

REVIEW

Are Those Who Ignore History Doomed to Repeat It?

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The Master Switch: The Rise and Fall of Information Empires

Tim Wu. Alfred A. Knopf, 2010. Pp x, 366.

INTRODUCTION

The Internet has become such an integral part of people's daily lives that one can easily forget how young it is. After a two-decade gestation period, during which the network was primarily the plaything of university-based computer scientists, the Internet exploded onto the public's consciousness during the mid-1990s. During this period, the Internet was widely regarded as unlike anything that had ever gone before.¹ Every month seemed to bear witness to a new innovation that made possible new forms of expression and communication. The Internet's potential seemed limitless.²

In recent years, the heady days of the Internet's youth have given way to the more troubled days of its adolescence. Commentators have begun to bemoan the ways in which the Internet may actually be damaging the human condition.³ Other writers are more sanguine

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¹ For a leading statement of Internet exceptionalism, see David R. Johnson and David Post, *Law and Borders—The Rise of Law in Cyberspace*, 48 *Stan L Rev* 1367, 1387–91 (1996). For a somewhat polemical statement of this position, see John Perry Barlow, *A Declaration of the Independence of Cyberspace* (Feb 8, 1996), online at <http://homes.eff.org/~barlow/Declaration-Final.html> (visited Apr 27, 2011).

² See George Gilder, *Telecosm: How Infinite Bandwidth Will Revolutionize Our World* 10–11 (Free Press 2000).

³ See, for example, Nicholas Carr, *The Shallows: What the Internet Is Doing to Our Brains* 190–92 (W.W. Norton 2010); Jaron Lanier, *You Are Not a Gadget: A Manifesto* 20 (Knopf 2010); William Powers, *Hamlet's BlackBerry: A Practical Philosophy for Building a Good Life in*

about the Internet's past but harbor concerns about its future. In particular, these authors warn that corporate actors are threatening to change the Internet's fundamental character in ways that will ultimately harm end users.⁴

Tim Wu has written an important new book in this latter tradition. In *The Master Switch: The Rise and Fall of Information Empires*, Wu scrutinizes the history of four of our nation's leading communications technologies and identifies a disturbing pattern that he calls "the Cycle." New technologies emerge swathed in the spirit of "revolutionary novelty and youthful utopianism" (p 6).⁵ Over time, consumers become dissatisfied with the quality or reliability of the new technology, and incumbents become concerned with the threat that the new technology poses to existing revenue streams (p 10). This in turn opens the door for a great mogul (often with the assistance of the federal government) to take control of the industry and make sure that it runs in an orderly fashion, which ushers in "a golden age in the life of the new technology" (p 10). In the process, the control asserted by this mogul transforms the technology "from a freely accessible channel to one strictly controlled by a single corporation or cartel—from open to closed system"—until some new form of ingenuity starts the Cycle anew (p 6).

The book offers much to admire. Wu builds his narrative around some of the leading figures in the history of technology, an approach that fits well with Wu's natural flair for storytelling. But perhaps the most compelling aspect of the book is the sheer scope of its argument. Attempting to find a single overarching pattern in industries as disparate as telephony, broadcasting, motion pictures, and computers is ambitious. If successful, identifying a single cycle that accurately describes how communications technologies and business practices change over time would give policymakers (and the policy advocates attempting to persuade them) the kind of clear policy inference

the Digital Age 1–4 (HarperCollins 2010); John Freeman, *The Tyranny of E-mail: The Four-Thousand-Year Journey to Your Inbox* 5–6 (Scribner 2009); Lee Siegel, *Against the Machine: Being Human in the Age of the Electronic Mob* 5–6 (Spiegel & Grau 2008); Andrew Keen, *The Cult of the Amateur: How Today's Internet Is Killing Our Culture* 9 (Doubleday 2007); Cass R. Sunstein, *Republic.com 2.0* 11–18 (Princeton 2007).

⁴ See, for example, Lawrence Lessig, *The Future of Ideas: The Fate of the Commons in a Connected World* 40–48 (Random House 2001); Siva Vaidhyanathan, *The Googlization of Everything (and Why We Should Worry)* 11–12 (California 2010); Barbara van Schewick, *Internet Architecture and Innovation* 372 (MIT 2010); Jonathan Zittrain, *The Future of the Internet—and How to Stop It* 178–85 (Yale 2008).

⁵ "Every few decades a new communications technology appears, bright with promise and possibility. It inspires a generation to dream of a better society, new forms of expression, alternative types of journalism" (p 10).

needed to justify the type of categorical intervention that Wu proposes.

But expanding a theory's scope can be a double-edged sword. While breadth of application heightens a theory's analytical power, it simultaneously makes it harder to frame a theory that is consistent with the underlying facts. Devising a theory that accurately describes the considerations driving the evolution of a single industry is difficult enough. Developing a theory that takes into account all of the essential characteristics and idiosyncrasies of multiple industries simultaneously makes the challenge even harder. The more general the theory, the more difficult this problem becomes.

The success of *The Master Switch* thus depends on the extent to which the histories of the industries on which Wu focuses actually fit the pattern he has identified. The first four Parts of this Review take each of Wu's key industries in turn and critically examine the historical instances the book discusses as well as the portions of the historical record that are not mentioned. Part V discusses the broader theoretical literature exploring some of the nuances lost by attempting to draw a single conclusion that spans all four of these industries. We recognize that Wu's book is aimed at a popular rather than a scholarly audience, and we applaud Wu's attempt to identify patterns in the manner in which different technology-oriented industries evolve. Nonetheless, a close examination of the historical episodes that serve as the foundation for Wu's argument suggests that the Cycle Wu has identified represents just one of many possible cycles. A more complex vision of the mechanisms driving these cycles would yield new insights into which policy levers to pull and when.

I. TELEPHONE

Wu traces the telephone industry through what he sees as three distinct turns of the Cycle. Although Wu's arguments invite readers to regard all three as examples of the same phenomenon, closer inspection reveals that each episode reflects a different definition of openness, a different vision of the mechanism by which an industry becomes open or closed, and a more complex picture of how the federal government influences the way technology evolves.

A. The Rise and Fall of Independent Telephony

The first turn of the Cycle began with the rise of Bell's relatively small, regional competitors—to whom Wu refers as “Independents”—

following the expiration of the initial Bell patents in 1894.⁶ Often overlooked, this important era was largely the result of a mistake in business strategy by the Bell System. Patterning itself after the telegraph system, the telephone system focused on establishing long-distance connections between large financial centers and ignored rural areas, smaller metropolitan areas, and even suburban areas around cities.⁷ Under this vision, the telephone was exclusively an instrument of commerce. Early Bell System executives never envisioned the extent to which people would want telephones in their own homes for purely social reasons.⁸

Bell's strategy created a skeletal network that left wide stretches of virgin territory within which the Independents could operate freely. This led to what Wu regards as the first great era of openness in the telephone industry. The low entry costs allowed local telephone companies competing directly with the Bell System to flourish (p 46). In 1907 and 1908, the Independents had captured more than 50 percent of the national market.⁹

Wu regards the Independents as being infused with a different ethos than Bell in that they saw the telephone as cheaper, more

⁶ See Daniel F. Spulber and Christopher S. Yoo, *Mandating Access to Telecom and the Internet: The Hidden Side of Trinko*, 107 Colum L Rev 1822, 1892–96 (2007); Daniel F. Spulber and Christopher S. Yoo, *Toward a Unified Theory of Access to Local Telephone Systems*, 61 Fed Comm L J 43, 63–65 (2008). Wu actually begins his narrative with a prologue reviewing the telephone industry's initial struggle to displace the telegraph industry. According to Wu, Western Union, like the Greek Titan Kronos, attempted to thwart the emergence of potential successors by consuming them (p 25). If so, Western Union's initial imitation of Kronos was very poor: as Wu mentions in passing, Western Union declined an offer to purchase the Bell telephone patents for \$100,000 (p 31). (Ironically, Western Union would later offer 250 times that amount, only to be rebuffed and ultimately absorbed by the Bell System, instead of the other way around.) Western Union's attempt to defend its turf was ultimately frustrated not by the Theodore Vail-type mogul envisioned by Wu's theory but rather by patent litigation and an auspiciously timed assault on Western Union courtesy of financier Jay Gould. Moreover, the fall of Western Union was not followed by the expected generation of dreamers experimenting with ways that the new technology might transform society (pp 6, 10). Instead, it was the displacement of one closed system by another closed system that was itself roundly criticized for its lack of innovation and penchant for control.

⁷ Milton L. Mueller Jr, *Universal Service: Competition, Interconnection, and Monopoly in the Making of the American Telephone System* 39–42, 55, 59 (MIT 1997); David F. Weiman and Richard C. Levin, *Preying for Monopoly? The Case of Southern Bell Telephone Company, 1894–1912*, 102 J Pol Econ 103, 106–07 (1994).

⁸ See Mueller, *Universal Service* at 77–78 (cited in note 7).

⁹ See US Census Bureau, *Historical Statistics of the United States: Colonial Times to 1970* part 2 at 783 (GPO Bicentennial ed 1975) (reporting a total of 3.1 million Independent telephones and 3.0 million Bell telephones in 1907 and a total of 3.3 million Independent telephones and 3.2 million Bell telephones in 1908). See also Robert Bornholz and David S. Evans, *The Early History of Competition in the Telephone Industry*, in David S. Evans, ed, *Breaking Up Bell: Essays on Industrial Organization and Regulation* 7, 13 (North-Holland 1983); Richard Gabel, *The Early Competitive Era in Telephone Communications, 1893–1920*, 34 L & Contemp Probs 340, 344 (1969).

common, less commercial, and more open (pp 46–47). Although associating the Independents with such values fits nicely into his narrative, doing so elides an important distinction within the Independent movement. One part of the movement was composed of cooperatives established by farmers in largely rural areas that reflected the values that Wu suggests.¹⁰ The more established wing of the Independent movement, however, consisted of firms backed by successful merchants, bankers, and business leaders who were much more conservative, less driven by a political and social agenda, and primarily interested in profit.¹¹ This latter group of Independents sought not a world of open interconnection but rather one in which they emerged as the new monopolists.¹² They stridently opposed government regulations mandating interconnection.¹³ Indeed, in most things, their values were not so different from Bell's. In addition, these two groups' attitudes toward the Bell System diverged widely. The more commercially oriented Independents' desire to destroy and replace Bell brooked no compromise.¹⁴ The rural cooperatives, in contrast, were simply interested in bringing service to their areas as quickly and cheaply as possible. As a result, they were much more willing to compromise with Bell and were even willing to enter into direct competition with other Independents.¹⁵

Wu does a service in calling attention to the rural cooperatives, which have long been deemphasized by histories of the Independent telephone industry. It would be a mistake, however, to replace an exclusive focus on one subgroup of Independents with an exclusive focus on the other. Although some would engage in a search for which of these constituencies represented the true Independents, the data suggest that the Independent movement enjoyed its greatest success where both wings offered their political support.¹⁶ Although this more complex perspective does not fit as smoothly with Wu's narrative, it does provide a more nuanced appreciation for the dynamics of innovation and industrial change.

¹⁰ See Robert MacDougall, *The People's Telephone: The Political Culture of Independent Telephony, 1894–1913*, 1 Bus & Econ Hist On-Line 4–5 (2003), online at <http://www.thebhc.org/publications/BEHonline/2003/MacDougall.pdf> (visited Jun 2, 2011).

¹¹ See *id.* at 5–6, 10.

¹² See Gabel, 34 L & Contemp Probs at 354 (cited in note 9) (“The successful competitor strives to become the surviving monopolist.”).

¹³ See Mueller, *Universal Service* at 10, 51, 78–79 (cited in note 7); Bornholz and Evans, *Early History of Competition* at 26–27 (cited in note 9); Gabel, 34 Law & Contemp Probs at 353–54 (cited in note 9).

¹⁴ See Mueller, *Universal Service* at 78–79 (cited in note 7).

¹⁵ See *id.* at 69.

¹⁶ See MacDougall, 1 Bus & Econ Hist On-Line at 5, 8 (cited in note 10).

The bigger question is what caused this burgeoning Independent movement to fade and allowed the industry to collapse back into monopoly. In accordance with a long historical tradition,¹⁷ Wu suggests that the Independents were undone by their inability to create their own long-haul long-distance network (p 53). Historians have begun to question this explanation, however. In sharp contrast to telegraphy, the vast majority of telephone traffic was local.¹⁸ The long-distance traffic that existed tended to travel no more than fifty to one-hundred miles.¹⁹ In such a world, long-haul long-distance was “of little commercial or social importance.”²⁰ Moreover, with respect to short-haul long distance, Bell and the Independents employed the same technology, so neither side had a cost or quality advantage.²¹ What mattered was not the total number of telephone subscribers nationwide or the ability to contact distant money centers, but rather the density of connections within a particular city or at most within a region.²² For example, residents of Muncie, Indiana, who subscribed to Bell could call Chicago, New York, or Boston. Or they could instead subscribe to the Independent, which would allow them to reach neighboring cities located some ten and twenty miles away.²³ The Independents’ regional dominance in the

¹⁷ See John V. Langdale, *The Growth of Long-Distance Telephony in the Bell System: 1876–1907*, 4 J Hist Geo 145, 155 (1978). See also Weiman and Levin, 102 J Pol Econ at 115–17 (cited in note 7).

¹⁸ See MacDougall, 1 Bus & Econ Hist On-Line at 13 & n 46 (cited in note 10) (reporting statements by two Independents that 97 percent and 98 percent of all telephone calls were local).

¹⁹ See Mueller, *Universal Service* at 72–73 & n 50 (cited in note 7) (reporting an AT&T graph showing that 98 percent of all calls from cities and 95 percent of calls from small towns were placed to points located within fifty miles); MacDougall, 1 Bus & Econ Hist On-Line at 13 n 46 (cited in note 10) (reporting a statement by an Independent that 98 percent of all long-distance calls were placed to points within an one-hundred mile radius). See also *Smith v Illinois Bell Telephone Co*, 282 US 133, 147 (1930) (reporting that interstate calls constituted less than 0.5 percent of all telephone traffic); Hearings on S 6 before the Committee on Interstate Commerce, Commission on Communications, 71st Cong, 2d Sess 1565, 1585–86 (1930) (statement of Joseph B. Eastman, Commissioner, Interstate Commerce Commission) (reporting that interstate traffic represented 0.47 percent of all exchange calls and 0.46 percent of total exchange revenue and that if exchange and toll calls were combined, intrastate traffic represented 1.36 percent of all calls and 9.9 percent of revenue); MacDougall, 1 Bus & Econ Hist On-Line at 12–13 (cited in note 10).

²⁰ Mueller, *Universal Service* at 73 (cite in note 7).

²¹ See id at 72.

²² See id at 59, 72; Bornholz and Evans, *Early History of Competition* at 28 (cited in note 9). Were dominance a function of national subscribership, the Independents could have nullified whatever advantage the Bell System may have enjoyed by forming a network of equal size simply by agreeing to interconnect with one another. Roger G. Noll and Bruce M. Owen, *The Anticompetitive Uses of Regulation: United States v. AT&T*, in John E. Kwoka Jr and Lawrence J. White, eds, *The Antitrust Revolution* 290, 292 (Scott, Foresman 1989).

²³ See MacDougall, 1 Bus & Econ Hist On-Line at 11–12 (cited in note 10) (quoting the president of Cleveland’s independent Cuyahoga Telephone Company as saying, “The Cuyahoga has the near long distance points, the Bell [has] the far-off”).

Midwest meant that in those areas they and not Bell enjoyed the strategic benefits of being the incumbent.

Wu offers an alternative explanation, attributing industry reconsolidation to the corporate depredations of AT&T President Theodore Vail, backed by the financial power of J.P. Morgan. These moguls abandoned the Bell System's initial policy of trying to drive the Independents out of business and instead simply merged into a monopoly by offering to buy the Independents out (pp 49–50, 52).²⁴ According to this account, the antitrust authorities offered only token opposition, allowing the modest concessions embodied in the 1913 Kingsbury Commitment to justify permitting the Bell System to keep its recently acquired companies (pp 55–56). Wu regards the Kingsbury Commitment as sanctioning monopoly, with the ultimate coup de grâce coming with the enactment of the Willis-Graham Act²⁵ in 1921 (p 59). Other commentators have similarly criticized the antitrust authorities for interpreting the Kingsbury Commitment to permit the Bell System to continue to acquire Independent telephone companies so long as it sold an equivalent number of lines to an Independent.²⁶ The only silver lining to the Kingsbury Commitment, according to Wu, was Vail's acceptance of common-carriage regulation (p 57), and even that claim appears to be suspect.²⁷

If true, this would represent a pattern somewhat consistent with the Cycle. A close review of the historical record reveals that, contrary to what some scholars suggest, the Bell System had not yet come close to reestablishing a monopoly at the time of the Kingsbury

²⁴ See AT&T, Annual Report 21 (1910) (“Wherever it could be legally done, and done with the acquiescence of the public, opposition companies have been acquired and merged into the Bell System.”).

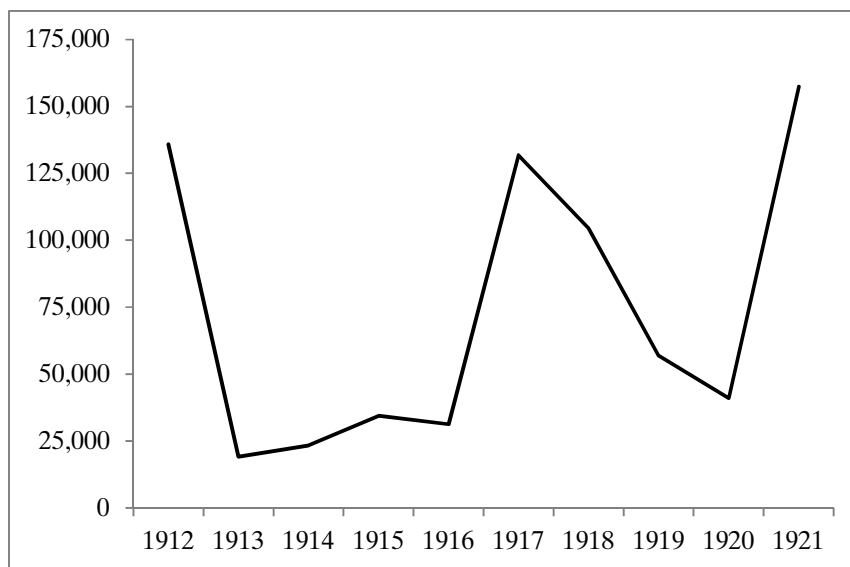
²⁵ 42 Stat 27, repealed by the Telecommunications Act of 1996, Pub L No 104-104 § 601(b)(2), 110 Stat 56, 143.

