:17 - 49:6.

42.5. Dean Schmalensee's assertion that the history of competition for operating systems shows that the category is easily contestable and that "inflection" points that displace rivals occur frequently is also belied by the evidence and his prior writings.

42.5.1. Dean Schmalensee previously observed that the "fact that entry has

occurred in the past does not imply there are no barriers to entry or that entry is necessarily easy."

i. GX 1513 (*Ease of Entry* Article).

42.5.2. The evidence shows not, as Dean Schmalensee claims, frequent displacement of a dominant firm, but rather Microsoft's demonstrated ability to perpetuate its market power.

i. Microsoft, according to Dean Schmalensee's own analysis, has had the dominant PC operating system since at least the late 1980s. Schmalensee Dir. ¶¶ 118-119.

ii. Microsoft has maintained that dominance notwithstanding the development of, among other things, (i) the graphical user interface; (ii) the migration of PC operating systems from 16-bit to 32-bit chip architecture; and (iii) the advent of the Internet, all of which Microsoft claims to be "inflection points." Maritz ¶ 15.

iii. Professor Fisher testified after being asked about the history of users switching operating systems that while "it's true that users would switch to [another] operating system if they perceived there to be a significant advantage," the "problem is that because of the network effects or what's sometimes been termed the applications barrier to entry, users are not very likely to perceive that in the present circumstances of Windows. And Microsoft does its best to see that they won't." Fisher, 1/6/99am, at 81:25 - 82:10.

42.5.3. Entry into other kinds of software shows little about the feasibility of entry into operating systems because, by contrast to other kinds of software, potential entrants into the operating systems market face the applications barrier to entry.

i. Dean Schmalensee's own chart shows that Microsoft has been the "market leader" in operating systems since 1981; the leader in every other product category he lists (word processors, spreadsheets, databases, personal finance software) has changed at least twice in the same period. Schmalensee Dir. Table 2. See also infra Part II.D.2.b.; ¶ 43.

ii. Microsoft discusses at length the history of the software industry (MPF ¶¶ 96-109) but ignores the evidence that other operating systems, including OS/2 and Rhapsody, have been unable to attract sufficient attention from ISVs to overcome the applications barrier to entry. See supra Part II.B.3.b.(2)-(4); ¶¶ 27-31.

42.5.4. Microsoft's argument that it has "won several distinct races" (MPF ¶ 116) in the operating system market between 1991 and 1998 ignores the fact that backward compatibility enabled Microsoft to ensure that its new operating system would be compatible with the applications designed for its prior operating systems and therefore to avoid the applications barrier to entry.

i. Making this precise point, Microsoft argues that "Windows 3.0 quickly overtook OS/2 in popularity because it had distinct advantages. At the time, the overwhelming number of applications were written for MS-DOS. Nevertheless, OS/2 included a subsystem that provided only limited support for MS-DOS applications, while Windows 3.0 provided much better support for MS-DOS applications." MPF ¶ 201. OS/2 was able to provide support for some MS-DOS applications only because Microsoft had granted IBM a license to the commented sourcecode for Windows 3.0. Schmalensee Dir. ¶ 127; MPF ¶ 203.

ii. Similarly, Microsoft attributes its success with Windows 95 to having provided "a smooth migration path" for users of its 16-bit operating systems, Windows 3.x. MPF ¶ 123. What was "smooth" about this migration path was users' ability to run their existing Windows 3.x applications on Windows 95-equipped machines.

iii. John Rose of Compaq, asked why he believed that Compaq does not have a "commercially viable alternative to Windows at the present time," testified: "What's important is the whole concept of compatibility. And by compatibility, any of the applications

that were written up to 17 years ago can still run on the customer's PC. So, the customer can have confidence that the data that they have on their personal computers they can run on any of our competitor's computers and they could run it on any version, and they could go backwards or they could go forwards." Rose, 2/17/99pm, at 19:21 - 20:11.

iv. Other Microsoft witnesses testified to the importance of "backward compatibility" in allowing successive Microsoft operating systems to succeed. See infra Part II.D.2.a.; ¶ 42.6.2.

v. Microsoft admits that ISVs avoided writing native OS/2 applications because "ISVs found that it made more sense to target the 16-bit Windows APIs because an application written for those APIs would run on both Windows 3.1 and OS/2. (Allchin Dir. ¶¶ 299, 305; Soyring, 11/17/98pm, at 80.)" MPF ¶ 205. In effect, Microsoft is saying ISVs will target the APIs that give them the broadest target market (Windows'), even if that means not writing to other APIs that might offer some advantages. See supra ¶¶ 26.1.2, 26.2.

42.5.5. Microsoft's inaccurate assertion that "the commercial success of Microsoft's operating systems is not attributable to a pre-existing stock or guaranteed supply of applications for new Microsoft operating systems, (MPF ¶ 196, citing Maritz ¶¶ 136-52), contradicts its acknowledgement of the importance of backward compatibility.

i. Microsoft claims that Windows 3.0 succeeded even though at the time of its release more applications existed for OS/2 (MPF ¶ 196) -- but elsewhere acknowledges that Windows "beat" OS/2 because only Windows was fully backwardly compatible with applications written for MS-DOS. See supra ¶ 42.5.4; MPF ¶ 201.

ii. Similarly, Microsoft claims Windows 95 succeeded even though at the time of its release there were few applications written to its new 32-bit APIs (MPF ¶ 196) -- but elsewhere acknowledges that Windows 95 succeeded because users could run their old Windows 3.x applications. See supra ¶ 42.5.4; MPF ¶ 123.

42.6. That Microsoft, like other operating system vendors, must continue to attract ISV attention and improve its product (Schmalensee Dir. ¶ 160; Maritz, 1/28/99pm, at 6:13 - 7:9) is entirely consistent with a high applications barrier to entry and with market power.

42.6.1. Because of its large installed base, the costs to Microsoft to attract sufficient ISVs to make its operating system broadly attractive to users are far less than the costs to its rivals.

i. See supra Part II.B.3.b., ¶¶ 25-27.

42.6.2. Because of its ability to ensure "backward compatibility," Microsoft can migrate its installed base between its operating system releases, thus perpetuating its advantage and, hence, the applications barrier to entry.

i. Rational's Mike Devlin testified that, "because Microsoft strives to make its operating system product 'backwardly compatible,' we (and our customers) know that a program we write using the APIs for one Microsoft operating system will likely run on its successor." Devlin Dir. ¶ 15.

ii. Microsoft executive Ben Slivka wrote: "Regardless of all the cool, sexy features in OS/2 (multi-tasking, better graphics API, memory protection), it was not a no brainer upgrade from MS-DOS -- customers had to **give something up** in order to switch to OS/2: their existing software! Only with Windows 95 (where we have focused on compatibility to an amazing extent) are we finally going to enable to move customers away from MS-DOS." GX 21, at MS98 0102396, (emphasis in original).

42.6.2.1. Microsoft's efforts to attract ISVs are consistent with monopoly power because monopoly power does not mean unlimited power, because even a monopolist has an incentive to increase demand for its product, and because attracting ISVs reinforces the applications

barrier to entry.

i. See infra II.D.4.; ¶ 50.

