The Lessons from Microsoft

MICROSOFT'S BEHAVIOR TEACHES ECONOMISTS A LOT ABOUT STRATEGIC BEHAVIOR IN A RAPIDLY CHANGING ENVIRONMENT.

By Dennis W. Carlton

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This paper examines the lessons economists can draw from the Microsoft litigation. The paper explains that the most interesting economic lesson is how strategic behavior involving tie-in sales and exclusionary acts can be used in a dynamic network industry to allow an initial monopolist to remain the monopolist even in the face of rapid technological change. The paper goes on to explore the complications for antitrust policy that Microsoft's conduct and the proposed remedy in the antitrust case represent.

This paper is based in part on my presentation to the National Association for Business Economics, September 2000, and on my Alexander Brody Distinguished Service Lecture delivered at Yeshiva University, March 2000.

1United States v. Microsoft, Civil Action No. 98-1232. I have served as a consultant for Sun Microsystems and others in matters adverse to Microsoft.
now understand certain strategic behavior does not necessarily mean that this behavior should always be attacked as an antitrust violation. I will use this new understanding to briefly discuss some of the antitrust issues that this case raises.

The major insights from the Microsoft case that I discuss are as follows:

• Microsoft's behavior shows how tying of complementary products and exclusive dealing can be used in a dynamic network industry so that a dominant firm can remain dominant over time, even though the products change dramatically over time. This is the central economics lesson from the Microsoft case.

• Some antitrust issues raised by the Microsoft case are simple; others are more difficult. The case confirms why it is appropriate for the antitrust laws to use a Rule of Reason (i.e., weighing of benefits vs. costs) to assess whether exclusionary conduct that prevents (or impairs) rivals from obtaining customers can be an antitrust violation.² Tie-in claims of bundling Internet Explorer, Microsoft's browser, with Windows, Microsoft's operating system, raise complicated issues; and how those claims are ultimately decided could have a huge effect on competition in high tech industries.

• Antitrust remedies are hard to fashion in a case like Microsoft. The goal is to deter future violations in this and other industries. One remedy is to impose a large financial penalty, a course of action that I understand the government is not authorized to pursue in its civil action against Microsoft. Another approach, the one taken in this case, is to pursue structural relief. The trick is to reduce market power at the operating system level, the target of the government complaint, without creating huge losses by breaking up a successful firm.

Basic Facts

Although everyone is probably familiar with several of the facts in the Microsoft case, let me present some basic facts in order to illustrate the main economic insights. Because I am less interested in the exact details of the Microsoft case than in the general lessons that economists should draw from that case, I will consciously oversimplify in order to focus on my main points. A reader interested in only the Microsoft case can find plenty of details in the public filings, the Department of Justice Websites, and the numerous conferences that have occurred.

To function, a computer needs an operating system that handles the internal management of tasks such as file sharing and printing. Windows is Microsoft's operating system. Application programs such as Word are written to work on a specific operating system like Windows. They do not generally work on other operating systems like IBM's OS2 or Linux or Apple's operating system unless developers incur the costs of adapting the applications to these other operating systems. Figure 1 illustrates these facts by showing that, unless the application program has the correct “grooves,” it will not “fit” into an operating system.

The demand for an operating system depends on the number and quality of applications written for it. The more high-quality applications there are, the greater is the demand for the operating system. There will be more applications written for an operating system with a large installed base of existing users than for an operating system with a small base, because switching operating systems in order to use a given application is costly. Hence, a new application will penetrate the user population faster if it is written to work on the operating system with the largest existing installed base. This linkage makes the computer industry a network industry and explains why the demand for an operating system with many applications exceeds that for a rival operating system with few applications.

The notion that network industries are somehow new and require a new understanding of economics is misleading. Network industries have long existed and been

²Nothing is as simple as it sounds. Microsoft often did not demand exclusivity by the terms of its contract, but instead used various terms to attain such exclusivity. This in itself raises complicated issues that I have discussed elsewhere. See Carlton (2000) and footnote 4 below, as well as Paragraph 241 of Judge Jackson’s Findings of Fact, U.S. v. Microsoft, Civil Action No. 98-1232, 11/5/99.
important. The railroad industry, which began almost 200 years ago, provides a good example; but there are many others. Indeed, the features of the Microsoft case that are of particular economic interest include the complementarity between two products, operating systems and applications, and the economies of scale that exist in these products. This particular set of circumstances is certainly not a new phenomenon.3 The principles of microeconomics do not have to be repealed to understand these circumstances, just applied appropriately.

