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

*Joseph Farrell** & Philip J. Weiser****

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I. INTRODUCTION

Just as the dust settles from the Microsoft case, the Federal Communications Commission (“FCC” or “the Commission”) is preparing 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 technology that facilitates Internet content or services — and will significantly influence the future development of the Internet.

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 clear and consistent legal rules.³ Moreover, courts reviewing the FCC’s decisions in this area are increasingly pressuring the Commission to devise a regulatory regime more compatible with economic theory and antitrust policy.⁴

1. See, e.g., Inquiry Concerning High-Speed Access to the Internet over Cable and Other Facilities, 17 F.C.C.R. 4798 (2002) (Declaratory Ruling and Notice of Proposed Rulemaking) [hereinafter High-Speed Declaratory Ruling].

2. See Richard A. Posner, *Antitrust in the New Economy*, 68 ANTITRUST L.J. 925, 925 (2001).

3. For a discussion of technological convergence and its impact on telecommunications regulation, see NAT’L RESEARCH COUNCIL, BROADBAND: BRINGING HOME THE BITS 9 (2002), which states that “with convergence, everything — video, audio, text, and so forth — has become a digital stream that can be transported across the Internet.”

4. For an example of increasing judicial insistence on careful economic analysis by regulators, see *United States Telecom Ass’n v. FCC*, 290 F.3d 415, 422–28 (D.C. Cir. 2002), in which the court criticized the economic rationale behind the FCC’s rules for unbundling the local telecommunications network. See also Warren G. Lavey, *Inconsistencies in Applications of Economics at the Federal Communications Commission*, 45 FED. COMM. L.J. 437,

To do so, however, the FCC must develop a 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 influenced mainstream antitrust thinking by establishing that vertical integration (e.g., mergers) and many kinds of vertical contracts had efficiency benefits and were unlikely to harm competition.⁵ While post-Chicago School scholarship of the 1980s and 1990s has weakened that view,⁶ 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, early 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 adopted a policy of 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.⁷

These contrasting traditions of analyzing open access leave telecommunications policy unsettled. Technological convergence and emerging competition in telecommunications blur the lines between industries regulated primarily by antitrust (notably computing) and those subject to telecommunications law, and telecommunications regulators increasingly pledge fealty to antitrust approaches.⁸ The

439–40 (1993) (calling for increased judicial efforts to promote consistency in the use of economic theory to justify regulation).

5. The landmark event in the rise of Chicago School thinking was the Supreme Court’s decision in *Continental T.V., Inc. v. GTE Sylvania, Inc.*, 433 U.S. 36, 48 n.15, 55–56 (1977), which cited heavily to Chicago School criticisms of the Court’s earlier doctrine.

6. See David S. Evans & Michael Salinger, *Competition Thinking at the European Commission: Lessons from the Aborted GE/Honeywell Merger*, 10 GEO. MASON L. REV. 489, 512 & n.58 (2002) (discussing the impact of post-Chicago School scholarship).

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

8. For two discussions of the impact of convergence on regulatory policy, see Philip J. Weiser, *The Imperative of Harmonization Between Antitrust and Regulation*, in TELECOMMUNICATIONS CONVERGENCE: IMPLICATIONS FOR THE INDUSTRY AND FOR THE PRACTICING LAWYER 73 (PLI Intellectual Property Course, Handbook Series No. G-698,

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.⁹ Some commentators — most 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 ("ISPs").¹⁰ Others, echoing the Chicago School perspective, argue that the market will facilitate open access to the extent that open access is efficient.

The open access question is even more ubiquitous than it may first appear, as policymakers and commentators often use different terms to describe the issue. Antitrust commentators discuss the "primary" (or "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."¹¹ 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.¹²

2002) and Philip J. Weiser, *Law and Information Platforms*, 1 J. TELECOMMS. & HIGH TECH. L. 1 (2002) [hereinafter Weiser, *Information Platforms*].

9. Though the definition of "broadband" will evolve over time, the FCC's current dividing line is 200 kilobits per second — bandwidth sufficient "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 Deployment of Advanced Telecommunications Capability, 14 F.C.C.R. 2398, ¶¶ 20, 22 (1999) (Report); see *id.* ¶ 25 (noting that the definition will evolve); see also Inquiry Concerning the Deployment of Advanced Telecommunications Capability, 17 F.C.C.R. 2844, ¶ 7 (2002) (Third Report) (adhering to the 200 kilobits per second dividing line). But see NATIONAL RESEARCH COUNCIL, *supra* note 3, at 78–80 (proposing alternative definition).

10. See LAWRENCE LESSIG, *THE FUTURE OF IDEAS* 147–67 (2001). This argument builds off a prior piece that addressed critics of mandated modularity. 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 U. 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)).

11. For a further explanation of the information platform concept and how it can frame technology policy debates, see Weiser, *Information Platforms*, *supra* note 8, at 3–8. A notable example of an information platform from the computer industry is the Microsoft Windows operating system, which exposes Application Programming Interfaces ("APIs") that can be used by applications developers to "call" certain functions provided by the operating system. See *United States v. Microsoft Corp.*, 253 F.3d 34, 53 (D.C. Cir. 2001).

12. 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.

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 *internalizing complementary efficiencies* or “ICE.” 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.¹³

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.¹⁴ Ideally, such a framework would harmonize telecommunications regulation with antitrust policy and guide regulation in related contexts, such as unbundling policy for local telecommunications networks.¹⁵ The FCC could thus more accurately apply economic principles to information platforms and satisfy judicial demands for a better economic explanation of its regulatory policies.

This Article proceeds in five main parts. Part II 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 III first discusses how close (i.e., other than arm’s-length) vertical relationships can yield important efficiencies.

13. Christopher Yoo makes a similar observation in his exposition of 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 the project’s focus on cable television, broadcast, and broadband markets, but disclaiming any application to telecommunications markets).

14. Such a framework would provide more guidance than prior ad hoc FCC decisions in this area, which typically arose from merger reviews. See James B. Speta, *A Common Carrier Approach to Internet Interconnection*, 54 FED. COMM. L.J. 225, 226 (2002) (“[T]he only legal rules governing Internet interconnection are a limited number of company-specific conditions 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 Warner Order failed to set forth a principled model of analysis . . .”).

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

Part III 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, because they *internalize complementary efficiencies*. Part IV 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 V 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 VI 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 addressed, 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 more harmonious convergence between antitrust and regulatory policy.

II. OPEN ARCHITECTURE 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. 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 Projects 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.¹⁶ 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 being comprised of four layers: content, applications, logical, and physical.¹⁷ At its center lies the

16. See JANET ABBATE, *INVENTING THE INTERNET* 54-65 (1999).

17. There are various ways to describe the layers of Internet architecture. Lawrence Lesig, for example, suggests a definition of the content layer that includes what others call the

logical layer, essentially a two-part standard called the Transfer Control Protocol and Internet Protocol (“TCP/IP”) that enables computer-to-computer communication.¹⁸ The Internet Protocol (“IP”) enables network devices (“routers”) to send packets of data to their destination without even knowing what form of data is being transmitted.¹⁹ This design feature is often called “end-to-end” networking.²⁰

The openness of the Internet’s logical layer invites diversity in the layers above and below it. The physical layer below includes wired, wireless, satellite, and cable transport facilities. In the layers above, developers can create new applications such as e-mail, the World Wide Web, and Napster without first asking permission of anyone, and in particular a custodian of the TCP/IP standard. In turn, these applications support the content layer and enable consumers to access all forms of information — voice, video, audio, and data. Many commentators suggest that the openness of the logical standard was crucial in spurring the development of applications and content.²¹

applications layer. See Lawrence Lessig, *The Internet Under Siege*, FOREIGN POL’Y, Nov./Dec. 2001, at 56, 59–60; see also Yochai Benkler & Alan Toner, *Access to the Internet* (June 12, 2001) (using a three-layered model, and defining the logical and applications layers as one layer), at <http://cyber.law.harvard.edu/ilaw/Access> (last visited Oct. 29, 2003). Tim Berners-Lee, by contrast, set out a model similar to what we have in mind. See TIM BERNERS-LEE, *WEAVING THE WEB* 18 (1999); see also Kevin Werbach, *A Layered Model for Internet Policy*, 1 J. TELECOMMS. & HIGH TECH. L. 37, 59 (2002) (adopting a four-layered model); Philip J. Weiser, *Information Platforms*, *supra* note 8, at 4, 5 & n.14 (same).

18. This protocol is so central that many definitions of the term “Internet” include the role of the TCP/IP standard. For example, the FCC has used the following definition:

“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.

High-Speed Declaratory Ruling, *supra* note 1, ¶ 1 n.1 (quoting Federal Networking Council, *FNC Resolution: Definition of “Internet”* (Oct. 24, 1995), at http://www.itrd.gov/fnc/Internet_res.html (last visited Oct. 29, 2003)).

19. For explanations of this standard, see Robert E. Kahn & Vinton G. Cerf, *What Is the Internet (And What Makes It Work)* (Dec. 1999), at http://www.cnri.reston.va.us/what_is_internet.html (last visited Oct. 29, 2003), ABBATE, *supra* note 16, at 122–30, and Speta, *supra* note 14, at 245–46.

20. See Marjory S. Blumenthal, *End-to-End and Subsequent Paradigms*, 2002 L. REV. M.S.U.-D.C.L. 709, 709–11 (defining the concept); see also Dale N. Hatfield, *Preface*, 8 COMM.LAW CONSPICUOUS 1, 2 (2000) (defining the concept without reference to the “end-to-end” label in terms of “shifting intelligence and control to the edge of the network”). For a classic articulation of the principle of end-to-end networking, see J. H. Saltzer et al., *End-to-End Arguments in System Design*, 2 ACM TRANSACTIONS ON COMPUTER SYSTEMS 277 (1984), reprinted in *INNOVATIONS IN INTERNETWORKING* 195 (Craig Partridge ed., 1988).

