

ELHAUGE ON TYING: VINDICATED BY HISTORY

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Einer Elhaug is almost singlehandedly winning a battle against the Single Monopoly Theory. The theory, as popularized by early Chicago School theorists,¹ argues that a “vertically integrated monopolist can earn monopoly profit only in one of the markets—either the upstream or downstream market, but not both [and that] firms typically cannot extend monopoly power over one product to other products without sacrificing total profit.”² The theory has been used to decry most any antitrust prohibition on vertical restraints or product bundling. If a monopolist engages in restrictive contracts, vertical acquisitions, or assorted tying arrangements, the theory goes, it can only be motivated by efficiency concerns. After all, if there is only one monopoly profit, then there are no more anticompetitive rents to be obtained, only gains from efficiencies.³

Though such a permissive attitude might be emblematic of adherents to an extreme view of the Chicago School of Antitrust, there has been surprisingly strong support for relaxing the rules against tying, both in academia and in the Supreme Court. Following a strict version of the Coase Theorem, the logic suggests that any effort invested in obtaining market power in an adjacent market will be (at least) countered by a loss in the rents currently enjoyed in the monopolized market. And any effort to extract higher prices in a competitively supplied good or service will be disciplined by sophisticated purchasers.

Professor Elhaug decisively entered this fray with his 2009 Harvard Law Review article, *Tying, Bundled Discounts, and the Death of the Single Monopoly Profit Theory*.⁴ Decrying that “[t]ying law has for too long been in the thrall of the single monopoly profit theory,”⁵ Professor Elhaug argued that contrary to Chicago’s conventional wis-

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1. See Aaron Director & Edward H. Levi, *Law and the Future: Trade Regulation*, 51 NW. U. L. REV. 281, 290 (1956); Richard A. Posner, *The Chicago School of Antitrust Analysis*, 127 U. PA. L. REV. 925, 926-27 (1979).

2. Robert Bork & Greg Sidak, *What Does the Chicago School Teach About Internet Search and the Antitrust Treatment of Google?*, AM. ENTERPRISE INST. 1, 10-11 (2012), http://aei.org/files/2012/10/05/-what-does-the-chicago-school-teach-about-internet-search-and-the-antitrust-treatment-of-google_132249480630.pdf (citing Posner, *supra* note 1, at 928).

3. Posner, *supra* note 1, at 927.

4. Einer Elhaug, *Tying, Bundled Discounts, and the Death of the Single Monopoly Profit Theory*, 123 HARV. L. REV. 397, 422 (2009).

5. *Id.*

dom, “single monopoly profits are the exception, not the rule.”⁶ Offering an “analytical autopsy,” Professor Elhaug concluded persuasively, “[i]t is time to declare the death of the single monopoly profit theory.”⁷

Professor Elhaug’s systematic attack—and in subsequent work, counterattack⁸—on the single monopoly theory involves more analytic detail than is necessary to parse here. The essence of the debate, particularly as it relates to the law of tying, is whether antitrust law should permit actions against purportedly illegal ties.⁹ Proponents of the single monopoly theory argue that tying offers no supra-monopoly profit, and therefore no additional deadweight loss, on top of any legal monopoly power. Professor Elhaug argues, in contrast, that prohibiting monopolists from bundling different goods would indeed lead to greater economic surplus.

Most of this debate between Professor Elhaug and his critics has occurred on theoretical grounds, resting on arguments invoking economic models and theory. This article brings some empirics into the discussion. It examines one case study—the many antitrust actions of the Department of Justice (“DOJ”) against International Business Machines (“IBM”)—and evaluates the consequences of the DOJ’s repeated scrutiny of IBM’s assorted tying arrangements. It concludes, first, that the DOJ was successful in forcing IBM to unbundle several of its significant bundling strategies—i.e., but for the DOJ’s scrutiny, IBM would have proceeded bundling several of its products and services; and second, when IBM acceded to the DOJ’s demands and ended the targeted bundling arrangements, it proceeded to open new markets and unleash significant economic surplus. In short, this case study offers at least one instance in which prosecuting illegal ties yielded significant social benefits.

IBM’S HISTORY OF ANTITRUST SCRUTINY¹⁰

Usselman (2009) sets the scene for IBM’s showdown with DOJ antitrust enforcers:

Few American corporations of the twentieth century achieved greater notoriety than International Business Machines (IBM). Under the sustained leadership of Thomas J. Watson and his son Tom, IBM rose from a modest-sized supplier of punched-card accounting equipment in the 1910s to become the world’s dominant supplier of electron-

6. *Id.*

7. *Id.*

8. Einer Elhaug, *The Failed Resurrection of the Single Monopoly Profit Theory*, 6 COMPETITION POL’Y INT’L 155 (2010); Einer Elhaug, *Should Ties without a Substantial Foreclosure be Per Se Illegal?* (unpublished manuscript) (on file with author).

9. The traditional definition of a tie is when a seller refuses to sell one product unless the buyer also takes another product. See EINER ELHAUGE & DAMIEN GERARDIN, *GLOBAL ANTITRUST LAW AND ECONOMICS* 562 (2d ed. 2011).

10. The remainder of this article relies heavily on excerpted portions of Steven W. Usselman, *Unbundling IBM: Antitrust and the Incentives to Innovation in American Computing*, in *THE CHALLENGE OF REMAINING INNOVATIVE* 249 (Sally H. Clarke, Naomi R. Lamoreaux & Steven W. Usselman eds., 2009) [hereinafter Usselman (2009)]; and Steven W. Usselman, *Public Policies, Private Platforms: Antitrust and American Computing*, in *INFORMATION TECHNOLOGY POLICY: AN INTERNATIONAL HISTORY* 97 (Richard Coopey ed., 2004) [hereinafter Usselman (2004)].

ic computers, the glamour product of the American Century. When the younger Watson relinquished the helm in 1971, IBM had the highest market capitalization of any American company. Foreign governments strained to create their own champions capable of matching the American giant, while vanquished competitors such as General Electric and RCA left the computer market to Big Blue. As further advances in hardware and programming drove computing down in price and size and brought it into a much wider realm of applications, IBM retained a powerful presence in virtually every segment of the broadening market.