²⁶ See, for example, Gerald W. Brock, *The Telecommunications Industry* 155–56 (Harvard 1981); Jeffrey E. Cohen, *The Politics of Telecommunications Regulation: The States and the Divestiture of AT&T* 48 (M.E. Sharpe 1992); Mueller, *Universal Service* at 134 (cited in note 7).

²⁷ A general common-carriage obligation would typically involve regulating retail rates and the duty to serve all retail subscribers. The Kingsbury Commitment, however, did not address retail service in any way. Instead of focusing on retail subscribers, the Kingsbury Commitment provided the Independents access to the Bell System's long-distance network. Moreover, the Commitment was not reciprocal: promising to allow the Independent companies' subscribers to contact Bell System subscribers through the Bell long-distance network did not obligate the Bell System to provide its subscribers with access to Independent telephone companies' customers in return. Mueller, *Universal Service* at 132 (cited in note 7). These considerations make it hard to portray the Kingsbury Commitment as the type of mandatory interconnection that represents the core of Wu's policy recommendations. To the extent that common carriage was forthcoming, it was from the newly formed state public-utility commissions who had jurisdiction over local telephone service and not federal antitrust authorities whose purview was limited to interstate commerce. See *id* at 132–35.

Commitment; indeed, Independents still controlled 45 percent of the national market.²⁸ The issue, then, is not the status of the Bell System at the time of the Kingsbury Commitment but rather what happened afterwards. Again, the historical record is more complex than generally known. Although many scholars evaluating the Kingsbury Commitment's efficacy have focused on whether the number of Independent lines acquired from Bell exceeded the number of Bell lines acquired by the Independents,²⁹ a more telling measure might be the Commitment's impact on the absolute number of lines that Bell purchased from the Independents. As shown in Figure 1, the number of total Bell acquisitions plummeted after 1913, suggesting that the Kingsbury Commitment was not as toothless in curbing further Bell takeovers of Independent telephone systems as some would suggest. It was not until 1917 that the pattern of acquisitions would resume, which was when the de facto requirement that the Bell System sell as many lines as it acquired discussed above actually emerged.

FIGURE 1. TELEPHONE LINES ACQUIRED BY THE BELL SYSTEM, 1912–1921



Source: Federal Communications Commission, 3 Report on Control of Telephone Communications: Control of Independent Telephone Companies 42 table v (June 15, 1937).

²⁸ See US Census Bureau, *Historical Statistics* part 2 at 783 table R 1–12 (cited in note 9) (indicating that the Independents still controlled 4.288 million of 9.543 million total telephone lines).

²⁹ See Richard H.K. Vietor, *Contrived Competition: Regulation and Deregulation in America* 172 (Belknap 1994); Gabel, 34 L & Contemp Probs at 353 (cited in note 9).

The true determinant of Bell's reacquisition of its monopoly position was thus not the failure of the Kingsbury Commitment in 1913 but rather a change in the way the Commitment was enforced after 1916. In this regard, the historical account presented in the book misses two key factors: the assent of the Independent telephone industry and the intercession of the federal government.

Consider first the role of the Independent telephone industry. The historical record reveals a dynamic that is much more complex and interesting than the simple hegemony of a corporate giant. The period of aggressive Bell acquisitions between 1907 and 1913 produced a storm of complaints by the Independents, which were received favorably by the antitrust authorities.³⁰ By 1915, however, the nature of competition began to shift as the market neared saturation. Instead of racing for customers that did not yet have service, the Independents had to compete head-to-head for customers already served by Bell. Major portions of the Independent telephone industry had little stomach for such a bruising battle and began searching instead for ways to consolidate with the Bell System.³¹ It was only at this point that the Independents conceived of modifying the Kingsbury Commitment to permit the Bell System to acquire Independent telephone companies so long as it disgorged an equivalent number of lines.³² Thus, between 1913 and 1916, opposition by the Independent telephone industry was enough to thwart Theodore Vail's imperial aspirations. It was only in 1917, after the Independent telephone companies began supporting the endeavor, that reconsolidation was permitted to occur.³³

The other key factor was the federal government. What is often overlooked is that for a brief span running from August 1, 1918, to August 1, 1919, the US government took over the telephone system and placed it under the supervision of Postmaster General Albert Burleson. The story is too long to tell here in detail, and the forces driving the move were complex.³⁴ For now, it suffices to note that one

³⁰ See Kenneth N. Bickers, *The Politics of Regulatory Design: Telecommunications Regulation in Historical and Theoretical Perspective* *113–14, 120–21 (unpublished PhD dissertation, University of Wisconsin–Madison, 1988) (on file at University of Wisconsin–Madison); Gabel, 34 *Law & Contemp Probs* at 352 (cited in note 9).

³¹ See Bickers, *The Politics of Regulatory Design* at *123–24 (cited in note 30). Indeed, the heterogeneity of the Independent telephone companies left them vulnerable to divide-and-conquer strategies. Mueller, *Universal Service* at 112 (cited in note 7); Bornholz and Evans, *Early History of Competition* at 28 (cited in note 9).

³² See Bickers, *The Politics of Regulatory Design* at *125 (cited in note 30).

³³ See *id.* at *126–27.

³⁴ The decision was influenced by the fact that Britain had recently nationalized its telephone system, the US government had recently taken over the railroad system, and Postmaster General Albert Burleson had been a longtime advocate of government ownership of

of Burleson's central commitments was to run the telephone system like the postal system—that is, on a unified basis. The day after taking control, Burleson issued an order making clear that the purpose of government control of the telephone system was “to coordinate and unify these services so that they may be operated as a national system.”³⁵ Six days later, he issued another bulletin noting that “[g]overnmental operation and control of the telephone systems of the country would undoubtedly cause the coordination and consolidation of competing systems wherever possible.”³⁶ To encourage the unification of the service, Burleson indicated that “negotiations . . . already under way for the consolidation of a number of competing telephone systems at the time the Government assumed control . . . should be continued.”³⁷ Where such negotiations had not yet begun, Burleson made clear that he had “no objection to the companies taking up such negotiations.”³⁸

Another bulletin followed eight days later ordering companies “[t]o proceed as expeditiously as possible with the plans heretofore instituted for consolidating and unifying the telephone plants and properties.”³⁹ In areas where such plans were not yet underway, consolidation plans “should be formulated as soon as practicable” wherever consolidation “is manifestly desired by the public” and “can be effected on fair terms and in accordance with law.”⁴⁰ Where two competing operators continued to operate, Burleson ordered them to “cooperate in making extensions and betterments” in order to promote “unification and the elimination of waste.”⁴¹ On the same day, Burleson issued another order creating the Committee on Solicitation of Telephone Systems, consisting of AT&T Vice President Nathan C. Kingsbury and the president of one of the Independents, “for the purpose of making the necessary investigations, conducting negotiations, and arriving at agreements for the unification and consolidation of the various telephone companies operating in the

the telephone system. For a more complete account, see Christopher S. Yoo and Michael Janson, *The Federal Takeover of the U.S. Telephone System During World War I* *Part II (unpublished manuscript, 2011) (on file with authors).

³⁵ US Post Office, *Bulletin No 2: Assuming Possession and Control* (Aug 1, 1918), in *Government Control and Operation of Telegraph, Telephone, and Marine Cable Systems, August 1, 1918 to July 31, 1919* 62, 62 (GPO 1921).

³⁶ US Post Office, *Bulletin No 3: Consolidation of Competing Telephone Systems* (Aug 7, 1918), in *Government Control* 62, 62 (cited in note 35).

³⁷ *Id.* at 63.

³⁸ *Id.*

³⁹ US Post Office, *Bulletin No 4: Extensions and Betterments Curtailed* (Aug 15, 1918), in *Government Control* 63, 63 (cited in note 35).

⁴⁰ *Id.*

⁴¹ *Id.*

same community.”⁴² The report issued after the end of the takeover noted with great pride the postmaster general’s support for “consolidations for the purpose of getting rid of pernicious competition and wasteful operation” and his approval of thirty-four consolidations of competing telephone operations during this period.⁴³

The reconsolidation of the telephone industry was thus as much the product of the accession of the Independent telephone industry and the policies of the federal government as the industrial machinations of Theodore Vail. Indeed, the post office could unify the system far more decisively and quickly than the Bell System ever could. Any attempt to fit this historical episode back into the Cycle by suggesting that the Bell System was the moving force behind the government takeover is belied by the fact that everyone expected that Burleson’s first order of business was to fire Vail and that Vail evaded the sack only by promising to do whatever the postmaster general wanted.⁴⁴

The flowering of the Independent telephone companies and the eventual retrenchment of the industry in the hands of AT&T thus represent an imperfect fit with Wu’s Cycle. Instead of a new technological environment opened by a group of people committed to openness and closed by the actions of a corporate mogul, we find a situation in which both the forces challenging the incumbent and the means through which the incumbent was able to reassert its dominance to be much more complex. Analysis of these complexities promises to yield a richer sense of the interactions between innovation, commercial interests, and government actors obscured by attempts to make this episode conform to some predetermined pattern.

B. The Breakup of AT&T

The event marking the second turn of the Cycle in the telephone industry is the breakup of AT&T (pp 194–95). On a superficial level, splitting the Bell System into a long-distance company (AT&T), seven local telephone companies (Ameritech, Bell Atlantic, BellSouth, NYNEX, Pacific Telesis, SBC, and US West), and an equipment

⁴² US Post Office, *Committee on Consolidation of Telephone Systems* (Aug 15, 1918), in *Government Control* 63, 63–64 (cited in note 33).

⁴³ US Post Office, *Report of the Postmaster General on the Supervision and Operation of the Telegraph, Telephone, and Cable Properties* (Oct 31, 1919), in *Government Control* 5, 10, 11 (cited in note 35).

⁴⁴ See Albert Bigelow Paine, *In One Man’s Life: Being Chapters from the Personal and Business Career of Theodore N. Vail* 318–23 (Harper 1921). See also John Brooks, *Telephone: The First Hundred Years* 152 (Harper & Row 1975).

company (Lucent Technologies) would appear a likely candidate for a return to openness.

On closer inspection, however, the parallels between these episodes become less clear. As an initial matter, the type of openness implicated by the breakup of AT&T is very different from the type of openness at issue during the era of Independent telephony. Openness during that period was the direct result of the emergence of direct competition in local telephone service (p 48). Thus, the type of interconnection at issue was fundamentally horizontal.

The judicial proceedings ordering the breakup of AT&T, in contrast, abandoned all hope of inducing direct competition between multiple local telephone service providers.⁴⁵ Instead, the breakup was designed to promote competition in complementary services, such as long-distance, customer-premises equipment, and data-processing services (the last of which were direct precursors to the modern Internet) (pp 189–91). Providers of these complementary services did not want to replace AT&T's local telephone network and provide services *instead* of AT&T. They wanted to access AT&T's local telephone network so they could provide services *in addition* to those provided by AT&T. In short, they sought to offer complements to the local telephone network, not substitutes. The type of interconnection these firms sought was thus not horizontal but rather vertical. Wu's other work recognizes that horizontal and vertical interconnection

⁴⁵ See *United States v Western Electric Co*, 673 F Supp 525, 537 (DDC 1987) (concluding that under the breakup of AT&T, "[t]he exchange monopoly of the Regional Companies has continued because it is a natural monopoly"), *affd* 894 F2d 1387 (DC Cir 1990); *In the Matter of Implementation of the Local Competition Provisions in the Telecommunications Act of 1996*, Notice of Proposed Rulemaking, 11 FCC Rcd 14171, 14173–74 ¶ 4 (1996) (noting that the Communications Act of 1934, 48 Stat 1064, codified as amended at 47 USC § 151 et seq, was grounded on the notion that local telephony constituted a natural monopoly and that "[t]he Modification of Final Judgment (MFJ) that required AT&T to divest the Bell Operating Companies (BOCs) in 1984 was not so much a repudiation as a reduction in the scope of this paradigm"). For other high-profile acknowledgements that local telephone service remained a natural monopoly, see *Verizon Communications Inc v FCC*, 535 US 467, 475–76 (2002); Stephen Breyer, *Regulation and Its Reform* 291 (Harvard 1982); Alfred E. Kahn, 2 *The Economics of Regulation: Principles and Institutions* 127 (Wiley & Sons 1971).

It is true that the breakup divided the local telephone companies into seven geographically distinct Regional Bell Operating Companies (RBOCs), each providing local telephone service in a different part of the country. But doing so did not create direct competitors: a customer in Chicago could receive service from only one RBOC, Ameritech. Simply put, two firms are not competitors simply because they participate in the same product market. Firms that sell the same product may be limited in the areas that they serve. To be competitors, they must also participate in the same geographic market. Thus, although RBOCs sold the same products, they operated mutually exclusive service areas and thus were not direct competitors. From the standpoint of retail markets, mergers between RBOCs are properly regarded as conglomerate mergers rather than horizontal mergers. Peter W. Huber, Michael K. Kellogg, and John Thorne, *Federal Telecommunications Law* §§ 7.5.2–7.5.3 at 626–32 (Aspen 2d ed 1999).

raise very different concerns,⁴⁶ but he glosses over this key distinction when treating the Independent telephone era and the breakup of AT&T as part of the same Cycle. As a general matter, horizontal practices raise significantly greater economic concern than vertical ones. In addition, horizontal and vertical remedies are targeted toward very different policy outcomes. The former is designed to break up a monopoly. The latter intends to leave the monopoly in place and simply insist that it be shared.

The differences between horizontal and vertical relationships make it difficult to regard the first two historical episodes in the telephone industry as being of a piece. Another difficulty arises from the mechanism through which the market opened. In the case of Independent telephony, the market opened through competitive entry. In the case of the breakup of AT&T, Wu sees the government as the key driver, led by the White House (p 187), backed by the Federal Communications Commission (FCC) (pp 188–91), and finished by the antitrust courts (p 193). Given the Reagan administration's emphasis on deregulation and competitive markets, Wu suggests that the government must have regarded AT&T's efforts to preserve its monopoly as "blasphemy" (p 193).

Again, a broader look at the history yields a story with more interesting twists and turns. The atmosphere surrounding monopoly and deregulation was quite complex. On the one hand, deregulation enjoyed widespread intellectual and political support, perhaps best demonstrated by the deregulation of the airline industry during the Carter administration in 1978 under the leadership of Senator Ted Kennedy and Stephen Breyer, who was then serving as chief counsel to the Senate Judiciary Committee. On the other hand, the decision to proceed with the breakup of AT&T must be viewed side by side with the Reagan administration's other signature antitrust policy decision: the termination of the longstanding case against IBM. The fact that the administration reached different opinions in the IBM case and the AT&T case suggests it was applying a nuanced, context-sensitive vision of competition policy rather than mechanically pursuing an ideology.⁴⁷

Equally interesting is the inconsistency of the government's support for openness. Although the FCC would eventually support liberalizing markets for long-distance services and customer-premises equipment, it initially refused to do so and instead sided with AT&T,

⁴⁶ See Tim Wu, *Why Have a Telecommunications Law? Anti-discrimination Norms in Communications*, 5 *J Telecomm & High Tech L* 15, 36–38 (2006).

⁴⁷ See Richard Schmalensee, *Bill Baxter in the Antitrust Arena: An Economist's Appreciation*, 51 *Stan L Rev* 1317, 1325–27 (1999).

until the courts overturned its decisions and forced it to reverse course.⁴⁸ As discussed below, this episode is more properly regarded as supporting Wu's ambivalence about whether government is part of the problem or part of the solution rather than as an example where the government played a positive role in helping open a technology.⁴⁹

C. The Telecommunications Act of 1996 and the Merger Wave of the 2000s

The final turn of the Cycle in the telephone industry begins with the enactment of the Telecommunications Act of 1996⁵⁰ and ends with SBC's acquisition of AT&T in 2007 (pp 243–44, 252). The dynamics of this episode are particularly complex. Wu's argument is that the telecommunications industry hid behind the ideology of deregulation to push through a statute that effectively insulated it from antitrust scrutiny and then used litigation to render the implementation of that statute a nullity. At the same time, they used mergers to reconstruct the Bell System despite the lack of meaningful competition (pp 242–48).

History has shown the Telecommunications Act of 1996 to be a deeply flawed piece of legislation, although the specific critique offered differs from person to person.⁵¹ The statute's flaws are evident in the fact that the crown jewel was supposed to be the restoration of local telephone companies' ability to offer long-distance service. As it turns out, by 1996 long distance had begun to become so competitive

⁴⁸ See *In the Matter of Hush-A-Phone Corp.*, 20 FCC2d 391, 418–20 (1955), rev'd 238 F2d 266 (DC Cir 1956); *In the Matter of MCI Telecommunications Corp.*, 60 FCC2d 25, 41–44 (1976), rev'd 561 F2d 365 (DC Cir 1977); *In the Matter of Petition of American Telephone and Telegraph Company for a Declaratory Ruling and Expedited Relief*, 67 FCC2d 1455, 1479 (1978), rev'd under the name of *MCI Telecommunications Corp v FCC*, 580 F2d 590, 596–97 (DC Cir 1978).

⁴⁹ See Part V.

⁵⁰ Telecommunications Act of 1996, Pub L No 104-104, 110 Stat 56 (1996), codified at 47 USC § 151 et seq.

