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**Modularity, Vertical Integration, and Open Access Policies:
Towards A Convergence of Antitrust and Regulation
In The Internet Age**

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Abstract

This article aims to help regulators and commentators incorporate both Chicago School and post-Chicago School arguments in assessing whether regulation should mandate open access to information platforms. The authors outline three alternative models that the FCC could adopt to guide its regulation of information platforms in the future and facilitate a true convergence between antitrust and regulatory policy.

This work stems from the University of Colorado's Silicon Flatirons Telecommunications Program's first two policy conferences, "Telecommunications Law for 21st Century" and "The Regulation of Information Platforms," which largely spurred the discussion that led to this collaboration. The authors thank Doug Melamed, Jon Nuechterlein, Robert Pitofsky, Steve Salop, Marius Schwartz, Jim Speta, and Steve Williams for their helpful comments and encouragement.

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MODULARITY, VERTICAL INTEGRATION, AND OPEN ACCESS POLICIES: TOWARDS A CONVERGENCE OF ANTITRUST AND REGULATION IN THE INTERNET AGE*

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Just as the dust is settling from the Microsoft case, the Federal Communications Commission (FCC) is about to craft rules to regulate broadband networks.¹ Taken together, these developments may mark the beginning of a new model of regulation for the Internet age. This regulatory regime will govern when a firm must provide “open access” to its platform – be it an operating system, a telecommunications service, or some other application that facilitates Internet content or services – and will significantly influence the Internet’s future development.

A critical challenge for this emerging model of regulation will be whether and how to integrate antitrust policy and telecommunications regulation into a coherent whole. Antitrust and regulation have starkly contrasting traditions on mandated access. As the Internet, computer software, and telecommunications (“New Economy”²) industries converge, affected firms will increasingly seek consistent and clear legal rules. Moreover, courts reviewing the FCC’s decisions in this area are increasingly pressuring it to devise a regulatory regime more compatible with economic theory and antitrust policy.³ To do so, however, the FCC must develop a

* An edited version of this paper will appear in the *Harvard Journal on Law and Technology*, 2004. This work stems from the University of Colorado’s Silicon Flatirons Telecommunications Program’s first two policy conferences, “Telecommunications Law for 21st Century” and “The Regulation of Information Platforms,” which spurred the discussion that led to this collaboration. The authors thank Dale Hatfield, Marty Katz, Mark Lemley, Doug Melamed, Jon Nuechterlein, Robert Pitofsky, Steven Salop, Marius Schwartz, Jim Speta, Steve Williams, and Chris Yoo for their helpful comments and encouragement.

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¹ See, e.g., In re Inquiry Concerning High-Speed Access to Internet Over Cable and Other Facilities, Declaratory Ruling and Notice of Proposed Rulemaking, 17 FCC Rcd. 4798 (2002) (Cable Modem Order).

² See Richard A. Posner, *Antitrust in the New Economy*, 68 ANTITRUST L.J. 925, 925 (2001) (defining New Economy as computer software, Internet-related, and telecommunications equipment and service providers).

³ For a discussion of technological convergence and its impact on telecommunications regulation, see BRINGING HOME THE BITS, supra note __, at 9 (“With convergence,

framework for regulating what economists call “vertical relations”: how a firm relates to other firms in adjacent markets, and whether it integrates into those markets.

In broad-brush terms, antitrust policy viewed much vertical conduct as suspect until the 1970s. By the late 1970s, however, the Chicago School of economics had taught mainstream antitrust thinking that vertical integration (e.g., merger) and many kinds of vertical contract had efficiency benefits and were unlikely to harm competition.⁴ While post-Chicago School scholarship of the 1980s and 1990s has weakened that view,⁵ current antitrust doctrine still generally presumes that vertical agreements, vertical extension, and vertical mergers are unobjectionable unless a fact-intensive investigation shows otherwise.

By contrast, in similarly broad-brush terms, telecommunications policy positively encouraged integration and close coordination into “one network” under the regulated AT&T monopoly. Starting in the 1970s, however, a series of FCC and court decisions shifted policy into developing and protecting open interfaces. This “open architecture” philosophy held that powerful firms at one level should not be allowed to leverage that power into—or perhaps even participate in—adjacent competitive segments. Likewise, the United States government’s early support for the Internet encouraged the development of an open architecture based on modular standards.⁶

These contrasting traditions of analyzing “open access” leave telecommunications policy unsettled as technological convergence and emerging competition in telecommunications blur the lines

everything—video, audio, text, and so forth—has become a digital stream that can be transported across the Internet.”). For an example of the increasing judicial insistence on careful economic analysis by regulators, see *U.S. Telecom Ass’n v. F.C.C.*, 290 F.3d 415, 422-28 (D.C. Cir. 2002) (evaluating critically the economic rationale behind the FCC’s rules for the unbundling of the local telecommunications network); *see also* Warren G. Lavey, *Inconsistencies in Application of Economics At The Federal Communications Commission*, 45 FED. COMM. L.J. 437, 439-40 (1993) (calling for increased judicial oversight to ensure greater consistency in the use of economic theory to justify regulation) (hereinafter, Lavey, *Inconsistencies*).

⁴ The landmark event for the rise of Chicago School thinking was the Supreme Court’s decision in *Continental TV, Inc. v. GTE Sylvania, Inc.*, 433 U.S. 36 (1978), which cited heavily to Chicago School criticisms of the Court’s earlier doctrine, *see id.* at 48 n.13, 55, 56.

⁵ David S. Evans & Michael Salinger, *Competition Thinking At The European Commission: Lessons From The Aborted GE/Honeywell Merger*, 10 GEO. MASON L. REV. 489, __ n. 158 (2002) (discussing impact of post-Chicago scholarship).

⁶ As we explain in more detail below, “modularity” is a means of managing complexity. As one commentator defined the term, modularity involves the “breaking up [of] a complex system into discrete pieces—which can then communicate with one another only through standardized interfaces within a standardized architecture—[in order to] eliminate what would otherwise be an unmanageable spaghetti tangle of systemic interconnections.” Richard N. Langlois, *Modularity In Technology and Organization*, 49 J. ECON. BEHAVIOR & ORG. 19, 19 (2002).

between industries regulated primarily by antitrust (notably computing) and those subject to telecommunications law, and as telecommunications regulators increasingly pledge fealty to antitrust approaches.⁷ The clash of traditions and of arguments on open access is particularly sharp in one of today's central telecommunications problems: the regulatory treatment of broadband transport and its close complements. Broadband transport, usually provided by cable modems or telephone digital subscriber lines (DSL), promises to transform the Internet by vastly speeding up downloads and by permitting high-bandwidth applications.⁸ Some commentators, notably Lawrence Lessig, have urged regulators to impose modularity on this market by requiring broadband transport providers to share their facilities with Internet service providers.⁹ Others, echoing the Chicago School perspective, argue that the market will facilitate open access to the extent that it is efficient.

The open access question is even more ubiquitous than may appear, as policymakers and commentators often use different terms to describe the issue.¹⁰ Antitrust commentators discuss "the primary

⁷ For two discussions of the impact of convergence on regulatory policy, see Philip J. Weiser, *The Imperative of Harmonization Between Antitrust and Regulation*, 698 PLI/PAT 73 (2002); Philip J. Weiser, *Law and Information Platforms*, 1 J. TELECOM. & HIGH TECH. L. 1 (2002).

⁸ The definition of "broadband" will evolve over time, but the FCC's current dividing line is 200 kilobits per second, as it constitutes "enough capacity to provide the most popular forms of broadband—to change web pages as fast as one can flip through the pages of a book and to transmit full-motion video." Inquiry Concerning the Development of Advanced Telecommunications Capability to All Americans in a Reasonably Timely Fashion, and Possible Steps to Accelerate Such Development Pursuant to Section 706 of the Telecommunications Act of 1996, 14 FCC Rcd 2398, 2406 (1999); *id.* at 2407-08 (noting that definition will evolve); *see also* Inquiry Concerning the Development of Advanced Telecommunications Capability to All Americans in a Reasonably Timely Fashion, and Possible Steps to Accelerate Such Development Pursuant to Section 706 of the Telecommunications Act of 1996, 17 FCC Rcd. 2844, 2847 (2002) (adhering to definition); NATIONAL RESEARCH COUNCIL, BROADBAND: BRINGING HOME THE BITS 78-80 (2002) (hereinafter, "BRINGING HOME THE BITS") (proposing alternative definition).

⁹ *See* LAWRENCE LESSIG, *FUTURE OF IDEAS* 147-67 (2001). This argument builds off a prior piece with Mark Lemley that addressed critics of this proposal. *See* Mark A. Lemley & Lawrence Lessig, *The End of End-to-End: Preserving the Architecture of the Internet in the Broadband Era*, 48 UCLA L. REV. 925 (2001) (engaging arguments made in Phil Weiser, *Paradigm Changes in Telecommunications Regulation*, 71 COLO. L. REV. 819, 831 (2000) and James B. Speta, *Handicapping the Race for the Last Mile? A Critique of Open Access Rules for Broadband Platforms*, 17 YALE J. ON REG. 39, 77-90 (2000)).

¹⁰ For a further explanation of the information platform concept and how it can frame technology policy debates, see Philip J. Weiser, *Law and Information Platforms*, 1 J. TELECOM. & HIGH TECH L. 1, ___-___ (2002). A notable example of an information

(or sometimes ‘bottleneck’) market” and “the secondary (or complementary) market.” In telecommunications, participants talk of “conduits” and “content.” This Article, adopting the terminology used in the computer industry, will discuss “platforms” (often “information platforms”) and “applications.” The essence of the issue is the “complementarity” between “applications” and “platforms,” whether the application is an input to the platform, a buyer of the platform, or neither.¹¹

This Article aims to help regulators and commentators incorporate both Chicago School and post-Chicago School arguments in assessing whether regulation should mandate open access to information platforms. Much discussion on such questions focuses on the degree of competition among platforms. By contrast, the central analytical tool—not necessarily the victor—in our discussion is a Chicago School-style argument we call ICE (for reasons discussed below). ICE claims that even a monopolist has incentives to provide access to its platform when it is efficient to do so, and to deny such access only when access is inefficient. ICE is often a persuasive argument, yet its logic admits several cogent exceptions. Unfortunately, regulators and commentators seldom do justice to the nuances of this principle: some ignore ICE, while others embrace it and underestimate its exceptions. Only by addressing both ICE and its exceptions can regulators make full use of economics in analyzing open access requirements.¹²

In its broadband proceedings, the FCC has an opportunity to embrace the insights of ICE and its exceptions in developing a framework to evaluate independent providers’ claims for mandated access to a platform such as broadband transport.¹³ Ideally, such a

platform from the computer industry is the Microsoft Windows operating system, which exposes Application Programming Interfaces (APIs) that can be used by application developers to “call” on certain functions provided by the operating system. *See* *United States v. Microsoft Corp.*, 253 F.3d 34, 53 (2001).

¹¹ In part for this reason, we define “applications” broadly, not distinguishing between “software applications” and “hardware products” (such as peripherals), both of which may connect to an underlying platform. Rather, we will use the term “applications” for all complementary products or services used in conjunction with a platform.

¹² For a similar observation and a project related to ours, see Christopher S. Yoo, *Vertical Integration and Media Regulation In The New Economy*, 19 *YALE J. ON REG.* 171, 177 n.19 & 178 (2002) (describing project’s focus on cable and broadcast markets, but disclaiming any application to telecommunications markets).

¹³ Such a framework would provide more guidance than past FCC decisions in this area, which have tended to arise in merger reviews and have been ad hoc. *See* James B. Speta, *A Common Carrier Approach To Internet Interconnection*, 54 *FED. COMM. L.J.* 255, 256 (2002) (“And yet, despite these controversies and many others, the only legal rules governing Internet interconnection are a limited number of company-specific conditions in imposed in some merger reviews.”); Philip J. Weiser, *Internet Governance, Standard Setting, and Self-Regulation*, 28 *N. KY. L. REV.* 822, 844 (2001) (“In terms of setting a precedent for future regulation of information platforms, the FCC’s AOL/Time

framework could also guide telecommunications regulation in related contexts, such as unbundling policy for the local telecommunications network,¹⁴ and harmonize telecommunications regulation with antitrust policy. The FCC could thus satisfy judicial demands for a better economic explanation of its regulatory policies, and better recognize the common economic principles applying to information platforms.

This Article proceeds in five parts. Part I recounts experiences of the Internet, computer, and telecommunications industries, illustrating the powerful benefits of modularity that inspire proponents of open access regulation. To explain the Chicago School skepticism of such regulation, Part II first discusses how close (i.e., other than arm's-length modular) vertical relationships can yield important efficiencies. Part II then explains the "ICE" principle: even monopoly platform providers have at least some incentive to operate in a modular fashion when it is efficient to do so: they internalize the complementary efficiencies. But Part III describes eight holes in the ICE logic: reasons why a monopoly platform provider might inefficiently "close" its platform. We do not see comparable reasons why such a monopoly might inefficiently open its platform. Part IV outlines regulatory tools often used to facilitate open access, discusses factors that regulators should consider when contemplating open access policies, and offers three possible regulatory philosophies consistent with our discussion. Finally, Part V applies the ICE framework to the FCC's *Computer Inquiries*, the *Microsoft* case, and the current broadband proceedings, illustrating how the subtleties of ICE and its exceptions, if not carefully understood, can lead to policy instability. In conclusion, the Article urges the FCC to adopt a coherent model of platform regulation that takes account of ICE and permits a happier convergence between antitrust and regulatory policy.

I. OPEN ARCHITECTURE, VERTICAL DISINTEGRATION, AND MODULARITY

This Part focuses on the benefits of modularity. Sections A, B, and C explain how the Internet, computing, and telecommunications industries all came to be organized in a relatively modular fashion.

Warner Order failed to set forth a principled model of analysis.").

¹⁴ See *U.S. Telecom Ass'n v. F.C.C.*, 290 F.3d 415 (D.C. Cir. 2002) (remanding development of standard for unbundling the local telecommunications network back to the FCC).

Section D then discusses the benefits of modularity in general, and the rationale for making it a guiding light for information policy.

A. *The Creation of the Internet and Its End-to-End Architecture*

The Internet's development was a triumph of United States technology policy. The Internet grew from the Defense Department's Advanced Research Administration's ARPANET and later relied on support from the National Science Foundation. From its early days in the late 1960s until the early 1990s, the Internet remained a government project, relying on the academic and research community for its development.¹⁵ By the time commercial entities developed Internet services and products in the 1990s, its basic architecture was already in place. This architecture reflects the Internet pioneers' conscious strategy that the platform should not anticipate what applications would rely on it, and that no central gatekeeper should decide which applications could be provided.

The Internet can be understood as comprised of four layers.¹⁶ At its center lies the logical layer,¹⁷ essentially a two-part standard called the Transfer Control Protocol and Internet Protocol (TCP/IP) that enables computer-to-computer communication. The Internet

¹⁵ See Abbate, *supra* note __, at 54-65.

¹⁶ There are various ways to describe the layers of Internet architecture. Lawrence Lessig, for example, suggests a definition of the content layer that includes what others call the application layer. See Lawrence Lessig, *The Internet Under Siege*, FOREIGN POLICY 56, 59, 60 (November/December 2001); see also Yochai Benkler & Alan Toner, *Access To The Internet* 3 (June 12, 2001) (available at <http://eon.law.harvard.edu/ilaw/Access/>) (using three-layered model and defining logical and applications layer as one). Tim Berners-Lee, by contrast, set out a model similar to what we have in mind. See TIM BERNERS-LEE, *WEAVING THE WEB* __ (1999); see also Kevin Werbach, *A Layered Model For Internet Policy*, 1 J. TELECOM & HIGH TECH. L. __, __ (2002) (adopting a four layer model approach); Philip J. Weiser, *Law and Information Platforms*, 1 J. TELECOM & HIGH TECH. L. 1, __ (2002) (same).

¹⁷ This protocol is so central that many definitions of the term "Internet" include the role of the TCP/IP standard. See, e.g., *FNC Resolution: Definition of Internet* (October 24, 1995) (available at http://www.itrd.gov/fnc/Internet_res.html). The FCC has used:

the definition of the Internet that has been adopted by the Federal Networking Council: "'Internet' refers to the global information system that -- (i) is logically linked together by a globally unique address space based on the Internet Protocol (IP) or its subsequent extensions/follow-ons; (ii) is able to support communications using the Transmission Control Protocol/Internet Protocol (TCP/IP) suite or its subsequent extensions/follow-ons, and/or other IP-compatible protocols; and (iii) provides, uses or makes accessible, either publicly or privately, high level services layered on the communications and related infrastructure described herein."

In *The Matter of Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities*, GN Docket 00-185, FCC 02-77 2 n.1 (March 15, 2002) (citing *See FNC Resolution: Definition of 'Internet,' available at http://www.itrd.gov/fnc/Internet_res.html*, visited Jan. 22, 2002).

Protocol (IP) enables network devices (“routers”) to send packets of data to their destination without even knowing what form of data is being transmitted.¹⁸ This design feature is often called “end-to-end” networking.¹⁹

The openness of the Internet’s technical architecture invites diversity in the layers above it and the physical layer beneath it. The physical layer includes wired, wireless, satellite, and cable transport facilities. In the layers above, developers can create new applications such as email, the World Wide Web, and Napster without first asking permission of anyone, and in particular of a custodian of the TCP/IP standard, as this standard belongs to no one. In turn, these applications support the content layer and enable consumers to access all forms of information – voice, video, audio, or data. Many commentators suggest that the openness of the logical standard was crucial in spurring the development of applications and content.²⁰

B. *The Transformation of the Computer Industry*

The computer industry evolved from supplying integrated proprietary systems to a modular industry open to specialization and entry at different layers. Initially, when IBM and other vertically integrated companies dominated the market, customers typically chose among single-vendor systems, normally relying, for example, on IBM peripherals to go with IBM mainframes.²¹ To keep its

¹⁸ For an explanation of this standard, see Robert E. Kahn & Vinton G. Cerf, *Internet Policy Institute, What Is the Internet? (And What Makes It Work)* (December 1999) (available at http://www.internetpolicy.org/briefing/12_99_story.html); Abbate, *supra* note __, at 122-130; *see also* James B. Speta, *Internet Interconnection*, *supra* note __, 245-46.