As IBM navigated a course through the startling technological transformations that have characterized modern information technology, it persistently faced a challenge . . . the threat of antitrust prosecution. In 1936, just months after IBM secured a major contract from the new Social Security Administration that would help make its punched-card equipment a ubiquitous feature of private and public bureaucracies, the Department of Justice won an antitrust suit against the company. As IBM vaulted to leadership in electronic computing during the early 1950s, Justice launched another investigation, which culminated in 1956 with a comprehensive consent decree. A decade later, with IBM still in the throes of executing the massive System/360 project that replaced its entire product line with machines built from solid state components manufactured in its own plants, Justice intervened once more. The resultant suit, one of the most significant in the annals of antitrust, lasted from early 1969 to 1982. By the time a judge dismissed the suit as “without merit,” IBM had successfully launched its widely heralded PC. Even when the firm’s fortunes later turned sharply downward, antitrust remained a significant element in its strategic thinking. In an ironic twist, IBM provided vital testimony on behalf of the Justice Department in its case against Microsoft, the company that had displaced Big Blue atop the industry. Meanwhile, IBM renegotiated its own agreement with government, which agreed to remove key provisions from the consent decree that had governed IBM’s behavior since 1956.

The ongoing engagement between IBM and the Department of Justice bore many marks of an epic struggle between rival combatants. The elder Watson had once gone to jail for antitrust violations while employed at NCR. He brooked no compromise with the Department of Justice and castigated his son for negotiating a consent decree. The younger Watson implied in his memoirs that the stress of countering the suit launched in 1969 and several accompanying private antitrust actions contributed to the heart attack that forced his early retirement as CEO. IBM spent a small fortune defending itself against these claims,

as legions of lawyers and economists on both sides devoted years of the professional lives to the cases.¹¹

But the stakes were unquestionably high, and despite unfortunate collateral damage, the economic history flowing from those suits suggest that the Justice Department's efforts produced fruitful results. Usselman (2009) continues:

At issue, from the first dispute of the 1930s through the Microsoft case, was a fundamental set of business practices [the heart of the IBM business model] that the elder Watson had instilled upon his arrival at IBM in 1914. Those practices were aimed at providing comprehensive services obtained from tightly integrated systems. At the heart of these systems stood a proprietary technology, known as the accounting machine in the electromechanical age and later as the central processing unit (or CPU) during the computer era. Attached to it were an array of peripheral devices, including readers to input stored data and printers to present results in various forms. The separate components in an installation were linked through distinctive means—by punched cards of unique format in the electromechanical era, and later by exclusive input-output channels and software programs known as operating systems—over which IBM also retained close proprietary control. The precise mix of devices varied from customer to customer, as IBM representatives in the field worked to tailor each system to the needs of the particular client. IBM technicians visited these sites regularly, in some cases maintaining a virtually constant presence, in order to keep the equipment running and to devise further uses for it. This package of equipment and services came at a single comprehensive price, unique to each installation. For many decades, such prices were expressed strictly in terms of a monthly rental charge, as IBM in all cases retained ownership of the equipment and leased it to customers. The practice remained common even after the 1956 consent decree required IBM to sell as well as lease its products.

Antitrust proceedings against IBM aimed at breaking apart this integrated approach to conducting its business. Both government and private litigators sought to compel IBM to separate the various components of its bundled products and services, to make each available independently from the others, and to set distinct prices for each of them. Though the specific remedies varied from case to case, as technology changed and antitrust doctrine evolved, this was the persistent objective. IBM's adversaries looked to "unbundle" the components and services that made up the integrated systems. They sought to establish

11. Usselman (2009), *supra* note 10, at 249-50 (internal citations omitted).

clearly defined targets of modest scope at which competitors could take aim. Their objectives paralleled precisely those pursued more recently by government prosecutors, and by IBM itself, when they attempted to force software giant Microsoft to draw clear boundaries between its operating systems and applications software.¹²

THE CONSENT DECREE OF 1936 –
UNBUNDLING ACCOUNTING MACHINES AND PUNCH CARDS

Usselman (2009) describes IBM's earliest foray with antitrust scrutiny:

IBM began its long engagement with antitrust in the mid-1930s, at a time when its fortunes otherwise ran high. Though rental income dipped slightly following the Crash of 1929, business demand for [IBM's] punched-card equipment soon stabilized, as firms seeking paths to recovery frequently revamped their accounting procedures. New government programs mandating standard reporting of data further stimulated demand. A federal contract to manage information for the new Social Security Administration, secured in 1935, soon accounted for a significant portion of IBM's rising revenues. Watson's profit-sharing agreement made him the nation's highest paid business executive. Such conspicuousness attracted scrutiny. The Department of Justice took IBM to court in May 1936. Sixteen days later, a panel of justices returned a resounding verdict against the company.

The central issue in this case involved IBM's practice of requiring customers who leased its [accounting] machines to purchase punched cards [which stored the data for accounting processing and were used with the machines] from IBM. Government prosecutors complained that the provision [held captive customers who leased machines and were forced to purchase punch cards.]¹³

DOJ antitrust enforcers claimed that such a practice constituted an illegal tie, both enabling IBM to earn inordinately large returns from punch cards and preventing them from switching to accounting equipment supplied by IBM's competitors. Usselman (2009) continues:

[P]rosecutors noted that the federal government itself, when contracting with IBM for services associated with Social Security and other programs, had secured a special agreement under which it could manufacture its own cards in the standard IBM format. Lawyers for IBM countered [with what were already the traditional defenses of tying:] that the

12. *Id.* at 249-50 (internal citations omitted).

13. *Id.* at 252 (internal citations omitted).

company must maintain control over cards in order to ensure quality, thereby keeping its leased machines in good working order and preserving its reputation for reliable performance. The government production facility, defense attorneys suggested, would utilize manufacturing equipment supplied by IBM and operate under the watchful eye of its technicians. Paper for the cards would come from suppliers approved by IBM. A skeptical court, noting that government had agreed to pay substantially higher rental charges in order to gain the privilege of producing its own cards, shrugged away the arguments about quality control. IBM could achieve the same end, judges asserted, by publishing technical standards for the cards. The court ordered IBM to drop the card purchase requirement and compelled the firm to assist alternative suppliers of cards in starting production facilities that would compete with IBM's.¹⁴

Culminating in a consent decree, IBM agreed to create a separate market for the punched cards. The decree marked an early example of antitrust policymakers aiming to unbundle components that had historically been closely joined in an integrated system. Nonetheless, it did little to slow IBM's advance in the market for accounting machines—perhaps proving that IBM's quality justifications for the tie were unfounded—and perhaps had little time to open new markets, as a superior generation of equipment was on the rise following World War II.