42.7. Microsoft's argument that Professor Fisher and Dr. Warren-Boulton lacked adequate factual support for their conclusion that Microsoft's monopoly is protected by the applications barrier to entry (MPF ¶¶ 172-76, 185, 187) is wrong in other reasons as well.

i. Professor Fisher and Dr. Warren-Boulton relied on Microsoft documents, the testimony of Microsoft executives, and testimony by ISVs -- including Microsoft's own witness, Mr. Devlin of Rational Software -- about how ISVs choose the operating systems to which they write. Fisher Dir. ¶¶ 65 - 77**;** Warren-Boulton Dir. ¶¶ 46 - 59**;** Fisher, 6/1/99am, at 58:19 - 60:3 **("I have read the transcript of the trial since I was here last, and I kept coming across pieces from the Microsoft witnesses which I marked up and said basically, 'Hey, you know, they may not be thinking in terms of returns to scale and network externalties, but what they are describing is exactly what [the applications barrier to entry] ought to look like to the people in the trenches, so to speak.' . . . Mr. Devlin of Rational Software gave a very clear description of what this looks like. He says things like 'I wouldn't want to write for Unix . . . Unix is -- what's the word I want -- fractured or some such thing.' And he describes wanting to write for Windows because Windows can promise him all the customers. That's what it looks like to the software developer.");** Devlin, 2/4/99am, at 37:17 - 38:14**; see also generally supra** ¶¶ 26**,** 27**.**

ii. Dean Schmalensee, by contrast, based his erroneous conclusions that there is no applications barrier to entry on press releases and newspaper articles touting the existence of niche operating systems (Schmalensee Dir. ¶¶ 96 - 113**). He ultimately conceded virtually all of the key facts that underlie the applications barrier to entry. See supra Part II.D.2.a;** ¶ 42.1**.**

b. Dean Schmalensee's contention that entry into the microcomputer software industry is easy is a red herring

43. Dean Schmalensee argues that "there are no barriers in the microcomputer software industry that prevent" new entry (Schmalensee Dir. ¶ 37). But whether entry into the microcomputer software industry as a whole is easy is beside the point because the relevant question is not whether entry into the "industry" is easy or even whether producing a PC operating system is easy, but rather whether producing an operating system with sufficient applications to challenge Windows is easy.

i. Professor Fisher testified: "This case . . . centers on monopoly power in the market for PC operating systems. The question of entry into the microcomputer software industry in general is not relevant." Fisher, 6/1/99am, at 9:3-17; Fisher 6/1/99am, at 23:6-20.

ii. As Professor Fisher further explained, there is no evidence that the microcomputer industry in general does or could constrain Microsoft's ability to exercise substantial market power over PC operating systems. "To take a simple but illuminating example, Nintendo produces games. Games are in the microcomputer software industry," but they are "not a constraint on Microsoft's power in . . . pricing its Windows operating system." Fisher, 6/1/99am, at 10:3-7.

iii. Nor is the fact that others in the microcomputer industry could hire programmers and produce a PC operating system relevant. Those firms are "not going to be able to produce an operating system with those programmers, or with other programmers, which can overcome the economies of scale and the network externalities that are required." Those firms are "not going to be able to produce an operating system which attracts a very large number of applications writers, enough to overcome Microsoft's very commanding lead." Fisher, 6/1/99am, at 10:23 - 11:6.

44. The factors that, according to Dean Schmalensee (Schmalensee Dir. ¶ 95), make entry into the "microcomputer software industry" easy are not enough to overcome the applications barrier to entry into personal computer operating systems.

44.1. That the microcomputer software industry has abundant skilled programmers and a ready supply of capital cannot, as Microsoft implies (Schmalensee Dir. ¶¶ 39-44), overcome the economies of scale that create the applications barrier to entry.

i. As explained, the evidence shows that, despite the ready availability of programmers and capital, the economic incentives to write for niche operating systems are insufficient to warrant sinking the huge costs necessary to create an operating system and set of applications capable of substituting for Windows for a large number of users. See supra Part II.B.3.b; ¶¶ 25-31.

ii. Professor Fisher testified that "if there were no other barrier to entry into operating systems . . . acquiring programmers and financing and so forth wouldn't be a problem" but there nonetheless "is a very substantial barrier to entry. I suppose it would be harder to get in if it weren't easy to get programmers, but getting good programmers is not near enough to get into the P.C. operating system business." Fisher, 6/1/99am, at 23:21 - 24:4.

iii. Dr. Warren-Boulton testified that although there appears to be no capital entry barrier (Warren-Boulton, 11/19/98pm, at 65:25 - 66:6), the applications barrier to entry presents a huge entry barrier. Warren-Boulton Dir. ¶ 59.

44.2. Microsoft's argument that rivals can overcome the applications barrier to entry by mimicing the Windows user interface and cloning the Windows APIs **(MPF ¶ 204)** is inconsistent with the evidence. To the contrary, cloning the Windows APIs is infeasible because the number of APIs is very large and constantly changing.

i. John Soyring of IBM testified: "Not only is it difficult to reliably duplicate the function of each API, another company can not realistically duplicate the function of all of the APIs since Microsoft continues to introduce new APIs. Applications will not work correctly if they use APIs whose functions have not been duplicated. Therefore, there will always be a risk that some application important to a user now -- or in the future -- will fail. This uncertainty places a heavy drag on any chance for long-term success. Given the expense, time and uncertainty involved, I do not think supporting Windows applications on another operating system for desktop or mobile PCs offers any reasonable opportunity for a positive financial return, and I would not recommend that IBM attempt to provide additional support for Windows applications in OS/2." Soyring Dir. ¶ 13. Soyring further testified that, because IBM "lacked the technical capability or the legal rights" to Microsoft's Windows 95 source code, it could not ensure that Windows applications would run on OS/2. Soyring, 11/17/98pm, at 76:4-20. **See also Soyring, 11/17/98pm, at 90:24 - 91:9.**

ii. Bryan Sparks of Caldera, a Linux vendor, testified that "writing a Windows compatible operating system that's capable of running Windows applications without Microsoft's supplied operating system is very difficult. We tried that for sometime in a sister company when I was at Novell, and we just determined that the breadth of API's is astonishing" and that Microsoft "adds API's at what we perceive as an incredible rate, and keeping up with that API and developing a compatible product is very, very difficult. And even if you created that, you'd have a hard time branding it as an acceptable platform because of the breadth of the API." Sparks Dep. (played 12/1/98am), at 52:15 - 53:25.

iii. Microsoft's Joachim Kempin noted in December 1997 that cloning the Windows APIs "would be a lot of work and potentially" pose "patent problems for someone attacking us." GX 61. Bill Gates understood that the more difficult a technology is to clone, the more control over it Microsoft would have; in discussing Microsoft's strategy for its HTML rendering engine (code named "Trident"), Gates wrote: "I think we want to make Trident extremely hard to clone. I think we want to patent elements of Trident. I think we want to make extensions to Trident on an ongoing basis." GX 351.

iv. Dr. Warren-Boulton testified: "Certainly, at this point, cloning . . . in the sense of developing an operating system which would provide the complete set of API's that is in Windows 98, is physically almost impossible and, as a practical business matter, is not reasonable." Warren-Boulton, 11/19/98pm, at 29:13-21.

