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THE PROBLEM OF BIGNESS: FROM STANDARD OIL TO GOOGLE

Naomi R. Lamoreaux

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This essay sets recent expressions of alarm about the monopoly power of technology giants like Google and Amazon in the long history of Americans' response to big business. It argues that we cannot understand that history unless we realize that Americans have always been concerned about the political and economic dangers of bigness, not just the threat of high prices. The problem policy makers faced after the rise of Standard Oil was how to protect society against those dangers without punishing firms that grew large because they were innovative. The antitrust regime put in place in the early twentieth century managed this balancing act by focusing on large firms' conduct toward competitors and banning practices that were anticompetitive or exclusionary. Maintaining this balance was difficult, however, and it gave way over time—first to a preoccupation with market power during the post-World War II period, and then to a fixation on consumer welfare in the late twentieth century. Refocusing policy on large firms' conduct would do much to address current fears about bigness without penalizing firms whose market power comes from innovation.

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Abstract: This essay sets recent expressions of alarm about the monopoly power of technology giants like Google and Amazon in the long history of Americans' response to big business. It argues that we cannot understand that history unless we realize that Americans have always been concerned about the political and economic dangers of bigness, not just the threat of high prices. The problem policy makers faced after the rise of Standard Oil was how to protect society against those dangers without punishing firms that grew large because they were innovative. The antitrust regime put in place in the early twentieth century managed this balancing act by focusing on large firms' conduct toward competitors and banning practices that were anticompetitive or exclusionary. Maintaining this balance was difficult, however, and it gave way over time—first to a preoccupation with market power during the post-World War II period, and then to a fixation on consumer welfare in the late twentieth century. Refocusing policy on large firms' conduct would do much to address current fears about bigness without penalizing firms whose market power comes from innovation.

The Problem of Bigness: From Standard Oil to Google

A number of observers have been sounding the alarm recently about the growth of monopoly power in the US economy. Expressions of concern have come from all parts of the political spectrum (Langlois 2018), but the most sustained warnings have issued from a group calling themselves the "New Brandeisians" in homage to Louis Brandeis's famous essay, "A Curse of Bigness" (1914, Ch. 8). Members of this group charge that giant tech firms like Google and Amazon are exploiting blatantly anticompetitive practices to block potential rivals, and that they are manipulating the political system to get away with it. Critics are particularly worried that current antitrust orthodoxy, which focuses on the issue of harms to consumers, has left the country all but defenseless against these other kinds of ills, and they are seeking to prod policy makers to take preventive action (see Lynn 2010; Wu 2018; Khan 2018; and, for an overview, Berk 2018).

The New Brandeisians argue that the country has entered a second Gilded Age, and certainly, as this essay will show, the concerns they express are much the same as those provoked by the rise of the Standard Oil Trust in that earlier period of turmoil. To late-nineteenth-century Americans, Standard was a monster that corrupted politicians and laid waste to its competitors, and the outrage it provoked pushed Congress to pass the Sherman Antitrust Act in 1890. It was not until 1911, however, that the Supreme Court found the company in violation of the law and broke it up. During the intervening two decades large firms emerged to dominate most important sectors of the economy. Some of these giants followed Standard's example and achieved their dominance by acquiring competitors. Others grew large by innovating, devising new products or new ways of producing that yielded significant economies

of scale. Regardless of the route these firms took to bigness, their sheer size and sudden emergence awoke fears that, unless the government did something fast to prevent it, the giants would entrench themselves by nefarious means.

There was general agreement that Standard had grown large by pursuing anticompetitive practices and should be broken up. The knottier problem was how to deal with the "trusts" (as big businesses were generically called) that acquired their market power by innovating. Although contemporaries tried, following President Theodore Roosevelt's lead, to sort large trusts into "good" and "bad" categories, this exercise in classification turned out to have severe limitations. Because firms always pursue a mix of strategies to "escape from equilibrium," in Margaret Levenstein's (2012) apt phrase, deciding which behaviors were pro- and which were anticompetitive was a difficult task. Not only did "good" trusts sometimes resort to "bad" practices to preserve their advantages, but there were many cases in which it was not at all easy to distinguish actions that that were anticompetitive in their purpose and effect from those that improved productivity and brought real benefits to consumers. During the so-called Progressive Period—that is, from the turn of the twentieth century to the outbreak of the First World War—policy makers struggled with this problem. The solution they arrived at was to write a set of specific prohibitions into the Clayton Antitrust Act of 1914 and simultaneously to create a new regulatory agency, the Federal Trade Commission (FTC), empowered to define and police the boundary.

The boundary between anticompetitive practices and those that enhanced efficiency, however, remained difficult to draw. Firms continuously sought new ways to increase their market power, and regulators just as continuously sought new ways to make their efforts illegal. The line between behaviors seen as violating the law and those viewed as legally acceptable

undoubtedly shifted back and forth over time, and regulators undoubtedly were excessively vigilant in some periods and excessively lax in others. During the late 1930s, however, in the context of a revival of anti-big business sentiment during the late New Deal, antitrust officials abandoned the attempt to draw the line and instead defined bigness itself as the problem. Their success in inducing the courts to impose antitrust remedies on firms that had not been found guilty of anticompetitive conduct provoked a counter reaction by a group of economic and legal scholars, dubbed the "Chicago School," who in turn prevailed in the courts once economic conditions deteriorated in the 1970s. Advocates of the Chicago School sought to shift the focus of inquiry from whether large firms had market power to whether the market power they possessed had been detrimental to consumers. Like the aggressive trust busters they opposed, however, they emphatically rejected the preoccupation with conduct that early twentieth-century policy makers had built into the law—just in time for a new wave of giant innovative firms to behave in ways that reanimated those very concerns.

Standard Oil and the Rise of Antitrust

The Standard Oil Company's market share suddenly rose during the 1870s, from about 4 percent of the US petroleum industry to fully 90 percent, sparking the fears that gave birth to the antitrust movement. These fears were not primarily about high prices or harm to consumers. The price of refined petroleum dropped during the 1870s from about 25 cents per gallon to less than 10 cents, much faster than the general price level, and it remained essentially flat in real terms into the twentieth century.[1] Instead, critics focused on Standard's brutal treatment of

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[1] Contemporaries attributed the drop to the expansion of output in the oil fields rather than to any savings from Standard's large-scale operations (New York 1888, p. 12). Granitz and Klein share this view, though their data

competitors, particularly its use of secret discounts from railroads to force rivals to sell out. They also worried that Standard's enormous wealth would enable it to wield undue influence on the political system (see especially Tarbell 1904).

These worries had a real basis in fact. As Elizabeth Granitz and Benjamin Klein (1996) have shown, Standard's rapid rise to dominance owed more to railroad rebates than to any initial advantage in efficiency. Although its refineries were large by the standards of the time, the minimum efficient scale of production was well below Standard's capacity. Nor did Standard benefit from any barriers to entry that might have arisen from superior technology or control of raw-material resources. The industry was competitively structured with most of the growth in production in the late 1860s and early 1870s coming from new entrants rather than the expansion of existing refineries (Williamson and Daum 1959, Ch. 12). Price competition was so intense that producers were driven (unsuccessfully) to collude. After an agreement to form a pool collapsed in 1872, a frustrated John D. Rockefeller, Standard's president, dismissed all such devices as "ropes of sand" (Chandler 1977, p. 321).

