Innovation Matters

Competition Policy for the High-Technology Economy

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Citation:

Innovation Matters: Competition Policy for the High-Technology Economy
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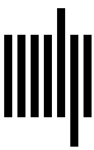
DOI: 10.7551/mitpress/12686.001.0001
ISBN (electronic): 9780262358637
Publisher: The MIT Press
Published: 2022

OA Funding Provided By:

The open access edition of this book was made possible by generous funding from Arcadia—a charitable fund of Lisbet Rausing and Peter Baldwin.



The MIT Press

8 "We Are Going to Cut Off Their Air Supply": Microsoft and Innovation Harm from Exclusionary Conduct

> We decide this case against a backdrop of significant debate amongst academics and practitioners over the extent to which "old economy" §2 monopolization doctrines should apply to firms competing in dynamic technological markets characterized by network effects.
> —*US v. Microsoft*, Court of Appeals (2001)

1 Introduction

More than two decades have passed since the US Department of Justice (DOJ), several states, and the European Commission (EC) accused Microsoft of violating antitrust laws.[1] The allegations stirred controversy, with observers expressing concerns that ranged from warnings that antitrust enforcement would chill innovation in the personal computer (PC) industry to expressions of outrage over missed opportunities for stronger remedies.[2] The industry has changed dramatically since these cases were resolved. Nonetheless, the Microsoft antitrust cases still hold valuable lessons for how courts should evaluate conduct in high-tech markets.

In the 1990s, Microsoft held a commanding position as the supplier of the world's most popular PC operating system, Microsoft Windows. Windows was installed on more than 80 percent of IBM-compatible PCs, at the time by far the world's most popular type of PC.[3] Microsoft's grip on the PC market seemed secure. The operating system was a technical achievement protected by a web of intellectual property rights. Yet the real key to Microsoft's security was not its technical complexity or intellectual property, but rather the thousands of applications written to operate with Windows.

Personal computer operating systems are platforms with strong cross-platform network effects. Computer users value the number and

quality of applications that run on the operating system, and application developers value the number of operating system users. Motivating developers to write applications that would run on a new operating system is a barrier to entry that new operating system entrants must cross to become viable competitors.

IBM confronted the applications barrier after it spent more than $1 billion to develop, test, and market a PC operating system to compete with Windows.[4] IBM created the first mass-market PC, but it did not have proprietary software or hardware that would enable the company to fully monetize its technologies. Frustrated by its inability to capitalize on the burgeoning PC industry, IBM launched an alternative PC operating system called OS/2 Warp in 1994.[5] IBM ultimately abandoned OS/2, not because it was technologically inferior to Windows, but because it failed to attract a sufficient number of applications to make computer users switch from Windows.[6]

Despite Microsoft's success in suppressing challengers, in 1995 Microsoft's chairman and chief executive officer, Bill Gates, was nervous about an emerging threat to its empire. Microsoft was behind the curve on a new technology, the internet, which Gates correctly characterized as "the most important single development to come along since the IBM PC was introduced in 1981."[7] Internet users were connecting to the World Wide Web with a new program, the Netscape Navigator internet browser. Gates was nervous not merely because Microsoft was late to the internet party, but also because he was concerned that the browser was a Trojan horse that would break the applications barrier to entry by creating an alternative platform for software development.

Navigator is a type of software called middleware, which occupies a space between the operating system and applications. Like operating systems, middleware facilitates application software development by exposing application programming interfaces (APIs), which are routines that perform certain widely used functions. Unlike operating systems, the Netscape APIs were not specific to a particular operating system. Netscape employed a new programming language, Java, which allows applications to run on different operating systems.[8] Gates warned his colleagues within Microsoft that Netscape was "pursuing a multi-platform strategy where they move the key API into the client to commoditize the underlying operating system."[9] Netscape's cofounder, Marc Andreessen, fueled Gates's anxiety when he predicted that the browser would become a meta-operating system and reduce the Microsoft operating system to "an unimportant collection of slightly buggy device drivers."[10]

Microsoft should have welcomed Netscape, if not for the threat that it posed to the operating system. Internet browsing technologies are complements to other services provided by PCs, and in that respect they add value to Microsoft's operating system by giving consumers access to the World Wide Web. The concern that rattled Gates was the risk that Netscape would allow rival operating systems to benefit from the same network effects that fueled demand for Microsoft's operating system (namely, the benefits that users obtain from the ability to use a wide range of applications). Network effects had caused the PC market to tip to the Windows platform by the mid-1990s.[11] Gates understood that middleware such as Netscape, which promoted the use of the platform-independent Java programming language, could level the PC market and fracture the Windows monopoly.

Microsoft's initial response to the Netscape threat was an attempt to exclude Netscape from supplying browsers that operated with Windows operating systems. Microsoft executives met with top Netscape personnel in May 1995 and suggested that the companies divide the browser market, with Microsoft becoming the sole browser supplier for Windows in return for Microsoft refraining from competing with Netscape for browsers that work with other operating systems. Netscape did not accept Microsoft's offer.[12] Had Netscape accepted, antitrust authorities could have challenged the arrangement as a collusive market division.

Gates had another solution to plug the vulnerability in the applications barrier wall. Microsoft had its own browser, Internet Explorer (IE), but Netscape had gotten a head start; in 1996, IE accounted for only about 5 percent of internet usage. Netscape sold its browser at that time as a separate product, with a retail price of $49. Microsoft originally sold IE as a separate product as well, for use with Windows 95. But Gates could offer IE for free, as a bundle included with Windows 95, and Microsoft subsequently integrated IE into newer versions of its operating system. Windows was Microsoft's ace in the hole. Nearly every purchaser of an IBM-compatible PC wanted the computer to be equipped with the Windows operating system. By bundling IE with the operating system, consumers didn't pay extra for the Microsoft browser, but if they wanted Navigator as an add-on, they would have to pay an additional $49 or so. A senior Microsoft executive was quoted as saying, "We are going to cut off their air supply."[13] The Windows/IE bundle robbed Netscape of the demand (air) to pay for Navigator.