The functions of an operating system have increased over time. For example, the development of the graphical user interface (in which a user can pictorially see and choose functions) illustrates an improvement in the usefulness of an operating system. There is no reason to believe that the operating system will not continue to evolve.

A browser allows one to view Web pages. In the mid-1990s, the most popular browser was Netscape. The Netscape browser was a form of “middleware.” It sat on top of an operating system and displayed Web pages that were downloaded off the Internet. The Netscape browser ran on all of the leading operating systems because Netscape had incurred the costs of adapting its browser to each of these operating systems.

The Netscape browser had its own application programming interfaces (APIs)—the building blocks that software developers use to write application programs. Because Netscape had its own APIs (and the potential to expand those APIs) and because Netscape ran on all of the leading operating systems, Netscape’s browser had the potential to become a substitute for Windows as a platform for application programs. Software developers might have written programs based on Netscape APIs instead of basing their programs on the Windows APIs (the “grooves” in the interface between Windows and applications in Figure 1). If Netscape (and application programs) had developed in this manner, then the unique link between application programs and the operating system would have been broken because application programs written to the Netscape browser would have worked on any operating system. Therefore, a large installed base for a particular operating system would no longer have provided an advantage for that operating system over other operating systems when new applications are written. Figure 2 illustrates how a browser could theoretically fit into any operating system.

3Whether scale directly alters the product characteristic (as in making it easier to interchange files with users of the same application program and operating system) or affects the price of a complementary product, the economic effects in a dynamic model are similar. See Carlton and Waldman (2000).

In this schematic, the “grooves” on its bottom side enable it to work with each operating system, while the common “grooves” on the top provide that applications written to the browser will work on any operating system on which the browser sits.

Java was (and, to some extent, still is) another substitute for Windows. Java is part programming language and part middleware. The middleware portion of Java is the Java Virtual Machine that sits on top of an operating system. There is a JVM for each of the leading operating systems. The JVM enables an operating system to process application programs written in Java and that use Java APIs. Thus, like Netscape, Java also had the potential to become a substitute for Windows as a platform for applications programs. Netscape facilitated the distribution of JVMs and the use of Java. Every time a user put Netscape on his machine, a JVM was installed.

Thus, Figure 2 also illustrates how Java breaks the unique link between the operating system and applications for any middleware products (such as a browser) that “fits” on top of every operating system, yet provides a common top layer for applications.

Rapid technological change and diffusion are familiar stories. Using one common measure of processing speed, chip speed has over the last twelve years increased by a factor of about sixty. The number of PCs shipped annually has risen from 19 million in 1990 to about 125 million in 2000. And, of course, the rise of the Internet has been phenomenal. Over the last decade, Microsoft’s share of operating systems on new personal computers based on
Intel-type designed chips has been over ninety percent and is growing. It is in excess of eighty percent (Apple is about five to ten percent) when one considers all PCs.

**What Microsoft Did: Lessons for Business Strategy**

**Microsoft's Conduct**

I now want to use these simplified facts to focus on the economic lessons from Microsoft's behavior, focusing on two aspects. I emphasize that I am not discussing the legality of Microsoft's actions.

The first aspect of their behavior relates to exclusive dealing. Exclusive dealing occurs when a firm says to its customers or distributors that they are not allowed to deal with a rival's product. So, for example, if Microsoft said to a distributor (e.g., an original equipment manufacturer [OEM] that makes computers and sells them with an operating system installed) that it could distribute computers only with Windows, it would be engaging in exclusive dealing. As I understand the facts, Microsoft did not typically engage in such explicit exclusive dealing but did offer pricing structures and other terms to encourage exclusivity. For example, in conduct attacked by the Department of Justice in 1995, Microsoft would charge OEMs a fee for Windows based on all computers shipped whether or not Windows was used in those computers. This means that the marginal cost of Windows was zero, creating an incentive for an OEM to exclusively use Windows.4

As another example, Microsoft arranged an extra discount that Compaq (an OEM of computers) would receive provided Compaq shipped its computer with Microsoft's Internet Explorer browser and promoted only IE and not Netscape. Other OEMs also received discounts on Windows provided they favored IE, not Netscape.