Determined to find another way to limit competition in the industry, Rockefeller took advantage of a parallel effort at cartelization that the railroads that served the oil region were undertaking. Like the petroleum refiners, the railroads had been attempting—without success—to restrain price competition, and they hit on a plan that would deploy the refiners as enforcers. The idea was to form a select group of leading refiners in Cleveland, Pittsburgh, and other production centers into an association called the South Improvement Company, which would then allocate each railroad a share of the business of transporting oil. In return for ensuring that

show that the margin between the price of crude and refined oil also fell during the 1870s by about 50 percent (Granitz and Klein 1996, p. 30). Chandler (1977, pp. 321-325) argues that Standard achieved economies of scale in refining and pipeline shipping, though most of the advances he describes occurred after the 1870s, when margins were flat.

the railroads kept to their allocations, the chosen refiners were granted rebates (discounts) on their own shipments of oil as well as drawbacks (kickbacks) on those of competitors, giving them a significant cost advantage. Although the violent opposition of producers in the oil fields prevented the railroads from actually implementing the plan, there was a period of several months, after the company was formed but before it fell apart, when prospects seemed dire for refineries not included in the scheme. Rockefeller took advantage of this period to induce the other Cleveland refiners to sell out to him. As Granitz and Klein (1996) have pointed out, companies outside a pool normally have nothing to fear because they can profit from underselling participants. Only the advantages that the South Improvement refineries stood to gain over their competitors can explain why so many rivals ended up selling out to Rockefeller at prices they regarded as below value. Standard emerged from this incident with effective control over the Cleveland segment of the industry and then secretly merged with the participating refiners in other production centers. As a result of these acquisitions and mergers, Standard grew large enough to demand that the railroads continue to grant it rebates, which in turn enabled it defend its dominance and acquire most of the remaining independent refineries.[2]

That Standard used its resources for political ends is also clear.[3] For example, it is on record as contributing $250,000 to Ohio Republican Party boss Marcus Hanna's fund to defeat

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[2] For a somewhat different explanation of Standard's rise, see Priest (2012). Priest is critical of Granitz's and Klein's account, but his evidence is consistent with their analysis. See also Klein's response (2012). Some historians (for example, Chandler 1977, p. 321) have argued that the rebates Standard received were compensation for the gains in efficiency it offered the railroads. There were undoubtedly some such gains, but as Daniel Crane (2012) has shown, there are many aspects of the rebate arrangements (especially the drawbacks) that do not fit such a story and can only be explained as anticompetitive. According to a report by the US Bureau of Corporations (1907), Standard continued to receive what were effectively rebates long after they were ostensibly outlawed by the Interstate Commerce Act of 1887. The report spurred Congress to pass new legislation (the Hepburn amendment) that closed the loophole in the law (Johnson 1959, pp. 583-585).

[3] Some of the most nefarious charges were never proven. In one major scandal, for example, Standard stood accused of bribing Ohio legislators to secure a seat in the US Senate for H. B. Payne, the father of the company's treasurer. The charges were compelling enough for the Ohio legislature to conduct an investigation, with troubling though inconclusive results. At that time US senators were chosen by the various state legislatures rather than by the general electorate. See Tarbell (1904), Vol. 2, pp. 112-119.

William Jennings Bryan, the Democratic candidate for president in 1896 (White 2017, p. 846). It also used its influence to try to protect itself from prosecution. A good example was the pressure brought on Ohio's attorney general, David K. Watson, to drop a lawsuit to revoke the company's corporate charter. As was the norm at the time, Ohio law prohibited corporations from holding stock in other companies. Searching for another way to consolidate the company's acquisitions, Standard's lawyers developed a complex type of voting trust, whereby shareholders in the various companies it controlled, including the Standard Oil Company itself, transferred their stock to a board of trustees who voted it on their behalf, giving the board powers akin to those of a holding company (Nevins 1953, Vol. 1, Ch. 21; Williamson and Daum 1959, pp. 466-470; Hidy and Hidy 1955, pp. 40-49). When Watson learned about this arrangement, he filed suit to dissolve the Standard Oil Company on the grounds that participation in the trust violated the terms of its Ohio charter. According to a later attorney general, Watson was repeatedly offered bribes to drop the case. That charge is difficult to substantiate, but there are extant letters from Hanna threatening Watson's political future: "From a party standpoint, interested in the success of the Republican party, and regarding you as in the line of political promotion, I must say that the identification of your office with litigation of this character is a great mistake" (quoted in Bringhurst 1979, p. 14). Watson persevered and won the case in 1892, though rather than revoke the corporation's charter, the Ohio Supreme Court merely required it to withdraw from the trust (*State v. Standard Oil Company*, 49 Ohio St. 137). Standard obeyed the letter of the court's order and dissolved the trust, but it preserved its monopoly by moving its corporate domicile to New Jersey and reorganizing as a holding company under that state's newly liberalized general incorporation law (Bringhurst 1979, pp. 12-22; Hidy and Hidy 1955, pp. 219-232).

Standard's success in eliminating competition in the petroleum industry stimulated the formation of similar combinations in a number of other industries, ranging from whisky to lead to sugar to cottonseed oil. As concerns about these new sources of monopoly power rose, most states enacted antitrust laws (more than a dozen before Congress passed the Sherman Act in 1890), and a number of state attorneys general filed suits to revoke the charters of corporations that participated in trusts (May 1987; Nolette 2012). State initiatives waned, however, when the trusts began to reorganize as New Jersey holding companies, and as a consequence, pressure built on the federal government to step up its own antitrust activities (US Commissioner of Corporations 1904; Seager and Gulick 1929; Thorelli 1954). These pressures intensified as a result of the Great Merger Movement of 1896-1904, when about 1,800 firms disappeared into nearly 160 horizontal combinations. Few of the mergers were as dominant in their industries as Standard Oil was in petroleum, but estimating conservatively about a third of them initially had market shares in excess of 70 percent and a half more than 40 percent (Lamoreaux 1985, pp. 2-5).

Although the number of Sherman Act prosecutions increased under Presidents Theodore Roosevelt and especially William Howard Taft, federal courts initially found it difficult to apply the law to the so-called tight combinations that took the form of state-chartered corporations. The federal government could act under the Constitution's commerce clause, but it had to tread warily for fear of undermining the states' authority over corporations; once an area of law came within the domain of the commerce clause, state jurisdiction ended (McCurdy 1979; Lamoreaux 1985, pp. 162-169). Eventually the Supreme Court found a way around that problem in the form of the "Rule of Reason," which it handed down in a pair of landmark decision breaking up the

Standard Oil and the American Tobacco Companies in 1911 (*Standard Oil Co. v. United States*, 221 US 1; *United States v. American Tobacco*, 221 US 106).