⁵¹ See Richard A. Epstein, *Takings, Commons, and Associations: Why the Telecommunications Act of 1996 Misfired*, 22 Yale J Reg 315, 315–16 (2005) (“There is widespread agreement today on all sides of the telecommunications wars that something is deeply flawed with the design or implementation (or both) of the Telecommunications Act of 1996.”). For criticisms that the Act deterred investment, see, for example, Daniel F. Spulber and Christopher S. Yoo, *Networks in Telecommunications: Economics and Law* 274–76 (Cambridge 2009); Robert W. Crandall, Allan T. Ingraham, and Hal J. Singer, *Do Unbundling Policies Discourage CLEC Facilities-Based Investment?*, 4 Topics Econ Analysis & Pol *1–4 (2004), online at <http://www.bepress.com/topics/vol4/iss1/art14> (visited June 8, 2011); Jerry A. Hausman and J. Gregory Sidak, *A Consumer-Welfare Approach to the Mandatory Unbundling of Telecommunications Networks*, 109 Yale L J 417, 457–61 (1999). For criticisms of the Act's theoretical soundness and administrability, see, for example, Spulber and Yoo, *Networks in Telecommunications* at 272–74 (cited in note 51); Mark A. Lemley and Philip J. Weiser, *Should Property or Liability Rules Govern Information?*, 85 Tex L Rev 783, 809–13 (2007); Paul L. Joskow and Roger G. Noll, *The Bell Doctrine: Applications in Telecommunications, Electricity, and Other Network Industries*, 51 Stan L Rev 1249, 1279–84 (1999).

that rates dropped to no more than a few pennies per minute.⁵² In fact, wireless providers do not even charge more for long-distance calls, instead simply treating long-distance minutes the same as local minutes.⁵³ They typically do not allow subscribers to choose their own long-distance provider, and yet given that wireless long distance is essentially free, consumers are left with little room to complain about the lack of choice. Moreover, the extent to which the 1996 Act exempted telephone companies from antitrust scrutiny is easily overstated. Although the disputes over access rates are now largely exempt from regulatory scrutiny, notwithstanding the Act, the mergers that are the focus of Wu's concern still had to pass review by the antitrust authorities and the FCC.⁵⁴

On a more fundamental level, attempts to draw parallels between the structure of the modern telecommunications industry and the industry structure that preceded the breakup of the Bell System are a bit disingenuous. The new AT&T bears little resemblance to the old AT&T. Prior to the breakup, AT&T had essentially a nationwide reach and controlled over 80 percent of the market.⁵⁵ The new AT&T faces a far different reality. As an initial matter, AT&T can only offer local telephone service in roughly half the country. Moreover, it now faces vigorous competition from other telephone providers. The number of wireless telephone subscribers reached over 277 million by the end of 2008, more than double the number of total wireline subscribers.⁵⁶ Moreover, in the first half of 2009, an estimated 21 percent of adults relied exclusively on their wireless phones for voice service.⁵⁷ Approximately 29 million households now rely on Voice over Internet Protocol (VoIP) provided by cable companies and other Internet providers to provide voice services, which represents

⁵² See FCC Industry Analysis & Technology Division, Wireline Competition Bureau, *Reference Book of Rates, Price Indices and Household Expenditures for Telephone Service* table 1.15 (2008), online at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-284934A1.pdf (visited June 8, 2011); *In re Section 63.71 Application of Verizon Long Distance LLC for Authority to Discontinue Domestic Telecommunications Services*, 25 FCC Rcd 8447, 8451 ¶ 51 (2010) (noting the existence of prepaid phone cards charging less than two cents per minute for domestic long distance).

⁵³ See *In the Matter of Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993*, 25 FCC Rcd 11407, 11469 ¶ 87 (2010) (noting that all nationwide service providers and many smaller operators offer national flat-rate pricing plans that include "bucket[s]" of minutes that can be used nationwide without incurring long-distance charges).

⁵⁴ *Verizon Communications v Law Offices of Curtis V. Trinko*, 540 US 398, 406–07 (2004).

⁵⁵ See US Census Bureau, *Statistical Abstract of the United States: 1984* 560 & table 948 (GPO 104th ed 1983).

⁵⁶ See *In the Matter of Implementation of Section 6002(b)*, 25 FCC Rcd at 11505 ¶ 155.

⁵⁷ See *id.* at 11603 ¶¶ 339–40.

nearly 20 percent of the market and is continuing to grow.⁵⁸ In addition, WiFi hotspots and other wireless LAN services have become important bases for voice communications.⁵⁹ In the Internet era, moreover, people communicate in more diverse ways than by making phone calls. Although it was once common to think of data as an application riding on a voice network, voice is now more properly regarded as an application riding over a data network. Indeed, in a world increasingly dominated by text messaging, young mobile phone users typically do not use the voice feature of their phones at all.⁶⁰

The result is that the number of telephone lines provided by incumbents has been in steep decline, dropping from a high of 193 million in December 2000⁶¹ to a low of 122 million as of June 2010.⁶² Indeed, many incumbents are looking for opportunities to exit the telephone business altogether, as demonstrated by Verizon's recent sale of a number of rural telephone systems to Frontier.⁶³ Indeed, concerns about AT&T's supposedly dominant position in telephony seems singularly misplaced when scholars are saying that cable is the new natural monopoly with which other technologies cannot hope to compete.⁶⁴

Most importantly, the mechanism supposedly used to close the industry during this turn of the Cycle is much more elaborate than mere aggrandizement by an industry mogul. The scheme discussed requires a high degree of sophistication, involving the co-option of the legislative process, strategic use of regulation, and the ability to convince antitrust authorities to sanction anticompetitive mergers.

⁵⁸ See Industry Analysis and Technology Division, Wireline Competition Bureau, Federal Communications Commission, *Local Telephone Competition: Status as of June 30, 2010* 2 figure 1 (Mar 2011), online at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-305297A1.pdf (visited June 8, 2011).

⁵⁹ See *In the Matter of Implementation of Section 6002(b)*, 25 FCC Rcd at 11605–10 ¶¶ 343–50 (showing huge growth in use of those resources, including 500 percent growth for AT&T from 2008 to 2009).

⁶⁰ *Id.* at 11431 ¶ 8, 11521 ¶ 176, 11526 ¶ 180 (noting that consumers are increasingly willing to substitute messaging and data services for voice, with teen usage being a major driver of mobile messaging growth).

⁶¹ See Industry Analysis and Technology Division, Wireline Competition Bureau, Federal Communications Commission, *Local Telephone Competition: Status as of June 30, 2002* table 1 (Dec 2002), online at http://www.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/IAD/lcom1202.pdf (visited Apr 28, 2011) (showing a steady decline in lines provided by incumbents).

⁶² See Industry Analysis and Technology Division, Wireline Competition Bureau, Federal Communications Commission, *Local Telephone Competition: Status as of June 30, 2010* at 1 (cited in note 58).

⁶³ See *Applications Filed by Frontier Communications Corp. and Verizon Communications Inc. for Assignment or Transfer of Control*, 25 FCC Rcd 5972, 5973 ¶ 1 (2010).

⁶⁴ See Susan P. Crawford, *The Looming Cable Monopoly*, 29 *Yale L. & Pol. Rev. Inter Alia* 34, 40 (2010), online at http://yalelawandpolicy.org/sites/default/files/YLPRIA29_Crawford.pdf (visited Apr 28, 2011).

Such a theory requires a good deal more analytical structure on how incumbents can use a variety of government processes to close markets than the simple, mogul-driven vision Wu originally proposed. While this scenario is certainly plausible, significantly more analysis is required before it becomes more than just an amorphous concern.

* * *

The examples drawn from the telephone industry are considerably more complex than the simple exposition of the Cycle would lead one to believe. Instead, a closer examination of the historical context reveals rich and multifaceted dynamics surrounding the nature of the parties, the particular vision of openness being pursued, the role of the government, and the specific mechanisms by which an industry transforms from open to closed and back. As is so often the case, real-world examples resist being reduced into simple stories. Although a more detailed exploration of the history of the telephone industry would not fit so easily into the simple narrative Wu advances, it would have yielded greater insight into forces that shape and reshape the way technologically driven industries evolve.

II. RADIO AND TELEVISION

The second major industry that Wu examines is broadcasting. His narrative begins with the early days of radio and the emergence of television and culminates with the advent of cable television. Although each example exhibits some of the features of Wu's Cycle, each deviates from the pattern in important ways that invite further analysis.

A. Radio

Wu's narrative on the history of radio centers on David Sarnoff, the president of the Radio Company of America (RCA) and its wholly owned subsidiary, the National Broadcasting Company (NBC). The first turn of the Cycle occurred when Sarnoff and RCA took the open technology that was early radio (p 39) and subdued it by the mid-1930s (p 84). Faced with the fact that AT&T's long-distance network provided "the only practical means of moving sound around the nation" (p 76), Sarnoff used patent litigation to induce AT&T to abandon radio altogether (pp 79-81). In addition, Sarnoff protected RCA's legacy AM radio business by preventing FM, which first emerged in the 1930s, from becoming an important medium until the 1970s (pp 133, 135).

Told in this way, the story of radio fits Wu's great-man account of a media mogul who crushes the opposition. Yet the account of Sarnoff-as-monopolist works only if one overlooks the fact that NBC faced serious competition throughout its existence. Beginning in the mid-1920s, first Arthur Judson and then William Paley built the Columbia Broadcasting System (CBS) into a serious rival to NBC. In this case, CBS was able to use government pressure to force AT&T to open its long-distance lines to networks other than NBC.⁶⁵ Yet CBS appears only a few times in Wu's narrative, usually in passing as part of a budding duopoly (pp 83, 132, 139). There is no exploration of how CBS managed to survive, let alone thrive. And while CBS makes a brief appearance, the Mutual Broadcasting System (MBS), which represented the other major rival to NBC,⁶⁶ is completely missing. Sarnoff's control over radio was thus far from airtight, which makes this episode an uncomfortable fit with Wu's Cycle.

B. Broadcast Television

Wu's history of the introduction of television in the US also revolves around Sarnoff, and it may provide the best example of the Cycle. But the smoothness of Wu's account, like his history of radio, is achieved by deemphasizing certain aspects of the historical record. Wu begins with a familiar history of the invention of television, focusing on the struggles of three inventors—John Logie Blair, Charles Francis Jenkins, and Philo T. Farnsworth—to bring their devices to market in the 1920s and 1930s (pp 136–37, 139–42, 148–51).

At first, television appeared to be the perfect Schumpeterian disruptive technology, poised to replace radio (p 135). But television took two decades to reach a mass market, a fact that incenses Wu. He holds radio mogul David Sarnoff primarily responsible, framing the story as a clash between naïve inventors and a rapacious capitalist. As the head of RCA, Sarnoff used all of his influence to retard and control the adoption of the new medium. Sarnoff, Wu suggests, did not want to kill radio's new competition. He was experienced enough to see that television was an unstoppable force, possibly even an opportunity (p 139). Rather than futilely trying to eliminate the new medium, Sarnoff did everything that he could to ensure that when television eventually reached the US market, it would do so as an

⁶⁵ See Erik Barnouw, *A History of Broadcasting in the United States: A Tower in Babel* 195 (Oxford 1966).

⁶⁶ See Herman S. Hettinger, *Broadcasting Advertising Trends in 1935*, 1 *National Marketing Review* 301, 311 (1936) (describing MBS as a network "firmly established as a portion of the broadcasting structure" by the end of 1935).

extension of his “empire of the air,” as Lee de Forest called it.⁶⁷ To achieve his victory and control the new medium, Sarnoff publicly disparaged television as an “experimental” technology, and he successfully coaxed the FCC to label it as such (pp 138–46).

Wu inveighs against the FCC’s efforts to block the introduction of television, and he invokes Friedrich Hayek to ask, “How can government possibly have enough information to know when something as unpredictable as a technology is ‘ready?’ ... [S]ome measure of regulation by the government was, of course, to be expected. But even this fact cannot justify a total freeze on commercial television lasting two decades” (p 145). In contrast to his condemnation of the FCC, Wu yearns for the open period of “permissionless innovation” that existed briefly when Herbert Hoover gave out ad hoc radio licenses as the secretary of commerce (p 145).

As alternatives to the US’s lack of action, Wu points to launches of television in Germany and England in the 1930s, and he speculates about the television innovation that might have been had Sarnoff and the FCC not intervened (pp 147–48). Instead of a vibrant television industry in the 1920s, however, America saw Sarnoff reveal RCA’s plans to introduce television at the 1939 World’s Fair in Queens, erasing the decades of inventors and inventions that had come before (pp 151–53). In this particular incarnation of the Cycle, Sarnoff-as-Kronos successfully ate his children and lived on as his own successor (or something like that). Farnsworth had some small revenge when he forced RCA to pay a licensing fee to use his television patent, but by then Sarnoff had effectively taken control (p 153). And even so, Wu acknowledges that television never enjoyed the amateur, noncommercial phase typically associated with his conception of the Cycle (p 154).

This is the neatest and one of the most compelling stories in the book. Indeed, master storytellers Aaron Sorkin and Ken Burns have told this story themselves in other works.⁶⁸ But it is also a story that overlooks some important history in order to paint an emotional picture of personal battles. It also tends to overread current issues back into history. (For example, the phrase “permissionless innovation” that Wu uses to talk about early television actually comes from Vint Cerf, as Wu acknowledges (p 145).) What Wu fails to mention in his reveries about the lost possibilities for TV in the 1930s

⁶⁷ See Lee de Forest, *Father of Radio: The Autobiography of Lee de Forest* 4 (Wilcox & Follett 1950).

⁶⁸ Aaron Sorkin, *The Farnsworth Invention* 96–101 (Samuel French 2010) (dramatizing an imaginary scene in which Sarnoff attempts to hire Farnsworth after being forced to pay him royalties); Ken Burns, *Empire of the Air: The Men Who Made Radio* (PBS Home Video 1991).

is that television had very limited success as a commercial medium in Europe before the Second World War. In Germany, the Nazis feared that television in homes might lead to private mockery of Hitler.⁶⁹ In Britain, only 20,000 television sets were sold before the outbreak of World War II.⁷⁰ It is possible that without opposition from Sarnoff and the FCC, television technology would have found a successful market in the US. But it is also possible that the capital, infrastructure, and cultural acceptance might have lagged, as they did in Europe.

Wu's great-man theory of history erases the complex and fascinating process of innovation and diffusion. Blair, Jenkins, Farnsworth, and Sarnoff are all clearly central figures in the development of television. Innovation, however, requires technology, capital, and culture to come together. Moreover, the television inventors did not come out of nowhere. They built on the many inventors who experimented with cathode ray tubes both privately and under the auspices of large companies like Bell Labs and Western Electric. The economic effects of the Great Depression and World War II are also important elements to the story to which Wu alludes only briefly (pp 146, 147, 154). Stories of great men make for great dramas, but they also require a belief in social vacuums that do not really exist.

C. Cable Television

The history of cable television bears some of the trappings of Wu's usual view of the Cycle. The industry's early days bore witness to advocates driven by idealistic motives, such as Ralph Lee Smith, Fred Friendly, and the Sloan Foundation (pp 176–77, 181–83). In other ways, however, cable industry was quite different. Two figures in particular receive credit for promoting an industry that challenged the big three television networks.

The first is President Richard Nixon, who supported the key regulatory decisions that made cable possible (pp 177, 184–85). Although Wu does not credit him explicitly, Nixon even pioneered the term "separations policy" (p 184) that would become in name and substance the core of Wu's policy recommendation. As Wu notes, Nixon's motives were far from above reproach, given that his desire to promote cable was driven by a desire to retaliate against the broadcast television networks that were causing him so much grief (p 185).

⁶⁹ William Uricchio, *Introduction to the History of German Television, 1935–1944*, 10 *Hist J Film Radio & Television* 115, 115–16 (1990).

⁷⁰ See Asa Briggs, 2 *The History of Broadcasting in the United Kingdom: The Golden Age of Wireless* 583 (Oxford 1961).

Despite this, Nixon remains one of the seminal figures in promoting the cable industry.

The second is Ted Turner, who Wu regards as a mogul cut from the same cloth as Theodore Vail (p 208). Unlike the typical moguls in Wu's Cycle, who use the corporate clout of a dominant incumbent to force industries to close, Turner was an outsider who pushed the industry toward openness. This proves once again how a close analysis of actual facts can reveal dynamics that are far more interesting than simple parables.

* * *

In short, each of these three episodes deviates from Wu's vision of the Cycle in important ways. With respect to radio, Sarnoff's efforts to leverage NBC's market must be viewed in light of the fierce competition it continued to face from CBS and MBS. Wu's account of the stillborn early days of broadcast television does not grapple with the role played by the Depression and World War II, and even then he candidly acknowledges that it did not enjoy the usual initial period of openness typically associated with the Cycle. With respect to cable, primary credit for ushering in a new era of openness in the television industry goes to a US President and the type of mogul usually associated with closedness, although one who began his career as an industry outsider. Unfortunately, the bases for these variations in the patterns and the insights from examining the interactions of a more complex set of forces remain unexplored.

III. MOTION PICTURES

Wu tells four stories about the American film industry. He starts with an account of the fall of the first American film oligopoly, the Motion Picture Patents Company, also known as the Edison Trust. He then turns to the coercive distribution practices of the early Hollywood studios. In the third film chapter, Wu considers the workings and impact of the motion picture "Production Code" that studios adopted in the 1930s to sanitize film content. And in a final chapter on film since the 1960s, Wu examines the methods media conglomerates have developed to manage risk in the uncertain business of making blockbuster movies. These are some of the major turning points in the development of the American film industry, and in Wu's hands, they offer lessons in how centralized control of cultural industries have limited free expression and shaped the marketplace of ideas.

In his study of the American film industry, Wu eschews the economic and industrially focused film scholarship that has flourished since the 1970s.⁷¹ Instead, he relies on the autobiographies of film moguls, and he revives the work of some of the earliest film historians, like experimental filmmaker Lewis Jacobs, Hollywood producer-director Benjamin Hampton, and (surprisingly) the French neo-Fascists Maurice Bardèche and Robert Brasillach. This fuels Wu's great-man perspective on history, and we get a picture of the film industry through the eyes of its once and would-be oligarchs. This approach allows Wu to tell a lively story of intense personalities and representative moments in the history of the American film industry. It also suggests indirectly that the evil that must somehow be checked is individual ambition and not necessarily media consolidation itself.

A. The Edison Trust versus the Independents

In the chapter on the early film industry, Wu recounts the standoff between the Edison Trust and the group of independent companies that challenged it. This is a bit of a divergence from his investigation of other industries, which all start with narratives about the openness that accompanies new inventions. And, indeed, the history of the film industry that preceded the Edison Trust would have been a perfect illustration of the Cycle that Wu posits. Film technology emerged simultaneously in the United States and many countries in Western Europe.⁷² The technologies varied widely, and so did the businesses that grew up to exploit them. Edison developed peep show movie houses, called kinetoscope parlors, for audiences to view short films individually, like they listened to phonographs in Edison's successful phonograph parlors. Other inventors built on the model of vaudeville or magic-lantern slide shows, developing projectors to display films to large audiences. These new devices required content and exhibition spaces, and many small companies arose to make films or set up small nickelodeons. Some of the early film exhibitors like Samuel Goldwyn and Adolf Zukor went on to become important moguls, but many more were pushed out of business by the rise of the

⁷¹ See generally, for example, Robert Sklar, *Movie-Made America: A Cultural History of American Movies* (Vintage 1975) (chronicling the social and economic path of the film industry); Douglas Gomery, *The Coming of Sound to American Cinema: A History of the Transformation of an Industry* (unpublished PhD dissertation, University of Wisconsin–Madison, 1975) (on file with the University of Wisconsin–Madison).

⁷² Sklar, *Movie-Made America* at 5–12 (cited in note 71) (describing creative efforts of inventors from Paris to Palo Alto, as well as the race in the United States, Great Britain, France, and Germany to achieve working motion-picture cameras).

Edison Trust.⁷³ The pre-Trust years are a great example of the openness that Wu sees at the start of new industries and longs to have preserved. It is curious that he does not spend more than a few sentences on it.