There can be good pro-competitive reasons to engage in exclusive-dealing type arrangements. It is well known that they can protect property rights and thereby encourage promotional effort. (See, e.g., Carlton and Perloff [1999], Chapter 12.) So, for example, a manufacturer of cameras might demand exclusivity of camera shops and prevent shops selling its camera from carrying competing brands so that, when the manufacturer engages in promotion or in dealer training, or provides customer leads to stores, other rival manufacturers of cameras will not be able to free ride on those efforts. But, it is also known that exclusive dealing can harm competition by making it more difficult for rivals to obtain distribution, especially when distribution is handled by only a handful of distributors. (If there are many distributors and there are no scale economies in distribution, exclusive dealing can't usually harm competition.) Here, Microsoft's conduct made it more difficult for a competing operating system to Windows to obtain distribution, for Netscape (which might have been a rival to the Windows operating system) to obtain distribution, and for JVMs to be installed on computers (since Netscape was an important distribution vehicle for JVMs). This use of exclusive-type arrangements in these ways can be viewed as a pretty standard application of foreclosure in which the foreclosure prevents rivals from competing effectively against Microsoft's operating system.

The second aspect of Microsoft's behavior that I want to focus on is its so-called “embrace and extend” strategy. This is really the most interesting part of their economic behavior. In this strategy, Microsoft recognizes the value of the browser but is concerned about the spread of a browser such as Netscape that might become a platform for applications written for any operating system. Microsoft therefore created IE, which it either physically bundles with Windows or includes it at no extra charge and which does not obviate the need for Windows-specific APIs for applications programs written for Windows. Much of the government's case at the antitrust trial was to establish that there were no efficiency reasons to bundle IE and Windows. Therefore, the consequence of Microsoft's strategy was to reduce the demand for Netscape's browser even though the IE browser was not superior. In this way, Microsoft hindered Netscape from developing into an alternative platform to Windows, and applications programmers writing a program to run on Windows still had to use Windows-specific APIs, preserving the link between the applications program and Windows (see Figure 3).

Microsoft's strategy with respect to Java was similar. Microsoft recognized the advantages of Java as a programming language and therefore became a Java licensee. Because Microsoft is a Java licensee, the IE browser, like Netscape's, comes bundled with a JVM. But, after "embracing" Java, Microsoft then "extended" it. For example, it created tool kits for Java software developers that made it easy for them to mix Windows APIs with Java APIs.5 Figure 3 illustrates this Windows-specific extension of Java. The consequence of Microsoft's actions is that many application programs written with Microsoft's

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4Deciding when exclusivity effectively achieved through pricing (or other means) should be treated as the equivalent of explicit exclusivity for legal purposes is a tricky issue. See Carlton (2000) and Thom et al. (2000). I do not want to analyze here when contractual restrictions turn into exclusionary conduct, a topic analyzed in the just cited papers. For purposes of this paper, assume that Microsoft's actions can be characterized as equivalent to exclusive dealing.

5Microsoft's behavior regarding Java is the subject of a breach of contract suit by Sun against Microsoft.
Java will not run on other operating systems, and hence Microsoft again preserves its application advantage.

Consequences of Microsoft’s Actions

Microsoft’s actions toward Netscape and Java each accomplish the same goal. They prevent the application advantage of Windows from slipping away and thereby prevent the source of Microsoft’s operating system monopoly from eroding. Importantly, Microsoft’s actions show how a dominant firm can use a variety of conducts to preserve and maintain its monopoly position in a rapidly changing environment. That is a new lesson from Microsoft, though it is probably one that some of the IBM antitrust cases should have suggested.6

By preventing new applications from being simultaneously usable on both Windows and other operating systems, Microsoft preserves its advantage. But it also means that, as the operating systems evolve, Microsoft will continue to have an advantage over competing operating systems as long as its operating systems use existing applications. Perhaps more importantly, even if operating systems for PCs vanish, Microsoft is well positioned to become the monopolist of any new system as long as that new system can utilize the stock of Windows-based applications. So, for example, if handheld devices replace PCs, then Microsoft could monopolize operating systems for them if such systems can use existing Windows-based applications. In this way, Microsoft can swing its monopoly over time from product to product by using its application advantage at each point in time to advantage its own products. This behavior explains how one firm with a head start can use tie-in sales and other behavior to prevent generic complementary products from being developed. Moreover, at each stage it can use its special link to the complementary product to become the monopolist of the primary product, even when the primary product is changing rapidly over time. Indeed, it is the combination of some scale economies (or network economies) and rapid technological change that produces the circumstances under which a dominant firm can remain dominant over time in the face of rapid technological change.7

Figure 4 illustrates these points. Initially, there is a monopolist of A (operating system), which utilizes complementary products B (applications that work only with A) and B’ (applications that work with A or a future rival A’). By preventing B’ from succeeding, the competition between A and a rival A’ in later periods is avoided, and the initial monopolist of A remains the monopolist in later periods. An important point is that product A in the later period could be a different product than A in the initial period, as long as A in the initial period and A in the later period both utilize B as a complementary product.