According to the Rule of Reason, loose combinations, such as price-fixing agreements among firms, were illegal *per se*. But tight combinations like Standard could not be held in violation of the Sherman Act by the mere fact of their size. Although "combining … so many other corporations, aggregating so vast a capital" gave substance "to the prima facie presumption of intent and purpose" to create a monopoly, the *prima facie* presumption of intent had to be "made conclusive" by showing that the purpose of the combination was to restrain trade. If that case could be made, the federal government could take action without undermining the states' regulatory powers, for the simple reason that states did not have the authority to charter corporations in violation of federal law. The key then was to demonstrate that the company's domination resulted not from "normal methods of industrial development" but by "new means of combination … with the purpose of excluding others from the trade and thus centralizing in the combination a perpetual control" (*Standard Oil v. United States*, p. 75).

This emphasis on "excluding others from the trade" homed in on exactly the behaviors that most worried contemporaries. Although some later commentators have reinterpreted the Rule of Reason as a test of harm to consumers (see especially Bork 1965 and 1978), that is a misreading both of the decision and the context that gave rise to it.[4] In his opinion in the Standard Oil case, Chief Justice Edward Douglass White made no attempt to measure the extent of any damage done to consumers but instead focused on the combines' abusive conduct toward other individuals and firms. "No disinterested mind," he concluded, could survey the evidence about Standard Oil "without being irresistibly driven to the conclusion that the very genius for

[4] Bork's reading of history has been much criticized. For an overview of this literature, see Crane (2014), n3.

commercial development and organization which was manifested from the beginning soon begot an intent and purpose … to drive others from the field and to exclude them from their right to trade and thus accomplish the mastery which was the end in view.” Ticking off the methods Standard used to exclude competitors was enough to demonstrate “a purpose and intent” to monopolize the industry which “we think so certain as practically to cause the subject not to be within the domain of reasonable contention” (*Standard Oil v. United States*, pp. 75-77).

“Good” versus “Bad” Trusts: The Case of Meatpacking

Once the Court solved the problem of applying the Sherman Act to state-chartered corporations, the *Standard Oil* case was easy for it to decide; Standard had a virtual monopoly of output in the petroleum industry, and there was abundant evidence that it had acquired its dominant position by predatory means. Other cases, however, posed more difficult issues. What should be done about industries dominated by several large firms (oligopolies) rather than single giant enterprises (monopolies)? What about firms that grew large by innovating—that vanquished competitors because they had developed superior products or because their production processes were more efficient? Although some contemporaries, like Brandeis, regarded bigness itself as a danger, most policy makers thought it was important to distinguish “good” trusts from “bad.” Otherwise regulations designed to prevent anticompetitive behavior might themselves have anticompetitive consequences by constraining innovation (Johnson 1961; Urofsky 1982; McCraw 1984, Ch. 3).

The meatpacking industry provides a good example of the difficulties that policy makers faced in distinguishing between good and bad trusts. During the same period that Standard was monopolizing production in the petroleum industry, a small number of very large firms came to

dominate meatpacking through a series of innovations that dramatically increased the availability and reduced the price of fresh meat. Many small producers suffered from the resulting gale of creative destruction. Distinguishing their howls of protest from those provoked by unfair competitive practices was not easy, however, in part because of the meatpackers' own behavior. Not content to rely on the advantages brought by their superior efficiency, they resorted to cartels and other types of collusion, triggering a series of antitrust prosecutions and providing critics with abundant evidence of anticompetitive activity.

As late as the 1870s, fresh beef was an expensive and seasonal commodity in Eastern markets. Cattle were shipped live by rail from collection points on the Great Plains and then butchered locally. Not only did shippers have to pay freight charges on substantial parts of the animals that were unsalable, but cattle had to be fed, watered, and otherwise cared for in route and could only be transported when the weather was neither too cold nor too hot. Many entrepreneurs recognized that there would be substantial cost savings from slaughtering cattle in the Midwest and shipping only the dressed beef to Eastern markets, but the first to overcome all the difficulties was Gustavus Swift (Yeager 1981, Ch. 3; Chandler 1977, pp. 299-301). He collaborated with a refrigeration engineer to design a suitable railroad car and then sank much of his capital into a small fleet. When the railroads, concerned about their substantial investments in cattle cars and feeding stations, refused to carry his cars, he formed an alliance with the Grand Trunk Railroad, the one carrier serving Eastern markets that was not heavily invested in the old technology. Swift bought harvesting rights to ice on Great Lakes, built a chain of ice stations along the railroad route, and developed partnerships with wholesalers who were willing to distribute his product. Where wholesalers were not cooperative, he competed with them head on—sometimes selling beef directly from his railroad cars at rock-bottom prices. The only firms

that could withstand Swift's competition were those with the financial resources to build similar vertically integrated enterprises. By 1887 three had emerged. Together with Swift they suppled about 85 percent of the interstate market in dressed beef. Other competitors entered over time, but the industry remained highly concentrated with the top five firms accounting for 75 percent of the interstate market in 1907-08 and 81 percent in 1916-17 (Yeager 1981, p. 112; Aduddell and Cain 1981, p. 219).

The meatpackers' innovations enabled consumers to purchase corn-fed beef from the Midwest at prices that undercut the market for the less desirable cattle raised on western ranges. Politically powerful ranchers responded to the decline in their market, as well as the appearance of monopsony buyers for their output, by demanding that Congress investigate and take action against the beef trust. Their voices were joined by those of local butchers and meat wholesalers whose businesses had been hurt by competition from the large packers. As it turned out, there was much to investigate. Although the meatpackers had initially competed vigorously on price, by the late 1880s they were resorting to price-fixing agreements and cartels to keep prices from falling. These efforts continued until 1902, when the Justice Department secured an injunction against their pool. This avenue of collusion blocked, the three largest producers decided to merge. Although the deal ultimately fell through, in preparation for the consolidation they had each acquired several smaller companies which they then unloaded on a new firm, the National Packing Company. Jointly owned by the top three meatpackers, National Packing functioned for the next decade as an evener that adjusted its level of production as needed to stabilize prices in the industry (Yeager 1981, Ch. 6; Aduddell and Cain 1981, pp. 228-229).

President Roosevelt was one of those who believed in the importance of "discriminating between those combinations which do good and those combinations which do evil" (as quoted in

Johnson 1961, p. 418), and he sought discretionary authority to make these kinds of determinations within the executive branch. Congress never granted Roosevelt the powers he sought. In 1903, however, it established the Bureau of Corporations in the new Department of Commerce and Labor.[5] The Bureau had no enforcement powers, but it was authorized to conduct investigations of large-scale businesses with the aim of distinguishing good trusts from bad. The idea was that it would use the glare of publicity to discourage bad trusts from pursuing anti-competitive practices.

