[Working Draft]

Chapter 1:
GE versus the Market

Introduction

This chapter examines General Electric's (GE) early manufacturing and financing history. In the context of my dissertation on financialization, this chapter places the company within a larger narrative arch for two reasons. The first is to explore the factors that permitted GE to maintain a profitable and dominant foothold in the manufacturing sector before its turn to financialization; the second is to explore GE's longer history in the financial sector in order to appreciate more fully the extent to which financialization entailed a fundamental restructuring of the company. While the dissertation as a whole tells a story about the decline of the industrial economy, this chapter on its own tells a story about manufacturing ascent. In particular, this chapter argues that GE's industrial success was rooted in its ability to control the market in three interrelated ways: *research and development* to prevent market entry, *industrial collusion* to determine prices, production, and markets, and *finance* to cultivate and control consumption. Not until GE's hegemonic position in the industrial economy was challenged did its turn toward financialization begin.[1]

The modern electrical industry emerged in the last quarter of the nineteenth century. It was a period of profound transformation in the world of business. Due to innovations in transportation, communications, mechanical power, and electrification, industry grew to unprecedented levels. Gone were the days when the traditional family firm, functionally limited and relatively provincial, reigned as the dominant business form. In its stead emerged the multi-unit, large-scale industrial enterprise commanding immense sums of capital and creating markets across national and international boundaries. New financial institutions such as the stock market, investment houses, and commercial banks provided the means for increased investment in production, marketing, and distribution. To administer these complex industrial organizations, a new cohort of salaried managers arose to the task. They allocated resources, monitored production, and coordinated the firm's varying activities on the open market. Just as important for production as developments in technology was the manifestation of an industrial workforce

[1] By the early 1990s, GE's financial division GE Capital had begun to produce nearly 50 percent of the company's total profits. Indeed, with a vast portfolio of financial businesses, such as securities brokerage and trading, foreign banking, commercial reinvestment, auto, train, and aircraft leasing, mortgage and other forms of consumer financing, GE had then become one of the largest non-bank financing companies in the world.

made possible by the population boom in the northeast United States. Amid such concomitant changes in the structure of private enterprise was born the era of industrial capitalism.[2]

Exponential growth notwithstanding, the economy of the late 1800s was deeply unstable and mired in crisis. In the business community, the enigmas of overproduction, ruinous competition, and declining prices engendered a pervasive sense of insecurity. As severe and reoccurring economic cycles crashed onto to the national scene, bewilderment about the inner workings of the new economy heightened. Businessmen scrambled for solutions when credit markets froze and businesses failed during the depressions of the late nineteenth century. Yet their problems became more acute as workers began organizing in unions to fight for better wages and working conditions. In this context, businessmen became increasingly apprehensive about a profitability squeeze from both labor and competing sections of capital.[3]

Firms responded by colluding in their respective industries. Following the lead of the railroads, other industries, too, in an effort to control prices and output, formed cartels. Yet as consortiums of separate business entities, each independent in their internal affairs, some cartels found it difficult to enforce rules of association, especially during times of economic contraction when members became tempted to cut prices to increase market share. As such, many industries opted for the trust where control of investment decisions and day-to-day business operations was centralized in a board of trustees. When the passage of Sherman Antitrust Act officially made trusts illegal, many were replaced by a new legal entity called the holding company. In the end, however, collusion in these various organizational forms all sought to accomplish the same thing: market control through industrial practices that sought to regulate economy.[4]

Formed in 1892, GE emerged in this volatile context of industrial change. The fierce competition that consumed the nascent electrical industry triggered some of the most striking forms of collusion for market control. As a multitude of electrical innovations opened up bustling new markets, dozens of electrical businesses rushed in to create a highly competitive industry where no single firm initially had the ability to influence price, quantity, or other aspects

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[2] Alfred Chandler and Takashi Hikino, *Scale and Scope: The Dynamics of Industrial Capitalism* (Cambridge (Mass.): Belknap Press of Harvard University Press, 2004).

[3] Sven Beckert, *The Monied Metropolis: New York City and the Consolidation of the American Bourgeoisie, 1850-1896* (Cambridge: Cambridge University Press, 2001); James Livingston, *Origins of the Federal Reserve System: Money, Class, and Corporate Capitalism, 1890-1913* (Ithaca, NY: Cornell University Press, 1989).

[4] Naomi R. Lamoreaux, *The Great Merger Movement in American Business, 1895-1904* (Cambridge: Cambridge University Press, 1985); Gabriel Kolko, *Railroads and Regulation: 1877-1916* (Princeton, NJ: Princeton Univ. Pr., 1965); Martin J. Sklar, *The Corporate Reconstruction of American Capitalism, 1890-1916: The Market, the Law, and Politics* (Cambridge: Cambridge Univ. Press, 2004); James Weinstein, *The Corporate Ideal in the Liberal State, 1900-1918* (Westport, CT: Greenwood Press, 1981); Beckert, *The Monied Metropolis*; James Livingston, *Origins of the Federal Reserve System*; Kolko, *Railroads and Regulation*.

of the market. Electrical firms thus responded by merging and acquiring competitors, which culminated with the emergence of two industry leaders: GE and Westinghouse. Nonetheless, when cutthroat competition ensued between the two, market control became their main objective. One strategy, in an effort to protect inventions and block market entry, was to aggressively expand one's patent portfolio; a second strategy, with the goal of setting prices, establishing production quotas, and dividing markets, was to establish cross-licensing and patent-pooling agreements; and yet a third strategy, which was geared toward cultivating and controlling consumption, was to offer its customers financial services. GE established market control in the late nineteenth century *and maintained it through the mid twentieth* using all three strategies. Although what follows is a story about GE, it characterizes in many ways the development of industrial capitalism in the US.

Research and Development

Due to the complexity of the technology, the electrical industry from the beginning had to invest heavily in research and development. Indeed, the initial products of the electrical industry were bound up with no simpler task than the electrification of entire cities. The first step in this direction was the practical application of electric light through light bulb and dynamo in the late 1870s. Then came electric motors and trolleys in the 1880s, followed by transformers, transmission equipment, big generating units, and electric trains in the 1890s. In factories, electric motors revolutionized industrial processes away from older forms of power generation, while transmission and generating apparatus further revolutionized industry by freeing it from the tyranny of location. Factories thus began concentrating in larger cities in order to tap into the ample supply of labor. As city dwellers commuted to work each day on electric trolleys, subways, and elevated rail, electrical transportation increasingly began to replace cable cars and the lingering horse-drawn carriage. Excluding businesses that set up their own isolated electrical power plants, all such electricity was supplied from central power stations operated by newly formed electrical utilities. To keep apace with the perpetual demands for product improvement, electrical firms began to increasingly invest in research and development. However, such investments were more than for innovation in itself, but also a means of blocking competitors from entering the market. In no electrical firm was this truer than in GE.