THE CONSENT DECREE OF 1956 – UNBUNDLING EQUIPMENT AND SERVICES

Usselman (2004) describes the events leading to and following the 1956 consent decree, which meaningfully shaped IBM's business strategy and had a profound impact on the development of the American computing industry:

In breaking apart [the] bonds [that connected IBM's accounting machines and the associated punch cards], government [regulators] hoped to create space for competition involving both price and innovation. By the end of the 1940s, however, this decree had largely failed to accomplish the desired affect [sic]. As worldwide demand for accounting equipment soared during the war and after, IBM revenues reached unprecedented levels. The firm actually gained market share. Not surprisingly, Justice began investigating, and the younger Thomas Watson, walking a fine line between his incensed father and government, entered into negotiations that would stretch across several years before resulting in a consent decree. These negotiations occurred at the very time Tom Watson was devising his strategies for computing, and they unquestionably shaped his choices. Watson understood clearly that Jus-

14. *Id.* at 252-53. (internal citations omitted).

tice would not permit him to acquire expertise in electronics and computing by purchasing concerns such as the pioneering firm of Eckert and Mauchly, who had approached him about a sale. IBM would have to develop its own capabilities in the new technology (Its competitor, Sperry-Rand, was allowed to purchase Eckert and Mauchly).

The subsequent consent decree of January 1956 went even further [than its 1936 predecessor]. Its principal provisions called for IBM to sell as well as lease its products and to allow consumers to purchase parts of their systems from competitors. To facilitate the integration of components from rival suppliers, government required that IBM license its patents and technology. Government hoped . . . these measures [would] break open the closed world of IBM and to facilitate competition by giving upstarts clearer targets upon which to concentrate their efforts. In effect, the Justice Department positioned IBM as a broker or common carrier for component and peripherals manufacturers and for applications programmers, much as the FCC had done with network broadcasters.

To this end, the 1956 consent decree also insisted IBM set up a new entity, the Service Bureau Corporation (SBC). This wholly owned subsidiary would offer data processing services. While utilizing IBM equipment, the service bureau would operate independently from its parent. The consent decree banned SBC from hiring IBM personnel or using the IBM logo. More importantly, it called for open distribution of all operating manuals and other technical materials flowing between IBM and SBC. At a time when virtually no one had imagined the idea of prepackaged software products, the creation of an entity such as SBC constituted a first step toward unbundling hardware and services and creating separate forums of competition for each.¹⁵

[SBC did, indeed, grow to become a very substantial company.] By 1958, it had achieved annual revenue of approximately \$40 million. This amounted to just under 3.0 percent of IBM's total revenue for that year and about 4.5 percent of the revenue IBM generated from its activities in data processing. [Yet] [m]uch of this business likely represented a shift from services previously performed by IBM to the new subsidiary, as the parent reported a drop in the services share of data processing revenue from 5.0 percent in 1955 to 2.8 percent in 1958 to a low of 2.0 percent in 1961. Meanwhile, SBC's share of IBM's data processing revenue held steady at about 3.0 percent into the early 1960s. For 1963, it reported revenue of \$65 million, [whereas] IBM generated more than \$2.8 billion in revenue that year, more than double the figure from 1958, with over \$2.2 billion coming from data pro-

15. Usselman (2004), *supra* note 10, at 100-01 (internal citations omitted).

cessing.

During the mid-1960s, revenue from both SBC and [IBM] services spiked upward, [and] . . . [b]y 1966, revenues at SBC had crept up to \$150 million, or more than 4.6 percent of the IBM total from data processing, while services held steady at roughly 3.5 percent. Together, SBC and services accounted for more than 8 percent of IBM's data processing revenues that year.¹⁶

But SBC's more profound economic impact was how it reshaped the industrial organization of computing. Usselman (2004) continues:

A glance through the annual reports of the parent firm from the late 1950s and early 1960s reveals one overriding theme: A concern with developing new applications for computers. During these years, IBM publicists struggled to find ways to educate stockholders and others about concepts such as "programming" and "software." For several years running, those writing the annual report felt compelled to define these terms. Only by developing such applications tools, they stressed, could IBM open new markets and sustain the remarkable rates of growth in its sales of computer hardware.

This emphasis on programming [directly implicated SBC's quasi-independent role in the marketplace] . . . as an operator of several complex computer hardware installations, [SBC] might conceivably have become a source or at least a testing ground) for [IBM's] new applications programming. Given the requirements in the consent decree that IBM and SBC openly publicize their technical communications, such developments might then have diffused through the industry and spawned considerable competition. Perhaps not surprisingly, however, IBM chose not to give SBC a prominent role in its efforts to develop new applications. Instead, IBM marshaled much of its programming talent toward the new Applied Systems Development Division (ASDD), which it created in 1959. Under the leadership of Jerrier Haddad, who had made his mark in system design, this group would explore complex applications. Each of the two established product divisions and the giant marketing division, meanwhile, would likewise renew their focus on developing new applications software for their customers. [The parent firm also created a new series of Data Centers in the early 1960s.] Offering services such as real-time database processing, these centers seemingly operated in direct competition with SBC, and at least some observers felt they clearly violated the consent decree. The rise of these centers might explain why SBC revenues had

16. *Id.* at 101 (internal citations omitted).

by the early 1970s receded sharply to just over \$60 million annually, or less than 1 percent of the revenue IBM derived each year from data processing.¹⁷

In the 1960s, IBM's responses to these emerging markets only reinforced their independent economic significance. IBM began making heavy investments in training new programmers, developing new applications for its hardware, and creating new markets for computers and computing services. Usselman (2004) describes that the unbundling posed a challenge to IBM, and IBM's vigorous response further fueled the industry's dynamic growth:

[IBM's struggles with having SBC separated from IBM's hardware divisions] point to the difficulties of breaking a firm into separate entities along functional lines. Despite its avowed desire to develop new programming applications, IBM clearly preferred to keep developments in software tightly coupled to those in hardware. Given the state of computer technology at the time, IBM had some compelling technical reasons to keep software and hardware joined in this way. With memory and central processing unit capacity severely limited, systems design still involved significant fundamental trade-offs between hardware and software. Machines still aimed at either the commercial or scientific user. Yet even as IBM strove to collapse such distinctions and to produce general-purpose machines in standard format—a pursuit that resulted in the announcement of the System 360 line of computers in April 1964—it still preferred not to separate hardware so completely from services and programming. For in addition to facilitating technical compromises, the ties between these activities gave IBM enormous flexibility in its business practices. Most importantly, they introduced substantial latitude into its pricing, because sales representatives could as necessary offer customers various amounts of services and programming for no additional charge. Such practices gave IBM an important strategic advantage. (In 1995, new CEO Louis Gerstner would renegotiate the 1956 consent decree with the Justice Department in order to regain absolute freedom for IBM to bundle products and services in any manner it pleased and offer a single comprehensive price.)¹⁸

Yet if IBM proved resistant to decoupling hardware from services (and their close cousin, programming) and capable of turning the government-created service bureau into a neglected stepchild, the experiment at market segmentation of 1956 was not without effect. SBC and other service bureaus, though largely forgotten today, emerged as

17. *Id.* at 101-02 (internal citations omitted).

18. *Id.* at 102-03 (internal citations omitted).

important intermediaries between hardware suppliers and computer users. Some of the service bureaus began to focus upon particular sorts of customers with common data processing needs. Ross Perot, a premiere IBM salesman, left the firm in 1962 to found Electronic Data Services (EDS), which grew into a spectacularly successful enterprise by focusing upon the needs of government contractors. In cultivating such niches, pioneering bureaus sometimes developed software tools that could, with some customizing, be used by many customers. In this way, they helped promote the idea of software as a consumer-oriented packaged product, whose development costs could be spread across a large number of customers.¹⁹

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This critical learning process would, perhaps, have occurred without the consent decree of 1956. But in sending a clear signal to entrepreneurs that they could enter the service business without discrimination from the largest supplier (indeed, they could anticipate that supplier making available important technical information), government almost certainly encouraged the evolution in thinking about the nature of the industry. [Antitrust regulators certainly felt gratification in seeing the industry grow and diversity.] The experience of watching IBM respond to the service bureaus, moreover, helped spur the Justice Department to launch the next round of antitrust action and significantly influenced its thinking about the industry.²⁰

THE ANTITRUST ACTION OF 1969 – UNBUNDLING HARDWARE AND SOFTWARE

Usselman (2004) describes the subsequent battle between IBM and DOJ antitrust enforcers that ultimately gave birth to the American software industry:

The Justice Department again began taking a hard look at the computer industry in January 1967, when it declared its intent to investigate business practices at IBM. Two years later, on the final day of the Johnson administration, Attorney General Ramsey Clark filed an antitrust suit against the firm. The first item of contention in the suit involved the bundling of hardware with software and services. At the urging of chief counsel Burke Marshall, who had joined IBM after a stint as assistant attorney general in which he had responsibility for antitrust, IBM had already announced during 1968 that it would offer separate pricing on services and applications programs. In pressing forward with the suit, government signaled its intent both to make certain IBM followed through on this shift in policy and to seek restitution

19. *Id.* at 103 (internal citations omitted).

20. *Id.* at 104 (internal citations omitted).

for any enduring advantages IBM may have derived from its previous practices. Government would carry this inquiry forward with great persistence. The case stretched over more than a dozen years, until a federal judge with the concurrence of the Reagan Justice Department deemed it without merit in January 1982. In the interim, the Justice Department had lent its support to several private antitrust actions as well, including the suit by Control Data that resulted in the sale of the SBC in 1973.

On their surface, these events point to a straightforward interpretation: Antitrust action, though not resulting in an ultimate victory for government in the courts, prompted IBM to alter its business practices in fundamental ways and in the process created a distinct market for computer software. Though IBM fought this interpretation in the courts, arguing that the decision to unbundle resulted from concerns about costs and other economic factors, this view seems rapidly to be taking hold, both among academics and participants. In his 1993 autobiography, for instance, Tom Watson unequivocally attributed the decision to unbundle to Marshall's advice regarding antitrust. Watts Humphrey, who headed IBM's programming efforts at the time and played an instrumental role on the task force assigned to carry out the new policy, has recently recollected events in much the same fashion. Recent assessments by Martin Campbell-Kelly, Edward Steinmuller, and David Mowery have likewise identified the decision to unbundle as a watershed moment in the history of the software industry and have suggested concerns about antitrust exerted a major influence over IBM as it took this step.

But is the story really quite so straightforward? Does Justice deserve full credit for the shift in policy at IBM? Might the firm, under pressure from competition and trends in technology, have acted independently? And did the decision to unbundle, whatever its roots, really make all that much difference to the software industry? These questions are worth posing, not out of a desire to reject the prevailing interpretation, but rather in an effort to sharpen our thinking about precisely how government intervention altered the competitive structure.

We can gain some insight into these questions by revisiting the situation prevailing in the mid-1960s, when the Justice Department renewed its interest in IBM and the computer industry. One story dominated the industry at that time: System 360. With this new line of computers, IBM had apparently reasserted its dominance over the industry. The value of computer hardware shipped each year by IBM, after increasing steadily from just under half a billion dollars in 1959 to slightly more than \$2 billion [] in 1965, jumped suddenly in 1966 to \$3.4 billion. The following year it exceeded \$4.5 billion. IBM's share of the industry total, which had slipped from around 80 percent in the early

sixties to less than 63 percent in 1965, surged to over 71 percent in 1967. Those gains came at the expense of firms such as Univac, Honeywell, GE, and upstart Control Data, which had once appeared to offer the stiffest challenge to IBM. Another potential rival, RCA, barely held its ground.