Microsoft employed numerous other tactics to suppress adoption of the Navigator browser and advantage IE in what came to be known as

the first "browser war."[14] Microsoft's efforts to suppress Netscape, along with improvements to IE, allowed the company to increase its IBM-compatible PC browser share from about 5 percent in 1996 to more than 50 percent by 1998.[15]

Section 2 describes the case filed by the DOJ and several states which alleged that Microsoft engaged in unlawful conduct to *maintain* its Windows monopoly. Section 3 describes a case brought by the EC, which raised a different concern: unlawful conduct by Microsoft to *extend* its monopoly in PC operating systems into the market for workgroup server operating systems.[16] While the DOJ and the states focused on efforts by Microsoft to prevent the adoption of platform-independent middleware, the EC focused on features of Windows that made it incompatible with non-Microsoft server software. The EC also pursued bundling allegations for media players and browsers.[17]

Section 4 examines the US and European antitrust allegations from an economic perspective. The antitrust authorities in both jurisdictions concluded that many aspects of Microsoft's conduct harmed innovation. Nonetheless, for the most part they applied conventional antitrust jurisprudence to evaluate whether Microsoft's conduct violated their antitrust laws. An exception is the refusal by the court of appeals in the US case to hold Microsoft liable for tying IE to the Windows operating system, which the court instead remanded for further analysis by the district court to account for efficiency justifications from selling software bundles or integrated software products.

A central premise in the US case—and to a lesser extent the European case—is the potential for browsers and other middleware to eliminate Microsoft's dominance of PC operating systems. That potential has not been realized. Nevertheless, the cases prevented Microsoft from extinguishing rival browsers and encouraged Microsoft to open its software products to interoperate with other products. The cases also affirmed the legal precedent that it is unlawful for dominant firms to extinguish nascent competitive threats without requiring proof that the threats are significant and likely to be realized.

The US and European plaintiffs settled their allegations without further litigation or harsh punishments such as a breakup. Section 5 asks whether the settlement was a lost opportunity. Although many criticized the settlement for being too soft on Microsoft, the terms of the settlement ended Microsoft's exclusionary conduct, facilitated competition for browsers and other middleware, and encouraged Microsoft

to support interoperable products. Section 6 concludes with lessons gained from the US case that are applicable to other competition issues in the high-technology economy.

2 *US v. Microsoft*

The DOJ sued Microsoft on May 18, 1998, for monopolizing the markets for PC operating systems and browsers in violation of Sections 1 and 2 of the Sherman Act. Nineteen states and the District of Columbia joined the suit. The complaint alleged that Microsoft excluded competition in browsers and PC operating systems by "tying" IE to Windows. The complaint alleged a tie even when Microsoft integrated IE into Windows because Microsoft refused to sell IE as a separate product (a "technological tie"). In addition, the complaint alleged that Microsoft excluded competition by entering into agreements with PC original equipment manufacturers (OEMs), internet service providers (ISPs), internet content providers (ICPs), and independent software vendors (ISVs) that favored IE and disadvantaged Navigator.

By 1999, when the case went to trial before Judge Penfield Jackson in the District Court of the District of Columbia, the DOJ and the plaintiff states had brought additional allegations that were not in the original complaint.[18] These allegations buttressed the plaintiffs' case that Microsoft sought to prevent the emergence of middleware that would enable applications that were not dependent on the Windows platform. An allegation aimed directly at the ability of the browser to break the applications barrier to entry addressed Microsoft's actions to subvert the adoption of Java to enable interoperable software. Microsoft licensed Java from Sun Microsystems and purported to promote Sun's platform-independent Java technologies. The government and the plaintiff states alleged that: Microsoft modified the Java programming language in a way that made it incompatible with Sun's implementation; entered into contracts with major ISVs to promote Microsoft's proprietary version of Java rather than any Sun-compliant version; did not adequately inform ISVs that its version of Java did not conform to the Sun implementation; and coerced Intel to stop working with Sun Microsystems to improve the Java technologies.[19]

The complaint specifically alleged harm to innovation from Microsoft's conduct. The harm included the following:[20]

- Impairing the incentive and ability of Microsoft's competitors to undertake research and development (R&D) by limiting their rewards from any resulting innovation
- Impairing the ability of Microsoft's competitors and potential competitors to obtain financing for R&D
- Inhibiting Microsoft's competitors that succeed in developing promising innovations from effectively marketing their improved products to customers
- Reducing the incentive and ability of OEMs to innovate and differentiate their products in ways that would appeal to customers
- Reducing competition and the spur to innovation by Microsoft and others that only competition can provide

Judge Jackson concluded that Microsoft engaged in a campaign of exclusionary conduct that "succeeded in preventing—for several years, and perhaps permanently—Navigator and Java from fulfilling their potential to open the market for Intel-compatible PC operating systems to competition on the merits"[21] and did not advance any legitimate business justifications for its conduct.[22] The threats that middleware and platform-independent Java programming tools posed to Microsoft were central to the court's findings, although the court acknowledged that "these middleware technologies have a long way to go before they might imperil the applications barrier to entry."[23]

The court held Microsoft liable for monopolizing the market for the worldwide licensing of Intel-compatible PC operating systems, and for attempting to monopolize the market for internet browsers, both in violation of Section 2 of the Sherman Act. In addition, it found Microsoft guilty of unlawful tying, in violation of Section 1 of the Sherman Act, by requiring consumers to take IE as a condition of obtaining Windows.[24]

Judge Jackson concluded:[25]

> While the evidence does not prove that [new competitors] would have succeeded absent Microsoft's actions, it does reveal that Microsoft placed an oppressive thumb on the scale of competitive fortune, thereby effectively guaranteeing its continued dominance in the relevant market. More broadly, Microsoft's anticompetitive actions trammeled the competitive process through which the computer software industry generally stimulates innovation and conduces to the optimum benefit of consumers.

The court accepted the plaintiffs' proposed remedy. In addition to a series of temporary conduct restrictions, the proposed remedy called

for the structural separation of Microsoft into two independent corporations, with one continuing Microsoft's operating systems business and the other undertaking the balance of the company's operations.[26]

Microsoft appealed. The court of appeals sustained the district court finding that Microsoft monopolized the market for the licensing of Intel-compatible PC operating systems, but it rejected the finding that Microsoft attempted to monopolize the market for internet browsers, largely because the plaintiffs did not establish a separate market for internet browsers or show why such a market, if it existed, could be monopolized. The court also refused to affirm Judge Jackson's finding that Microsoft engaged in a per se illegal tie when it bundled the sale of IE with Windows 95, and later when Microsoft integrated IE into Windows 98.[27]

In rejecting the per se rule for the tying of software products, the court of appeals noted, "We do not have enough empirical evidence regarding the effect of Microsoft's practice on the amount of consumer surplus created or consumer choice foreclosed by the integration of added functionality into platform software to exercise sensible judgment regarding that entire class of behavior."[28] The court remanded the tying issue for a rule of reason analysis that would have accounted for efficiency justifications from selling software bundles or integrated software products, but the parties ultimately agreed to a settlement that preempted this evaluation.

