The Microsoft Antitrust Case
A Case Study For MBA Students

by

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This case is intended as a teaching tool. It presents essential aspects of the Microsoft case, but is not exhaustive. It rather pays special attention to aspects of the case that are best to illustrate key concepts to students. For a more comprehensive study of all aspects of the case including a full discussion of remedies, the reader is referred to Economides (2000).

1. Facts

Microsoft is a large diversified computer software manufacturer with one of the highest valuations in the world. Microsoft produces the Windows family of operating systems for personal computers and servers. It also produces applications software that run on the Windows family of operating systems, most notably the very successful MS-Office Suite consisting of *Word* (word processor), *Excel* (spreadsheet), *PowerPoint* (presentations), *Outlook* (e-mail and news), and *Access* (database).[1] Almost all Microsoft products are complementary to a member of the Windows family of operating systems for personal computers and servers.

During the last few years, the Federal Trade Commission and the Department of Justice of the United States have investigated Microsoft on various antitrust allegations. The 1991-1993 and 1993-1994 investigations by the Federal Trade Commission ("FTC") ended with no lawsuits. The 1994 investigation[2] by the United States Department of Justice ("DOJ") was terminated with a consent decree in 1995.[3] The key provisions of the 1995 consent decree were:

1. Microsoft agreed to end "per-processor" (zero marginal price) contracts with computer manufacturers (Original Equipment Manufacturers, "OEMs") but it was allowed to use unrestricted quantity discounts.

2. "Microsoft shall not enter into any License Agreement in which the terms of that agreement are expressly or impliedly conditioned upon the licensing of any other Covered Product, Operating System Software product or other product (provided,

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[1] Microsoft produces software, including operating systems for PC (Windows 95, 98, NT, 2000), operating systems for local network and Internet servers (Windows NT, 2000), "back-office" products for network and Internet servers, Internet clients, Internet and network servers, desktop applications (Office, Word, Excel, Access, Outlook, PowerPoint, MS-Money, etc.), games, and programming languages (Visual Basic, Java). Microsoft also produces services, including Internet service (MSN, WebTV), Internet content (MSN), and product support, and some hardware such as branded mice, keyboards, etc.

[2] USDOJ sued Microsoft on July 15, 1994, under Section 2 of the Sherman Act, alleging that Microsoft had entered into licensing agreements with OEMs that prevented other operating system vendors from gaining widespread distribution of their products.

[3] The Court entered the consent decree as its Final Judgment on April 21, 1995.

however, that this provision in and of itself shall not be construed to prohibit Microsoft from developing integrated products); or the OEM not licensing, purchasing, using or distributing any non-Microsoft product."[4]

Thus, the 1995 consent decree imposes two restrictions, one horizontal, and one vertical. The horizontal restriction stops Microsoft from using zero marginal cost pricing. However, it allows for quantity discounts, disregarding the fact that zero marginal cost pricing is a special case of a quantity discount contract.[5] The vertical restriction of the 1995 consent decree prohibits product bundling created by contract, but allows Microsoft to keep expanding the number and type of functions of its products, including Windows. In short, in the 1995 consent decree contractual bundling was disallowed, but technological bundling was explicitly allowed.[6]

During 1997, Senator Orin Hatch (R-Utah) held congressional hearings on Microsoft that featured Microsoft's CEO Bill Gates, Netscape's CEO Jim Barksdale, and PC manufacturer Michael Dell, among others. Senator Hatch took the position that if present antitrust law cannot deal with various anti-competitive acts attributed to Microsoft, Congress should change or enhance the antitrust laws.[7] Sun Microsystems, Oracle, IBM, Netscape, and Novell formed a loose coalition lobbying intensely for antitrust action against Microsoft.[8]

On October 20, 1997, DOJ alleged that Microsoft violated the 1995 consent decree by bundling Internet Explorer ("IE") with the Windows operating systems, and requiring computer manufacturers to distribute IE with Windows 95. DOJ petitioned the District Court to find Microsoft in civil contempt. On December 11, 1997, Judge Thomas Penfield Jackson issued a preliminary injunction barring the bundling of IE with

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[4] Final Judgment, Civil Action No. 94-1564.

[5] This is a contradiction in the terms of the consent decree. Clearly, the zero marginal price contract is a special case of a quantity discount contract, more generally referred to by economists as a non-linear pricing contract. If quantity discounts are allowed, but zero marginal price is not (as the consent decree reads), it is not clear how low the marginal price is allowed to be so that the consent decree is not violated.

[6] Microsoft has expanded over the years before and after the 1995 consent decree the functionality included in Windows, leading to the elimination of some stand-alone add-ons markets. For example, Microsoft included a disk defragmenter in Windows 1995 and the market for defragmenters promptly died. Similarly, when hard disk compression was included in Windows 1995, the market for disk compression software died. However, the market for fax software survived and expanded after the inclusion of fax capabilities in Windows 1995.

[7] See Hatch (1998).

[8] See, for example, Reback *et al*. (1994). Gary Reback represented Netscape and was instrumental in creating this loose coalition, as well as providing the main arguments that the government used in this case. Brinkley and Lohr (2000), page 326, also mention a Netscape "white paper" written by Wilson Sonsini lawyers Gary Reback and Susan Creighton and entitled "White Paper Regarding the Recent Anticompetitive Conduct of the Microsoft Corporation," dated 1996, which was never made public but was made available to the NY Times reporters.