GE was itself the product of a competitive deadlock in the field of research and development. As patent wars consumed the early electrical industry, manufacturers spent considerable resources attempting to circumvent patented technology and litigating patent infringement suits. The most famous case of the time with industry-wide ramifications was *Edison Electric Light Company* v. *United States Electric Lighting Company*. The basic issue concerned the well-known Edison patent No. 223,889, which, according to the prosecution, gave the Edison interests an exclusive right to manufacture and sell the incandescent lamp. From this premise followed the contention that all incandescent lamp manufacturers were infringing the Edison patent. Several months of trial, volumes of testimony, and dozens of witnesses later, Judge Wallace of the US Circuit Court upheld the Edison patent. The ruling granted the Edison interests injunctive relief and accounting for profits and damages, which, according to the Edison counsel, amounted to some $15 million. More significantly, the ruling granted the Edison interests the right to issue licenses and collect royalty payments on all lamp production until the patent's expiration in 1894, which worked to effectively solidify a lamp monopoly for several years.[5] Right after the decision, an attorney for the Edison interests proclaimed, "There will be an increase from 40 per cent to 100 per cent of the incandescent lamps manufactured at once, though it is quite likely that some factories will not be closed, but may be allowed to continue on the royalty system."[6]

The Edison patent case cultivated a strong sense of uncertainty across the industry. Electrical manufacturers grew wary about a looming future where patent infringement suits would undermine business growth. For the Edison interests who had been primarily invested in DC lighting systems, entering the emerging field of AC technology without infringing on competitors' patents would have been virtually impossible. Lest the Edison interests face another bout of costly litigation, Henry Villard, then president of Edison GE, orchestrated the merger with Thomson-Houston to form GE. Villard anticipated that the merger would at once eliminate a key competitor (Thomson-Houston) while improve the company's position against another (Westinghouse). Edison, however, was against the merger declaring that the elimination of competition would ruin the incentive to invent. "If you make the coalition, my usefulness as an inventor is gone," Edison wrote Villard. "I can invent only under powerful incentive. No

[5] Quoted in "Edison's Patent Upheld: Judge Wallace Decides the Incandescent Lamp Case," *New York Times*, July 15, 1891.
[6] Quoted in "Edison's Patent Upheld: The End of the Incandescent Light Litigation," October 5, 1892.

competition means no invention."[7] Yet already having lost control of the company, Edison's plea was to no avail.

The merger brought together two of the top three electrical firms and leveraged the fruits of their research and development to obtain market control. At the time, Edison GE was capitalized at $15 million compared to Thomson-Houston's $10.4 million, while both companies reported more than $10 million in total income. Edison GE had about six thousand employees on payroll, whereas Thomson-Houston had about four thousand. In the central station business, Thomson-Houston had supplied about 500 more than Edison GE, but Edison GE dominated the isolated plants business. With Edison GE having supplied 180 street railways and Thomson-Houston 204, both companies held a controlling share of the electric railway market. Yet the merger was more than a horizontal integration of competitors in similar product. It was also a combination of different businesses. For example, Thomson-Houston held robust patent positions in AC and arc lighting systems, whereas Edison GE held them in DC technology and incandescent lamps. As such, the combined patents of both companies gave GE a commanding position across the entire electrical industry and set in motion the beginning of the U.S. electrical oligopoly.[8]

Through the first half of the twentieth century, research and development continued to play a vital role in boosting GE's competitive advantage. Following the lead of German pharmaceutical and chemical companies, US manufacturing firms in capital-intensive industries (e.g. petroleum refining, chemicals, communications, and electrical) began to heavily invest in independent research labs. Although many firms had already established testing and engineering labs responsible for product design and efficiency, such labs had not been separated from production facilities. In contrast, independent research labs were isolated from the immediate needs of the firm and given the space to focus on long-term innovation and fundamental research. To do this they discarded the practice of contracting technical experts and replaced it by hiring permanently employed engineers, mathematicians, and scientists. Collectively, these researchers had a twofold responsibility: streamlining the patenting process to prevent

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[7] Quoted in Harold C. Passer, *The Electrical Manufacturers 1875-1900: A Study in Competition, Entrepreneurship, Technical Change, and Economic Growth* (Ayer, 1988).

[8] Leonard S. Reich, *The Making of American Industrial Research: Science and Business at GE and Bell, 1876-1926* (Cambridge: Cambridge University Press, 2002); Passer, *The Electrical Manufacturers*; John Winthrop Hammond, *Men and Volts: The Story of General Electric* (Schenectady, NY: General Electric, 1941).

competitors from entering older markets, and developing new products to permit their respective firm to enter newer ones.[9]

At GE chief engineer Charles Steinmetz was the first to champion an independent research lab. Born in Breslau, Germany in 1865, Steinmetz left to the United States in his mid-20s to pursue a career in electrical engineering. His first stint was as an assistant draftsman making $12 per week. The firm, Eickemeyer & Osterheld, was primarily a manufacturer of hats, but also had a small, yet growing operation in electrical machinery building motors for streetcars. There, over the course of three years, Steinmetz received comprehensive training as an electrical engineer. During this time, Steinmetz published regularly on emerging AC technology and read his papers before the American Institute of Electrical Engineers. In this way, Steinmetz rapidly began to gain an international reputation. In 1892, when GE acquired Eickemeyer & Osterheld, not only did GE seek to secure important patents and eliminate a growing competitor but also to employ Steinmetz.[10]

Steinmetz proved his value to GE and made his way up the corporate hierarchy as an electrical engineer very quickly. Within the first few months at GE, Steinmetz helped bring the company's work on polyphase systems into fruition, a technological development of immense significance making power transmission more efficient and economical. In what became known as the "Steinmetz method," Steinmetz improved upon a mathematical technique to analyze AC circuits, simplifying the process from one involving high-level calculus to basic algebra. With such success, Steinmetz was promoted after his first year at GE to head the Calculating Department that did the design computations for the entire company. Since most of the design work required Steinmetz's approval, this position made him GE's de facto chief engineer.[11]

Steinmetz was a staunch critic of the free market. Brought up in the corporate world during the economic turmoil of the 1890s, he observed how competition led to price wars and overproduction, and then to economic crisis and industrial bankruptcy. In this context, Steinmetz concluded that competition was not only inefficient but destructive too. "As soon as the world can produce more than can be consumed, it leads to the destruction of industry," said Steinmetz in an interview with the Metropolitan. "If unrestrictive competition is destructive, then restrict

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[9] Reich, *The Making of American Industrial* Research; George Wise, *Willis R. Whitney, General Electric, and the Origins of U.S. Industrial Research* (New York: Columbia University Press, 1985).
[10] Ronald R. Kline, *Steinmetz: Engineer and Socialist* (Baltimore: Johns Hopkins University Press, 1992).
[11] Ibid.