A key issue in the case was whether Microsoft undermined industry adoption of a platform-independent Java programming language by supporting a proprietary version of Java and encouraging software developers to use its version rather than the platform-independent version promoted by Sun Microsystems. Judge Jackson held that these actions were part of an overall scheme to monopolize the markets for Intel-compatible operating systems and internet browsers. The court of appeals agreed that Microsoft's actions with regard to Java were exclusionary, but it held that "a monopolist does not violate the antitrust laws simply by developing a product that is incompatible with those of its rivals" and that Microsoft had sufficient legitimate reasons to promote its modified version of Java to escape a finding of antitrust liability.[29]

On the critical issue of the structural remedy, the court of appeals ruled that the district court failed to hold a hearing on the likely consequences from the ordered relief and failed to provide an adequate explanation for the order. Accordingly, the court of appeals vacated the court's remedy order in its entirety and remanded the case with instructions to conduct a remedies-specific evidentiary hearing and a new

determination in light of the appellate court's more limited findings of liability.[30]

Judge Jackson had several interactions with the press during the Microsoft trial, in which he lambasted Microsoft's conduct. At one point, he likened the structural remedy to training a mule by hitting it with a two-by-four to get its attention. The court of appeals took issue with his comments to the press and remanded the case to a different district court trial judge for the hearing on remedies.

A full hearing on remedies never occurred. The Antitrust Division of the DOJ and nine state plaintiffs agreed to a settlement that abandoned the structural remedy in favor of imposing a number of behavioral conditions. Nine other plaintiff states returned to the courthouse to litigate a more severe remedy, but they agreed to a Final Judgment (Settlement) in November 2002 that differed only slightly from the one proposed by the Antitrust Division and the nine settling states.[31] The Final Judgment included requirements that Microsoft not punish OEMs or ISVs for supporting competitive products. Microsoft agreed to give OEMs flexibility in the way that they display icons, shortcuts, and menu options, including the promotion of non-Microsoft middleware. Furthermore, the Final Judgment compelled Microsoft to disclose APIs, communication protocols, and the related documentation necessary for middleware to communicate with the operating system and with a Microsoft server operating system product; and it also obligated Microsoft to license any intellectual property that was necessary to supply the relevant interoperability information at reasonable and nondiscriminatory terms.[32]

3 The European Commission Enters the Fray

In December 1998, the EC opened an investigation into allegations that Microsoft harmed competition by (1) unlawfully tying its Windows Media Player (WMP) to the Windows operating system and (2) designing Windows 2000 to make it incompatible with rival workgroup server operating systems. The EC ultimately held that both allegations were an abuse of dominance, in violation of European antitrust law.[33]

The tying claim paralleled the browser-tying allegation in the US case, but it had a different outcome. In the US case, the court of appeals acknowledged potential efficiency justifications for the tying of software products and remanded the district court's decision for further review under the rule of reason. The EC considered, but rejected,

Microsoft's tying defenses. The EC did not credit Microsoft's claim that the WMP was an integral component of Windows, or that the tie lowered consumer transaction costs by providing the WMP as a convenient default option. Furthermore, the EC did not consider whether other media players could compete without charging fees (e.g., by collecting revenues for advertising or content).

The EC ruled, "The tying of WMP … shields Microsoft from effective competition from potentially more efficient media player vendors, which could challenge its position, thus reducing the talent and capital invested in innovation in respect of media players." In addition to a fine for abuse of dominance, the EC settled the WMP allegation by requiring Microsoft to sell a version of Windows without the media player, which it did at the same price. Not surprisingly, there were few sales of the bare-bones version of Windows.[34]

In response to the interoperability allegation, the EC concluded that Microsoft's failure to provide interoperability information imposed a competitive disadvantage on rivals in the market for workgroup servers, in violation of European antitrust law.[35] The EC rejected Microsoft's claim that some of the information was protected by intellectual property and that Microsoft's decision not to license its intellectual property was an objective defense to the interoperability allegation.[36] In 2004, the EC ordered Microsoft to offer to potential rivals, with no expiration date, "complete and accurate specifications for the protocols used by Windows work group servers in order to provide file, print, and group and user administration services to Windows work group networks"[37] and to license them at reasonable and nondiscriminatory terms.[38]

In 2008, the EC opened new Microsoft investigations into the tying of the IE browser to Windows and the disclosure of interoperability information.[39] The latter ended in response to voluntary commitments by Microsoft to supply information to improve interoperability between third-party products and several Microsoft products, including Windows, Windows Server, Microsoft Office, Microsoft Exchange, and Microsoft SharePoint.[40] The browser tying investigation was settled after Microsoft agreed to pay fines and include a "ballot box" in its start-up display that allowed users to install different browser products and choose a default browser.[41] That obligation expired at the end of 2014,[42] and aptly so because IE's share of browser usage was half that of the Google Chrome browser by that date.[43]

The interoperability allegations and resulting settlements have special significance because they addressed conduct that is difficult to

reach under US antitrust law but nonetheless affects the ability of firms to compete in a critical sector of the information economy. US antitrust law imposes few obligations on firms to license intellectual property or otherwise assist their competitors. In *Verizon v. Trinko*, the plaintiff alleged that Verizon had discriminated against rivals that sought to compete in local telephone markets by delaying or impeding their connections to Verizon's lines. The US Supreme Court held that Verizon's failure to accommodate rivals was not unlawful exclusionary conduct. In its 2004 opinion, the Court said, "Firms may acquire monopoly power by establishing an infrastructure that renders them uniquely suited to serve their customers. Compelling such firms to share the source of their advantage is in some tension with the underlying purpose of antitrust law, since it may lessen the incentive for the monopolist, the rival, or both to invest in those economically beneficial facilities."[44]

European antitrust law is more accommodating to allegations that dominant firms have a duty to assist their rivals.[45] As precedent for its decision that Microsoft harmed competition and innovation by withholding interoperability information, the EC cited a commitment by IBM in the early 1980s to disclose sufficient interface information to competitors in the European Community to enable them to attach their hardware and software products to IBM's System/370 mainframe.[46] The EC also cited a 1991 European Software Directive, which, with regard to limitations on the rights of copyright holders, states the objective "to make it possible to connect all components of a computer system, including those of different manufacturers, so that they can work together."[47]

There are other cases in which the EC asserted a duty for dominant firms to assist rivals. In a 1993 decision, the EC ruled, "An undertaking in a dominant position may not discriminate in favour of its own activities in a related market."[48] In two prominent cases that preceded the Microsoft decision, the EC ruled that copyright protection did not immunize owners from an obligation to share information with their rivals.[49]

4 An Economic Assessment of the US and European Antitrust Litigation against Microsoft

The Microsoft litigation was one of the most important episodes of antitrust enforcement action in the high-technology economy. This section offers an economic perspective on whether the litigation effectively addressed key competition issues, with a focus on innovation.