Windows.[9] On May 12, 1998, the Court of Appeals (DC Circuit) ruled that the 1995 consent decree did not apply to Windows 98, which was shipped with an integrated IE as part of the operating system and an IE icon on the PC desktop. On June 23, 1998, the Court of Appeals voided the 1997 preliminary injunction, arguing that "courts are ill equipped to evaluate the benefits of high-tech product design."[10]

During the week following the Court of Appeals defeat of its 1995 consent degree enforcement suit, DOJ filed a major antitrust suit against Microsoft. In this action (DOJ Complaint 98-12320), filed on May 18, 1998, DOJ was joined by the Attorneys General of 20 States and the District of Columbia. This paper focuses on this last and continuing lawsuit against Microsoft.

Over the years, Microsoft has integrated in the Windows class of operating systems many functions and features that were originally performed by stand-alone products.[11] Moreover, the Court of Appeals in its June 23, 1998 decision affirmed that Microsoft's practice of bundling IE with Windows was legal under the terms of the 1995 consent decree. To overcome this interpretation of the law, DOJ argued that Microsoft's bundling of IE with Windows and its attempt to eliminate Netscape as a competitor in the browser market was much more than adding functionality to Windows and marginalizing a series of add-on software manufacturers. DOJ alleged (and the District Court concurred) that Microsoft added browser functionality to Windows and marginalized Netscape because Netscape posed a potential competitive threat to the Windows operating system. This distinctive threat posed by Netscape was a crucial part of the DOJ allegations. DOJ alleged that applications could be written to be executed "on top" of Netscape. Since Netscape could be run on a number of operating systems, DOJ alleged that Netscape could erode the market power of Windows. In DOJ's logic, Microsoft gave away IE and integrated it in Windows so that Netscape would not become a platform that would compete with Windows. Thus, DOJ alleged that Microsoft's free distribution of IE, its bundling with Windows, and all its attempts to win the browser wars were defensive moves by Microsoft to protect its Windows monopoly.

The Microsoft trial took place at an accelerated schedule at the U.S. District Court of the District of Columbia from October 19, 1998 to June 24, 1999. Only twelve witnesses testified from each side. Microsoft's CEO Bill Gates was not called as a witness, but his video taped deposition was extensively used during the trial. Judge Thomas Penfield Jackson announced that he would announce his "findings of fact" *before* his "conclusions of law." This was widely interpreted as implying that the judge was

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[9] The Court also referred the issue to a special master, Prof. Lawrence Lessig of Harvard.

[10] The Court of Appeals further noted that "the limited competence of courts to evaluate high-tech product designs and the high cost of error should make them wary of second-guessing the claimed benefits of a particular design decision." 147 F.3d at 950 n.13.

[11] For example, disk compression and disk de-fragmentation were not part of Windows 3.1 and were added to Windows 95 and 98.

trying to give an opportunity to the sides to reach a compromise and resolve the case through a consent decree.

On November 5, 1999, Judge Jackson issued his "findings of fact," siding very strongly with the plaintiffs. In December 1999, Judge Richard Posner, a prominent antitrust scholar and the Chief Judge of the Seventh Circuit Court of Appeals, agreed to serve as mediator for settlement discussions.[12] On April 1, 2000, settlement talks broke down after some States reportedly disagreed with the proposed agreement.[13] On April 3, 2000, Judge Jackson issued his "conclusions of law" finding for the plaintiffs on almost all points. In particular, Judge Penfield Jackson found:

1. The relevant antitrust market is the PC operating systems market for Intel-based computers.
2. Microsoft has a monopoly in this market "where it enjoys a large and stable market share."
3. Microsoft used its monopoly power in the PC operating systems market to exclude rivals and harm competitors.
4. Microsoft hobbled the innovation process.
5. Microsoft's actions harmed consumers.
6. Various Microsoft contracts had anti-competitive implications, but Microsoft is *not* guilty of anti-competitive exclusive dealing contracts hindering the distribution of Netscape Navigator.

On June 7, 2000, after an extremely short hearing, Judge Jackson issued his remedies decision, splitting Microsoft into two companies, and imposing severe business conduct restrictions. The plaintiffs remedies proposal as adopted by the Judge imposed a breakup of Microsoft into two pieces, an "operating systems" company which would inherit all the operating systems software, and an "applications" company with all the with all the remaining software assets. Cash and securities holdings of other companies held by Microsoft would be split between the resulting entities. Bill Gates and other officers / shareholders of the company would not be allowed to hold executive and ownership positions in both of the resulting companies.

The District Court ruling also imposed interim conduct restrictions on Microsoft. These restrictions, to last three years, were:

1. Microsoft would create a pricing schedule that would apply to all buyers, so that price would not be conditioned on the sale of other Microsoft products.
2. Microsoft would not be allowed to have exclusive contracts that do not allow the other party to use, display, or feature its opponents products.
3. APIs and other technical information of Windows should be shared with outsiders as it is shared within Microsoft.
4. Microsoft is not allowed to take actions against manufacturers who feature competitors' software.

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[12] As mediator, Judge Posner was *not* acting in his judicial capacity.