21. For example, Jason Oxman stated:

The most important technical feature of the Internet is its openness, which allows any user to develop new applications and to communi-

B. The Transformation of the Computer Industry

The computer industry has evolved from an industry that supplied fully integrated proprietary systems to a modular industry open to specialization and entry at different levels. Initially, when IBM and other vertically integrated companies controlled the market, customers typically chose among single-vendor systems, relying, for example, on IBM peripherals to go with IBM mainframes.²² To keep its system closed, IBM kept the interfaces between the different parts of its system secret and proprietary.²³

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.²⁴ Apple relied on a closed business model, but when IBM did introduce its personal computer, it (perhaps almost by accident) used an open architecture,²⁵ relying on Microsoft and Intel to produce key components for its system and allowing them to license these components to other computer makers.²⁶ The industry thus began to change from a closed to an open business model, with different providers specializing in different components.²⁷

This modular, or "Silicon Valley," structure facilitated innovation in ways that had not been matched with an integrated structure.²⁸ Specialization by new entrants ensured "rapid improvement in compo-

cate with virtually any other user. This openness is driven by the sharing of . . . the Internet protocol No one owns the Internet protocol, no one licenses its use, and no one restricts access to it.

Jason Oxman, *The FCC and the Unregulation of the Internet*, at 5 (FCC Off. of Strategic Plan. & Pol'y Analysis, Working Paper No. 31, July 1999), at http://www.fcc.gov/Bureaus/OPP/working_papers/oppwp31.txt (last visited Oct. 29, 2003).

22. Particularly with its System 360, IBM emerged as the dominant firm in this market, leading commentators to refer to the eight top firms in the vertically-integrated computer industry as "Snow White and the Seven Dwarfs." E.g., Peter Huber, *Loose Ends*, MEDIA L. & POL'Y, Nov. 1995, at 1, 7.

23. See Langlois, *supra* note 7, at 32.

24. On IBM's slow entry into the personal computer market, see Steve Bickerstaff, *Shackles on the Giant: How the Federal Government Created Microsoft, Personal Computers, and the Internet*, 78 TEX. L. REV. 1, 29 (1999).

25. See Langlois, *supra* note 7, at 24 (indicating that the open architecture of the IBM PC evolved from earlier PCs without any "conscious" design or strategy).

26. See Richard N. Langlois, *Technological Standards, Innovation, and Essential Facilities: Toward a Schumpeterian Post-Chicago Approach*, in DYNAMIC COMPETITION AND PUBLIC POLICY: TECHNOLOGY, INNOVATION, AND ANTITRUST ISSUES 215 (Jerry Ellig ed., 2001) (noting IBM's reliance on Intel and Microsoft); see also ANNABELLE GAWER & MICHAEL A. CUSUMANO, 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).

27. See ANDREW S. GROVE, ONLY THE PARANOID SURVIVE: HOW TO EXPLOIT THE CRISIS POINTS THAT CHALLENGE EVERY COMPANY 39-52 (1996).

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

nents, 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."²⁹ 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"). These firms were thus able to produce "Windows-Intel"-compatible computers, taking market share away from both IBM and Apple.³⁰

C. The Development of Competition in Telecommunications

Richard Viotor remarks that the modern era in telecommunications began with a rubber cup.³¹ The independently-marketed "Hush-A-Phone" attached to a handset and would insulate telephone conversations against background noise. The AT&T Bell System insisted that the FCC should ban the product because it was a "foreign attachment" to its network. 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 [the] control of the carrier."³² 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.³³

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.³⁴ In

29. See Langlois, *supra* note 26, at 215.

30. 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 the combined market share of IBM and Apple declined between 1984 and 1992 from 52.5% to 21.4%, and that the average price of computers fell by 40% in 1992 alone).

31. See RICHARD H. K. VIOTOR, *CONTRIVED COMPETITION: REGULATION AND DEREGULATION IN AMERICA* 190 (1994) (stating that telecommunications "[d]eregulation began more or less with a rubber cup").

32. *Hush-A-Phone Corp.*, 20 F.C.C. 391, 420 (1955) (Decision) [hereinafter *Hush-A-Phone*], *rev'd*, 238 F.2d 266 (D.C. Cir. 1956).

33. See *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 it, though it gave it lip service.

34. See *Use of the Carterfone Device in Message Toll Tel. Serv.*, 13 F.C.C.2d 420 (1968) (Decision) [hereinafter *Carterfone*]. In response to an antitrust case brought by the producers of the Carterfone, see *Carter v. AT&T*, 365 F.2d 486 (5th Cir. 1966), this decision established that AT&T's restrictive tariff violated the Communications Act. See *Carterfone*, *supra*, at 426. The AT&T tariff stated 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." *Id.* at 421. The Commission found, in particular, that such restrictions were discriminatory in light of the fact that AT&T allowed its own equipment to interconnect to the network. See *id.* at 423.

so doing, the Commission announced a broad protection for users to "interconnect" foreign devices to the telephone network.³⁵ To implement this principle, the Commission asked AT&T to file new tariffs allowing attachments that did not harm the network.³⁶

After the Carterfone decision, the FCC, and, later, the Department of Justice ("DOJ" or "Justice Department"), supported competitive entry into the long-distance market. Entrants like MCI sought interconnection to the public switched network so that their customers could reach all telephone subscribers.³⁷ 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, permitting it to compete with AT&T's long distance services.³⁸ In so doing, 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.³⁹ Moreover, the skepticism that regulatory authorities could otherwise stop an integrated monopoly from engaging in predatory conduct (such as discriminatory interconnection) in adjacent markets became a central rationale for AT&T's divestiture of the Bell Companies.⁴⁰ Pro-

35. *Id.* at 424 (announcing that "a customer desiring to use an interconnecting device . . . 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").

36. 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 AT&T "Foreign Attachment" Tariff Revisions, 15 F.C.C.2d 605, ¶ 23 (1968) (Memorandum Opinion and Order) (permitting the effectiveness of AT&T tariff revisions, including the PCA provisions); see also *Litton Sys., Inc. v. AT&T*, 700 F.2d 785, 799 n.15 (2d Cir. 1983) (quoting an AT&T internal report that the PCA requirement was "a redundant, artificial, and economic barrier to those wishing to purchase their own equipment"); *Northeastern Tel. Co. v. AT&T*, 651 F.2d 76, 95 (2d Cir. 1981) (concluding that AT&T may have designed the PCAs in an unreasonable manner).

37. See *MCI*, 18 F.C.C.2d 953, ¶¶ 35-36 (1969) (Decision).

38. 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 claims 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").

39. See Philip J. Weiser, *Goldwasser, the Telecom Act, and Reflections on Antitrust Remedies*, 55 ADMIN. L. REV. 1, 10-11 (2003).

40. See *United States v. AT&T*, 552 F. Supp. 131, 170 (D.D.C. 1982), *aff'd sub nom. Maryland v. United States*, 460 U.S. 1001 (1983) (noting that AT&T had not been "effectively regulated"). The Modification of Final Judgment, which set forth the terms of the divestiture, see *United States v. W. Elec. Co.*, 569 F. Supp. 990 (D.D.C. 1983) [hereinafter MFJ], adhered to the following basic logic, often called either "Baxter's Law" or the "Bell Doctrine":

[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

tected by the divestiture decree, various companies introduced new data communications services and fiber optics into the backbone network.⁴¹

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 market entry, and result in lower prices.⁴² Moreover, as producers experiment with different approaches, the market can move quickly based on “rapid trial-and-error learning.”⁴³ Modularity thus allows for a smooth dissemination of the best of breed in each level or layer, as users mix and match components.⁴⁴

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 Under Judge Greene*, 50 HASTINGS L.J. 1395, 1415–16 (1999) (discussing the DOJ’s objections to a pure conduct remedy). But see Robert W. Crandall, *The Failure of Structural Remedies in Sherman Act Monopolization Cases*, 80 OR. L. REV. 109, 179–92 (2001) (arguing that equal access regulations alone, without divestiture and quarantine, would have ensured the MFJ’s competitive benefits).

41. See Howard A. Shelanski, *Competition and Deployment of New Technology in U.S. Telecommunications*, 2000 U. CHI. LEGAL F. 85, 107 (2000) (explaining that AT&T failed to deploy these technologies in its long-haul network until Sprint and other upstarts not only deployed the technologies but also began advertising superior quality networks). 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 A. Newberg, *Antitrust and Intellectual Property: From Separate Spheres to Unified Field*, 66 ANTITRUST L.J. 167, 202 (1997) (quoting the testimony of Timothy J. Regan, Division Vice President and Director of Public Policy for Corning, before the House Judiciary Committee on May 9, 1995).

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

43. Richard N. Langlois & Paul L. Robertson, *Networks and Innovation in a Modular System: Lessons from the Microcomputer and Stereo Component Industries*, 21 RESEARCH POL’Y 297, 301 (1992).

44. As Clayton Christensen put it:

The three cases sketched above show modularity arising through different means, but in each case the modular structure seemed to promote innovation. In the development of the computer industry and the Internet, this structure facilitated 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 inventors to launch new products (such as modems) and new applications (notably, the World Wide Web) that work with their respective networks.⁴⁵ Given its success in facilitating innovation in these and other cases, some commentators — most notably Lawrence Lessig — argue that government policy should facilitate modularity.⁴⁶

As Part III 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 is efficient to do so. In particular, Part III explains the logic of a critical economic concept — *internalizing complementary efficiencies* — and its claim that firms have a strong incentive to implement modularity voluntarily when modularity enhances consumer value.

Modular architectures help companies respond to individual customer needs and introduce new products faster by upgrading individual sub-systems 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 helps them be fast, flexible and responsive.

Clayton M. Christensen, *The Rules of Innovation*, TECH. REV., June 2002, at 33, 36.

45. See Jay M. Atkinson & Christopher C. Barnekov, *A Competitively Neutral Approach to Network Interconnection*, at 6 (FCC Off. of Strategic Plan. & Pol'y Analysis, Working Paper No. 34, Dec. 2000), at http://www.fcc.gov/Bureaus/OPP/working_papers/oppwp34.pdf (last visited Oct. 29, 2003).

46. See LESSIG, *supra* note 10, at 174–76; Lawrence Lessig, *Innovation, Regulation, and the Internet*, THE AMERICAN PROSPECT, Mar. 27, 2000, at 26, 29 (“[T]he burden should be on those who would compromise [on the principle of openness] to show that [such a compromise would] not take away from the innovation we have seen so far.”), available at <http://www.prospect.org/print/V11/10/lessig-1.html> (last visited Oct. 29, 2003). 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: Research into Emerging Policy Issues in the Development and Deployment of Internet Protocols*, at 17 (emphasis in original), at <http://www.tmdenton.com/pub/bellheads.pdf> (last visited Oct. 29, 2003).