Did the US courts enforce the antitrust laws to promote innovation?

The complaint filed by the DOJ and several states highlighted concerns about the effects of Microsoft's conduct on innovation in the PC industry. Judge Jackson's Findings of Fact mentions "innovation" no less than thirty times. The court of appeals introduced its opinion with the statement, "We decide this case against a backdrop of significant debate amongst academics and practitioners over the extent to which 'old economy' §2 monopolization doctrines should apply to firms competing in dynamic technological markets characterized by network effects" and noted that "competition in such industries is 'for the field' rather than 'within the field'." The court also cited Joseph Schumpeter to support the proposition that monopoly may be a temporary phenomenon in these types of markets.[50] In reaching its opinion, however, the court of appeals did little to assess whether Microsoft's conduct promoted or harmed innovation.

The court of appeals applied a rule of reason analysis to three elements related to the design of IE and Windows: (1) Microsoft's elimination of IE from the Add/Remove Programs utility in Windows 98, (2) the comingling of software code for Windows and IE, and (3) Microsoft's refusal to allow OEMs to uninstall IE or remove it from the Windows desktop. The court sustained findings that the first two elements had anticompetitive features and that Microsoft did not proffer procompetitive justifications. For the third element, the court recognized Microsoft's procompetitive justifications and held that the plaintiffs did not meet their burden to demonstrate anticompetitive effects.[51] The court avoided the difficult task of balancing anticompetitive effects and procompetitive justifications from Microsoft's product design decisions. In all three instances of design-related conduct that the court examined closely, it found either an anticompetitive effect or a procompetitive justification, but not both.[52]

A different element of the court's decision affirmed a valuable precedent for the evaluation of innovation and future competition. The court sustained the verdict that Microsoft unlawfully maintained its monopoly in IBM-compatible PC operating systems by eliminating the *nascent* threat posed by Netscape and other middleware. The court did not require evidence of harm to actual competition, nor did the court require proof that potential harm to competition was likely.

Should the courts have gone further to assess innovation concerns? There was no dispute that Microsoft was a highly innovative company

when the DOJ and the states filed suit. From 1994 to 1996, Microsoft invested almost 15 percent of its revenue in R&D, which was far above the average R&D intensity in manufacturing, and spent millions of dollars to develop and improve IE. Microsoft was compelled to innovate in order to sell operating system software to new customers and upgrades to its installed base of customers that already owned a computer with Windows.

The relevant question for antitrust enforcement is not whether Microsoft was an innovative company, but whether Microsoft's challenged practices hindered innovation. Chapter 3 explains that a firm with monopoly power might invest heavily in R&D to preempt new competition. As a monopolist, Microsoft had more to gain by preventing competition than rivals could expect to achieve by competing head-to-head against Microsoft. But Microsoft did not preempt competition by innovating more than its rivals. Instead, Microsoft entered into contractual arrangements to limit Netscape's access to key distribution channels and to impede the adoption of platform-neutral software. This is exclusionary contracting, not preemptive innovation.

Antitrust enforcement for exclusionary contracts can alter the trade-offs among incentives to create a new product, incentives for subsequent innovators, and the consumer benefits from the innovations. Weak antitrust rules that allow a firm to lawfully exclude rivals increase the incentive to invent by increasing the profit from the innovation. But weak antitrust rules also allow an incumbent to exclude subsequent innovators and charge high prices.[53]

Finding the optimal balance between rewards for initial and subsequent innovation can be a challenging task in the real world of antitrust enforcement.[54] Nevertheless, it is clear that Microsoft profited handsomely as a successful incumbent, and its conduct erected barriers to subsequent innovators. It was far more important for antitrust enforcement to increase the opportunity for firms to compete within the PC field rather than allow Microsoft to profit by shielding itself from competition. There is no evidence that Microsoft's exclusionary conduct was justified because it increased the company's incentive to innovate.

There is an argument that antitrust enforcement against Microsoft was futile because network effects in the PC industry would make a dominant supplier an inevitable market outcome. In fact, experience shows that rivals can coexist, but this argument would be flawed even if the market were winner-take-all. Competition *for* the market is a spur to innovate notwithstanding that powerful network effects may shield the successful innovator from further competition *in* the market. Absent

Microsoft's exclusionary conduct, rivals have large incremental payoffs from R&D, which can make the difference between a large return or no return at all if another rival is first to capture the market. This larger incremental return from R&D is a spur for innovation in a competitive market.

The district court held that Microsoft's agreements contributed to monopolization, in violation of Section 2 of the Sherman Act, but held that they did not violate Section 1 of the Sherman Act because they did not substantially foreclose competition. Considering the role of network effects in the PC industry, an economic case can be made that the agreements also should have been held unlawful under Section 1 because, if the agreements were allowed to persist, their exclusionary effects would have been sufficient to tip the market to IE and prevent competition from Netscape and other platform-independent middleware.

Microsoft develops and operates Windows as a platform that coordinates applications developers, device manufacturers, and computer users. Neither Judge Jackson nor the court of appeals specifically analyzed Microsoft's conduct as a platform, perhaps because platforms were not part of the vernacular at that time. A two-sided analysis may have affected a finding of liability related to the integration of Windows and IE (which the appellate court remanded for further analysis). The integration of IE with Windows made APIs available to software developers to implement internet functionality, such as code that executes Hypertext Markup Language (HTML) files. This is a benefit that accrues to the application side of the Windows platform at the possible expense of computer users and OEMs that would prefer IE to be less integrated with Windows. It is unlikely, however, that a two-sided or multisided analysis would have reversed the finding that Microsoft's exclusionary contracts violated the Sherman Act. There is no evidence that Microsoft's restrictive agreements promoted innovation on either side of the Windows platform.

At a general level, economic theory regarding the effects of competition on innovation incentives supports the allegations brought by the DOJ and several states against Microsoft and the findings of antitrust liability.

The European Commission case: Did interoperability obligations promote innovation?