[13] See New York Times, April 2, 2000.

5. Microsoft will allow OEMs to alter Windows in significant ways.
6. Microsoft is not allowed to design Windows to disable or compromise rivals' products.

Microsoft appealed, and was granted a stay of all parts of the District Court decisions until the appeal is heard. Although the Washington DC Appeals Court expressed its willingness to hear the case in plenary session, the District Court agreed with the government's proposal to petition the Supreme Court to hear the case immediately, invoking a rarely used provision of antitrust law. At this point in time (August 2000) it is unclear if the Supreme Court will agree to hear the case, and if it does, what aspects of the case it will rule on, and what aspects it will send to the DC Court of Appeals.[14] Either way, the appeals process is likely to take at least a year. It is widely believed that, irrespective of which Court hears the appeal, it will be settled soon after the 2001 presidential election. George W. Bush, the Republican presidential candidate has stated that he will only pursue price fixing antitrust cases.[15] Democratic candidate Al Gore may also choose to settle the case.

2. Antitrust Law On Monopolization And Attempting To Monopolize

The key issue in the case is the issue of monopolization of operating systems market by Microsoft. The U.S. antitrust law, as presently interpreted, implies that "monopolization" under ¶ 2 of the Sherman Act is illegal if the offender took anti-competitive actions to acquire, preserve, or enhance its monopoly. For "monopolization," plaintiffs have to prove that the defendant

1. Possessed market power; *and*
2. Willfully acquired or maintained this monopoly power as distinguished from acquisition through a superior product, business acumen, or historical accident.

Therefore, contrary to popular belief, for monopolization to be illegal under U.S. antitrust law, it is not sufficient for a company to "monopolize" a market in the sense of possessing a very large market share, even a market share of 100%.

U.S. antitrust law, as presently interpreted, implies that "attempting to monopolize" is illegal under ¶ 2 of Sherman Antitrust Act if the specific actions taken have anti-competitive consequences. For example, bundling, and, more generally, price discrimination could be illegal if they have anti-competitive consequences. Similarly, exclusionary contracts (which restrict distribution or production) could be illegal if they have anti-competitive effects. To prove "attempting to monopolize" (under Sherman Act ¶ 2), plaintiffs have to prove that the defendant

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[14] DOJ argued that review by the Supreme Court was appropriate to expedite the final judgment because of the importance of the case for the national economy. However, it is worth noting that the plaintiffs have a real interest to avoid the DC Court of Appeals since that Court ruled (June 23, 1998) on the issue of bundling Internet Explorer and Windows 95 in the earlier Microsoft case exactly in the opposite way to Judge Jackson's decision on bundling in the case being appealed.

[15] Financial Times, June 26, 2000, Interview with George W. Bush.

1. Engaged in predatory or anti-competitive conduct
2. with specific intent to monopolize
3. and that there was a "dangerous probability" that the defendant would succeed in achieving monopoly power.

3. Economics Of Markets With Network Effects

In assessing the Microsoft case, it is important to remember that the case focuses on markets with network effects. Network effects define crucial features of market structure that have to be taken into consideration in understanding competition and potentially anti-competitive actions in these markets.

A market exhibits network effects (or network externalities)[16] when the value to a buyer of an extra unit is higher when more units are sold, everything else being equal. In a traditional network, network effects arise because a typical subscriber can reach more subscribers in a larger network. In a virtual network,[17] network effects arise because larger sales of component A induce larger availability of complementary components B_1, ..., B_n, thereby increasing the value of component A. The increased value of component A results in further positive feedback.[18] For example, the existence of an abundance of Windows-compatible applications increases the value of Windows.

There are a number of crucial features of markets with network effects that distinguish them from other markets. First, markets with strong network effects where firms can chose their own technical standards are "winner-take-most" markets. That is, in these markets, there is extreme market share and profits inequality.[19] The market share of the largest firm can easily be a multiple of the market share of the second largest, the second largest firm's market share can be a multiple of the market share of the third, and so on. This geometric sequence of market shares implies that, even for small n, the nth firm's market share is tiny.

For example, abundance of applications written for Windows increases the value of Windows and induces more consumers to buy Windows. This increases the incentive for independent applications writers to write applications for Windows, and this further increases sales and market share for Windows. Moreover, consumers are willing to pay

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[16] The word "externality" means that the value is not intermediated in a market. For the purposes of this paper, we will use the words "network effects" and "network externalities" interchangeably.

[17] A virtual network is a collection of compatible goods (that share a common technical platform). For example, all VHS video players make up a virtual network. Similarly, all computers running Windows 98 can be thought of as a virtual network.

[18] Despite the cycle of positive feedbacks, it is typically expected that the value of component A does not explode to infinity because the additional positive feedback is expected to decrease with increases in the size of the network.

[19] See Economides and Flyer (1998).

more for the brand with the highest market share (since it has more associated applications), and therefore profits associated with this brand can be a large multiple of profits of other platforms. This implies a very large market share for Windows, a small market share for the Mac, a very small market shares for the third competitor, and almost negligible shares for the fourth and other competitors.