III. 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 relationships between complementary products.⁴⁷ 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. Furthermore, 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 modularity 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.⁴⁸ 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*. ICE suggests that even a platform monopolist 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.⁴⁹ 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 market

47. See, e.g., *United States v. Arnold Schwinn & Co.*, 388 U.S. 365, 379 (1967) (recognizing the per se illegality of certain types of vertical restraints).

48. 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 ventures), tie-ins, partial equity investments, long-term contracts, and affiliate relationships.

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

share.⁵⁰ Palm presumably preferred to emulate Microsoft, which has benefited enormously from modularity in the PC market.

The Apple and Microsoft examples might make Palm's decision to vertically separate seem like a no-brainer, but it was not. By separating its operations vertically, Palm lost control of some important aspects of its product deployment. For instance, Palm's reliance on outsiders and an "inability to crack the whip on its far-flung programmers" contributes (according to some observers) to its "slow pace of innovation" in applications.⁵¹ By contrast, Sega developed the operating system, equipment, and leading games (such as Sonic the Hedgehog) for its Sega Genesis system all in-house, presumably in order to control its product offerings and drive consumer demand for its system.⁵²

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).⁵³ A closer vertical relationship can be an efficient response to such hazards.⁵⁴

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 goods together.⁵⁵ 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

50. *See id.*

51. Erick Schonfeld & Ian Mount, *Beating Bill*, BUS. 2.0, June 2002, at 36, 39, available at <http://www.business2.com/articles/mag/print/0,1643,40438,FF.html> (last visited Oct. 29, 2003).

52. *See* ADAM M. BRANDENBURGER & BARRY J. NALEBUFF, CO-OPETITION 237-41 (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 determine when or whether integration has outlived its usefulness and when, if ever, to separate integrated divisions that once worked well together. *See* Tam, *supra* note 49.

53. *See* Yoo, *supra* note 13, at 262-64 (noting that vertical integration guards against free riding, hold-up problems, and other strategic behaviors by vital complementors).

54. More precisely, the hazards arise 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.

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

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.⁵⁶

Innovation can require changing the platform/application interface, which can be a slow process if an industry relies on open standards and open interfaces. In such cases, hand-in-glove coordination between the platform sponsor and one or more complementors can accelerate innovation.⁵⁷ 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 in an integrated manner 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,⁵⁸ particularly when the product is newly introduced and relatively unknown.⁵⁹

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, appreciated this point in a case involving the rollout of cable television and related equipment.⁶⁰

Analyzing a firm's choice of vertical structures is a focus of the "new institutional economics" ("NIE"). Building on insights of Nobel Laureate Ronald Coase,⁶¹ NIE "seeks to extend and enrich understanding of the microanalytic details of business behavior and the in-

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

57. For a development of this theme and a discussion of the virtues of proprietary platform competition, see Philip J. Weiser, *The Internet, Innovation, and Intellectual Property Policy*, 103 COLUM. L. REV. 534 (2003). For a further discussion of how developing stable interfaces can be too expensive and time consuming to merit the effort, see Langlois, *supra* note 7, at 23.

58. See Douglas Lichtman, *Property Rights in Emerging Platform Technologies*, 29 J. LEGAL STUD. 615, 616–17 (2000).

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

60. See *United States v. Jerrold Elec. Corp.*, 187 F. Supp. 545, 556–57 (E.D. Pa. 1960), *aff'd per curiam*, 365 U.S. 567 (1961) (allowing leeway for bundling in introducing a new product when reputation matters).

61. See generally 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."

dustry settings that shape firm conduct.”⁶² 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.⁶³ 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. Conversely, firms will sometimes opt for vertical integration in order to facilitate complex coordination and strengthen incentives for product development and deployment.⁶⁴

B. ICE and the Rationale Against Open Access Regulation

In an ideal world, a firm could obtain the benefits of vertical integration while still employing some degree of modularity to spur independent innovation. In attempting such strategies, platform providers who integrate into applications development often take pains “not to compete with customers” so as to minimize any ill effects of integration on independent applications.⁶⁵ But because getting the best of both worlds in this way is hard, firms may give up and stick to their core business. In this respect, Palm’s decision to divest its operating system can be seen as a step to reassure its licensees that it can be trusted as a steward of the standard, that it will not leverage its control of the platform into related markets, and that it will remain focused on serving the needs of independent developers — particularly now that Microsoft’s rival handheld operating system is offered on a modular basis (i.e., without a hardware component).⁶⁶ Similarly, AT&T divested its equipment manufacturing arm, Lucent, perhaps to reassure

62. Timothy J. Muris, Chairman, Fed. Trade Comm’n, Remarks at George Mason University Law Review’s Winter Antitrust Symposium (Jan. 15, 2003), at <http://www.ftc.gov/speeches/muris/improveconfoundtio.htm> (last visited Oct. 29, 2003).

63. 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) and Gregory J. Werden, *The Law and Economics of the Essential Facility Doctrine*, 32 ST. LOUIS U. L.J. 433, 462–64 (1987).

64. 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 integration. See, e.g., *United States v. Microsoft Corp.*, 253 F.3d 34, 92–94 (D.C. Cir. 2001); *ILC Peripherals Leasing Corp. v. IBM*, 458 F. Supp. 423, 443–44 (N.D. Cal. 1978), *aff’d sub nom. Memorex Corp. v. IBM*, 636 F.2d 1188 (9th Cir. 1980); *Telex Corp. v. IBM*, 367 F. Supp. 258, 347 (N.D. Okla. 1973), *rev’d on other grounds*, 510 F.2d 894 (10th Cir. 1975).

65. This phrasing is most natural when applications developers buy the platform product and then sell a combined product downstream. Nonetheless, 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.

66. See Ian Fried & Dawn Kawamoto, *Two Palms Better Than One?* (Feb. 4, 2002), at <http://news.com.com/2100-1040-828446.html> (last visited Oct. 29, 2003).

equipment customers who competed with other parts of AT&T that Lucent would not favor the latter.⁶⁷

If a monopoly platform provider chooses to stick 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, and otherwise deal with developers, 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 complementary efficiencies* arising from applications created by others. Although antitrust law has not always appreciated it,⁶⁸ we call this point Obvious ICE.

Obvious ICE can be illustrated with a numerical example involving a platform monopolist in the game console market.⁶⁹ Assume that competition in the market for applications (video games) will yield a selection of applications such that each user of the platform values it at \$100, while a monopoly in applications will yield platform valuations of only \$70.⁷⁰ Under these conditions, if the platform provider were to monopolize the applications market, the platform's value to a buyer would fall by \$30; consequently, the platform provider would have to 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.⁷¹

67. See 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, 457 n.83 (2002).

68. Judge Posner makes this point sharply in discussing the antitrust rule governing minimum resale price maintenance. See RICHARD A. POSNER, *ANTITRUST LAW* 177–78 (2d ed. 2001).

69. 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 *id.* at 195–96 (noting that courts use market shares of 50% to 70% as threshold indicators of when a firm is a monopolist); *United States v. DuPont & Co.*, 351 U.S. 377, 391 (1956) (defining "monopoly power" as "power to control prices or exclude competition"); see also ABA SECTION OF ANTITRUST LAW, *ANTITRUST LAW DEVELOPMENTS* 235–36 (4th ed. 1997) (noting the 50% and 70% benchmarks and citing supporting federal case law); *id.* at 238 (listing factors relevant to monopoly power determinations 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. Syufy Enters.*, 903 F.2d 659, 664 (9th Cir. 1990) ("A high market share, though it may ordinarily raise an inference of monopoly power, will not do so in a market with low entry barriers . . .").

70. Such valuations reflect the quality, variety, and price of the available applications, and are measured assuming that the platform is already purchased.

71. The argument as formulated yields a slightly sharper conclusion than is usually stated. First, it is the incremental value to 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 Joseph

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 among 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 unintegrated 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.⁷² 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: while innovators can seldom capture all their incremental value through simple pricing, the integrated provider (as ICE reminds us) can capture 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 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. Moreover, such subtleties would only be necessary if blunter means (e.g., rendering an application inoperable) were unavailable. For these reasons, a platform provider’s decision to integrate vertically may well hurt independent complementors, seemingly posing formidable competitive concerns.⁷³

Obvious ICE does not address these concerns. But a stronger and less obvious version 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.

Farrell, *Integration and Independent Innovation on a Network*, 93 AM. ECON. REV. 420 (2003).

72. This need not be literal integration; alliances with particular applications developers could have similar effects. Therefore, this Article sometimes refers to “close vertical relationships” instead of using the traditional term “vertical integration.”

73. See Farrell & Katz, *supra* note 56, at 421–26; Farrell, *supra* note 71, at 421–23.

Suppose, in the hypothetical above, that the platform provider could integrate into the applications market, and by participating in that market improve the platform's 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 value the platform at \$70 rather than at \$100. 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 could 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.⁷⁴

ICE maintains that the platform monopolist cannot increase its overall profit by monopolizing the applications market, because it could always have charged consumers a higher 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.⁷⁵

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.⁷⁶ 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 ensur-

74. That is, the platform provider makes an extra \$40 per user at the cost of only \$30 per user of 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 difference in pure profits.

75. See, e.g., *United States v. Microsoft Corp.*, 84 F. Supp. 2d 9, 26 (D.D.C. 1999) (“[I]f there are innovations that will make Intel-compatible PC systems attractive to more consumers, and those consumers less sensitive to the price of Windows, the innovations will translate into increased profits for Microsoft.”).

76. See, e.g., Farrell, *supra* note 71, at 421–24.

ing efficient competition in that market. (Palm's recent break-up may illustrate such a motive.)

The more ambitious version of ICE is a close kin to the "one monopoly profit theory,"⁷⁷ which dates back to early Chicago School thinking and the later work of Richard Posner and Robert Bork.⁷⁸ But the "one monopoly profit" label⁷⁹ captures only part of ICE. It claims that a platform monopolist cannot gain by inefficiently leveraging its market 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. In sum, ICE better conveys the claim that the platform monopolist has an incentive to be a good steward of the applications sector for its platform⁸⁰ and 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 spillovers and leveraging of market power. It also underlies the basics of Chicago School doctrine, as well as its more ambitious arguments for the per se legality of tying ar-

77. 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 Equip. Leasing Co. v. W. Union Tel. Co., 797 F.2d 370, 374 (7th Cir. 1986); see also POSNER, *supra* note 68, at 200–02.