44.3. Microsoft argues that "emulation software" like WINE and WABI can allow other operating systems to overcome the applications barrier to entry (MPF ¶¶ 130, 159), but in fact Windows emulators face the same inadequacies and problems as Windows clones.

i. Sun's Brian Croll testified that WABI, which runs on Sun's Solaris operating system, like other emulation products, "very rarely works adequately" and does not allow Solaris to serve as a competitive applications platform for desktop users. Croll Dep. (7/14/98), at 166:16 - 167:17 (DX 2563).

c. Dean Schmalensee is wrong in arguing that the existence of potential threats to Windows shows that barriers to entry are low

45. Dean Schmalensee argued that the threat to the applications barrier to entry posed by Internet browsers and Java is inconsistent with the conclusion that entry barriers are high (Schmalensee, 6/22/99pm, at 71:6 - 74:17). This testimony is misconceived.

i. As Professor Fisher testified, the fact that barriers to entry might someday be eroded, whether by Internet browsers, Java, or other threats, known or unknown, does not affect whether Microsoft has monopoly power today. Fisher, 6/1/99am, at 14:9- 15:6; 6/1/99am, at 25:25 - 26:18.

ii. Dean Schmalensee's position, as Professor Fisher testified, proves too much. It implies that "any monopolist who took action to preserve its monopoly and saw a threat worth taking action would be able to argue successfully that the fact it took the actions means that it can't have monopoly power." Fisher, 6/1/99am, at 13:12-20.

iii. Microsoft has taken steps to ensure that these threats cannot overcome the applications barrier to entry, and its conduct has reinforced the already substantial entry barriers. Fisher, 6/1/99am, at 12:9-17; Fisher, 6/1/99am, at 60:4 - 62:2; Fisher, 6/1/99am, at 66:9-25.

46. The possibility that other information applications might eventually wrest some business away from personal computers similarly does not show, as Microsoft argues (Maritz ¶¶ 104, 275-77), that entry barriers are low.

46.1. First, other devices, as explained, do not constrain Microsoft's ability to exercise power over PC operating systems and thus do not affect whether Microsoft has monopoly power.

i. See supra Part II.B.1; ¶ 19.

46.2. Second, even if other devices were to become better substitutes for some PC uses and gain wider use, that would affect only the value or size of Microsoft's monopoly power, not its

existence. In any event, the evidence shows that demand for PCs, and thus the value of Microsoft's monopoly, will if anything increase.

i. See supra Part II.B.1; ¶ 19.

ii. Steve Ballmer recently stated that the "PC will remain a very important central device to the way computing happens, in our view, over the course of the next ten years." GX 2301, at 4. He further commented that he could "accept the notion of new devices. I just don't accept the idea that the PC goes away. And so while other things, other environments may grow up faster, the PC stays important." Id. at 5.

iii. Bill Gates wrote in May 31, 1999, opinion piece for Newsweek that, "despite pundits who had predicted the end of personal computers, sales continue to rise." He concluded: "For most people at home and at work, the PC will remain the primary computing tool." GX 2059.

iv. The very report Microsoft introduced in support of its contention that information appliance shipments will soon overtake PC shipments in fact shows the opposite. It states: "When viewed in its all-encompassing scale, with all form factors and all customer segments, PC's far out-ship information appliances on a unit basis . . . and dwarf the market on a value basis." DX 2423, at page 6. As Professor Fisher testified, the report shows "that the PC isn't going away" but, to the contrary, will "remain extremely important" and that Microsoft's "[m]onopoly over PC operating systems will, therefore, continue to be important." Fisher, 6/3/99pm, at 69:14-18; see also GX 2082 (IDC chart showing that number of PC units shipped is expected to continue to grow significantly until at least 2002, and that despite slightly faster growth in shipments of information appliances, in 2002 there will still be several tens of millions more PC units shipped); GX 2083 (IDC chart showing that the expected value of PC units shipped will remain vastly larger than the expected value of shipments of other information appliances until at least 2002).

v. Steve Case testified, "'It's hard[] to imagine that PCs won't be the dominant way people connect with the internet for many years to come and Microsoft has a pretty amazing lock on that business . . . . Other devices will emerge, but I doubt any will challenge Windows.'" Fisher, 6/4/99am, at 44:17 - 45:4 (quoting Case Dep. (quoting Ct. Ex. 1) (citation omitted)). Case further testified that AOL "'[h]as no intention of battling Microsoft's core business'" and "'no flight of fancy that [AOL] can dent in any way, shape or form what is

a Microsoft monopoly in the operating system business.'" Fisher, 6/4/99am, at 43:19 - 44:16 (quoting Case Dep. (quoting Ct. Ex. 1)).

46.3. Third, other devices could threaten Microsoft's monopoly only if PCs were effectively eliminated as an important computing device. The evidence shows precisely the opposite: that demand for PCs will remain robust for the foreseeable future.

i. Professor Fisher testified: "So long as PCs remain an important computing device, and a device which has the property that you need them to do certain applications," that "[o]ne cannot imagine" that "a small change in the price of the Windows operating system is going to cause a lot of people to abandon PCs and go to these other devices." Fisher, 6/3/99pm, at 82:4-19, 65:23 - 66:6. Professor Fisher rejected the proposition "that the possible innovations in various other devices" will "reduce the problem of Microsoft's monopoly." Fisher, 6/1/99am, at 28:12-15.

ii. Professor Fisher further testified: "Microsoft has monopoly power over operating systems for PCs. The question of the influence of other devices, in this case information appliance devices, would only become relevant to Microsoft's monopoly power over PC operating systems if it did one of two things, and I don't think either one is going to happen. One is that information appliance unit shipments would become so big and so widespread that people would drive . . . PCs out." "This chart" DX 2423 "shows PC shipments growing and continuing to grow, and it matches the obviously sensible proposition that PCs are going to continue to be important and indeed very important." Fisher, 6/3/99pm, at 65:9-22.

iii. Further evidence that PCs will continue in importance is the fact that non-PC devices cannot be used to accomplish tasks for which PCs are necessary. For instance, Microsoft pointed to gaming console as a source of possible competition to PCs (Fisher, 6/2/99pm, at 72:21 - 76:19); but the very exhibit Microsoft introduced states that "'the new Sony machine will not process text or calculate a budget.'" Fisher, 6/3/99pm, at 72:15-17 (quoting DX 2553). It further reports: "Sony executives went to some pains today to assert that their new machine was not a competitor to Wintel, the combination of Microsoft corporation's Windows operating system and Intel's pentium microprocessors that dominates the personal computer industry." DX 2553.

iv. Dean Schmalensee does not have a basis to opine that Microsoft's monopoly

will be extinguished by the existence of other devices. When asked whether he had reached a judgment about "the extent to which" the "personal computer operating system will continue to be an important business going forward into the future," he responded that he was being tempted "to prophesy again," and that "from everything" he had "seen, at least for some number of years -- and it would be hard to say how many -- . . . a lot of work will be done on the desktop using desktop equipment. How much, how fast, how the trends will go, I don't know, but it seems apparent to me that for some time to come," the PC operating system "will be an important business." Schmalensee, 6/23/99pm, at 41:15 - 42:14.

46A. Microsoft's argument that the price it can charge for Windows is constrained by "a range of potential entrants" (MPF ¶ 91) -- including information appliances (MPF ¶¶ 149 - 152), the operating systems used in information appliances (MPF ¶¶ 148, 153), network computers (MPF ¶ 148, 154), and "emerging and as yet unknown challengers." (MPF ¶ 156) -- is not supported by the evidence.

46A.1. For such speculative potential entrants to affect the current price of Windows, Microsoft would have to be practicing "limit pricing," which is inconsistent with the evidence. See supra Part II.D.3.; ¶ 49.

46A.1.1. There is no evidence that information appliances constrain the price Microsoft charges for Windows.