Second, due to the natural extreme inequality in market shares and profits in such markets at any point in time, there should be no presumption that there were anti-competitive actions that were responsible for the creation of the market share inequality or the very high profitability of a top firm. Great inequality in sales and profits is the natural equilibrium in markets with network externalities and incompatible technical standards. No anti-competitive acts are *necessary* to create this inequality.

Third, because "winner takes most" is the natural equilibrium in these markets, attempting to superimpose a different market structure, (say one of all firms having approximately equal market shares), is futile and counterproductive. If a different market structure is imposed by a singular structural act (say a breakup of a dominant firm), the market would naturally deviate from it and instead converge to the natural inequality equilibrium. If forced equality is imposed as a permanent condition, it would create significant social inefficiency, as discussed below.

Fourth, in such markets, once few firms are in operation, the addition of new competitors, say under conditions of free entry, does not change the market structure in any significant way. The addition of a fourth competitor to a triopoly hardly changes the market shares, prices, and profits of the three top competitors.[20] This is true under conditions of free entry. Therefore, although eliminating barriers to entry can encourage competition, the resulting competition does not significantly affect market structure. In

[20] See Economides and Flyer (1998). The table below, taken from this paper, shows market coverage and prices as the number of firms with incompatible platforms increases. Maximum potential sales was normalized to 1.

Table 1: Quantities, Market Coverage, And Prices Among Incompatible Platforms

Total number of firms I	Sales of largest firm q_1	Sales of second firm q_2	Sales of third firm q_3	Market coverage $\Sigma^I_{j=i}\, q_j$	Price of largest firm p_1	Price of second firm p_2	Price of third firm p_3	Price of smallest firm p_I
1	0.6666			0.6666	0.222222			2.222e-1
2	0.6357	0.2428		0.8785	0.172604	0.0294		2.948e-2
3	0.6340	0.2326	0.0888	0.9555	0.170007	0.0231	0.0035	3.508e-3
4	0.6339	0.2320	0.0851	0.9837	0.169881	0.0227	0.0030	4.533e-4
5	0.6339	0.2320	0.0849	0.9940	0.169873	0.0227	0.0030	7.086e-5
6	0.6339	0.2320	0.0849	0.9999	0.169873	0.0227	0.0030	9.88e-11
7	0.6339	0.2320	0.0849	0.9999	0.169873	0.0227	0.0030	0

Note that the addition of the fourth firm onward makes practically no difference in the sales and prices of the top three firms.

markets with strong network effects, antitrust authorities cannot significantly affect market structure by eliminating barriers to entry.

Fifth, the fact that the natural equilibrium in network industries is winner-take-most with very significant market inequality does not imply that competition is weak. Competition on which firm will create the top platform and reap most of the benefits is in fact very intense.

Sixth, there is a more fundamental concern about the application of antitrust in network industries.[21] In industries with significant network externalities, under conditions of incompatibility between competing platforms, monopoly may maximize social surplus. When strong network effects are present, a very large market share of one platform creates significant network benefits for this platform which contribute to a large consumers and producers surplus. It is possible to have situations where a breakup of a monopoly into two competing firms of incompatible standards *reduces* rather than increases social surplus because network externalities benefits are reduced. This is another way of saying that *de facto* standardization is valuable.[22]

Seventh, in network industries, the barriers to entry may be higher but the rewards of success may also be higher compared to non-network industries. Thus, it is unclear if there is going to be less entry in network industries compared to traditional industries. If a requirement for entry is innovation, one can read the previous statement as saying that it is unclear if innovation would be more or less intense in network industries. The dynamics of the innovation process in the winner-take-most environment of network industries are not sufficiently understood by academic economists so that they could give credible advice on this issue to antitrust authorities. However, in the last two decades we have observed very intense competition in innovative activities in network industries financed by capital markets.

Eighth, the existence of an installed base of consumers favors an incumbent. However, competitors with significant product advantages or a better pricing strategy can

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[21] In the Microsoft case, both sides had the chance to address this issue, but failed to do so.

[22] Economides and Flyer (1998), show that, in market conditions similar to the ones in the OS software market, social welfare (total social surplus) can be higher in monopoly. The table below taken from this paper shows profits, consumers' and total surplus in a market of I incompatible firms as the number of competitors I increases.

Table 2: Profits, Consumers' And Total Surplus Among Incompatible Platforms

Total number of firms I	Profits of largest firm Π_1	Profits of second firm Π_2	Profits of third firm Π_3	Total industry profits $\Sigma^I_{i=1} \Pi_i$	Consumers' surplus CS	Total surplus TS
1	0.1481			0.1481	0.148197	0.29629651
2	0.1097	7.159e-3		0.1168	0.173219	0.29001881
3	0.1077	5.377e-3	3.508e-4	0.1135	0.175288	0.28878819

overcome the advantage of an installed base.[23] Network effects intensify competition, and an entrant with a significantly better product can unseat the incumbent. In network industries we often observe Schumpeterian races for market dominance. This is a consequence of the winner-take-most natural equilibrium combined with the high intensity of competition that network externalities imply.