78. The classic statement of the Chicago School position came in Ward S. Bowman, Jr., *Tying Arrangements and the Leverage Problem*, 67 YALE L.J. 19 (1957). The orthodox restatements of it came in RICHARD A. POSNER, *ANTITRUST LAW: AN ECONOMIC PERSPECTIVE* 171–84 (1976) and ROBERT H. BORK, *THE ANTITRUST PARADOX* 372–75 (1978).

79. See BORK, *supra* note 78, at 229 (“[V]ertically related monopolies can take only one monopoly profit.”); RICHARD A. POSNER & FRANK H. EASTERBROOK, *ANTITRUST* 870 (2d ed. 1981) (“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 v. Boston Edison Co.*, 915 F.2d 17, 23 (1st Cir. 1990) (Breyer, J.); *W. Resources, Inc. v. Surface Transp. Bd.*, 109 F.3d 782, 787 (D.C. Cir. 1997).

80. In this spirit, some commentators have 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, 277–78 (1977); see also Lichtman, *supra* note 58, at 615. But see SUZANNE SCOTCHMER, *INNOVATION AND INCENTIVES* (forthcoming 2004) (manuscript ch. 5, on file with authors).

rangements.⁸¹ 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 within the applications market that is plainly exclusionary.

IV. HOLES IN THE ICE: 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,⁸² but we find these eight particularly relevant to the information industries.

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.⁸³ 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 one-to-one proportions between the platform and the applications market, suppose that the platform pro-

81. See BORK, *supra* note 78, at 288 (arguing that all vertical restraints should be per se legal).

82. See Steven C. Salop & R. Craig Romaine, *Preserving Monopoly: Economic Analysis, Legal Standards, and Microsoft*, 7 GEO. MASON L. REV. 617, 625 (1999).

83. See *Olympia Equip. Leasing Co. v. W. Union Tel. Co.*, 797 F.2d 370, 374 (7th Cir. 1986) ("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 Hosp. Dist. No. 2 v. Hyde*, 466 U.S. 2, 36 n.4 (1984) (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 78, at 22, but later commentators criticized this argument as too deferential to the regulatory process. See Louis Kaplow, *Extension of Monopoly Power Through Leverage*, 85 COLUM. L. REV. 515, 522 n.26 (1985).

vider can take an additional profit of \$1 per unit in the applications market by monopolizing that market. As ICE stresses, this profit potential 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.⁸⁴ 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 perhaps 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 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.⁸⁵ 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.⁸⁶ 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 the option should be *unattractive* because it would decrease demand for telephone sub-

84. 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.

85. This issue also emerged in cases involving railroad regulation. See *N. Pac. R.R. v. United States*, 356 U.S. 1, 8 (1958) (noting that land grant sales conditioned on “preferential routing” might well be an example of a tie used as a substitute for an unlawful rebate); see also Kaplow, *supra* note 83, at 522 n.26.

86. See Roger G. Noll & Bruce M. Owen, *The Anticompetitive Uses of Regulation: United States v. AT&T*, in *THE ANTITRUST REVOLUTION* 328, 339–44 (John E. Kwoka, Jr. & Lawrence J. White eds., 2d ed. HarperCollins 1994), available at <http://www.oup.com/us/antitrustrevolution> (last visited Oct. 29, 2003). In theory, an ideal “global price cap” could restore ICE, but 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 & Robert D. Willig, *The Scope of Competition in Telecommunications* (1996) (unpublished manuscript, on file with authors); and MARK ARMSTRONG ET AL., *REGULATORY REFORM: ECONOMIC ANALYSIS AND BRITISH EXPERIENCE* (1994).

scription. But that decrease did not deter AT&T because of the price regulation of local telephone service. In the Carterfone decision and its aftermath, the FCC imposed an “unbundling” requirement on AT&T to prevent it from requiring consumers to rent phones, and thereby opened the customer premises equipment (“CPE”) market to competition.⁸⁷ This issue was at the heart of the government’s anti-trust case against AT&T, even though AT&T’s long-distance rates — like its local ones — were regulated.⁸⁸ 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.”⁸⁹

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.⁹⁰ 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.⁹¹ 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.⁹² Price discrimination is familiar in airline travel, where airlines use various means to segment

87. See *supra* note 34 and accompanying text.

88. 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, 11 F.C.C.R. 3271, ¶¶ 10–13 (1995) (Order) (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 the justification for regulatory action based on Baxter’s Law is more complicated than often appreciated. Three possible variations on this classic explanation might address this complication. First, areas that 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.

89. See *supra* note 40 and accompanying text.

90. Proponents of the “leverage theory” of tying regularly invoke this explanation. See, e.g., Lawrence A. Sullivan, *Section 2 of the Sherman Act and Vertical Strategies by Dominant Firms*, 21 SW. U. L. REV. 1227, 1237 (1992); see also Kaplow, *supra* note 83, at 523 (“[P]ractices merely increasing profits to an existing monopoly, without ‘extending’ it, can increase the welfare loss that results.”).

91. For example, in the Internet environment, customer identity might be more readily tracked through the complement than through the platform product.

92. 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).

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.⁹³

Price discrimination need not in itself be inefficient or anti-consumer, but the platform monopolist's desire to price discriminate can outweigh ICE and lead it to exclude efficient innovation or price competition in complementary products. In the classic case, the monopolist does so more or less intentionally because control of the complementary market allows it to maximize profits through large markups on complementary goods — for example, the substantially higher ticket prices charged to first class airline passengers for better meal service.⁹⁴ In other cases, profit maximizing price discrimination involves *below-cost* pricing of complements. The platform provider has no motive to exclude such offerings per se and probably would be delighted if independent complementors were to offer cheap and innovative offerings; independent developers, however, may refrain from providing such products where the platform provider offers its own complements below cost.⁹⁵

Economists recognize that price discrimination can either harm or benefit consumers overall (and is likely to harm some and benefit others).⁹⁶ Some forms of price discrimination, like Ramsey pricing,⁹⁷ can raise profits at the lowest possible cost to consumers as a group, and

93. See, e.g., Tiffany Kane, *Legislators Laud Debut of Covad's Service* (June 19, 2002) (reporting on Covad's tiered pricing structure), at <http://news.com.com/2100-1033-937523.html> (last visited Oct. 29, 2003); see also CARL SHAPIRO & HAL R. VARIAN, *INFORMATION RULES 300* (1998) (indicating that price discrimination is predictably prevalent in information industries).

94. This, of course, does not explain why the platform monopolist seeks to co-opt and tame independent innovation rather than welcoming it. But allowing independent innovation while restricting the available independent product offerings to facilitate price discrimination may prove either infeasible or unadministrable.

95. See Farrell & Katz, *supra* note 56 (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.

96. See Richard A. Posner, *The Chicago School of Antitrust Analysis*, 127 U. PA. L. REV. 925, 926–28 (1979) (explaining how price discrimination can reduce the “misallocative effects of monopoly”). Moreover, if price discrimination increases output and thus generates 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. ECON. 253, 257 (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 R. Varian, *Price Discrimination*, in 1 HANDBOOK OF INDUSTRIAL ORGANIZATION 597, 644–46 (Schmalensee & Willig eds., 1989); Hausman & MacKie-Mason, *supra*, at 257.

97. 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.*, 525 U.S. 366, 426 (1999) (Breyer, J., concurring in part and dissenting in part).

this is valuable where profits are an important spur to innovation.⁹⁸ 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.⁹⁹ But it is. Even where price discrimination 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 toward 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.¹⁰⁰

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.¹⁰¹ Thus, even if a two-

98. See Hausman & MacKie-Mason, *supra* note 96, at 263 (allowing for price discrimination in the sale of a patented product can spur innovation and thus substitute for longer intellectual property protection).

99. See, e.g., *Town of Concord v. Boston Edison Co.*, 915 F.2d 17, 24 (1st Cir. 1990); BORK, *supra* note 78, at 241–42; POSNER, *supra* note 68, at 203–06.

100. For an anecdotal suggestion that cable providers may fear such effects, see David Lieberman, *Media Giants' Net Change Major Companies 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 into the cable business ‘to have the blood sucked out of our veins’”).

101. Some have argued that this point adds a dynamic element to the analysis that the traditional Chicago School model lacks. See Kaplow, *supra* note 83, at 524, 527–29 (arguing that a monopolist’s “motivation is to change the structural conditions it faces in the future in order that it may receive greater profits,” and contrasting “dynamic” and “static” approaches); see also Steven C. Salop & R. Craig Romaine, *Preserving Monopoly: Economic Analysis, Legal Standards, and Microsoft*, 7 GEO. MASON L. REV. 617, 625–26 (1999) (discussing the “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 tying strategy, see Dennis W. Carlton & Michael Waldman, *The Strategic Use of Tying to Preserve and Create Market Power in Evolving Industries*, 33 RAND J. ECON. 194 (2002).

level monopoly may not yield more than one monopoly profit, it can protect the monopolist against entry in several ways.¹⁰²

First, if there are no independent applications suppliers, any potential platform rival would need to enter at both the platform and applications levels.¹⁰³ 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.¹⁰⁴

The two-level entry theory also underlaid the Justice Department’s challenge to General Electric’s licensing policies for medical imaging equipment. The company had contractually restricted hospitals from servicing the equipment of other hospitals. The DOJ argued that these restrictions illegally raised barriers to entry in the market for medical imaging equipment.¹⁰⁵ 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.¹⁰⁶ 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

102. 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 maintain supracompetitive prices for an extended time.”); POSNER, *supra* note 68, at 202 (“[T]he 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 & Christodoulos Stefanadis, *Tying, Investment, and the Dynamic Leverage Theory*, 32 RAND J. ECON. 52 (2001) and Jay Pil Choi, *Preemptive R&D, Rent Dissipation, and the “Leverage Theory,”* 111 Q. J. OF ECON. 1153 (1996).

103. Artificially created entry barrier issues 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).

104. See 47 U.S.C. § 548(c)(5) (2000); Implementation of Cable Television Consumer Protection and Competition Act of 1992, 16 F.C.C.R. 19074 (2001) (Notice of Proposed Rulemaking); News Release, FCC, FCC Extends Program Access Exclusivity Rules (June 13, 2002), at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-223381A1.doc (last visited Oct. 29, 2003).