¹⁹ *See* Majorie S. Blumenthal, *End-to-End And Subsequent Paradigms*, 2002 L. REV. M.S.U.-D.C.L. 709, 709-11 (defining concept); Dale Hatfield, *Preface*, 8 COMMLAW CONSPICUOUS 1, 1 (2000) (same). For a classic articulation of the principle, *see* Jerome H. Saltzer et al., *End-to-End Arguments in System Design*, 2 ACM TRANSACTIONS IN COMPUTER SYSTEMS 277 (1984), *reprinted in* INNOVATIONS IN INTERNETWORKING 195 (Craig Patridge ed., 1988).

²⁰ *See* Jason Oxman, *The FCC and the Unregulation of the Internet* 5 (OPP Working Paper No. 31, 1999), available at http://www.fcc.gov/Bureaus/OPP/working_papers/oppwp31.txt) (The Internet’s “openness is driven by the sharing of that common communications protocol: IP, the Internet protocol, developed by early Internet pioneers. No one owns the Internet protocol no one licenses its use, and no one restricts access to it.”).

²¹ Particularly with its System 360, IBM emerged as the dominant firm in this market, leading commentators to refer to the eight leading firms in the proprietary, vertically-integrated computer industry as “Snow White and the Seven Dwarfs.” Peter Huber, *Loose Ends*, 4-NOV MEDIA L. & POL’Y 1, 7 (1995).

system closed, IBM kept secret and proprietary the interfaces between the different parts of its system.²²

Although IBM was very successful in the market of the 1970s, it was slow to grasp the significance of the personal computer, which Apple developed and deployed in the late 1970s.²³ Apple relied on a closed business model, but when IBM did introduce its personal computer, it (perhaps almost by accident) used an open architecture,²⁴ relying on Microsoft and Intel to produce key components for its system and allowing them to license these components to other computer makers. The industry thus began to change from a closed to an open or “Silicon Valley” business model, with different providers specializing in different components.²⁵

This modular structure facilitated innovation in ways that had not been matched in the integrated structure.²⁶ New entrants could and did specialize in components where they excelled, ensuring a “rapid improvement in components, including not only the chips but various peripheral devices like hard disks and modems, as well as the proliferation of applications software, that has driven down the quality-adjusted price of the personal computer system.”²⁷ IBM, on some accounts, tried to control the platform, but other firms, such as Compaq, were able to reverse engineer IBM’s Basic Input Output System (BIOS) and produce “Windows-Intel”-compatible computers, taking market share away from both IBM and Apple.²⁸

²² See Langlois, *supra* note __, at 32.

²³ On IBM’s failure to grasp the significance of the personal computer market, see CLAYTON CHRISTENSEN, *THE INNOVATOR’S DILEMMA* 108-110 (1997).

²⁴ See Langlois, *supra* note __, at 24 (explaining that the open architecture of the IBM PC did not result from any “conscious” design or strategy); see also ANNABELLE GAWER AND MICHAEL A. CUSAMANO, *PLATFORM LEADERSHIP: HOW INTEL, MICROSOFT, AND CISCO DRIVE INDUSTRY INNOVATION* 15-38 (2002) (explaining how Intel, along with Microsoft, emerged to provide platform leadership in this open architecture environment).

²⁵ See Grove, *supra* note __, at 39-52.

²⁶ See ANNALEE SAXENIAN, *REGIONAL ADVANTAGE: CULTURE AND COMPETITION IN SILICON VALLEY AND ROUTE 128* (1994).

²⁷ Richard N. Langlois, *Technology Standards, Innovation, and Essential Facilities: Towards A Schumpeterian Post-Chicago Approach*, in Jerry Ellig (ed.) *DYNAMIC COMPETITION AND PUBLIC POLICY: TECHNOLOGY, INNOVATION, AND ANTITRUST ISSUES* 215 (2001).

²⁸ See David P. Angel & James Engstrom, *Manufacturing Systems and Technological Change: The U.S. Personal Computer Industry*, 71 *ECON. GEOGRAPHY* 79, 79, 81 (1995) (noting that market share of IBM and Apple declined from 1984 to 1992 from 52.5% to 21.4% and that average price of computers fell by 40% in 1992 alone).

*C. The Development of Competition In
Telecommunications*

Richard Viotor remarks that the modern era in telecommunications began with a rubber cup.²⁹ This independently marketed “Hush-A-Phone” attached to a handset and would insulate telephone conversations against background noise. The AT&T Bell System protested that this was a “foreign attachment” to its network and that the FCC should ban it. In 1955 the FCC agreed, concluding that the Hush-a-Phone was “deleterious to the telephone system” and that, in general, “telephone equipment should be supplied by and under control of the carrier.”³⁰ On appeal, the D.C. Circuit reversed the FCC’s decision, holding that the owner of the telephone network cannot restrict the use of reasonable attachments to the network.³¹

In 1968, the Commission analogously held that AT&T could not prevent the use of a device called the Carterfone, which facilitated communication between a mobile radio and the landline network.³² In so doing, the Commission announced a broad protection for users to “interconnect” foreign devices to the telephone network.³³ To

²⁹ Telecommunications “[d]eregulation began more or less with a rubber cup.” RICHARD VIOTOR, *CONTRIVED COMPETITION* 190 (1994).

³⁰ Hush-a- Phone Corp., 20 F.C.C. 391, 420 (1955), *rev'd*, 238 F.2d 266 (D.C. Cir. 1956).

³¹ Hush-a-Phone Corp. v. United States, 238 F.2d 266, 269 (D.C. Cir. 1956). It is often thought that the court established this principle over the FCC’s opposition. In fact, the FCC ostensibly endorsed the principle, but absurdly agreed with AT&T’s claim that the Hush-A-Phone was a threat to the network. Because the FCC’s implementation effectively gutted the principle, it may be that the Commission did not really believe in this principle, though it gave it lip service.

³² In re Use of the Carterfone Device in Message Toll Tel. Servs., 13 F.C.C.2d 420 (1968). This decision, in response to an antitrust case brought by the producers of the Carterfone, see *Carter v. American Tel. & Tel. Co.*, 365 F.2d 486 (5th Cir. 1966), ruled that AT&T’s restrictive tariff violated the Communications Act, see 13 F.C.C.2d at 421 (outlining AT&T tariff providing that “[n]o equipment, apparatus, circuit, or device not furnished by the telephone company shall be attached to or connected with the facilities furnished by the telephone company, physically, by induction, or otherwise”). In particular, the Commission found that the fact that AT&T allowed its own equipment to interconnect to the network rendered such restrictions discriminatory. *Id.* at 421-24.

³³ The Commission announced that:

[A] customer desiring to use an interconnecting device to improve the utility to him of [the telephone network] . . . should be able to do so, so long as the interconnection does not adversely affect the telephone company’s operations or the telephone system’s utility for others.

Id. at 424.

implement this principle, the Commission asked AT&T to file new tariffs allowing attachments that did not harm the network.³⁴

After *Carterfone*, the FCC and, later, the Department of Justice supported competitive entry into long distance. Entrants like MCI sought interconnection to the public switched network so that their customers could reach all telephone subscribers.³⁵ In both MCI's private antitrust suit and the Justice Department's action against AT&T, the courts concluded that AT&T must allow MCI to interconnect so that it could compete with AT&T's long distance services.³⁶ These cases established that the effectiveness of regulation is a question of fact to consider in an antitrust case, but not a bar to relief altogether;³⁷ as to AT&T, the belief that regulatory authorities could not otherwise stop an integrated monopoly from engaging in predatory conduct (such as discriminatory interconnection) in adjacent markets became a central rationale for divestiture.³⁸ Protected by the decree, MCI and others introduced

³⁴ AT&T took full advantage of the proviso allowing it to condition the use of attachments, requiring "protective connecting arrangements" (PCAs) that would limit greatly the use of non-AT&T equipment. See American Tel. & Tel. Co. "Foreign Attachment" Tariff Revisions in AT&T Tariff FCC Nos. 263, 260, and 259, Memorandum Opinion and Order, 15 F.C.C.2d 605, 606 (1968); see also *Litton Sys., Inc. v. AT&T Co.*, 700 F.2d 785, 799 n.15 (2d Cir. 1983) (quoting AT&T internal report that the tariff requirements of employing PCAs were "a redundant, artificial, and economic barrier to those wishing to purchase their own equipment"); *Northern Tel. Co. v. AT&T*, 651 F.2d 76, 95 (2d Cir. 1981), cert. denied, 455 U.S. 943 (1982) (concluding that AT&T may have designed PCAs in an unreasonable manner).

³⁵ See *Microwave Communications, Inc.*, 18 F.C.C.2d 953 (1969).

³⁶ See *MCI Communications v. AT&T*, 708 F.2d 1081, 1105 (7th Cir. 1983); *United States v. AT&T*, 552 F. Supp. 131 (D.D.C. 1982), *aff'd sub nom.*, *Maryland v. United States*, 460 U.S. 1001 (1983). For a discussion of the exact nature of MCI's interconnection concerns, see *MCI Communications*, 708 F.2d at 1131-32 (discussing, among other things, MCI's claim that AT&T required its customers to dial unnecessary digits and that AT&T's interconnection procedures "utilized materials inadequate for the volume of business MCI was doing . . . and involved unduly complex and ineffective installation and maintenance procedures").

³⁷ See Philip J. Weiser, Goldwasser, *The Enforcement of the Telecom Act, and Reflection on Antitrust Remedies*, __ ADMIN. L. REV. __, __ (2003).

³⁸ See *AT&T*, 552 F. Supp. at 170 (noting that AT&T had not been "effectively regulated"). The MFJ's basic logic, which is often called either "Baxter's Law" or the "Bell Doctrine," is that:

[R]egulated monopolies have the incentive and opportunity to monopolize related markets in which their monopolized service is an input, and that the most effective solution to this problem is to 'quarantine' the regulated monopoly segment of the industry by separating its ownership and control from the ownership and control of firms that operate in potentially competitive segments of the industry.

Paul L. Joskow & Roger G. Noll, *The Bell Doctrine: Applications in Telecommunications, Electricity, and Other Network Industries*, 51 STAN. L. REV. 1249, 1249-50 (1999); see also Joseph D. Kearney, *From the Fall of the Bell System to the Telecommunications Act: Regulation of Telecommunications*, 50 HASTINGS L. J. 1395, 1415-16 (1999) (discussing the Department's objections to a pure conduct remedy); but see Robert W. Crandall, *The Failure of Divestiture Remedies in Sherman Act Monopolization Cases*, 80 OR. L. REV. 109, 179-92 (2001) (arguing that equal access

fiber optics in the backbone network and new data communications services.³⁹

D. Modularity and The Logic For Open Access Regulation

Modularity means organizing complements (products that work with one another) to interoperate through public, nondiscriminatory, and well-understood interfaces. As the cases described above suggest, modularity can arise as an internal management system, as a self-governing organization of a market, or as a result of public policy decisions.

Modular industry structures enable independent firms to introduce innovations into an established environment. An open architecture can facilitate innovation in individual components, spur entry, and result in lower prices.⁴⁰ Moreover, as producers experiment with different approaches, the market can move quickly based on “rapid trial-and-error learning.”⁴¹ Modularity thus allows for a smooth dissemination of the best of breed in each level or layer, as users mix-and-match components.⁴²

regulations alone, without divestiture and quarantine, would have ensured the MFJ’s competitive benefits).

³⁹ See Howard A. Shelanski, *Competition and Deployment of New Technologies in U.S. Telecommunications*, 2000 U. CHI. LEGAL F. 85, 107 (2000) (explaining that AT&T failed to deploy it in its long-haul network until Sprint and other upstarts did and began advertising a superior quality network). As an executive from Corning explained:

AT&T, which owned most of the telephone lines in America at the time [of the invention of fiber optic technology], said it would be 30 years before its telephone system would be ready for optical fiber. And when it was, AT&T planned to make its own fiber. . . . [After AT&T entered into a consent decree,] MCI took the risk [of ordering fiber optic technology] and placed a 100,000 kilometer order for a new generation of fiber.

Willard K. Tom & Joshua Newberg, *Antitrust and Intellectual Property: From Separate Spheres to A Unified Field*, 66 ANTITRUST L.J. 167, 202 (1997) (quoting Testimony of Timothy J. Regan, Division Vice President and Director of Public Policy, Corning, Inc., Before House Judiciary Committee (May 9, 1995)).

⁴⁰ Joseph Farrell et al, *The Vertical Organization of Industry: Systems Competition Versus Component Competition*, 7 J. ECON. & MGMT. STRAT. 143, 172-73 (1998).

⁴¹ Richard N. Langlois & Paul L. Robertson, *Networks and Innovation In A Modular System: Lessons From The Microcomputer and Stereo Component Industries*, 21 RESEARCH POLICY 297, 301 (1992).

⁴² As Clayton Christensen put it:

Modular architectures help companies respond to individual customer needs and introduce new products faster by upgrading individual subsystems without having to redesign everything. Under these conditions (and only under these conditions), outsourcing titans like Dell and Cisco Systems can prosper—because modular architectures help them be fast, flexible and responsive.

Clayton M. Christensen, *The Rules of Innovation*, TECHNOLOGY REVIEW 33, 36 (June 2002).

The three cases sketched above show modularity arising through different means, but in each case the modular structure seemed to facilitate innovation. In the computer industry and the development of the Internet, this structure proved to facilitate innovation and entry. Similarly, with the breakup of the integrated Bell System, new companies were able to enter equipment and long distance markets. Open standards and interfaces in the telecommunications and Internet industries enabled companies to launch new products (such as modems) that work with the telephone network, and new applications – notably, the World Wide Web – that work over the Internet.⁴³ Given its success in facilitating innovation in these and other cases, some commentators – most notably Lawrence Lessig – argue that government policy should facilitate modularity.⁴⁴

As Part II discusses, however, making modularity a guiding light for regulatory policy creates tension with much modern economic thinking and antitrust policy, which tends to presume that platform providers can be trusted to allow open access when it would be efficient to do so. In particular, Part II explains the logic of a critical economic concept – *internalizing complementary externalities* (ICE) – and its claim that firms have a strong incentive to implement modularity voluntarily when it is efficient to do so.

II. INTEGRATION AND EFFICIENCIES: PUTTING THE MODULARITY MOVEMENT ON ICE

Perhaps partly recognizing the efficiency and competitive benefits of modularity, antitrust policy until the 1970s was wary of allowing dominant firms to integrate into adjacent markets and create closed

⁴³ See Jay Atkinson & Christopher C. Barnekov, A Competitively Neutral Approach to Network Interconnection, Federal Communications Commission Office of Plans and Policy Working Paper # 34, 6 (December 2000) (available at http://www.fcc.gov/Bureaus/OPP/working_papers/oppwp34.pdf) (explaining this point).

⁴⁴ LESSIG, *FUTURE OF IDEAS*, supra note __, at 174-76; Lawrence Lessig, *Innovation, Regulation, and the Internet*, THE AMERICAN PROSPECT (April 10, 2000) <<http://www.prospect.org/archives/V11-10/lessig-1.html>> (“the burden should be on those who would compromise [on openness] to show that it will not take away from the innovation we have seen so far”). In a report to the government of Canada, T.M. Denton Consultants argued:

It might be questioned whether governments had interests to defend here. The justification for taking an interest is that the future operation of networks may well determine how economies will function, and is therefore a matter of national importance. Governments are guardians of the marketplace, and they have legitimate interests in knowing how they work. *In a computer-mediated marketplace, interfaces between networks determine who may compete.*

T.M. DENTON CONSULTANTS, NETHEADS VERSUS BELLHEADS, FINAL REPORT FOR THE CANADIAN FEDERAL DEPT. OF INDUSTRY 15 (available at www.tmdenton.com/netheads.htm).

relationships between complementary products.⁴⁵ Over the last twenty-five years, however, antitrust policy has accepted the Chicago School argument that close (even closed) vertical relationships can yield and be motivated by integrative efficiencies. In particular, economists' better understanding of how complements boost demand for the primary good has taught antitrust that powerful firms, recognizing the merits of a modular industry structure, will often institute it voluntarily. The question for regulators therefore is not whether modularity is good—it very often is—but whether modularity is likely to be good *even when* it will not emerge (or survive) spontaneously, as it often will when it is most valuable to consumers.

This Part explains the logic behind allowing firms (even monopolists) to decide whether or not to integrate vertically into—or, more broadly, depart from an arm's-length relationship with—complementary markets. For brevity we sometimes talk as if platform firms choose between full integration and an arm's-length modular relationship with a complement, but of course there is a spectrum of vertical relationships, including partial integration (e.g., joint venture), tie-ins, partial equity investments, long-term contracts, and affiliate relationships.

Section A outlines some important efficiency benefits that can stem from a vertical relationship closer than an arm's-length one (or, equivalently, inefficiencies of arm's-length relationships). Section B goes on to explain the powerful concept of “internalizing complementary efficiencies,” or ICE. ICE suggests that even a platform monopoly often has incentives to make efficient choices about when to maintain modularity and when to get involved in an adjacent market.

A. Integrative Efficiencies

Palm, which introduced the first successful personal digital assistant, later decided to separate its operating system and software applications divisions from its hardware division.⁴⁶ It did not want to follow Apple, which failed to commit to an open licensing strategy for its operating system and subsequently lost its initially strong

⁴⁵ See, e.g., *United States v. Arnold Schwinn & Co.*, 388 U.S. 365 (1967) (imposing per se rule against vertical restraints).