The Edison Trust was formed in 1909 when the Edison Manufacturing Company, the Eastman Company, and other leading film equipment manufacturers, producers, distributors, and theater owners pooled their patents and cut licensing deals in an attempt to corner the entire American film market. The Trust succeeded briefly, but their extortive pricing, litigiousness, and failure to innovate led a group of independent film producers and exhibitors to effectuate a successful coup only a few years into the Trust's reign. Trust members put their energy into crushing the competition through aggressive business tactics and lawsuits, with the Trust suing one leader of the Independents, Carl Laemmle, 289 times over a three-year period (p 68). But while the Trust members focused on gaining complete control of the industry, the Independents focused on content. They pioneered the use of film stars, and they standardized feature-length films (pp 61–63). At the time, the film industry was growing to meet the interests of the middle-class audience that was drawn to feature films, a form that better lent itself to the pacing of legitimate theater and novels. They were also drawn to the glamour of stars, especially when they came from the stage, like Sarah Bernhardt (p 62). The Trust members became so invested in their calcifying business model that they missed the importance of these changes. Indeed, they fought against them: Who wanted to pay actors more money once they achieved star status?

As he does throughout the book, Wu points to the cultural implications of the kind of consolidation that the Trust achieved. “In an information industry,” he writes incisively, “the cost of monopoly must not be measured in dollars alone” (p 69). During the brief reign of the Trust, creative innovation among Trust members came to a halt; we know this because innovation continued outside the system, in the sphere of the Independents. Wu characterizes the Trust's tactics as representing “an essential tension between free expression and intellectual property” (p 68). And he explains the inevitable failure of such a tight-fisted choke hold on the market.

While condemning the Trust, Wu celebrates the Independents' flight to the West Coast, and he describes Los Angeles as a den of freedom for “industry outlaws on the lam” (p 68). As even Wu

⁷³ See *id.* at 141 (listing Goldwyn and Zukor among those who “held power over movies”); *id.* at 34–41 (narrating the Edison Trust's early dominance in the film industry).

intimates, this is a romantic notion of the early LA film industry. Film production in LA predates the formation of the Trust, and there were many rational reasons for film companies to relocate from Fort Lee, New Jersey—the first American movie capital—to LA. Perhaps the primary reasons were the weather and terrain. In the years before roughly 1914, when Klieg lights made indoor shooting feasible,⁷⁴ the warm Southern California weather and long days permitted many more hours of shooting a year than the filmmakers could get back east. And the coastline, desert, and mountains near LA have continued to provide great backdrops for stories set in seemingly far-off locales.⁷⁵

Even if the Independents were not the free-spirited pirates Wu paints them to be, they did successfully challenge the Trust. First, they surpassed the Trust aesthetically, and then they supported the government's efforts to break up the cartel in a federal district court in 1915.⁷⁶ The Trust thus lasted only six years, a period of time more consistent with the tumult of an emerging industry than with the innovation- and creativity-killing dynamics associated with the Cycle. Moreover, Wu claims that, following the victory, “[t]he American film industry was, for the first time, an open industry” (p 72). But was it? The Independents hastened the downfall of one oligopoly, the Edison Trust, but, as we will see in the next section, they replaced it with another.

B. The Birth of Hollywood

The closed system controlled by the Edison Trust was followed immediately by another closed system. The Independents of the early 1910s, men (and they were all men) like Adolph Zukor, Carl Laemmle, William Fox, and William W. Hodkinson, quickly emerged as the leaders of film studios like Universal, Paramount, and Twentieth-Century Fox—the studios, that is, that formed the new oligopoly that we have come to call Hollywood. And with some reshuffling, it is that oligopoly that remains in control of the entertainment industry today. Wu's second story of the film industry addresses the swift closing of the newly opened industry. He explains how film mogul Adolph Zukor and some of his underlings at Paramount studios introduced a new centralized distribution system to the recently opened circuit of movie theaters. Where the Trust had relied on exclusive contracts with its theater owners, Zukor used the

⁷⁴ See Peter Baxter, *On the History and Ideology of Film Lighting*, 16 *Screen* 83, 90–91 (1975).

⁷⁵ See Sklar, *Movie-Made America* at 67–69 (cited in note 71).

⁷⁶ See *United States v Motion Picture Patents Co.*, 225 F 800, 807–10 (ED Pa 1915).

power of his star actors and high-profile Broadway adaptations to impose oppressive terms on the exhibitors. Zukor dictated that if the exhibitors wanted a new Mary Pickford film, they would have to buy the entire year's run of Paramount films as a single block. Not only would they have to buy the entire block, but they would have to do it "blind"—that is, sight unseen (pp 86–87, 93–97).

"Was block booking really such a bad thing?" Wu wonders in this chapter (p 95). As a matter of pure economics, Wu concedes the answer may well be no. Many industries have turned to bulk sales to accommodate the scale of large industries, and Wu concedes that the scholarly defenses of the practice offered by Nobel prize-winning Chicago School scholar George Stigler and UCLA antitrust expert Benjamin Klein "might be right" (p 96).⁷⁷ Wu nonetheless argues that two other concerns justify judicial hostility toward block booking. First, by simultaneously adopting block-booking regimes during the 1920s, 1930s, and 1940s, the market leaders effectively kept their competition out of the market. The studios did not explicitly collude, but they did simultaneously work to freeze competitors out through practices that Wu calls "parallel exclusion" (p 97). Second, industries that peddle expression are different. In the sphere of cultural production, the combination of block booking and oligopolistic structure severely limited the range of voices that could get to the movie-going audience, both in the US and abroad, where the Hollywood studios controlled most markets.

Both of these claims are quite contestable. Although some antitrust scholars have long argued that parallel behavior in an oligopolistic industry creates the same harm as collusion,⁷⁸ courts and other antitrust scholars have generally rejected such arguments based on the difficulty of fashioning a remedy that requires a firm to deviate from the rate of output that is individually rational.⁷⁹ Second, as

⁷⁷ See generally George J. Stigler, *United States v. Loew's, Inc.: A Note on Block-Booking*, 1963 Sup Ct Rev 152; Roy W. Kenney and Benjamin Klein, *The Economics of Block Booking*, 26 J L & Econ 497, 538–39 (1983).

⁷⁸ See, for example, Richard Posner, *Oligopoly and the Antitrust Laws: A Suggested Approach*, 21 Stan L Rev 1562, 1562 (1969) (calling for both types of activity to give rise to liability under the Sherman Act); Philip Areeda and Herbert Hovenkamp, 1 *Antitrust Law: An Analysis of Antitrust Principles and Their Application* ¶ 112d at 137–38 (Aspen 3d ed 2006).

⁷⁹ See *Bell Atlantic Corp v Twombly*, 550 US 544, 553–54 (2007); *Brooke Group Ltd v Brown & Williamson Tobacco Corp*, 509 US 209, 227 (1993) ("Tacit collusion, sometimes called oligopolistic price coordination, or conscious parallelism, describes the process, not itself illegal."); Areeda and Hovenkamp, 6 *Antitrust Law: An Analysis of Antitrust Principles and Their Application* ¶ 1433a at 250 (Aspen 3d ed 2006); Donald F. Turner, *The Definition of Agreement under the Sherman Act: Conscious Parallelism and Refusals to Deal*, 75 Harv L Rev 655, 656 (1962) (indicating that oligopoly pricing remained as a contentious issue for antitrust courts);

discussed below, there is a long scholarly tradition showing that bundling content from the same provider can actually cause the quantity and variety of media programming to increase.⁸⁰

The film industry became fully vertically integrated, according to Wu, in 1926, a year he calls “the turning point for American film” (p 97). In that year, Zukor took over the large midwestern theater chain of Balaban and Katz, solidifying his control over more than a thousand US theaters. And the following year, Zukor and the other studio heads successfully fought a Federal Trade Commission investigation into their monopolistic practices. Wu chalks the latter victory up to personal influence; through film industry lobbying, Hollywood moguls convinced President Calvin Coolidge to appoint a sympathetic Abram Myers to head the Commission. Myers proved relatively lenient, although the studios fought even his minor reprimand. And for Wu this is the end of the story. “The rise of Hollywood and the Zukor model,” he writes, “is another definitive closing turn of the Cycle” (p 98).

But we might also see the 1927 clash with the Federal Trade Commission (FTC) as the beginning rather than the end of the Cycle. For the next twenty years, the US government would remain in a continuous negotiation with the Hollywood studios over their vertically integrated structure. The Department of Justice continued an on-again, off-again investigation of Hollywood’s block-booking practices, and the threat of an antitrust action kept the studios in close relationships with the presidential administrations that followed.⁸¹ During the Depression, Franklin Delano Roosevelt declared motion pictures to be an essential industry, allowing them temporarily to defer an antitrust investigation.⁸² Then, during World War II, Hollywood further deferred an antitrust investigation by working for the war effort.⁸³ Only after World War II, in 1948, did the government finally conclude its case against Hollywood, forcing them to divest themselves of the theater chains they had acquired.⁸⁴

C. The Hollywood Production Code

While the centrally controlled studio system created by Zukor and other moguls was good for business, Wu argues, it made

Carl Kaysen and Donald F. Turner, *Antitrust Policy: An Economic and Legal Analysis* 110–19, 266–72 (Harvard 1959).

⁸⁰ See Part V.B.

⁸¹ See Guiana Muscio, *Hollywood’s New Deal* 36–104 (Temple 1997).

⁸² See *id.* at 117–20.

⁸³ See *id.* at 197–99.

⁸⁴ See *United States v Paramount Pictures, Inc.*, 334 US 131, 150–53 (1948).

Hollywood vulnerable in another way: it made the industry more susceptible to content control. When a few individuals held the reins of the entire industry, it made it much easier for religious organizations to exert pressure over the bottleneck of control. “In fact,” Wu speculates, “had Zukor and his cohorts at Warner Bros., Universal, and Fox not wiped out the independent producers, distributors, and theaters, the rule of the Production Code would not even have been possible” (p 119).

In his third chapter on the film industry, titled “The Legion of Decency,” Wu recounts how Hollywood came to implement the Production Code. Wu’s history of the Production Code weaves together an institutional analysis with personal narratives, as he explains how Hollywood came to censor itself during the 1930s. He tells the story of the Catholic Legion of Decency’s threats, led by Father Daniel Lord, to boycott films, and he focuses on the underlying anti-Semitism that drove many of the reformers who sought to impose new standards of decency on Hollywood. Following Thomas Dougherty’s seminal biography of top Production Code administrator Joseph Breen, Wu relates Breen’s personal vendettas against the studio moguls.

These biographical accounts are placed in the context of an industrial analysis. “[I]n the United States,” Wu writes, “it is industrial structure that determines the limits of free speech” (p 121). Congress is prevented from abridging freedom of speech, but industries and individuals may find ways of internally regulating what can be said. And that is exactly what happened when Hollywood succumbed to pressure from religious organizations (among other pressures) and agreed to an internal system of prior restraint. Starting with a 1927 agreement, the “Don’t and Be Carefuls,” studios began to submit story ideas, scripts, and rough cuts of films to the Motion Picture Producers and Distributors Association for review and approval, resulting in what Wu calls “perhaps the strictest abridgement of speech in US history” (p 124).

A few moguls tamed by powerful social reformers is certainly one way of reading the history of the Production Code. But over the last thirty years or so, film industry scholars have come to see it as something else. As early as 1909, the Edison Trust agreed to submit films to a review body called the National Board of Censorship (later the National Board of Review), and all Trust films had to carry the

board's seal of approval.⁸⁵ This system certainly helped appease critics who worried that film was spreading vice and immorality. But the seal also helped to consolidate the Trust's hold on the industry. Not only did they control every stage of production and distribution, they now had control over content as well. And the seal was one more element binding theater owners to the exclusive display of Trust member films.

Similarly, the Production Code was a corporate document. Far from an imposition on the studios, moguls actually had reasons to embrace the code. For one, it helped regularize Hollywood's product. Like stars and genres, the regulations of the code brought some stability to the most volatile aspect of the filmmaking process: storytelling. With the code, the studios instituted a system with explicit storytelling conventions. Both writers and audiences came to understand the rules of Hollywood exposition, and the product became much more reliable. Moreover, the code created a language for talking about sex, crime, and politics. If explicit scenes of passion were limited, for example, filmmakers could still develop a new language of ambiguous symbolic cues (panning to a fireplace or smoking a cigarette) that audiences learned to understand (or ignore if they so chose).⁸⁶ And finally, it is important to note, the Production Code Administration did not always oppose the studios. It also helped them. There may not have been federal censorship of movies, but in 1916, the Supreme Court declared film to be "a business pure and simple,"⁸⁷ denying First Amendment protection and opening the door for state and local censorship. In addition, many countries had national censorship bodies. One function of the Production Code Administration was to ensure that films flowed freely across state and national borders. In the case of the films such as *Little Caesar* and *All Quiet on the Western Front*, for example, the Production Code Administration staff went to state censor boards to make the case for having the films shown despite their depictions of violence.⁸⁸

The Production Code did place limits on the market for ideas, as Wu argues. But these were limits that Hollywood leaders found

⁸⁵ See Richard Maltby, *Censorship and Self-Regulation*, in Geoffrey Nowell-Smith, ed., *The Oxford History of World Cinema* 235, 235–36 (Oxford 1996) (noting that the requirement of approval from the National Board of Censorship served both to censor and standardize the product).

⁸⁶ For studies of the production code that take this approach, see *id.* at 242. See also Stephen Prince, *Classical Film Violence: Designing and Regulating Brutality in Hollywood Cinema, 1930–1968* 252–53 (Rutgers 2003).

⁸⁷ *Mutual Film Corp v Industrial Commission of Ohio*, 236 US 230, 244 (1916), overruled by *Joseph Burstyn, Inc v Wilson*, 343 US 495, 499–502 (1952).

⁸⁸ See Leonard L. Jeff and Jerold L. Simmons, *The Dame in the Kimono: Hollywood, Censorship, and the Production Code from the 1920s to the 1960s* 15 (Grove Weidenfield 1990).

valuable, even desirable. Content regulation did not curb Zukor's business; it helped ensure its stability.

D. Conglomeration and Blockbusters

Even with the Production Code in place, however, filmmaking has always remained a risky business, and in Wu's fourth chapter on the film industry, titled "Mass Production of the Sprit," he addresses Hollywood's transformation from an entertainment industry into part of a series of diversified conglomerates. In search of the changing economic model of the film industry, Wu traces the history of two bombs, Michael Camino's 1980 flop *Heaven's Gate* and the 2007 Steve Carell vehicle *Evan Almighty* (pp 217–18, 236–37). *Heaven's Gate* was the indulgent *Gesamtkunstwerk* that took down a studio, United Artists (p 218). *Evan Almighty* was merely a loss on a Universal Studios balance sheet (p 237). What happened between the two flops? Why did one have dire consequences while the other barely registered? What happened in the intervening twenty-seven years? According to Wu, it is the rise of the multinational, diversified conglomerate.

Starting in the late 1960s, all of the studios either became part of a conglomerate or they grew into multimedia communication companies on their own. Paramount was acquired by Gulf + Western; Disney eventually acquired radio stations, comic book publishers, and a TV network. The effect of this conglomeration, Wu tells us, was to bring an end to "the second open age of film" (p 218). Wu does not explain what he means by the second open age of film, but we can assume that he is referring to the rise of independent and semi-independent companies in the 1960s and 1970s, companies like BBS Productions, which made *Easy Rider* and started the television rock group The Monkees.

As he does in earlier chapters, Wu tells this story through the lens of individuals. In this case he focuses primarily on executive Steve Ross. Ross took a family conglomerate that included parking garages and funeral homes and built a media empire around Warner Bros. Wu might have chosen other corporate titans through which to tell this story; Gulf + Western CEO Charles Bluhdorn, who took over Paramount in 1966, is a candidate who would have yielded a very different picture. Bluhdorn ruled Paramount from a distance, putting his trust in people who knew the industry like Bob Evans and Peter Bart. But Ross is a great example of the kind of business leader that interests Wu. A conglomerate, as Wu colorfully defines it, "is a hydra-headed creature whose operations and advantages have mystified lawyers and economists alike" (p 219). If conglomerates do not make rational sense, much of the motivation for amassing media empires can be attributed, Wu argues, to "purely personal motivations, indeed

vanities” (p 225). Ross, for example, was known for bestowing lavish corporate gifts on his clients and throwing company funds at overindulged pet projects.

The takeover of Hollywood by conglomerates, however, did change the running of the industry. Wu describes Ross as “the first pure businessman” (p 222), as opposed to a theater owner or producer, who hit it big in Hollywood. (We might quibble and suggest that Joseph Kennedy held that title sixty years earlier.)⁸⁹ And as a result, Ross brought a new risk-management system to the industry. Wu lists two new practices in particular. First, under Ross and the conglomerates, Hollywood began to rely much more heavily on making films based on existing products, like successful books or cartoon characters. The film industry used to refer to these films as “presold.” Second, film studios focused more on distribution and less on production. They began to “mine festivals” (pp 232–33) for talent and products, rather than having to take early risks on careers or ideas. By the time Universal made *Evan Almighty*, studio economics had changed. The days of the moguls making films gave way to businessmen offsetting risky endeavors with tested strategies. Through television and DVD sales, even flops like *Evan Almighty* could recover some of their losses.

This example looks very different from Wu’s other explorations of Hollywood history. When writing about the Edison Trust, block booking, and the Production Code, we get a picture of consolidation limiting access to the market. But conglomerates’ takeover of studios also leads to the industry’s absorption of the Independents who challenged it. Companies like BBS were acquired by the studios, as all successful independent production companies have been since. And the practice of acquiring and distributing festival films also introduced more diversity into the market. If anything, in Wu’s account, the introduction of conglomerates opened the system to include more voices rather than pushing them out.

E. It’s the Content, Stupid

The Master Switch does not attempt to offer a complete history of the American film. As he does throughout the book, Wu focuses on a few important nodal moments in the development of the industry in order to distill key lessons for media industries. But Wu’s account of the film business is very different from his account of other industries. Here, technological change does not loom very large. He does not

⁸⁹ Cari Beauchamp, *Joseph P. Kennedy Presents: His Hollywood Years* 33 (Knopf 2009).

focus on how the coming of sound, color, home video, or digital cinema challenged the closed order of the industry. There is no Kronos effect in his history of Hollywood, although that might have been a fascinating investigation. Instead, Wu seems to pick moments when consolidation and content clash. The Independents defeated the Trust by introducing stars and feature films. Block booking pushes competitors out of the market. Consolidation also makes it possible for religious groups to impose prior restraints on the industry through the Production Code. And the conglomerates' takeover of studios leads to safer business practices, like relying on hits that have been proven in other media. If there is a lesson in these chapters, it is, as he tells us in his account of block booking, that content and not just economics must be considered when regulating and evaluating the structure of cultural industries and its impact on diversity. Wu, however, does not give us any clues about how to go about measuring the cultural value of film output.

