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“No Inventions, No Innovations”: Reassessing the Government’s Antitrust Case Against United States Steel Corporation

I. INTRODUCTION

THE U.S. SUPREME COURT DECISION¹ IN 1920 in the federal antitrust case against U.S. Steel Corporation (hereinafter “Corporation” or “Company”) has been described as a “watershed” opinion.² The prosecution charged the Company and its subsidiaries to be a combination between competitors in restraint of trade and an attempt to monopolize and monopolization of the steel industry, in violation of the Sherman Act of 1890. All charges against the Company were dismissed and the Court rejected the Government’s request for dissolution of the holding company. The case was a dramatic reversal from the Court’s holdings in the *Standard Oil* and *Tobacco* cases. It marked the end of an era in which “the last of the big [antitrust] cases had failed.”³

A majority of Justices in *United States v. United States Steel Corp.* gave considerable weight to the absence of predatory practices on the part of the Company, and concluded that the consolidations were necessary and inevitable in order to achieve the benefits of economies of scale.

The United States Supreme Court’s majority opinion in *United States Steel Corp.* (as well as the lower court’s opinion) were highly controversial, with one scholar describing the opinion as based on a “mistaken view of the facts.”⁴ Other scholars

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1. *United States v. United States Steel Corp.*, 251 U.S. 417 (1920) (4–3 decision) (McReynolds, J. and Brandeis, J., recused).

2. ALEXANDER M. BICKEL & BENNO C. SCHMIDT, JR., *THE JUDICIARY AND RESPONSIBLE GOVERNMENT 1910-21*, 9 *HISTORY OF THE SUPREME COURT OF THE UNITED STATES* 170–71 (1984) [hereinafter BICKEL & SCHMIDT].

3. *Id.* at 170–71.

4. *Id.* at 168.

were critical of the parties, asserting that the Court was “misled” by the Corporation’s withholding of material information and by the “remarkable negligence” of the prosecution “in developing and presenting to the Court the economic aspects of this case.”⁵

Fetter concludes that, had the Court been presented with the correct economic facts and the case properly argued before the Court, “a hair could have tipped the scales” against the Corporation.⁶ Although scholars Fetter and Bickel recognize that the Court was presented with unchallenged misinformation, the authors fail to identify the economic principles that could have swayed the Court against the Corporation. It was Charles Schwab in 1901 (then president of the newly-organized Corporation) who articulated these economic principles in his testimony before the U.S. Industrial Commission:

*[T]he steel business is one in which experiment and development are applied constantly to improvement. It is one in which they have had to go on from year to year with new processes and new methods; and where you can take advantage of experimental processes and developments of individual works and apply them to the whole, you reap a great benefit.*⁷

In an article prepared by Schwab and introduced into the record of the Commission, he expounded on the significance of new products and processes, stating that “[t]he improved processes that have come out of [the iron and steel industry’s] pursuit have revolutionized many other industries, and made them in turn great and prosperous.”⁸

In these two statements, Schwab displayed extraordinary foresight. He identified the link between new steel products and processes, on the one hand, and economic progress in other American industries. If he had been prophetic, he could have foreseen the steel industry’s crucial role in the emergence of the automotive industry. Or he could have pointed to his own technological pioneering in the development and manufacture of the steel H beam for use in the construction of buildings, bridges, and subways.

It is this subject of R&D and technological progress in the steel industry during the period 1901 to 1914 that was essentially neglected by the Government in its case against the Corporation. The Corporation pre-empted the Government on the subject, by presenting superficial and incomplete testimony in support of its alleged interest in technology. Likewise, the Corporation managed to avoid scrutiny of its Pittsburgh-Plus pricing (a system of price fixing and uniform delivery prices for steel products) by testimony glossing over the subject to uninformed federal

5. FRANK ALBERT FETTER, *THE MASQUERADE OF MONOPOLY* 73, 85 (1st ed. 1931) [hereinafter FETTER].

6. *Id.* at 73–74.