⁴⁶ See Ian Fried and Dawn Kawamoto, *Two Palms Better Than One?* CNET NEWS.COM (February 4, 2002) (available at <http://news.com.com/2100-1040-828446.html#>).

market share.⁴⁷ It would prefer to be another Microsoft, which has benefited enormously from modularity and the development of independent applications for its platform.

The Apple and Microsoft examples might seem to make Palm's decision to vertically disintegrate a no-brainer. But it is not. By separating its operations vertically, Palm will lose control of some important aspects of its product deployment. For instance, Palm's reliance on outsiders and "inability to crack the whip on its far-flung programmers" contributes (according to some observers) to its "slow pace of innovation" in applications.⁴⁸ By contrast, Sega developed the operating system, equipment, and leading games (such as Sonic the Hedgehog) for its Sega Genesis system all in-house in order to control its product offerings and drive consumer demand for its system.⁴⁹

Because the platform and the applications made for it are economically interdependent, an arm's-length relationship can involve contractual "hold-up" hazards (on both sides, though especially threatening to competitive applications providers).⁵⁰ A closer vertical relationship can be an efficient response to such hazards.⁵¹

An arm's-length relationship can also lead to what economists call "double marginalization." The classic formulation, offered by Augustin Cournot in 1838, is that separate complementary monopolies, each imposing a monopoly markup, wind up with a final product price that exceeds the overall monopoly price. As a result, both consumers and the producers are worse off than they would be if the two firms merged and charged a monopoly price for the two

⁴⁷ See Pui-Wing Tam, *For Palm, Splitting In Two Isn't Seamless*, WALL ST. J., June 27, 2002 at B4.

⁴⁸ Erick Schonfeld & Ian Mount, *Beating Bill*, BUSINESS 2.0 (June 2002) (available at www.business2.com/articles/mag/print/0,1643,40438,FF.html).

⁴⁹ See ADAM M. BRANDENBURGER & BARRY J. NALEBUFF, CO-OPETITION 237-241 (1996). One possible explanation for these differing approaches is that the proprietary strategy is most effective in launching a new system, but, as Palm is discovering, it is difficult to later separate integrated divisions that once worked well together and it is not easy to determine when or whether integration has outlined its usefulness. See Tam, *supra* note __.

⁵⁰ See Yoo, *supra* note __, at 262-64 (noting that vertical integration guards against free riding, holdup problems, and other strategic behaviors by vital complementors).

⁵¹ More precisely, the problem arises when fully effective modularity is not available, so that ex post haggling is likely. There may then be an intriguing positive feedback: when modularity works well, it is appealing and may be stable, but when it starts to break down, a platform supplier's best response may eventually be to integrate—perhaps killing off whatever imperfect modularity remains. For an examination of how Intel approached this problem, see ANNABELLE GAWER AND MICHAEL A. CUSAMANO, PLATFORM LEADERSHIP: HOW INTEL, MICROSOFT, AND CISCO DRIVE INDUSTRY INNOVATION 54-56 (2002).

goods together.⁵² More generally, this insight explains that firms providing complementary activities or products are in a mutual position of “vertical externality.” When Microsoft, for example, improves its software or lowers its price, more consumers buy Intel’s complementary microprocessor; similarly, when Intel improves its hardware or lowers its price, demand for Microsoft’s operating system rises. Thus, when complementors move closer to maximizing joint profits -- whether through integration or through a closer contractual relationship than arm’s-length pricing -- it tends to encourage innovation and price-cutting.⁵³

Innovation can require changing the platform/application interface, which can be slow if an industry relies on open standards and open interfaces. In those cases, hand-in-glove coordination between the platform sponsor and one or more complementors can accelerate innovation.⁵⁴ In particular, a new product that would require new interfaces may be most readily launched in a hand-in-glove, even integrated, fashion. (Indeed, Palm first launched its product before moving to modularity through its voluntary split.) Moreover, such coordination can give a platform provider more scope for penetration pricing and other start-up tactics aimed to encourage efficient use and adoption of its platform,⁵⁶ particularly when the product is newly introduced and relatively unknown.⁵⁷

Integration or hand-in-glove coordination also helps assure consumers that complementary products will work well, because the platform sponsor retains control over quality and interoperability. Antitrust law, even at the height of its hostility to vertical tie-ins,

⁵² AUGUSTIN COURNOT, RESEARCHES INTO THE MATHEMATICAL PRINCIPLES OF THE THEORY OF WEALTH 103 (1838) (Nathaniel T. Bacon trans., MacMillan Co. 1927).

⁵³ For development of this point and some important refinements of it, see Joseph Farrell and Michael L. Katz, *Innovation, Rent Extraction, and Integration of Systems Markets*, 48 J. IND. ECON. 413 (2000). Of course, when competitors—in contrast to complementors—move closer to maximizing joint profits, the result can readily be anticompetitive.

⁵⁴ For a development of this theme and a discussion of the virtues of proprietary platform competition, see Weiser, *Intellectual Property Policy*, supra note __, at __-__; see also note __, infra. For a further discussion of how developing stable interfaces can be too expensive and time consuming to merit the effort, see Langlois, supra note __, at 23.

⁵⁶ For a discussion of this point, see Douglas Lichtman, *Property Rights In Emerging Platform Technologies*, 29 J. LEGAL STUD. 615, __-__ (2000).

⁵⁷ See JEFFREY H. ROHLFS, BANDWAGON EFFECTS IN HIGH-TECHNOLOGY INDUSTRIES 197 (2001).

appreciated this point in a case involving the rollout of cable television and related equipment.⁵⁸

Analyzing firms' choice of vertical structures is a focus of the "new institutional economics" (NIE). Building on insights of Nobel Laureate Ronald Coase,⁵⁹ NIE "seeks to extend and enrich understanding of the microanalytic details of business behavior and the industry settings that shape firm conduct."⁶⁰ Usefully if tautologically, NIE suggests that firms will vertically integrate or depart from arm's-length market dealing when such arm's-length dealing would be more costly.⁶¹ Thus, firms will sometimes opt for modularity as a means of bringing maximum imagination and diversity to the problem of developing applications on a platform and minimizing the need for complex coordination, and sometimes opt for vertical integration to facilitate complex coordination and to strengthen incentives for product development and deployment.⁶²

Platform providers integrating into applications development often take pains "not to compete with customers" in order to minimize the ill effects on independent applications.⁶³ But getting the best of both worlds in this way is hard, and firms may give up. Thus Palm's decision to divest its operating system may help reassure its licensees (like Handspring) that it can be trusted as a steward of the standard, it will not leverage its control of the platform into related markets, and it will remain focused on serving the needs of independent developers – particularly now that Microsoft's rival operating system

⁵⁸ See *United States v. Jerrolds Elec. Corp.*, 187 F.Supp. 545 (E.D. Pa. 1960), *aff'd per curiam*, 365 U.S. 567 (1961) (allowing leeway for bundling in introducing new product where reputation matters).

⁵⁹ See, e.g., Ronald H. Coase, *The Nature of the Firm*, 4 *ECONOMICA* 386 (1937); Ronald H. Coase, *The Problem of Social Cost*, 3 *J.L. & ECON.* 1 (1960). The subject is also known as "transactions cost economics."

⁶⁰ Timothy J. Muris, *Improving the Economic Foundations of Competition Policy* (January 15, 2003), available at www.ftc.gov/speeches/muris/improveconfoundatio.htm.

⁶¹ For discussions of this point and citations to relevant literature, see Alan J. Messe, *Tying Meets The New Institutional Economics: Farewell To The Chimera of Forcing*, 146 *U. PA. L. REV.* 1, 50-66 (1997); Gregory J. Werden, *The Law and Economics of The Essential Facility Doctrine*, 32 *ST. LOUIS U. L.J.* 433, 462-464 (1987).

⁶² Because it is seldom obvious which of these two strategies is superior, antitrust courts have waded carefully into the area of "technological tying," requiring plaintiffs to establish that any competitive harms outweigh the efficiencies produced by such developments. See, e.g., *United States v. Microsoft Corp.*, 253 F.3d 34, 53 (2001); *ILC Peripherals Leasing Corp. v. IBM*, 458 F.Supp. 423, 439 (N.D. Cal. 1978), *aff'd sub nom. Memorex Corp. v. IBM*, 636 F.2d 1188 (9th Cir. 1980); *Telex Corp. v. IBM Corp.*, 367 F. Supp. 258, 347 (N.D. Okl. 1973), *rev'd on other grounds*, 510 F.2d 894 (10th Cir. 1975).

⁶³ This phrasing is most natural when applications developers buy the platform product and then sell a combined product downstream. As we noted above, the same issues arise whether this is the market structure, or whether the platform provider buys from the applications developers, or whether end users or intermediaries buy both products. See note ___, *supra*, and accompanying text.

is offered on a modular basis (i.e., without a hardware component).⁶⁴ Similarly, AT&T divested its equipment manufacturing arm, Lucent, perhaps to reassure equipment customers who competed with other parts of AT&T that Lucent would not favor the latter.⁶⁵

B. ICE and The Rationale Against Open Access Regulation

If (for whatever reason) a monopoly platform provider sticks to its core platform business, it would prefer that applications—the complements to its product—be cheaply, innovatively, and efficiently supplied. Thus, in choosing how to license interface information, certify complementors or not, “evangelize,” etc., such a firm has a clear incentive to choose the pattern that will best provide it or its customers with applications. That is, a firm will *internalize* the *complementary efficiencies* arising from applications created by others. Although antitrust law has not always appreciated it,⁶⁶ we call this point *Obvious ICE*.

Obvious ICE can be illustrated with a numerical example involving a platform monopolist in the game console market.⁶⁷ Assume, for exposition, that competition in the applications (video games) market will yield a selection of applications that gives each

⁶⁴ See Ian Fried and Dawn Kawamoto, *Two Palms Better Than One?* CNET NEWS.COM (February 4, 2002) (available at <http://news.com.com/2100-1040-828446.html#>).

⁶⁵ See CARL SHAPIRO & HAL R. VARIAN, *INFORMATION RULES* (1998); ADAM M. BRANDENBURGER & BARRY J. NALEBUFF, *CO-OPETITION* (1996).

⁶⁶ Judge Posner makes this point sharply in discussing *Dr Miles* and the antitrust rule governing minimum resale price maintenance. See RICHARD POSNER, *ANTITRUST LAW* 177-78 (2001).

⁶⁷ In antitrust, a company need not control 100% of a market (and even “market” is a nuanced term of art) to be considered a “monopolist”; rather, a “monopolist” is a company with considerable control over prices and output (and/or the ability to exclude competitors). See *United States v. DuPont & Co.*, 351 U.S. 377, 391 (1956) (defining “monopoly power” as “power to control prices or exclude competition”). On “monopoly power” and when a firm is a monopolist, see RICHARD POSNER, *ANTITRUST LAW* 195-96 (2001) (noting, among other things, that courts often use market shares of 50%-70% as threshold indicators of when a firm is a monopolist); see also SEE AM. BAR ASS’N, *ANTITRUST LAW DEVELOPMENTS* 235-36 (4th ed. 1997) (noting the 50% and 70% benchmarks and citing supporting federal case law); *id.* at 238 & n.45 (listing factors relevant for monopoly power determination such as “presence and degree of barriers to entry or expansion, technological superiority resulting in cost advantages, economies of scale and scope, ability to price discriminate, the relative size of competitors, competitors’ performance, pricing trends and practices, homogeneity of products, potential competition, and the stability of market shares over time”); *United States v. Syfy Enterprises*, 903 F.2d 659 (9th Cir. 1990) (even 86% market share not sufficient to constitute a monopoly where entry is easy).

user of the platform a value of \$100, while a monopoly in applications will yield each platform purchaser a value of only \$70. (This value reflects the quality, variety, and price of the available applications, and is measured assuming that the platform is already purchased.) Then, if the platform provider monopolizes the applications market, the platform's value to a buyer falls by \$30; consequently, the platform provider must either sell fewer platforms or lower its platform price by \$30. In that way, the platform provider *internalizes the complementary efficiencies* (here \$30) from a better performing applications market: hence the term ICE.⁶⁸

Obvious ICE neither proves nor assumes that competition in applications markets is efficient. If, for instance, it is exceptionally hard to avoid spillovers of innovation among applications developers, then competition between applications developers might lead to less rather than more innovation. Or, if consumers cannot easily judge the quality of applications, fly-by-night entry into applications could spoil the market. If, for such reasons, a competitive applications market would yield less value than a monopolized one, the monopoly platform provider would gain by efficiently preventing competition in the market for applications. Thus, Obvious ICE does not say what structure of the applications market is optimal, but simply observes that the un-integrated platform monopolist has an incentive to favor whichever form of organization of applications is most efficient (or delivers the most value to users).

But often a platform monopolist *does* integrate into (and remain in) the market for applications for its platform.⁶⁹ For at least three reasons, it will often be able to take a dominant position in that business. First, it has a stronger incentive than an independent firm to work harder on its applications, since innovators can seldom capture all their incremental value through simple pricing, and (as ICE reminds us) the integrated provider then captures some—perhaps all—of the residue in its platform sales. Second, even if a platform provider truly tries to cooperate with independent applications developers, it is unlikely to be as open with them as with its own applications division (unless it builds a “Chinese wall” to

⁶⁸ The argument as formulated yields a slightly sharper conclusion than is usually stated. First, it is the incremental value of the marginal platform purchaser that counts. Second, if the platform provider chooses a different price strategy than that described, it will more than capture the advantage of the more efficient downstream organization. *See, e.g.,* Joseph Farrell, *Integration and Independent Innovation on a Network*, __ AMER. ECON. REV. __ (2003) (hereinafter, “Farrell, Independent Innovation”).

⁶⁹ This need not be literal integration; alliances with particular applications developers could have similar effects. Therefore this Article often discusses “close vertical relationships” instead of the traditional term “vertical integration.”

keep information from the latter). Third, if the integrated firm wants to hamstring applications rivals, it might be very easy to bias interface design, the timing of new releases, pricing policy, and other choices -- and such subtleties would only be necessary if blunter means were unavailable. For these reasons, a platform provider's decision to integrate vertically may well hurt independent complementors, seemingly posing a formidable competitive concern.⁷⁰

Obvious ICE does not address these questions. But a stronger and less obvious extension of ICE claims that platform monopolists will act efficiently even in deciding whether or not to integrate into adjacent markets. Similarly, this version of ICE claims that if a platform monopolist integrates into an adjacent market, it will still welcome value-added innovations by independent firms. Thus, according to this form of ICE, such close vertical relationships do not raise economic policy concerns.

Suppose, in the hypothetical above, that the platform provider could integrate into the applications market, and by participating in that market improve the value to users from \$100 to \$105, while breaking even on its applications. Then, it will be able to charge \$5 more for its platform and sell as many as before; whether or not it chooses just that pricing, it will profit from vertical integration, as it should, since by hypothesis integration increases value. Suppose, on the other hand, that the platform provider contemplates integrating into applications, monopolizing that market, and making a profit of \$20 per user there while users get the \$70 rather than the \$100 benefit. Because the \$20 profit is less than the \$30 harm created by this action—harm that is in the first instance to applications buyers, but that redounds to the platform monopolist's bottom line because consumers will be willing to pay less for the platform—it will lose by such a strategy, as it should since, by hypothesis, this strategy leads to lower overall value. To be sure, a platform provider would choose to monopolize the applications market if it can make \$40 (per user) rather than \$20 in doing so, but only because the assumptions imply that this monopolization would somehow increase rather than decrease total value.⁷¹

⁷⁰ See Farrell & Katz, *supra* note __, at __ (J of Ind Econ); Farrell, *Independent Innovation*, *supra* note __, at __.

⁷¹ That is, the platform provider makes an extra \$40 per user at the cost of only \$30 per user reduced value. Admittedly, the assertion that this increases total value rides on an assumption that excluded applications firms do not capture more than the \$10 in pure profits.

ICE maintains that the platform monopolist cannot increase its overall profit by monopolizing the applications market, because it could always have charged consumers more (in the platform price) in the first place; it has no incentive to take profits or inefficiently hamper or exclude rivals in the applications market because it can appropriate the benefits of cheap and attractive applications in its pricing of the platform. To the contrary, ICE claims that a platform monopolist has an incentive to innovate and push for improvements in its system – including better applications – in order to profit from a more valuable platform.⁷²

For the reasons discussed above, firms may hesitate to enter an applications market where they must compete with the platform provider. More generally, efficient applications competition can be problematic if one of the competitors controls the platform.⁷³ In such cases, ICE teaches that platform providers may choose to stay out of (or exit from) the applications market altogether as a means of ensuring efficient competition in that market. (Palm’s recent break-up may illustrate such a motive.)

This more ambitious version of ICE is close kin to the “one monopoly profit theory,”⁷⁴ which dates back to early Chicago School thinking and the later work of Richard Posner and Robert Bork.⁷⁵ But the “one monopoly profit theory”⁷⁶ label captures only part of

⁷² See, e.g., *Microsoft*, 65 F.Supp.2d at 17 (“[I]f there are innovations that will make Intel-compatible PC systems more attractive to more consumers, and those consumers will be less sensitive to the price of Windows, the innovations will translate into increased profits for Microsoft.”).

⁷³ See, e.g., Farrell, *Independent Innovation*, supra note __, at __.

⁷⁴ Judge Posner has outlined the argument succinctly for the case where the complement is an input into the platform product:

But the bare fact that a firm has monopoly power in Market X does not imply that it will have an incentive to obtain monopoly power over Y, an input into X. In general a monopolist like any other firm wants to minimize its input costs; the lower those costs are, the greater the monopoly profits it will be able to make. Therefore the rational monopolist will usually want his input markets to be competitive, for competition usually will minimize the costs that he has to pay for his inputs.

Olympia Equipment Leasing Co. v. Western Union Telegraph Co., 797 F.2d 370, 374 (7th Cir. 1986); see also POSNER, *ANTITRUST LAW*, supra note __, at 200-02.