The EC stressed the procompetitive benefits from its decision to require Microsoft to supply interoperability information to facilitate competition for workgroup servers and media players. The EC rejected Microsoft's

defense that it had no obligation to license its protocols, some of which were protected by intellectual property rights, and stated:[55]

> If competitors had access to the refused information, they would be able to provide new and enhanced products to the consumer. In particular, market evidence shows that consumers value product characteristics such as security and reliability, although those characteristics are relegated to a secondary position due to Microsoft's interoperability advantage. Microsoft's refusal thereby indirectly harms consumers.

The EC rejected the concern that obligations imposed on Microsoft to assist rivals by providing interoperability information would undermine innovation incentives and conflict with the objectives of intellectual property protection.

The US and Europe are an ocean apart regarding obligations of dominant firms to assist their rivals. US law is arguably too accommodating to conduct by dominant firms that excludes rivals, while European antitrust law fails to identify the conditions under which an obligation to assist rivals is procompetitive. Nonetheless, even if failure to support interoperability is not an antitrust *violation*, a requirement to support interoperability is a valid *remedy* for anticompetitive conduct.

The purpose of a remedy is to restore competition and deter future anticompetitive conduct. It is difficult to restore competition that might have occurred if Microsoft had not squashed the threat from Netscape and platform-independent middleware, both because the middleware threat was an exceptional opportunity to erode Microsoft's monopoly and because in an industry such as PC operating systems with powerful network effects, merely bringing an end to exclusionary practices is not sufficient to reverse ill-gotten gains. An interoperability requirement is a forward-looking remedy that prevents Microsoft from extending its unlawfully maintained dominance in client operating systems into workgroup servers. In theory, at least, it is one of the most important elements of the settlements that resolved the US and European antitrust cases. In practice, the EC and the plaintiffs in the US case encountered numerous difficulties regarding enforcement of these interoperability requirements.

Two years after the EC required that Microsoft supply complete and accurate interface information that would allow non-Microsoft workgroup servers to achieve full interoperability with Windows PCs and servers, the EC concluded that Microsoft had not provided sufficient technical documentation to allow competitors to develop interoperable

servers. It also held that Microsoft's license fees were excessive, before the company reduced them in October 2007, three years after the EC settlement decree. The EC fined Microsoft 899 million euros for its noncompliance.[56]

A report on the effectiveness of the Final Judgment that settled the US case also alleged that Microsoft did not live up to its obligations to supply interoperability information.[57] The Final Judgment originally had a five-year term expiring in November 2007, but at the end of the decree's original term, a technical committee established to monitor compliance identified hundreds of instances in which Microsoft had not disclosed adequate documentation to guide interoperability.[58] In response to these and other concerns, Microsoft agreed to extend selected provisions of the Final Judgment governing the licensing of client-server communications protocols until November 2009. The presiding judge added another extension until May 2011.

The disclosure and licensing obligations included in the settlements of the US and European Microsoft litigation had the potential to restore competition and promote innovation for PC and workgroup operating systems. Unfortunately, they were too limited in scope to promote substantial competition and the requirements were not clearly specified, which led to lengthy and complex disputes over the required disclosures, the necessary degree of documentation, and reasonable licensing terms. It is possible that broader disclosure obligations would have been more effective and easier to enforce, with results more similar to the positive outcomes from compulsory licensing obligations in the 1956 AT&T and IBM consent decrees and the 1975 Xerox consent decree (see chapter 6).

The middleware threat to Microsoft

A criticism of *US v. Microsoft* is that the case was built on a false premise: that Navigator and other middleware products would eliminate the applications barrier to entry that protected Microsoft from competition for operating system software. This presumption was present, albeit to a lesser extent, in the European litigation as well. More than a dozen years after the DOJ, in concert with the plaintiff states, and the EC settled their allegations against Microsoft, this promise has yet to be fully realized.

Furthermore, developments occurred in the PC industry that promote interoperability and do not require Java. Microsoft has continued to support the Office productivity suite for Apple computers as

well as Windows-based PCs, and has supported protocols such as Open Office XML that allow computer users to open and save documents between Microsoft Office applications within the same platform and between platforms (such as Microsoft Word for Windows and for Apple operating systems). Open-source programs such as the Apache Open Office productivity suite also facilitate porting work product between different computer platforms.

Browsers have evolved and expanded functionality without providing standardized support for Java.[59] Google offers a suite of productivity applications that users can access with the Chrome browser from any platform that runs it.[60] Many other important applications are cloud-based, including products and services offered by Salesforce.com, Dropbox, and Adobe. There are also document creation tools, financial software, and websites for hosting software development tools and collaboration. These applications reside on remote servers and can be accessed by a client with little computing power. In this respect, they come close to the world without an applications barrier to entry envisaged by the plaintiffs in the Microsoft case.

Although the threat that Netscape and Java would eliminate Microsoft's grip on PC operating systems did not materialize, it was correct as an economic matter to hold Microsoft liable for its conduct. The company's restrictive contracts had little (if any) efficiency justification. Importantly, if Microsoft had been absolved of any antitrust liability, it could have continued its restrictive practices, which would have erected entry barriers to new competition from browsers and internet applications.

In summary, the antitrust cases filed against Microsoft in the US and Europe promoted competition and innovation in the computer industry even if they were based on flawed predictions about the evolution of the industry.

Microsoft's efforts to fragment Java

The district court found that Microsoft sought to defeat industry adoption of a platform-independent Java by effectively splitting the Java standard. The court of appeals agreed that Microsoft harmed competition by deceiving Java developers about the cross-platform portability of its proprietary Java implementation and by coercing Intel to stop assisting Sun Microsystems to improve the Java technologies. It also affirmed that these actions supported a finding that Microsoft engaged in unlawful monopolization in violation of the Sherman Act. However,

the court refused to affirm the district court ruling that Microsoft committed an anticompetitive act by designing a Java virtual machine (JVM) that was proprietary to the Windows platform. The court of appeals followed precedent in US antitrust law that even monopolies have broad discretion to choose their product designs and innovations. Moreover, the court of appeals found that Microsoft had an efficiency justification for its Java design because its efforts improved the performance of Java for Windows environments.

Based on the logic of the case and the objective to restore competition lost by Microsoft's conduct, the Final Judgment reasonably could have required Microsoft to offer support for Sun's Java implementation without prohibiting the company from promoting its own version of Java. The monopolization case against Microsoft focused on the company's efforts to prevent the Netscape browser and other Java-based middleware from breaking the applications barrier to entry. The promise of a nonproprietary Java platform was at the crux of the case. Had Microsoft not splintered the Java standard, it is possible that Java would have fulfilled its promise to become a platform for the development of easily portable PC applications.