7. REPORT OF THE INDUS. COMM’N TRUSTS & INDUS. COMBINATIONS Vol. 13, 451 (testimony of Charles M. Schwab, President, U.S. Steel Corporation May 11, 1901).

8. Charles M. Schwab, *Industrial and Railroad Consolidation*, 172 N. AM. REV. 655, 663 (1901) [hereinafter Schwab].

investigators in the hearings of 1901 (U.S. Industrial Commission) and 1911 (Stanley Congressional hearings), and in the prosecution of the *United States Steel Corp.* case during the period 1911-1914.⁹

On the question of steel technology, the Government was simply unprepared to challenge the Corporation, which made bold claims as to the “quality” of its products and its commitment to technological progress in steelmaking. The Corporation’s actual policy on R&D, at the time, was later described in an article in *Fortune Magazine*, as “no inventions, no innovations,” reflecting the sentiment that pioneering didn’t pay.¹⁰

My study will examine the application and relevance of Schwab’s economic principles during the period 1901 to 1914 to the prosecution of the *Steel* case. It is this author’s contention that the public record during this period, as represented by industry trade journals, newspapers, and other publications, would have established that the only pioneers in steel technology were the independent, emerging steel companies, such as Tennessee Coal Iron and Railroad Company (TCI), Bethlehem Steel Corporation (Bethlehem), and American Rolling Mill Company (Armco). Had the Government examined the public record on Bethlehem alone and secured testimony from Charles Schwab on its technological progress, then, arguably, the Court would have been influenced by an abundance of evidence that the Corporation intentionally forfeited its so-called “first mover” advantage.

The term “first mover” advantage was used by Alfred Chandler to describe entrepreneurs with large manufacturing plants and large capital resources, who are in position to acquire a great competitive advantage over newcomers to the industry by investing in research and development (R&D) and new products and processes.¹¹ According to Chandler, these “pioneers” have the resources to invest in facilities to “commercialize a product or process.”¹² Chandler viewed the management of U.S. Steel (particularly under Chairman Elbert Gary) as dissipating its first-mover advantage.¹³

Nevertheless, based on the experience of the steel industry in the early Twentieth Century, it may be argued that first mover advantages are not limited to large industrial corporations. Entrepreneurs with business acumen, who understand the potential competitive advantages of R&D (in an industry dependent on technological progress in products and processes) can compete effectively with their larger, more established counterparts. Chandler, in suggesting that U.S. Steel

9. See *infra* notes 150–51 and accompanying text (regarding defense counsel’s direct examinations of James A. Farrell, then president of U.S. Steel).

10. *U.S. Steel Corporation*, FORTUNE MAGAZINE, Mar. 1936, at 173.

11. ALFRED D. CHANDLER, JR., SCALE AND SCOPE: THE DYNAMICS OF INDUSTRIAL CAPITALISM 34–35 (1994) [hereinafter CHANDLER].

12. *Id.* at 35. The term “pioneers” is defined as “entrepreneurs who made the investment in facilities needed to commercialize a product or process - to bring it into general use.” Pioneers are also the “innovators” of new methods and new processes. *Id.*

13. *Id.* at 139.

dissipated its first mover advantage, overlooks the fact that the two steel companies to benefit were Bethlehem Steel (a medium-size corporation) and Armco (a start-up entity).

In summary, this author seeks to contribute to the historical record on the *United States Steel Corp.* case in two ways. First, this study will present evidence in support of the proposition that the Corporation's disinterest in and aversion to new technology, subsequent to its formation in 1901, was clear evidence that the Company was acting contrary to the public interest, as that principle was articulated by Charles Schwab in 1901. Second, the findings should cast doubt on Chandler's thesis that (1) technological progress depends on the first mover to invest substantial capital in R&D and plant, and (2) the experience of the steel industry (in which smaller, independent companies assumed the role as first mover) was an exception to the rule. This author perceives the experience in the steel industry during 1901-1914 as evidence that technological progress through new and greatly improved products and processes depends on entrepreneurial ambition, foresight, and risk-taking, more so than the size and wealth of the industrial enterprise.