At a time when computer hardware still accounted for nearly three-quarters of all revenue in the data processing industry, these figures could hardly have comforted those concerned about fostering competition in computing. In the eyes of at least some observers, moreover, IBM's resurgence had resulted less from the merits of its new line than from the heavy-handed tactics used to market the new machines. IBM had rushed to announce a comprehensive series of machines all at once in large part because of competition from Honeywell and GE. It had then expanded the line to counter high-end machines produced by Control Data and to meet the unanticipated demand for time-sharing. Many of these products reached customers later than promised, and most did not meet projected standards of performance for long after that. Much of the disappointing performance resulted from difficulties with the common operating system, which IBM had promised would enable machines throughout the line to run the same programs. Many of the private lawsuits against IBM, including that of Control Data, hinged upon accusations that the firm had knowingly announced its products prematurely. The government raised these concerns in its suit as well.

When the Justice Department again focused its gaze upon IBM in 1967, then, it was overwhelmingly concerned about competition among manufacturers of computer hardware. It homed in on the issue of bundling not out of a desire to foster an independent software industry, but rather because it believed such bundling gave IBM an unfair advantage in the market for hardware by enabling it to obscure the true price and performance of its hardware products. IBM could shift unbilled services and technical support across its large customer base as needed, in order to cover itself in quarters where it faced the stiffest competitive challenges. The common operating system and programming associated with System 360 facilitated these sorts of tactical responses. It was in this sense, rather than out of an appreciation for network effects and the possibility of operating systems functioning as "tails wagging dogs," that Burke Marshall characterized bundling as a classic "tie." In the opinion of Marshall and IBM's crack team of lawyers, the strongest evidence against IBM consisted of an immense database assembled by Control Data documenting cases in which IBM deployed these sorts of marketing tactics. As part of its settlement with Control Data, IBM took possession of this database and promptly destroyed it, severely hampering the government's case.

The primacy of hardware in the thinking of Justice Department officials becomes clear when we consider the position they took in the mid-1960s regarding the patenting of computer programs. As entrepreneurs in the nascent software industry pressed Congress and the patent office to extend patent protection to programs, the Justice Department initially came down hard against the idea. Following the arguments of many prominent law professors, including the future Supreme Court Justice Stephen Breyer, officials in the Justice Department argued that programs should exist as free goods in the public domain. They sought to curtail attempts to turn a grass-roots endeavor into an organized competition among firms holding broad proprietary rights. (IBM, with no interest in marketing its software independently from hardware and believing free software developed elsewhere encouraged computer sales, concurred heartily with the Justice Department on this point, as did other computer manufacturers. With its decision to unbundle, the firm hastily reversed itself, advocating strong copyright protection and licensing of rights.)

In asking IBM to unbundle and charge separately for services such as programming, then, Justice was almost certainly not looking to create a proprietary software industry. Yet the question remains, did Justice through its antitrust action in fact create such an industry, even if inadvertently?

At least one observer at the time, Walter Bauer of Informatics, offered some strong testimony in the affirmative. At the same 1970 conference at which he castigated the service bureaus for not paying sufficient heed to the importance of applications programming, Bauer predicted that “unbundling or separate pricing will be the biggest factor in the growth of software products.” Interestingly, however, Bauer attributed this significance not so much to the diminished power of IBM under unbundling, but rather to the sanction the firm would provide to the software industry. “One of the processes which will be acting to accelerate the acceptance of purchased software is the fact that IBM with its very large sales organization will be promoting this point of view,” explained Bauer somewhat cynically. “There is now a fifteen-year history in modern data processing which says that the only technical or marketing approach which is acceptable is the way IBM does it. As a buyer or seller, you conform.” Bauer anticipated that IBM “will pursue software products aggressively,” noting that “there is probably a general consensus and major agreement on that point.” Yet he questioned whether it would ultimately prevail, because IBM management was “basically hardware and hardware sales oriented.” Bauer predicted that IBM and other manufacturers would get the jump on the independents in the market for software products during the first half of the 1970s because of their established marketing presence. Independents would

gain the upper hand during the last half of the decade, however, because computer manufacturers “have been so long oriented to the computer as hardware only, and to the provision of ‘tool’ software, that their ability to enter software markets and to provide systems engineering and applications engineering service has weakened over past years, at least relative to market demand or potential.” Putting his finger on what he considered the essence of the matter, Bauer concluded, “Systems work is in direct conflict with the basic objective of marketing hardware.”

While Bauer clearly believed unbundling to be an important development, the overall thrust of his comments casts some doubt upon the idea that the Justice Department spawned the software and software services enterprises. Bauer seems to suggest that these activities would have emerged in the ordinary course of events and that IBM would have responded to the new situation, though not all that effectively, regardless of the constraints placed upon it by government. Is this correct?

One can begin by asking whether IBM would have unbundled even without the pressure of the Justice Department. This was certainly the contention of the firm’s lawyers who fought the antitrust suit. They argued that bundling of software was an artifact of the days when IBM needed to foster applications programming in order to increase the size of the market for hardware. With the market maturing, this need had disappeared, and programming seemed increasingly like a costly drain on resources. This seemed all the more true because programming accounted for a steadily larger share of IBM’s development resources. In the late fifties, according to Phister’s data, the money spent on programming development was a mere 4 percent of that devoted to engineering. By the mid-sixties, this figure had jumped to more than 60 percent. Over that stretch of time, the number of programmers had jumped from less than 100 to over 2500. Tom Watson later recalled his chagrin in discovering that programming for System 360, particularly its critical operating system, appeared not to yield the economies of scale customarily achieved in manufacturing. The man in charge of developing that system later wrote a famous book, *The Mythical Man-Month*, which attempted to explain the reasons. Given these characteristics of software and the increasing proportion of consumer dollars flowing toward it, the lawyers contended, IBM and other manufacturers would simply have to charge for programming if it hoped to recoup its investments.

The incentives to charge for programming grew all the more intense because of two trends in technology pursued by competitors. The first was the creation of emulators, or programs that enabled a machine of one hardware design to run applications programs written for another.

er. In 1963, Honeywell announced an emulator that enabled its new computers to mimic the workhorse IBM 1401, and soon RCA followed with an emulator of its own. By breaking the close ties between programming and particular hardware, emulators accomplished much of what unbundling might accomplish, as Honeywell's choice of the name "Liberator" for its emulator suggests. In the eyes of IBM, emulators allowed firms to get a free ride on its investment in programming. Initially, IBM had planned to introduce System 360 without an emulator. In effect, it hoped to tie users to a new architecture and operating system, and conceivably compel them to develop new applications programs. In the end, however, IBM could not resist the advancing tide and offered software that enabled most System 360 models to operate as if they were a 1401. User surveys suggest that more than half of the time logged by the new machines during the first [two] years was spent in emulator mode.