4. The Issue Of Low Prices

The judge ruled that Microsoft had monopoly power in the OS market for Intel-based PCs. In antitrust, it is generally understood that a firm has monopoly power when it has the sustained ability to increase price or exclude competitors. The existence of significant barriers to entry and the very high market share of Microsoft in the operating systems market gave indications that Microsoft had monopoly power. But there was also a very strong indication to the contrary. Microsoft priced its operating system to OEMs at an average price of $40-60, a ridiculously low price compared to the static monopoly price.[24] Microsoft's witnesses showed that the static monopoly price was about $1,800, a large multiple of Microsoft's actual price.[25] At first glance, it seems that Microsoft could

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[23] A clear example of this is the win of VHS over Beta in the United States consumer video recorders market. Beta was first to market and had a significant installed base in the first five years of the coexistence of the two competing standards. However, because VHS (i) introduced earlier a longer tape; (ii) used wide and inexpensive licensing of its technology; and (iii) its licensees had a much wider distribution system, VHS emerged as the winner and Sony stopped selling Beta recorders to the US consumer market.

[24] It is very likely that the marginal price for the last unit sold to the same OEM was extremely low since the 1995 consent decree allowed Microsoft to have quantity discounts but barred it from zero marginal cost pricing.

[25] The derivation of the monopoly price for Windows follows. Let p_H be the price of the PC hardware (everything except Windows) and let p_W be the price of Windows. Assume that Windows is installed on all PCs. Since hardware and software are combined in a ratio of 1:1, the demand of a PC with Windows is $D(p_H + p_W)$. Profits of Microsoft from Windows sales are:

$$\Pi_H = p_W D(p_H + p_W) - F_W$$

where F_W is the fixed cost of developing Windows, and the marginal cost is negligible. Maximizing Π_W implies marginal revenue equals marginal cost, i.e.,

$$D(p_H + p_W) + p_W\, dD/dp_W = 0 \iff 1 + [p_W/(p_H + p_W)][(p_H + p_W)/D][dD/dp_W] = 0 \iff p_W/(p_H + p_W) = 1/|\varepsilon|,$$

or equivalently, the monopoly price of Windows is

$$p_W = p_H/(|\varepsilon| - 1),$$

where $|\varepsilon| = -[(p_H + p_W)/D]/[dD/dp_W]$ is the market elasticity of demand for PCs with Windows. If one assumes that the average price of PC hardware is $1,800 and $|\varepsilon| = 2$, the monopoly price of Windows is p_W = $1,800. Even if one assumes a much higher elasticity, $|\varepsilon| = 3$, and a much lower average price of PC hardware at $1,200, the monopoly price is $600, which is ten to twelve times the price charged by Microsoft to OEMs.

not possibly have monopoly power in OSs when its OS price is about 3% of the monopoly price.

Understanding and explaining the very low price of Windows is important for understanding what Microsoft's competitive position was and how Microsoft thought of it. Plaintiffs failed to explain Microsoft's pricing by either assuming it away or giving spurious explanations. First, the government claimed that pricing significantly above marginal cost was evidence of monopoly power, and that the discrepancy between actual and theoretical monopoly price did not matter. But, any software is priced significantly above marginal cost since marginal cost is zero, and the government has not yet sued other software manufacturers on these grounds. Second, the government's economic witnesses claimed that the static monopoly model of the plaintiffs did not apply, but offered no alternative model that could explain the difference between the actual price and the monopoly price of the static model.

Why was the price of Windows price low? For the early periods of each operating system, one expects that the existence of network effects would prompt Microsoft to charge a low price so that each platform becomes accepted by independent software developers as well as users and the bandwagon gets rolling. This network-effects-based theory does not explain why Microsoft did not increase the prices of each generation of operating systems as each one matured. It also does not explain why Microsoft did not increase significantly its price of Windows as it doubled its market share in the past four years.

A variation of the network effects-induced low price theory gives a predatory flavor to Microsoft's strategy. In this view, Microsoft priced low to hook consumers and generate network effects, while it planned to increase the price "in the future." This theory is particularly implausible because Microsoft dominates the PC desktop market and has doubled its market share in recent years without increasing the price for Windows while expanding its functionality. How long will Microsoft wait until it increases the price of Windows?[26]

A number of other theories have been proposed to explain Microsoft's pricing. Some claim that the availability of an existing installed base of Windows constrained Microsoft's pricing. That could have been true if in fact Windows could easily and legally be uninstalled by users. But Microsoft's licensing requirements and the sheer complexity of the uninstallation operation make it almost impossible for a user to uninstall a Windows operating system that was installed by an OEM and move it to a different (presumably new) computer. So the Windows installed base does not constrain Windows pricing.

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[26] Some even claim that in a network industry, a firm can practice predation without *ever* increasing the price, but just benefiting in the future from the network effects. But such a strategy is indistinguishable from a truly competitive strategy and cannot be considered predatory.

Others claim that the fact that software is durable constrains Windows pricing. It is true that once Windows runs on an overwhelming market share of PCs, the substitute for a new Windows computer is an old Windows computer. The fact that computers and software are both durable makes this true. But very rapid technological change has prompted consumers to buy new computers much faster than traditional obsolescence rates would imply. Even doubling the price of Windows to OEMs would not have implied a significant change to the final price of the combined computer and operating system. So, durability of software and durability of computers, although a factor, is unlikely to explain the huge difference between the actual price and the static monopoly price.