II. ECONOMIC POLICY

Mr. Beall. Is it not a fact that the existence of that keen competition was always a spur to the Carnegie Steel Co. or the Carnegie Co. (Ltd.) to try to improve the methods and try to cheapen production and try to extend the market?

Mr. Carnegie. Everything.¹⁴

- Andrew Carnegie, Testimony Before the
House Stanley Committee

This article is a study of a segment of the Technological Revolution (also known as the Second Industrial Revolution) that took place in the United States during the period 1897 to 1914. It was also the time of the Great Merger Movement (1897-1904) resulting from industrialization of the private economy with the formation of trusts and holding companies in such important sectors of the economy as the steel industry and railroad systems. It was also the period when the merger movement was made possible by the Captains of Industry (sometimes referred to as Robber Barons), including such notables as J. P. Morgan ("the nation's preeminent investment banker"),¹⁵ the underwriting firm of Moore & Schley (precipitated U.S. Steel's acquisition of TCI), Elbert H. Gary (senior management of Federal Steel and

14. *United States Steel Corp.: Hearings Before the Comm. on Investigation of United States Steel Corp.*, 62nd Cong. 2419 (1912) (statement of Andrew Carnegie before the House Stanley Committee).

15. CHANDLER, *supra* note 11, at 131.

U.S. Steel), Andrew Carnegie (controlling stockholder of Carnegie Steel), Charles M. Schwab (senior management of Carnegie Steel and U.S. Steel, and controlling stockholder of Bethlehem Steel), James J. Hill (controlling stockholder of Great Northern Railroad), and John D. Rockefeller (controlling stockholder of Standard Oil). These men were instrumental in facilitating the merger movement.

Competing companies in the industry, such as steel and railroads, were forming cartels, pools, and trade associations, and conducting business through “a community of interest principle.” These arrangements are described as “loose combinations,” while trusts, holding companies, and merged entities are referred to as “tight combinations.” Mergers might be described as “vertical,” involving the extension of operations backward (by example, raw materials) or forward (by example, fabrication). Horizontal mergers normally involved a combination of competing companies, operating in the same market or potentially in the same market.

Industrialization was advanced by inventors and entrepreneurs, such as Harry H. Campbell (who adopted scientific methods in developing basic open-hearth steel) in the 1890s,¹⁶ and Charles M. Schwab who was one of the early pioneers to produce open-hearth structural steel and who took the risk of building mills using the new technology of inventor, Henry Grey. Alfred Chandler would have described Schwab as a “first mover.” At the same time, Schwab was a pioneer “who made the investment in facilities needed to commercialize a product or process - to bring it into general use.”¹⁷

It was the use of loose combinations, such as pools and trade associations between competing independent companies, as well as combinations of independent business entities through mergers, trusts and holding companies, that raised the specter of abuse: excessive profits, non-competitive pricing of goods and services, allocation of market shares, and adverse effects on “small-producer democracy.” On the other hand, there was the recognition that in order for the modern industrial enterprise to exploit new technology, and operate with maximum efficiency and compete in the foreign markets, the Corporation would require a structure that achieved “economies of scale and scope.”¹⁸ There was clear recognition by leading government officials that federal antitrust laws were needed in order to deal with business entities conducting transactions and forming combinations in interstate commerce.¹⁹ The result was the Sherman Antitrust Act

16. THOMAS J. MISA, *A NATION OF STEEL: THE MAKING OF MODERN AMERICA 1865-1925* 81 (1st ed. 1995) [hereinafter MISA].

17. CHANDLER, *supra* note 11, at 35.

18. *Id.* at 18.

19. President Theodore Roosevelt, in his message to Congress on December 2, 1902, expressed the following national sentiment: “Our aim is not to do away with corporations; on the contrary, these big aggregations are an inevitable development of modern industrialism. . . we must be careful not to stop the great enterprises which have legitimately reduced the cost of production . . . The Congress has not heretofore made any appropriation for the better enforcement of the anti-trust law as it now stands. Very much has been done by the Department of Justice in securing the enforcement of this law, but much more could be done if the

of 1890 (Sherman Act) and a series of federal antitrust decisions interpreting the Sherman Act, by the lower courts and the U.S. Supreme Court during the period between 1897 to 1911.