Rule of reason treatment for tying

Economics offers several arguments for why product tying and its close cousins, bundling and technological tying, can have anticompetitive effects. By requiring a customer to purchase both the operating system and the IE browser as a package, the benefit to a customer from a different browser is no greater than the incremental value of the alternative browser relative to IE.[61] This is how the tie cuts off a rival's "air supply" and makes rival entry more difficult if the rival has to charge a price to cover its cost. The net benefit from an alternative to IE could be even less than its incremental value if the customer has transaction costs to purchase and install the rival browser, or if disk space limitations or compatibility issues impose additional costs.

It is often more profitable for a firm to offer customers the option to purchase products separately rather than as a tied sale because this allows a firm to more profitably sort customers according to their willingness to pay for the products.[62] If a firm with monopoly power refuses to offer this option, it raises a plausible concern that the intent of the tie is to exclude rivals by making entry more difficult. Of course, this is hardly definitive evidence in support of monopolistic intent because it is common for firms that have no significant market power

to offer products only as a bundle, and such firms could not successfully employ bundling to monopolize a market.[63]

A related intent argument is that Microsoft should have had an incentive to work with, rather than against, Netscape because the Navigator browser was a product which, like other complementary applications, added value to the Windows operating system. The fact that Microsoft took numerous measures to impede Netscape suggests that Microsoft was more concerned that Navigator would create a path for competition with Windows rather than adding value to Windows.[64]

Similar arguments for and against pure bundling apply to technologically integrating the operating system and the browser. There are innocent reasons for a technological tie. Microsoft could have anticipated that nearly all consumers would want the browser with the operating system and may have viewed a bundled offering as a positive step that would satisfy consumer demand. Offering the browser separately would impose transaction costs and make it more difficult for consumers to access the internet to install products and upgrades. Furthermore, a separate browser product would incur additional product support costs. Today, the notion that operating systems should be available without internet browsers is as antiquated as the notion that word processing programs should not include spell-checkers or that cell phones should not include cameras.

These benefits from integration do not excuse Microsoft for engaging in practices that excluded competition from Netscape and other middleware, but they support the conclusion of the court of appeals that software bundling and product integration should not be treated as per se unlawful. The court correctly remanded the tying allegations for analysis under a rule of reason standard, although the Settlement preempted that evaluation.

5 Was the Final Judgment a Lost Opportunity?

The Final Judgment that resolved *US v. Microsoft* did not accommodate the plaintiffs' initial request to cleave Microsoft into separate operating system and application companies. Some believe that the divestiture would have created incentives for the independent applications company to port applications to competing operating systems and for the operating system company to facilitate competition in applications and middleware.[65] As an integrated supplier of operating systems, application software, and middleware, Microsoft has an incentive to

exclude or disadvantage rival products.[66] The divestiture would have eliminated or significantly reduced the incentive for Microsoft to preference its own applications and middleware.

Although the more modest conditions in the Settlement elicited harsh criticism,[67] the proposed divestiture could have raised prices and diminished innovation and would have had large administrative costs. An independent supplier of the Microsoft Office productivity suite would not account for the positive effect of a lower price for the Office suite on the demand for the Windows operating system, and vice versa for the operating system company. A single company that sells both the operating system and the Office suite would take these positive interactions into account and likely choose a lower profit-maximizing total price for both products. This is the "Cournot complements effect" discussed in chapter 2. A similar Cournot complements effect would apply to innovation incentives for the operating system and complementary applications under reasonable assumptions about demand.[68]

If the Settlement had required the divestiture, courts would have had to interpret and enforce the restrictions on line-of-business activities, including the technical requirements that define an operating systems company, an application, and middleware. Howard Shelanski and Gregory Sidak maintain that interpretation and enforcement of the proposed structural remedy would have been at least as onerous as the interpretation and enforcement of the 1982 consent decree that provided the framework for the dissolution of the Bell System.[69] Furthermore, the telecommunications industry eventually recreated the vertically integrated structure of the pre-divestiture Bell System following the Telecommunications Act of 1996. It is likely that similar reintegration would have followed structural separation of Microsoft, with network effects driving businesses and consumers to support a dominant supplier.

Although a vertically integrated firm has an incentive to disadvantage its rivals, an independent monopoly supplier of the operating system can have an incentive to squeeze independent suppliers of complementary applications by charging a high price for the operating system or by investing aggressively in R&D to develop complementary products, if it is permitted to do so. An independent operating system monopolist has an incentive to invest aggressively in complementary applications because, even if its R&D fails to produce the best applications, it can create products that discipline market prices, which allows the firm to extract a higher price for the operating system. It is a case

of "heads I win, tails you lose." Total industry innovation could suffer from an independent monopoly supplier's aggressive conduct.[70]

Integration of the operating system and applications facilitates coordination of R&D effort and promotes knowledge flows between complementary activities. Integration also can mitigate "holdup" that can occur when an independent firm makes R&D investments and subsequently bargains over the division of profits between the inventor and a user or other beneficiary of the invention. Holdup refers to strategic bargaining after the counterparty has made large and unrecoverable expenditures, such as investments in R&D. Because the investments are costs that have been spent in the past and cannot be recovered, the party that made these investments does not have a credible threat to reject a bargain merely because it does not compensate these costs. The risk of holdup in future negotiations can discourage independent R&D investment. An integrated firm does not have an equivalent risk of strategic bargaining.[71]

The Final Judgment could have been tougher on Microsoft, but the Settlement and the threat of continued oversight by US and European antitrust enforcers had beneficial consequences for competition and innovation. The prohibitions on restrictive agreements in the Final Judgment likely facilitated competition for internet browsers. Google Chrome is the most popular internet browser by a large margin[72] and delivers some of the promise of *US v. Microsoft* by enabling web-centric applications, many of which are powered by servers that run Unix and Linux operating systems. David Heiner, writing as Deputy General Counsel at Microsoft, explained a Microsoft commitment to interoperability embodied in a 2008 policy statement in part by the desire to attract developers to Microsoft's platform and in part by ongoing competition law scrutiny.[73]

Structural divestiture of Microsoft into separate operating and application companies might have eventually led to greater competition and more innovation in the PC industry, although that outcome is highly uncertain and divestiture would have created inefficiencies, at least in the near term, and would have had large administration costs. It is unfortunate that the district court approved the plaintiffs' proposal to break up Microsoft without a hearing. Consequently, there is no record to evaluate the merits and costs of the proposed divestiture, which led the court of appeals to vacate Judge Jackson's order and remand the case to the district court with instructions to consider a remedies-specific evidentiary hearing (which the Settlement preempted).