⁷⁵ The classic statement of the Chicago School position came in Ward Bowman, *Tying Arrangements and the Leverage Problem*, 67 *YALE L.J.* 19 (1957). The orthodox restatement of it came in POSNER, *ANTITRUST LAW: AN ECONOMIC APPROACH* 200-02 (1976) and ROBERT H. BORK, *THE ANTITRUST PARADOX* 372-74 (1978).

⁷⁶ See ROBERT BORK, *THE ANTITRUST PARADOX* 229 (1978) (“[V]ertically related monopolies can take only one monopoly profit”); RICHARD POSNER & FRANK EASTERBROOK, *ANTITRUST* 870 (2d ed. 1989) (“There is only one monopoly profit to be made in a chain of production.”). Judges, too, have used the “one monopoly profit” label. See, e.g., *Town of Concord, Mass. v. Boston Edison Co.*, 915 F.2d 17, 23 (1st Cir. 1990) (Breyer, J.); *Western Resources, Inc. v. Surface Transportation Board*, 109 F.3d 782, 787 (D.C. Cir. 1997) (Williams, J.).

ICE. It claims that a platform monopolist cannot gain by inefficiently “leveraging” that power into applications: this is ICE’s claim that where competition in the applications market is efficient, the platform monopolist will protect it. But ICE goes further, stressing the broader principle that the platform monopolist gains from an *efficient* applications market—whether that be unbridled competition, integration without independents, licensing of a limited set of independents, or some attempt to combine these or other structures. The “one monopoly profit” label fails to suggest this broader point. Our term, *internalization of complementary efficiencies*, better conveys the claim that the platform monopolist has an incentive to be a good steward of the applications sector for its platform;⁷⁷ it thus better captures the argument for laissez-faire vertical policies.

The stronger form of ICE largely explains modern antitrust law’s reluctance to worry broadly about leveraging and spillovers of market power. It also underlies the basics of Chicago School doctrine, as well as its more ambitious arguments for *per se* legality of tying arrangements.⁷⁸ Surprisingly (and, as we see below, not always correctly), it suggests that antitrust and regulation should generally not worry even if an integrated firm engages in behavior that is plainly exclusionary if assessed entirely within the applications market.

III. HOLES IN THE ICE AND WHEN ITS LOGIC CAN FAIL

ICE is a central organizing principle for the analysis of vertical competitive effects. But its claims do not always hold. In this Part, we explain eight ways in which it can fail: (1) Baxter’s Law; (2) price discrimination; (3) potential competition; (4) bargaining problems; (5) incompetent incumbents; (6) option value; (7) regulatory strategy; and (8) incomplete complementarity. There are other exceptions,⁷⁹ but we find these ones particularly relevant to the information industries.

⁷⁷ In this spirit, Edmund Kitch has argued that intellectual property holders should be able to control the development and deployment of complementary products; see Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J.L. & ECON. 265, 287 (1977). More recently, see Douglas Lichtman, *Property Rights in Emerging Platform Technologies*, 29 J. LEGAL STUD. 615 (2000).

⁷⁸ Bork, *supra* note __, at 288 (arguing that all vertical restraints, like tying, should be *per se* legal).

⁷⁹ For one such different formulation, see Steven C. Salop & R. Craig Romaine, *Preserving Monopoly: Economic Analysis, Legal Standards, and Microsoft*, 7 GEO.

A. *Baxter's Law*

Even classical Chicago School adherents concede an exception to ICE where the platform (the core monopoly) is subject to regulation but the applications market is not.⁸⁰ The economics of “Baxter’s Law” echo the ICE argument itself: ICE argues that a monopolist can capture in its platform profits improvements in consumer value in applications, but it generally cannot do so if the platform price is regulated. Thus, regulated platform prices can lead a monopolist to relate differently to the applications market than ICE would ordinarily suggest.

Two simple economic reasons underlie Baxter’s Law. First, suppose that there is an “ideal” price cap that constrains the price of the platform product and that will not respond if platform-level profits change over time. Now consider how the regulated platform monopolist will view an opportunity to raise the price of applications and take a profit there. Assuming fixed 1:1 proportions between the platform and the applications market, suppose that the platform provider can take an additional profit of \$1 per unit in the applications market by monopolizing that market. As ICE stresses, this lowers the profit-maximizing price for its platform by \$1 (in the simplest case), given the level of platform sales. But whereas this “normally” lowers platform profits by \$1, it may have a far smaller effect on platform profits when the platform price is already regulated below the profit-maximizing level.⁸¹ In a sense, the platform provider can compensate for the fact that its platform is priced below the profit-maximizing price by taking additional – and possibly otherwise inefficient -- profits in the applications market.

The second reason for Baxter’s Law does not apply under an ideal price cap but does hold under some other common forms of price

MASON L. REV. 617, 625 n.26 (1999) (listing situations).

⁸⁰ See *Olympia*, 797 F.2d at 374 (“There are, however, special circumstances in which a rational monopolist may want to restrict competition in an input market; as it happens, one of those circumstances is where the monopolist’s rates are regulated.”); *Jefferson Parish*, 466 U.S. at 36 n. 4 (O’Connor, J., concurring) (“In a regulated industry a firm with market power may be unable to extract a supercompetitive profit because it lacks control over the prices it charges for regulated products or services. Tying may then be used to extract that profit from sale of the unregulated, tied products or services.”) (citations omitted). Bowman’s initial argument contemplated this exception, see Bowman, supra note __, at 22, but later commentators criticized his treatment of this argument as too deferential to the regulatory process. See Kaplow, supra note __, at 522 n.26.

⁸¹ The loss of demand is the \$1 divided by the absolute slope of the demand curve, so it is $-dx/dp$, or $(-dx/dp)/x$ per unit sales. Multiplying by the gross margin $(p-MC)$ gives $(p-MC)(-dx/dp)/x$, or $[(p-MC)/p] * (-p/x dx/dp)$. This is the Lerner markup index times the absolute elasticity of demand; this amounts to 1 if p is profit-maximizing, and is less than 1 if p is below the profit-maximizing level.

regulation. Suppose that the platform provider is regulated in a rate-of-return fashion, or by a price cap that responds over time to changes in platform profits. Then, by raising the price of its application product by \$1 and gaining profits there, a platform provider would benefit on balance even if in the short term its profits in the platform market would fall by the full \$1, because the regulatory process will over time make its platform operations whole and restore that “lost” \$1.

This exception to ICE has figured prominently in telecommunications policy.⁸² In particular, the Bell System allegedly leveraged its way to market power in complementary markets, denying equal access to its network to competitors in long distance and equipment manufacturing.⁸³ By excluding such competitors, AT&T could rent telephones to its customers, and sell equipment from its Western Electric affiliate to its operating companies or telephone subscribers, at inflated rates. Such a strategy was *available* to AT&T because of its network-level market power, but ICE would claim it should be *unattractive* because it would decrease demand for telephone subscription. But that decrease did not deter AT&T because of the price regulation of local telephone service. In its *Carterfone* decision and its aftermath, the FCC imposed an “unbundling” requirement on AT&T to prevent it from requiring consumers to rent phones from it, and thereby opened the customer premises equipment market to competition.⁸⁴ This issue was at the heart of the government’s antitrust case against AT&T, even though AT&T’s long distance rates – like its local ones – were regulated.⁸⁵

⁸² This issue also emerged in cases involving railroad regulation. See *Northern Pacific Ry. v. United States*, 356 U.S. 1, 8 (1958) (noting that land grant sales conditioned on “preferential commitments” might well be an example of a tie used as a substitute for an unlawful rebate); see also Kaplow, *supra* note ___, at 522 n.26.

⁸³ See Roger Noll & Bruce Owen, *The Anticompetitive Uses of Regulation: United States v. AT&T*, in *THE ANTITRUST REVOLUTION* 290 (J. E. Kwoka & Lawrence J. White eds., 1989), available at www.oup.com/us/antitrustrevolution. In theory, an ideal “global price cap” could restore ICE, but much modern telecommunications regulation rarely focuses on this goal, instead aiming to deregulate workably competitive segments. For more extensive discussions of the relationship of ICE to regulation, see JEAN-JACQUES LAFFONT & JEAN TIROLE, *COMPETITION IN TELECOMMUNICATIONS* (2000); B. DOUGLAS BERNHEIM AND ROBERT D. WILLIG, *THE SCOPE OF COMPETITION IN TELECOMMUNICATIONS* (1996); MARK ARMSTRONG, SIMON COWAN & JOHN VICKERS, *REGULATORY REFORM: ECONOMIC ANALYSIS AND BRITISH EXPERIENCE* (1994).

⁸⁴ See note ___ and accompanying text, *supra*.

⁸⁵ AT&T was federally regulated as a dominant carrier in the interstate long-distance market until 1995. See *Motion of AT&T Corp. to be Reclassified as a Non-Dominant Carrier*, Order, 11 F.C.C.R. 3271, 3280-82 (1995) (ending rate regulation of AT&T in the long distance market). The fact that AT&T faced regulation in its complementary markets – both in long distance and, in some cases, in CPE – suggests that this

Because then-Assistant Attorney General Baxter highlighted this hole in ICE in championing the consent decree that broke up AT&T, this exception is termed “Baxter’s Law” or the “Bell Doctrine.”⁸⁶

B. Price Discrimination

Participating in, or dominating, the applications market can help a platform monopolist to price discriminate; this objective may make even inefficient vertical leveraging profitable.⁸⁷ Control over applications can help a platform monopolist to engage in price discrimination, charging different markups on combinations of the platform with different sets of applications.⁸⁸ It can customize its offerings for different buyers, separating “inframarginal” customers who are willing to pay more, from “marginal” customers who would switch to other alternatives in the face of a price increase.⁸⁹ Price discrimination is familiar in airline travel, where airlines use various means to segment the market and extract premium prices from inframarginal business travelers who cannot plan in advance. In telecommunications, both incumbents and entrants practice price discrimination by offering different tiers of packages or sets of offerings to different customers.⁹⁰

Price discrimination need not in itself be inefficient or anti-consumer, but the platform monopolist’s desire to price discriminate

justification for regulatory action is more complicated than often appreciated. Three possible variations on this classic explanation might address this complication. First, areas where regulation did not address – such as certain CPE markets, particularly where AT&T sold equipment to itself – may have been open to abuses. Second, imperfections of regulation may have enabled the AT&T monopoly to take greater advantage of consumers by providing both the monopoly and complementary service – i.e., the end of vertical integration helped consumers by facilitating better regulation. Finally, the ability to prevent competition might have helped AT&T to forestall innovation in complementary markets that would force it to depreciate its sunk investments more quickly than it wished.

⁸⁶ See note __, supra.

⁸⁷ Proponents of the “leverage theory” of tying regularly invoke this explanation. See Lawrence A. Sullivan, *Section 2 of the Sherman Act and Vertical Strategies By Dominant Firms*, 21 SW. U. L. REV. 1227, 1237 (1992); Kaplow, supra note __, at 523 (“practices merely increasing profits to an existing monopoly, without ‘extending’ it, can increase the welfare loss that results”).

⁸⁸ In the Internet environment, customer identity might be more readily tracked through the complement than through the platform product.

⁸⁹ For a discussion and explanation of the difference between “marginal” and “inframarginal” customers, see James A. Keyte, *Market Definition and Differentiated Products: The Need For A Workable Standard*, 63 ANTITRUST L.J. 697, 739-45 (1995).

⁹⁰ See, e.g., Tiffany Kane, *Legislators Laud Debut of Covad’s Service*, CNET NEWS.COM (June 19, 2002), available at <http://news.com.com/2100-1033-937523.html> (reporting on Covad’s tiered pricing structure); see also Shapiro and Varian, supra note __, at __-__ (arguing that price discrimination and “versioning” are predictably prevalent in information industries).

can outweigh ICE and lead it to exclude efficient innovation or price competition in complements. In the classic case, it does so more or less intentionally where maximizing its profits involves large markups on (certain) complements – say, better meal service for first class passengers -- because in order to price discriminate in this manner, the monopolist must control the complementary market.⁹¹ In other cases, profit maximizing price discrimination involves *below-cost* pricing of complements: then, the platform provider has no motive to exclude as such and probably would be delighted if independent complementors were to offer cheap and innovative offerings, but independent developers may refrain from providing such products where the platform provider offers its own complements below cost.⁹²

Economists recognize that price discrimination can either harm or benefit consumers overall (and is likely to harm some and benefit others).⁹³ Like Ramsey pricing (of which it is a form),⁹⁴ some forms of price discrimination can raise profits at the lowest possible cost to consumers as a group, and this is valuable where profits are an important spur to innovation.⁹⁵ Thus modern economics is not generally hostile to price discrimination.

As a result, some commentators do not see price discrimination as an exception to ICE.⁹⁶ But it is. Even where price discrimination

⁹¹ This, of course, does not explain why the platform monopolist does not welcome independent innovation, but co-opt and tame it. But that approach may well be hard to do in practice.

⁹² See Farrell and Katz, *supra* note __ (formally modeling such an effect). A platform provider could alternatively offer a uniform subsidy to independent as well as its own complements, which might avoid this problem but raise others.

⁹³ See Posner, *Chicago School of Antitrust*, *supra* note __, at 926, 928 (explaining how price discrimination can reduce the “misallocative effects of monopoly”). Moreover, if price discrimination increases output and thus generate economies of scale and/or “learning by doing” efficiencies, unit cost of production will drop. See Jerry Hausman & Jeffrey MacKie-Mason, *Price Discrimination and Patent Policy*, 19 RAND J. OF ECON. 253, 257 (Summer, 1988). Finally, even if price discrimination is harmful, policies to limit it may have unintended consequences, such as leading firms to use cruder means of achieving the same purpose. See Hal Varian, *Price Discrimination*, in HANDBOOK OF INDUSTRIAL ORGANIZATION __ (Schmalensee and Willig, eds., 1989); Hausman & MacKie-Mason, *supra* note __, at __.

⁹⁴ As Justice Breyer explained, “Ramsey pricing is a classical regulatory pricing system that assigns fixed costs in a way that helps maintain services for customers who cannot (or will not) pay higher prices.” *AT&T v. Iowa Util. Bd.*, 119 S. Ct. 721, 752 (1999) (Breyer, J., concurring in part and dissenting in part).

⁹⁵ See Hausman & MacKie-Mason, *supra* note __, at 263 (allowing for price discrimination in the sale of a patented product can spur innovation and thus substitute for longer intellectual property protection).

⁹⁶ See, e.g., *Town of Concord*, 915 F.2d at 24; Bork, *supra* note __, at 241-42; POSNER, *ANTITRUST LAW*, *supra* note __, at 203-06.

itself *enhances* efficiency, the platform monopolist may impose highly inefficient restrictions on applications competition in order to engage in price discrimination.

To illustrate, consider the attitude of cable providers to streaming video applications over their cable modems. ICE would suggest that cable providers should happily endorse this use of their platform, as it would make the platform more valuable to users and therefore more profitable. But a cable provider who allows video streaming will find it harder to engage in the profitable and customary price discrimination that sets high markups for premium cable programming. Thus a cable provider might rationally, but inefficiently, try to stop this innovative method of distribution.⁹⁷

C. *Potential Competition*

Platform monopolists will evaluate actions in complementary markets through two lenses. On the one hand, ICE reminds us that the platform franchise often is worth more when the complement is efficiently supplied. On the other hand, competition in the complement can sometimes threaten the primary monopoly.⁹⁸ Thus, even if a two-level monopoly may not yield more than one monopoly profit, it can protect that monopoly against entry.⁹⁹

⁹⁷ For an anecdotal suggestion that cable providers may fear such effects, see David Lieberman, *Media Giants' Net Change Establish Strong Foothold Online*, USA TODAY, Dec. 14, 1999, at B3 (reporting that Dan Somers, CEO of AT&T Broadband, dismissed suggestions that it would allow video streaming of programming on the ground that "AT&T did not spend \$56 billion to get the blood sucked out of its veins.").

⁹⁸ Some have argued that this reason adds a dynamic element to the analysis that the traditional Chicago School model lacks. See Kaplow, *supra* note __, at 528-30 (contrasting "dynamic" and "static" approaches); *id.* at 523-23 (arguing that a monopolist's "motivation is to change the structural conditions it faces in order that it may receive greater profits in the future"); Steven C. Salop & R. Craig Romaine, *Preserving Monopoly: Economic Analysis, Legal Standards, and Microsoft*, 7 GEO. MASON L. REV. 617, 625-26 (1999) (discussing "preserving monopoly theory" that posits that vertical integration can be used "to impede the efforts of firms that might reduce the monopolist's power and thereby cause it to reduce its prices, increase innovation or perhaps lose out to a superior rival."); Herbert Hovenkamp, *Antitrust Policy After Chicago*, 84 MICH. L. REV. 213, 261 (1985) (criticizing Chicago School orthodoxy as focused on "static" analysis and unable to take account of "strategic behavior"). For an economic model of this strategy, see and Dennis W. Carlton & Michael Waldman, *The Strategic Use of Tying To Preserve and Create Market Power In Evolving Industries*, __ RAND J. ECON. __ (2002).

⁹⁹ In his *Town of Concord* opinion, then-Chief Judge Breyer set out this justification: Insofar as it is more difficult for a firm to enter an industry at two levels than at one, the monopolist, by expanding its monopoly power, has made entry by new firms more difficult. And insofar as the monopolist previously set prices cautiously to avoid attracting a competitive challenge, the added security of a two-level monopoly could even lead that monopolist to raise its prices.

915 F.2d at 23-24; see also *Matsushita Elec. Indus. Co. v. Zenith Radio Corp.*, 475 U.S. 574, 591 n.15 (1986) ("[W]ithout barriers to entry, it would presumably be impossible to

First, if there are no independent applications suppliers, any potential platform rival would need to enter at both the platform and applications levels.¹⁰⁰ This “two-level entry” theory is familiar to both telecommunications regulation and antitrust policy. For example, the program access provisions of the Cable Policy Act of 1992 give satellite firms access to cable networks affiliated with rival cable operators in order to ensure that satellite providers can compete effectively with cable and are not hindered by a lack of programming availability.¹⁰¹ Similarly, cable companies must offer a “basic tier” of service to ensure, among other things, that satellite providers can compete in the market for premium channels even when they cannot provide local programming.