This study is about one particular case: *United States v. United States Steel Corporation*, initiated in 1911 and decided by the federal district court (with the judges sitting as the Circuit Court) in 1915, and by the U.S. Supreme Court in 1920.²⁰

III. LEGAL POLICY ON COMBINATIONS IN RESTRAINT OF TRADE (1897-1911)

*Holmes's opinion is great despite its flaws. Not the least of its greatness consists in his bringing so sharply into view the paradox inherent in the policy of the antitrust law. The paradox had been there from the beginning. Congress had wanted to do two things which, although not incompatible are not easily kept in tandem: to preserve the benefits of competition while enjoying the benefits of consolidation.*²¹

- William Letwin, *Law and Economic Policy in America*

With the passage of the Sherman Act,²² it became incumbent upon the executive branch to administer the new law and to prosecute federal antitrust cases. Federal appointments by the President to the U.S. Supreme Court, as well as the appointment of the U.S. Attorney General of the Department of Justice, were part of the President's duties. In 1901, President Theodore Roosevelt appointed Philander C. Knox as Attorney General. Knox has been credited with institutionalizing federal antitrust enforcement, including the creation of the Antitrust Division within the Department of Justice.²³

In the period 1897 to 1911, a majority of the U.S. Supreme Court Justices declared illegal business combinations as contracts in restraint of trade.²⁴ Justice

Congress would make a special appropriation for this purpose, to be expended under the direction of the Attorney-General." THEODORE ROOSEVELT, PRESIDENTIAL MESSAGE TO CONGRESS, DECEMBER 2, 1902, *reprinted in* ADDRESSES AND PRESIDENTIAL MESSAGES OF THEODORE ROOSEVELT, 1902-1904 349-51 (1904).

20. *United States v. United States Steel Corporation*, 251 U.S. 417, 437 (1920).

21. WILLIAM LETWIN, *LAW AND ECONOMIC POLICY IN AMERICA: THE EVOLUTION OF THE SHERMAN ANTITRUST ACT* 234 (1965).

22. Sherman Antitrust Act, 15 U.S.C. §§ 1-38 (2010).

23. HANS B. THORELLI, *THE FEDERAL ANTITRUST POLICY: ORIGINATION OF AN AMERICAN TRADITION* 405, 423, 427 (1955) [hereinafter THORELLI]. Thorelli examines the actions taken by President Roosevelt and Attorney General Knox in 1903 in the administration and enforcement of the Sherman Act. *See also id.* at 560-63.

24. One historian summarizes the U.S. Supreme Court's strict construction of the Sherman Act as follows: Precisely in the period of intense combination activity, 1898-1904, the strict construction placed upon the Sherman Act by the Harlan majority in the Supreme Court appeared to forbid loose agreements, associations, pools, or cartels, among independent firms, and certain methods of

Rufus W. Peckham adopted what is described as a natural-liberty doctrine, favoring “small-producer democracy.”²⁵ In *Trans-Missouri Freight*, Justice Peckham ruled as follows:

*It is wholly different, however, when such changes are effected by combinations of capital whose purpose in combining is to control the production or manufacture of any particular article in the market, and by such control dictate the price at which the article shall be sold; the effect being to drive out of business all the small dealers in the commodity, and to render the public subject to the decision of the combination as to what price shall be paid for the article. In this light, it is not material that the price of an article may be lowered. It is in the power of the combination to raise it*²⁶

The Court held that the Sherman Act had superseded the common law, such that all restraints, reasonable or unreasonable, were prohibited.