105. See Competitive Impact Statement at 4–5, *United States v. Gen. Elec. Co.*, No. CV-96-121-M-CCL, 1999 U.S. Dist. LEXIS 598 (D. Mont. Jan. 11, 1999), at <http://www.usdoj.gov/atrl/cases/f1800/1842.htm> (last visited Oct. 29, 2003).

106. See *id.*

browser was a complementary application in the short term, but could have facilitated operating systems competition in the long term.¹⁰⁷ By exposing its own application programming interfaces, the browser could ultimately “commoditize” the underlying operating system.¹⁰⁸ 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.¹⁰⁹

Finally, independent providers of complements may themselves be likely entrants into the platform market. Carl Shapiro, a leading economist, 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*.”¹¹⁰ 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

107. Lessig has called this scenario a “partial substitute.” See Brief of Prof. Lawrence Lessig as Amicus Curiae at 46–47, *United States v. Microsoft Corp.*, 87 F. Supp. 2d 30 (D.D.C. 2000) (No. 98-1232), at <http://www.lessig.org/content/testimony/ab/ab.pdf> (last visited Oct. 29, 2003). This term, however, 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-à-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*, J. ECON. PERSP., Spring 2001, at 63, 73.

108. For a discussion based on Microsoft’s internal documents (as revealed by the trial), see Timothy F. Bresnahan, *Network Effects and Microsoft*, at 23–25, at http://www.stanford.edu/~tbres/Microsoft/Network_Theory_and_Microsoft.pdf (last visited Oct. 29, 2003); see also Timothy F. Bresnahan, *A Remedy That Falls Short of Restoring Competition*, ANTITRUST, Fall 2001, at 67, 67 [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.”).

109. *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); see also Bresnahan, *Restoring Competition*, *supra* note 108, at 67–68 (describing Microsoft’s campaign).

110. Declaration of Carl Shapiro at 6, *United States v. Microsoft Corp.*, 87 F. Supp. 2d 30 (D.D.C. 2000) (No. 98-1232), at <http://www.usdoj.gov/atr/cases/f4600/4642.pdf> (last visited Oct. 29, 2003); see *id.* (listing examples). To address Microsoft’s anticompetitive tactics to defeat a complementary product that threatened its monopoly platform, Shapiro’s testimony recommended divesting Microsoft’s applications division from its operating systems division in order to create additional competition in the operating systems market. See *id.* at 6–7. But see Howard A. Shelanski & J. Gregory Sidak, *Antitrust Divestiture in Network Industries*, 68 U. CHI. L. REV. 1, 99 (2001) (criticizing Shapiro’s 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).

platform monopoly's price cuts or quality enhancements in response to entry as much as a stand-alone entrant would.¹¹¹

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 Brothers, and Paramount) out of the network market.¹¹² In court, however, the FCC failed to justify them and they were invalidated.¹¹³ The studios — who had been the complementary providers of programming — then entered the platform market, creating three new networks. The existing networks likewise moved quickly to create their own programming.¹¹⁴ Similarly, the Telecommunications Act of 1996 ("Telecom Act") arguably assumed that the long-distance providers — who rely on the local network — were likely entrants into the local telephone market and that the local providers were almost certain entrants into the long-distance market.¹¹⁵

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.¹¹⁶ Thus, this problem has an immediate

111. See Joseph Farrell, *Prospects for Deregulation in Telecommunications*, 6 INDUS. & CORP. CHANGE 719, 727 (1997).

112. See *Schurz Communications, Inc. v. FCC*, 982 F.2d 1043, 1045–48 (7th Cir. 1992).

113. 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. Many commentators have concurred with Judge Posner's critical assessment. See, e.g., Crandall, *supra* note 40, at 178–79.

114. 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, Aug. 5, 2002, at C1 (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.

115. See 47 U.S.C. § 271 (2003); see also Joel I. Klein, Address before the American Enterprise Institute (Nov. 5, 1997) ("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."), at <http://www.usdoj.gov/atr/public/speeches/1268.htm> (last visited Oct. 29, 2003).

116. See Michael L. Katz, *Intellectual Property Rights and Competition Policy: Four Principles in a Complex World*, 1 J. TELECOMMS. & HIGH TECH. L. 325, 342 (2002).

impact, and also discourages independent innovations in the longer run.¹¹⁷

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.¹¹⁸ Invoking this theory, the Federal Trade Commission (“FTC”) complained that Intel’s demand for intellectual property licenses from its licensees (complementors) violated the antitrust laws.¹¹⁹

Such discouragement of efficient independent innovation might be a problem inherent in closed architectures.¹²⁰ In a fully modular structure without a gatekeeper, the innovation could quickly be introduced,¹²¹ 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 APIs to independent developers, spending money and resources to cooperate with complementary (applications) providers.¹²² Similarly, Intel carefully manages its complementors.¹²³

117. Economists would call this the “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 problem of discouraging innovations.

118. See Farrell & Katz, *supra* note 56, at 430 (providing an economic model to support this conclusion).

119. See Carl Shapiro, *Technology Cross-Licensing Practices: FTC v. Intel*, in *THE ANTITRUST REVOLUTION* 350, 361–63 (John E. Kwoka, Jr. & Lawrence J. White eds., 4th ed. Oxford Univ. Press 2004).

120. 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 *TEX. L. REV.* 989 (1997). For an argument that copyright law should not allow complementors to access a platform standard through reverse engineering as a means of addressing transaction cost issues, see Lichtman, *supra* note 58, at 637–38. For an argument that patent law should give second-generation inventors legal protection to facilitate fair arrangements with original inventors and to address the hold-up problem, see Suzanne Scotchmer, *Standing on the Shoulders of Giants: Cumulative Research and the Patent Law*, *J. ECON. PERSP.*, Winter 1991, at 29. Moreover, real property law also recognizes that “strategic behavior” can prevent a socially desirable arrangement and provides for flexibility in crafting appropriate relief to avoid this outcome. See, e.g., *Walgreen Co. v. Sara Creek Prop. Co.*, 966 F.2d 273, 276–79 (7th Cir. 1992) (Posner, J.).

121. 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 20–21 and accompanying text.

122. See MICHAEL A. CUSUMANO & RICHARD W. SELBY, *MICROSOFT SECRETS: HOW THE WORLD’S MOST POWERFUL SOFTWARE COMPANY CREATES TECHNOLOGY, SHAPES MARKETS, AND MANAGES PEOPLE* 166–74 (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. See Joe Wilcox, *Microsoft Tallies Antitrust Efforts* (Aug. 5, 2002), at <http://news.com/2100-1009-948440.html> (last visited Oct. 29, 2003).

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 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.¹²⁴ Thus, even if there is only one monopoly profit, some may think otherwise and inefficiently seek a second.¹²⁵ And even when top management appreciates ICE, other employees may not.¹²⁶

In our experience, businesspeople are often reluctant to help outside firms compete against internally supplied applications.¹²⁷ 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

123. On Intel’s strategy, see GAWER & CUSUMANO, *supra* note 26, at 15–38. For related antitrust issues concerning Intel, see Intel Corp., 64 Fed. Reg. 20134 (Fed. Trade Comm’n Apr. 23, 1999) (Analysis to Aid Public Comment and Commissioner Statements) and Intergraph Corp. v. Intel Corp., 195 F.3d 1346 (Fed. Cir. 1999). For an economic model that explains “the theoretical rationale for 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 the Threat of Ex Post Entry* (June 20, 2003), at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=319180 (last visited Oct. 29, 2003). See also Farrell & Katz, *supra* note 56.

124. For example, consider competition when a platform monopoly such as an incumbent local exchange company (“ILEC”) charges an “access charge” above marginal cost to its downstream rivals (for example, long-distance providers). 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, *supra* note 71, at 423. In our experience, however, this “opportunity cost argument” is not obvious to policymakers, businesspeople, or even distinguished economists.

125. See Kaplow, *supra* note 83, at 548–49 (“[O]ne 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.”).

126. Some courts have acknowledged this possibility. For example, the court in *Time Warner Entertainment Co. v. FCC* noted 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.” 240 F.3d 1126, 1138 (D.C. Cir. 2001). Such resistance to change 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.

127. See, e.g., Bruce T. 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).

complement.¹²⁸ Incumbents may fail to imagine the potential benefits of increased competition in the market for applications, 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.¹²⁹ 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,¹³⁰ but that regulated incumbent firms often miss this opportunity.¹³¹ Thus, two commentators claim that the local telephone companies have "deliberately limited the growth and profitability of their infrastructure businesses to protect their customer relationship businesses."¹³²

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.¹³³ Apple had developed an operating system widely viewed as better than Microsoft's MS-DOS (which IBM and others licensed),¹³⁴ but thought it could make more money by

128. This recalls Mao Tse-Tung's famous adage: "Let a hundred flowers bloom, let a hundred schools of thought contend." THE ENCYCLOPEDIA OF WORLD HISTORY (Peter N. Stearns ed., Houghton Mifflin CD-ROM 6th ed. 2001), available at <http://www.bartleby.com/67/4149.html> (last visited Nov. 30, 2003). 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 *ECONOMICS FOR AN IMPERFECT WORLD* (Richard Arnott et al. eds., 2003).

129. See Clifford Winston, *U.S. Industry Adjustment to Economic Deregulation*, J. ECON. PERSP., Summer 1998, at 89, 89 (stating that, 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).

130. See John Hagel III & Marc Singer, *Unbundling the Corporation*, MCKINSEY Q., 2000, No. 3, at 148, available at <http://www.optimizemagazine.com/mckinsey/2002/0408.htm> (last visited Oct. 29, 2003).

131. See *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 Beard et al., *supra* note 67, at 421 (2002) with Robert W. Crandall & J. Gregory Sidak, *Is Structural Separation of Incumbent Local Exchange Carriers Necessary for Competition?*, 19 YALE J. ON REG. 335 (2002).

132. Hagel & Singer, *supra* note 130, at 154.

133. See Charles R. Morris & Charles H. Ferguson, *How Architecture Wins Technology Wars*, HARV. BUS. REV., Mar.-Apr. 1993, at 86, 90 (noting how Apple's refusal to open the Macintosh platform hurt it in the marketplace); see also 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."); Joseph Farrell & Nancy Gallini, *Second Sourcing as a Commitment: Monopoly Incentives to Attract Competition*, 103 Q. J. ECON. 673 (1988).