The two-level entry theory also underlay the Justice Department’s challenge to General Electric’s licensing policies for medical imaging equipment. GE had contractually restricted hospitals from servicing the equipment of other hospitals. The Department argued that these restrictions illegally raised barriers to entry in the market for medical imaging equipment, because if hospitals’ service staffs learned to service outside equipment, new equipment providers would need only to enter the equipment market, relying on hospital service staffs to service their own equipment and that of other hospitals’.¹⁰² Thus, this case fits our framework, with equipment playing the role of the “platform” and service the role of “applications.”

Second, complements may ultimately make possible substitutes for the platform. In the *Microsoft* case, for example, Netscape’s Web browser was a complementary application in the short run, but could have facilitated operating systems competition in the long term.¹⁰³

maintain supracompetitive prices for an extended time.”); POSNER, ANTITRUST LAW, supra note __, at 202 (“The possibility that tying might discourage entry into the monopolized market for the tying product cannot be excluded altogether.”). For an argument along these lines, see Jay Pil Choi, *Preemptive R&D, Rent Dissipation, and the Leverage Theory*, 111 Q. J. OF ECON. 1153 (1996).

¹⁰⁰ Artificially created entry barrier concerns emerged as an early “post-Chicago School” concern. See, e.g., Jonathan B. Baker, *Recent Developments In Economics That Challenge Chicago School Views*, 58 ANTITRUST L.J. 645, 651-52 (1989).

¹⁰¹ See 47 U.S.C. § 548(c)(5); In re Implementation of Cable Television Consumer Protection and Competition Act of 1992, Notice of Proposed Rulemaking, 16 FCC Rcd. 19,074 (2001) (evaluating whether to extend rules); News Release, FCC Extends Program Access Exclusivity Rules (June 13, 2002) (available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-223381A1.doc).

¹⁰² See *United States v. General Electric*, Civil No. CV 96-121-M-CCL, Competitive Impact Statement (July 13, 1998) (available at <http://www.usdoj.gov/atr/cases/fl1800/1842.htm>).

¹⁰³ Lessig has called this scenario a “partial substitute,” see note __, *infra*, but this

By exposing its own application programming interfaces, the browser could ultimately “commoditize” the underlying operating system.¹⁰⁴ As the district court found (and the court of appeals affirmed), Microsoft concluded that this was a serious threat to its core monopoly and undertook a campaign to undermine Netscape’s browser.¹⁰⁵

Finally, independent providers of complements may themselves be likely entrants into the platform market. Carl Shapiro recently concluded that while “network monopolies can be very strong, they are most vulnerable to attack by firms in a strong position in a widely-used *complementary product*.”¹⁰⁶ Complementors know the market and have an economic interest in lowering the price of the underlying platform (lower platform prices will raise demand for their product). For the same reason, complementors need not fear a platform monopoly’s price cuts or quality enhancements in response to entry as much as a stand-alone entrant would.¹⁰⁷

term does not emphasize the temporal nature of what is often called “middleware.” See James B. Speta, *Tying, Essential Facilities, and Network Externalities: A Comment On Piraino*, 93 NW. U. L. REV. 1277, 1282 (1999) (pointing out that Microsoft’s predatory actions vis-a-vis Netscape can be explained on the ground that Microsoft viewed the browser as a partial substitute for the operating system); Michael D. Whinston, *Exclusivity and Tying In U.S. v. Microsoft: What We Know, and Don’t Know*, 15 J. ECON. PERSP. 63 (2001) (same).

¹⁰⁴ For a discussion based on Microsoft’s internal documents (as revealed by the trial), see Timothy F. Bresnahan, *Network Effects and Microsoft 23-24* (2001) (http://www.stanford.edu/~tbres/Microsoft/Network_Theory_and_Microsoft.pdf); see also Timothy F. Bresnahan, *A Remedy That Falls Short of Restoring Competition*, ANTITRUST 67 (Fall 2001) (hereinafter, Bresnahan, Restoring Competition) (“[T]he development of a spectacularly innovative complementary product . . . can lower entry barriers into the monopolized market and create an opening for substitutes to make inroads and competition to emerge.”).

¹⁰⁵ *United States v. Microsoft Corp.*, 87 F.Supp.2d 30, 38 (D.D.C. 2000) (“In this case, Microsoft early on recognized middleware as the Trojan horse that, once having, in effect, infiltrated the applications barrier, could enable rival operating systems to enter the market for Intel-compatible PC operating systems unimpeded. Simply put, middleware threatened to demolish Microsoft’s coveted monopoly power.”), *aff’d*, 253 F.3d 34 (D.C. Cir. 2001); Bresnahan, Restoring Competition, *supra* note __, at 67-68 (describing Microsoft’s campaign).

¹⁰⁶ See Declaration of Carl Shapiro, *United States v. Microsoft Corp.* 5-6 (April 28, 2000) (available at <http://www.usdoj.gov/atr/cases/f4600/4642.pdf>) (listing cases). To address Microsoft’s anticompetitive tactics to defeat a complementary product that threatened its monopoly platform, Shapiro’s testimony recommended divesting Microsoft’s applications products from its operating system in order to create additional competition in the operating systems market. See *id.*; but see Howard A. Shelanski & J. Gregory Sidak, *Antitrust Divestiture in Network Industries*, 68 U. CHI. L. REV. 1, 99 (2001) (criticizing proposal). On entry by complementors in the computer industry more broadly, see Timothy F. Bresnahan & Shane Greenstein, *Technological Competition and the Structure of the Computer Industry*, 47 J. INDUS. ECON. 1 (1999).

¹⁰⁷ See Joseph Farrell, *Prospects for Deregulation In Telecommunications*, 4 INDUSTRIAL AND CORPORATE CHANGE __, __ (1997).

In television programming and distribution, the FCC's financial interest and syndication ("finsyn") rules effectively barred the major networks (then ABC, NBC, and CBS) from the programming market and kept the major studios (then Fox, Warner Bros., and Paramount) out of the network market.¹⁰⁸ In court, however, the FCC failed to justify them and they were invalidated.¹⁰⁹ The studios – who had been the complementary providers of programming – then entered the platform market, creating three new networks. Likewise, the existing networks moved quickly to create their own programming.¹¹⁰ Similarly, the 1996 Telecommunications Act arguably assumed that the long distance providers – who rely on the local network -- were likely entrants into the local telephone market and the local providers were almost certain entrants into the long distance market.¹¹¹

D. Bargaining Problems

An independent innovator and a gatekeeping platform monopolist may fail to reach a mutually beneficial access arrangement. We identify two ways in which this can happen. In the simplest such bargaining problem, a complementor develops an innovative application, but "transaction costs" obstruct agreement with the platform gatekeeper, and the innovation lies fallow.¹¹² Thus, this problem has an immediate impact, and also discourages independent innovations in the longer run.¹¹³

¹⁰⁸ See *Schurz Comm. Inc. v. FCC*, 982 F.2d 1043, 1045-48 (7th Cir. 1992).

¹⁰⁹ Judge Posner remarked of the FCC's justification for these rules: "Stripped of verbiage, the opinion, like a Persian cat with its fur shaved, is alarmingly pale and thin." *Id.* at 1050. Most commentators have concurred with Judge Posner's critical assessment. See, e.g., Crandall, *supra* note ___, at 178-79.

¹¹⁰ In so doing, the networks often eschewed outside programming, only much later realizing the benefits of contracting out. See, e.g., Bill Carter, *Ailing ABC Turns To HBO In Search of TV Hits*, N.Y. TIMES D1 (August 5, 2002) (reporting that, after its initial hesitation, ABC decided not to rely largely on its internal production of programming, but to solicit programming from outside sources). To a degree, therefore, the finsyn rules did protect modularity and prevent vertical integration, whether or not that was desirable.

¹¹¹ See 47 U.S.C. Sec. 271; see also Joel Klein, *The Race For Local Competition: A Long Distance Run, Not a Sprint 7* (November 5, 1997), available at <http://www.usdoj.gov/atr/public/speeches/1268.htm> ("In essence, then, the Act envisions that the local and long distance companies will enter each other's markets and offer new and improved services, including bundled offerings of local and long distance, at better prices to consumers.").

¹¹² See Michael L. Katz, *Intellectual Property Rights and Competition Policy: Four Principles For A Complex World*, 1 J. TELECOM. & HIGH TECH. L. ___, __ (2002).

¹¹³ Economists would call this "short-run" both because it is immediate and because it is inefficient given the set of applications that have been developed, in contrast to the

A second kind of bargaining problem arises if the platform provider threatens to withhold access to the platform unless the application inventor licenses its new application very cheaply. If the inventor reluctantly agrees, this may be an efficient solution after the fact, but the prospect of this outcome discourages future independent invention.¹¹⁴ Invoking this theory, the FTC complained that Intel's demand of intellectual property licenses from its licensees (complementors) violated the antitrust laws.¹¹⁵

Such discouragement of efficient independent innovation might be a problem inherent in closed architectures.¹¹⁶ In a fully modular structure without a gatekeeper, the innovation could quickly be introduced,¹¹⁷ and the innovator would profit to an extent commensurate with its innovation. But, in the longer term, ICE suggests a possible self-correcting dynamic: if the platform sponsor thinks that more complementary innovation will be forthcoming as a result, it could set up a private commons or otherwise implement modularity. Microsoft exposes many of its application programming interfaces (APIs) to independent developers, spending money and resources to cooperate with complementary (applications) providers.¹¹⁸ Similarly, Intel carefully manages its complementors.¹¹⁹

problem of discouraging innovations.

¹¹⁴ See Joseph Farrell & Michael L. Katz, *Innovation, Rent Extraction, and Integration in System Markets*, 48 J. IND. ECON. 413, 430 (2000) (providing an economic model to support this conclusion).

¹¹⁵ See note __, supra; Carl Shapiro, *Technology Cross-Licensing Practices: FTC v. Intel (1999)* in THE ANTITRUST REVOLUTION (John E. Kwoka & Lawrence White, eds.) (2003).

¹¹⁶ To mitigate these potential barriers to innovation, intellectual property law has sought to develop certain open access doctrines. See Mark A. Lemley, *The Economics of Improvement In Intellectual Property Law*, 75 TEXAS L. REV. 989 (1997). On whether copyright law should allow complementors to gain access to a platform standard through reverse engineering as a means of addressing transaction cost issues, see Lichtman, supra note __, at __-__ (discussing issue and arguing against such access). On whether patent law should give second-generation inventors legal protection to facilitate a fair arrangement with the original inventor and address the holdout problem, see Suzanne Scotchmer, *Standing on the Shoulders of Giants: Cumulative Research and the Patent Law*, 5 J. ECON. PERSP. 29 (1991) (discussing issue and arguing for such protection). Moreover, real property law also recognizes that "strategic behavior" can prevent a socially desirable arrangement and provides for flexibility in crafting appropriate relief so as to avoid this outcome. See, e.g., *Walgreen Co. v. Sara Creek Property Co.*, 966 F.2d 273, 276-79 (7th Cir. 1992) (Posner, J.).

¹¹⁷ In the Internet environment, for example, the openness of the logical standard allows developers like Napster to introduce applications without first reaching agreement with a network owner. See supra notes __-__ and accompanying text.

¹¹⁸ See MICHAEL A. CUSUMANO & RICHARD W. SELBY, *MICROSOFT SECRETS: HOW THE WORLD'S MOST POWERFUL SOFTWARE COMPANY CREATES TECHNOLOGY, SHAPES MARKETS, AND MANAGES PEOPLE* (1995). Under the proposed consent decree reached with the Justice Department, Microsoft would formalize – and be subject to judicial oversight related to – the disclosure of information on its otherwise proprietary interfaces.

A platform monopolist may find it hard to make a credible commitment to modularity. One way may be to stay out of the complementary sector altogether. Just as in the *AT&T* case, where the Justice Department was skeptical that equal access was credible without divestiture and quarantine, some platform gatekeepers think their complementors will find a voluntary quarantine the best guarantee of fair treatment. This could involve spinning off divisions, as *AT&T* and *Palm* did.

E. Incompetent Incumbents

A platform monopolist will not behave as ICE predicts if it fails to understand ICE. Some applications of ICE are surprising even for professional economists.¹²⁰ Thus, even if there is only one monopoly profit, some may think otherwise and inefficiently seek a second.¹²¹ And even where top management appreciates ICE, other employees may not.¹²²

See Joe Wilcox, Microsoft Tallies Antitrust Efforts, CNET News.com (August 5, 2002) (<http://news.com.com/2100-1009-948440.html>).

¹¹⁹ On Intel's strategy, see Gawer, *supra* note __. For related antitrust issues concerning Intel, see Intel Corp., Analysis of Proposed Consent Order to Aid, Public Comment at 2 (Mar. 17, 1999), available at <http://www.ftc.gov/os/1999/9903/d09288intelanalysis.htm>; see also *Intergraph Corp. v. Intel Corp.*, 195 F.3d 1346 (Fed. Cir. 1999). For an economic model that explains "the contrast between Intel's stated concern for complementors and its inability to fully commit not to behave aggressively towards them," see David Miller, Invention Under Uncertainty and Ex Post Entry (January 30, 2003), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=319180; see also Farrell and Katz *supra* note __.

¹²⁰ For example, consider competition when a platform monopoly such as an ILEC (incumbent local exchange company) charges an "access charge" above marginal cost to its downstream (long-distance, for example) rivals. If demand is totally inelastic, ICE implies that no imputation rule is necessary to ensure that the ILEC should charge itself the same access charge as it charges rivals. See *e.g.*, Farrell, Independent Innovation, *supra* note __, at __. In our experience, however, this "opportunity cost argument" is not obvious to policymakers, business people, or even distinguished economists.

¹²¹ See Kaplow, *supra* note __, at 548-49 ("one might argue that even if a leveraging strategy is unprofitable or doomed to complete failure in the long run, many firms cling to a misguided belief that they can succeed").

¹²² Some courts have acknowledged this possibility. See, *e.g.*, *Time Warner Entertainment Co. v. Federal Communications Commission*, 240 F.3d 1126, 1138 (D.C. Cir. 2001) (noting that a company may be "reluctant to ditch or curtail an inefficient in-house operation because of the impact on firm executives or other employees, or the resulting spotlight on management's earlier judgment"). This strategy thus might be rational for individual managers wanting to avoid the detection of their own mistakes, but irrational for the company as a whole, which would suffer from the lack of superior applications for its platform product. In economics, this is called a "principal-agent" problem.

In our experience, businesspersons are often reluctant to help outside firms compete against internally supplied applications.¹²³ This may be particularly likely if the benefit of modularity comes in the form of “a hundred flowers” of diverse paths of innovation in the complement.¹²⁴ Incumbents may lack the imagination to realize what they are failing to imagine, and thus fail to implement modularity even when it would spur greater innovation and thus increase their platform profits.

ICE’s insights for business strategy may be particularly hard to see for industries emerging from a regulated environment of end-to-end service.¹²⁵ ICE-aware business commentators have argued that the customer relationship business, the product innovation business, and the infrastructure business can be “unbundled” from one another to great efficiency benefits,¹²⁶ but that regulated incumbent firms often miss this opportunity.¹²⁷ Thus, two commentators claim that the local telephone companies have “deliberately limited the growth and profitability of their infrastructure business to protect their customer relationship business.”¹²⁸

ICE-savvy commentators also argue that Apple erred in the early 1980s by not licensing its operating system so that others could build computer systems around it.¹²⁹ Apple had developed an operating system widely viewed as better than Microsoft’s MS-DOS (which

¹²³ See, e.g., Allen, *Vertical Integration and Market Foreclosure: The Case of Cement and Concrete*, 14 J. L. & ECON. 251, 270-72 (1971) (offering this explanation for vertical integration).

¹²⁴ This recalls Mao Tse-Tung’s famous adage: “Let a hundred flowers bloom, a hundred schools of thought contend.” For explorations of the economics of innovation and diversity, see Raaj Kumar Sah & Joseph E Stiglitz, *The Invariance of Market Innovation to the Number of Firms*, 18 RAND J. ECON. 98 (1987) and Joseph Farrell et. al, *Market Structure, Organizational Structure, and R&D Diversity*, in _____ (2003).

¹²⁵ See Rogerson, supra note __, at 89 (Under the influence of regulation, “managers and employees of regulated firms settle into patterns of inefficient production and missed opportunities for technological advance and entry into new markets”); *id.* at 98 (noting that it takes time for the management of formerly regulated monopolists to move to a more entrepreneurial culture).

¹²⁶ John Hagel III & Marc Singer, *Unbundling the Corporation*, 3 MCKINSEY Q. (2000), available at <http://www.optimizemagazine.com/mckinsey/2002/0408.htm>.

¹²⁷ *Id.* This concern underlies the much-discussed proposal of imposing a wholesale-retail separation of the incumbent local telephone providers’ operations. For debate on this, compare T.Randolph Beard et al., *Why Adco? Why Now? An Economic Exploration Into The Future Structure For The “Last Mile” In Local Telecommunications Markets*, 54 FED. COMM. L.J. 421 (2002) with Robert W. Crandall & J. Gregory Sidak, *Is Structural Separation of Incumbent Local Exchange Carriers Necessary For Competition?*, 19 YALE J. REG. 335 (2002).

¹²⁸ Hagel & Singer, supra note __.

¹²⁹ Charles R. Morris & Charles H. Ferguson, *How Architecture Wins Technology Wars*, HARV. BUS. REV., March-April 1993, at 90 (noting how Macintosh’s refusal to open its platform hurt it in the marketplace).