46A.1.2. Because such appliances -- such as television set-top boxes, hand-held computers, wireless telephones and game consoles -- perform only limited functions, an increase in the price of Windows would be unlikely to cause substantial numbers of users to stop buying Windows machines and switch to information appliances.

i. The Microsoft-introduced IDC report on information appliances notes that they are complements for PCs, not substitutes. DX

2423 at 35.

ii. See supra ¶¶ 46; 19.3.3.3; infra Part VII.D.C.3; ¶ 396.2.

46A.1.3. Although Microsoft argues that information appliances reflect the tendency in the computer industry for smaller devices to displace larger ones. (MPF ¶ 151), it cites no evidence, and relies only on conjecture, for the suggestion that set-top boxes and similar devices might at some unspecified time in the future displace PCs for a significant number of users and begin to undermine Microsoft's operating system monopoly.

46A.2. Operating systems for information appliances do not constrain the price Microsoft charges for Windows.

i. Dean Schmalensee admitted that Palm, the operating system in the most widely-used information appliance, represented merely "the germ of a potential competitor." He further testified that Palm is "a potential paradigm shift that has been written about a lot. Do I think the Court should make a prediction that that's going to happen? No. It is a symptom of the way the industry operates, however." Schmalensee, 1/13/99pm, at 66:2-17. Microsoft cites no evidence that such operating systems will soon if ever threaten to displace Windows for any significant number of users.

46A.3. Network computers do not constrain the price Microsoft charges for Windows.

i. Microsoft presents no evidence that network computers will develop soon, if ever, into hardware that threatens to displace Intel-compatible PCs for any significant number of users. To the contrary, the IDC study on which Microsoft relies forecasts "a steady and growing market for the PC" until at least 2003. Fisher, 6/2/99am, at 78:23 - 83:23; DX 2423, at 35.

ii. Even if network computers reduce demand for Intel-compatible PCs, network they will not reduce Microsoft's operating system monopoly

power over those users who continue to demand Intel-compatible PCs. See generally Part II.D.2.c.; ¶ 46.

46A.4. There is no evidence that "emerging and as yet unknown challengers" constrain the price Microsoft charges for Windows (MPF ¶ 156).

47. Dean Schmalensee's speculation that operating-system neutral, web-based applications developed on the Internet could some day erode the applications barrier to entry (Schmalensee, 6/23/99am, at 36:15 - 41:22; **MPF ¶¶ 190-193**) also does not mean that Microsoft lacks monopoly power.

47.1. First, the possible development of a range of web-based applications even roughly comparable to the set of applications available for Windows is entirely speculative.

i. Bill Gates wrote, with regard to AOL's acquisition of Netscape, "Platform threat - AOL doesn't have it in their genes to attack us in the platform space." GX 2241, at MS98 0231890 (sealed; cited portion published).

ii. Dean Schmalensee conceded that he performed no study or analysis to determine how many web-based applications exist or how much investment in that area has been made. Schmalensee, 6/23/99am, at 49:16 - 50:23; Schmalensee, 6/23/99pm, at 37:15 - 38:10.

iii. Dean Schmalensee conceded that he performed no study of the number of web-based applications that require Windows. Schmalensee, 6/23/99am, at 54:21 - 55:9.

iv. Dean Schmalensee, when asked if "there will come a time in the future when people will spend as much effort developing web-based applications as they do developing applications for Windows" responded: "I'm not a prophet . . . . I cannot, as I sit here, represent that I know what will happen in this regard in the future." Schmalensee, 6/23/99pm, at 38:18 - 39:2; Schmalensee, 6/23/99pm, at 39:13 - 40:1 ("one extrapolates current trends with some hazard in this business, and as I say, I'm not a prophet").

v. Dean Schmalensee conceded that he did not, and could not, determine the

number of web-based applications would exist in the next couple of years. Schmalensee, 6/23/99am, at 50:24 - 51:7. **Dean Schmalensee was unable even to approximate the number of Web-based applications that exist, the range of such applications, or the number and range of such applications that are likely to exist within two years.** Schmalensee, 6/23/99am, at 48:9 - 51:7**.**

vi. Professor Fisher testified that he conducted no study of the number of web-based applications because "however interesting those applications are they are nowhere near enough to overcome the . . . applications barrier to entry into operating systems for PCs." Fisher, 6/3/99pm, at 81:6-15.

vii. Microsoft's broad assertion that users today "can access interactive Web pages that provide virtually all of the functionality most users obtain through applications running on Windows." Maritz, 1/28/99pm, at 21-22**;** 1/28/99pm, at 19-23**.)" MPF ¶ 147; see also ¶ 189, lacks evidentiary support. The cited testimony describes certain existing Web-based applications (including some office productivity suites) but does not support the Microsoft's assertions about the range and features of Web-based applications or the speed, stability, and security of such applications.**

viii. Microsoft cites a statement by Louis Gerstner, CEO of IBM, that the "PC era is over" (MPF ¶ 191, citing DX 2420 at 6) but ignores the May 1999 statement by its own Chairman, Bill Gates, that "the PC will not die . . . For most people at home and at work, the PC will remain the primary computing tool." GX 2059**.**

47.2. Second, because web-based applications require a browser, Microsoft could vitiate this potential threat by gaining a substantial share of browsers and then using proprietary extensions.

i. See infra Part VII.D.

ii. Dean Schmalensee acknowledged that Web-based applications must be accessed through a browser. Schmalensee, 6/23/99am, at 51:12-53:1**.**

48. Dean Schmalensee is also wrong in arguing that the possibility of entry should be assessed

"over a long period of time," beyond the next several years (Schmalensee Dir. ¶ 184).

i. As Professor Fisher testified, this argument confuses the question of the period over which Microsoft could recoup predatory investments designed to preserve its monopoly power with whether that power exists. For example, under Dean Schmalensee's reasoning, one could not determine whether AT&T was a monopolist in 1980 without considering "the telephone industry well into the next millennium because it is possible that if it succeeded in driving out MCI, it would still recoup money 30 years later." Fisher, 6/1/99am, at 18:12 - 20:10-15.

3. Dean Schmalensee's contention that "long term threats" prevent Microsoft from exercising monopoly power today is flawed

49. Dean Schmalensee bases his argument that barriers to entry are low, and thus that Microsoft lacks monopoly power, principally on his contention that Microsoft's pricing of Windows is severely constrained by largely unknown long-term threats to its position. Dean Schmalensee reasons that, if Microsoft were a monopolist, it would be charging more than $1,800 for Windows, instead of the approximately $70 it in fact charges, and infers from this that Microsoft is engaging in massive limit pricing designed to exclude threats that have not yet arisen (Schmalensee, 1/21/99am, at 11:17-18, 13:11-19, 23:25 - 24:5). The evidence, however, is at odds with Dean Schmalensee's argument.