Lessons for Antitrust

Let me now turn to the economic issues related to the antitrust challenge of Microsoft’s behavior. First, it is perfectly legal to be a monopolist. U.S. antitrust laws (and patent laws) recognize that firms that innovate will have market power and that the associated profits provide the incentive to firms to develop new products that consumers want. And our antitrust laws recognize that tough competition helps consumers but harms rivals. Just because a rival complains does not mean that a firm is doing something wrong. Our antitrust laws do, however, prevent the creation or maintenance of market dominance through certain types of conduct deemed “bad acts.”

Although the Microsoft case raises some hard questions about antitrust law, some of the issues are relatively routine.8 This is the case for the claims regarding exclusionary conduct aimed at preventing OEMs from distrib-

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6The IBM cases (e.g., the private cases as well as the government case) often focused on peripherals. Once one realizes that intelligence and processing capability can reside in peripherals, some of the issues in the IBM cases become similar to those in the Microsoft cases.

7If the technological change is so rapid that the value of the complementary product vanishes, then the advantage of the incumbent is eroded.

8With the important caveat of footnotes 2 and 4.
The Lessons from Microsoft


The standard tie-in case is that a monopolist of product A requires that you also buy product B. Why? Why not just charge more for A? The case law provides feeble answers. The most common explanation is that such a tie enables price discrimination to occur—which has ambiguous consequences on social welfare. The bottom line is that there is little economic justification for traditional antitrust hostility toward tie-ins. (This insight, due to Aaron Director and Edward Levi, still applies today [with some modifications].)9

But the tie here creates true competitive harm, by disadvantaging rival operating systems by preserving the Microsoft advantage in applications. So the economic underpinnings of tie-in law can finally be made sensible once one understands the rationale for Microsoft’s behavior. This should be one of the key economic insights of the Microsoft case applied to antitrust.

The claims regarding the “embrace and extend” conduct aimed at Netscape and Java are more complicated to evaluate. Let me focus solely on the tie-in claim regarding IE. Tie-in law is muddled from an economic viewpoint. The standard tie-in case is that a monopolist of product A requires that you also buy product B. Why? Why not just charge more for A? The case law provides feeble answers. The most common explanation is that such a tie enables price discrimination to occur—which has ambiguous consequences on social welfare. The bottom line is that there is little economic justification for traditional antitrust hostility toward tie-ins. (This insight, due to Aaron Director and Edward Levi, still applies today [with some modifications].)9

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A difficult issue is whether product design should be subject to antitrust attack. Recall that Microsoft was challenged for making the code of Windows and IE inseparable (a physical tie-in). There are some plausible benefits of expanding the functions of the operating system. Do we want courts weighing the efficiency benefits vs. the competitive harm issue, as a general matter? Do we want the government telling Ford how to design a car in terms of what components have to be removable? The costs of impeding technological change could be enormous. If one goes down this route, one should give significant weight to efficiencies, which are likely to be too difficult for courts to evaluate.10

One unique feature of the Microsoft case may be the unusual amount of internal e-mails that could allow one to figure out the real reason that IE was tied and what the costs of untying it would be. But it would be foolish to believe that such e-mails will exist in the next antitrust case. So, if the tie-in claim against Microsoft stands, I would hope that it would be interpreted as a reflection of the rather unique circumstances of this case and not as a general attack on tie-in sales achieved through product design.

Remedy

What remedy makes sense in this complicated case? The purpose of a remedy is to deter future bad acts in this and other industries and to restore competition. There are at least three possible remedies—a fine, conduct restrictions, and structural relief.

First, a large fine (e.g., many billions) would be appropriate so that the threat of future large fines should serve as a deterrent to future bad conduct in both this and other industries. The beauty of a fine is that one does not have to get involved in figuring out the costs of structural relief in which a successful firm is torn apart. The fine should be large enough to make this firm (and other potential violators) take notice and must specify the types of undesirable conduct with enough specificity so that the firm knows what to avoid in the future. The major difficulty is that the government (though not private plaintiffs) has no legal basis to request monetary damages in a civil antitrust suit. This represents a serious impediment for the government to fashion an effective remedy quickly.