competition."[12] In his mind, the formation of large corporations and industrial cartels was not the problem but rather the solution. Indeed, he considered the Sherman Antitrust Act to be a reactionary law, and stated, "It is not that trusts destroy competition, but competition destroys itself… Consolidation is the direct logical result of competition." Steinmetz argued that planning and large organization was the inevitable outcome of industrial society. However, acknowledging a link between consolidation and the potential to abuse power, Steinmetz contended that supervision, and, eventually, public ownership of large industrial firms would be necessary. Yet, he thought that how such developments would unfold would ultimately depend on each country's unique cultural history.[13]

Steinmetz's critique of the free market was most likely reinforced by his socialist politics. In 1884, Steinmetz joined a student group affiliated with the German Socialist Party at the University of Breslau. His activities there included reading the works of renowned socialist thinkers and helping to establish the Socialist Party's local paper. Seeking to escape the same fate of his arrested comrades, Steinmetz fled to Zurich before finishing a doctorate in mathematics. After completing one semester in an engineering program at the Swiss Federal Polytechnic Institute, Steinmetz departed for New York City, leaving behind his homeland as well as his involvement with the Socialist Party. Not until 1911 did Steinmetz return to politics when he served in the administration of Schenectady mayor George Lunn, the first and only mayor in the state of the New York to win on a socialist ticket.[14]

Steinmetz's anti-competitive views informed his efforts to convince GE executives to establish an independent research lab. In describing a lab's would-be benefits, Steinmetz said, "It appears to me that our Company would have in such work a very great advantage over any other concern."[15] Despite making his case on the basis of controlling the market, the idea was initially not well received by the executive leadership. GE president Charles Coffin and the board of the directors were uninterested in investing in a project only loosely tied to the company's manufacturing operations. Yet unrelenting in his efforts, Steinmetz garnered the support of vice president Edwin Rice and patent counsel Albert Davis. Each of the three men made their case on the basis of stymieing competition, especially in lighting where new technological developments

[12] Arthur H. Gleason, "The Socialism of Steinmetz," *Metropolitan*, March 1914. https://catalog.hathitrust.org/Record/000057192.
[13] He contended that due to an individualistic ethos and opposition to bigness, in both government and in industry alike, state corporatism like in Germany would not be possible in the United States, at least not right away.
[14] Kline, *Steinmetz*
[15] Quoted in Reich, *The Making of American Industrial Research.*

had begun to encroach upon GE's market share. Davis, for example, warned of the opportunity costs to not expand research in lamps, stating, "If someone gets ahead of us in this development we will have to spend large sums in buying patents or patent rights."[16] With the support of these top executives, Coffin and the board of directors finally acquiesced.

At the end of 1900, GE became the first major firm in the U.S. to establish an independent research lab. Rice first announced the Research Lab to shareholders in the company's 1902 annual report. "Although our engineers have always been liberally supplied with every facility for the development of new and original designs and improvement of existing standards, it has been deemed wise during the past year to establish a laboratory to be devoted exclusively to original research," stated Rice. "It is hoped by this means that many profitable fields may be discovered."[17] Despite some initial setbacks, the Research Lab underwent immense expansion during its first two decades of operation. Beginning with a staff of three in a carriage barn behind Steinmetz's home on the banks of the Erie Canal, the Research Lab by 1914 had been transformed into a seven-story redbrick building of 65,000 square feet housing a workforce of more than 300. That same year, construction began on a supplemental research building of relatively equal size. From 1910 to 1919, the number of professional workers, which included research scientists and engineers, grew from 47 to 134. Funding and staff continued to grow through the 1920s. In 1928, the Research Lab's director MIT chemist Dr. Willis R. Whitney was promoted to GE vice president and the lab itself was granted divisional status within the company.[18]

One way the Research Lab helped GE establish market control was through patents. Whitney established a system of careful recordkeeping that screened for patentable developments. His researchers were required to log their work daily and submit monthly reports, which he would then scan and submit everything of promise to GE's Patent Department. This process was further streamlined in 1910 when the Patent Department assigned lawyers of technical competence to frequent the Research Lab, monitor research, and submit patent applications. Researchers worked closely with the lawyers to help GE circumvent its competitors' patents. Researchers helped them prepare case records for patent infringement suits and were called upon regularly by the Patent Department to testify in court. Though committed

[16] Ibid.
[17] *GE Annual Report*, 1902, MiSci Archives.
[18] *GE Annual Reports*, 1926, 1928, 1935, 1932, MiSci Archives.

to fundamental research, researchers had to receive approval from the Patent Department before publishing and presenting their discoveries to the scientific community, and in some cases were forced to maintain total secrecy to prevent competitors from accessing valuable technical and scientific knowledge – the underlining inventive motive, after all, was to discover "profitable fields."[19]

The Research Lab also helped GE establish market control through product innovation and development. GE's early defense of the incandescent lighting market is a prime example. At the turn of the twentieth century, German electrical engineers made major technological breakthroughs. Everyone in the industry knew that innovations in metal filaments would soon produce a better product than Edison's carbon-based light bulb, which had thus far dominated the market. That Westinghouse held the US patent rights to some of this technology brought the threat within national borders. In a letter to Rice, Steinmetz bemoaned, "It appears shameful to me, that the successors of Edison should cease to be considered as the leaders in the development of incandescent lighting, and European engineers get the credit which our company should have retained, if its engineers had not been sleep."[20] Lest GE lose the race against German competitors, namely AEG and Siemens, Whitney regrouped the Research Lab to solely focus on developing a commercially viable metal filament. The breakthrough came in 1911 when GE researchers discovered a way to make tungsten ductile. With the most robust and efficient filament to date, the ductile-tungsten lamp was an immediate success, capturing over 70 percent of the US lighting market in just three years. In both domestic and international markets, GE leveraged its patents on ductile-tungsten and granted licenses to competitors in exchange for royalty payments and setting lamp production quotas.[21]

Through the mid century, the Research Lab continued to play a vital role in helping GE establish market control. Other technological breakthroughs such as the high-frequency alternator and the modern X-ray tube allowed GE to enter new markets and establish first mover advantages. The Research Lab also worked closely with GE's manufacturing and engineering departments to help bring down production costs and improve product quality, which also worked to boost GE's competitive advantage. In lamps, for example, lower costs and higher quality permitted GE to steadily lower prices to extend its market share. With these and other

[19] Reich, *The Making of American Industrial Research*
[20] Quoted in Reich, *The Making of American Industrial Research.*
[21] *GE Annual Reports*, 1907-1910, MiSci Archives; Reich, *The Making of American Industrial Research.*

technological contributions, the Research Lab quickly proved itself to be an essential component of GE's manufacturing success.

Industrial Collusion

GE had a comprehensive approach to market control. In addition to leveraging research and development, GE colluded with competitors to determine prices of products, quotas of production, and division of markets. Through various cross-licensing and patent-pooling agreements, GE led the effort to control the electrical market both domestically and abroad. Indeed, such agreements were not so much meant to reduce the transaction costs of negotiating multiple licenses as much as they were to block market entry, stymie competition, and maintain market share, all of which were integral parts of its larger effort to turn greater profits. Although confronting some barriers to such anti-competitive practices, GE was relatively successful through the first half of the twentieth century.