IBM and others licensed),¹³⁰ but thought it could make more money by bundling the operating system with its own computers. Thus, considered as an operating system platform provider, Apple bet on its own production and distribution channel rather than on a competitive hardware sector. Whether it failed to see that it was making this bet, or simply overrated its hardware and distribution prowess, Apple lost the chance to be the leading producer of operating systems, realizing too late that it would have done better to promote an open network.¹³¹

If incumbents do not always fully understand ICE, what policy implications follow? Sensibly, public policy does not normally let regulators tell a business how to maximize its profits;¹³² similarly, the antitrust laws and regulatory policy generally do not seek to correct business strategy failures. Although we agree with this reluctance to second-guess platform providers' calculations of their best interests, one lesson does follow: the less we can count on monopoly to be efficient even on its own terms, the more we should value platform-level (intermodal) competition, perhaps especially diverse competition.¹³³ In the case of Apple, for example, the presence of a rival platform protected customers; it also made the punishment for Apple's error more striking and more visible – even monopolists who fail to understand ICE are punished with lower profits, but the punishment is sharper or at least more visible when there is competition among platforms.¹³⁴ Thus, the arcane complexities of ICE and its implications boost the (already strong) case for platform-level competition.¹³⁵

¹³⁰ See Stanley M. Besen & Joseph Farrell, *Choosing How to Compete: Strategies and Tactics in Standardization*, 8 J. ECON. PERS. 117, 118 (1994).

¹³¹ On the inferiority of Apple's strategy, see Langlois & Robertson, *supra* note __, at 308-12.

¹³² For example, the "business judgment rule" used in corporate law instructs courts not to substitute their judgment for business decisions in assessing liability, provided that the decision at issue can be "attributed to any rational business purpose." *Sinclair Oil Corp. v. Levien*, 280 A.2d 717, 720 (Del. 1971); see also William Baxter, *Legal Restrictions on Exploitation of the Patent Monopoly: An Economic Analysis*, 76 YALE L.J. 267, 318 (1966) (rejecting use of "antitrust laws to assure that private economic interests are perceived correctly"); Kaplow, *supra* note __, at 549 ("purpose of antitrust laws is not to improve the effectiveness of management").

¹³³ The importance of such competition is elaborated in Weiser, *Intellectual Property Policy*, *supra* note __.

¹³⁴ Joseph Farrell, *Standardization and Intellectual Property*, 30 JURIMETRICS J. 35, 42 (1989) ("As the IBM PC experience reminds us, moreover, a technology may be much more likely to set a standard if its owner chooses to renounce at least part of the prospective proprietary gains, by making the system 'open' or by widespread licensing."); see also Joseph Farrell & Nancy Gallini, *Second Sourcing As A Commitment: Monopoly Incentives To Attract Competition*, 108 Q. J. ECON. 673 (1988).

¹³⁵ In evaluating, for example, mergers between platform providers, antitrust enforcers

If, as Judge Posner claims, an economics-based approach has won in antitrust,¹³⁶ we urge that this salutary triumph be leavened by recognizing that competition protects not only against powerful firms with bad incentives (on which economics-based antitrust mainly focuses), but also against powerful firms with incompetent or dishonest management. When a firm fails to optimize modularity (or anything else) in a fully competitive industry, its shareholders suffer, but customers broadly do not. When a monopoly fails to do, however, customers often suffer. Antitrust and regulation should thus aim to protect against incompetent monopolies as well as against rapacious ones.

F. Option Value

Perversely, fear of access regulation may itself discourage a firm from opening its platform. After a monopolist allows open access to its platform, it may not later be allowed to pursue a closed or fully integrated strategy. Under current antitrust practice, for example, a firm is far more likely to get into trouble for closing a previously open platform than for never opening it in the first place.¹³⁷ Some commentators and judges have noted the adverse *ex ante* effect of imposing liability for changing a cooperative practice and have cautioned courts against imposing such liability,¹³⁸ but the fear of such liability will not dissipate any time soon. Consequently, a firm may keep its platform closed even if it would more profitably be open, if the “option value” of later being able to close it is important.

Thus suppose that the platform provider can extract \$10 per customer of profits in applications by monopolizing that market, and knows the demand for its platform that will result, but is uncertain about how much more valuable the platform would be to its customers if applications were competitively supplied. Suppose in particular that the firm thinks it equally likely that customers will value the platform at only \$6 more (the advantages of applications competition are small) or that customers will value the platform at \$12 more (competitively supplied applications are very valuable).

should be mindful of the competitive impact related to the loss of rival platforms and the associated experimentation that arises from such platform diversity.

¹³⁶ See POSNER, *ANTITRUST LAW*, supra note __, at ix.

¹³⁷ For two cases that reflect this point, see *Aspen Skiing Co. v. Aspen Highlands Skiing Corp.*, 472 U.S. 585 (1985); *Eastman Kodak Co. v. Image Technical Servs., Inc.*, 504 U.S. 451 (1992). For a sense of the debate over these cases, compare Dennis Carlton, *A General Analysis of Exclusionary Conduct and Refusal to Deal--Why Aspen and Kodak Are Misguided*, 68 *ANTITRUST L.J.* 659, 668-71 (2001) (criticizing cases) with Jonathan B. Baker, *Promoting Innovation Competition Through the Aspen/Kodak Rule*, 7 *GEO. MASON L. REV.* 495 (1999) (endorsing cases).

¹³⁸ For a discussion of this point, see *Olympia*, 797 F.2d at 376.

Then the efficient path, which also (as in ICE) maximizes the firm's overall profits, is to open the platform initially, learn how much customers value that openness, and to leave it open if customers turn out to value open competition in applications at \$12, but to close it and take over the applications market if they turn out to value openness at only \$6.

But if that path is prohibited (or will attract antitrust liability), the firm must choose between opening the market forever and closing it. Note that an equal chance of a \$6 or \$12 boost to platform demand (from applications competition) is worth less than the \$10 applications profits. Therefore, if denied the option to close the platform later (should customers value openness at only \$6), the firm will inefficiently close the platform *ab initio*.¹³⁹

G. Regulatory Strategy Considerations

A second “iatrogenic”¹⁴⁰ exception to ICE arises if a firm thinks allowing open access in one context will increase its regulatory duties elsewhere. For instance, a broadband transport provider might refuse to open its platform even where open access increases its profits, because it does not want to risk having to provide other access. Thus competitive provision of broadband Internet service might add value to a cable broadband transport product, but in another, related market – say, video content – competitive providers will hurt the cable company's core product offering. If the company believed that opening up its pipe to ISPs would make it substantially more likely to have to open up to video providers, it might rationally resist open access even for ISPs. Similarly, it is unclear why AT&T would have disliked the Hush-A-Phone itself, but it might well have feared that welcoming it would have created a precedent for other attachments. In this way, the likely response of law and regulation can affect a firm's stance toward modularity.

Some firms may be more inclined than others to believe that “their” regulators will extrapolate across markets. Certainly, regulators do sometimes do so, using benchmarking between regional monopolists in devising public policy.¹⁴¹ Thus, in the cable

¹³⁹ A version of ICE survives: with the efficient path unavailable, the firm chooses efficiently among those that remain. But this may be cold comfort.

¹⁴⁰ This term literally means “[I]nduced in a patient by a physician's activity, manner, or therapy.” AMERICAN HERITAGE DICTIONARY (2000) (available online at www.dictionary.com).

¹⁴¹ This rationale underlay the creation of different regional companies as part of the AT&T consent decree. See *United States v. Western Elec. Co.*, 993 F.2d 1572, 1580

market, they may seek to preserve cable firms with different sets of assets or business strategy on the view that some cable firms will be more willing than others to experiment with open access arrangements.

H. Incomplete Complementarity

If applications can be valuable without the platform, platform providers may profit by monopolizing the applications market. As Michael Whinston has explained, this exception to ICE arises where (1) the platform is not essential for all uses of the application (creating the incentive); and (2) there are economies of scale or network effects in the application (creating the opportunity).¹⁴² Consider for instance a restaurant on a beach resort that some travelers visit for day trips, while others stay for a week. A monopolist hotel might profitably bundle the complement (meals) with its core offering (rooms) if doing so would foreclose the restaurant market to rivals. As ICE insists, raising the price of meals lowers longer-stay visitors' willingness to pay for rooms (if they know about it before booking), but part of the profits on meals will be extracted from day-trippers and of course does not reduce their demand for rooms.

In the information industries there are often strong complementarities between platforms and applications, so we have assumed in our exposition that applications are strict complements with the platform. In reality, however, an application for one platform – say, broadband transport – may also be useful for another – say, narrowband transport – and this may lead the broadband

(D.C. Cir.) (“[T]he existence of seven [Bell operating companies] increases the number of benchmarks that can be used by regulators to detect discriminatory pricing . . . in evaluating compliance with equal access requirements . . .”), *cert. denied*, 510 U.S. 984 (1993). Similarly, in approving the SBC/Ameritech merger, the FCC recognized lost benchmarking opportunities as a harm caused by the merger. *See Applications of Ameritech Corp., Transferor, and SBC Communications, Inc., Transferee, For Consent to Transfer Control of Corporations Holding Commission Licenses and Lines Pursuant to Sections 214 and 310(d) of the Communications Act and Parts 5, 22, 24, 25, 63, 90, 95, and 101 of the Commission's Rules, CC Docket 98-141, Memorandum Opinion and Order*, 14 FCC Rcd 14712, 14713 (1999) (“The merger will substantially reduce the Commission's ability to implement the market-opening requirements of the 1996 Act by comparative practice oversight methods.”). In that proceeding, one of us (Farrell) made this very argument on behalf of Sprint Corporation. Note that differences among regional monopolies may be what causes them to choose different strategies, so it is arguable whether regulators should be willing, a priori, to impose on one monopoly what another seemingly similarly situated one finds acceptable.

¹⁴² *See* Michael Whinston, *Tying, Foreclosure, and Exclusion*, 80 AMER. ECON. REV. 837 (1990).

transport provider to try to control the applications market. Thus, this exception could prove important.

IV. LESSONS FROM ICE, ITS EXCEPTIONS, AND TOWARDS A COGENT FRAMEWORK FOR OPEN ACCESS POLICIES

As discussed in Part II, modern antitrust generally supposes that ICE is broadly right with limited and fairly easily diagnosed exceptions, and thus usually permits even dominant firms to make their own vertical choices. Courts and commentators have often heeded the basic ICE argument for skepticism about claims that a monopolist would “leverage” its primary monopoly into a second market,¹⁴³ but have often adopted a simplistic form of this logic that does not address fully ICE’s exceptions.

In contrast, as telecommunications policy moved away from its disposition toward regulated integration, it turned sharply toward mandating modularity or “openness” with the Hush-a-Phone and Carterfone decisions, followed by the breakup of the Bell System and the Telecom Act’s unbundling provisions.

Thus some take ICE very seriously, others take its exceptions very seriously,¹⁴⁴ but few integrate the two in a sophisticated manner. In light of this divide, a central question is whether ICE is the rule, with relatively rare or minor exceptions, or whether ICE is actually the exception.¹⁴⁵ This Part discusses how ICE and its exceptions can help frame and evaluate open access obligations.

¹⁴³ See, e.g., *G.K.A. Beverage Corp. v. Honickman*, 55 F.3d 762, 767 (2d Cir. 1995) (“Once having achieved the alleged bottling monopoly, therefore, appellees’ sole incentive is to select the cheapest method of distribution.”); *Advo, Inc. v. Philadelphia Newspapers, Inc.*, 51 F.3d 1191, 1203 (3d Cir. 1995) (arguing that leveraging theory “makes no sense”).

¹⁴⁴ For two classic responses to Chicago School thinking, see Lawrence A. Sullivan, *Section 2 of the Sherman Act and Vertical Strategies By Dominant Firms*, 21 SW. U. L. REV. 1227 (1992); Louis Kaplow, *Extension of Monopoly Power Through Leverage*, 85 COLUM. L. REV. 515 (1985).

¹⁴⁵ See Herbert Hovenkamp, *Post-Chicago Antitrust: A Review and Critique*, 2001 COLUM. BUS. L. REV. 257 (“The principal difference between Chicago and post-Chicago economic analysis is” the prevalence of “a complex set of assumptions about how a market works, [which make] anticompetitive outcomes seem more plausible.”); see also RICHARD POSNER, *ANTITRUST LAW 194-95* (2001) (maintaining that policy deviations from ICE should be the exception, not the rule). Some “die-hard” Chicagoans believe that vertical arrangements can never have anticompetitive effects (i.e., believe that there are no exceptions to ICE), but most commentators recognize the heavy weight of economic opinion agrees that vertical integration and vertical market restrictions can injure competition in certain cases. See Richard A. Posner, *The Chicago School of Antitrust Analysis*, 127 U. PA. L. REV. 925, 932 (1979) (discussing “die-hard” Chicagoans who refuse to accept subsequent refinements of early Chicago School ideas).

In traditional telecommunications, the monopoly platform was generally price-regulated, and “Baxter’s law” provides that ICE does not apply to regulated monopolies.¹⁴⁶ And the Telecom Act’s unbundling obligations can be viewed and justified within this tradition. In particular, the Act’s ambitious effort to regulate “bottleneck” wholesale inputs, such as the local lines to residential telephone subscribers, aims in part to replace the legacy system of retail regulation.¹⁴⁷ But increasingly, as in broadband cable modems, telecommunications regulators confront arguments for open access regulation where the platform is not generally price-regulated. To address such arguments in a fashion that is consistent with antitrust policy, policymakers must understand the different regulatory tools for facilitating modularity, the difficult tradeoffs in developing a regulatory regime, and the possible regulatory philosophies for addressing the issue. This Part addresses each issue in turn.

A. *Regulatory Strategies to Facilitate Modularity*

When a regulator believes (despite ICE) that modularity is both efficient and yet threatened by actual or potential vertical integration, it may seek a remedy. Competitive remedies are often divided into “structural measures” and “conduct remedies.”¹⁴⁸ Antitrust law tends to favor structural measures, both to avoid enmeshing itself in closely regulating behavior and to get at the heart of the incentive and opportunity for the unlawful conduct.¹⁴⁹ Nonetheless, as demonstrated during the debates over remedy in the *Microsoft* case, structural remedies pose their own risks, which may ultimately dispose even antitrust courts towards conduct relief.¹⁵⁰

The classic and pure structural remedy is a “quarantine” that forbids the platform monopolist from participating in the applications sector. For those who distrust a platform monopolist’s stewardship of an applications market, and yet also doubt regulators’ ability to

¹⁴⁶ See Joskow & Noll, *supra* note __, at 1249-50.

¹⁴⁷ For a description of the Telecom Act’s market opening strategy, see Philip J. Weiser, *Federal Common Law, Cooperative Federalism, and the Enforcement of the Telecom Act*, 76 N.Y.U. L. REV. 1692, 1733-67 (2001). The regulatory reforms in electricity, which aim to facilitate competition in the generation market and more effective regulation of the natural monopoly transmission and distribution elements, embody a similar ambition. See Joskow, *supra* note __, at 125.

¹⁴⁸ For a discussion of these distinctive philosophies, see Howard A. Shelanski & J. Gregory Sidak, *Antitrust Divestiture in Network Industries*, 68 U. CHI. L. REV. 1, 15-16 (2001).

¹⁴⁹ See, e.g., *AT&T*, 552 F.Supp. at 193 n. 251 (discussing limitations of antitrust courts in superintending regulatory relief and importance of addressing core economic incentives).

¹⁵⁰ See, e.g., Shelanski & Sidak, *supra* note __, at __ (discussing rationale for less restrictive conduct remedy over divestiture relief).

stop anticompetitive behavior by other means, this approach remains a favored option.¹⁵¹ But it precludes (by definition) any integrative efficiencies.¹⁵² In addition, unless the platform/applications boundary is clean and natural, a quarantine risks becoming clumsy and artificial, as (some have argued) the quarantine imposed on the Bell Companies under the AT&T consent decree¹⁵³ illustrates.¹⁵⁴

Recognizing such problems, regulators sometimes try to get the best of both worlds, allowing the platform provider to integrate but trying to ensure that it not abuse its position. The aim is to make the platform monopolist behave in some ways (the worrying ways) as if it were not integrated into the applications market, even while behaving in other ways (the integrative efficiencies) as if it is. A fundamental problem with such best-of-both-worlds regulatory strategies is that it is difficult to know whether a particular approach will allow more by way of efficiencies or of anticompetitive effect; by and large, stricter rules against anticompetitive problems also risk greater collateral damage to the integrative efficiencies that presumably motivated the rejection of a quarantine. Nonetheless, regulators often seek to develop compromise approaches intermediate between quarantine and vertical *laissez-faire*.

One intermediate option is a *structural separation requirement*. Under the Telecom Act, for example, the Bell Companies may enter the long-distance market once certain conditions are met, but must do so through a structurally separate entity.¹⁵⁵ This form of regulation does not necessarily change a firm's ability to discriminate against rivals, but aims to make such discrimination easier to detect and prevent by requiring the firm to deal with its own affiliate at arm's length. This approach may require policing equal access arrangements and overseeing the management of the separate subsidiary (including the imputation of any access charges).¹⁵⁶

¹⁵¹ See, e.g., Charles H. Ferguson, *The United States Broadband Problem: Analysis and Policy Recommendations* 6 (May 31, 2002), available at <http://www.brookings.edu/comm/policybriefs/pb105.htm> (recommending quarantine solution).

¹⁵² Restrictions on entry may well limit competition in the applications market, but because of the possible countervailing effect, this is not a certainty.

¹⁵³ See AT&T, 552 F.Supp. at 227 (reprinting MFJ Sec. II (D)(1)).

¹⁵⁴ For the argument that this quarantine reflected an artificial distinction between local and long distance telecommunications services, See Mark A. Jamison, *Competition In Networking: Research Results and Implications For Further Reform*, 2002 L. REV. M.S.U.-D.C.L. 621, 622-23 (2002).

¹⁵⁵ See 47 U.S.C. Sec. 272.