49.1. First, limit pricing -- lowering price and thus sacrificing revenues today in order to deter entry tomorrow -- is irrational if potential rivals know that the firm can lower price later, if and when competition emerges. In that event, rivals will be deterred by the prospect of price reductions in response to competition, and there would be no reason for the monopolist to sacrifice revenues by cutting prices today. Dean Schmalensee's limit-pricing analysis thus must assume that Microsoft cannot credibly threaten to lower price in the future. Microsoft, however, plainly has the power to lower prices in the future, if and when competition emerges.

i. Professor Fisher and Dr. Warren-Boulton both testified that it is not plausible that Microsoft keeps the price of Windows significantly lower than Microsoft otherwise would in order to deter entry because Microsoft can lower its price should such entry occur. Potential entrants evaluate the profits they would earn after entry, and they recognize that Microsoft's price now is not a guide to what Microsoft would charge -- and what profits are therefore available to the entrant -- if entry actually occurred. Fisher, 6/2/99am, at 6:2 - 7:14; Warren-Boulton, 12/1/98am, at 43:14 - 45:5.

ii. Microsoft can credibly lower price tomorrow in response to entry because, as Dean Schmalensee himself testified, the marginal cost to Microsoft of producing and selling additional copies of Windows through an OEM is "zero." Schmalensee, 1/20/99pm, at 68:5-20; Warren-Boulton, 11/19/98am, at 58:25 - 59:3; Schmalensee Dir. ¶ 85.

iii. Dean Schmalensee asserted that the greatest threats to Windows' dominance are not other PC operating systems, but rather "paradigm shifts." Schmalensee, 1/13/99pm, at 65:7-24. But there is no reason to think that the possibility of "paradigm shifts" is affected by the prices Microsoft charges today. Fisher, 1/11/99pm, at 47:19 - 48:17.

49.2. Second, Dean Schmalensee's hypothesis that Microsoft is engaging in massive limit pricing is also inconsistent with how Microsoft views the constraints on its pricing of Windows.

i. Kempin testified that he did not consider competing operating systems or "'competition more generally'" in setting the Windows 98 royalty. See supra Part II.A.; ¶ 15.1.5.

ii. Kempin's memorandum on Microsoft's pricing of Windows 98, sent to Bill Gates, does not identify long-term threats as a constraint on Microsoft's pricing of Windows. Long-term threats are described instead as possibilities that could "derail" Microsoft's strategy. GX 365.

iii. Based on this evidence, Professor Fisher testified that long-term entry is not a significant consideration in Microsoft's choice of a price for Windows. Fisher, 1/13/99am, at 23:5-14 (it is doubtful "long-term entry . . . is . . . at the forefront of the Microsoft corporate mind").

49.3. Third, the analysis Dean Schmalensee advanced says nothing about whether

Microsoft possesses monopoly power. To the contrary, Dean Schmalensee's analysis

(Schmalensee, 6/23/99am, at

6:3 - 9:17) shows, at most, that Microsoft is not seeking to maximize its short-term profits exclusively

through operating system royalties.

i. Professor Fisher testified that Dean Schmalensee's analysis at most could show only that Microsoft is not taking out its monopoly power in the short-run price of Windows. Fisher, 1/12/99pm, 16:12 - 17:17. But it "wouldn't tell you anything about the power itself. It wouldn't tell you whether Microsoft had power. It would tell you whether it was exercising power in a particular way." Fisher, 6/1/99pm, at 9:3-12; Fisher, 1/11/99pm, at 48:13 - 50:19 (even if one concluded that Microsoft had priced to deter future entry, that would not necessarily mean that Microsoft lacks monopoly power today).

49.3.1. An analysis that focuses entirely on short-run prices is inappropriate

because it ignores the fact that Microsoft may charge what seems like a "low" short-term price in order

to maximize its profits in the future for reasons unrelated to deterring entry.

49.3.1.1. By keeping price low today and "growing" the market,

Microsoft earns greater complementary revenues in the future.

i. Paul Maritz testified: "Microsoft broadly licenses operating system products to computer manufacturers at attractive prices (typically less than 5% of the price of a new computer). Such broad licensing promotes the adoption and use of Microsoft's operating system products, which in turn promotes the development of a wide range of useful complementary hardware and software products that are compatible with Windows and thus with other Windows-related products." Maritz Dir. ¶ 132.

ii. Professor Fisher testified that a monopolist like Microsoft has a greater incentive than a nonmonopolist would to set a low price with the purpose of furthering the general popularity of computing because only the monopolist reaps the full future

reward of the greater popularity. Fisher, 1/12/99pm, 66:4 - 67:9, referencing colloquy at Fisher, 1/12/99am, 24:13 - 25:21.

iii. Professor Fisher further testified that, because Windows users often buy upgrades and other complementary products from Microsoft in years after their initial Windows purchase and because the number of copies of Windows sold has grown every year, Microsoft earns greater complementary revenues per copy of Windows than can be captured in Dean Schmalensee's equation. Fisher, 6/4/99am, at 13:23 - 15:3. Dean Schmalensee improperly compared current Windows revenues to current revenues from complementary products. Fisher, 6/4/99am, at 13:23 - 15:3.

iv. In fact, Dean Schmalensee did not investigate the complementary revenues Microsoft receives from the sale of Windows. Rather, he accepted his staff's representation that Microsoft "record[s] operating system sales by hand on sheets of paper" and, for that reason, lacked "a sophisticated internal accounting system" from which he could estimate anticipated complementary revenues. Schmalensee, 1/20/99pm, at 46:3 - 49:8.

49.3.1.2. Dean Schmalensee ultimately conceded that Microsoft may be pricing low today to obtain long-term benefits that depend on network effects.

i. Dean Schmalensee testified that Microsoft "keeps price low so that a lot of people use Windows, and I can attract applications vendors for both reasons, both because a lot of people use it and because there are more applications for it." Schmalensee, 6/22/99pm, at 39:13-18.

ii. In this regard, Dean Schmalensee's testimony is consistent with Professor Fisher's testimony that Microsoft has "an overriding interest in preserving the applications barrier to entry and taking advantage of the network effects. When it sells Windows, the more Windows it sells, the more the network effects are. That, by the way, is a reason for keeping the price of Windows lower than would otherwise be the case, and there are other reasons as well." Fisher, 1/12/99am, at 21:8-14.

49.3.1.3. Dean Schmalensee's focus on short-term price also overlooks the fact that Microsoft takes a portion of its monopoly returns, not in cash payments, but rather in the form of costly restrictions upon its customers and commitments by them to behave in ways that augment and maintain Microsoft's monopoly power.

i. Professor Fisher testified that Microsoft "takes some of its profits in the form of protection of its monopoly." Fisher, 1/12/99am, at 19:20-21. Professor Fisher further testified that there are examples in other industries of sellers with monopoly power choosing to exercise that power by means other than charging as high a price as possible for the monopolized product; in the late 1970s, for example, the two airlines that owned computer reservations systems found it more profitable -- before the Civil Aeronautics Board intervened -- to raise rival airlines' costs by biasing the systems' flight displays than to raise the price to those airlines of participating in the systems. Fisher, 1/12/99am, at.14:11 - 17:3.

ii. GX 1498, at GW 019843 (sealed).

iii. Garry Norris of IBM testified that some of Microsoft's MDA milestones require IBM to take acts that exclude Microsoft's potential rivals. Indeed, Norris testified, referring to the language in his contemporaneous notes of their March 6, 1997 meeting, that Microsoft's Bengt Akerlind told IBM "no Netscape and receive more MDA dollars across the P.C. company" and threatened IBM with "MDA repercussions" unless IBM agreed to promote IE exclusively. Akerlind told Norris that Microsoft might impose these repercussions, i.e., raise the price of Windows to IBM, either by modifying MDA milestones themselves or by exercising its discretion to decide whether IBM had met its MDA milestones. GX 2164; Norris, 6/8/99am, at 29:19 - 30:23; Norris, 6/8/99am, at 31:24 -

32:12.

iv.