Industrial collusion was initially a response to ruinous competition. In an attempt to monopolize the different areas of the electrical industry, including electric railway, lighting, and power apparatus, GE and Westinghouse filed hundreds of patent infringement suits against each other between 1894 and 1896.[22] Despite boasting in 1896, "The result of the work of your Company in protecting its patents and enjoining infringers has been highly satisfactory," litigation had cost GE more than $1 million dollars annually.[23] Additionally, the expiration of the Edison lamp patent in November 1894 led to the emergence of dozens of smaller competitors. No longer with its weapon of legal monopoly, GE first sought to retain its market share through an economy scale. "Your Company still owns patents of more or less importance upon the incandescent lamp," stated GE's 1895 annual report. "But it will chiefly rely upon the high quality of the lamp manufactured and its facilities for manufacturing in large quantities at a low cost to maintain its commanding position in the lamp business irrespective of patent control."[24] While GE's costs advantage permitted low enough prices to retain 50 percent market share, the downward pressure on prices was, at the same time, one of the reasons why profits remained low. Something else had to be done.

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[22] Ronald W. Schatz, *The Electrical Workers: A History of Labor at General Electric and Westinghouse: 1923-60* (Urbana: University of Illinois Press, 1983).
[23] *GE Annual Reports*, 1894-95, MiSci Archives.
[24] *GE Annual Report*, 1895, MiSci Archives.

For the men in charge of the leading electrical firms, the solution to the tumultuous start of the electrical industry was through collusion. In an effort to end the ongoing price competition, GE, Westinghouse, and 16 small lamp manufacturers negotiated an arrangement to fix prices and divide the incandescent lighting market. Finalized in August 1896, the agreement allotted 50 percent of the market to GE, 15 percent to Westinghouse, and the rest to the remaining firms. Per terms of the agreement, Westinghouse was to grant licenses to the other members under its patents. In exchange, Westinghouse was to adhere to the prices set by the licensees. In practice, this meant GE, the sole company in the agreement with the lion's share of the market. The reason GE did not take on the role of licensor was because its contracts with local lighting companies prevented it from licensing other firms. In any case, receiving only one-third of a cent per lamp, the licensing function was negligible, while the principle features were price setting and market allotment, from which GE was the main beneficiary. To prevent the emergence of new price competitors, lamp prices were raised only slightly in the ensuing years.[25]

That same year, GE and Westinghouse reached another agreement that covered all the other heavy electrical equipment. According to GE's official public statement, it was "The especial incentives which led to the arrangement at this time were the recent decisions in favor of patents of the General Electric company… and the equally strong position of the Westinghouse company…"[26] The agreement pooled both companies' patents and divided the market proportional to the value of each company's patent contribution, which was determined by an independent commission of lawyers and electricians. According to their findings, the agreement allotted GE 62.5 percent of the market and Westinghouse the remainder, and required that each company pay the other royalties for any business exceeding their respective share. The patent pool was administered by a five-person board consisting of two GE representatives and two from Westinghouse, and a fifth chosen by the four, for the duration of the 15-year agreement.[27]

For the moment, the 1896 agreements helped stabilize the industry for the electrical oligopoly. In incandescent lighting, members of the pool went on to produce 95 percent of lamps made in the United States during the immediate years. In heavier electrical equipment, the patent wars between GE and Westinghouse subsided. Instead, both companies redirected their legal efforts toward smaller competitors forcing all of those unable to withstand the financial burden

[25] *GE Annual Report*, 1896, MiSci Archives; Reich, *The Making of American Industrial Research.*
[26] "Early Morning Matter: General Electric," *Wall Street Journal*, March 13, 1896.
[27] Ibid.

of legal suit out of business.[28] At the same time, general business conditions improved for the electrical industry due to new electrical fields in locomotives and steam turbines.[29] Yet the 1896 agreements, which were based on patents whose expiration was fast approaching, were but a temporary fix.

GE thus sought additional ways to collude with national competitors. For example, in an effort to sustain its hold of the national incandescent lighting market, GE purchased a controlling share of the National Electric Lamp Association (NELA), a holding company of the leading small lamp manufacturers who had originally combined to pool their resources to compete with GE. In exchange for granting GE rights to three-quarters of its profits, NELA received financial and technical services from GE. Although NELA companies maintained managerial autonomy, GE used various licensing agreements to determine the prices of lamps, quotas of production, and market share for each association member.[30]

The semblance of industrial competition by this setup was exposed in 1911 when the Department of Justice (DOJ) investigated the electrical industry for antitrust practices. The case was part of a series of DOJ investigations of highly concentrated industries. However, unlike the forced breakup of Standard Oil and American Tobacco, GE entered into a consent decree that actually worked to strengthen the anticompetitive situation in the electrical industry. On the one hand, the consent decree did not prevent GE from setting lamp prices for its licensees. On the other, although it did enjoin GE from doing so for its distributors and retailers, GE circumvented this by formulating an agency system whereby distributors and retailers were designated as agents selling GE lamps on consignment. Under this arrangement, GE continued to fix prices since it retained product ownership through the entire distribution chain, which GE reported as business "conducted in such a manner as to avoid any possible ground for criticism as contravening the Anti-Trust Law."[31] Additionally, the consent decree ordered the dissolution of NELA and directed GE to acquire its assets, ostensibly to reveal to the public the full scope of GE's control. The upshot, however, was more concentration. Before the consent decree GE had accounted for just above 40 percent of the incandescent lighting market; after the acquisition its market share nearly doubled to 80 percent.[32] While GE was again charged for antitrust violations

[28] "Electrical Patent Suits." *Wall Street Journal*, June 23, 1896; *GE Annual Report,* 1897, MiSci Archives.
[29] *GE Annual Reports*, 1897-89, MiSci Archives.
[30] Reich, *The Making of American Industrial Research*
[31] *GE Annual Report*, 1911, MiSci Archives.
[32] Robert P. Rodgers, *The Impact and the Relevance of the 1911 General Electric Lamp Case*, report (Federal Trade Commission, 1982).

in the mid 1920s, the USSC unanimously ruled that GE's patent control and agency system were lawful trade practices. Under such favorable legal circumstances, GE continued to maintain control of the national incandescent lighting market.

During this time, GE was no less determined to control the electrical industry on an international scale. At the turn of the twentieth century, GE's growth abroad largely rested on two subsidiary manufacturers, one in Britain and one in France, as well as its role as licensor of German AEG, which, along with Siemens, was the most powerful electrical manufacturer in Europe. Additionally, GE had a growing export business that was managed by its Foreign Department and buttressed by a network of selling agencies around the world.[33] But not until after World War I under the leadership of Gerard Swope and Owen Young did GE establish its place at the top of the global electrical oligopoly.