As worries about the meatpackers' manipulation of the market increased with the formation of the National Packing Company, Congress pressured the Bureau to investigate the industry. The Bureau complied and issued a report in 1905 that provoked widespread outrage by largely exonerating the companies. Adopting an approach remarkably similar to that of the Chicago School today, the Bureau focused on the question of whether consumers had been harmed by the meatpackers' actions. The investigators collected data on revenues and costs, from which they concluded that the meatpackers' prices had been reasonable and their profits not excessive. In addition, they bolstered their empirical findings by arguing on theoretical grounds that prices had been held in check by the threat of potential competition, both from new entrants and from local butchers, and that it was unlikely that the packers had engaged in predatory pricing because the structure of the market would have made such a strategy unprofitable. The report did not examine muckrakers' claims that the packers exercised their power in ways that terrorized big and small businesses alike, "[t]o-day … compelling a lordly railroad to dismiss its general manager, to-morrow … black-listing and ruining some little commission merchant," or that they "thwart[ed] justice and nullif[ied] the laws by the almost undiscoverable methods of

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[5] There was significant congressional opposition to creating the Bureau, but Roosevelt was able to overcome it by strategically releasing a telegram from Standard Oil executives lobbying against the provision (Johnson 1959, 577).

partisan politics" (Russell 1905, 3, 242). It did not even address the most obvious instance of possible collusion—the use the packers' made of the National Packing Company—even though the report conceded that the new company "obviously tended to establish a strong community of interest among four of the six leading companies" (US Commissioner of Corporations 1905, p. 27). Criticism of the report was so scathing that Roosevelt, scrambling to get the damage under control, ordered the Bureau to publish a supplement (never actually produced) that would provide the public with the answers it demanded (Murphey 2013, pp. 86-91; Yeager 1981, pp. 185-190).

The Bureau's report was doubly disastrous because it contaminated the case that federal prosecutors were simultaneously bringing against the meatpackers for violating the injunction against price fixing. At the request of the federal district attorney in charge of the case, Roosevelt had ordered the Bureau to provide the Justice Department with the data it had collected, but the court ruled that the information could not be used as evidence, effectively sinking the prosecution (Yeager 1981, p. 189; Murphey 2013, p. 91). The Justice Department continued to seek ways of proceeding against the meatpackers and ultimately filed a criminal indictment in 1910 against the National Packing Company's directors for violating the Sherman Act. That case also failed when, two years later, a jury voted to acquit the men on all the charges (Yeager 1981, Ch. 9).[6]

This series of failures nonetheless had a couple of important consequences. In the first place, it prompted the meatpackers to change their behavior. Although they won the criminal

[6] There were many post-mortems of the case in the newspapers. The general consensus was that jurors were reluctant to assess criminal penalties on socially prominent defendants, particularly when only civil charges had been brought in the cases against Standard Oil and American Tobacco, and that they not able (and indeed did not even try) to follow the technical details of the government's case. See the reports in "Packers Free" 1912; "Jurors Muddled by Figures" 1912; and "Jury Acquits Packers" 1912.

case, they learned a crucial lesson from the experience (and also from the Supreme Court's articulation the previous year of the Rule of Reason in the *Standard Oil* case): large firms increased their risk of prosecution under the antitrust laws if they interacted with competitors in ways that smacked of cartelization or unfair leverage. The day immediately following the court victory, the three companies that owned National Packing announced that they would dissolve the company and divide up its properties (Yeager 1911, Ch. 9). Henceforth they would concentrate on improving their competitive positions by integrating vertically and exploiting economies of scale and scope. By the end of the decade the five largest firms had acquired controlling interests in the livestock markets handling most of the animals slaughtered in the United States. They had also integrated forward into the wholesale distribution of meat and meat products, as well as byproducts of the packing process (Aduddell and Cain 1981)

Second, the failures helped to propel a movement to revise the Sherman Act. Although the Supreme Court's decision to break up Standard Oil and American Tobacco was widely applauded, Chief Justice White's articulation of the Rule of Reason provoked worries about how combinations in restraint of trade could ever be considered reasonable (Winerman 2003, pp. 13-15). At the same time, the government's failure to rein in what appeared to be clear instances of collusion, most obviously by the meatpackers, contributed to a general sense that more needed to be done. Although lawmakers in the two major political parties differed on the details, there was broad agreement about the importance of clarifying the meaning of restraints of trade and attempts to monopolize. There was also agreement on the need to create an administrative body that would monitor businesses' adherence to the laws. By mostly lopsided majorities, Congress enacted the Clayton Antitrust and Federal Trade Commission Acts in 1914 (Sklar 1988; Winerman 2003). The first of these laws amended the Sherman Act to prohibit a number of

specific practices that had been used for anticompetitive purposes. The second created a new administrative agency tasked with enforcing the antitrust statutes and went further than the Clayton Act by declaring "unfair methods of competition in commerce" to be unlawful (Udell 1957, pp. 14-33).[7]

The meatpacking firms had initially grown large by innovating, but they had responded to the oligopolistic competition that ensued by colluding to control prices and costs. As a result, in the eyes of the public, they had become bad trusts, much like the Standard Oil Company. Indeed, one writer titled his book about them *The Greatest Trust in the World*, claiming that in comparison the Standard Oil Company was "puerile." Although after 1912 the packers focused increasingly on improving their competitive position by integrating vertically, they had so damaged their reputations that virtually anything they did was viewed with suspicion by regulators and the media alike. Taking a dim view of their attempts to exploit economies of scale and scope, the new FTC charged in 1919 them with using their dominance of all stages of the production and distribution of meat to monopolize the industry. Even with hindsight it is difficult to disentangle the efficiency gains that the meatpackers realized through vertical integration from the enhanced ability it gave them both to control prices and exclude competitors. Robert M. Aduddell and Louis P. Cain (1981) have recently reviewed the FTC's charges with a skeptical eye, concluding that many could not "be proved or disproved." They conceded, however, that the Commission had uncovered "sufficiently strong evidence to recommend prosecution under both sections I and II of the Sherman Act" (p. 235). In 1920 the

[7] These laws essentially structure antitrust policy to the present day, though there have been some key amendments, most importantly the Robinson-Patman Act (1936) prohibiting price discrimination, the Celler-Kefauver Act (1950) allowing the government to block vertical mergers that reduced competition, and the Hart-Scott-Rodino Antitrust Improvements Act (1976) requiring potentially anticompetitive mergers to be pre-screened by the FTC and Justice Department.

packers negotiated a consent decree with the Justice Department that required them, among other things, to divest themselves of their interests in stockyards and similar facilities (Aduddell and Cain 1981, 239-242).

To Balance or Not to Balance

The new antitrust regime put in place in the 1910s meant that firms could no longer acquire monopoly positions in their industries by buying out all their competitors the way Standard Oil had done. The Clayton Act made horizontal mergers illegal when their effect was "substantially to lessen competition or tend to create a monopoly." Firms could still grow large and acquire market power by innovating, so the key policy question became how to prevent businesses that grew large "normally" from turning to anticompetitive practices to preserve their market power, the way the meatpackers had done. The Clayton Act explicitly prohibited certain behaviors, such as tying contracts and discriminatory pricing, and the FTC had broad authority to take action against other conduct regarded as "unfair." As the commission's case against the meatpackers demonstrated, however, it was often difficult to distinguish actions that increased efficiency from those whose purpose was to forestall competition. These judgments became even more difficult over time, as businesses learned how to operate in the new institutional environment without running afoul of the antitrust laws.

The first decade or so of the twentieth century was a difficult period for the giant firms formed during the Great Merger Movement. Although many of these consolidations acquired the bulk of the capacity in their industries, relatively few maintained their dominance for long. Unless they were able to erect barriers to entry (which most were not), whenever they tried to raise prices, new firms would enter the market and their market shares would drop (Lamoreaux

1985). Shaw Livermore (1935, pp. 90-94) collected earnings data from 1901 to 1932 for 136 mergers that he deemed powerful enough at the time of their formation "to influence market conditions." He found that 37 percent of them were complete failures, while only 44 percent could be regarded as successes. Moreover, those that did not fail had to worry about antitrust prosecution (Bittlingmayer 1993). DuPont was broken up in 1911, shortly after Standard Oil and American Tobacco, and Alcoa signed a consent decree the next year. In the wake of those victories, the Justice Department launched suits against US Steel and International Harvester, among other companies. Both of those prosecutions ultimately failed, but they dragged on until the 1920s, absorbing company time and resources.