GX 1436 (sealed).

Fisher 1/12/99pm, 41:19 - 43:20 (sealed session).

v. Microsoft offered IBM substantial MDA discounts to reduce support for OS/2; had IBM accepted the provisions offered by Microsoft, Microsoft's annual Windows revenues from IBM would have dropped by $40 to $48 million, given IBM's volume of Windows shipments at that time. Norris, 6/7/99am, at 22:16-18. Norris testified that Microsoft offered to reduce the price IBM paid for Windows 95 if IBM, in Microsoft's words, agreed to "adopt Windows 95 as the standard operating system for IBM" and to make it "the only OS mentioned" in advertisements and marketing materials. Norris 6/7/99am, at 20:1 - 23:5 (quoting GX 2132). IBM did not agree to these provisions and others because they would have had the effect in the marketplace of effectively putting its own OS/2 operating system product "to the grave." Norris 6/9/99am, at 10:18-24.

vi. Kempin recognized that one tactic Microsoft could use to effectively decrease the cost to Windows would be to "Reduce some of the more rigid licensing requirements, which increase costs to the OEMs." GX 365.

49.3.2. Dean Schmalensee's analysis is also flawed because it leads to absurd results.

i. Professor Fisher demonstrated that, at the price that would maximize Microsoft's short-run profits, given Dean Schmalensee's undisputed assumption that Microsoft's short-run marginal cost of Windows equals zero, the elasticity of demand for Windows must equal one. Ct. Ex. 2-A; Ct. Ex. 2-B; Fisher, 1/12/99pm, at 13:16-16:19.

ii. If Microsoft believes that it is operating at a point on the demand curve at which the elasticity of demand for Windows equals one, Microsoft must believe that a 10% increase in the price of Windows -- about $5 -- would lead to about a 10% decrease in the number of copies of Windows it sells. As Professor Fisher testified: "If you look at the testimony of the OEMs and you just think about it, that can't possibly be right. You can't believe that. It would believe it would lose 10% if it raised the price only $5, and the OEMs have no other place to go." Fisher, 1/12/99pm, at 16:16 - 17:8 (testifying about Microsoft's pricing).

iii. Dean Schmalensee's analysis led him initially to the conclusion that the monopoly price for Windows itself is $ (Schmalensee Dir. App. B. ¶6) (sealed), which is more than average price Microsoft actually charges to OEMs (Schmalensee Dir. App. B. fn.11.) (sealed). In his public testimony, Dean Schmalensee rounded this figure for the monopoly price of Windows to "about $2,000" per copy. DX 2284; Schmalensee, 1/21/99am, at 9:1 - 16:3. Acknowledging in his rebuttal testimony that it was appropriate to use a lower average price for PCs and a higher figure for Microsoft's complementary revenues, Dean Schmalensee concluded the monopoly price for Windows was $1,480 -- still nearly 30 times the $50 average price for Windows that he used in January's public session. Schmalensee, 6/23/99am, at 20:7-13; DX 2284. Microsoft never mentions Dean Schmalensee's outlandishly high calculations for the monopoly price of Windows in its proposed findings and instead only states that Dean Schmalensee's calculation is "many times" the actual price of Windows. MPF ¶ 232.

iv. Describing Dean Schmalensee's testimony, Microsoft asserts that "a monopolist has <u>long term power over price</u> and can charge what would otherwise be a short-run profit-maximizing price indefinitely. (June 23, 1999 A.M. Tr. at 9 (Schmalensee).)" MPF ¶ 225 (emphasis in original). This argument both contradicts Dean Schmalensee's testimony that Microsoft may price low to obtain long-term benefits that depend on network effects (<u>see</u> <u>supra</u> ¶ 49.3.1.2) and ignores the fundamental economic principle that, because consumers have greater substitution possibilities in the long run than in the short run, the

short-run profit-maximizing price exceeds the long-run profit-maximizing price.

49.4. Fourth, even taken on its own terms, Dean Schmalensee's calculation of a "short term" monopoly price for Windows of more than $1,800 is wrong.

49.4.1. Dean Schmalensee's calculation depends on his assumptions about three variables, all measured in the same year: (i) the average hardware price of a PC less the price of Windows; (ii) the elasticity of demand for PCs, and (iii) the average revenues Microsoft earns from sales of other complementary products (GX 1960). In each instance, Dean Schmalensee made arbitrary or flawed assumptions.

49.4.1.1. Average price of a PC. Dean Schmalensee used $2,000 as the average price of a PC, even though that average was calculated by including higher-priced computers, such as workstations, and does not reflect the fact that, in setting its prices, Microsoft takes into account the downward trend in PC prices.

i. Dean Schmalensee acknowledged that his $2,000 figure includes significantly more expensive servers and that "presumably" the right number to use would be one that includes only desktop PCs. Schmalensee, 6/24/99pm, at 71:23 - 73:9.

ii. Professor Fisher testified that the $2000 figure Dean Schmalensee used in January for the average price of a PC (including Windows) significantly overstates today's true average price, whether or not that price properly includes monitors. Fisher, 6/4/99am, at 6:5-21; DX 2492 (citing $953 price).

iii. The average price of PCs has clearly fallen in recent years and

continues to fall. Fisher, 6/4/99am, 11:10 - 12:3. In February 1999, PC Data reported, sub-$600 PCs (not including monitor) were the fastest-growing retail segment and constituted 19.9% of all retail sales. DX 2493. Even the IDC study cited by Dean Schmalensee as the source for his estimate of average PC price shows PC prices falling historically and for the forseeable future. GX 2300; see also DX 2498, at 22. Dean Schmalensee acknowledged that it is appropriate to take the decline in hardware prices into account and lowered the average price of a PC in his formula from $2,000 in his January testimony to $1,800 in his June testimony. Schmalensee, 6/23/99am, at 14:11-17.

iv. Contrary to Dean Schmalensee's $2,000 figure, Microsoft executives looked to the future expected price of the PC in setting the Windows royalty, and Joachim Kempin's December 1997 memorandum to Bill Gates discusses how Microsoft's pricing should take into account the growth of the sub-$1,000 PC market segment. GX 365.

49.4.1.2. Elasticity of demand for PCs. Dean Schmalensee assumed that the elasticity of demand for PCs is 2 (Schmalensee, 1/21/99am, at 10:19-20; Schmalensee, 6/24/99pm, at 62:17-19), but the reasons he gave for doing so are arbitrary and unsound.

i. Dean Schmalensee asserted that an elasticity of 2 followed from plaintiffs' assertion that PCs were a market (Schmalensee, 1/21/99am, at 10:5-7; Schmalensee, 1/20/99pm, at 39:1-3; Schmalensee, 1/20/99pm, at 40:22 -23). But neither plaintiffs nor their experts took the position that PCs are a market. Neither Dr. Warren-Boulton nor Professor Fisher testified that there is a market ~~for operating systems~~ for Intel-based PCs, and Professor Fisher made clear that conclusion does not require defining a market for personal computers. Fisher, 6/2/99pm, at 30:2-13; Fisher, 6/3/99pm, at 65:23 - 66:6.

ii. Dean Schmalensee gave inconsistent testimony about his own views on the plausible range of elasticities.

(1) In his October 1998 deposition, he testified that there is

a plausible range one could think of, and that "'numbers below one are pretty implausible. Numbers above five and six are pretty implausible, based on elasticities one encountered, but that's a pretty wide range, economically, and I don't think I know enough to narrow it.'" Schmalensee, 6/24/99pm, at 63:16-20 (quoting Schmalensee's deposition).