In writing about Swope and Young, scholars have mostly focused on them in their capacity as corporate liberals.[34] Swope was born in December 1872 and raised in St. Louis, Missouri, then the fourth largest city in the US. Having developed an early interest in chemistry and mechanics, Swope went to MIT where he graduated with an engineering degree. There, he was exposed to a progressive faculty, including a young Louis Brandeis who in a legal philosophy course taught him about the ethic of public service. After college, while working as a low-level engineer in Chicago, Swope came into contact with the Hull House, where he briefly lived, volunteered as a teacher, and met his future wife Mary Hill. In St. Louis, the Swopes opened a settlement home modeled after the Hull House where they focused on teaching neighborhood women how to use the loom and fought for the establishment of local playgrounds. But such civil duties were cut short when Swope was promoted into the ranks of the corporate hierarchy.[35] Young, born in October 1874, unlike Swope grew up in the country on his grandfather's farm in Stark, New York. But similar to Swope, college is where Young was exposed to a considerable progressive influence, eventually becoming president of the campus Democratic Club. Attending the Law School of Boston University during the mid-1890s, Young was in the midst of a city in turmoil, where widespread agitation for reform further influenced

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[33] *GE Annual Reports*, 1901-1902, 1904, 1907, 1909-1910, MiSci Archives.
[34] Colin Gordon, *New Deals: Business, Labor and Politics in America: 1920-1935* (Cambridge: Cambridge University Press, 1994); Kim McQuaid, "Competition, Cartellization and the Corporate Ethic: General Electric's Leadership during the New Deal Era, 1933-40," *Journal of Economics and Sociology, Inc.* 36, no. 4 (October 1977): 417-428; Kim McQuaid, "Young, Swope and General Electric's 'New Capitalism': A Study in Corporate Liberalism, 1920-33," *The American Journal of Economics and Sociology* 36, no. 3 (July 1977): 323-334; Ronald Schatz, "The End of Corporate Liberalism: Class Struggle in the Electrical Manufacturing Industry, 1933-50," *Radical* America, 9 (July/August 1975): 187-205.
[35] David Loth, *Swope of GE: The Story of Gerard Swope and General Electric in American Business* (New York: Simon and Schuster, 1958).

his intellectual development. Yet Young's progressive outlook was always a cautious one, having once advised his cousin to "Think radically and act conservatively."[36]

During their tenure at GE, Swope and Young, president and chairman of the company from 1922-1939 (again from 1942-1944) respectively, implemented a series of joint contributory employee welfare plans in an effort to prevent the return of the explosive labor situation that had engulfed the country in the postwar. On the record, Swope and Young characterized the effort as a "comprehensive program" endeavoring to remove "fear of the future from the minds of its employees."[37] Such plans included Group Life and Disability Insurance, Savings, Pension and Life Retirement, Home Ownership, Unemployment, General Profit Sharing, and Employment Guarantee at the Incandescent Lamp Department. While no supporters of militant unionism, Young and Swope also expanded the works councils at GE and championed a policy of industry-wide labor conciliation.[38]

Rhetorically, Swope and Young went much further. In 1919, while serving on President Wilson's Industrial Conferences, Young drafted a list of propositions that supported what would have amounted to an industry-wide open shop. "We believe in the right of men to organize into unions, shop industrial councils or other organizations…[and] in the policy of collective bargaining," stated Young. "We believe that the men may deal with the management through representatives chosen by the men by secret vote so that the management and the men may be assured that the representatives are the honest choice of the men."[39] Later, in a speech delivered to Harvard Business School, Young went so far as to champion a future where the tension between labor and capital would be eliminated by making workers owners of all enterprise, and, of course, men such as themselves its management:

> I hope the day may come when these great business organizations will truly belong to the men who are giving their lives and their efforts to them, I care not in what capacity. Then they will use capital truly as a tool and they will all be interested in working it to the highest economic advantage. Then the idle machine will mean to every man in the plant who sees it an unproductive charge against himself… Then we shall have zest in labor, provided the leadership is competent and fair. Then we shall dispose, once and for all, of the charge that in industry organizations are autocratic and not democratic.

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[36] Quoted in Josephine Y. Case and Everett N. Case, *Owen D. Young and American Enterprise: A Biography* (Boston: Godine, 1982).
[37] *GE Annual Report*, 1930, MiSci Archives.
[38] *GE Annual Reports*, 1927-28, 1930, 1934, MiSci Archives.
[39] Quoted in Case and Case, *Owen D. Young and American Enterprise*

> Then we shall have all the opportunities for a cultural wage… Then we shall have no hired men…

Swope also spoke out favorably about improving work conditions and workers' organization. In a speech entitled "The Responsibilities of Modern Industry," delivered at a convention of business counterparts in 1926, Swope placed workers second on his list of three (after the public but before shareholders) that delineated to whom the corporation was responsible.[40] As a champion for higher wages and employee welfare plans, Swope did not base his beliefs on altruism but rather on the basis of efficiency. In his mind, higher wages led both to greater productivity and more viable consumers, the latter all the more pressing amid GE's 1920s entry into consumer markets. That same year, Swope unsuccessfully solicited AFL president William Green with a proposal for him to organize a nationwide, independent electrical union. This idea, too, was based on efficiency. "We knew we would be intolerably handicapped if the bulk of our employees were organized into different and often competing craft unions," stated Swope. "We could and would deal with one bargaining agent but hardly with a dozen or more."[41] While certainly on the liberal side of the business community, it was not until 1938 after a long and strenuous effort against independent unionization at GE that Swope and Young finally signed a collective bargaining contract with the United Electrical, Radio and Machine Workers of America (UE).

Of greater interest to Swope and Young was the organization of capital. In the summer of 1930 amid the plunge into depression, Swope met with President Hoover to propose a massive public-works plan to be financed by $2 billion in federal, state, and local government bonds. Swope suggested that the plan would at once revitalize industry and put hundreds of thousands back to work. When Hoover failed to act, Swope, assisted by Young, drafted another plan that was even more ambitious, and that sought to rally businessmen amid the growing specter of a public takeover of the private economy. The Swope Plan, as it came to be known, proposed a full-blown corporatist transformation of the US economy. In addition to various proposals for comprehensive social insurance, the Swope Plan called for federal legislation mandating all firms with 50 employees or more to form industry-specific trade associations to "outline trade practices, business ethics, methods of standard accounting and cost practice, standard forms of balance sheet and earnings statement… collect and distribute information on volume of business

[40] Gerard Swope, "The Responsibilities of Modern Industry," *Industrial Management* 72 (December 1926).
[41] Quoted in Loth, *Swope of GE*

transacted, inventories of merchandise on hand, simplification and standardization of products, stabilization of prices…"[42] In the electrical industry, GE had already accomplished this by spearheading the formation of the National Association of Electrical Manufacturers in 1926. With the distribution of such information prices could be fixed and markets allotted.