The firms that survived this shakeout period learned to compete in the new institutional environment by means other than price cutting. For example, they deployed advertising and other marketing strategies to build brand loyalty, improved their internal operations by integrating backward into raw-material production and forward into distribution, stayed on the technological cutting edge by investing in in-house R&D, and more generally erected barriers to entry in any way they could without inviting antitrust prosecution (Chandler 1977, Lamoreaux 1985). The firms that mastered these lessons dominated their industries for decades. Richard C. Edwards (1975) has compared the records of the 100 largest firms in the economy in 1903 and 1919. Most of the companies in the 1903 group struggled. Indeed, fully two thirds were either liquidated within the next two decades or lost ground in terms of the real value of their assets. By contrast, most of the firms in the 1919 group were highly successful, with more than 90 percent maintaining at least the real value of their assets fully a half century later. Tracking the 100 largest firms in the US economy at various points between 1909 and 1958, Norman R. Collins and Lee E. Preston (1961) similarly found that that the top firms gradually came to enjoy

"an increasing amount of entrenchment of position by virtue of their size" (p. 1001). Over these same decades, moreover, there was remarkably little change in overall levels of economic concentration. Scholars have measured concentration in different ways and over different sets of years, and as a result, their estimates bounce around a bit. But, as can be seen from Figures 1 and 2, there was no clear trend toward increasing (or decreasing) concentration, either in the manufacturing sector or in the economy as a whole.

Intriguingly, even as large firms consolidated their positions, the public's view of them became increasingly accepting. Louis Galambos (1975) has analyzed references to big business in a sample of periodicals read by various segments of the middle class over the period 1890-1940 and found that the antipathy of the late nineteenth century had greatly diminished by the interwar period. Dirk Auer and Nicholas Petit (2018) have conducted a similar analysis, searching the Proquest database of historical newspapers to find articles that included the word "monopoly." Even though the Auer and Petit were selecting on a word with generally negative connotations in American culture, they found that unfavorable mentions dropped from about 75 percent of the total in the late nineteenth century to a little over 50 percent starting in the 1920s.

This process of accommodation was probably furthered by the government's response to popular concerns about the dangers of bigness. In addition to the new antitrust laws already discussed, Congress took a first step toward limiting business influence in politics by passing the Tillman Act in 1907, prohibiting corporations from contributing money to political campaigns for national office. The act was a reaction to a particular set of revelations—that large mutual insurance companies were using their members' premiums to lobby for measures that weakened members' protections (Winkler 2004) —but it built on pervasive fears that large-scale businesses were using their vast resources to shape the rules in their favor. By the end of 1908, nineteen

states had enacted corporate campaign-finance legislation of their own, and they had also begun to restrict lobbying expenditures by corporations (McCormick 1981, p. 266). Congress would write an expanded version of the Tillman law into the Federal Corrupt Practices Act in 1925 (Mager 1976).

The new antitrust regime seems to have been similarly reassuring, even though the 1920s are generally regarded as a period when antitrust enforcement was relatively lax (Cheffins 1989). The FTC got off to an inauspicious start in the early 1920s—most of the complaints it filed were dismissed by the courts—and then it was essentially captured by business interests in the late 1920s (Davis 1962). By 1935, however, the agency was showing renewed vitality. The number of complaints it filed increased sharply, its dismissal rate fell to about a quarter, and it was winning the vast majority of the cases that proceeded to judicial review (Posner 1970, p. 382). At the Justice Department, there was no significant fall off in the number of cases during the interwar period, with the exception of the early years of the Great Depression. Prosecutors seem to have targeted fewer large firms during the 1920s, but the Department's win rate increased from 64 percent in 1920-1924 to 93 percent from 1925-29 (Posner 1970, pp. 368, 381; Cheffins 1989). Although most antitrust cases still involved horizontal combinations or conspiracies, by the 1930s about a third of the cases filed by the Justice Department were targeting abuses of market power, and the FTC's proportion was closer to half (Posner 1970, pp. 396, 405, 408).

One of the activities that increasingly concerned antitrust officials during the 1930s was patenting. After the First World War, large firms had stepped up both their investments in R&D and their efforts to accumulate patent portfolios. According to surveys conducted by the National Research Council (NRC), the number of new industrial research labs grew from about 37 per year between 1909 and 1918 to 74 per year from 1929 to 1936, and research employment

in these labs increased by a factor of almost ten between 1921 and 1940 (Mowery and Rosenberg 1989, pp. 62-69). Large firms generated increasing numbers of patents internally, but they also bought them from outside inventors. To measure both streams, Tom Nicholas collected information on patents assigned at issue during the 1920s to companies that the NRC reported as having at least one research lab. Because he was not able to observe assignments that occurred after the patent was granted, his numbers underestimate the stock of patents held by these firms. Nonetheless, he was able to match 17,620 patents to companies listed as having labs in 1927 (Nicholas 2008).

The competitive advantages to large firms that broad portfolios of patents could bring, both in terms of what they could achieve technologically and how they could forestall competition, were increasingly apparent—not least to the firms themselves (Reich 1985). As early as the 1920s, valuations on the securities markets began to mirror the size and quality of large firms' patent portfolios (Nicholas 2007). Federal antitrust authorities began to pay attention as well, especially during the late 1930s, when the administration of Franklin D. Roosevelt displayed renewed interest in the problem of monopoly (Hawley 1966). In 1938, a specially created commission, the Temporary National Economic Committee (TNEC), launched a three-year investigation into the "Concentration of Economic Power." The Committee began its hearings by examining large firms' use of patents to achieve monopoly control, focusing in particular on the automobile and glass industries. In 1939 the Committee held a second set of hearings to solicit ideas about how the patent system could be reformed (Hintz 2017). It also commissioned a book-length study by economist Walton Hamilton, *Patents and Free Enterprise* (1941). According to Hamilton, large firms had perverted the patent system. The system's original purpose had been to encourage technological ingenuity, but now, large firms were

instead deploying patents as barriers to entry and using licensing agreements to divide up the market and limit competition among themselves (Hamilton 1941, pp. 158-163; John 2018).

The TNEC's patent investigation was headed by Thurmond Arnold, assistant attorney general in charge of the Justice Department's antitrust division. Arnold's views about the abuse of patents were similar to Hamilton's, and at his insistence the committee's final report recommended compulsory licensing—requiring firms to license their technology at a fair royalty to anyone who wanted to use it. The recommendation went nowhere in Congress (Waller 2004), but Arnold nonetheless pursued it at Justice. As early as 1938, for example, he pushed Alcoa to license a set of its patents as part of an antitrust settlement, and the company agreed in a consent decree entered in 1942. By that time Arnold had already secured three other compulsory licensing orders, and many more were to come. Jonathan Barnett (2018) has compiled a complete list of such orders and their terms from 1938 to 1975. By the latter year the total had risen to 136, fully a third of which did not permit the firms to recoup any royalties at all for their intellectual property.