6 Lessons from *US v. Microsoft*

US v. Microsoft illustrates several themes that are generally relevant to competition policy for the high-technology economy and that appear repeatedly in this book in the context of other antitrust enforcement actions that allege harm to innovation or future price competition. I list several of these themes in this section.

The importance of protecting nascent competition

The district court took a hard line about attempts to eliminate nascent competition from Netscape Navigator and Java, without regard to whether that competition was likely to be realized. Judge Jackson opined that "it is not clear whether, absent Microsoft's interference, Sun's Java efforts would by now have facilitated porting between Windows and other platforms enough to weaken the applications barrier to entry. What is clear, however, is that Microsoft has succeeded in greatly impeding Java's progress to that end with a series of actions whose sole purpose and effect were to do precisely that."[74]

The court of appeals agreed. The higher court explained:[75]

> The question in this case is not whether Java or Navigator would actually have developed into viable platform substitutes, but (1) whether as a general matter the exclusion of nascent threats is the type of conduct that is reasonably capable of contributing significantly to a defendant's continued monopoly power and (2) whether Java and Navigator reasonably constituted nascent threats at the time Microsoft engaged in the anticompetitive conduct at issue. *As to the first, suffice it to say that it would be inimical to the purpose of the Sherman Act to allow monopolists free reign to squash nascent, albeit unproven, competitors at will—particularly in industries marked by rapid technological advance and frequent paradigm shifts*.

The court's condemnation of Microsoft's conduct without requiring evidence of actual or likely competition from Java and Netscape is an important precedent for antitrust enforcement in high-tech industries. Dominant firms are often able to identify nascent competitive threats in these industries and eliminate them before they mature into significant competitors. The appellate court in *US v. Microsoft* confirmed that the antitrust laws can block conduct that threatens competition in dynamic industries without requiring plaintiffs to establish with a high degree of certainty that the threatened competition would have had a significant effect on market outcomes. That precedent can reasonably apply to acquisitions by dominant firms of potential competitors,

despite the absence of a track record to establish that the acquired firms would be significant rivals if they remained independent.

Innovation is hard to predict

This may be obvious, but antitrust enforcers should not forget that innovation evolves in unexpected ways and from unexpected sources. Innovations change the ways that firms compete and frustrate attempts by courts to define markets that describe where future competition is likely to occur.

The computer industry evolved in ways that the DOJ and plaintiff states did not envisage in their complaint. Apple is a more significant competitive force than it was in 1998, and PCs face new competition from smartphones and other portable devices. Consumers no longer purchase browsers at computer stores. Cloud computing has transformed the industry by providing a remote server-based platform for applications that is agnostic to the client's desktop operating system. Cloud computing has achieved some of the objectives of the Microsoft antitrust litigation by moving applications off the desktop. But cloud computing has not commoditized the operating system, and it owes its success more to industrywide internet protocols than to adoption of a common Java technology. Events did not prove that the applications barrier to entry for PC operating systems would have evaporated if Microsoft had not "cut off Netscape's air supply."

Nevertheless, and despite the fact that the antitrust investigations of Microsoft may have lagged the pace of the computer industry, there were valid reasons to challenge Microsoft's conduct. A virtue of the Microsoft antitrust litigation is that the case proved to be robust to different futures for the PC industry. Browsers have not replaced operating systems, but they have evolved in their own right to become a valuable and diverse product category. Microsoft's conduct, if left unchecked, could have harmed consumers in many ways, such as by constraining the ability of software developers to support other computer platforms and by enforcing proprietary protocols to defeat interoperability. It is unlikely that firms and consumers would have the spectrum of choices they enjoy today if the courts had not constrained Microsoft's behavior.

Conventional analysis is suitable for some monopolization cases that involve innovation

Both the district court and the court of appeals identified innovation as a central concern in the Microsoft case, but the case mostly turned on

classic antitrust jurisprudence for enforcement of the Sherman Act. The courts did not explicitly consider whether innovation concerns justify greater tolerance for restrictive practices by dominant firms or whether they amplify conventional concerns that focus on price effects, with the exception of special treatment for the tying of software products.

Fortunately, innovation concerns do not typically justify exceptional treatment for monopolizing conduct. In industries such as computer software, dominant firms benefit from entry barriers that insulate them from price and innovation competition. Examples of these barriers include brand-specific network effects, such as the Windows ecosystem, which rewards loyalty to Microsoft's software products. Patent protection, economies of scale, and reputation also work to protect established firms from competition. Artificial entry barriers, such as exclusive dealing arrangements and intentional system incompatibilities, further shield established firms in these industries from price and innovation competition.[76] While there may be circumstances in which artificial entry barriers have efficiency benefits, a reasonable starting presumption for competition policy is that such barriers are not necessary to promote innovation. There are many other ways for firms to capture value that do not require conduct that excludes rivals.

The Arrow replacement effect teaches that an incumbent firm's profits deter investment in a new product that would replace the firm's existing profits. Weak antitrust enforcement is at least as likely to increase an incumbent's profits from its existing products as it is to increase profits from new products. Therefore, it is likely that the net effect of weaker antitrust enforcement would be to increase the Arrow replacement effect and deter innovation by an established firm.

Firms that are new to an industry have stronger innovation incentives than established firms if they can obtain comparable benefits from successful inventions. New entrants do not have profits that are at risk from innovation: They do not suffer from the Arrow replacement effect. Established firms can neutralize new entrants' strong innovation incentives if they engage in strategic conduct, such as exclusive dealing or predatory pricing, that denies entrants the ability to profit from their inventions.

These arguments bolster the case for strong antitrust enforcement to prevent exclusionary conduct by dominant firms that would threaten innovation. Of course, there are exceptions, but a good first approximation is that exclusionary conduct by a monopolist that would harm consumers in the absence of innovation concerns is also likely to harm consumers by reducing the incentives of the monopolist to innovate.[77]

Platform competition does not always necessitate a two-sided market analysis

The Windows operating system is a platform that connects computer users to computer applications and device manufacturers. Nonetheless, the Microsoft litigation did not turn on two-sided economic issues. Microsoft's exclusionary contracts, its tying and integration of the operating system and the browser, and its splintering of the Java standard were about preventing a potential competitive threat from middleware. It is unlikely that a careful consideration of two-sided interactions would have uncovered platform interaction effects that would justify reversing the courts' conclusions. Two-sided platforms raise important issues related to complementary activities, but not every litigation involving a platform market requires a two-sided analysis.