However, as the longer history discussed thus far has shown, such efforts at industrial collusion predated the depression and were about more than market standardization and stabilization. Industrial collusion was fundamentally about market control, and GE sought to accomplish this at the international level inasmuch as the national level. In the incandescent lighting market, GE played a leading role in the formation of what became know as the Phoebus Cartel, which carved the up the world into different markets for the leading electrical manufacturers. Signed in 1924, the Phoebus contract included Osram (the joint venture between German firms Siemens and AEG), the Dutch firm Phillips, Tungsram of Hungary, Associated Electrical Industries (a British firm in which GE was heavily invested), the French consortium Compagnie des Lampes, and International General Electric (IGE), which had been established in 1919 as a wholly owned GE subsidiary with Swope as its president. Per terms of the contract, the world was divided into two kinds of territories: "home territories," where only one local manufacturer could do business, and "common territories," where all contracted manufacturers were permitted to do business. The common territories were divided in a way that maintained each manufacturer's relative market share, and the quotas were referred to as a manufacturer's "local participating percentage." A Phoebus tribunal for settlement penalized manufacturers that produced over quota.[43] In addition to price-fixing and dividing global markets, the Phoebus Cartel implemented planned obsolence, an industrial strategy that seeks to compromise product quality in an effort to require consumers to replace the product more frequently. From a central testing laboratory in Switzlerland, the Phoebus Cartel coordinated the reduction of lightbulb quality across the hundreds factories bound by the agreement, and ultimately succeeeded in reducing lifespan from an average of 2,500 hours or more in the early 1920s to about 1,200 hours by the mid-1930s.[44] Although it had intended to last until 1955, the Phoebus Cartel was dissolved in 1939 upon the outbreak of World War II.

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[42] Quoted in George J. Frederick, *The Swope Plan: Details, Criticism, Analysis* (New York: Business Bourse, 1931).
[43] United States v. General Electric Co., 82 753 (United States District Court D. New Jersey January 19, 1949).
[44] Markus Krajewski, "The Great Lightbulb Conspiracy," IEEE Spectrum, September 24, 2014, , https://spectrum.ieee.org/tech-history/dawn-of-electronics/the-great-lightbulb-conspiracy.

In heavy electrical equipment, GE also helped form an international cartel to control the world market. In the US, through a combination of patent agreements and natural barriers to entry, GE had together with Westinghouse well-established control of the market by the late 1920s. In railway motors, for example, both companies accounted for 96 percent of the total US output, and 72 percent in all types of large power equipment. Abroad, such as in Europe and Japan, similar concentration prevailed, where in each country no more than two-four firms dominated their respective national markets. While both US companies already had various patent agreements with foreign competitors, they expanded them by establishing the Electrical Apparatus Export Association (EAEA) in 1930. Expect for the home markets of member firms, which included the US, Western European countries, the USSR, Japan, and the dominions under each countries' respective empire, the Cartel's scope purported to lay claim to all countries of the world. The agreement required members to coordinate competing bids for contracts through the Association's International Secretary in order to determine which firm would be permitted to make the lowest bid. The "successful tenderer" would then be required to pay five percent of the contract to the International Secretary and 10 percent to a deposit fund to be divided among the "unsuccessful tenderers."[45] In this way, i.e. through negotiation not competition, GE continued to solidify its commanding share of the world electrical market.

[Add concluding paragraph]

Finance

The early history of GE is intimately bound up with the financial sector. Due to the electrical industry's inherent reliance on research and development, from the beginning it mandated large sums of capital investment. As such, early electrical start-ups turned to influential investors to bring their products to market. But more than a facilitator of capital formation, the financial sector played a key role in cultivating markets for GE's products, both in heavy capital equipment inasmuch as consumer goods. Specifically, GE subsidiary financing companies supplied GE customers with financial services in exchange for controlling stock

[45] *Summary of the Federal Trade Commission Report on International Electrical Equipment Cartel*, report, University of Pittsburgh (Federal Trade Commission, 1948).

interest of their businesses. In this way GE and its subsidiary financing companies were able to control the market for consumption.

Two of the most prominent eastern banking houses, New York's Drexel, Morgan & Co. (renamed J.P. Morgan & Co. in 1895) and Boston-based Lee, Higginson & Co., orchestrated the merger between Edison General Electric and Thomson-Houston Electric to form GE in 1892. Throughout the 1880s, the Morgan interests had steadily increased its position in the Edison businesses, while Lee, Higginson & Co. had done the same in Thomson-Houston Electric. Ensuring that the new company's leadership would mainly consist of men from banking and finance, they appointed to GE's eleven-man board of directors four men associated with the Morgan interests (including J.P. Morgan himself) and three from Boston finance. The board then unanimously elected Charles Coffin to serve as GE's first president, a businessman with a strong background in electrical industry management and finance.[46]

Coffin was born to Quaker parents in Fairfield, Maine in 1844. After finishing high school at the age 18, he moved to Lynn, Massachusetts to work at his uncle's shoe business, Coffin and Clough. At the time, the shoe business in Lynn was a booming industry. In addition to helping with the design work of new shoes, Coffin frequently traveled outside of the city to carve out new territories of customers. In Lynn, Coffin helped relocate the business next to the train station so it would be the first building travelers would see upon arriving into the city. As his efforts brought the company to the top of the shoe industry, Coffin became main business partner, and shortly after renamed the company Charles A. Coffin & Co. As one of the most successful businessmen in the city, Coffin was chosen in a syndicate of Lynn shoe manufacturers to manage a new investment in an electrical company.[47]

Like he did in shoes, Coffin brought Thomson-Houston Electric to the top of the electrical industry. Specifically, he did this by cultivating and controlling the market for consumption. Initially there were two kinds of customers for electrical apparatus: business firms that bought isolated electrical power plants for their own operations and local utilities that sold electricity generated in central stations to business firms and municipalities. While many of the early competing electrical manufacturers solicited both forms of clientele, Coffin was one of the most aggressive in pursuing the latter. He sent out Thomson-Houston Electric salesmen to help promote the formation of local utilities by securing required permits from city governments, and

[46] Passer, *The Electrical Manufactures*
[47] Hammond, *Men and Volts*

by drawing up sales contracts that both granted their customers exclusive licenses on Thomson-Houston apparatus and partitioned the market to prevent competition between licensee companies. By stipulating that the utilities could only purchase electrical apparatus from Thomson-Houston Electric, the exclusive licenses effectively worked to control the market for consumption. They prevented the utilities from purchasing from Thomson-Houston Electric competitors, which in this initial decade of the electrical industry were Brush Electric and the Edison businesses.[48]

In addition to the commercial structure of the firm, Coffin's financing strategy played a crucial role in helping the budding electrical utility industry come to fruition. Since the local utilities were small and financial strapped, as well as wary about investing in the new electrical industry, Coffin directed Thomson-Houston Electric salesmen to help them solicit local capital. However, to fully pay for costly electrical apparatus and to keep apace with the rapid growth of the electrical industry, more capital than what they were able to furnish locally was needed. Therefore, Coffin, more so than his counterparts in the industry, accepted securities (utility stocks and bonds) as partial payment for electrical apparatus. To ameliorate the strain on working capital this would eventually cause, Coffin generated cash by rediscounting the securities with investment banks to which he pledged Thomson-Houston Electric's own securities as collateral. However, given that the investment banks were unwilling to supply an endless stream of cash, in 1890 Coffin organized a financial subsidiary named United Electrical Securities Corporation in the state of Massachusetts.[49]