This move against patents was part of a more fundamental shift in antitrust policy that began with Arnold during the late New Deal and then acquired broader intellectual support in the 1950s and 1960s with the spread of what has been called the structure-conduct-performance paradigm, sometimes also known as the "Harvard School" (Phillips Sawyer 2018). Most often associated with the work of economist Joe S. Bain (1959), the paradigm's core idea was that the market power of large firms tends both to be self-perpetuating (because size itself confers advantages that operate as barriers to entry) and to hurt consumers (because size is associated with higher profits). The implication was that antitrust authorities should abandon what Bain called their "conduct orientation" and attack the problem of market power directly (p. 607).

Even before the development of this academic rationale, however, a federal appeals court had arrived at essentially the same conclusion in a landmark 1945 decision in the ongoing antitrust suit against Alcoa.[8] Justice Learned Hand's opinion found Alcoa in violation of the Sherman Act because it produced the lion's share (Hand estimated 90 percent) of the country's aluminum ingots and because was it was not simply the "passive beneficiary of a monopoly." Alcoa's crime was that it continued to behave entrepreneurially and actively seek new business (*United States v. Aluminum Co., of America*, 148 F2d 416 [1945]):

> True, it stimulated demand and opened new uses for the metal, but not without making sure that it could supply what it had evoked…. It was not inevitable that it should always anticipate increases in the demand for ingot and be prepared to supply them. Nothing compelled it to keep doubling and redoubling its capacity before others entered the field. (pp. 430-431)

Anticompetitive conduct of the sort that had led to the breakup of Standard Oil was not an issue. As Justice Hand admitted, "We need charge [Alcoa] with no moral derelictions after 1912," the year the company had settled an earlier antitrust suit. "[W]e may assume that all it claims for itself is true"—that the company "won its way by fair means" (pp. 430-431). Alcoa was in violation of the Sherman Act because it was big and successful, not because it had done anything wrong.

The shift in judicial thinking signaled by the *Alcoa* case stimulated major new antitrust initiatives against AT&T, IBM, and other large innovative firms during the post-World War II era. It also justified the imposition of compulsory licensing orders even in cases where there was

[8] The case was heard by the Second Circuit because four of the Supreme Court justices had been associated with prior antitrust litigation against Alcoa and had to recuse themselves. Congress passed a law in 1944 permitting cases where the Supreme Court could not muster a quorum to be certified instead to one of the circuit courts of appeal (Smith 1988).

no evidence that patents were being used anticompetitively (Barnett 2018). In levying such an order on the United Shoe Machinery Company, for example, the court admitted, "Defendant is not being punished for abusive practices respecting patents, for it engaged in none, except possibly two decades ago in connection with the wood heel business. It is being required to reduce the monopoly power it has, not as a result of patents, but as a result of business practices" (*United States v. United Shoe Mach. Corp.*, 110 F. Supp. 295 [1953]). Drawing a line between actions that improved efficiency and those that harmed competition can always be difficult, and it is perhaps especially difficult in the area of patents. But the courts had effectively decided that it was not necessary even to attempt to draw the line.

The new focus on market share in turn provoked a backlash. Economists like Harold Demsetz (1973 and 1974) challenged the structure-conduct-performance paradigm that supported it on theoretical grounds, arguing that the observed relationship between size and profits was just a correlation that was more reasonably explained by the likelihood that the most efficient firms would both earn high profits and have a high market share. Legal scholars like Robert Bork argued that antitrust policy had strayed from its original objective, which was to protect consumers (Bork 1965, 1966, and 1978). Like devotees of the structure-conduct-performance paradigm, these "Chicago School" scholars rejected earlier policy makers' focus on conduct.[9] They simply applied a different test to assess whether a large firm had violated the antitrust laws: instead of measuring the firm's market share, they asked whether the firm had made consumers worse off (Posner 1979).

[9] As Poser (1979) explained, the Chicago School's view of antitrust grew out of a series of studies arguing that predatory pricing, tying contracts, and similar types of bad conduct were economically irrational and so not likely to occur.

The Resurgence of Concerns about Bigness

By the late 1970s, the Chicago School's views were having a major impact on antitrust policy and on the courts (Phillips Sawyer 2018). Inflation was rampant, growth low, and the US manufacturing sector seemed to be collapsing, transforming what had once been vibrant industrial cities into rust-belt wrecks. The decline had many sources, ranging from external developments such as rising foreign competition to internal problems such as changes in managerial practices that undermined product quality, but it did not seem to be a good time to target the most innovative firms and largest employers in the economy (Hannah 1999; Lamoreaux, Raff, and Temin 2003; Cheffins 2019). Some giant enterprises, including the meatpackers Swift and Armour, disappeared into mergers. Others, like the big three auto makers, General Motors, Ford, and Chrysler, struggled to maintain the profitability of their core business, with Chrysler only surviving with the help of a government bailout. A few successfully reinvented themselves by pursuing different business models. General Electric largely abandoned its consumer electronics business in favor of a strategy of conglomerate mergers. IBM moved away from computer manufacturing and focused instead on business information services and consulting.

Although overall levels of concentration in the economy dipped for a time as a result of these changes (see Figures 1 and 2), they soon began to rise again as new behemoths emerged in the most rapidly growing sectors of the economy, particularly those exploiting cutting-edge computing and information technologies where there were important network externalities (Autor, et al., 2017; Gutiérrez and Philippon 2017; Grullon, Larkin and Michaely 2018; Peltzman 2014). In such industries, consumers stood to benefit from using the same products that many others were using, and so firms that pulled ahead in the competition quickly acquired

dominant market shares. Google, Apple, Amazon, and the other new "superstar" firms (the term comes from Autor, et al. 2017) grew primarily by innovating—by offering consumers desirable new products or new ways of buying familiar ones. Nevertheless, their rapid rise set off waves of anxiety about the growth of monopoly power in the American economy reminiscent of the late-nineteenth-century reaction to Standard Oil (Lynn 2010; Khan 2018; Wu 2018).

As Carl Shapiro observes in his companion essay in this issue, the increase in the market share of these superstar firms does not necessarily mean that the economy has become less competitive. Indeed, good evidence to the contrary comes from the simple fact that the identity of the firms singled out as objects of concern has changed as technology has continued to evolve. In the first decade of the twenty-first century, for example, critics decried Wal-Mart's detrimental effect on competing retailers and the monopsony power it exercised over suppliers and workers (Lichtenstein 2009). By the next decade, however, the spotlight had shifted to Amazon, as internet sales challenged the profitability of bricks-and-mortar retailers. According to New Brandeisian Lina Khan (2017, 709-710), for example, Amazon's 46 percent share of e-commerce in the United States does not begin to capture the extent of its dominance. As Khan sees it, Amazon has cut prices and sacrificed profits in a predatory drive to position itself as the indispensable provider of infrastructure services to a broad range of businesses, including those with which it is in competition. Although so far it has generally refrained from exploiting its market power over rivals, it has used its muscle to force down prices charged by its suppliers and also by providers of transportation services. The potential for worse is there in Khan's view, and she argues that the antitrust authorities should take preventive action. However, is also plausible that ongoing technological progress will give rise to new enterprises that will challenge Amazon's hegemony, just as Amazon previously contested Wal-Mart's.