Still others claim that the low price is implied by the very low cost of pirating software. If that were the case, it would have prompted Microsoft to cut its much higher prices of MS-Office and other software, since pirating takes the same effort irrespective of the type of software. Moreover, the control that Microsoft can exert on piracy of the operating system is much greater than on piracy of applications. Therefore, although piracy could have been more of a problem if the OS software was much more expensive, it is unlikely that the price of Windows is low because of piracy considerations.

Finally some claim that Microsoft kept the price of Windows low because that allowed Microsoft to charge more for complementary goods that it produces, such as the Microsoft Office suite. There are two reasons that make this argument unlikely to be correct. First, Microsoft also produces its most popular products, including the Microsoft Office suite, for the Mac. If Microsoft kept the price of Windows low so that is sold MS-Office for Windows at a high price, then the price of MS-Office for Macs should have been lower than the price of MS-Office for Windows, which is factually incorrect. Second, Windows has the ability to collect surplus from the whole assortment of applications that run on top of it. Keeping Windows' price artificially low would subsidize not only MS-Office, but also the whole array of tens of thousands of Windows applications that are not produced by Microsoft. Even if Microsoft had a monopoly in the Office market, this is definitely not the optimal way to collect surplus. Moreover, receiving revenues from complementary goods cannot by itself explain the vast difference between the actual and the monopoly price of Windows.[27]

Microsoft claimed that its low pricing was due to actual and potential competition. Microsoft's internal e-mails point to a real fear that the company would be

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[27] Suppose Microsoft receives net revenue R_C from complementary goods, so that its profits from Windows are

$$\Pi_H = (p_W + R_C)D(p_H + p_W) - F_W .$$

Then the monopoly price of Windows is

$$p_W = p_H/(|\varepsilon| - 1) - R_C .$$

Even if Microsoft makes a net revenue $R_C = \$200$ from complementary goods from every unit of Windows sold, when $p_H = \$1{,}800$ and $|\varepsilon| = 2$, the monopoly price of Windows is $p_W = \$1{,}600$, and when $p_H = \$1{,}200$ and $|\varepsilon| = 3$, the monopoly price of Windows is $p_W = \$400$, vastly above the actual price.

overtaken by the next innovator. Even if objectively it is difficult to see the big threat from potential competitors, it is clear that Microsoft's executives constantly felt the fear of potential competition. On the pricing of Windows, I am inclined to believe Microsoft's view: Microsoft priced low because of the threat of competition. This means that Microsoft believed that it could not price higher if it were to maintain its market position. In essence, Microsoft pricing reveals that, to a large extent, its executives believed that market conditions (most importantly potential competition) constrained higher prices.

5. DOJ's Monopolization Theory

The government claimed that Microsoft's actions to exclude and marginalize Netscape were sufficient to show that Microsoft's possessed and exercised its monopoly power. Essentially the government claimed that even if Microsoft did not exercise monopoly power in pricing, it was sufficient to show that it exercised it in exclusionary actions. But, most economists would agree that it is much more profitable to exercise market power by increasing price than by raising the costs of rivals.[28] If Microsoft consistently sells at low prices, it loses a large amount of potential profits. It is very hard to make a convincing argument that it is worth sacrificing these profits just to exclude a future potential competitor. After all, even if the potential competitor is successful in entering, it could only reduce Microsoft's future profits, which are worth less today.

The government's and the judge's theory was that Microsoft exercised its monopoly power by attempting to marginalize Netscape. The government and the judge agree that Microsoft attempted to marginalize Netscape's browser because Microsoft feared that Netscape would become a rival platform to Windows. In this point of view, once Netscape became such a platform, applications would be written to run "on top" of Netscape Navigator. Moreover, the bigger Netscape's market share, the more likely it is that ISVs would write applications for the Netscape platform; it follows that, in DOJ's view competition in OSs is maximized when Netscape is a monopoly in browsers. Since Netscape Navigator could run on many operating systems (not just Windows), therefore, from this perspective, Netscape created a threat to Windows. In this view, all actions to aggressively compete with Netscape were just attempts by Microsoft to defend its monopoly in PC operating systems.

This is an interesting theoretical argument, but it has both theoretical and empirical deficiencies. First, in winner-take-most competition, DOJ's analysis fails to distinguish between profit sacrifices to keep out potential rivals and competition where a company keeps its prices low in order to win consumer business from actual and potential rivals. Second, although at some point in time Marc Andreesen, Netscape's CTO, claimed that Netscape would create the capabilities of running applications, there was never a consistent effort by Netscape to create a comprehensive set of Applications Product Interfaces ("APIs") that would support typical applications that now run under

[28] The exception is regulated industries where a firm is not free to increase price.

Windows. Moreover, Netscape hardly put sufficient effort and resources in reaching independent applications developers to write for such a platform. So, although potentially Netscape could have created such a platform, it was very far away from that goal, and the probability of succeeding against the array of Windows applications was low.

Third, Netscape, even if successful, is likely to have been limited to Internet-based applications. The performance of such applications is dependent on the Internet working efficiently and at top speed. Actual performance would also potentially be hampered by excessive loads on the CPUs of servers where the applications would actually run. Essentially the model of Netscape as competitor of operating systems required a number of contingencies to be met, and therefore faced a very significant uncertainty. If instead applications were to run on the PC itself (on top of Netscape) they would need to interface to some extent with the underlying operating system. If this system was Windows, then it would be unlikely that it would accommodate perfectly its direct competitor.