There is a fine line between complementors and competitors

Complementary products and services add value to a firm that sells or licenses a complementary product or service, but complements can also create a path for new competition. That was Microsoft's worry about Navigator. The Microsoft case exposes one of many flaws in the theory of "one monopoly profit" advanced by conservative antitrust enforcers. Under that theory, the monopoly supplier of a product, such as an operating system, has no incentive to exclude competition from efficient suppliers of complementary products (such as software applications or workgroup servers), because the monopolist can charge a price that extracts the contribution made by the complementary products to the value of the combined system.

The one monopoly profit theory fails when the complementors are a potential threat to the monopolist's market dominance. Netscape threatened Microsoft's dominance with a browser product that could break the applications barrier to entry. Workgroup servers are a threat because they can marginalize the desktop operating system by running applications on a network. The one monopoly profit theory can fail for other reasons. For example, competition can interfere with the monopolist's ability to charge usage-dependent prices, and a monopoly supplier can have inefficient incentives to invest in R&D for complementary products.[78]

Concerns about competition from complementors have appeared in other antitrust cases. Examples include a number of older cases in which firms sold peripheral equipment, such as disk drives and printers, that were plug-compatible with IBM mainframes, meaning that

they could be easily connected to and interoperate with the mainframe. These components added value for IBM, but they also provided entry points for competitors and limited IBM's discretion to impose usage-dependent prices.

Standards and interoperability are critical for innovation but difficult to regulate

The Microsoft cases raise two separate issues related to standards and interoperability. One is the allegation that Microsoft engaged in conduct that splintered the Java programming language. The appellate court held that Microsoft's conduct with respect to Java was anticompetitive, but the court did not require Microsoft to support a common implementation of the Java technologies. The court's opinion reflected a reluctance to regulate adherence to industry standards and is consistent with a view that competition policy should not prevent firms from developing their own solutions, even if those solutions cause a standard to fragment. That policy hinges more on the difficulty of regulating compliance with an industry standard than on the desirability of an industrywide standard. The court could have obligated Microsoft to support a common Java standard without preventing Microsoft from developing its own Java implementation. The EC followed this type of approach when it compelled Microsoft to offer a ballot box that allowed consumers to choose among different browsers.

A second standards-related issue is the requirement in the Final Judgment that settled the US case and in the decision by the EC that Microsoft support interoperability between Windows operating systems and non-Windows server operating systems and other products. Although the US case did not challenge conduct by Microsoft that impeded server interoperability, the obligation to disclose server-related information and to license related intellectual property at reasonable and nondiscriminatory terms is an important and forward-looking element of the Final Judgment.

The compulsory licensing obligations in the Final Judgment and the EC decision did not warrant concern that they would severely undermine Microsoft's innovation incentives. The protocols and related information at issue do not allow a firm to clone a Microsoft product. Rather, they provide information necessary to facilitate a large ecosystem of complementary products and services. Unfortunately, these obligations turned out to be the most difficult conditions to enforce. One difficulty was the lack of experience in documenting and licensing

technology necessary for interoperability. While Microsoft had a history of making APIs available to programmers (because it was in its interest to do so), there was no corresponding history for documenting and licensing interoperability technology. Problems arose in identifying as well as adequately documenting the required technologies, defining the breadth of licenses, and determining reasonable royalty structures.[79]

Experience with the interoperability requirements in the Microsoft cases has implications for enforcement actions in other cases. Enforcement of obligations to supply interoperability information and relevant intellectual property is administratively difficult unless the obligations are specified very clearly, or they are so general that they do not raise questions about the information and intellectual property licenses that must be supplied or the scope of the requirements.

The ease of integrating into related technological areas makes these cases difficult

The ease with which firms that hold a dominant position in a digital technology can extend their dominance by integrating into related markets is a vexing challenge for antitrust enforcement. In many industries, integration into a related market involves large investments and continuing costs to manufacture, market, and distribute the related products. Computer software and digital services more generally are different. While software vendors can have large upfront costs to develop a new product, the incremental costs of producing, marketing, and distributing the product can be very low. It is not costly to bundle a media player, paint program, or spell-checker with the release of a software product such as Windows or Office. It was also a relatively low cost for Microsoft to include IE on the same CD with Windows 95 and to integrate code for IE into Windows 98 and subsequent operating systems. Consumers can benefit from the low cost of distributing the new product, but the integration can also foreclose actual and potential rivals in the new market, diminish competition, and harm subsequent innovation.

Many tech platforms can scale up easily and expand rapidly into new activities at relatively low incremental cost. Because many tech platforms can easily integrate into new applications, they can often copy start-ups that attempt to compete, which deters independent innovation unless the intent is to sell the innovation to an incumbent platform. The ease of integrating into related technological areas complicates antitrust enforcement that seeks to prevent dominant firms from monopolizing related markets. It is often difficult for antitrust enforcers

to determine when related activities constitute separate markets in which competition may be harmed and difficult for enforcers to weigh the costs of monopolization against the benefits of having an established firm supply new products. If enforcers determine that a dominant firm has monopolized a related market, it can be difficult for enforcers to fashion a workable remedy.

The next chapter examines the tradeoff between innovation by a dominant firm and harm to competition in the context of the design of Google's internet search engine, and highlights the difficulty of implementing effective remedies for alleged anticompetitive conduct related to product integration and design. The Microsoft case may be old news, but it reveals issues that continue to challenge antitrust enforcement for the high-technology economy.

The open access edition of this book was made possible by generous funding from Arcadia—a charitable fund of Lisbet Rausing and Peter Baldwin.

This book was set in Palatino by Westchester Publishing Services.

Library of Congress Cataloging-in-Publication Data

Names: Gilbert, Richard J., 1945- author.
Title: Innovation matters : competition policy for the high-technology economy / Richard J. Gilbert.
Description: Cambridge, Massachusetts : MIT Press, [2020] | Includes bibliographical references and index.
Identifiers: LCCN 2019039525 | ISBN 9780262044042 (hardcover)
Subjects: LCSH: High technology industries. | Competition. | Antitrust law--Economic aspects. | Consolidation and merger of corporations--Law and legislation--Economic aspects.
Classification: LCC HC79.H53 G56 2020 | DDC 338.8/2--dc23
LC record available at https://lccn.loc.gov/2019039525