¹⁵⁶ See, e.g., *Second Computer Inquiry*, 77 F.C.C.2d at 462 (detailing measures imposed on telephone company to facilitate monitoring of structurally separated

Other intermediate approaches do not control scope or structure, but order the platform provider not to discriminate in certain ways, contrary (presumably) to its assessed incentives. “*Conduct remedies*” try to control behavior directly, often requiring ongoing supervision by a regulator or court.¹⁵⁷ Non-structural remedies also include mandated *unbundling* and *compatibility*.¹⁵⁸

Mandated *unbundling* requires an integrated platform provider to offer the platform without (at least some of) its applications. In its simplest form it is meant to protect applications competition even for a monopoly platform. When regulators fear that an integrated platform provider will inefficiently hinder independent applications on its platform—presumably because of an exception to ICE—they may mandate that independent developers and/or consumers be truly able to combine the platform product with independent applications, on terms comparable to those (perhaps only implicitly) given by the platform provider “to itself.”

Thus, telecommunications regulators used unbundling to facilitate competition in the terminal equipment (“applications”) market by defining an interface to AT&T’s telephone network (“platform”), and permitting all customer premises equipment compatible with that interface and certain requirements to plug into the network. Similarly, MCI demanded and won the right to compete against AT&T in the (not immediately clearly defined) long-distance component (“application”) of a long-distance call, complementing the Bell System’s provision of local exchange access (the “platform”, or the first and last miles of such a call). In these cases, the exception to ICE was Baxter’s Law, and the goal of unbundling was to protect competition in applications, which regulators thought

subsidiary).

¹⁵⁷ See, e.g., *Roland Machinery Co. v. Dresser Industries, Inc.*, 749 F.2d 380, 391-92 (7th Cir. 1984) (Posner, J.); cf. Ken Auletta, *Final Offer*, THE NEW YORKER, 43 (Jan. 15, 2001) (quoting Chief Judge Posner, mediator in the Microsoft case, as stating that a conduct remedy-based consent decree must be “sufficiently clear to be judicially administrable and that (even if clear) they would not impose an undue administrative burden on the district court, which would have to administer the decree.”).

¹⁵⁸ For ease of exposition, we use the general term “open access” to describe all measures that require the platform provider to deal with other firms with whom it might otherwise choose not to deal. Some suggest that there is little need to parse the term more narrowly, but, like most commentators, we believe that the approaches discussed above are worth analyzing separately. Compare Mark A. Lemley & Lawrence Lessig, *The End of End-to-End: Preserving the Architecture of the Internet in A Broadband Era*, 48 UCLA L. REV. 925, 969 n.139 (2001) (quarreling with suggestion that interconnection regulation and unbundling regulation are distinct approaches) with Gerald R. Faulhaber, *Access = Access₁ + Access₂*, 2002 L. REV. M.S.U.-D.C.L. 677 (2002) (making this distinction); Speta, *Internet Interconnection*, supra note __, at 252 (same); Weiser, *Paradigm Changes*, supra note __, at 826 (same); Joseph D. Kearney & Thomas W. Merrill, *The Great Transformation of Regulated Industries Law*, 98 COLUM. L. REV. 1323, 1350-57 (1998) (same).

likely to be efficient notwithstanding AT&T's opposition. And the Telecommunications Act's unbundling provisions are in part (but see below) intended to ensure competition in those whatever parts of the network that sustain competition, despite whatever natural monopoly network elements remain; again, Baxter's Law disarms ICE.

In antitrust, Kodak was required to continue cooperating with independent providers of service ("applications") for its copiers ("platform"); the exception to ICE was in part hold-up or a failure of consumer information. As a condition of their merger, the FTC required AOL/Time Warner to offer broadband transport separately from Internet access; to regulate this requirement, the FTC relied on a benchmark arrangement between AOL/Time Warner and Earthlink and appointed a monitor to oversee other such arrangements.¹⁵⁹ The "essential facilities doctrine" aims to protect competition in applications on a monopoly platform; one of its weaknesses is that no exception to ICE appears doctrinally required for its application.

As the MCI and Telecom Act examples illustrate, unbundling sometimes (though not always, as the CPE example shows) requires both complex regulation and difficult price-setting.¹⁶⁰ For this reason and because most antitrust problems do not confront Baxter's Law, antitrust commentators are often skeptical of unbundling policies.

Antitrust is however open to unbundling remedies when the potential competition exception to ICE applies, as our discussion of the General Electric case above shows. If complementors are important to potential platform competition, then unbundling may be required so as to increase the chance of such competition. In the *Microsoft* case, for example, the Justice Department sought and obtained a judicially overseen regime for how Microsoft manages the APIs for its Windows operating system. In particular, the court imposed regulations aimed to ensure that rival "middleware applications" can be as compatible with Microsoft's Windows operating system as are Microsoft's rival applications.¹⁶¹ The Microsoft remedy aims to restore the chance of platform competition indirectly facilitated by independent middleware. Likewise, the Telecom Act's unbundling provisions are meant in part as stepping stones for the many-level entry otherwise required in order to

¹⁵⁹ See Faulhaber, *supra* note __, at __-__.

¹⁶⁰ As Justice Breyer explained, forced sharing regimes risk undermining investment incentives if prices for the shared facilities are set too low, and create considerable administrative costs if the regime is ambitious. See *AT&T Corp. v. Iowa Utilities Bd.*, 525 U.S. 366, 427-30 (1999) (Breyer, concurring in part and dissenting in part).

¹⁶¹ *U.S. v. Microsoft*, 231 F.Supp.2d 144 (D.D.C. 2002).

compete against the platforms of incumbent local exchange providers.

As in the CPE example, an unbundling remedy may require the regulator to ensure that technical interface standards allow independent complementors to work with the platform. A different set of policies, directed at platform-level competition, also involve compatibility mandates. Such mandates can help make “small” platforms more effective competitors when economic network effects are important.¹⁶² Regulators can flatly require compatibility or establish a right for any firm (or for non-dominant firms) to request or ensure it.¹⁶³ The relevant kind of compatibility depends on the nature of the network effects.

Network effects sometimes arise directly from the size of a platform’s customer base, in which case a compatibility mandate should ensure *access to customers*, requiring firms to share the benefits of their combined customer networks, even if one firm contributes the majority of customers. For example, in instant messaging (as with many communications products), it is directly valuable to be able to communicate with more other users. In a compatibility mandate in that market, as part of a merger approval the FTC required AOL to develop an interoperable system with at least two other instant messaging providers.¹⁶⁴ Similarly the Telecom Act requires every telecommunications provider to terminate calls to its subscribers from other providers, thus “socializing” the network effect.¹⁶⁵

In other cases the network effect arises from a greater variety of complements: an example is the “applications barrier to entry” in the Microsoft case. Then, a compatibility requirement involves reducing porting costs so as to ensure that applications written for one platform are readily available on others. A strong form of this would make public and common the platform/applications interface, and thus modularize the market.

¹⁶² Economists describe a greater value of a larger network as a “network effect.” For an overview, see Joseph Farrell & Paul Klemperer, *Competition with Switching Costs and Network Effects*, 3 HANDBOOK OF INDUSTRIAL ORGANIZATION (Mark Armstrong and Robert Porter, eds.) (forthcoming 2003) (on file with authors); Mark A. Lemley & David McGowan, *Legal Implications of Network Economic Effects*, 86 CAL. L. REV. 479 (1998).

¹⁶³ On rights of “reverse engineering” to ensure compatibility, for instance, see Samuelson and Scotchmer, *supra* note ____.

¹⁶⁴ See *In the Matter of America Online, Inc. and Time Warner, Inc.*, Decision and Order (December 14, 2000) (available at <http://www.ftc.gov/os/2000/12/aoldando.pdf>). For discussion, see Faulhaber, *supra* note __, at 684-85.

¹⁶⁵ For discussion and an analogy to intellectual property policy, see Joseph Farrell, *Prospects for Deregulation in Telecommunications* in INDUSTRIAL AND CORPORATE CHANGE (1997).

B. Considerations for Regulatory Policy

Our analysis suggests that regulators should consider two basic questions: first, whether an exception to ICE exists, and, if this seems likely, then how well the regulator can address the competitive harms that might result. A regulatory regime that addresses both questions will minimize the opportunity for anticompetitive conduct while also being less apt to chill efficient conduct. This Section will discuss each consideration in turn.

In assessing possible exceptions to ICE, regulators should consider error costs. Courts are accustomed and explicitly instructed to weigh error costs, for instance as part of a preliminary injunction inquiry.¹⁶⁶ Moreover, the law has adopted a number of doctrinal devices to guard against false positives; in antitrust these include the opportunity for a monopolist to offer an efficiency explanation for challenged conduct.¹⁶⁷ Error costs include both “false positives” and “false negatives,” although some Chicago School commentators argue that policymakers should worry less about “false negatives” because the marketplace can ultimately address regulatorily unremedied market power abuses whereas ill-conceived regulation faces no such self-correcting mechanism.¹⁶⁸

Second, regulators should evaluate how well they can address the identified anticompetitive conduct. As antitrust law recognizes, not all marketplace harms are easily remediable. Professor Donald Turner first made this point in regard to the difficulty of policing tacit collusion between oligopolists,¹⁶⁹ and remediability concerns continue to figure prominently in debates over whether and how antitrust law can address single-firm conduct, as in the *Microsoft* case.¹⁷⁰ In the regulatory arena, this concern is both less pronounced – as regulatory bodies have greater resources than courts – and also less well considered. Remedies can also have unintended negative side effects.¹⁷¹ Remedies should aim to avoid chilling efficient

¹⁶⁶ See, e.g., *American Hospital Supply Co. v. Hospital Products Ltd.*, 780 F.2d 589, 593 (7th Cir. 1986) (noting that harm calculation should account for probability of error).

¹⁶⁷ See Baker, *supra* note __, at 518 (discussing this point).

¹⁶⁸ For an example of the debate on this score, compare Salop & Romaine, *supra* note __, at 646 (discussing false negatives concern) with Ronald A. Cass & Keith Hylton, *Preserving Competition: Economic Analysis, Legal Standards, and Microsoft*, 8 GEO. MASON L. REV. 1, 26-36 (1999) (discounting this argument).

¹⁶⁹ See Donald F. Turner, *The Definition of Agreement Under the Sherman Act: Conscious Parallelism and Refusals to Deal*, 75 HARV. L. REV. 655, 671 (1962).

¹⁷⁰ See Weiser, *Antitrust Remedies*, *supra* note __, at __.

¹⁷¹ In criticizing the finsyn rules, Judge Posner made this very argument. See Schurz,

conduct, creating large administrative costs, or allowing opportunities for rivals to engage in strategic behavior. One guard against overbroad regulatory remedies is to ask whether less intrusive measures could be equally effective at addressing the harmful conduct.

C. *Regulatory Philosophies*

Our analysis suggests three basic coherent paths for the regulation of vertical relations. Each of these models for regulation ultimately converges with antitrust policy by taking account of integrative efficiencies, appreciating the logic of ICE, and acknowledging its exceptions, but each proceeds from different basic premises. In particular, they differ in their presumptions about the reliability of assessing claimed exceptions to ICE, about the importance of vertical efficiencies, and about the FCC's ability to administer vertical regulation.¹⁷²

In the model closest to antitrust practice, the FCC could intervene only after careful investigation compellingly shows that ICE fails along the lines of an analytically coherent exception, and that regulation's likely benefits outweigh its costs.¹⁷³ This model thus expects that exceptions to ICE can be fairly reliably diagnosed or predicted (placing the burden on the regulator to overturn an ICE presumption), and that regulators are reasonably good at predicting (or diagnosing and correcting) their own failures.¹⁷⁴

The two other models, while contrasting in substance, both reflect pessimism about regulators' ability to diagnose exceptions to ICE: such pessimism is hardly unreasonable, since some of the exceptions sketched above might be genuinely widespread, and yet might easily be colorably asserted even where they do not really arise. One response to such pessimism could be a categorical protection of modularity, as advocated by some commentators.¹⁷⁵ An opposite

982 F.2d at 1045-48.

¹⁷² Of course, these models could be used not only to consider new regulation but also to consider removing old regulations in light of changed market conditions (or new economic learning). In some recent decisions, the Commission has lifted restrictive regulations on this very logic. See *Unbundling Order*, 166 FCC Rcd at 7424, para. 10; *id.* at 7438, paras. 34 & 35.

¹⁷³ One of us has advocated this approach previously. See Phil Weiser, *Changing Paradigms in Telecommunications Regulation*, 71 U. COLO. L. REV. 819, 835 (2000); see also, e.g., *Western Resources, Inc.*, 109 F.3d at 788 (noting that the Surface Transportation Board took roughly this approach).

¹⁷⁴ Such rules would thus focus on "readily observable conduct whose presence or absence is highly correlated with a conclusion a court would reach were it to conduct a full analysis." Baker, *supra* note __, at 496.

¹⁷⁵ See, e.g., Francois Bar et al., *Access and Innovation Policy For The Third Generation Internet*, 24 TELECOMMUNICATIONS POLICY 489, 496 (2000) (insisting that

response is a categorical presumption that ICE applies, as in a hard-line Chicago approach.¹⁷⁶ Stating the strategies in this manner suggests a helpful way to frame the contrast between an open architecture strategy and the Chicago School approach. Some Chicago scholars appear to trust ICE more than they trust imperfect regulators or courts to diagnose its exceptions;¹⁷⁷ while open architecture advocates, such as Lawrence Lessig, appear to trust the history of successful innovation through modularity (and its extrapolation to the future) more than they trust either ICE or regulators' ability to diagnose its exceptions.

V. THE FRAMEWORK IN ACTION

Agencies and courts are often asked to decide what vertical conduct should be regulated. ICE and its exceptions, as well as the considerations noted above, can help them towards a sophisticated and consistent treatment of platform monopolists.¹⁷⁸ Such sophistication will aid courts in addressing what the *Microsoft* court aptly identified as the central challenge of competition policy: “distinguishing between exclusionary acts, which reduce social

“open access to the network led to rich experimentation by many actors whose ideas had previously been excluded from shaping network evolution”). This categorical protection might also rely on two arguments that telecommunications uniquely justifies regulatory oversight that deviates from the logic of ICE's suggestion that platform providers can be trusted. First, network industries might create greater incentives for predatory strategies, particularly those that would raise entry barriers. See A. Douglas Melamed, *Network Industries and Antitrust*, 23 HARV. J.L. & PUB. POL'Y 147, 149-152 (1999) (suggesting this possibility). Second, telecommunications networks – as platforms for transporting ideas – might warrant open access not based on competition policy, but on First Amendment values.

¹⁷⁶ See William F. Baxter, *Reflections Upon Professor Williamson's Comments*, 27 ST. LOUIS U. L.J. 315, 320 (1983) (urging courts to be mindful of problem of “error rates” and “false positives” in judging exclusionary conduct); Frank H. Easterbrook, *The Limits of Antitrust*, 63 TEXAS L. REV. 1, 3 (1984) (“judicial errors that tolerate baleful practices are self-correcting while erroneous condemnations are not.”).

¹⁷⁷ A compatible argument, based on Joseph Schumpeter's theory of creative destruction, is that the successive battles for dominance mean that any market power gained through predatory tactics will only be temporary and thus not worth addressing. See, e.g., Richard Schmalensee, *Antitrust Issues in Schumpeterian Industries*, 90 AMER ECON REV PAP. AND PROC. 192, 195 (2000); Shelanski & Sidak, *supra* note __, at 11-12 (discussing Schumpeterian competition, in which “firms compete through innovation for temporary market dominance, from which they may be displaced by the next wave of product advancements”).

¹⁷⁸ This would not only mean better results, but also a reduction in regulatory uncertainty and its associated impact on investment incentives. See Warren G. Lavey, *Making and Keeping Regulatory Promises*, 55 FED. COMM. L.J. 1, 10-11 (2002) (discussing importance of regulatory certainty and predictability).

welfare, and competitive acts, which increase it.”¹⁷⁹ To demonstrate the insights derived from this framework, this Part evaluates the recent antitrust litigation against Microsoft, the history of the Computer Inquiries, and the proposal for network neutrality of broadband platforms.

A. *Microsoft*

The antitrust litigation against Microsoft underscores both the substantive importance of ICE and the procedural considerations discussed above. Substantively, the Department of Justice’s case against Microsoft relied on the potential competition exception to ICE. The Justice Department developed evidence that Microsoft itself and others in the industry viewed the development of strong independent “middleware” as a threat to Microsoft’s monopoly in operating systems. In addition (whether or not the Justice Department had this in mind), many observers have highlighted the bargaining problems rationale in this context – i.e., a platform monopolist’s ability to deter socially valuable innovation by appropriating it for itself.¹⁸⁰ Although the Department’s case did not explicitly frame its case in terms of ICE, the economic thinking behind the case reflects ICE and its importance.

The *Microsoft* case also offers important procedural lessons. First, the D.C. Circuit’s opinion sought to minimize error costs by evaluating carefully the efficiency justifications offered by Microsoft (rejecting many as unconvincing).¹⁸¹ Second, the case demonstrated how courts – like regulatory agencies – may change their thinking as they confront additional information. In interpreting an earlier consent decree provision that governed product bundling decisions, for example, the D.C. Circuit imposed a stringent test to determine whether Microsoft illegally tied its browser to its operating system: was there a “plausible claim [that integration] brings some advantage.”¹⁸² When that court examined a very similar question in the context of the government’s antitrust case, however, it backed off this ICE-heavy stance and set out a more agnostic test to govern technological tying – one that examines the actual justifications (as

¹⁷⁹ *Microsoft*, 253 F.3d at 38.

¹⁸⁰ For a model and further explanation of this point, see David Miller, *Invention Under Uncertainty and Ex Post Entry* (January 30, 2003), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=319180.

¹⁸¹ See 253 F.3d at 59 (setting out standard as “[i]f the monopolist asserts a procompetitive justification--a nonpretextual claim that its conduct is indeed a form of competition on the merits because it involves, for example, greater efficiency or enhanced consumer appeal--then the burden shifts back to the plaintiff to rebut that claim.”); see also *id.* at 62-65, 66-67, 69-71 (applying that standard).