At about the same time some competitors began offering emulators capable of running a broad array of applications, others introduced machines with a minimum of software tailored for particular niche operations. Firms aiming at the scientific user, such as SDS and DEC, led the way. But over time, other firms showed how these lean machines, unburdened by extensive software, could undercut IBM's more general purpose machines in particular markets.

Taken together, these developments certainly called into question the strategic wisdom of tightly coupling software and hardware. But whether IBM would have responded in the way its lawyers implied, without added pressure from the Justice Department, nevertheless remains open to question. As Bauer understood, IBM remained tied to the idea that software existed to sell hardware. Much of the impetus behind System 360 had been to perpetuate that mode of operations by at once establishing a new basic configuration and spreading the costs of programming across an ever larger group of machines, thus allowing IBM to leverage its volumes more effectively. Ironically, System 360 had also served to create a large base of installed machines capable of running common programs. That base opened unprecedented opportunities for independent software providers to write standard programs (much as the PC would later do on a much more spectacular scale). IBM appears not to have anticipated that development (just as it and other firms would later fail to grasp the profound implications of the PC for software). When IBM did unbundle its software, moreover, it dropped the price of its hardware a mere 3 percent. This figure, though justifiable on certain grounds, certainly fell on the low end of the range anticipated by observers at the time. IBM also made no moves to unbundle the operating system and other control programs. These remained bundled until Amdahl and other manufacturers, capi-

talizing on the antitrust provisions pertaining to licensing, had placed significant numbers of cloned IBM CPU's on the market and IBM perceived an opportunity to reclaim some of its losses in hardware by selling operating software to these Original Equipment Manufacturers—OEMs and their customers. (Pressure from the EU during the early 1970s may also have contributed to the decision to market parts of the operating system separately.)

If it seems unlikely that IBM would have moved aggressively toward unbundling without pressure from the Justice Department, the question still remains whether IBM could have stemmed the trends in technology and retarded the rise of the software industry had it not unbundled. For those frustrated software entrepreneurs of the mid-1960s who complained they could not hope to make a go of it in the industry so long as IBM gave away its software, this question may appear preposterous. Yet there are some grounds, both theoretical and in the historical evidence, to doubt whether bundling really erected such an impenetrable barrier to entry.

The theoretical grounds involve the matter of whether bundling in this case largely served to facilitate some sort of cross-subsidy between hardware and software that could not long persist under the ordinary course of competition. Software entrepreneurs frequently asserted that IBM used the bloated prices of its hardware to subsidize software. Yet in the eyes of the Justice Department and many others, the subsidy seemed if anything to flow the other way with IBM's low programming costs per machine giving it a critical advantage in the competition with hardware providers. The pioneering strategies of firms such as DEC, which hardly came into view at the time Justice launched its inquiry but figured prominently in the decision to drop the case, showed how competitors might root out these cross-subsidies and exploit them. Similarly, pioneering software firms such as ADR and Informatics had by the mid-1960s demonstrated how programs targeted toward input/output control and file management could outperform those developed by IBM, in large part because these pioneers found ways to achieve the same level of performance with less hardware. As Bauer of Informatics understood, firms oriented toward sales of hardware felt little incentive to write such software. Their bundles likely harbored significant inefficiencies.

How prevalent were firms such as ADR and Informatics, which managed to exploit these opportunities and crack the market for software even before IBM's move to unbundle? If we restrict our definition strictly to firms selling or licensing proprietary software, the answer is clearly "not very." Phister's data give no accounting of software sales prior to 1963 and record no significant purchases of software by users for another [four] years after that. They do suggest, though, that be-

tween 1963 and 1967 the purchased software sector grew from \$5 million in annual revenue to \$175 million, or about 3 percent of total revenue in the data processing industry (which, coincidentally or otherwise, was the amount IBM chose to drop its hardware prices with unbundling). Because software at this point was so closely tied to data services, we might get a more accurate read on the situation by considering the services sector as well. Interestingly, the share of industry revenues derived from services between 1963 and 1967 declined by almost precisely 3 percent, from nearly 13 percent to just under 10 percent. The rise of standard packaged software during these years appears possibly to have come at the expense of services (though the absolute amount of revenue from services during these years nearly doubled, from \$265 million to \$560 million).

Did these trends change noticeably after 1968, the year IBM unbundled? Yes, they did, but not in the way one might expect. The share of revenue from software continued to increase at about the same rate for another [two] years, then stabilized from 1969 through 1973 at approximately 4.5 percent (or \$600 million in 1973). The real action occurred in services. After its low of just under 10 percent in 1967, the services sector increased its share to 17.5 percent by 1970. It stayed at that level or slightly above for another half decade, when it rose to just over 20 percent. The share derived from hardware virtually mirrored the trend in services, falling sharply from nearly 74 percent in 1967 to 62 percent in 1970, where it remained until further decline in 1975. It was services, then, not software, that grew rapidly in the immediate wake of unbundling. Software did increase its share in the late 1970s, rising to 7.7 percent in 1978. By then, services accounted for 20.5 percent and hardware 58.4 percent.

The rapid rise of services relative to software takes on added significance, moreover, when we consider that the industry figures include IBM. According to Phister, services actually declined in significance at IBM during the late 1960s and early 1970s. In 1966, IBM earned 3.5 percent of its data processing revenue from services, plus another 5.2 percent from the service bureau. By 1972, services accounted for just 0.7 percent of IBM revenue from data processing, with the service bureau contributing another 1.3 percent in its last year of ownership by IBM. Unfortunately, we have no data on the amount of revenue IBM derived from software during these years. Phister estimates that from 1974 through 1978, however, IBM generated between 10.2 and 12.4 percent of its revenue from services, supplies, and software. (This number corresponds fairly closely to the estimate of Charles Lecht that IBM accounted for roughly 8-10 percent of the total data processing industry pie from these activities in 1976.) Given the paltry level of services [two] years before and the identified share of 1.4 percent for sup-

plies, this would suggest IBM derived something on the order of 7.5 percent or more of its data processing revenue from software during these years. If correct, these estimates suggest that IBM accounted for perhaps three-quarters of total industry revenues generated from purchased software products during the decade after unbundling.