10There is a distinction between a physical tie and a contractual tie. In a physical tie, the product comes bundled so that a requirement that the components of the bundle be sold separately requires analyzing how production costs within the firm will be affected when the physical nature of the product is altered. In contrast, a contractual tie requires that a user consume, say, two separate components from one firm. A requirement that the components cannot be tied will not entail a change in the physical nature of each of the components produced. Courts have been reluctant to intervene within a firm and tell firms how to operate. In contrast, courts have frequently intervened in market transactions achieved through contract. So, for example, it would be unusual for a court to order GM to allow Ford to use its spare production capacity, but would not be unusual for courts to prevent GM from contractually monopolizing independent dealers (if it had the ability to do so) to prevent distribution of Ford cars.
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and this impediment could be removed only through legislation.

The second possible remedy involves conduct restrictions. Basically, Microsoft is told: “Don’t do it again. Don’t engage in conduct that places significant restrictions on third parties (e.g., OEMs) from dealing with your potential rivals.” There are two difficulties with conduct remedies. First, they are hard to enforce because the third parties may be reluctant to complain about Microsoft if their success depends on Microsoft. Because of the constant ongoing assistance that Microsoft must provide an OEM, some OEMs could be fearful to complain about Microsoft’s conduct to enforcement officials. Second, the conduct that will work tomorrow in harming rivals may be difficult to predict today. Hence, specific conduct remedies may turn out to be obsolete quickly.

The third remedy, the structural dismembering of Microsoft, is the most radical. Any structural remedy imposes costs by destroying the internal knowledge that a successful firm has developed that has allowed its constituent parts to work together successfully. The advantage is that, unlike a conduct remedy that requires enforcement, a structural remedy relies on the forces of competition to remedy the complained-about behavior. There are a variety of possible structural remedies that could restore competition in operating systems, which was the focus of the government’s case. One is to create several operating companies. The Justice Department specifically chose not to do this, fearing that the costs of doing so were too high with one of the costs being different versions of Windows. Instead, the Justice Department chose to create one operating system company and one applications company. The idea is that “soon,” there would be an incentive for the operating company to develop its own applications and for the applications company to develop its own operating systems. That remains to be seen.

Conclusion

The Microsoft case illustrates how an initially dominant firm can use contractual and physical ties to remain a dominant firm in a rapidly changing industry. It raises some antitrust issues that defy easy solutions. One can perhaps argue that the Microsoft violations were so egregious—and the reported e-mail evidence seems overwhelming—that a dramatic remedy is needed and justified. Maybe so. However, the harm from a general interventionist antitrust policy could dwarf any benefits. If the drastic remedy of structural relief is imposed in this case, it should best be regarded as an exceptional remedy for an exceptional case.

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REFERENCES


Tomorrow's Electric Distribution Companies

CRUCIAL STRATEGIC DECISIONS WILL AFFECT THE ENTIRE U.S. ECONOMY.

By Ahmad Faruqui and Ken Seiden

The issues surrounding electric industry restructuring, merger and acquisition activities, changing regulations, and ever-accelerating technology enhancements are daunting to electric utility distribution companies and poorly understood by their customers. The regulatory “safety net” providing a guaranteed double-digit earnings stream is not what it once was. Even the apparently safe option of a pure “poles and wires” strategy is potentially threatened by load (sales) losses from distributed generation resources (such as large customers generating their own power), energy conservation measures and services, and distribution bypass (sales direct from generators to ultimate customers).

The electric industry has been dominated by vertically integrated utilities for most of its history. These utilities are being restructured as the electric industry is being deregulated and moves toward competition. Some vertically integrated utilities have sold off their generation assets and are becoming distribution companies that deliver electricity. Some observers contend that such companies will simply provide physical delivery service, that is, they will become “poles and wires” companies that will perform a few basic functions, such as line maintenance and tree trimming. This article shows that such a de minimus view of the future electric distribution company is myopic. Several alternative futures await the creative distribution company of tomorrow. The key to success is choosing that future, which best matches the company’s core competencies. Since electricity supply affects every aspect of the U.S. economy, these choices are likely to have ramifications far beyond the utilities and should be understood by all businesses for which electricity is important in their operations and planning.

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