In his dissent, Justice Edward D. White offered a different interpretation of the words “every contract in restraint of trade.”²⁷ The Justice held that the Court must look to the common law to demonstrate that the words “embrace only contracts which unreasonably restrain trade, and, therefore, that reasonable contracts, although they, in some measure, ‘restrain trade,’ are not within the meaning of the words.”²⁸

Justice White, and later Justice Oliver Wendell Holmes in the *Northern Securities* case, rejected the natural-liberty doctrine of Justice Peckham, favoring instead a rule of reason, described by one historian as recognizing “the necessity of combination and consolidation in an industrially developed economy.”²⁹

The *Northern Securities* case in 1904 represented the Government’s explicit challenge to the “tight combination.” The defendant was a holding company with controlling interests in two major railroad corporations, one controlled by J. P. Morgan and the other by James J. Hill. The case is also noted for Justice Holmes’ dissent:

I repeat, that in my opinion there is no attempt to monopolize, and what, as I have said, in my judgment amounts to the same thing, that there is no

incomplete consolidation such as the trustee device and the ‘artificial’ holding company, but not corporate merger or consolidation.

MARTIN J. SKLAR, *THE CORPORATE RECONSTRUCTION OF AMERICAN CAPITALISM, 1890-1916: THE MARKET, THE LAW AND POLITICS* 158 (1988) [hereinafter SKLAR].

25. *Id.* at 139.

26. *United States v. Trans-Missouri Freight Ass’n.*, 166 U.S. 290, 323–24 (1897).

27. *Id.* at 346 (White, J., dissenting).

28. *Id.*

29. SKLAR, *supra* note 24, at 140.

*combination in restraint of trade until something is done with the intent to exclude strangers to the combination from competing with it in some part of the business which it carries on.*³⁰

According to Justice Holmes, “[s]ize has nothing to do with the matter.”³¹ While scholar Thorelli considered the U.S. Supreme Court decisions of the late 1890s, such as *Trans-Missouri Freight*, as having greater legal significance than the holding in *Northern Securities*, he viewed the case as popularizing antitrust.³²

In 1910, President William Howard Taft appointed Justice White to Chief Justice, thereby elevating a leading proponent of the common law doctrine of rule of reason. Chief Justice White’s rule of reason was propounded in May 1911 in the *Standard Oil* and *American Tobacco* cases.³³ First, Justice White found evidence of unreasonable restraints of trade and monopoly in the *Standard Oil* case.³⁴ The Justice then described the test for a rule of reason as:

*intent and purpose to exclude others which was frequently manifested by acts and dealings wholly inconsistent with the theory that they were made with the single conception of advancing the development of business power by usual methods, but which, on the contrary, necessarily involved the intent to drive others from the field and to exclude them from their right to trade . . .*³⁵

30. *Northern Securities v. United States*, 193 U.S. 197, 409 (1904) (Holmes, J., dissenting).

31. *Id.* at 407.

32. THORELLI, *supra* note 23, at 562–63. Thorelli writes:

This prominence of the Hill-Morgan-Harriman railroad case may be explained in part by skillful administration propaganda, in part by the fact that the opinion was taken to indicate that no matter how sophisticated their manipulations the greatest financiers in the country, as indeed its biggest businesses, were subservient to the statute and, thus, ultimately were subject to democratic control.

Id. at 563.

33. *Standard Oil Co. v. United States*, 221 U.S. 1 (1911); *United States v. American Tobacco Co.*, 221 U.S. 106 (1911).

34. *Standard Oil Co.*, 221 U.S. at 42–43. Justice White identifies the following misconduct:

Rebates, preferences, and other discriminatory practices in favor of the combination by railroad companies; restraint and monopolization by control of pipe lines, and unfair practices against competing pipe lines; contracts with competitors in restraint of trade; unfair methods of competition, such as local price cutting at the points where necessary to suppress competition; espionage of the business of competitors, the operation of bogus independent companies, and payment of rebates on oil, with the like intent; the division of the United States into districts, and the limiting the operations of the various subsidiary corporations as to such districts so that competition in the sale of petroleum products between such corporations had been entirely eliminated and destroyed; and finally reference was made to what was alleged to be the ‘enormous and unreasonable profits’ earned by the Standard Oil trust and the Standard Oil Company as a result of the alleged monopoly.

Id.

35. *Id.* at 76.