IV. PERSONAL COMPUTERS AND THE INTERNET

As with the other historical episodes appearing in the book, *The Master Switch's* history of the personal computer industry and the Internet presents a wealth of interesting stories and personal narratives, with the internal conflicts within Apple Computer taking center stage. While the intramural battle between the "Two Steves" is both fascinating and important, this dynamic should not overshadow other aspects and actors that played a key role in shaping the personal computer industry during its early days.

A. Early Kit Computers

In 1962, the *New York Times* published an interview with electronic computing pioneer Dr. John Mauchly, one of the inventors of both the ENIAC (arguably the world's first functional electronic digital computer) and the UNIVAC (the first commercially available computer produced in the United States).⁹⁰ The focus of the interview was a yet-to-be-developed technology that Mauchly referred to alternatively as a "pocket computer" and a "personal computer."⁹¹ Recent advances in miniaturized electronics made the development of such devices "inevitable," Mauchly argued, and the imminent availability of such small, portable, and, above all, affordable computers would bring the power of electronic computing, heretofore

⁹⁰ See *Pocket Computer May Replace Shopping List*, *NY Times* 23 (Nov 3, 1962).

⁹¹ See *id.*

the exclusive province of governments and corporations, into the lives of the ordinary individual. Within a decade or so, Mauchly predicted, “everyone would have his own computer” and would mobilize that computing power for purposes previously unimaginable. For example, a housewife equipped with one of these “pocket computers” could use it not only to maintain her household inventory but also to order goods electronically. “Taking her computer from her handbag,” she could connect it directly to a communications kiosk at her local grocery store. Once the store’s computer network had verified her identify and authorized the charge against her “universal checking account,” everything she needed for the coming week would be determined automatically, packaged, and made immediately available for pickup or delivery.⁹²

Mauchly’s vision of the empowering potential of the “pocket computer” seems to us today remarkably prescient, encompassing elements of both the personal computer and the Internet. But Mauchly was not alone, even in the early 1960s, in imagining the revolutionary potential of a truly personal computer. The very first popular treatment of electronic computers, Edmund Berkeley’s 1948 *Giant Brains; or, Machines That Think*, had described a relatively simple home computer (called “Simon”) that could be built for about \$500, and by 1955 Berkeley was selling via mail his “Geniac Electronic Brain Construction Kit,” which allowed hobbyists to build a series of thirty “electronic brains.”⁹³ Over the course of the 1960s, several companies, including Heathkit, were marketing do-it-yourself home computer kits. Some of these, such as the 1967 CT-650 (the so-called “paperclip computer”) were probably too simplistic to be much use to anyone; others, such as the 1965 Honeywell Model 316 Kitchen Computer, available for purchase from the Neiman Marcus catalog, was perhaps a little too far ahead of its time: although the Model 316 was surprisingly sophisticated (it shipped, fully assembled and functional, with an unheard of 4 kB of RAM), it also cost \$10,600.

By the middle of the 1970s, there were multiple microcomputer systems available for purchase in the United States, including both relatively inexpensive machines such as the Kenbak I (\$750) as well as high-end equipment like the Hewlett-Packard 9380A (\$5,075), which shipped not only with a version of the BASIC programming language but also, for an additional \$5,870, a 2.5 MB hard drive.⁹⁴ By 1975, even

⁹² See *id.*

⁹³ See Edmund Callis Berkeley, *Giant Brains; or, Machines That Think* 22 (Wiley 1949).

⁹⁴ See Mark Richards and John Alderman, *Core Memory: A Visual Survey of Vintage Computers Featuring Machines from the Computer History Museum* 105 (Chronicle 2007); Hewlett-Packard Memory Project, *Company History & Facts, the Seventies*, online at <http://>

the stodgy old IBM Corporation had developed a portable desktop computer, the IBM 5100, which included a screen, a tape drive, and a keyboard—all packaged in a handy suitcase-like carrying case.⁹⁵ That same year witnessed the launch of *Byte* magazine, one of several new publications devoted to the burgeoning microcomputer industry.⁹⁶ For the most part, this was an industry that catered either to existing computer users (in this period, mostly businesses) or amateur enthusiasts. Nevertheless, it is clear that by the early 1970s, at least, that Mauchly's imagined “personal computer” was well on its way to becoming a reality.

B. The Altair 8800, the Apple II, and the Two Steves

The existence of such early examples of commercially available microcomputers challenges conventional narratives about the “invention” of the modern personal computer. Most popular histories of computing are dominated by just two moments of invention: the MITS Altair 8800 (1975) and the Apple II (1977). The Altair 8800 is often represented as the first “real” microcomputer, and the Apple II as the first commercially viable “home computer.”⁹⁷ The mythology surrounding these two machines—and the small but select group of celebrity inventors and entrepreneurs most associated with their development—has so eclipsed all other innovations as to make them effectively invisible.⁹⁸ But while both machines are important (albeit not necessarily for the reasons typically given in the conventional narratives), it is misleading to use them as guides to the overall development of an entire industry.

The Altair 8800 was one of the more successful of the early microcomputer kits (although, as we have seen, by no means the first) and was influential in that it helped establish one of the first standard industry architectures (the S-100 bus). More importantly, it was the machine that first attracted the attention of Harvard sophomore Bill Gates and his boyhood friend Paul Allen.⁹⁹ In what has become one of the best-known and most defining success stories of the modern era, the mere existence of the Altair 8800 so inspired Gates and Allen that

www.hpmemory.org/wb_pages/wall_b_page_08.htm (visited Aug 17, 2011); *Hewlett-Packard HP 9830 Calculator/Computer* (Jan 6, 2010), online at <http://www.hp9830.com/> (visited Aug 17, 2011).

⁹⁵ Frank G. Soltis, *Fortress Rochester: The Inside Story of the IBM iSeries 382* (29th Street Press 2001).

⁹⁶ Paul Freiburger and Michael Swaine, *Fire in the Valley: The Making of the Personal Computer* 213–23 (McGraw-Hill 2d ed 2000).

⁹⁷ Robert X. Cringely, *Accidental Empires: How the Boys of Silicon Valley Make Their Millions, Battle Foreign Competition, and Still Can't Get a Date* 61–62 (HarperBusiness 1996).

⁹⁸ For a typical example, see *id.* at 61–64, 75.

⁹⁹ See *id.* at 52.

the former quit school and the latter his job, and both moved to Albuquerque to found a company called Micro-Soft (as their company was then called). The company's first product was a version of the BASIC computer language written specifically for the Altair.¹⁰⁰ The rest, as they say, is history.

The Apple II, as the name implies, was the second version of a computer developed by another pair of boyhood friends, the legendary Two Steves: Steve Wozniak and Steve Jobs. In 1976 the Two Steves, along with another friend, Ronald Wayne, started a company to sell a microcomputer kit developed by Wozniak.¹⁰¹ Within another year, the company had incorporated, attracted venture capital, and launched the Apple II, a well-designed, consumer friendly microcomputer.¹⁰² Although Apple Computer was actually only one of several firms marketing mass-market microcomputers in this period, it was by far the most visible, and Wozniak and Jobs quickly emerged as the symbol not only of a new kind of company—the high-tech personal computer start-up firm—but also of a new kind of computing culture: hip, empowering, and open (pp 273–74). In the conventional mythology, Jobs provided the countercultural credibility and charisma, “the Woz” the technical expertise.

Wu relies on this mythology to illustrate the shift from openness to control in the personal computer industry. According to his account, it was the Apple II computer, and the Apple II exclusively, that came to define the meaning of the modern personal computer and its subsequent implications for society. As he tells the story, in its early years, Apple Computer was the “original revolutionary, the protocountercultural firm that pioneered personal computing” (p 270). What made Apple different, according to Wu, was Steve Wozniak's commitment to radical openness, to the personal computer as “a benefit to humanity—a tool that would lead to social justice” (p 275). In Wu's interpretation, Wozniak embedded these values into the design of the personal computer, forever establishing openness as the true essence of the spirit of personal computing. Unlike the machines of its competitors, the Apple II was built with an “open architecture,” which meant that users were encouraged to open it up and “tinker with the innards, to soup it up, make it faster, add features, whatever” (p 276). Whereas its competitors were simply building computers, Apple was “the first

¹⁰⁰ See *id.* at 52–55.

¹⁰¹ See Steve Wozniak, *iWoz: Computer Geek to Cult Icon: How I Invented the Personal Computer, Co-Founded Apple, and Had Fun Doing It* 171–74 (W.W. Norton 2006) (noting Wozniak's belief that there was a market to sell developed computer parts to hobbyists that otherwise lack the resources or time to create them on their own).

¹⁰² See Cringely, *Accidental Empires* at 62–63 (cited in note 97).

company to bring open computing, then merely an ideological commitment, to mass production and popular use” (p 270).

But just as an apple brought down the original paradise, so too did this Apple contain the seeds of its own destruction. Where Steve Wozniak was committed to openness, his partner Steve Jobs was obsessed with aesthetic purity. Where Woz’s Apple II was designed to be open and expandable, Jobs’s Macintosh was closed and controlled. Although innovative in certain respects (particularly its incorporation of the graphical user interface and the “mouse” pointing device), the Macintosh was, according to Wu, also “completely retrograde” (p 277). In choosing elegant design over user accessibility, Jobs had “elected the design principles that had governed the Hollywood Studios, Theodore Vail’s AT&T, indeed anyone who had ever dreamed of a perfect system” (p 277). In Wu’s parable of the Two Steves, the essential nature of the personal computer (open, organic, user-friendly) is corrupted by the cold beauty of the closed, impersonal system. As Steve Jobs assumed more and more control of Apple Computer, he would “repudiate, decisively and forever,” Steve Wozniak’s original vision of personal empowerment through technology (p 291). With the introduction of the iPod, iPhone, and iPad, Jobs completed his usurpation of the potential of the personal computer. These devices, according to Wu, constituted the culmination of Jobs’s desire for “perfect control over product and consumer” (p 291). While they might at first appear to be user-friendly, they are in fact designed specifically to be “Hollywood-friendly.” With obvious approval, Wu repeats the dire prediction of Tom Conlon, a columnist at *Popular Science*: “Once we replace the personal computer with a closed-platform device such as the iPad, we replace freedom, choice and the free market with oppression, censorship and monopoly” (p 293). A more perfect encapsulation of Wu’s larger cyclical model of history can hardly be imagined.

The primary source for Wu’s pocket history of the personal computer is Wozniak’s own recent memoir, *iWoz*.¹⁰³ But while personal recollections make for interesting reading, they are rarely reliable historical sources. In order to fit his model to the relevant history, Wu has to be carefully selective. Missing is the long prehistory of the personal computer, from Mauchly’s original coinage through the early microcomputers of the mid-to-late 1960s to the early attempts to commercialize the technology in the 1970s. Almost completely ignored are Apple’s competitors, many of whom had market shares almost as large as Apple’s, even in Apple’s heyday of the late 1970s and early

¹⁰³ See generally Wozniak, *iWoz* (cited in note 101).

1980s. Microsoft and IBM appear only, and curiously, as the spiritual successors to Wozniak's ideal of openness. No mention is made at all of many of the other great contributors to the history of the personal computer, many of whose goals and agendas do not fit neatly into Wu's simplistic open-versus-closed dichotomy. Even the history of Apple itself is curiously truncated: We know (perhaps) what cofounders Steve Jobs and Steve Wozniak believed in what they were doing, but what about Apple president and CEO Michael Scott, or key investors such as the former Intel executive Mike Markkula (who would soon become Apple's second CEO) or venture capitalist Arthur Rock—not to mention the other Apple engineers, marketing executives, sales specialists, and users? To what degree were they willing to compromise openness for usability or simplicity or some other virtue?

How would the historical picture look if we incorporated a richer, more nuanced, more diverse set of perspectives? To begin with, it might be difficult to define who exactly “invented” the personal computer. Was it Berkeley or Mauchly, who both at least imagined its existence? Or the early microcomputer kit manufacturers who built actual, working machinery? Or does the claim to have truly invented a product require that the product possess a certain level of sophistication? These questions matter not so much in terms of establishing priority (like almost every significant technological innovation, the personal computer is the product of many contributors, and so fine-grained distinctions about who was first are seldom productive or interesting) but rather in that they complicate any interpretation of the “essential character” of any given technology. There were amateur enthusiasts, like Steve Wozniak, for whom the personal computer was more a toy with which to tinker than a tool for accomplishing some other activity. But there were also others whose interest was always primarily commercial.¹⁰⁴ Some aspects of the early microcomputer systems were open; others were closed. In fact, it might be argued that it is the unresolved tension between the two that proves most productive for the industry: the technology had to be open enough to encourage peripheral innovation but closed enough to allow for consistency, control, and profitability.

The case of the Altair 8800 is illuminative in this respect. The Altair was not the first, the least expensive, or the most powerful of the microcomputer kits available in the mid-1970s. Like many of these build-it-yourself kits, it was built around the Intel 8080 microprocessor, which was designed for and marketed specifically to microcomputer

¹⁰⁴ See Cringely, *Accidental Empires* at 184 (cited in note 97); Wozniak, *iWoz* at 194–95 (cited in note 101).

manufacturers. From the point of view of these manufacturers, the Intel 8080 was a commodity technology: combined with a set of related control chips (also provided, and heavily marketed, by Intel), almost any company with expertise in electronics could assemble a microcomputer kit.¹⁰⁵ In this sense, the Intel architecture was open. The only unique contribution of MITS, the manufacturer of the Altair, was the S-100 bus, which provided expansion slots into which other peripheral devices could be easily inserted. The S-100 bus became one of the first industry standard architectures, representing yet another degree of openness.¹⁰⁶ This openness was not ideological, but rather practical. In order to put together its kit quickly and inexpensively, MITS had to build in the ability for future upgrades. In its stock configuration, the Altair 8800 could not actually do very much.¹⁰⁷ Getting it to do anything interesting required memory upgrades, peripheral devices such as screens and keyboards, and software applications. The S-100 bus allowed the Altair 8800 to be expandable.¹⁰⁸ The extent to which it also made the Altair architecture “open” was entirely unintentional and, from the point of view of MITS at least, undesirable. Like many innovators who designed architectures which were a little too open, MITS was soon forced out of the market it had helped create by competitors leveraging the widespread availability of peripherals designed for the S-100 bus and software developed for the Intel 8080 microprocessor. The only long-term survivor of the cutthroat competition created by the S-100 clones was the one company who aggressively protected as proprietary its contribution to the otherwise open ecosystem: in a now legendary “open letter” to computer hobbyists, Microsoft cofounder Bill Gates famously decried the deplorable tendency among hobbyists to share their software.¹⁰⁹ While the Altair BASIC language that Microsoft developed was “open” in the sense that it could be used to create and expand the overall system, it was itself closed off to the public.

The ready availability of sophisticated microprocessors like the Intel 8080, Motorola 6800, and MOS Technologies 6502 created the conditions for rapid expansion within the microcomputer industry in the mid-to-late 1970s. That these were the products of large,

¹⁰⁵ See Ross K. Bassett, *To the Digital Age: Research Labs, Start-Up Companies, and the Rise of MOS Technology* 278–79 (Johns Hopkins 2002).

¹⁰⁶ Cringely, *Accidental Empires* at 276 (cited in note 97) (describing the “hundreds” of S-100 circuit cards circulating in the burgeoning computer market compatible with multiple machines).

¹⁰⁷ See *id.* at 53.

¹⁰⁸ See *id.* at 136–37 (describing the bus technology as unprofitable because it was “published and available to any manufacturer who wanted to implement it”).

¹⁰⁹ See Bill Gates, *An Open Letter to Hobbyists* (Feb 3, 1976), online at http://upload.wikimedia.org/wikipedia/commons/1/14/Bill_Gates_Letter_to_Hobbyists.jpg (visited Aug 7, 2011).

traditional, and often defense-oriented firms is generally omitted from the conventional hippy- and hacker-focused origins stories of the personal computer. Within a few years, dozens (if not hundreds) of microcomputer companies had emerged to capitalize on this emerging market. Of these, Apple was arguably the most visible, although Tandy Radio Shack and Commodore International were comparable in terms of both technology and market share.¹¹⁰ It is not at all clear that it was the Apple II that primarily defined for the public what a personal computer was and should be, much less that “openness” was a computer’s most important feature. The Commodore 64, introduced in 1982, remains the best selling computer of all time. More than seventeen million were sold worldwide.¹¹¹ And yet the Commodore 64 was not an open architecture machine.¹¹²

Even the Apple II was only “open” in limited ways. Like the Altair 8800, it was designed with expansion slots to encourage peripheral development.¹¹³ This was a common design strategy for computer manufacturers: the goal was to encourage network effects and to establish your platform as the key element of an overall technology ecosystem. Those elements of the system that Apple wanted and needed to control, such as the Apple system software, it kept proprietary. In 1982, for example, it sued the Franklin Computer Company, which had created an Apple II clone, for copyright infringement.¹¹⁴ It is not clear that Apple was ever open in the sense that Wu and Wozniak imply; it was certainly not open in the modern usage established by the open source software movement.

C. IBM as the Paragon of Openness

In any case, the one computer manufacturer that might plausibly claim to have firmly established the personal computer industry was not Apple, Tandy Radio Shack, or Commodore, but rather the IBM

¹¹⁰ Joanna Stavins, *Estimating Demand Elasticities in a Differentiated Product Industry: The Personal Computer Market* *23 (Federal Reserve Bank of Boston Working Paper Series, July 1995), online at http://www.bos.frb.org/economic/wp/wp1995/wp95_9.pdf (visited Aug 17, 2011) (showing that Radio Shack, Commodore, and Apple were the three largest firms in the personal computer industry in the late 1970s).

¹¹¹ Nick Bilton, *The New Commodore 64, Updated with Its Old Exterior*, NY Times Bits Blog (Apr 6, 2011), online at <http://bits.blogs.nytimes.com/2011/04/06/the-new-commodore-64-updated-with-its-old-exterior/> (visited Aug 17, 2011). See also Richards and Alderman, *Core Memory* at 141 (cited in 94).

¹¹² Daniel Terdiman, *Silicon Valley Celebrates Commodore 64 at 25*, CNET News (Dec 10, 2007), online at http://news.cnet.com/8301-13772_3-9832182-52.html (visited Aug 17, 2011).

¹¹³ See Cringely, *Accidental Empires* at 136 (cited in note 97) (noting that Wozniak created “a scheme for adding special function cards to the Apple II”).

¹¹⁴ *Apple Computer, Inc v Franklin Computer Corp*, 545 F Supp 812 (ED Pa 1982), revd 714 F2d 1240 (3d Cir 1983). See also Wozniak, *iWoz* at 220–21 (cited in note 101).