Fourth, Microsoft's actions clearly could have competitive justifications. Microsoft's management saw that the Internet was taking off and wanted to have a dominant position in it.

DOJ and the District Court Judge also agreed that Microsoft sabotaged Sun's Java operating language so that Java would not become a "universal language" in the sense that applications written for it could be run in any operating system. Over the years, the computer industry has gone through a number of such pipe dream "universal languages." They have all failed for a very simple reason: A "universal language" cannot be too specialized -- after all it has to be recognizable by diverse operating systems. But efficiency and speed in program execution requires specialization. Universal languages eventually fail because they get more and more efficient for particular operating systems and thereby their universality fails.[29]

Microsoft created an implementation of Java for Windows that was more efficient than the original Java by Sun. Microsoft's implementation (that is, Microsoft's Java virtual machine) allowed for all programs written for the original ("pure") Java to be run on it. Thus, it preserved *backward compatibility* with the original Java that ran on all operating systems. Because of that, Microsoft's actions were not anti-competitive. Microsoft claims that Sun's non-OS-specific Java language was inefficient and slow, and that Microsoft improved it. This is a reasonable pro-competitive justification for Microsoft's actions. The fact that Microsoft's Java implementation also runs programs that do not run in other Java implementations is not cause for anti-competitive concern, especially since Microsoft has published the function calls its Java makes to Windows. Competing operating systems could implement these calls.

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[29] The fate of human languages is similar. As each language becomes more efficient for a certain group it gets more specialized and cannot easily be understood by the rest of the world.

A key economic witness of DOJ, Prof. Frank Fisher of MIT, proposed in pre-trial filings and supported during the trial a novel theory of predation. The traditional theory of predation requires that a product is sold below incremental (or "avoidable") cost for a period of time until competitors are driven out of business; then the monopolist increases prices and reaps its monopoly profit.[30] Instead, Prof. Fisher calls an action predatory if it would not have been profitable (and therefore not undertaken) in the long run unless the predator was taking into consideration profits arising out of the negative impact of the practice on competition. According to this definition of predation, there is no need for the predator to price below incremental cost, nor even below average cost. All that is required for predation, according to Prof. Fisher, is for a company to take some (presumably very aggressive) action that would not be rewarding unless competitors are hurt. If this definition is to be adopted, a large array of actions that are normal business practice and which benefit consumers are going to be characterized as predatory and therefore illegal. In antitrust economics, it is widely believed that rules should be fashioned to maximized social surplus. The Fisher rule fails to do so. It creates an artificial cushion of profits. If an aggressive competitor dares to take away some of these profits, he is named a predator. Moreover, since the cushion is created without regard to cost, it can be at any status quo level. Instead of promoting competition and efficiency, the Fisher predation theory could protect slack and monopoly rents. The judge erred to the extent that he based his ruling on this incorrect theory.

It is well understood that the potential surplus of a consumer for a unit of a good can only be extracted once. If Microsoft is able to extract the surplus of a consumer that buys an Internet browser through Windows, it has no incentive to try to monopolize the market for browsers, as long as the market for browsers is competitive. To the extent that the market for browsers is monopolized, it can take away from the surplus appropriated by Windows, and then Microsoft may have an incentive to expand its market share in browsers. There is significant evidence that the market for browsers was originally monopolized by Netscape. Then the inroad of Microsoft into browsers replaced a monopoly with duopoly. And, it brought the price to zero and intensified research and development in browsers to the great benefit of consumers. It is quite ironic that, although the inroad of Microsoft into browsers was greatly beneficial to consumers and broke the Netscape monopoly, the government and the judge find Microsoft's actions anti-competitive. We next discuss the effects on consumers in more detail.

6. Effects On Consumers

In principle, there are three ways that consumers could be hurt by potentially anti-competitive actions. First, consumers may be hurt because these actions increase prices. Second, consumers may be hurt because these actions may limit their choices in terms of variety and quality. Third, these actions may limit innovative activity thereby hurting future consumers. Any harm in any of these three dimensions should be evaluated and balanced with any benefit of these actions in the other dimensions. It is customary in antitrust cases to value the benefits to consumers and balance them with the burden of

[30] See, for example, Areeda and Kaplow (1997), p. 512, 514.

anti-competitive actions. The District Court failed to do this task. The Court did not attempt to quantify the benefits to consumers from giving away Internet Explorer and the intensification of competition that resulted. Also, the Court did not try to assign a monetary value to the losses to consumers resulting from the anti-competitive actions for which it found Microsoft liable.

Consumers have directly benefited from the free distribution of Internet Explorer as well as its bundling and tight integration with Windows. When Microsoft started to seriously compete with Netscape in the Internet browser market, Netscape -- essentially the sole provider of Internet browser software -- charged non-academic users $40-50 to use its browser.[31] Microsoft, by contrast, gave its Internet browser away. Netscape responded by giving its browser away as well. Today, with at least 100 million browsers installed in the United States, Microsoft's actions have created a benefit of at least $4 to $5 billion to American consumers. And, since Microsoft's actions intensified competition, which in turn produced higher quality browsers, they provided further benefits to consumers.