United Electrical Securities performed a similar function as the investment banks: it raised cash for Thomson-Houston Electric by issuing bonds (backed by utility securities) to the investing public. For example, in the beginning of 1892, United Electrical Securities issued one million dollars in collateral bonds. They bore a five percent interest and were secured by utility bonds bearing a six-seven percent interest held by United Electrical Securities. Secured by an interest in excess of one-two percent above the issue, investors deemed the subscription both safe and profitable, which, in a relatively short period of time, led to a two hundred thousand dollar oversubscription. From the standpoint of United Electrical Securities, the one-two percent excess meant turning a profit from its services in financial intermediation.[50] For Thomson-Houston

[48] Ibid.
[49] Ibid.
[50] "Financial Intelligence: The Electrical Stock Market," *Electrical World* 19, no. 5 (1892): 72.

Electric, owner of all of the common stock of United Electrical Securities, the profits eventually trickled down in the form of payments in dividends. The main benefit for Thomson-Houston Electric, however, was that it no longer had to finance sales transactions itself, which worked to maximize its working capital. When GE formed shortly after, both Coffin and United Electrical Securities were included in merger.[51]

What seemed to be a smooth financial operation in the electrical securities market came crashing down during the 1893 depression. The closure of hundreds of banks precipitated thousands of business failures. For those companies that stayed afloat, the ensuing credit crunch meant paying higher interest rates on money borrowed to meet payroll and other short-term debt obligations. But for GE, the problems were even more acute as its customers began defaulting on their loans. "During the summer of 1893, even old and strong customers were obliged to ask for leniency in paying their accounts and notes," stated Coffin. "Under these circumstances, your Company found itself with its own obligations to meet, but unable at the time to collect the money with which to meet them."[52] GE was further affected by a growing burden of indirect obligations. In addition to providing finance through United Electrical Securities, which on its own could not meet the demand of the growing industry, GE had begun endorsing its customers' notes with outside investment banks. As the economy crashed and its costumers defaulted on the loans, the debts became GE obligations. According to the 1894 annual report, "The indirect obligations of the Company, arising from its endorsement of discounted Notes Receivable, were six months ago, almost as embarrassing as its direct debt, as the larger part had to be provided for by your Company at maturity, their makers being unable to take care of them."[53] With net indebtedness approaching $9 million, GE found itself deeply underwater, and talk of a GE bankruptcy began circulating within the circles of New York finance.[54]

To weather the storm, Coffin presented the GE board with a plan that involved taking on heavy losses to raise $4 million in cash. Specifically, the plan proposed to liquidate a large share of GE's securities holdings through United Electric Securities. Since the value of the securities had fallen considerably during the depression, Coffin proposed selling the most attractive to a Morgan-led syndicate of bankers for thirty-three cents on the dollar. The plan was accepted and GE divested securities worth approximately twelve million for just over four million dollars.

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[51] *GE Annual Report*, 1893, MiSci Archives.
[52] *GE Annual Report*, 1894, MiSci Archives.
[53] Ibid.
[54] Ibid.

While the money allowed Coffin to pay off GE debts and thereby stave receivership, the Morgan-led board began to apply more oversight over Coffin's management. In its 1894 annual report, GE ensured shareholders, "To-day, no paper is under discount expect such as it is believed will be paid by the makers; consequently the indirect obligations of the Company are nominal rather than real."[55] Thus, GE continued financing its customers' purchases, but at the moment with more caution over risky lending practices. It extended short credits only to those "desirable customers," even if it meant, "accept[ing] smaller profits."[56] To the extent the goal was to take GE out of debt, its new conservative approach in financing was successful the following year. "By liquidating [securities]… and by adhering to the policy of selling for cash or on short time," reported GE's second vice-president J.P. Ord, "the Company has not only collected enough cash to retire all its floating and reduce its funded debt, but has sufficient working capital to pay cash for all of its purchases during the year."[57]

GE's policy of financial conservatism did not last long. In 1897, United Electrical Securities issued another million dollars in collateral bonds, and by January 1902 had issued a total of ten million.[58] The rebound of utility stocks was partly the reason for GE's reentry into the profitable business of financial intermediation. "Due to the rapid growth of electric enterprises [utilities] in all parts of the country," stated GE's treasurer Henry Darling, "the value of the Company's investments in stocks and bonds of local lighting and railway companies has greatly increased… upon which it is hoped a future profit may be realized by the Company."[59] Although turning a profit from financial intermediation was certainly a perk, it was not GE's main objective. Instead, GE sought to cultivate a market for its electrical apparatus. With this agenda in mind, Coffin helped incorporate another financing firm in 1904. Similar to its Massachusetts counterpart, Electric Securities Corporation of New York was incorporated "to purchase or otherwise acquire, to own and manage, to guarantee, pledge, sell or otherwise dispose of stocks, bonds, or other securities or obligations…"[60] Within the first five years of business, Electrical Securities had issued 3.5 million dollars of bonds secured by utility securities worth 125 percent of the principle (4.375 million).[61] Both of GE's financing firms continued running parallel

[55] *GE Annual Report*, 1894, MiSci Archives.
[56] Ibid.
[57] *GE Annual Report*, 1895, MiSci Archives.
[58] *United Electrical Securities Annual Report*, 1902
[59] *GE Annual Report*, 1902, MiSci Archives.
[60] Electrical Securities Corporation, "Charter, Trust Agreements And Other Documents Dated 1904-1910," *HathiTrust*. https://www.hathitrust.org/.
[61] Ibid.

operations through the 1920s, which contributed to the rapid growth of the electrical industry.[62] To put the industry's growth into perspective, in 1902 public utilities produced 4,768 million kilowatt-hours of electricity. By 1920, electrical production had increased ninefold to 43,555 million kilowatt-hours.[63]

The year after incorporating Electrical Securities, Coffin steered GE into yet another financing venture, one that helped GE not only cultivate the utilities market but also control its consumption. Amid the early twentieth century wave of holding companies, Electric Bond & Share Corporation, a wholly owned GE subsidiary, was one of the first of its kind in the electrical industry. Similar to GE's two other financing companies, Electric Bond & Share buttressed its operations in utility financing by selling collateral bonds to the public.[64] However, what was different about Electric Bond & Share was the degree with which it involved itself in the control of the utilities. In its nineteen-year tenure, Electric Bond & Share organized and held voting minority stock in eight sub-holding companies (as well as three large utilities), which in turn held controlling stock in nearly 200 smaller utilities. Control of the utilities was possible through a small block of concentrated voting stock for two reasons: first, the majority of utility stock capitalization was non-voting, and second, the remaining voting stock was widely dispersed among the public.[65] One example of such pyramiding was in American Gas & Electric, Electric Bond & Share's first sub-holding company organized in 1906. In just five years, American Gas & Electric had acquired control of thirteen subsidiary utilities that operated throughout the Midwest and east coast, collectively serving a population of about 550,000.[66] Electric Bond & Share's staff of investment bankers presided over the merger of smaller utilities, which helped consolidate the fractured industry that for many years had been locally segmented and competitively ruinous. Additionally, with a staff of more than 500 professionals, Electric Bond & Share supplied supervisors, purchasing agents, construction engineers, and accountants to help the growing utilities manage day-to-day operations. It was this holding company structure coupled with the advent of turbines and high-voltage power transmission that made the efficient distribution of electrical power possible beyond major cities.[67]