Corporation. What IBM did for the personal computer industry was to establish a single, industry-wide architecture. Some elements of this architecture were open, others aggressively closed. What is important is not whether it was open or closed but simply that it was standard. And to a certain extent, all standards are closed. They limit certain kinds of innovation and enable others. Within a few years of its introduction, the IBM-Microsoft-Intel architecture killed off almost all of its competitors (pp 278–79). In doing so, it allowed software developers and peripheral manufacturers to focus all their attention on a single dominant ecosystem. The result was an explosion of investment and innovation in the personal computer industry. Within unity, diversity.

Wu acknowledges the role of the IBM-Microsoft-Intel architecture in bringing about a mass-market revolution in personal computing, but his characterization of this architecture as being “open” is inconsistent. It is true that IBM constructed its early personal computers around widely available components, such as the Intel 8086 microprocessor. In fact, this decision helped contribute to IBM’s eventual downfall as a personal computer manufacturer, as other manufacturers could also easily purchase identical equipment.¹¹⁵ But one key element of the IBM system, the Microsoft Disk Operating System (MS DOS), did remain tightly controlled. True, it remained controlled by Microsoft, not IBM, but controlled nonetheless. Microsoft gladly licensed their system to IBM clone manufacturers, which ultimately made IBM irrelevant.¹¹⁶ But there was nothing open about the Microsoft operating system. Once again, we see that elements of the system can be made open while others remain proprietary. These are not primarily ideological positions; they are commercial strategies. It is true that in certain technologies, in specific historical periods, the balance between open and closed can become upset. It is not at all obvious, however, that the history of either the personal computer or the Internet illustrates a clear or inevitable trajectory from open to closed. The reality is much more complicated.

The point of all this is not to quibble over historical details. Such disputes are generally of interest only to specialist historians, industry insiders, and patent lawyers. But when historical case studies are used to develop sweeping arguments about important social issues and policy concerns, it is important that we get the facts straight. There are, astonishingly, almost no rigorous historical treatments of the personal computer industry. The literature is so dominated by the wonderfully compelling life stories of fabulously rich computing celebrities that it

¹¹⁵ See Cringely, *Accidental Empires* at 136–37, 171–81 (cited in note 97).

¹¹⁶ Henry W. Chesbrough and David J. Teece, *Organizing for Innovation: When Is Virtual Virtuous?*, 74 Harv Bus Rev 65, 69–70 (Jan–Feb 1996).

is difficult for more staid, academic histories to compete. More significantly, it is clear from the solid histories that do exist that the true story of the personal computer revolution is exceedingly complicated and involves a wide range of actors, including not just inventors but manufacturers, marketers, developers, users, educators, and content providers as well. There is more to this story than just Steve Jobs and Steve Wozniak.

D. AOL–Time Warner

Of all the stories that Wu recounts, the one that is the hardest to fit into his narrative is the epic failure of the AOL–Time Warner merger, which he candidly terms “A Surprising Wreck” (p 257). At the time, many observers thought of the combination of the largest dial-up Internet service provider (ISP) (which was also the leading provider of proprietary content) with a firm that represented the second-largest cable operator (which was also the largest broadband ISP and the holder of a vast film library) as something akin to the end of history. As it turned out, it was simply the end of approximately \$200 billion in Time Warner shareholder value.

So what derailed this would-be juggernaut combination of content and conduit? Although Wu acknowledges the problems caused by the clash of corporate cultures, he assigns primary responsibility to the irrepressible force of the Internet (pp 260, 265–66, 268). Once end users were freed to serve as their own guides in finding content, the walled garden that AOL tried to preserve did not stand a chance.

Somewhat strangely, Wu takes little comfort from this story, rejecting the exceptionalist position that the Internet is inherently different (pp 5, 14, 317). Indeed, he harbors great concern that some corporate interest will attempt and succeed where AOL failed (pp 7, 14, 285–86, 290, 296, 317–18). And yet, these concerns remain quite amorphous without any clear explanation of why Wu thinks that a later effort might be more successful in altering the Internet’s open architecture than was AOL’s.

Another plausible explanation is that AOL and the entire dial-up ISP model were undone not by openness but rather by the Internet’s shift from narrowband transmission via dial-up modems to broadband transmission. In the narrowband world, in which end users employ telephone connections to dial into modem banks maintained by ISPs, the network serves as a mere passthrough. Indeed, the network is oblivious to whether the connection is carrying a voice call, a fax, or data communications. All of this changed with the deployment of broadband connections, such as Digital Subscriber Line (DSL) and cable modem systems. Because these systems use the same wire to carry two different streams (video combined with data in the case of

cable modem systems and voice combined with data in the case of DSL), both types of providers must maintain equipment in their central facilities to separate the streams as well as a data network within the facility to hold the traffic emerging from the data connection until it can be routed toward its ultimate destination. Thus a broadband network provider no longer serves as a mere passthrough. Instead, it must necessarily perform a number of functions previously provided by ISPs. When that is the case, the incremental cost to establish a direct connection to a backbone access point is trivial, and it makes little sense for the network provider to rely on an ISP for services that a broadband network can provide more cheaply itself.¹¹⁷

AOL was thus undone not by the Internet's architecture but rather by the technological collapse of the interface on which the dial-up ISP business model was based. Interestingly, since Time Warner was the largest broadband network provider at the time, AOL might have been able to survive had it converted itself into the homepage for Time Warner's portal services. Ironically, as Wu notes, it was prevented from displacing the incumbent proprietary portal service (known as Road Runner) by merger conditions imposed by the Federal Trade Commission (p 265).

* * *

In short, framing the computer industry in terms of an intramural dispute within Apple does not fairly capture the relevant history. Not only does it overstate the extent to which the Apple II was in fact open, it also exaggerates the importance of the Apple by ignoring the wide range of other early microcomputers, many of which were far more successful than the Apple II and which reveal a vibrant market-based competition between open and closed strategies. Furthermore, architectural outcomes were driven more by technical considerations (such as occurred with the Altair 8800) or legal restrictions (as was the case with the AOL–Time Warner merger) rather than by a principled precommitment to openness. Only by truncating the account of these events can the history be made to fit the mogul-driven vision of the Cycle that is the central driver of the book.

¹¹⁷ See Christopher S. Yoo, *Would Mandating Network Neutrality Help or Hurt Broadband Competition? A Comment on the End-to-End Debate*, 3 J Telecomm & High Tech L 23, 33–34 (2004).

V. TOWARD A BETTER UNDERSTANDING OF THE FORCES DRIVING THE CYCLE

A more comprehensive account of the histories of the telephone, radio, television, film, and computer industries reveals patterns of interactions between forces that are much more complex than suggested by the more streamlined account presented in *The Master Switch*. Far from being a problem, these variations in the patterns of industry evolution are invitations for further analysis that hold considerable promise for providing a richer understanding of the forces shaping emerging communications technologies.

A. Different Theoretical Conceptions of the Cycle

Wu argues that information industries pass through a life cycle that transitions from open to closed and eventually back to open, with openness and closedness measured largely in terms of vertical integration (pp 130, 147, 305–06, 311). As noted earlier, Wu views the Cycle as being driven by corporate moguls attempting to reassert dominance (p 10).

This argument fits into a long tradition of theories exploring how the degree of vertical integration varies over the course of an industry's life cycle. The best-known theory was offered by Nobel laureate George Stigler. Stigler argued that vertical integration in an industry follows a "U" shape over time, beginning as vertically integrated, transitioning to vertically disintegrated as the industry matures, and then returning once again to vertically integrated as the industry declines. Because young industries often employ new materials and technologies that are typically unavailable on the open market, firms operating in these industries must produce all of their key inputs themselves. As demand for the product becomes better established, production becomes sufficiently large, and risk drops to the point where third parties have strong incentives to begin providing these inputs. When the industry enters its decline phase, the decline in sales volume causes third-party input providers to disappear, and firms operating in this industry must once again provide these inputs for themselves.¹¹⁸ A literature has emerged assessing Stigler's life cycle theory of vertical integration empirically.¹¹⁹

¹¹⁸ George Stigler, *The Division of Labor Is Limited by the Extent of the Market*, 59 J Pol Econ 185, 190 (1951).

¹¹⁹ For empirical studies validating Stigler's theory, see Irvin B. Tucker and Ronald P. Wilder, *Trends in Vertical Integration in the U.S. Manufacturing Sector*, 26 J Indus Econ 81, 92 (1977); David Levy, *Testing Stigler's Interpretation of "The Division of Labor Is Limited by the Extent of the Market,"* 32 J Indus Econ 377, 387 (1984); James M. MacDonald, *Market Exchange*

Many eminent scholars have identified similar patterns in media industries. Ithiel de Sola Pool notes that during the first generation of broadcast radio stations, “broadcasters themselves had to take responsibility for putting on programs.”¹²⁰ Bruce Owen and Gregory Rosston similarly observe that because “[i]ndependent programmers did not come forward in sufficient numbers” to meet cable’s burgeoning demand for programming, cable operators had to self-finance the initial generation of cable programming.¹²¹ Alfred Kahn has expressed similar views.¹²² The history of the cable industry provides a particularly dramatic demonstration of this dynamic.¹²³ In 1990, 50 percent of all cable networks and thirteen of the top fifteen cable networks by viewership (87 percent) were vertically integrated.¹²⁴ By 2009, these numbers had dropped precipitously, with only 6 percent of all cable networks and two of the top

or *Vertical Integration: An Empirical Analysis*, 67 *Rev Econ & Stat* 327, 387 (1985); Harold Demsetz, *Vertical Integration: Theories and Evidence*, in Harold Demsetz, ed, 1 *Ownership, Control, and the Firm: The Organization of Economic Activity* 166, 166–86 (Basil Blackwell 1988).

For empirical studies drawing the contrary conclusion, see J.A. Stuckey, *Vertical Integration and Joint Ventures in the Aluminum Industry* 21–95 (Harvard 1983); Kathryn Rudie Harrigan, *Vertical Integration and Corporate Strategy*, 28 *Acad Mgmt J* 397, 424 (1985); Mike Wright and Steve Thompson, *Vertical Disintegration and the Life-Cycle of Firms and Industries*, 7 *Managerial & Decis Econ* 141, 143 (1986).

¹²⁰ Ithiel de Sola Pool, *Technologies of Freedom* 35 (Belknap 1983). See also Howard A. Shelanski, *The Bending Line between “Broadcast” and Wireless “Carriage,”* 97 *Colum L Rev* 1048, 1054 (1997) (“RCA appeared to have been correct that broadcast licensees would themselves have to develop programming to stimulate a market sufficient to attract sponsors or purchasers of air time—i.e., as Harold Power told J.P. Morgan in 1915, “[t]o get broadcasting started, you have to start broadcasting.”), citing Barnouw, 1 *A History of Broadcasting* at 36 (cited in note 65).

¹²¹ Bruce M. Owen and Gregory L. Rosston, *Local Broadband Access: Primum Non Nocere or Primum Processi? A Property Rights Approach*, in Thomas M. Lenard and Randolph J. May, eds, *Net Neutrality or Net Neutering: Should Broadband Internet Services Be Regulated?* 163, 164–65 (Springer 2006). In so doing, Bruce Owen disclaimed his previous support for treating cable operators as common carriers. See Bruce M. Owen, *Public Policy and Emerging Technology in the Media*, 18 *Pub Pol* 539, 546, 551 (1970).

¹²² Alfred E. Kahn, *A Democratic Voice of Caution on Net Neutrality* 3, Progress Snapshot, Release 2.24 (Oct 2006), online at <http://www.pff.org/issues-pubs/ps/2006/ps2.24voiceofcautiononnetneutrality.pdf> (visited Aug 13, 2011) (abandoning his previous support for treating cable operators as common carriers out of recognition that vertical integration into programming created “public benefits from the especial incentives of the several broadcasters to produce programming of their own”). For Kahn’s earlier advocacy of regulating cable operators as common carriers, see Kahn, 2 *The Economics of Regulation* at 35–43 & n 114 (cited in note 45).

¹²³ For an analysis of the data between 1990 and 2001, see Christopher S. Yoo, *Vertical Integration and Media Regulation in the New Economy*, 19 *Yale J Reg* 171, 231 & table v (2002). For an analysis updating this data through 2009, see Christopher S. Yoo, *Comments of Christopher S. Yoo, Applications of Comcast Corporation, General Electric Company and NBC Universal, Inc, for Consent to Assign Licenses or Transfer Control of Licenses*, 29–30 & figures 10–11 (2010), online at <http://fjallfoss.fcc.gov/ecfs/document/view?id=7020472619> (visited Aug 13, 2011).

¹²⁴ See *Competition, Rate Deregulation and the Commission’s Policies Relating to the Provision of Cable Television Service*, 5 *FCC Rcd* 4962, 5109–14 tables 4–5, 7–8 (1990).

fifteen cable networks by viewership (13 percent) being vertically integrated.¹²⁵ Other examples include the fact that Apple relied on its proprietary software provider Claris to produce the first generation of software for the Macintosh.¹²⁶ Indeed, industries that require the simultaneous development of complementary products often rely on a single, vertically integrated player to get both sides on board.¹²⁷

Interestingly, this vision of the typical industry life cycle follows the opposite pattern as the one Wu proposes. Even more importantly, Stigler's life cycle is driven by different forces. Instead of hegemonic business strategy driven by corporate moguls, Stigler's version is the result of the size of the underlying market.

Clayton Christensen, who Wu cites favorably to support other propositions,¹²⁸ offers a theory of vertical integration that follows a similar pattern but for somewhat different reasons. During an industry's early stages, firms compete by offering greater product functionality. At that time, the interdependency of production functions, the need to stay at the cutting edge of the technological frontier, and the need for unstructured technical dialogue leads them to prefer vertically integrated firm structures.¹²⁹ Eventually, market leaders push the level of product improvement past what customers can utilize, at which point the basis for competition shifts to other factors, such as speed to market and customization. This represents a different type of competition, which favors the more vertically disintegrated structure associated with modularity.¹³⁰ After the benefits provided by these alternative dimensions have been exhausted, competition once again turns to price,

¹²⁵ See Yoo, *Comments of Christopher S. Yoo* at 29 figure 10 (cited in note 123).

¹²⁶ Claris Corporation, *Presenting Claris 1.0*, InfoWorld S8-S9 (Sept 26, 1988) (advertisement).

¹²⁷ See Bernard Caillaud and Bruno Jullien, *Chicken & Egg: Competition among Intermediation Service Providers*, 34 RAND J Econ 309, 310-11, 322-23 (2003); Jean-Charles Rochet and Jean Tirole, *Platform Competition in Two-Sided Markets*, 1 J Eur Econ Assn 990, 990, 1013, 1018 (2003).

¹²⁸ Wu cites Christensen's work for the idea of disruptive innovation, defined in the book as innovations that "threaten[] to displace a product altogether," pointing to the example of the typewriter's replacement by the word processor (p 20). This broad generalization is not quite faithful to Christensen's very specific conception of disruptive technologies, which arise when established firms commit to pushing the technological ceiling above what consumers actually need. This leaves the door open for new entrants offering products that are clearly technologically inferior but are a better fit with what consumers actually need and are willing to pay for. See Clayton M. Christensen, *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail* xv (Harvard Business 1997). To Christensen, then, disruptive innovation is not an attack by a superior technology from above. It is an attack by an inferior technology from below. Id at 165.

¹²⁹ See Clayton M. Christensen, Matt Verlinden, and George Westerman, *Disruption, Disintegration, and the Dissipation of Differentiability*, 11 Indust & Corp Change 955, 962-63 (2002).

¹³⁰ See id at 963-64.

which refocuses firms on the cost minimization made possible by vertical integration.¹³¹ Under Christensen's theory, the mechanism driving the level of vertical integration is the relative pace of product innovation and consumers' ability to absorb those changes, rather than the level of specialization permitted by the size of the market.

Other technology-focused life cycle theories draw very different conclusions.¹³² For example, the "dominant design" theory pioneered by William Abernathy and James Utterback posits that when a new industry first emerges, the uncertainty surrounding which particular configuration of technologies will best serve consumers' needs discourages specialization in production and gives advantages to those who keep their production processes flexible.¹³³ Once the industry coalesces around a dominant design, price competition intensifies, and the market becomes stable enough to provide incentives to investing in more specialized production processes.¹³⁴ Many scholars assumed that the desire for greater control over production processes once a dominant design has emerged would lead to greater vertical integration.¹³⁵ Later scholars recognized that firms could accomplish the same objectives through contracts establishing long-term partnerships with suppliers and distributors instead of through formal vertical integration.¹³⁶ This pattern would continue until a major change in technology, market demand, or government regulation caused the market to undergo "dematurity," at which point the cycle begins once again.¹³⁷ Other scholars have refined the analysis still further, suggesting that the life cycle is more likely to be restarted by innovations that destroy the know-how embodied in the existing technological

¹³¹ See id at 963 n 7.

¹³² For a survey of life cycle theories and their policy implications for the Internet, see Christopher S. Yoo, *Product Life Cycle Theory and the Maturation of the Internet*, 104 Nw U L Rev 641, 666–67 (2010).

¹³³ See James M. Utterback and William J. Abernathy, *A Dynamic Model of Process and Product Innovation*, 3 Omega Intl J Mgmt Sci 639, 643–44 (1975).

¹³⁴ See William J. Abernathy and James M. Utterback, *Patterns of Industrial Innovation*, 80 Tech Rev 47, 41, 44 (June–July 1978).

¹³⁵ See James M. Utterback, *Mastering the Dynamics of Innovation: How Companies Can Seize Opportunities in the Face of Technological Change* 90 (Harvard 1994); James M. Utterback and Fernando F. Suárez, *Innovation, Competition, and Industry Structure*, 22 Rsrch Pol 1, 4 (1993) (observing that Abernathy and Utterback considered vertical integration to be an "inevitable outcome of technological evolution in an industry").

¹³⁶ See Utterback and Suárez, 22 Rsrch Pol at 4, 18 (cited in note 135).