¹⁸² *United States v. Microsoft Corp.*, 147 F.3d 935, 950 (D.C.Cir.1998).

opposed to any conceivable ones) in asking whether the competitive harms outweigh efficiencies of integration.¹⁸³

B. *The Computer Inquiries*

The FCC's *Computer Inquiries* illustrate the challenges of regulating access between a platform and its application market. In the 1960s, when data processing services (applications) began to be offered over the network (platform) of a monopoly telephone company, the FCC confronted the central issue on which this Article focuses: the local telephone companies, each the sole supplier in its region of the basic platform for telecommunications services, wished to integrate and to provide data processing services in competition with others.

In its *Computer I* decision, the Commission found that computer data services enjoyed "open competition and relatively free entry," and concluded that it should not "at this point, assert regulatory authority over data processing as such."¹⁸⁴ Because of an earlier antitrust consent decree limiting AT&T to providing regulated common carrier services,¹⁸⁵ this decision not to regulate data processing paradoxically amounted to a quarantine, excluding the platform monopolist AT&T from the "application" sector (data processing).¹⁸⁶ The FCC recognized that AT&T and other local telephone companies would be obvious entrants into this market, but feared that they would "favor their own data processing activities by discriminatory services, cross-subsidization, improper pricing of common carrier services, and related anticompetitive practices and activities."¹⁸⁷ Its initial response was thus to impose a quarantine on AT&T while allowing non-Bell telephone companies to integrate into data processing through a structurally separated subsidiary.¹⁸⁸

¹⁸³ *Microsoft*, 254 F.3d at 92, 95-97 (setting out new standard and noting different circumstances of its earlier decision).

¹⁸⁴ In the Matter of Regulatory and Policy Problems Presented by the Interdependence of Computer and Communication Services and Facilities, Final Decision and Order, 28 F.C.C.2d 267, 270 (1971) ("Computer I"). By contrast, the Commission had previously used its ancillary regulatory jurisdiction to regulate providers outside the scope of its explicit regulatory mandate. See *United States v. Southwestern Cable Co.*, 392 U.S. 157, 167-68 (1968) (regulations of cable television permissible on the ground that such regulations were ancillary to Commission's charge to regulate broadcasting).

¹⁸⁵ *Id.* at 298.

¹⁸⁶ *Id.* at 302.

¹⁸⁷ *Computer I*, 28 FCC at 270-71.

¹⁸⁸ *Id.* at 273.

But this quarantine required the FCC to classify all services into “telecommunications” and “data processing.” Because it could not anticipate how to do so, the FCC decided to classify “hybrid services” on a case-by-case basis.¹⁸⁹ This called forth a stream of cases that ultimately led the FCC to reconsider the basic premises of the *Computer I* regime.¹⁹⁰

The Commission’s *Computer II* decision followed the same basic philosophy as *Computer I*, but developed a new dividing line between “basic” telecommunications services and “enhanced” services. In *Computer II*, the Commission decided not to regulate the latter even if they relied on and contained basic telecommunications services.¹⁹¹ The *Computer II* rules also lifted the separate subsidiary requirement for almost all non-Bell (“independent”) local telephone (monopoly) companies, and concluded that GTE and the Bell Companies, if allowed to provide such services, must do so through a separate subsidiary.¹⁹² In place of this requirement, the Commission imposed a set of open access requirements on the independent telephone companies.¹⁹³

Of the actions taken in the *Computer Inquiries*, *Computer II*’s open access rules, which facilitated competition in the customer premises equipment (CPE), were the most successful and enduring. Despite its *Carterfone* decision in 1969, the FCC – facing heavy resistance from AT&T¹⁹⁴ – failed to enforce “network neutrality”

¹⁸⁹ *Id.* at 276-79.

¹⁹⁰ *Communications Industry Assoc. v. FCC*, 693 F.2d 198, 204 (D.C. Cir. 1982) (“As computer and communications technology continued to merge, the line between regulated and unregulated activities became increasingly blurred, and the *Computer I* definitions became unworkable.”); *Computer III Report and Order*, supra note ___, at para 10 (“After *Computer I* took effect, technological and competitive developments in the telecommunications and computer industries exposed shortcomings in its definitional structure, and in particular its *ad hoc* approach to evaluating the ‘hybrid’ category.”).

¹⁹¹ See Final Decision, *Amendment of Section 64.702 of the Commission’s Rules and Regulations (Second Computer Inquiry)*, 77 F.C.C.2d 384, 431-35, 450-52 (1980) (“*Computer II*”), *aff’d sub. nom.* *Communications Industry Assoc. v. FCC*, 693 F.2d 198 (D.C. Cir. 1982).

¹⁹² See 77 F.C.C.2d at 474. Even after the antitrust litigation against AT&T culminated in a divestiture of the local Bell Companies, the new consent decree continued to bar the Bell Companies from providing “information services” (a closely related concept to “enhanced services”) until the D.C. Circuit ultimately lifted that bar. See *United States v. W. Elec. Co.*, 900 F.2d 283 (D.C. Cir.), *cert. denied*, 510 U.S. 984 (1990).

¹⁹³ See *id.* at 474-75 (1980); see also Report and Order, *1998 Biennial Review - Review of Customer Premises Equipment and Enhanced Services Unbundling Rules in the Interexchange, Exchange Access and Local Exchange Markets*, 16 FCC Rcd 7418, 7442 ¶ 40 (2001) (“*CPE Unbundling Order*”) (noting *Computer II* requirement that all carriers not subject to the separate subsidiary requirement must “acquire transmission capacity pursuant to the same prices, terms, and conditions reflected in their tariffs when their own facilities are used”).

¹⁹⁴ See supra note __.

until the follow-on from the Carterfone decision converged with the Computer Inquiry rules. Ultimately the FCC imposed three sets of requirements to facilitate competition in CPE: (1) all equipment had to be certified as compliant with existing network requirements; (2) incumbent telephone providers had to “unbundle” sales of equipment and telephone service; and (3) those incumbents had to sell CPE through a separate subsidiary.¹⁹⁵ The FCC’s explanation for this regulatory strategy reflected Baxter’s Law, and the D.C. Circuit endorsed the FCC’s judgment that “competition in the CPE market and innovation in the CPE industry occurring apart from the telecommunications network demonstrate that CPE is severable from communications transmission services.”¹⁹⁶ Moreover, after this strategy spurred the development and deployment of scores of CPE products, the FCC concluded that its unbundling requirement on equipment sales was no longer necessary, leaving in place only its certification requirements.¹⁹⁷

The *Computer III* decision then lifted the requirement that the Bell Companies establish a separate subsidiary for enhanced services (although the Bell Companies were still restricted under the MFJ). The Commission concluded that separate-subsidary regulation could better be replaced with non-structural safeguards,¹⁹⁸ and in order to ensure enhanced service providers non-discriminatory access to the telephone network it mandated “comparably efficient interconnection” and “open network architecture.”¹⁹⁹ Following a

¹⁹⁵ See *North Carolina Utilities Comm’n v. FCC*, 552 F.2d 1036 (4th Cir.), cert. denied, 434 U.S. 874 (1977) (upholding certification process requirements); 47 C.F.R. Sec 64.702(e) (requiring unbundling of CPE and telephone service); *Communications Industry Assoc.*, 693 F.2d at 205-06 (requiring, among other things, incumbent telephone companies to market CPE only through a separate subsidiary and preempting inconsistent state regulation).

¹⁹⁶ *Computer & Communications Industry Ass’n v. FCC*, 693 F.2d 198, 209 (D.C. Cir. 1982).

¹⁹⁷ See *In re Review of Customer Premises Equipment and Enhanced Services Unbundling Rules In the Interexchange, Exchange Access, and Local Exchange Markets*, Report and Order, 16 FCC Rcd 7418 (2001) (removing unbundling restrictions in light of market conditions).

¹⁹⁸ Final Decision, Amendment of Sections 64.702 of the Commission’s Rules and Regulations (Third Computer Inquiry), 104 F.C.C.2d 958, 964-965 (1986).

¹⁹⁹ For the comparably efficient interconnection requirements, see Report and Order, *Computer III Further Remand Proceedings: Bell Operating Company Provision of Enhanced Services, 1998 Biennial Regulatory Review - Review of Computer III and ONA Safeguards*, 14 FCC Rcd 4289, 4297-99 ¶ 13 (1999) (“*Computer III March 1999 Order*”). For the open architecture requirements, see Further Notice of Proposed Rulemaking, *Computer III Further Remand Proceedings: Bell Operating Company Provision of Enhanced Services*, 13 FCC Rcd 6040, 6085-6089 ¶¶ 78-91 (1998) (“*Computer III Further Notice*”); see also Robert Cannon, *Where Internet Service*

remand from the Ninth Circuit regarding these requirements, the Commission has yet to close the book on the *Computer III* rules.²⁰⁰

The FCC's actions in the Computer Inquiries thus reflected a series of different approaches, beginning with a quarantine in *Computer I*, moving to structural separation in *Computer II*, and then to a conduct remedy without structural separation in *Computer III*. Similarly, while the MFJ quarantined the Bell Companies from certain adjacent markets, first the MFJ court and then the Telecom Act loosened the restrictions, allowing more vertical integration.²⁰¹ And firms often voluntarily change their approaches to vertical scope, as AT&T did by divesting its equipment-manufacturing arm Lucent, and in its approach to wireless (in the McCaw merger and the later spinoff of AT&T Wireless).

An optimistic interpretation of such instability would be that, unsurprisingly in view of the competing merits, the right policy can shift quickly, and that policymakers and executives ably track these shifts. For instance, relevant magnitudes may simply vary over time. Or perhaps a spell of quarantine will establish reliable access arrangements, creating a benchmark that makes later discrimination harder and thus making it possible to capture benefits of vertical integration without excessive discrimination or the need for heavy-handed conduct regulation.²⁰² Alternatively, a cynical interpretation would be that the *Computer I* regime rightly imposed a quarantine and that later relaxations reflected a bending to the political power of the local telephone companies. Finally, a pessimistic but less cynical interpretation would be that the FCC was repeatedly stabbing in the

Providers and Telephone Companies Compete: A Guide To The Computer Inquiries, Enhanced Service Providers, and Information Service Providers, 9 COMMLAW CONSPECTUS 49, 56-65 (2001).

²⁰⁰ See *People of State of Cal. v. F.C.C.*, 905 F.2d 1217, 113 P.U.R.4th 92 (9th Cir. 1990) (vacating and remanding initial order); *California v. FCC*, 39 F.3d 919 (9th Cir. 1994) (vacating in part), *cert. denied*, 514 U.S. 1050 (1995); In re *Computer III Further Remand Proceedings: Bell Operating Company Provision Of Enhanced Services, 1998 Biennial Regulatory Review--Review of Computer III and ONA Safeguards and Requirements, Further Notice of Proposed Rulemaking*, 13 FCC Rcd. 6040, 6051, para. 15 (1998); see also Robert Cannon, *The Legacy of the Federal Communication Commission's Computer Inquiries*, 55 FED. COMM. L.J. 167, 200-03 (2003); Robert Cannon, *Where Internet Service Providers and Telephone Companies Compete: A Guide To the Computer Inquiries, Enhanced Service Providers and Information Service Providers*, 9 COMMLAW CONSPECTUS 49 (2001).

²⁰¹ For changes in the MFJ, see *United States v. Western Elec. Co.*, 767 F.Supp. 308 (D.D.C. 1991), *aff'd*, 993 F.2d 1572 (D.C. Cir. 1993) (lifting information services restriction). For the Telecom Act's policies, see 47 U.S.C. Sec. 271 (governing entry into in-region long distance).

²⁰² For a development of this point, see Marius Schwartz, *The Economic Logic for Conditioning Bell Entry into Long Distance on the Prior Opening of Local Markets*, 18 J. REG. ECON. 247 (2000).

dark, unable to maintain a stable view of the relative merits of different policies.

We see little evidence of subtle balancing to suggest that changes in circumstances explain the changes in policy, so it is tempting instead to describe the variation as “vacillating” in an inadequate analytical framework.²⁰³ Thus, having first adopted one imperfect policy, regulators may become painfully aware of its deficiencies and of the advantages of an alternative approach. This greener-grass syndrome could arise with any tradeoff, but it seems particularly likely with a tradeoff only poorly understood and not guided by clear analytical principles. Indeed, the FCC’s inability to articulate its outlook on vertical relations convincingly has begun to plague it in court – in the *finsyn* case and the *Computer III* rules, for example – where it must explain policy swings.²⁰⁴ By contrast, the FCC’s policy of facilitating competition in equipment manufacturing was grounded in Baxter’s Law and withstood judicial scrutiny.

C. Broadband Policy

In its broadband proceedings, the FCC announced its intent to determine how its *Computer III* rules apply to broadband networks.²⁰⁵ In the old environment, regulated monopoly telephone companies held the keys to the development of new, “information services” like “dial-a-joke” and dial-up Internet access.²⁰⁶ Given that Baxter’s Law does not apply in the broadband context (as cable modems and DSL do not face classic price regulation), if the FCC intends to impose modularity on broadband Internet, it must develop a reasoned basis for doing so.

In re-thinking the basis for these rules, the FCC could decide to adopt a more “antitrust-like” approach.²⁰⁷ Antitrust law aspires to aid

²⁰³ Warren G. Lavey, *Ending Structural Separation For The Telephone Companies*, 18 CONN. L. REV. 81, 85-86 (1985) (arguing that Computer I’s separate subsidiary requirement did not rest on demonstrated monopoly abuses or cost-benefit analysis).

²⁰⁴ See *California*, 905 F.2d at 1234 (reversing FCC decision on the ground that it reflected an “unexplained change” from its previous decisions); see also Lavey, *Inconsistencies*, supra note __, at 444-48 (discussing Computer III).

²⁰⁵ This proceeding also shall attempt to respond to the Ninth Circuit’s remand of the FCC’s Computer III rules.

²⁰⁶ See *Wireline Broadband NPRM*, supra note __, ¶ 36 (“[T]he core assumption underlying the *Computer Inquiries* was that the telephone network is the primary, if not exclusive, means through which information service providers can gain access to their customers”).

²⁰⁷ One of us has advocated such an approach. See Philip J. Weiser, *Toward A Next Generation Regulatory Regime*, __ LOYOLA L. REV. __ (2003).

the workings of the market by stopping certain anticompetitive practices, whereas regulation traditionally substitutes for competition. Traditional public utility regulation oversaw price-setting as well as entry and exit decisions in order to limit the monopolists' ability to extract rents from consumers while ensuring the regulated utility a sufficient return on its investment.²⁰⁸ As alternative providers entered formerly monopolized industries, antitrust enforcers sought to facilitate competition, whereas regulators reacted hesitantly.²⁰⁹ The Telecom Act endorsed entry and aimed to facilitate competition in an emergingly competitive market,²¹⁰ but still left the FCC with broad regulatory powers and discretion.

In developing its regulatory strategy for new environments such as broadband where price regulation is absent, the FCC should define more clearly when to restrict a firm's conduct – for instance, only after exclusionary conduct is demonstrated, where it seems probable, or where it would do the most harm. Antitrust enforcers normally address exclusionary conduct by a single firm only *ex post*, once such conduct has been proven. Regulators, by contrast, often act to avoid vertical competitive harms before they occur, but do not always explain how their actions fit with ICE or antitrust policy more generally.²¹¹ If the FCC decides to impose a network neutrality requirement on broadband platforms, it should do just that.

²⁰⁸ For a discussion, see Kearney & Merrill, *supra* note __, at 1359-1361.

²⁰⁹ *Compare, e.g.,* Otter Tail Power Co. v. United States, 410 U.S. 366 (1973) with Hush-a- Phone Corp., 20 F.C.C. 391, 420 (1955), *rev'd*, 238 F.2d 266 (D.C. Cir. 1956). In *Otter Tail*, antitrust's market-opening measures came twenty years in advance of regulatory reforms. See Pub. L. No. 102-486, 106 Stat. 2776, 2915-16 (1992) (codified at 16 U.S.C. Sec. 824(j)-(k)) (authorizing FERC to mandate wholesale "wheeling" of power to facilitate competition).

²¹⁰ For discussions of the evolution of how antitrust and telecommunications regulation relate to one another, see Philip J. Weiser, *Information Platforms*, *supra* note __, at __; Weiser, *Reflections on Antitrust Remedies*, *supra* note __, at __. For a discussion of regulation's evolution from its old regime to a new paradigm, see Joseph D. Kearney & Thomas W. Merrill, *The Great Transformation of Regulated Industries Law*, 98 COLUM. L. REV. 1323, 1329 (1998).

²¹¹ Some commentators suggest that telecommunications regulation parts company with the maxim that sound competition policy aims to protect "*competition, not competitors.*" *Brown Shoe Co. v. United States*, 370 U.S. 294, 320 (1962) (emphasis in original). In particular, regulation sometimes adopts measures rationalized as infant industry protection that seeks to produce certain innovative benefits – at the risk of falling victim to the perilous exercise of predicting winners and losers. See Joskow, *supra* note __, at 125 (noting that the Public Utility Regulatory Power Act's "requirements that utilities contract with certain independent power suppliers, combined with competitive generation procurement programs in the late 1980s, helped to stimulate technological innovation" that facilitated the use of natural gas as a fuel).

CONCLUSION

Changes in the telecommunications market and the emergence of the Internet have created both a challenge and an opportunity for regulators. In dynamic markets governed by both telecommunications regulation and antitrust oversight, there is considerable uncertainty about which regulatory strategy can best protect competition. Nevertheless, the FCC has an opportunity to adopt a coherent approach to information platform regulation that takes account of ICE and would facilitate convergence between antitrust and regulatory policy. Such an approach would be welcomed by the courts and would help steer a steady course on open access policies for the years to come.