What, then, are we to conclude about the significance of unbundling for the software industry during the first [ten] years of the new practices? The most important effect appears to have been to establish a clearer separation between hardware manufacture and computer services, much as the Justice Department had attempted with its consent decree of 1956. Competitive forces and trends in technology may have pushed the industry in this direction even in the absence of antitrust action. Some prime movers in services, such as Perot's EDS, had emerged during the years immediately prior to the antitrust investigation that began in 1967. One source estimates that by 1965 some forty significant service providers had emerged, and that the industry included as many as 2800 firms all told. In pursuing its case, the Justice Department clearly focused more on the concerns of hardware manufacturers such as Control Data than on those of the software and services sector.

To the extent that services constitute a branch of software, we can say that antitrust may well have hastened the emergence of the software industry during the late 1960s and early 1970s, if perhaps a bit inadvertently. The action by government certainly did nothing to impede the forces propelling the emergence of a separate and vibrant services sector, and Justice may well have hastened the process by causing IBM to withdraw from services. That withdrawal, however, was balanced to some degree by increased marketing by IBM of standard programs. This packaged program sector lagged behind services and the projected estimates of observers such as Bauer, who had anticipated independent software providers would soon overtake IBM in this rapidly expanding field during the late 1970s. That development would eventually come to pass, but only after the emergence of the personal computer during the early 1980s.²¹

POST 1982 – THE ANTITRUST LEGACY AND THE PC REVOLUTION

Usselman (2004) describes the latest chapter that has IBM as a target of antitrust scrutiny—one that ends in giving birth to the PC revolution and, ironically, with IBM as a witness for the government in its antitrust suit against Microsoft:

During the course of the long antitrust proceedings against IBM,

21. *Id.* at 104-11 (internal citations omitted).

which stretched from January 1969 well into 1982, the American computer industry experienced sustained rapid change. Continual refinement of solid-state production technology made available processors of much higher speed and also dramatically increased the memory and storage capacities of computing systems. Increased capacities gave programmers much greater latitude. Instead of devoting the lion's share of their energies to conserving processor time, programmers increasingly could focus their efforts on making computers receive data in different forms, manipulate it in various ways, and present the results in more comprehensible fashion. Data processing continued its metamorphosis into information processing. The modular design of System 360, in combination with new systems applications such as time-sharing, opened huge opportunities for equipment manufacturers to concentrate on building lower-cost versions of common components such as printers and terminals that could be used within IBM systems. The 1956 consent decree had at last begun to bear fruit. Additional competition came from dynamic new firms such as Digital Equipment Company and Wang Industries. Taking advantage of the plummeting cost and shrinking size of components, these start-up companies built "mini-computers" tailored to serve particular types of users.

Meanwhile, miniaturization unleashed an alternative path of innovation that fell entirely outside the IBM paradigm and the realm of institutional users it served. Individual enthusiasts began to patch together one-of-a-kind computers of limited capacity. Infused with a strong anti-institutional ideology and renegade spirit, these hackers brought the vision of a "home computer" into reality. The era of the unshackled amateurs did not last for long, however, as firms such as Apple Computer and IBM soon imposed a degree of order on the PC market. Rather than offer a stripped-down, expandable kit that customers could assemble and refine themselves, Apple sold a standard machine that included its own monitor, disc drive, and keyboard. The company also provided several basic software packages. As Apple's revenues soared from three-quarters of a million dollars in 1977 to just under a billion dollars in 1983, IBM launched a crash program to develop a microcomputer of its own. Its PC, introduced in 1981, immediately captured 26 percent of the market. The impact of the PC went well beyond IBM's own sales, moreover, because the product's modular design and extensive use of licensed components left other manufacturers free to produce clones that accounted for another 50 percent or more of the market. In effect, IBM with the PC repeated its experience with System 360 in mainframe computing, only in fast forward. Drawing on its market presence and its capacity for technical compromise, IBM provided a platform that helped rapidly transform the desktop computer into a standardized mass-produced commodity, then watched as low-cost

competitors undercut it in the marketplace.

By all accounts, the rapid diffusion of the PC has been the most important factor in the growth of the packaged software industry. Though virtually no one anticipated it at the time, the PC revolutionized the industry by providing a mass market of unprecedented proportions for standard software products. Because software is expensive to generate but cheap to reproduce, this mass market fundamentally changed the dynamics of an industry that had always been hampered by severe constraints on productivity. Now, software producers could amortize their development costs across a vast number of machines. Network externalities, particularly the increasing social returns from standardization of basic programs, reinforced the phenomenon.

What role did antitrust play in this stunning development? Certainly, we can find little direct evidence that government anticipated these trends from the start and sought actively to give shape to the industry. It may be, however, that the legacy of the antitrust actions of 1956 and the late 1960s did in fact exert some influence over the course of events. Such an argument hinges largely upon the critical decisions by IBM to license both the operating system on a nonexclusive basis from Microsoft and the chip containing the central processing unit on a similar basis from Intel. Did these decisions, made during the final stages of the long antitrust suit against it, reflect a concern deep within IBM about tying up the industry with closed, proprietary systems? After years of antitrust surveillance, had IBM adjusted its thinking and strategies to the point that it instinctively unbundled?

Perhaps, but more likely, the firm simply failed to anticipate the future. As one executive close to the situation recalled, the thinking of top management was that the PC was a small market, and one cannot make big mistakes in small markets. Watts Humphrey recalls that some within IBM did in fact question the decision to license the operating system, but that in its frustration at not having moved more quickly into the market for small machines, top management suspended its customary vigilance regarding such exposures. Soon enough, moreover, IBM certainly went to considerable efforts to recover from these blunders and to reestablish proprietary control with its own operating system and input/output channels. Of course, by then it had triumphed in the antitrust case and no longer dominated the industry.

If government appears not to have directly stimulated the transformation associated with the PC, it certainly wasted little time in addressing the state of competition in the industry that resulted. For that transformation had by no means eliminated the need for the essential balancing acts that had long characterized the computer industry and its leading firms. Computers remained machines of indeterminate purpose. Indeed, as they grew more commonplace and came into the hands of a

more diverse population, the possibilities of what they might do continued to expand. Within the separate but parallel realms Apple and IBM had created, designers and programmers thus still needed to strike compromises and achieve a balance between standardization and customization.