¹³⁷ See William J. Abernathy, Kim B. Clark, and Alan M. Kantrow, *Industrial Renaissance: Producing a Competitive Future for America* 21, 109 (Basic Books 1983); William J. Abernathy and Kim B. Clark, *Innovation: Mapping the Winds of Creative Destruction*, 14 Rsrch Pol 3, 18 (1985); Utterback, *Mastering the Dynamics of Innovation* at 158–65 (cited in note 135).

paradigm¹³⁸ and challenge the linkages between the existing paradigm's core technological concepts.¹³⁹

In contrast to the models advanced by Stigler and Christensen, the overall pattern of vertical integration and renewal associated with dominant design theory is more consonant with the Cycle Wu envisions. Dominant design theory does differ in one important respect, however. The life cycle is driven not by the ambitions of moguls or by corporate strategy but rather by the inexorable force of the underlying technology. As was the case with Stigler's theory, the empirical literature testing dominant design theory is somewhat mixed.¹⁴⁰

Stigler's model also drew criticism from another Nobel laureate, Oliver Williamson, who suggested that vertical integration was more the result of opportunistic behavior and transaction costs than sales growth.¹⁴¹ Consistent with this insight, David Teece developed a theory of industry life cycles that combines transaction cost considerations with dominant design theory. Most innovations are not stand-alone products; instead, they usually must be combined with other inputs in order to become marketable to consumers.¹⁴² During an industry's initial stages, when firms are struggling to identify the optimal product design, control of these other inputs does not play a significant role.¹⁴³ Once the dominant design has emerged, however, the innovator's success turns as much on its bargaining power vis-à-vis the providers of these other inputs as it does on the value provided by its own contributions. If the innovator has to make relationship-specific investments, it will be vulnerable to ex post opportunistic behavior by the providers of these other inputs.¹⁴⁴ The classic solution to this problem is to use long-term contracts to enter into a strategic

¹³⁸ See Michael L. Tushman and Philip Anderson, *Technological Discontinuities and Organizational Environments*, 31 Admin Sci Q 439, 442, 460 (1986).

¹³⁹ See Rebecca M. Henderson and Kim B. Clark, *Architectural Innovation: The Reconfiguration of Existing Product Technologies and the Failure of Established Firms*, 35 Admin Sci Q 9, 13–14 (1990).

¹⁴⁰ See Steven Klepper, *Industry Life Cycles*, 6 Indust & Corp Change 145, 159, 164 (1997) (finding that although the auto industry exhibited greater vertical integration as it matured, six other industries did not follow any consistent pattern of vertical integration). For reviews of the empirical literature on dominant designs, see Johann Peter Murmann and Koen Frenken, *Toward a Systematic Framework for Research on Dominant Designs, Technological Innovations, and Industrial Change*, 35 Rsrch Pol 925, 926–30 (2006); Fernando F. Suarez, *Battles for Technological Dominance: An Integrative Framework*, 33 Rsrch Pol 271, 272–73 (2004).

¹⁴¹ Oliver E. Williamson, *Markets and Hierarchies: Analysis and Antitrust Implications* 16–19 (Free Press 1975).

¹⁴² David J. Teece, *Profiting from Technological Innovation: Implications for Integration, Collaboration, Licensing and Public Policy*, 15 Rsrch Pol 285, 288 (1986).

¹⁴³ See id at 291.

¹⁴⁴ See id at 292.

partnership or, if the costs of external contracting and monitoring exceed the costs of internal governance, to vertically integrate.¹⁴⁵

Thus, transaction-cost theory also supports a pattern of vertical integration similar to the one Wu predicts. As was the case with dominant design theory, however, the dynamic driving this life cycle (minimization of transaction costs) is quite different from the one Wu envisions.

The theoretical literature thus exhibits a wide range of views regarding the forces causing the patterns of vertical integration within an industry to change over time. Indeed, in the historical episodes that Wu describes, key turning points are the result of a variety of factors, including the ambitions of industry moguls, patents, antitrust enforcement, and intellectual movements, many of which do not fit easily into a single conception of the Cycle. Instead, they invite closer analysis of how these episodes fit within the theoretical literature, an exercise that would help shed light on how market demand, technological change, and corporate ambitions can cause industries to shift between open and closed structures. Indeed, these differences provide the variation needed to evaluate the relative merits of the various hypotheses.

B. The Impact of Advertising and Market Structure on Content

Another area that receives little exploration is the role of advertising. Although the book discusses the radio industry's early opposition and later acceptance of advertising as a primary source of revenue (pp 74–77), it does not analyze the structural implications of advertising support or the role of advertisers as rivals for control. For example, radio networks often sold blocks of time to advertisers, who then hired advertising agencies to produce programs for these slots.¹⁴⁶ This in effect forced networks to surrender control over their own schedules to advertisers, a fact that gave sponsors tremendous control over industry behavior. Advertisers thus represented important industry players who often served as important counterweights to Sarnoff.

Reliance on advertising support has several other structural effects.¹⁴⁷ For example, it introduces an intermediary into the relationship between programmers and viewers. As a result, programming is likely to be influenced more by programs' impact on consumers' willingness to buy

¹⁴⁵ See *id.* at 293–94.

¹⁴⁶ See Barnouw, 1 *A History of Broadcasting* at 156–59 (cited in note 65).

¹⁴⁷ See Christopher S. Yoo, *Rethinking the Commitment to Free, Local Television*, 52 *Emory L.J.* 1579, 1677–82 (2003); Christopher S. Yoo, *Architectural Censorship and the FCC*, 78 *S. Cal L. Rev.* 669, 681–85 (2005).

advertised products than by audiences' desire to see particular programming.¹⁴⁸

Furthermore, advertising support limits consumers' ability to signal the intensity of their preferences in much the same way as voting regimes. As an initial matter, advertising revenue provides only an indirect signal of the value that listeners and viewers place on the underlying programs.¹⁴⁹ Moreover, unlike pricing regimes, in which audiences can signal particularly strong preferences by paying more for programming, advertising support gives consumers only one way to signal the intensity of their preferences: viewing versus nonviewing.¹⁵⁰ As a result, advertising responsiveness is generally regarded as understating the value that audiences place on those programs.¹⁵¹ The result is a reduction in the resources invested in program quality. At the same time, reliance on advertising support reduces the diversity of programming by increasing the break-even audience size that programming needs to survive.¹⁵²

These insights undercut the sharp distinction that Wu attempts to draw between these historical episodes' impact on industry economics and their impact on the nature and quality of the content being created (pp 97, 303–05). By affecting the economics, these industry practices directly affect the quality and diversity of content being conveyed. In short, these practices and the quality and quantity of speech are inexorably linked.

Consider block booking, which Wu notes may be economically beneficial (p 96). (This debate remains ongoing, particularly in the modern context of allowing cable subscribers to select channels á la carte.) Beyond the works that Wu cites, there is a long scholarly tradition showing how bundling content from the same provider can promote economic welfare,¹⁵³ either by allowing excess consumer surplus enjoyed by one consumer with respect to one product to fund

¹⁴⁸ See C. Edwin Baker, *Advertising and a Democratic Press* 48, 54–56, 62–66 (Princeton 1994); C. Edwin Baker, *Media, Markets, and Democracy* 24–30 (Cambridge 2002); Cass R. Sunstein, *Democracy and the Problem of Free Speech* 63–65 (Free Press 1993).

¹⁴⁹ See Jora R. Minasian, *Television Pricing and the Theory of Public Goods*, 7 J L & Econ 71, 75 (1964).

¹⁵⁰ See id; Michael Spence and Bruce Owen, *Television Programming, Monopolistic Competition, and Welfare*, 91 Q J Econ 103, 112 & n 12 (1977).

¹⁵¹ See Roger G. Noll, Merton J. Peck, and John J. McGowan, *Economic Aspects of Television Regulation* 23 (Brookings 1973) (estimating that advertising support understates viewer preferences for television programming by a factor of seven). Critics quibble with the magnitude of the estimate but not its core conclusion. See Yoo, 52 Emory L J at 1678 n 336 (cited in note 147).

¹⁵² See Spence and Owen, 91 Q J Econ at 112–13, 122–23 (cited in note 150); Suchan Chae and Daniel Flores, *Broadcasting versus Narrowcasting*, 10 Info Econ & Policy 41, 50–51 (1998).

¹⁵³ See Yoo, 52 Emory L J at 1702–12 (cited in note 147).

any shortfalls in another product¹⁵⁴ or by discouraging a single firm providing many channels from using its additional channels to offer content that simply cannibalizes audiences from offerings already on the air.¹⁵⁵ Wu nonetheless claims that despite these potential economic efficiencies, block booking remains problematic because of its adverse effect on the nature of the content being produced. This argument disregards the fact that improving economic efficiency can also have a positive effect on the quantity, quality, and diversity of programming. Increasing program producers' ability to appropriate surplus makes it easier for new films and programs to cover their costs. This favors special interest programs by enabling them to survive despite the fact that they draw relatively small audiences.¹⁵⁶ This insight draws support from the fact that a diverse range of cable networks, including C-SPAN, Discovery, and a number of networks targeted toward African Americans, all opposed regulatory efforts to unbundle cable television channels.¹⁵⁷

Wu also repeats the often-advanced claim that information industries are more horizontally concentrated than in the 1950s (pp 255–56). This claim ignores the broader literature suggesting that this is not true empirically.¹⁵⁸ Even more importantly, a rich theoretical literature exists showing that the relationship between horizontal concentration and program diversity is ambiguous.¹⁵⁹ Some empirical studies have indicated that increases in horizontal concentration may

¹⁵⁴ For the seminal contribution, see generally William James Adams and Janet L. Yellen, *Commodity Bundling and the Burden of Monopoly*, 90 Q J Econ 475 (1976). For other leading contributions, see Mark Armstrong, *Price Discrimination by a Many-Product Firm*, 66 Rev Econ Stud 151, 152 (1999); Yannis Bakos and Erik Brynjolfsson, *Bundling Information Goods: Pricing, Profits, and Efficiency*, 45 Mgmt Sci 1613, 1614, 1616, 1619 (1999); Michael A. Salinger, *A Graphical Analysis of Bundling*, 68 J Bus 85, 86, 92–93 (1995); R. Preston McAfee, John McMillan, and Michael D. Whinston, *Multiproduct Monopoly, Commodity Bundling, and Correlation of Values*, 104 Q J Econ 371, 372, 377–80 (1989); Richard Schmalensee, *Gaussian Demand and Commodity Pricing*, 57 J Bus S211, S228 (1984).

¹⁵⁵ For the seminal contribution, see Peter O. Steiner, *Program Patterns and Preferences and the Workability of Competition in Radio Broadcasting*, 66 Q J Econ 194, 200 (1952). For other important contributions, see Jack H. Beebe, *Institutional Structure and Program Choices in Television Markets*, 91 Q J Econ 15, 26–33 (1977); Steven T. Berry and Joel Waldfoegel, *Free Entry and Social Inefficiency in Radio Broadcasting*, 30 RAND J Econ 397, 411–14 (1999); Ronald L. Goettler and Ron Shachar, *Spatial Competition in the Network Television Industry*, 32 RAND J Econ 624, 647–48 (2001).

¹⁵⁶ See Yoo, 52 Emory L J at 1706–12 (cited in note 147); Thomas W. Hazlett, *Shedding Tiers for A La Carte? An Economic Analysis of Cable Pricing*, 5 J Telecomm & High Tech L 253, 280–81 (2006).

¹⁵⁷ See Hazlett, 5 J Telecomm & High Tech L at 281–83 (cited in note 156).

¹⁵⁸ See Eli M. Noam, *Media Ownership and Concentration in America* ch 13 (Oxford 2009).

¹⁵⁹ See Yoo, 78 S Cal L Rev at 693–98 (cited in note 147) (reviewing the literature).

actually improve program diversity,¹⁶⁰ although the FCC found the empirical support too ambiguous to support a strong policy inference in either direction.¹⁶¹ Again, in addition to affecting economic welfare, structural features of the underlying industries have implications for the nature of the content being created.¹⁶² The ambiguity of the empirical record does not support attributing any simple relationship between structure and conduct.

But Wu reserves his harshest criticism for vertical integration, which he claims reduces content diversity and innovation (pp 130, 147, 295, 305–06, 311) and presumes that an open, vertically disintegrated structure will yield better content (pp 35–39, 72–73, 139–47, 297). At other times, however, the book concedes that vertical integration may actually benefit consumers (pp 84, 162, 284 n *, 305, 306), epitomized by the seamless and high-quality end-user experience offered by Apple (pp 278, 291–92). Indeed, a vibrant theoretical literature exists identifying ways that vertical integration yields efficiencies.¹⁶³ An empirical literature is emerging that explores these conclusions.¹⁶⁴ Yet Wu concludes that the “Separations Principle” requires that these benefits be sacrificed (p 305). In the process, Wu also stops short of undertaking any detailed analysis of the literature exploring the impact that prohibiting these practices would have on the nature of media programming. The FCC’s experience with how restrictions on

¹⁶⁰ See Steven Berry and Joel Waldfogel, *Do Mergers Increase Product Variety? Evidence from Radio Broadcasting*, 116 Q J Econ 1009, 1024 (2001); Augustus E. Grant, *The Promise Fulfilled? An Empirical Analysis of Program Diversity on Television*, 7 J Media Econ 51, 59, 62 (1994); Robert P. Rogers and John R. Woodbury, *Market Structure, Program Diversity, and Radio Audience Size*, 14 Contemp Econ Pol 81, 90 (Jan 1996).

¹⁶¹ See *2002 Biennial Regulatory Review—Review of the Commission’s Broadcast Ownership Rules and Other Rules Adopted Pursuant to Section 202 of the Telecommunications Act of 1996*, 18 FCC Rcd 13620, 13742 ¶¶ 312–15 (2003).

¹⁶² See Yoo, 78 S Cal L Rev at 693–701 (cited in note 147).

¹⁶³ For surveys, see *id* at 706–13; Yoo, 19 Yale J Reg at 213–17, 232–37, 260–65 (cited in note 123).

¹⁶⁴ For studies showing that vertical integration enhances consumer welfare, see Tasneem Chipty, *Vertical Integration, Market Foreclosure, and Consumer Welfare in the Cable Television Industry*, 91 Am Econ Rev 428, 429 (2001); Eli M. Noam, *A Public and Private-Choice Model of Broadcasting*, 55 Pub Choice 163, 183 (1987); Michael G. Vita, *Must Carry Regulations for Cable Television Systems: An Empirical Analysis*, 12 J Reg Econ 159, 169 (1997). Other studies were inconclusive. See, for example, David Waterman and Andrew A. Weiss, *The Effects of Vertical Integration between Cable Television Systems and Pay Cable Networks*, 72 J Econometrics 357, 391 (1996). One study found a welfare loss of \$0.60 per cable subscriber per year. George S. Ford and John D. Jackson, *Horizontal Concentration and Vertical Integration in the Cable Television Industry*, 12 Rev Indust Org 501, 515–16 (1997). A recent review of the literature conducted by four members of the Federal Trade Commission staff concluded that vertical integration tended to be benign or welfare enhancing and described the welfare losses identified by the Ford and Jackson study (the only study finding that vertical integration reduced welfare) as miniscule. James C. Cooper, et al, *Vertical Antitrust Policy as a Problem of Inference*, 23 Intl J Indust Org 639, 648 (2005).

vertical integration in television broadcasting—such as the financial interest and syndication rules (finsyn) and the Prime Time Access Rule (PTAR)—actually restricted program diversity provide ample reason for caution.¹⁶⁵

These theoretical and empirical debates are rich and hotly contested; resolving them far exceeds the scope of this Review. Engaging the literature that explores how structural features affect media content would offer an account that may be less straightforward but would provide greater insights into the dynamics of innovation and technological change as well as provide some insight into if and when the balance might tip in the other direction. The measure of any media policy ultimately depends on the nature of the content that the public receives. One would thus expect an assessment of these impacts to be part of his proposal. Although Wu may well be right that the balance tips in favor of openness and vertical disintegration, without a clearer explanation of how to make the relevant tradeoffs, readers are left without a clear idea of why that is the case or the circumstances under which the balance might change (p 305).

C. The Role of the Government

Another ambiguity in Wu's argument is the role of the government. As a general matter, he is quite critical of government intervention, noting that corporate interests often enlist the government's help when closing down industries (pp 10–11, 145), even calling the FCC “among the most useful tools of domination [the broadcast] industry has ever invented” (p 128). He sounds similar notes when observing that “federal planning is never a good midwife for a new industry” (p 132). Even worse, “[a]gain and again in the histories I have recounted, the state has shown itself an inferior arbiter of what is good for the information industries,” with “[t]he federal government's role in radio and television from the 1920s through the 1960s” being “nothing short of a disgrace” (pp 307–08). Indeed, he contends that “[g]overnment's tendency to protect large market players amounts to an illegitimate complicity” (p 308). Antitrust litigation was the basis for breaking up AT&T. Yet Wu finds antitrust inadequate to the task of overseeing information industries (p 303).

¹⁶⁵ For more on finsyn, see *Schurz Communication v FCC*, 982 F2d 1043, 1051 (7th Cir 1992). For more on PTAR, see Thomas Krattenmaker, *The Prime Time Access Rules: Six Commandments for Inept Regulation*, 7 *Hastings Comm/Ent L J* 19, 36–37 (1984). On both, see Thomas G. Krattenmaker and Lucas A. Powe Jr., *Regulating Broadcast Programming* 72–74, 99–100 (American Enterprise Institute 1994); Jim Chen, *The Last Picture Show (On the Twilight of Federal Mass Communications Regulation)*, 80 *Minn L Rev* 1415, 1454–58 (1996).

At other times, however, he is more sanguine about government involvement. This is perhaps most evident in his call for regulatory intervention in defense of what he calls the “Separations Principle.” Wu credits the FCC for a number of policy successes and looks to it to provide the primary remedies (pp 309–11). Even the discredited antitrust authorities, Wu says, have an important role to play as a “safeguard against the FCC’s lapses” (p 312).

Wu draws support for the Separations Principle from certain traditional frameworks. One is common carriage (pp 57–59, 286, 310–11), which he believes logically extends to all public callings (pp 58, 286, 303 n *, 311). In so doing, he fails to address a number of limits that have historically been placed on common carriage. As an initial matter, the common law duty to provide nondiscriminatory service applies only to subscribers; it has not been extended to other carriers or other business entities providing complementary services.¹⁶⁶ At the same time, this argument overlooks the long line of Supreme Court cases rejecting the extension of common carriage to media industries on the grounds that doing so would harm free speech rather than help it.¹⁶⁷ Wu must also come to grips with the Supreme Court precedent discrediting the notion of public callings as a *Lochner*-era concept that failed to provide a principled way to distinguish industries properly subject to common-carriage regulation from those that are not.¹⁶⁸ Despite the efforts of noted scholars to develop a principled basis for identifying which industries are properly

¹⁶⁶ For the leading Supreme Court case decided in the context of railroads, see *Memphis & LRR Co v Southern Express Co (The Express Package Cases)*, 117 US 1, 27–28 (1886). For decisions extending this rationale to telephony, see *Pacific Telephone & Telegraph Co v Anderson*, 196 F 699, 703–05 (ED Wash 1912), citing *The Express Package Cases* to conclude that common carrier law did not compel the Interstate Telephone Company to accord the customers of competing companies the same access to Interstate’s switchboard as Interstate provided to its own customers. See also generally Huber, et al, *Federal Telecommunications Law* § 1.3.1 at 13–16 (cited in note 45).