134. See Stanley M. Besen & Joseph Farrell, *Choosing How to Compete: Strategies and Tactics in Standardization*, J. ECON. PERSP., Spring 1994, at 117, 118.

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 architecture.¹³⁵

If incumbents do not always fully understand ICE, what policy implications follow? Sensibly, public policy does not normally let courts or regulators tell a business how to maximize its profits.¹³⁶ Similarly, the antitrust laws and regulatory policy generally do not seek to correct business strategy failures.¹³⁷ 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 a monopolist to be efficient even on its own terms, the more we should value platform-level competition, perhaps especially diverse competition.¹³⁸ 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. Thus, the arcane complexities of ICE and its implications boost the (already strong) case for platform-level competition.¹³⁹

If, as Judge Posner claims, an economics-based approach has won in antitrust,¹⁴⁰ 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 so, however, cus-

135. On the inferiority of Apple's strategy, see Langlois & Robertson, *supra* note 43, at 308-12.

136. 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." See *Sinclair Oil Corp. v. Levien*, 280 A.2d 717, 720 (Del. 1971).

137. See 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 83, at 549 (stating that the "purpose of the antitrust laws is not to improve the effectiveness of management").

138. The importance of such competition is elaborated in Weiser, *supra* note 57.

139. In evaluating, for example, mergers between platform providers, antitrust enforcers should be mindful of the competitive impact related to the loss of rival platforms and the associated experimentation that arises from such platform diversity.

140. See POSNER, ANTITRUST LAW, *supra* note 68, at ix.

tomers 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 jurisprudence, 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.¹⁴¹ 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,¹⁴² but the fear of such liability will not dissipate any time soon. Consequently, a firm may keep its platform closed even if opening it would be more profitable, if the option value of later being able to close it is important.

Thus, suppose that the platform provider can extract \$10 of profits per customer 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). 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 leave it open if customers turn out to value open competition in applications at \$12, but 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 keeping it closed. 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 plat-

141. See, e.g., *Aspen Skiing Co. v. Aspen Highlands Skiing Corp.*, 472 U.S. 585, 603 (1985); *Eastman Kodak Co. v. Image Technical Servs., Inc.*, 504 U.S. 451, 483 (1992). For a sense of the debate over these cases, compare Dennis W. 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 these cases) with Jonathan B. Baker, *Promoting Innovation Competition Through the Aspen/Kodak Rule*, 7 GEO. MASON L. REV. 495, 501–02 (1999) (endorsing these cases).

142. See, e.g., *Olympia Equip. Leasing Co. v. W. Union Tel. Co.*, 797 F.2d 370, 376 (7th Cir. 1986).

form later (should customers value openness at only \$6), the firm will inefficiently close the platform *ab initio*.¹⁴³

G. Regulatory Strategy Considerations

A second “iatrogenic”¹⁴⁴ 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 access elsewhere. 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.¹⁴⁵ Thus, in the cable market, they may seek to preserve cable firms with different sets of assets or business strategies on the view that some cable firms will be more willing than others to experiment with open access arrangements.

143. A version of ICE survives: with the efficient path unavailable, the firm chooses efficiently among those that remain. But this may be cold comfort to both the firm and the rest of society.

144. This term literally means “induced in a patient by a physician’s activity, manner, or therapy.” AMERICAN HERITAGE DICTIONARY 867 (4th ed. 2000), available at <http://dictionary.reference.com/search?q=iatrogenic> (last visited Oct. 29, 2003).

145. This rationale underlaid the creation of different regional companies as part of the AT&T consent decree. See *United States v. W. Elec. Co.*, 993 F.2d 1572, 1580 (D.C. Cir. 1993) (“[T]he existence of seven [Bell Companies] increases the number of benchmarks that can be used by regulators to detect discriminatory pricing . . . in evaluating compliance with equal access requirements . . .”). Similarly, in approving the SBC/Ameritech merger, the FCC recognized lost benchmarking opportunities as a harm caused by the merger. See *Ameritech Corp.*, 14 F.C.R. 14712, ¶ 5 (1999) (Memorandum Opinion and Order) (“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.

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).¹⁴⁶ 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 the higher meal prices cannot 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 transport provider to try to control the applications market. Thus, this exception could prove important.

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

As discussed in Part III, 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,¹⁴⁷ but have often adopted a simplistic form of this logic that does not fully address ICE's exceptions.

In contrast, as telecommunications policy moved away from its disposition toward regulated integration, it turned sharply toward mandating modularity or “openness.” The Hush-A-Phone and Carter-

¹⁴⁶ See Michael D. Whinston, *Tying, Foreclosure, and Exclusion*, 80 AM. ECON. REV. 837, 850–55 (1990).

¹⁴⁷ 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. Phila. Newspapers, Inc.*, 51 F.3d 1191, 1203 (3d Cir. 1995) (arguing that leveraging theory “makes no sense”).

fone decisions, followed by the breakup of the Bell System and the Telecom Act's unbundling provisions, reflect this shift.

Thus, some take ICE very seriously, others take its exceptions very seriously,¹⁴⁸ 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.¹⁴⁹ This Part discusses how ICE and its exceptions can help frame and evaluate open access obligations.

In traditional telecommunications markets, the monopoly platform was generally price-regulated, and Baxter's Law provides that ICE does not apply to regulated monopolies.¹⁵⁰ And the Telecom Act's unbundling obligations can be viewed and justified within this tradition. In particular, the Act's ambitious effort to regulate "bottle-neck" wholesale inputs, such as the local lines to residential telephone subscribers, aims in part to replace the legacy system of retail regulation.¹⁵¹ But increasingly, as with broadband platforms, telecommunications regulators confront arguments for open access regulation where the market is not generally price-regulated. To address such arguments in a fashion that is consistent with antitrust policy, policy-makers 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."¹⁵² Antitrust law tends

148. 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) and Kaplow, *supra* note 83.

149. See Herbert Hovenkamp, *Post-Chicago Antitrust: A Review and Critique*, 2001 COLUM. BUS. L. REV. 257, 278-79 ("The principal difference between Chicago and post-Chicago economic analysis is" the prevalence in the latter of "a complex set of assumptions about how a market works, [which make] anticompetitive outcomes seem more plausible."); see also POSNER, *supra* note 68, at 194-95 (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., they believe that there are no exceptions to ICE), but the heavy weight of economic opinion agrees that vertical integration and vertical market restrictions can injure competition in certain cases. See Posner, *supra* note 96, at 932 (discussing "die-hard" Chicagoans who refuse to accept subsequent refinements of early Chicago School ideas).

150. See Joskow & Noll, *supra* note 40, at 1249-50.

151. 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).

152. See Shelanski & Sidak, *supra* note 110, at 15-16.

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.¹⁵³ 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.¹⁵⁴

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 stop anticompetitive behavior by other means, this approach remains a favored option.¹⁵⁵ But it precludes (by definition) any integrative efficiencies.¹⁵⁶ 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 decree illustrates.¹⁵⁷

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 limit the platform monopolist’s behavior in the applications market only to activities associated with integrative efficiency. A fundamental problem with such best-of-both-worlds regulatory strategies is that it is difficult to know whether the anticompetitive effects of a particular approach will outweigh the efficiencies it generates; 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 between quarantine and vertical *laissez-faire*.

153. See, e.g., *United States v. AT&T*, 552 F. Supp. 131, 193 n.251 (D.D.C. 1982), *aff’d sub nom.* *Maryland v. United States*, 460 U.S. 1001 (1983) (recognizing core economic incentives for anticompetitive conduct and discussing the limitations of antitrust courts in superintending regulatory relief).

154. See, e.g., Shelanski & Sidak, *supra* note 110, at 73–90 (examining the weaknesses of divestiture relief in the *Microsoft* case).

155. See, e.g., Charles H. Ferguson, *The United States Broadband Problem: Analysis and Policy Recommendations*, at 1, 6–8 (Brookings Inst., Policy Brief #105, July 2002), at <http://www.brookings.edu/comm/policy/briefs/pb105.pdf> (last visited Oct. 29, 2003).

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

157. See *United States v. AT&T*, 552 F. Supp. 131, 227 (D.D.C. 1982), *aff’d sub nom.* *Maryland v. United States*, 460 U.S. 1001 (1983) (forbidding the Bell Companies from “provid[ing] interexchange telecommunications services or information services”). 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.

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.¹⁵⁸ 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).¹⁵⁹

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.¹⁶⁰ Non-structural remedies also include mandated unbundling and compatibility.¹⁶¹

Mandated unbundling requires an integrated platform provider to offer the platform without (at least some of) its applications. In its simplest form, mandated unbundling 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 the platform product be truly open to independent applications on terms comparable to those (perhaps only implicitly) given by the platform provider “to itself.”

Telecommunications regulators used an unbundling strategy to facilitate competition in the terminal equipment (applications) market

158. See 47 U.S.C. § 272 (2003).

159. See, e.g., Amendment of Section 64.702 of the Commission's Rules and Regulations (Second Computer Inquiry), 77 F.C.C.2d 384, ¶ 205 (1980) (Final Decision) (detailing measures imposed on telephone companies to facilitate monitoring of structurally separated subsidiaries) [hereinafter Computer II], *aff'd sub nom.* Computer & Communications Indus. Ass'n v. FCC, 693 F.2d 198 (D.C. Cir. 1982).

160. See, e.g., *Roland Mach. Co. v. Dresser Indus., Inc.*, 749 F.2d 380, 391–92 (7th Cir. 1984) (Posner, J.); see also Ken Auletta, *Final Offer*, THE NEW YORKER, Jan. 15, 2001, at 40, 43 (quoting Chief Judge Posner, mediator in the *Microsoft* case, as stating that conduct remedy-based consent decree provisions 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”).