By the mid-1980s, that ongoing balancing act had come to focus on two fundamental issues—the design and production of the microprocessor, and the basic operating language. With Apple, both were proprietary; in the case of the PC, they were shaped respectively by Intel and Microsoft, the firms IBM had chosen as its original suppliers. In a move that clearly heralded its prominence in hardware production, Intel in the early 1990s began advertising directly to consumers. It gave its processors catchy names and insisted that machines containing its processors carry an “Intel Inside” sticker. Meanwhile, Microsoft had grown more profitable than IBM. As owner of the MS-DOS and Windows operating programs, it supplied the essential gateways through which most users gained access to their PCs.

Like IBM in the early mainframe computer industry, these powerful firms established a degree of uniformity in the essentials of computing without closing off the potential for further development. They continued to introduce new generations of processors and operating systems that placed greater computing power at the hands of individual consumers. Their influence and market power gave suppliers of memory, printers, and monitors confidence to pursue techniques of mass production. Most importantly, software writers could proceed with some assurance that their work would find a broad market and not be rendered obsolete by subsequent changes in basic hardware or in the basic operating system. As a result, the microcomputer industry sustained a vibrant competition to develop new applications, and computers came to perform a much broader array of functions.

And as with IBM before them, these dominant firms attracted virulent criticism. Competitors and some consumers accused them of wielding their market influence unfairly to close off technical alternatives. Vibrant competition first from the Japanese and then from domestic chip manufacturers kept Intel insulated from antitrust prosecution. But critics of Microsoft achieved considerable inroads. Throughout much of the 1990s, they persuaded the Department of Justice and attorneys general of several states to pursue vigorous antitrust action against the software giant. In their most extreme form, these actions would have forced Microsoft to sever all connections with hardware suppliers and banned it from the applications business, in effect leaving the firm to operate as a common carrier for specialized software programs written by others.

A settlement announced in the summer of 1994 stopped short of

either action. As it had in the case of IBM, the Justice Department determined that Microsoft managed to provide a healthy stability without stifling development. When a federal judge overturned the settlement in early 1995, the Justice Department and Microsoft briefly joined in an unlikely alliance that successfully appealed the decision. The erstwhile combatants renewed their hostilities shortly thereafter, however, as Justice Department officials accused Microsoft of violating the 1994 agreement by bundling its operating system with its internet browser and prohibiting suppliers of PCs from displaying icons for rival browsers on the Windows screen. When the first federal judge to hear the case concurred, it appeared Microsoft might be broken apart and the boundaries of the software industry redrawn in the radical fashion its most ardent critics desired. Rulings in the subsequent appeals, together with a change in administration at the Justice Department, produced an outcome considerably less hostile to Microsoft.

These actions against Microsoft bore a striking resemblance to those taken against IBM during the previous half century of American computing. Following long traditions in antitrust, Justice sought to separate the operating system, which now plays the role once held by hardware and logical design, from the applications software, which occupies the position once held by services (and, to a much lesser degree, software). Justice appeared to be on its strongest grounds when showing clear evidence that Microsoft used the tie between the operating system and other parts of the PC complex to exploit concessions from hardware manufacturers (evidence provided most unequivocally by IBM, now the proselytizer of non-proprietary open systems) and to suppress the emergence of independent providers of applications software. Its proposed remedy, though a bit more drastic than those of the 1950s and 1960s, shared with those earlier actions a desire to break the ties and establish clearer separations. Market segmentation, it was hoped, would foster competition and innovation. Microsoft and its defenders (including many economists) responded that such alleged ties cannot make economic sense over the long haul and that trends in technology would undermine any apparent advantages the firm derived from its dominance in operating systems. As before, it was difficult to see how the actions by Justice would in any way retard the forces of economic competition or impede those trends in technology. Though the settlement left the dominant firm largely unaltered and free for the moment to compete without significant restriction in the marketplace, it also left little doubt that government would continue monitoring the boundaries of computing, as it had throughout the history of the indus-

try.²²

CONCLUSION

By any measure, the American computing industry has been a remarkable economic success, and by any measure, IBM has been at the forefront of the industry's extraordinary achievements.²³ Therefore, IBM's history and actions have an oversized role in understanding the history and development of the computer industry, and in turn, the computer industry has a weighted role in shaping America's economic growth for the past century. Although this historical analysis, designed to understand the efficacy of a particular antitrust policy, offers only a limited window into the panoply of applications of that policy, it focuses on an exceedingly important slice. This is far from a generalizable analysis, but it is also far from an insignificant one.

Accordingly, as we explore the consequences of the Justice Department's scrutiny of IBM's bundling strategies, we obtain a meaningful insight into the efficacy of an antitrust policy that polices illegal ties. The contribution that anti-bundling antitrust policies have had on the overall economy—not just on IBM's trajectory—is significant enough for one of the instant authors to credit American competition policy for being one of the ingredients to the remarkable success of the nation's computer industry.

Throughout the history of this remarkable industry, government has through these tools (and, to a degree, through its funding and purchasing as well) sought persistently to shape demand in ways that countered the strong tendencies of network externalities to reinforce first-mover advantages. In particular, government has attempted whenever possible to break the bonds between providers of basic platforms and firms oriented toward tailoring those platforms to meet the varied desires of consumers. Though often obscured by the intense focus on government's role in funding the industry, these policies pertaining to competition have managed to encourage consumer-oriented innovation without sacrificing the social benefits derived from the stability of basic platforms. Working in concert with trends in technology and the forces of competition, they have given shape to the industry and helped foster those qualities that impart such a distinctive vitality to American computing.²⁴

We have no illusion that our account here will be the final word on the wisdom and efficiency of policing ties and prosecuting monopolists for bundling products. Significant work remains in Professor Elhauge's campaign against the single monopoly theory. Nonetheless, an eye to empirics, and specifically history, should be a refreshing addition to the debate, and we hope this account adds some artillery to Professor Elhauge's broader crusade.

22. *Id.* at 111-14 (internal citations omitted).

23. *Id.* at 97.

24. *Id.* at 97-98.