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[62] *GE Annual Report*, 1934, MiSci Archives.
[63] "Statistical Abstract of the United States: 1930," United States Census Bureau, https://www.census.gov/en.html.
[64] *GE Annual Report*, 1906, MiSci Archives.
[65] This is indicative of the separation of ownership from control discussed in Berle and Means' *The Modern Corporation and Private Property*.
[66] "Our Public Utility Letter," *United States Investor* 25 (January 3, 1914): 16-33.
[67] Ralph Sultan, *Pricing in the Electrical Oligopoly, Volume I: Competition or Collusion* (Harvard University Press 1974); Thomas P. Hughes, *Networks of Power: Electrification in Western Society, 1880-1930* (Baltimore: Johns Hopkins University Press, 1983).

For GE, the benefits between holding company and the utilities were mutual. For the utilities, GE understood that larger and better-managed firms not only attracted more investors but also brought them advantages of economies of scale in supplying electricity. For Electric Bond & Share, GE saw that its interests were twofold. First, ensuring that the utilities were profitable guaranteed Electric Bond & Share an income stream from payments in bond interest and dividends, which made up about 40 percent of its income. Second, in exchange for consulting services, Electric Bond & Share charged the utilities a fee of 1.6-2.0 percent of their gross earnings, which made up about another 40 percent of income. The remainder of income was accounted for by sales of investment securities. For GE, the most important aspect of the holding company structure was obvious: Electric Bond & Share, ranked as the largest holding company, allowed it to control a large section of the electrical utility market. Specifically, Electric Bond & Share consultants worked out the purchasing contracts on behalf of the utilities, which, not surprisingly, led to the utilities purchasing most of their electrical apparatus from GE. Despite divesting Electric Bond & Share in 1925, which was done to evade a looming FTC investigation, the relationships between manufacturer, holding company, and utilities had been established. Indeed, a Federal Trade Commission report leading up to the passage of the Public Utility Holding Company Act of 1935 found that utilities affiliated with Electric Bond & Share (later reorganized as United Corporation) continued purchasing over 90 percent of their turbines from GE.[68]

GE's new leadership in the 1920s continued along Coffin's footsteps. Despite divesting Electric Bond & Share, Swope and Young had no intention of exiting the utility financing business. In 1922, which was Swope and Young's first year as president and chairman, GE organized the Employees Securities Corporation to sell bonds to GE workers and invest the money in utility securities. Although GE had issued such bonds in the recent past, it had only been to a limited section of its workforce. Through Employees Securities, GE sought to streamline and expand the bond issues by reaching "employees with moderate incomes."[69] On the one hand, issuing bonds to employees under the banner of an investment and savings plan was emblematic of the wider trend in welfare capitalism in response to the postwar labor unrest. Specifically, GE conceived Employees Securities as a way for employees to invest their savings,

[68] *GE Annual Report*, 1924, MiSci Archives; Federal Trade Commission, *Utility Corporations*, Sen. Doc. No. 92, PART 72-A, 70th Cong., 1st Sess. 159 (1932).
[69] *GE Annual Report*, 1925, MiSci Archives.

"put something aside for the inevitable 'rainy day,'" and "become financially interested in the Company."[70] By the end of the decade, having issued nearly $40.5 million in bonds to approximately 35,500 employees, which was slightly under half of its entire workforce, GE touted the plan a success.[71] On the other hand, Employees Securities continued financing and staking an ownership interest in the utilities (sixty-three of the largest utilities in the first year alone), which, along with industrial plants and transportation systems, continued to be GE's main customers.[72] In this way, GE for the moment was able to maintain the historic and influential link between buyer and seller.

The novel financial turn came in the realm of consumer goods. Although GE's main business had originally been in light bulbs and heavy electrical equipment, under Swope and Young GE expanded into the burgeoning consumer markets of the 1920s. This included a variety of consumer electronics and home appliances, such as radios, fans, refrigerators, vacuum cleaners, and washing machines. To facilitate its plans for a mass commercial operation, GE established a financing company exclusively focused on selling consumer goods. Specifically, the Purchase Corporation (later renamed General Electric Contracts Corporation, GECC) financed the installment contracts of GE's specialty appliance dealers. By expediting the movement of goods more quickly throughout the entire supply chain, financing of this sort helped GE shed the higher inventory costs associated with increased production. Significantly, similar to its business in utility financing, GE's consumer financing remained focused on propping its manufacturing operations, meaning profits from finance were minimal. For example, in 1935, with a gross volume of purchased contracts of approximately $18.5 million, GECC's profits were a negligible $250 thousand.[73] This would continue to be the case through the mid twentieth century before GE's turn toward financialization.

[Add concluding paragraph]

Conclusion

[70] *GE Annual Report*, 1930, MiSci Archives.
[71] Ibid.
[72] *GE Annual Report*, 1923, MiSci Archives.
[73] Louis Hyman, *Debtor Nation: The History of America in Red Ink* (Princeton: Princeton University Press, 2013); *GE Annual Reports*, 1926, 1935, MiSci Archives.

By the mid twentieth century, a constellation of political, social, and economic forces began to pry open GE's viselike grip on national and global electrical markets. In addition to the sharpening tension with its workers, one of the first challenges came from a more vigorous antitrust effort by the DOJ. In lamps inasmuch as large electrical apparatus, GE faced repeated charges of antitrust practices in the postwar. While the Phoebus cartel folded on its own upon the outbreak of war, a court ordered consent decree dissolved the EAEA. The decline of trade barriers further eroded many of the interfirm contractual agreements upon which GE's market control had been based. Rising international competition, too, played a major factor. Although the US economy emerged in the postwar as the undisputed victor, European and Japanese economies aided by US unilateral trade policy recovered with impressive speed.[74] As early as the 1960s electrical firms such as Siemens, Hitachi, Mitsubishi Electrical, and Toshiba began to penetrate markets not only outside of the US but within it as well. Such changes in the structure of international political economy would eventually prompt GE executives to reconsider strategies for growth and ultimately trigger the turn toward financialization.

[74] Judith Stein, *Pivotal Decade: How the United States Traded Factories for Finance in the Seventies* (Yale University Press: New Haven, 2010)