As the example of the meatpackers underscored, companies that grow large through innovation are no less likely than those that grow large by merger to turn to anticompetitive practices to maintain their advantages. Microsoft is a recent case in point. The company rose to bigness on the success of its operating system for personal computers and its popular word-processing software. But when faced with new threats to its dominance from computer makers using other operating systems (most notably Apple) and from the growth of the internet, it took steps that even Chicago-influenced antitrust authorities regarded as anticompetitive. According to a lawsuit filed by Justice Department, Microsoft promoted the use of its own internet browser by integrating it into its Windows software, negotiating exclusive dealing contracts with internet service providers and software producers, cutting deals with computer makers to install the browser on all the new computers they sold, and threatening those who made similar arrangements with other browser companies with a loss of business. A federal district court found Microsoft in violation of the Sherman Act and ordered the company broken up. An appeals court vacated the breakup order and reversed some of the lower court's findings, but it affirmed other findings and remanded still others for further consideration. Microsoft then settled the case (Cohen 2004). Although the settlement did not completely end the company's legal problems, its executives absorbed the same lessons from the experiecne that large firms had learned in the early twentieth century: they had to change their ways to avoid antitrust problems.

Once again, the line between actions that improved efficiency and those that aimed "to cut off [rivals'] air supply," as Microsoft's executives were alleged to have threatened (Chandrasekaram 1998), was difficult to draw. Scholars disagreed vehemently about whether Microsoft had transgressed (see, for example, Bresnahan 2001; and the symposium in the Spring 2001 issue of this journal, including Klein 2001; Gilbert and Katz 2001; and Whinston 2001),

and we can never know the counterfactual outcome in the absence of litigation. After the settlement Microsoft's browser sank into obscurity, but so did the competing browsers that were the main beneficiaries of the antitrust action. In 2008, Google introduced a new browser, Chrome, that quickly swept away the competition. Ten years later Chrome had a 63 percent share of the global browser market, with Apple's Safari a distant second at 14 percent (as reported at W3Counter, https://www.w3counter.com/globalstats.php, accessed April 28, 2019). The browsers involved in the antitrust suit had been completely left in the dust. Would Chrome have been so successful if Microsoft had not first been chastened?

Google now stands accused of using its popular search engine to give preference to its own vertically linked services (Phillips Sawyer 2016; Edelman 2015). The FTC (2013, p. 3) conducted an investigation of these charges and dismissed them, deciding that "Google's display of its own content could plausibly be viewed as an improvement in the overall quality of Google's search product." By contrast, the European Union's Commissioner for Competition, Margrethe Vestager, found that the biases in Google's search results "artificially divert[ed] traffic from rival comparison shopping services and hinder[ed] their ability to compete." The diversion was detrimental to consumers, the Commissioner found, because "users do not necessarily see the most relevant results in response to queries" (European Commission 2015). Vestager brought formal charges against Google in 2015, and two years later the company was found guilty and fined a record $2.7 billion (as reported in Scott 2017).

Was the Federal Trade Commission too meek, or the European Commission too harsh? The *Wall Street Journal* got a peek behind the curtain of the FTC decision-making process when it (accidentally) gained access to scattered pages of an internal FTC staff report on the case through a Freedom of Information Act request (Phillips Sawyer 2016, p. 12). Although staff

members recommended that the FTC not take action on the charge that Google's search results were biased against competitors, they did encourage the commissioners to sue Google for several other antitrust violations. Moreover, the FTC staff regarded the search-engine recommendation to be a "close question": "[T]he evidence paints a complex portrait of a company working toward an overall goal of maintaining its market share by providing the best user experience, while simultaneously engaging in tactics that resulted in harm to many vertical competitors, and likely helped to entrench Google's monopoly power over search and advertising." The recommendation not to move forward with the charge was driven in part staff members' sense that the line between actions that enhance efficiency and those that are anticompetitive in purpose and effect is difficult to draw, but also by their perception that there was no interest in drawing it in the current antitrust legal environment. Such a determination "would require an extensive balancing of these factors, a task that courts have been unwilling—in similar circumstances—to perform" (FTC 2012, p. 86).

The FTC promised in its 2013 statement to "remain vigilant and continue to monitor Google for conduct that may harm competition and consumers," and in 2016 it announced that it was expanding its investigation into Google's use of Android to foreclose competition (as reported in Nicas and Kendall 2016).[10] However, critics remain convinced that its focus on consumer welfare is blinding it to the broader range of problems that bigness can entail (Wu 2018).[11] There is renewed concern, moreover, that the tech firms' enormous wealth is giving them an undue influence on policy. The Supreme Court's dismantling of restrictions on

[10]As of this writing, it has not yet issued a report, whereas the European Commission recently levied another record fine on Google in the Android case, this time for $5.1 billion (as reported in Satariano and Nicas 2018).
[11] Responding to critics, the FTC announced in 2018 that it would hold public hearings on competition policy, including "whether technology firms are undermining competition." One of the Democratic FTC commissioners also announced that Khan would join his office for a few months to advise him on antitrust policy toward Amazon and other tech giants (as reported in McLaughlin 2018).

corporate political contributions (*Citizens United v. Federal Election Commission*, 558 US 310 [2010]) has fueled worries about flows of money that citizens cannot observe. These anxieties have been exacerbated by what they are able to observe—the enormous resources that Google and other tech giants have been pouring into lobbying the federal government. Google spent less than $50,000 on lobbying in 2002. In 2017, it spent more than $18 million, and Amazon, Apple, and Facebook were not far behind, with expenditures by these four tech companies totaling nearly $50 million (as reported in Taplin 2017; Bach 2018). In the first three quarters of 2018, Google spent more on lobbying in Washington ($16.5 million) than any other business corporation, coming in ahead of the American Medical Association and the American Hospital Association, and spending considerably more than twice as much as the National Rifle Association (for a list of the firms and organizations that spend the most on lobbying, see Ackley 2018).[12]

The New Brandeisians are raising concerns about the threat that monopoly power poses to the economy and to our democracy. These concerns are not new. Indeed, they echo fears aroused by the rise of the Standard Oil Trust and other big businesses at the turn of the last century. Then, as now, the fears were not only about—not even primarily about—the effect of monopoly on consumers, but rather about the exclusion of competitors from the market and the manipulation of the political system for economic ends. The worries, then as now, had a substantial basis in fact, but they also posed difficult questions of interpretation. How can one determine whether an action was taken to improve efficiency or exclude a rival? What if an action did both?

[12] For a list of the firms and organizations that spend the most on lobbying, see "Google Still K Street's Top Tech Spender," https://www.rollcall.com/news/politics/tech-trade-appropriations-keep-k-street-in-business, accessed 2 December 2018.