(2) In his trial testimony, Dean Schmalensee testified he had done no work since his deposition to estimate the price elasticity for PC systems and had seen no estimates in the literature. Schmalensee, 1/20/99pm, at 39:8-11.

(3) Yet in his rebuttal direct testimony, when asked whether he had previously testified "that a range of up to 6 was plausible," he answered: "No, it isn't. I went back and looked at everything I've said in this proceeding on the subject, and I don't think that's consistent with what I said. . . . I never said 4 was plausible and I don't believe it." Schmalensee, 6/23/99am, at 18:16-24.

(4) Dean Schmalensee sought to reconcile this inconsistent testimony by characterizing his deposition testimony as an "outlier" among his testimony on the topic. He contended that his January testimony was consistent with his current contention that an elasticity of four in this market is "totally implausible." Schmalensee, 6/24/99pm, 64:12-23; id. at 67:23 - 69:6.

iii. Dean Schmalensee arbitrarily assumes an elasticity of demand for PCs of 2 despite having testified at his deposition that the elasticity could plausibly range up to five or six and despite having cited no studies of the PC industry by himself or others to justify his assumption. Schmalensee, 6/24/99pm, at 63:16 - 65:15.

49.4.1.3. Complementary revenues. Dean Schmalensee used an incorrectly low and arbitrarily-derived estimate of Microsoft's complementary revenues from Windows

sales.

i. Dean Schmalensee derived his estimate of complementary revenues by arbitrarily dividing the revenue of Microsoft's applications group (which he regarded as the repository of complementary revenues) by the revenue of Microsoft's platforms group (which he regarded as representing revenue from the sale of Windows), and then doubling that figure to reach what he called a "generous" estimate of approximately $100 in complementary revenues per copy of Windows. Schmalensee Dir. App. B, at B-4 n.11 Schmalensee, 1/21/99am, at 11:23 - 12:1 (characterizing this estimate as "generous"); Schmalensee, 1/21/99am, at 17:25 - 18:25 (explaining methodology).

ii. Correcting for Dean Schmalensee's errors, Professor Fisher estimated Microsoft's true complementary revenues as $160, before any doubling for conservatism -- that is, more than three times Dean Schmalensee's estimate. Fisher, 6/1/99pm, at 15:16 - 17:5. And this is quite apart from Dean Schmalensee's failure to take full account of future complementary revenues because of his formula's limitation to the short-term. See supra II.D.3.; ¶ 49.1.

49.4.2. Despite the conceptual defects in Dean Schmalensee's formula, as Professor Fisher testified, it is nonetheless possible using plausible estimates of each of the variables in the formula to estimate a short-term profit-maximizing price for Windows that is close to the price Microsoft actually charges.

i. Professor Fisher testified that using an elasticity of demand for PCs of four (within the range that Dean Schmalensee testified is "plausible"), a current price per PC of $1,000, and a corrected complementary-revenues estimate of $160, Dean Schmalensee's equation shows that the price for Windows that would maximize Microsoft's profit is $65 -- very close to the actual price of Windows. Fisher, 6/1/99pm, 17:17 - 18:2. Using an elasticity of five -- also within Dean Schmalensee's range -- would produce, according to Dean Schmalensee's analysis, a

profit-maximizing price of $40, which is in fact below the actual price of Windows. Fisher, 6/1/99pm, at 18:3-6; see also Fisher, 6/1/99pm, 11:8-23.

ii. Professor Fisher further testified that performing the same exercise with the significantly higher price per PC that was typical in 1996 or 1997 still produces estimates, according to Dean Schmalensee's analysis, that are within a few hundred dollars of the actual price of Windows in 1996 or 1997. Fisher, 6/2/99am, at 31:13-21.

49.4.2A. In challenging Professor Fisher's use of a demand elasticity for PCs of 4, Microsoft contradicts the testimony of its own economist, misstates Professor Fisher's testimony, and misapplies the concept of demand elasticity.

i. Microsoft disavows Dean Schmalensee's testimony: "Notwithstanding Schmalensee's deposition testimony, use of a demand elasticity of '4' would be inappropriate in this context . . ." MPF ¶ 228.

ii. Microsoft reasons that a demand elasticity of 4 "would mean that a 10% increase in the price of personal computers would lead to a 40% decline in demand for personal computers." MPF ¶ 288 (emphasis in original). But in the cited testimony, Professor Fisher explained that that interpretation is incorrect: "My hesitation is because . . I am about to say something relatively technical. . . . If you took a rough definition of elasticity, that would reduce -- the answer would be that that would reduce P.C. sales by 25 percent. I'm sorry. By 40 percent. . . . That, however, is not correct for price changes as large as 10 percent. Elasticity is a number that has to do with small changes." Fisher, 6/2/99am, at 41:17 - 42:4.

iii. Microsoft further argues that DX 2388, which is a chart by Dean Schmalensee purportedly tracking the average prices of Intel-based PCs from 1987 to 1997, shows a substantial increase in the price of personal computers in the mid 1990s without "anything approaching the decreases in demand of the sort that Fisher's demand elasticity of "4" would suggest." MPF ¶ 228. But

elasticity cannot be evaluated by looking at price and quantity movements over time with no further corrections.

49.5. Fifth, Microsoft's Proposed Findings repeatedly mischaracterize Professor Fisher's testimony regarding Dean Schmalensee's formula.

49.5.1. First, Microsoft inaccurately asserts that "in his initial testimony, Fisher testified that Microsoft engages in 'limit pricing.' (Jan. 11, 1999 P.M Tr. at 48-50 (Fisher).)" MPF ¶ 233.

i. In fact, Professor Fisher testified throughout the trial -- as did Dr. Warren-Boulton -- that he does not believe Microsoft practices limit pricing because such an effort to deter future entry by keeping current price low would not make sense. See supra ¶¶ 49.1, 49.2.

ii. In the testimony Microsoft cites, Professor Fisher answered a series of hypothetical questions, in which counsel asked him whether a finding that Microsoft did engage in limit pricing would necessarily mean that Microsoft does not have monopoly power. ("Q: What if you were to conclude that Microsoft priced its operating system, in part, in order to deter entry sometime in the future? Would that necessarily mean that Microsoft does not have monopoly power today?"). Fisher, 1/11/99pm, at 48:13 - 50:2 (emphasis added). Professor Fisher explained that such a hypothetical finding would not mean that Microsoft lacked monopoly power.

49.5.2. Second, Microsoft incorrectly asserts that plaintiffs "did not dispute the validity of Schmalensee's pricing formula" (MPF ¶ 226), which purported to show that Microsoft charges far below "what it would charge if it were a monopolist." MPF ¶ 221.

i. See, e.g., Fisher, 1/12/99am, at 18:18 - 27:21; Fisher, 1/12/99pm, at 11:20 - 18:17; Fisher, 6/1/99pm, at 6:6 - 10:6; Fisher,

6/4/99am, at 12:7 - 15:11 ("Q: I'd like to return just briefly to whether or not, in your view, Dean Schmalensee's formula, even if you had the right numbers, is something that results in something that is relevant to your economic analysis. Professor Fisher: Well, basically not. As I have now said several times, even without worrying about what else is going on, Dean Schmalensee's result only implies that Microsoft is doing something other than maximizing short-run profits in the price they charge for Windows. And that is true whether or not they have monopoly power.").

ii. Microsoft's assertion that plaintiffs "did not dispute the validity" of Dean Schmalensee's formula (MPF ¶ 226) is contradicted by its own statement, two paragraphs later, that "Fisher . . . attempted to rebut Schmalensee's pricing analysis." MPF ¶¶ 226, 228; see supra ¶ 49.4. 4.