161. 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 Lemley & Lessig, *supra* note 10, at 969 n.139 (quarreling with the 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 (making this distinction), Speta, *supra* note 14, at 252 (same), Weiser, *supra* note 10, at 826 (same), and Joseph D. Kearney & Thomas W. Merrill, *The Great Transformation of Regulated Industries Law*, 98 COLUM. L. REV. 1323, 1350–57 (1998) (same).

by defining an interface to AT&T's telephone network (the platform), and permitting all customer premises equipment compatible with that interface and with certain requirements to plug into the network.¹⁶² Similarly, MCI demanded and won the right to compete against AT&T in the long-distance component (an application) of a long-distance call,¹⁶³ 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 likely to be efficient notwithstanding AT&T's opposition. And the Telecom Act's unbundling provisions¹⁶⁴ are in part intended to ensure competition in the parts of the network that have the potential to sustain competition, despite whatever natural monopoly network elements remain. Again, Baxter's Law disarms ICE.

In the antitrust realm, the Ninth Circuit required Kodak to cooperate with independent providers of service (applications) for its copiers (the platform).¹⁶⁵ Similarly, the FTC required AOL Time Warner to offer broadband transport (the platform) separately from Internet access providers. 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.¹⁶⁶ In the *Kodak* case, the exception to ICE was a concern that Kodak had engaged in a hold-up strategy; by contrast, in the AOL matter, the FTC did not clearly identify any exception to ICE.

As the AT&T antitrust litigation and Telecom Act examples illustrate, unbundling often (though not always, as the CPE example shows) requires both complex regulation and difficult price-setting.¹⁶⁷ Because of this requirement 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

162. See *Proposals for New or Revised Classes of Interstate and Foreign Message Toll Telephone Service (MTS) and Wide Area Telephone Service (WATS)*, 56 F.C.C.2d 593, ¶ 16 (1975) (First Report and Order), modified by 58 F.C.C.2d 716 (1976) (Memorandum Opinion and Order), modified by 58 F.C.C.2d 736 (1976) (Second Report and Order), *aff'd sub nom.* N.C. Utils. Comm'n v. FCC, 552 F.2d 1036 (4th Cir. 1977).

163. See *MCI Communications v. AT&T*, 708 F.2d 1081, 1105 (7th Cir. 1983).

164. 47 U.S.C. §§ 251–52 (2003).

165. See *Image Technical Servs. v. Eastman Kodak Co.*, 125 F.3d 1195, 1224–28 (9th Cir. 1997).

166. See Faulhaber, *supra* note 161, at 684–85.

167. 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 v. Iowa Utils. Bd.*, 525 U.S. 366, 427–30 (1999) (Breyer, J., concurring in part and dissenting in part).

General Electric case above shows. If complementors are important in providing potential platform competition, then unbundling may be required so as to increase the chance of such competition. In the *Microsoft* case, for example, the DOJ 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 applications.¹⁶⁸ 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 compete against the platforms of incumbent local exchange providers.

As in the CPE example, an unbundling remedy may require regulators 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.¹⁶⁹ Regulators can flatly require compatibility or establish a right for any firm (or only for non-dominant firms) to request or ensure it.¹⁷⁰ 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, with instant messaging, the value of the service rises as a subscriber can communicate with more users. In a compatibility mandate in that market, the FCC required AOL, as part of a merger approval, to develop an interoperable instant messaging system.¹⁷¹ Similarly, the Telecom Act requires every telecommu-

168. *United States v. Microsoft Corp.*, 231 F. Supp. 2d 144 (D.D.C. 2002).

169. Economists describe a greater value of a larger network as a “network effect.” For an overview, see Joseph Farrell & Paul Klemperer, *Coordination and Lock-In: Competition with Switching Costs and Network Effects*, in 3 HANDBOOK OF INDUSTRIAL ORGANIZATION (Mark Armstrong & Robert Porter eds., forthcoming 2004) (on file with authors) and Mark A. Lemley & David McGowan, *Legal Implications of Network Economic Effects*, 86 CAL. L. REV. 479 (1998).

170. On rights of reverse engineering to ensure compatibility, for instance, see Pamela Samuelson & Suzanne Scotchmer, *The Law and Economics of Reverse Engineering*, 111 YALE L.J. 1575 (2002).

171. See Applications for Consent to the Transfer of Control of Licenses and Section 214 Authorizations by Time Warner Inc. and America Online, Inc., Transferors, to AOL Time Warner Inc., Transferee, 16 F.C.C.R. 6547, ¶¶ 191–200 (2001) (Memorandum Opinion and Order); see also Faulhaber, *supra* note 161, at 704–05 (discussing the interoperability mandate).

nications provider to terminate calls to its subscribers from other providers, thus “socializing” the network effect.¹⁷²

In other cases the network effect arises from a greater variety of complements available for a particular platform — an example is the “applications barrier to entry” in the *Microsoft* case.¹⁷³ To address such a network effect, a compatibility requirement may be imposed that reduces porting costs and thus ensures that applications written for one platform are readily available on others. An extreme compatibility requirement would make the platform/applications interface public and common, and thus modularize the market.

B. Considerations for Regulatory Policy

Our analysis suggests that regulators should consider two basic questions: whether an exception to ICE exists, and, if this seems likely, 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.¹⁷⁴ Moreover, the law has adopted a number of doctrinal devices to guard against false positives, which, in antitrust, include the opportunity for a monopolist to offer an efficiency explanation for challenged conduct.¹⁷⁵ Error costs include both “false positives” and “false negatives.” 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.¹⁷⁶

172. For discussion and an analogy to intellectual property policy, see Joseph Farrell, *Creating Local Competition*, 49 FED. COMM. L.J. 201, 202–04 (1996).

173. See *United States v. Microsoft Corp.*, 84 F. Supp. 2d 9, 18–23 (D.D.C. 1999).

174. See, e.g., *Am. Hosp. Supply Co. v. Hosp. Prods. Ltd.*, 780 F.2d 589, 593 (7th Cir. 1986) (noting that harm calculations should account for the probability of error); see also Frank H. Easterbrook, *The Limits of Antitrust*, 63 TEX. L. REV. 1, 3 (1984) (“[J]udicial errors that tolerate baleful practices are self-correcting while erroneous condemnations are not.”); William F. Baxter, *Reflections upon Professor Williamson’s Comments*, 27 ST. LOUIS U. L.J. 315, 320 (1983) (urging courts to be mindful of “error rates” and “false positives” in judging exclusionary conduct).

175. See Baker, *supra* note 141, at 518.

176. For an example of the debate on this score, compare Salop & Romaine, *supra* note 82, at 653–55 (discussing varying perspectives on the relative degree of harm associated with false positives and false negatives) with Ronald A. Cass & Keith N. Hylton, *Preserving Competition: Economic Analysis, Legal Standards, and Microsoft*, 8 GEO. MASON L. REV. 1, 30–33 (1999) (arguing that false positives are more harmful than false negatives).

Regulators should also evaluate how well they can address any 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,¹⁷⁷ 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.¹⁷⁸ 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.¹⁷⁹ Remedies should aim to avoid chilling efficient 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 models for the regulation of vertical relations. Each of these models 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, the models 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.¹⁸⁰

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 the benefits of regulation likely outweigh its costs.¹⁸¹ This model thus expects that exceptions to ICE can be fairly reliably diagnosed or predicted (placing the burden on the regulator to overturn the presump-

177. 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).

178. See Weiser, *supra* note 39, at 14–21.

179. In criticizing the finsyn rules, Judge Posner made this very argument. See *Schurz Communications, Inc. v. FCC*, 982 F.2d 1043, 1045–48 (7th Cir. 1992).

180. 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 based on this very logic. See *Policy and Rules Concerning the Interstate, Interexchange Marketplace*, 16 F.C.C.R. 7418, ¶¶ 10, 34, 35 (2001) (Report and Order) [hereinafter *Unbundling Order*].

181. One of us has advocated this approach previously. See Philip J. Weiser, *Changing Paradigms in Telecommunications Regulation*, 71 U. COLO. L. REV. 819, 835 (2000); see also *W. Res., Inc. v. Surface Transp. Bd.*, 109 F.3d 782, 788 (D.C. Cir. 1997) (noting that the Surface Transportation Board took roughly this approach).

tion that ICE applies), and that regulators are reasonably good at predicting, or diagnosing and correcting, their own failures.¹⁸²

The two other models, while differing 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 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.¹⁸³ An opposite response is a categorical presumption that ICE applies, as in a hard-line Chicago approach. 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.¹⁸⁴ Open architecture advocates, such as Lawrence Lessig, appear to trust the history and future prospects of successful innovation through modularity more than they trust either ICE or regulators' ability to diagnose its exceptions.

VI. 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.¹⁸⁵ Such sophistication

182. 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 141, at 496.

183. See, e.g., Francois Bar et al., *Access and Innovation Policy for the Third Generation Internet*, 24 TELECOMM. POL'Y 489, 496 (2000) (insisting that "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, 149-52 (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.

184. A compatible argument, based on Joseph Schumpeter's theory of creative destruction, is that 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., Shelanski & Sidak, *supra* note 110, at 10-12 (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"); see also Richard Schmalensee, *Antitrust Issues in Schumpeterian Industries*, 90 AMER. ECON. REV. PAP. & PROC. 192, 195 (2000) (discussing Schumpeterian competition between Microsoft and Netscape in the Internet browser market).

185. Such treatment would not only mean better results, but also a reduction in regulatory uncertainty and its associated impact on investment incentives. See Warren G. Lavey, *Mak-*

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 welfare, and competitive acts, which increase it.”¹⁸⁶ 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 Justice Department’s case against Microsoft relied on the potential competition exception to ICE. The DOJ 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.¹⁸⁷ In addition, whether or not the DOJ 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.¹⁸⁸ Although the Justice Department 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.¹⁸⁹ 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 had previously imposed a stringent test to determine whether Microsoft illegally tied its browser to its operating system.¹⁹⁰ In particular, the court asked whether there was a “plausible claim that [integration] brings some advantage.”¹⁹¹ When that

ing and Keeping Regulatory Promises, 55 FED. COMM. L.J. 1, 10–11 (2002) (discussing the importance of regulatory certainty and predictability).

186. *United States v. Microsoft Corp.*, 253 F.3d 34, 58 (D.C. Cir. 2001).

187. See Kevin J. Arquit & Arman Y. Oruc, *Predation Against “Dangerous” Complements*, 4 SEDONA CONF. J. 21, 27–28 (2003).

188. For a model and further explanation of this point, see Miller, *supra* note 123.

189. See *Microsoft*, 253 F.3d at 59 (“If 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 62–64, 66–67, 69–71 (applying that standard).