Moreover, consumers may have directly benefited from the relatively low price of Windows. Microsoft's operating system, for which computer manufacturers pay $40-60 per copy, is cheap compared to the historical and current prices of other operating systems. For example, in the late 1980s, IBM sold OS/2 (which ran much fewer applications than Windows) for hundreds of dollars. Some Linux packages -- essentially add-ons to the free Linux source code – currently sell for $150, and run far fewer applications than Windows does. These price discrepancies highlight a huge contradiction in the government's case and in the judge's findings of fact. If Microsoft were a true malevolent monopoly, it would charge far more for Windows than it does. The annual consumer benefits from Windows' relatively low price may be many billions of dollars.

The District Court judge ruled that Microsoft's action of distributing Internet Explorer at no charge "increased [the] general familiarity with the Internet and reduced the cost to the public of gaining access to it," "gave Netscape an incentive to improve Navigator's quality," and benefited consumers since it "compelled Netscape to stop charging for Navigator."[32] On the other hand, the District Court judge ruled that consumers were hurt in various ways by Microsoft's anti-competitive actions. The judge ruled that consumers were hurt[33] because they could not get Windows without a browser since Microsoft "forced OEMs to ignore consumer demand for a browserless version of Windows," and that the inclusion of Internet Explorer lead to "degraded system performance, and restricted memory."

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[31] Netscape was distributed for free to academic and governmental institutions. Netscape was also distributed for free to all in its introductory stage.

[32] Findings of Fact, United States v. Microsoft, Civil Action No. 98-1232 (TPJ) & State of New York v. Microsoft Civil Action No. 98-1233 (TPJ), thereafter ("FOF"), at paragraph 408.

[33] FOF at paragraph 410.

I believe that the Judge erred in ruling that free distribution of IE significantly harmed consumers by degrading performance and restricting available computer memory. First, because IE has been integrated in Windows, it is very hard to judge how a computer would work without it, how much memory it would use, how quickly it would run, etc. One would have to construct a computer with some other new component of the OS taking over the functions that IE performs now, and then test it. The Court failed to do so, and cannot conclusively rule on this issue. Second, the Internet-related tasks of operating systems are in very high demand as the Internet is presently in an exponential expansion path. The number of consumers who have been harmed in the way suggested by the Judge is likely to be very small, and in an age of cheap computers, memory, and hard drive capacity, their losses could not be very large.

The District Court Judge ruled that the prices of Windows 95 and 98 were too high based on internal Microsoft e-mails that discussed a range of prices considered by the company for pricing Windows. Since the marginal cost of Windows is almost zero, clearly Microsoft had a wide range of prices it could have used. The static monopoly price for Windows was thirty to forty times higher, as discussed earlier.

Netscape Navigator and Internet Explorer ended up being very similar products in terms of their functionality. Most computer magazines rate recent versions of IE above Netscape's. There does not seem to be any loss in variety or quality by the domination of the browser market by IE. Windows-based computers can run both IE and Navigator simultaneously, and users are not forced to choose one to the exclusion of the other. One could use one browser for some tasks and another for others.

The court ignored the issue of compatibility which was probably the most central issue in the case. Backward and forward compatibility are crucial for software markets, and, as explained earlier, are the source of network effects. Microsoft provides *de facto* compatibility through its Windows operating systems. Compatibility is an important benefit to society because it is the source of network externalities. Compatibility and its benefits could get quickly eliminated or significantly reduced if Microsoft is broken into competing pieces. Microsoft did not forcefully present to the Court the benefits to society of its dominant position arising from the de facto compatibility it created and the resulting network effects.

Finally on the issue of innovation, economists' opinions are split on whether monopoly or competition would create more innovation. Economists' opinions are also split on whether vertically integrated or independent companies create more innovation. The government economists did not provide any specific theory to support the theory that Microsoft was damaging the innovation process.

7. Further Reading

A more detailed exposition of the case, including a discussion of remedies, can be found in Economides (2000). An excellent resource on the Microsoft case is at the "Economics of Networks" web site at http://www.stern.nyu.edu/networks . The views of

some of the key participants in the case can be found in their presentations at the conference on the Microsoft trial at NYU on May 5, 2000, in streaming video at http://www.stern.nyu.edu/networks/video.html . In increasing difficulty, interested students should look at

1. Dictionary of terms on network economics at http://www.stern.nyu.edu/networks/dictionary.html ;
2. "Competition in the Computer Industry," at http://www.stern.nyu.edu/networks/98-11.pdf ;
3. The survey "Economics of Networks" at http://www.stern.nyu.edu/networks/top.html .
4. "Compatibility and Market Structure for Network Goods," at
5. http://www.stern.nyu.edu/networks/98-02.pdf ;

and on the reference list at the end of the case.

8. Questions For Students

1. Discuss the effects of the Microsoft "per processor" license on competition. How does Microsoft gain using such pricing? What is the importance of Microsoft's market share on the impact of such pricing? Do the consumers gain?
2. Discuss the differences between contractual bundling and technological integration of additional functions in a PC operating system.
3. Analyze each of the arguments on pricing of Windows in section 4. Do you agree or disagree with each one of them?
4. Do you agree with the government's theory on monopolization in section 5? Why or why not?
5. Do you agree with the arguments on consumers losses and benefits in section 6.

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