4. Dean Schmalensee is wrong that Microsoft's other behavior is inconsistent with monopoly power

50. Dean Schmalensee argued that Microsoft is not a monopolist because it does not "behave like a firm with monopoly power" (Schmalensee Dir. ¶ 180 (emphasis omitted)), but his analysis is flawed.

50.1. As an initial matter, Schmalensee's approach is flawed because it implicitly but wrongly assumes that monopoly power means unlimited power and ignores the fact that a monopolist has an incentive to increase its monopoly profits by improving product quality.

i. Dr. Warren-Boulton testified that, "to an economist, every monopolist faces competition. Every monopolist faces potential entry. But the reason why he faces competition or potential competition is because profit-maximizing behavior is to raise your prices until you run into that competition. . . . So something is out there, whether it's entry, whether it's just simply demand falls off, or whatever reason, there is a reason why" a monopolist "doesn't increase the price further than he is already increasing it." Warren-Boulton, 11/19/98am, at 38:23 - 39:18.

ii. Dr. Warren-Boulton also testified: "There's nothing about monopoly power that indicates that a profit-maximizing monopolist has some incentive not to listen to its customers." Warren-Boulton, 11/30/98am, at 29:22 - 30:11.

iii. Professor Fisher testified that even a monopolist has incentive to increase demand for its product. Fisher, 1/12/99pm, at 19:1 - 20:15.

50.2. Microsoft's general efforts to innovate are thus consistent with monopoly power, even if absent innovation Microsoft might eventually lose its monopoly power (see Maritz Dir. ¶ 153).

i. Professor Fisher testified that one "can't look at an industry or a market, and . . . from merely the fact that innovation is going on, conclude that there can't be monopoly power." Fisher, 1/12/99pm, at 19-20; 6/3/99am, at 8:11-14.

ii. Dr. Warren-Boulton testified that "a company always has the option, if you like, of simply stopping technical innovation . . . I just don't understand why anyone would want to do that . . . there is nothing I conclude from that as to whether or not" Microsoft "is a monopoly or not. A monopolist also has the same incentive to innovate as a competitive firm." Warren-Boulton, 11/19/98am, at 79:12-25.

iii. Dr. Warren-Boulton further explained: "if Microsoft were to simply . . . shut down its R&D version . . . it would probably lose its monopoly power within a reasonable time period," but that is entirely consistent with Microsoft's possession of monopoly power today. Warren-Boulton, 11/19/98pm, at 41:8 - 43:14.

50.3. Microsoft's efforts (amounting to several hundred millions of dollars a year) to induce ISVs to write applications that run on Windows are also consistent with monopoly power.

50.3.1. Inducing ISVs to write more and better applications makes Microsoft's operating system more attractive, thus increasing the monopoly profits Microsoft can earn.

i. Paul Maritz testified that Microsoft's efforts to work with developers result in "great applications for Microsoft's Windows family of

operating system products," which in turn increases Windows' attractiveness to consumers. Maritz Dir. ¶¶ 127, 136.

ii. See supra II.B.3.b.(1); ¶ 26.1.

50.3.2. Inducing ISVs to write more and better applications to Windows also increases the applications barrier to entry because it increases the attractiveness of the Windows platform, which reinforces ISVs' incentives to write first and foremost to Windows, and reduces the resources ISVs can devote to writing to other operating systems.

i. Dr. Warren-Boulton testified that inducing ISVs to develop for Windows is "an investment in creating the applications barrier to entry." Warren-Boulton, 11/24/98am, at 39:13-14.

50.4. Microsoft's argument that the existing installed base of Windows users and piracy together prevent Microsoft from exercising monopoly power (Schmalensee, 1/14/99am, at 25:4-22; Maritz Dir. ¶ 123**; MPF ¶¶ 91, 157-60**) is also flawed.

50.4.1. The evidence shows that, whatever constraint piracy imposes on Microsoft's pricing, it is not substantial and does not prevent Microsoft from enjoying monopoly power.

50.4.1.1. Microsoft discourages piracy by penalizing OEMs through MDAs for shipping naked machines.

i. Dean Schmalensee testified that Microsoft's MDAs penalized OEMs for shipping naked machines, and that the purpose of the penalty is to reduce piracy. Schmalensee, 6/23/99pm, at 67:13 - 70:17; 69:7 - 70:18.

ii.

DX 2283 (admitted in sealed session). See generally GX 1509

GX 1495 (sealed); GX 1508 (sealed); GX 1510 (sealed); GX 1512 (sealed); GX 1504 (sealed).

50.4.1.2. There is no evidence that piracy prevents Microsoft from exercising substantial monopoly power. To the contrary, the evidence shows that Microsoft has substantial and durable discretion over its pricing of Windows notwithstanding the possibility of piracy.

i. See supra Part II.C., ¶¶ 33-38.

ii. Microsoft's arguments about the importance of piracy are unsupported. Microsoft's sole factual assertion about Windows (as opposed to software in general) -- that it loses more than $1 billion annually in Windows revenue to piracy -- is not substantiated in the cited evidence. MPF ¶ 160, citing Maritz (MPF ¶ 206). Microsoft cites no evidence that piracy prevents Microsoft from exercising monopoly power over operating systems.

iii. Microsoft's own documents show that Microsoft has been able to deter piracy. Microsoft's Market Development Agreements give OEMs a discount for not shipping machines without operating systems (so-called "naked" machines); this discount is called the "anti-piracy" provision by Microsoft. Schmalensee, 6/23/99pm, at 67:13 - 70:17**. All of the major OEMs earned this discount in 1998.** DX 2283 **(admitted in sealed session); see also supra** ¶ 50.4.1.1**.**

50.4.2. The evidence similarly shows that the modest constraint created by its installed base does not prevent Microsoft from enjoying monopoly power. **Thus, Microsoft's assertion that the price it can charge for Windows is constrained by its installed base (MPF ¶¶ 91, 157-158) does not fit the facts of how Windows is sold.**

i. As Professor Fisher testified, Microsoft prohibits licensees from

transferring operating systems to new computers; there is thus no "secondary market" in operating systems. Fisher Dir. ¶ 77.

ii. The installed base cannot affect the price of operating systems acquired in connection with OEM sales. "New operating systems are principally acquired in connection with the purchase of new computers and only secondarily in connection with upgrades. At best, Microsoft's installed-base argument relates to its pricing of upgrades. It does not apply to the more important channel of new computers." Fisher Dir. ¶ 75; Warren-Boulton, 11/19/98am, at 64:18 - 66:8 (testifying that consumers buying an operating system with a new PC and an "upgrade" operating system have different demand characteristics).

iii. And, as Dr. Warren-Boulton explained, the constraint on Microsoft's pricing of upgrades is modest because, although software "never wears out" (Maritz Dir. ¶ 202), it can become obsolete. Warren-Boulton, 11/19/98am, at 64:7-17. Indeed, as explained, Microsoft's pricing of its Windows 98 upgrade product evidences substantial pricing discretion and thus monopoly power even in that market segment. See supra II.C.3.; ¶ 38.2.