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

191. *Id.*

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 examined the actual justifications (as opposed to any conceivable ones) in asking whether the competitive harms outweighed the efficiencies of integration.¹⁹²

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 (the 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."¹⁹³ Because of an earlier antitrust consent decree limiting AT&T to providing regulated common carrier services,¹⁹⁴ this decision not to regulate data processing amounted to a quarantine, excluding the platform monopolist AT&T from the data processing (applications) sector.¹⁹⁵ 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."¹⁹⁶ Its initial response was thus a quarantine approach towards AT&T and the imposition of

192. See *Microsoft*, 253 F.3d at 92, 95–97 (noting the different circumstances of its earlier decision and setting out a new standard).

193. Regulatory and Policy Problems Presented by the Interdependence of Computer and Communication Servs. and Facilities, 28 F.C.C.2d 267, ¶ 11 (1971) (Final Decision and Order) [hereinafter 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, e.g., *United States v. Southwestern Cable Co.*, 392 U.S. 157, 167–68 (1968) (holding that regulations of cable television were permissible on the ground that such regulations were ancillary to the Commission's charge to regulate broadcasting).

194. See *United States v. W. Elec. Co.*, No. 17-49, 1956 U.S. Dist. LEXIS 4076, at *3, *6 (D.N.J. 1956) (restricting AT&T from offering anything other than "common carrier communications services" and defining those services as "communications services and facilities . . . subject to public regulation").

195. See Computer I, *supra* note 193, ¶ 39 & n.13.

196. *Id.* ¶ 12.

a structural separation requirement on non-Bell telephone companies.¹⁹⁷

But this quarantine, as well as the structural separation provisions, required the FCC to classify all services into "communication" or "data processing." Because it could not anticipate how to do so, the FCC decided to classify "hybrid services" on a case-by-case basis.¹⁹⁸ This practice called forth a stream of cases that ultimately led the FCC to reconsider the basic premises of the Computer I regime.¹⁹⁹

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.²⁰⁰ The Computer II rules concluded that GTE and the Bell Companies, if allowed to provide such services, must do so through a separate subsidiary, but lifted the separate subsidiary requirement for almost all non-Bell ("independent") local telephone (monopoly) companies.²⁰¹ In place of this requirement, the Commission imposed a set of open access requirements on the independent telephone companies.²⁰²

Of the actions taken in the Computer Inquiries, Computer II's open access rules, which facilitated competition in customer premises equipment, were the most successful and enduring. Despite its Carterfone decision in 1969, the FCC — facing heavy resistance from AT&T²⁰³ — failed to enforce a "network neutrality" policy until the follow-on from the Carterfone decision converged with the Computer Inquiry rules. Ultimately the FCC, in a set of decisions reflecting Bax-

197. See *id.* app. A (providing for the codification of this response at 47 C.F.R. § 64.702(b)-(c)).

198. See *id.* ¶ 27.

199. See *Computer & Communications Indus. Ass'n 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."); see also Amendment of Sections 64.702 of the Commission's Rules and Regulations (Third Computer Inquiry), 104 F.C.C.2d 958, ¶ 10 (1986) (Report and Order) [hereinafter *Computer III*] ("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.").

200. See *Computer II*, *supra* note 159, ¶¶ 119-32.

201. See *id.* ¶ 228. 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. 1990).

202. See *Computer II*, *supra* note 159, ¶ 231; see also *Unbundling Order*, *supra* note 180, ¶ 40 (noting the 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").

203. See *supra* note 36.

ter's law, 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.²⁰⁴ 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."²⁰⁵ 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.²⁰⁶

The Computer III decision lifted the requirement that the Bell Companies and GTE establish a separate subsidiary for enhanced services (although the Bell Companies were still restricted under the MFJ²⁰⁷). The Commission reasoned that separate-subsidary regulation could better be replaced with non-structural safeguards,²⁰⁸ and in order to ensure enhanced service providers non-discriminatory access to the telephone network it mandated "comparably efficient interconnection"²⁰⁹ and "open network architecture."²¹⁰ Following remands from the Ninth Circuit regarding these requirements, the Commission has yet to close the book on the Computer III rules.²¹¹

The FCC's actions in the Computer Inquiries thus reflected a series of different approaches, beginning (at least as to the local Bell

204. See *N.C. Utils. Comm'n v. FCC*, 552 F.2d 1036 (4th Cir. 1977) (upholding the certification process requirements); 47 C.F.R. § 64.702(e) (2000) (requiring unbundling of CPE and telephone service); see also *Communications Indus. Ass'n*, 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).

205. *Communications Indus. Ass'n*, 693 F.2d at 209.

206. See *Unbundling Order*, *supra* note 180, ¶¶ 9–10 (removing unbundling restrictions in light of market conditions).

207. See MFJ, *supra* note 40.

208. See *Computer III*, *supra* note 199, ¶ 3.

209. See *Computer III Further Remand Proceedings: Bell Operating Company Provision of Enhanced Services*, 14 F.C.C.R. 4289, ¶ 13 (1999) (Report and Order) (discussing the comparably efficient interconnection requirements).

210. See *Computer III Further Remand Proceedings: Bell Operating Company Provision of Enhanced Service*, 13 F.C.C.R. 6040, ¶¶ 78–84 (1998) (Further Notice of Proposed Rulemaking) [hereinafter *Computer III Further Notice*] (discussing the open architecture requirements); see also Robert Cannon, *Where Internet Service Providers and Telephone Companies Compete: A Guide to the Computer Inquiries, Enhanced Service Providers, and Information Service Providers*, 9 COMM.LAW CONSPICUOUS 49, 56–65 (2001).

211. See *California v. FCC*, 905 F.2d 1217 (9th Cir. 1990) (vacating initial order and remanding); *California v. FCC*, 39 F.3d 919 (9th Cir. 1994) (partially vacating subsequent order and remanding); *Computer III Further Notice*, *supra* note 210 (continuing inquiry into the appropriate response to issues remanded by the Ninth Circuit); see also Robert Cannon, *The Legacy of the Federal Communication Commission's Computer Inquiries*, 55 FED. COMM. L.J. 167, 200–03 (2003); Cannon, *supra* note 210, at 56–57.

Companies) 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, the MFJ first quarantined the Bell Companies from certain adjacent markets; subsequent changes to the MFJ, along with the Telecom Act, loosened the restrictions, allowing more vertical integration.²¹² The telecommunications firms themselves also took shifting approaches to vertical relations, as shown by AT&T's divestiture of its equipment-manufacturing arm Lucent, its approach to wireless (in the McCaw merger and subsequent spin-off of AT&T Wireless), and its purchase and later sale of local cable properties.

An optimistic interpretation of such instability would be that, as the right policy shifted in light of the competing merits, policymakers and executives ably tracked these shifts. For instance, market conditions and other relevant factors may simply have varied over time. Or, perhaps the spell of quarantine imposed on the Bells, by establishing reliable access arrangements, created a benchmark that made later discrimination harder and thus made it possible to capture the benefits of vertical integration without excessive discrimination or the need for further heavy-handed conduct regulation.²¹³ 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 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.²¹⁴ 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

212. For changes in the MFJ, see *United States v. W. 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. § 271 (2003) (governing entry into in-region long distance).

213. For development of this possibility, 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, 286 (2000).

214. Warren G. Lavey, *Ending Structural Separation for 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).

finsyn rules and the Computer III proceedings, for example — where it must explain policy swings.²¹⁵ 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.²¹⁶ 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.²¹⁷ 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.²¹⁸ Antitrust law aspires to aid 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 monopolist's ability to extract rents from consumers while ensuring the regulated utility a sufficient return on its investment.²¹⁹ As alternative providers entered formerly monopolized industries, antitrust enforcers sought to facilitate competition, whereas regulators reacted hesitantly.²²⁰ The Telecom Act endorsed entry and aimed to facilitate competition in an

215. See *California*, 905 F.2d at 1234 (finding that the initial Computer III order reflected an "unexplained change" from the Commission's previous decisions); see also Lavey, *supra* note 4, at 444–48 (discussing Computer III).

216. See *Appropriate Framework for Broadband Access to the Internet over Wireline Facilities*, FCC CC Docket No. 02-33, FCC 02-42, ¶¶ 43–53 (Feb. 15, 2002) (Notice of Proposed Rulemaking). Those proceedings also will attempt to respond to the Ninth Circuit's remand of the FCC's Computer III rules. See *id.*

217. See *id.* ¶ 36 ("[W]ith respect to technology, the core assumption underlying the Computer Inquiries was that the telephone network is the primary, if not exclusive, means through which information service providers can obtain access to customers.")

218. One of us has advocated such an approach. See Philip J. Weiser, *Toward a Next Generation Regulatory Strategy*, 35 LOY. U. CHI. L.J. (forthcoming Dec. 2003) (manuscript at 45–59, on file with authors).

219. See Kearney & Merrill, *supra* note 161, at 1359–61.

220. Compare, e.g., *Otter Tail Power Co. v. United States*, 410 U.S. 366, 372 (1973) with *Hush-A-Phone*, *supra* note 32, at 420. In *Otter Tail*, antitrust's market-opening measures came twenty years in advance of regulatory reforms. See *Energy Policy Act of 1992*, Pub. L. No. 102-486, 106 Stat. 2776, 2915–16 (codified at 16 U.S.C.S. §§ 824j–824k (2003)) (authorizing the Federal Energy Regulatory Commission to mandate wholesale "wheeling" of power to facilitate competition).

emerging market,²²¹ 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.²²² The FCC must provide such an explanation if it decides to impose an open access requirement on broadband platforms.

VII. 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.

221. For discussions of the evolution of how antitrust and telecommunications regulation relate to one another, see Weiser, *Information Platforms*, *supra* note 8, at 9; Weiser, *supra* note 39, at 1–2. For a discussion of regulation's evolution from its old regime to a new paradigm, see Kearney & Merrill, *supra* note 161, at 1329.

222. Some commentators suggest that regulation parts company with the maxim, stated in *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 seek to produce certain innovative benefits — at the risk of falling victim to the perilous exercise of predicting winners and losers. See Paul L. Joskow, *Restructuring, Competition and Regulatory Reform in the U.S. Electricity Sector*, J. ECON. PERSP., Summer 1997, at 119, 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).