In response to the rise of Standard Oil and other trusts, lawmakers put in place a complex of institutions that had at their core two basic principles: that firms could grow large by innovating as well as by combining with their competitors; and that even the most innovative enterprises might resort to anticompetitive tactics to preserve their market position. The institutions that early twentieth-century lawmakers created were by no means perfect, but the balance they struck between these competing principles underpinned a long period in which fears of big business abated and large firms learned to stabilize their industries and compete on dimensions other than price without running afoul of the antitrust authorities. Striking the right balance was difficult, however, and over the long run policy makers lost their commitment to the effort, swinging first to the extreme that bigness in itself was bad and needed to be countered, and then to opposite extreme that bigness was never a problem so long as it brought gains to consumers. Perhaps now would be an opportune time to return to the task of assessing large firms' conduct. How else can we avoid the twin perils of, on the one hand, attacking firms that are large and successful because they are innovative, and on the other, allowing large, successful firms to block innovative challengers?

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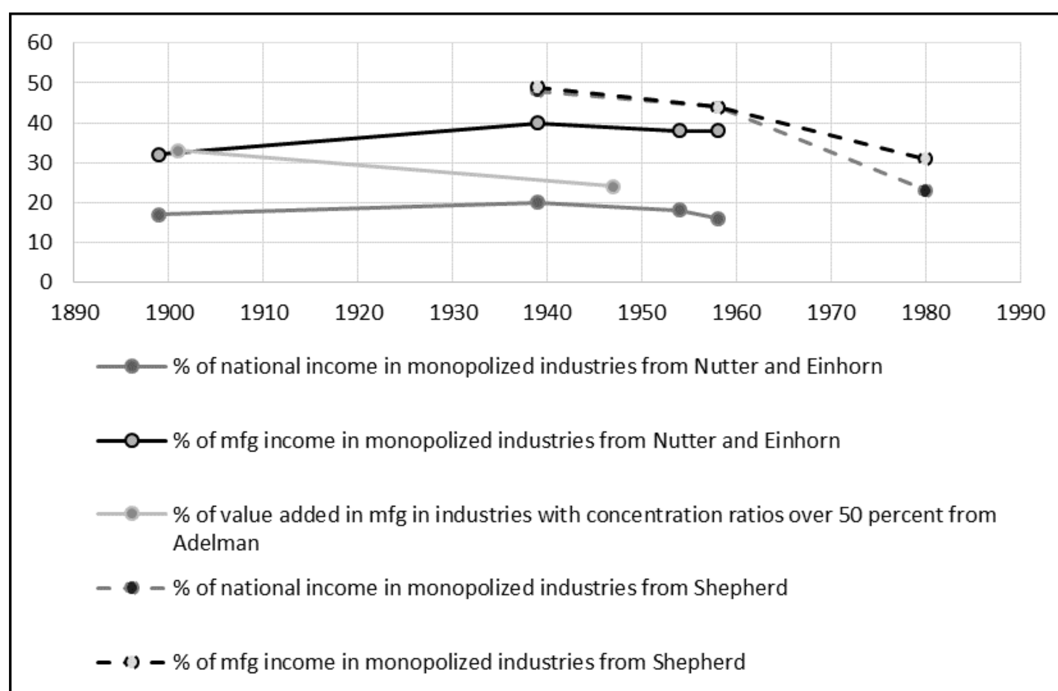
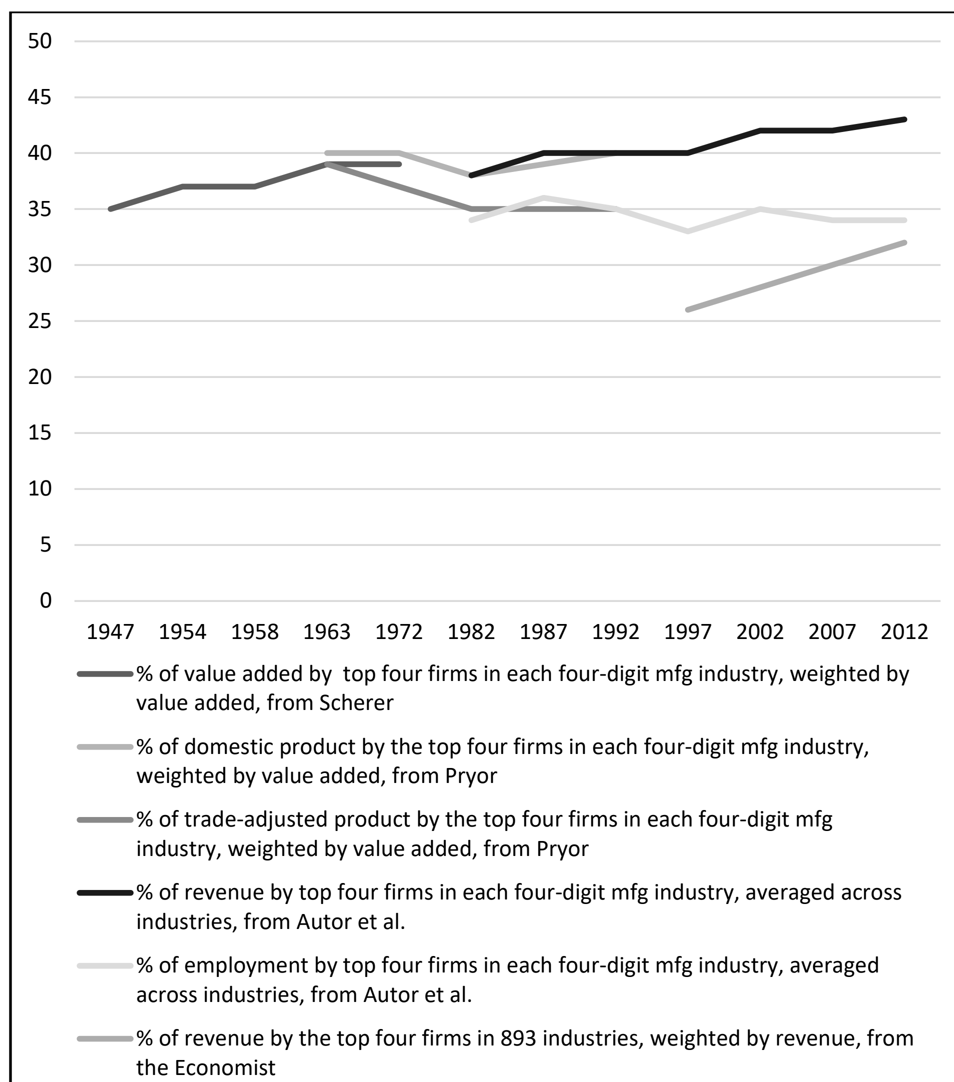
Figure 1. Percent of National and Manufacturing Income in Monopolized Industries, Selected Years, 1899 to 1980



Notes: The authors studied broad industry categories to determine whether they were effectively monopolized—that is, whether they were dominated by small numbers of large firms.

Sources: Nutter and Einhorn (1969), 48, 50, 56, 63; Adelman (1951), 291; Shepherd (1982), 618.

Figure 2. Four-Firm Concentration Ratios, Selected Years, 1947-2012



Notes: All series are for the manufacturing sector, except the one from the *Economist*, which covers the whole economy. Manufacturing's share of total output declined over this period from about 25 to 12 percent.

Sources: Scherer (1980), 69; Pryor (2001), 320; Autor, et al. (2017), 34; "Corporate Concentration," *Economist*, https://www.economist.com/graphic-detail/2016/03/24/corporate-concentration, accessed April 26, 2019.