¹⁶⁷ For the leading case, see *CBS v Democratic National Committee*, 412 US 94, 109–11 (1973). For a broader review, see Christopher S. Yoo, *Free Speech and the Myth of the Internet as an Intermediated Experience*, 78 *Geo Wash L Rev* 697, 724–25, 727, 740–41 (2010).

¹⁶⁸ The Court noted in *Nebbia v New York*, 291 US 502, 536 (1934):

It is clear that there is no closed class or category of businesses affected with a public interest In several of the decisions of this court wherein the expressions ‘affected with a public interest,’ and ‘clothed with a public use,’ have been brought forward as the criteria of the validity of price control, it has been admitted that they are not susceptible of definition and form an unsatisfactory test of the constitutionality of legislation directed at business practices or prices.

See also *Olsen v Western Reference & Bond Association*, 313 US 236, 245 (1941), quoting *Tyson & Brother v Banton*, 273 US 418, 446 (1927) (Holmes dissenting); Ronald A. Anderson, *Government and Business* 225 (South-Western 4th ed 1981) (arguing that *Nebbia* “destroyed that concept”).

considered affected with the public interest,¹⁶⁹ no coherent conceptual foundation has emerged. On a more practical level, any invocation of common carriage must take into account the controversy it has engendered. Courts, regulators, and commentators have struggled to implement common-carriage regimes in a coherent manner for more than a century.¹⁷⁰

At other points, Wu refers to the Separations Principle as “more a constitutional than a regulatory framework,” although he takes pains to point out that this observation is not intended to invoke the principles of the US Constitution (pp 308–09). In fact, Wu advocates an intervention that would be far more sweeping. Even though Supreme Court precedent clearly regards the Constitution exclusively as a limit on state power, not private power, Wu openly calls for governmental intervention against private power (pp 199, 300–02, 310). Such a position contradicts traditional liberal principles in which the individual is logically prior to the state as well as the fundamental liberal commitment (recognized by Wu at p 267) that the coercive power of the state poses far greater dangers to liberty than private exercises of power ever can.¹⁷¹ Even those sympathetic to Wu’s policy recommendations acknowledge that basing them on the Constitution would require nothing short of a revolution in doctrine.¹⁷²

In fact, what Wu suggests is a new constitutional principle is really an old regulatory one. US policymakers have long experimented with approaches that require structural separation between the network and those who would provide services over the network. The FCC imposed just such a structural separation requirement in its first and second *Computer Inquiries*.¹⁷³ It also underlay the key provision in the 1984 consent decree settling the landmark antitrust case against

¹⁶⁹ See, for example, Thomas B. Nachbar, *The Public Network*, 17 *CommLaw Conspectus* 67, 109 (2008); James B. Speta, *A Common Carrier Approach to Internet Interconnection*, 54 *Fed Comm L J* 225, 228–29 (2002).

¹⁷⁰ See Daniel F. Spulber and Christopher Yoo, *Networks in Telecommunications: Economics and Law* 255–56 (Cambridge 2009); Kahn, 1 *The Economics of Regulation* at 20–94, 325–27 (cited in note 45); Kahn, 2 *The Economics of Regulation* at 47–94, 325–27 (cited in note 45).

¹⁷¹ See Christopher S. Yoo, *Technologies of Control and the Future of the First Amendment*, 53 *Wm & Mary L Rev* 747, 755–58 (2011).

¹⁷² See Lawrence Lessig, *Code Version 2.0* 313–19 (Basic Books 2006) (suggesting that the traditional judicial focus on state action and away from resolving political questions has created a powerful inertia not likely to be overcome).

¹⁷³ See *Amendment of Section 64.702 of the Commission’s Rules and Regulation’s (Second Computer Inquiry)*, 77 *FCC2d* 384, 388–89 (1980), *affd* under the name of *Computer and Communications Industry Association v FCC*, 693 *F2d* 198 (DC Cir 1982); *Regulatory and Policy Problems Presented by the Interdependence of Computer and Communication Services and Facilities (First Computer Inquiry)*, 28 *FCC2d* 267, 285 (1971), *affd* in part and *revd* in part under the name of *GTE Service Corp v FCC*, 474 *F2d* 724 (2d Cir 1973).

AT&T requiring that the Bell System separate its long-distance, equipment-manufacturing, and local telephone businesses into separate companies.¹⁷⁴

Over time, however, policymakers have begun to recognize that vertical integration often creates important benefits that cannot be realized under a structural separation mandate.¹⁷⁵ Leading examples include the initial deployment of digital protocols in the core of the telephone network and vertical switching services such as caller ID.¹⁷⁶ The delays in introducing these services created annual welfare losses in excess of \$1 billion.¹⁷⁷ It is for this reason that many scholars have criticized structural separation.¹⁷⁸ It is also the reason that the FCC abolished the requirement in its third *Computer Inquiry*.¹⁷⁹ Given the high degree of similarity between these issues, Wu's proposal might be expected to explain why the considerations underlying the FCC's previous decision to abandon structural separation as too costly do not still apply.

On the most basic level, however, Wu's proposal must come to grips with a more fundamental problem: anyone looking to the government as a remedy to private power must address the fact that the same economic characteristics that allow private actors to dominate markets also allow them to dominate politics as well, a problem that Charles Lindblom called "circularity."¹⁸⁰ Although Wu suggests that the Separations Principle is a way to preempt politics (p 304), more traditional analyses of regulatory behavior raise serious doubts as to whether politics and technology policy can be rendered distinct. Indeed, instead of mimicking David versus Goliath, many of the historical episodes that Wu describes represented a clash of opposing corporate interests (including a majority of the most recent ones, such as Apple versus IBM, the AOL–Time Warner merger, and the modern debate over network neutrality). Wu's admonition that

¹⁷⁴ *United States v AT&T*, 552 F Supp 131, 196, 223–34 (DDC 1982) (describing the provisions of the consent decree), affd *Maryland v United States*, 460 US 1001 (1983).

¹⁷⁵ *Amendment of Sections 64.702 of Commission's Rules and Regulations (Third Computer Inquiry)*, 104 FCC2d 958, 1002–11 ¶¶ 79–97 (1986), affd and modified by 2 FCC Red 3035, 3037 ¶ 10 (1987), vacd and remd under the name of *California v FCC*, 905 F2d 1217, 1238–39 (9th Cir 1990).

¹⁷⁶ Christopher S. Yoo, *Beyond Network Neutrality*, 19 Harv J L & Tech 1, 24–25 (2005).

¹⁷⁷ Jerry A. Hausman, *Valuing the Effect of Regulation on New Services in Telecommunications*, 1997 Brookings Papers on Econ Activity: Microecon 1, 3, 10, 14–15.

¹⁷⁸ See, for example, Robert W. Crandall and J. Gregory Sidak, *Is Structural Separation of Incumbent Local Exchange Carriers Necessary for Competition?*, 19 Yale J Reg 335, 364–89 (2002); Warren G. Lavey, *Ending Structural Separation for Telephone Companies*, 18 Conn L Rev 81, 113 (1985).

¹⁷⁹ *Third Computer Inquiry*, 104 FCC2d at 964 ¶ 3 (cited in 175).

¹⁸⁰ Charles E. Lindblom, *Politics and Markets: The World's Political-Economic Systems* 201–21 (Basic Books 1977).

“government’s only proper role is a check on private power, never as an aid to it” (p 308) provides little guidance when private power is implicated on both sides of every policy issue. Moreover, past experience with restrictions on vertical integration has shown that Wu’s Separations Principle would involve government intervention to standardize interfaces, mediate disputes over access, and enforce structural separation,¹⁸¹ interventions that can only be characterized as regulatory rather than constitutional.¹⁸²

D. Normative Assessment of Openness

Another of the book’s signal characteristics is that it generally discusses openness (particularly with respect to vertical integration) in laudatory terms (pp 111, 195, 292–93, 305–06). Indeed, the book was supposed to be named *Open* until Knopf published Andre Agassi’s autobiography under that title the previous year.¹⁸³ At some moments, however, Wu seems more ambivalent. Open media tends to fragment rather than unite a nation (pp 214–15). Moguls step in to centralize an industry when people are unhappy with the quality of content or the reliability of a service; indeed, the arrival of the centralizing mogul “heralds a golden age in the life of the new technology” (p 10). In addition, “the closing is driven by a hunger for quality and scale—the desire to improve, even perfect the medium and realize its full potential, which is limited by openness, for all its virtues” (p 78). Wu credits the new (closed) radio industry for “creating a broad listenership for quality programming” (p 84). Centralizing innovation improves coordination and reduces waste (pp 110–11, 306). Wu singles out for special praise the locked-down vision of computing embodied in the Apple Macintosh, iPod, iPad, and iPhone, which delivered unrivaled functionality and a seamless user experience (pp 278, 292). Indeed, the most casual review of the contemporary economy reveals a wide range of practices that completely span the spectrum.

In short, the book candidly recognizes that embracing openness necessarily involves a tradeoff. In so doing, it naturally invites inquiry into whether conditions exist that might tip the balance the other way.

¹⁸¹ See Yoo, 19 Harv J L & Tech at 5, 11, 37–39 (cited in note 176).

¹⁸² See Adam Thierer, *Thoughts on Wu’s Master Switch, Part 6 (His Audacious Information Industrial Policy)* (Technology Liberation Front Nov 2, 2010), online at <http://techliberation.com/2010/11/02/thoughts-on-wu’s-master-switch-part-6-his-audacious-information-industrial-policy> (visited Aug 19, 2011) (suggesting that enforcement of these interventions through unelected bureaucrats like the FCC would undercut any benefit to a constitutional approach).

¹⁸³ See Jennifer 8 Lee, *Got Galley of The Master Switch by Tim Wu. Original Name Was Open, Then Andre Agassi Took It* (July 21, 2010), online at <http://j8.ly/got-galley-of-the-master-switch-by-tim-wu-ori> (visited Apr 29, 2011).

Fortunately, the scholarly literature on standardization and modularity has advanced analytical frameworks that can provide some traction on this question. Consider first the theory of optimal standardization.¹⁸⁴ Standardization is largely a function of the heterogeneity of consumer preferences. If everyone wants the same thing, one can satisfy all of their preferences with a single network optimized in the way that everyone wants. As what people want becomes more diverse, one would naturally expect the services that the network is offering to become more diverse in response.¹⁸⁵ If that is the case, shifts away from the way the current network is designed may represent nothing more than the network's attempt to evolve to meet consumer demand. From this perspective, experiments with new standards should be regarded not necessarily as anticompetitive but as a potential sign of a healthy environment for innovation.¹⁸⁶ Indeed, if demand is sufficiently heterogeneous, firms generally avoid me-too strategies, preferring to pursue approaches that distinguish them from their competitors. When this is the case, industries are more likely to reflect a mix of business strategies rather than uniform tactics. Thus, the fact that one firm has adopted an open architecture may make it more likely that at least some of its competitors will adopt a closed one.¹⁸⁷

Further insights emerge from modularity theory,¹⁸⁸ which suggests that modular architectures are not appropriate if the tasks constituting the overall process exhibit too many interdependencies.¹⁸⁹ In addition, changes in the technological environment may cause a previously modular architecture to break down.¹⁹⁰ A growing number of theorists have recognized that the Internet's layered architecture establishes a form of modularity that allows each actor to optimize its own

¹⁸⁴ See Yoo, 19 Harv J L & Tech at 34–37 (cited in note 176).

¹⁸⁵ See Joseph Farrell and Garth Saloner, *Standardization and Variety*, 20 Econ Letters 71, 71–74 (1986).

¹⁸⁶ See Shane Greenstein, *Glimmers and Signs of Innovative Health in the Commercial Internet*, 8 J Telecomm & High Tech L 25, 26 (2009).

¹⁸⁷ See Christopher S. Yoo, *The Changing Patterns of Internet Usage*, 63 Fed Comm L J 67, 89 (2010).

¹⁸⁸ See Christopher S. Yoo, *Layering, Modularity Theory, and Internet Policy* *48–50 (forthcoming 2012) (on file with authors).

¹⁸⁹ See Michael E. Raynor and Clayton M. Christensen, *Integrate to Innovate* *16–19 (Deloitte Research 2002), online at [http://www.deloitte.com/assets/Dcom-SouthAfrica/Local%20Assets/Documents/I2I\(1\).pdf](http://www.deloitte.com/assets/Dcom-SouthAfrica/Local%20Assets/Documents/I2I(1).pdf) (visited Aug 19, 2011). See also Carliss Y. Baldwin, *Where Do Transactions Come From? Modularity, Transactions, and the Boundaries of Firms*, 17 Indust & Corp Change 155, 180–86 (2008); Chesbrough and Teece, 74 Harv Bus Rev at 65, 70 (cited in note 116).

¹⁹⁰ See Baldwin, 17 Indust & Corp Change at 180 (cited in note 189); Chesbrough and Teece, 74 Harv Bus Rev at 68 (cited in note 116); Michael G. Jacobides and Sidney G. Winter, *The Co-evolution of Capabilities and Transaction Costs: Explaining the Institutional Structure of Production*, 26 Strategic Mgmt J 395, 405 (2005).

behavior locally. The problem is that when these individually rational decisions combine and interact with one another, they can lead to aggregate behavior that is suboptimal.¹⁹¹

Rather than extolling the virtues of open architectures in the abstract, these frameworks provide a basis for a better understanding of both the benefits of open architectures and their limitations. Although not as simple and straightforward as the view of openness embodied in the Cycle, the additional nuance adds power to the analysis and makes it more likely that any decisions will reflect good policy.

E. The (In)evitability of the Cycle

The Master Switch provides a different perspective on the frequent debates among innovation scholars over whether technological progress primarily results from “demand pull” or “technology push.” Instead, Wu offers a more charismatic vision in which corporate moguls are the primary movers of technological change (pp 14, 29). Despite the personality-driven nature of this change model, Wu frequently speaks of the Cycle as if it is unavoidable, describing it as some inexorable force (pp 7, 252). At other times, however, Wu concedes that the Cycle is not inevitable (pp 85, 156). Sometimes industries skip the initial open phase, as occurred with television (p 154). Corporate moguls seeking to assert control over an industry sometimes fail, as happened in AOL’s acquisition of Time Warner (pp 264–68), and sometimes promote openness, as Ted Turner did with respect to cable television (pp 208–11).

Like Wu’s other exceptions to the simple version of the Cycle, these deviations invite further analysis. If the forces opening and closing industries are supposed to be inexorable, policy analysts should be very interested to determine what caused the industry to deviate from the expected pattern. Acknowledging the possibility of variations also has major implications for Wu’s policy recommendations, because it is the supposed relentlessness of the Cycle that provides the primary impetus for taking action to forestall the outcome that Wu fears.

Part of the explanation lies in the fact that openness has its charismatic figures as well. Although Wu describes Ted Turner’s role in turning cable into a viable alternative to broadcast television, many other figures go unmentioned. Many of the greatest successes of the open-source movement were pushed by strong central figures, such as

¹⁹¹ See Jon Crowcroft, et al, *Is Layering Harmful?*, 6 IEEE Network 20, 23–24 (Jan 1992); Randy Bush and David Meyer, *Some Internet Architectural Guidelines and Philosophy* *7–8 (IETF Network Working Group, Request for Comments 3439, Dec 2002), online at <http://tools.ietf.org/pdf/rfc3439> (visited Aug 19, 2011).

Richard Stallman. The account of Google does not even mention Google founders Sergey Brin and Larry Page, an omission particularly interesting in light of Page's reemergence as the head of Google following the book's publication. Even the Internet protocol suite, Wu's archetype for the ideal open architecture, was greatly influenced by Vint Cerf's steady and visionary guidance, although he too is downplayed in Wu's narrative. Clearly, bold leadership was not the exclusive province of the established corporate interests.

Any claims about the continuing dominance of incumbents must also be viewed in light of how frequently and quickly the leading players in the technology player have changed. In the 1980s, the companies regarded as dominant included IBM and AT&T (as a long-distance company). Although both continue to exist, neither is as influential as during the 1980s, and neither is currently regarded as a market leader. During the 1990s, AOL was a dominant industry force, and now it is struggling to remain relevant. The other behemoths of the 1990s, Microsoft and Intel, now face vibrant competition from Google, who in turn is facing challenges from the next generation of upstarts, led by Facebook and Netflix.¹⁹²

A deeper look at the history reveals the limitations of focusing only on broad patterns to the exclusion of the detail that inevitably accompanies any industry. Rather than focusing on a single, abstract pattern, policymakers would be better served by trying to understand the complex forces driving innovation and technological change. Only then can we understand the dynamics of the various industry cycles and how best to address them.

CONCLUSION

The great American architect Daniel Burnham is reported to have said, "Make no little plans. They have no magic to stir men's blood."¹⁹³ In his own field, Tim Wu has taken this advice to heart. In attempting to discover a general pattern that describes the path along which every technology must inevitably travel, he has authored a book with grand ambitions. If successful, his efforts to distill from four disparate communications industries a single, unified pattern of technological and business practices would be a major accomplishment. The more general the result, the more powerful the analysis becomes.

¹⁹² On the growing competition between Google and Facebook, see Adrian Ron, *Google and Facebook Are Fighting for Our Lives*, Daily Telegraph Blog (May 13, 2011), online at <http://blogs.telegraph.co.uk/technology/adrianhon/100006687/google-and-facebook-are-fighting-for-our-lives/> (visited Aug 19, 2011). On Google's recent efforts to compete with Netflix, see *YouTube Adding 3,000 More Films*, Boston Globe Bus 6 (May 10, 2011).

¹⁹³ Charles Moore, 2 *Daniel H. Burnham: Architect, Planner of Cities* 147 (Da Capo 1968).

The breadth of the book's vision is thus one of its greatest strengths. At the same time, however, it presents some of its greatest challenges. History is notoriously untidy, and all too often real-world facts stubbornly refuse to conform to what would otherwise be a terrific story.

Rather than trying to fit all of these industries into a single Procrustean pattern, a more detailed assessment of the history might suggest replacing a model that is deterministic and general with one that is more nuanced and contingent. This approach would search for the many evolutionary paths that an industry might follow as well as a better understanding of the factors that cause industries to fall into one pattern or the other. The fact that *The Master Switch* is aimed at a general audience instead of at academics partially justifies the simplified presentation of the episodes discussed in the book. That said, the book is based almost entirely on a historical claim, so the force of its policy recommendations depends entirely on the accuracy and completeness of its treatment of the historical record.

A more measured and nuanced approach would lead to policy implications that are less sweeping and categorical, and thus less likely to yield the simple policy inferences that policymakers and policy advocates seek. That said, adding complexity can produce a theory that more accurately describes real-world outcomes and thus can provide a better foundation for sound public policy.