In addition, the decision of the Court to dissolve Standard Oil was based on its finding of monopolization of trade. The Court cited with approval the findings of the lower court that the defendant's acquisition of control of the many companies in the various branches of the petroleum industry operated to destroy potential competition so as to constitute both a conspiracy in restraint of trade under section 1 of the Sherman Act and an attempt to monopolize and monopolization under section 2 of the Act.³⁶

In summary, under the rule of reason, an unreasonable restraint of trade and monopoly may be defined by a four-point test: if interstate or foreign commerce is involved, the court must find (1) public injury, (2) unfair practices, (3) suppression of competition, or (4) a power to control prices.³⁷

As Judge Buffington begins his opinion in the *U.S. Steel Corp.* case, he cites the *Standard Oil and American Tobacco* cases as the settled law governing the case.

The four tests summarized above will be used in this study in evaluating the lower court's opinion, particularly with respect to the public injury from U.S. Steel's disregard for technological innovation and for its scheme to establish a nationwide uniform pricing system for steel products.

**IV. UNITED STATES V. UNITED STATES STEEL CORPORATION,
251 U.S. 417 (1920)**

*We next turn to that most injurious feature of monopoly's wrong to the public, to wit, increase in the price of its product or a deterioration in quality. Turning, first, to the basic question of quality, no dispute arises under the proofs.*³⁸

- U. S. Circuit Court, Judge Buffington

In 1911, President William Howard Taft favored the U.S. Supreme Court's rule of reason doctrine. As a result, the President and his Attorney General, George W. Wickersham, relied on the "prosecutorial process" for "rigorous" enforcement of the Sherman Act.³⁹

The case against U.S. Steel was initiated by a Government petition on October 26, 1911, and resulted in a Circuit Court decision in 1915 and, on appeal by the

36. *Id.* at 72-74.

37. SKLAR, *supra* note 24, at 162.

38. *United States v. United States Steel Corp.*, 223 F. 55, 80 (D. N.J. 1915), *aff'd*, 251 U.S. 417 (1920).

39. SKLAR, *supra* note 24, at 172, 297, 368-70.

Government, a U.S. Supreme Court decision in 1920 after World War I.⁴⁰ The Supreme Court majority included Chief Justice White and Justice Holmes. U.S. Steel would be favored by the Justices' 1911 rule of reason. The Justices would be looking for predatory conduct and would find that U.S. Steel had not "attempted to crush its competitors or drive them out of the market."⁴¹ The fact that the Corporation decreased its share of the domestic steel market over the period 1901 to 1911 was considered evidence of an absence of monopolistic power. Mere size of the entity was no offense.

The Circuit Court, in a detailed analysis of the facts of the case, rejected the Government's charge that the holding company was a monopoly or that it attempted to monopolize the steel and iron trade in the United States. The lower court concluded that U.S. Steel had engaged in collaborative pricing with its competitors. But the Court rejected the Government's petition for the dissolution of a holding company that, according to the lower court's assessment, represented the consolidation, directly or indirectly, of 180 independent entities.⁴² The Court also refused to enjoin the Company from engaging in further price fixing, electing to retain jurisdiction in the event of future collaboration in the fixing of "unreasonable" prices.⁴³

A majority of the Circuit Court and the U.S. Supreme Court accepted the Company's and the industry's basic contention that vertically and horizontally integrated steel producers (and the resulting concentration of capital) were necessary in order to achieve economies of scale. The lower court was unanimous in finding price fixing (up until nine months before the suit was initiated), and in finding that the Company's products were of "high quality."⁴⁴ But in the absence of a coherent and effective presentation by the Government as to the Company's policies on R&D, experimentation, and innovation, the Court was unaware of the Company's disinterest in new processes and products, the very goals that Charles

40. The District Court judges in this antitrust case were sitting as a Circuit Court. Bickel and Schmidt indicate that, after the case had been docketed in the U.S. Supreme Court, the Corporation "opposed extending the time for filing a narrative record . . . and suggested instead that the rules be waived, and the case proceed on the original record – the raw record, so to speak." BICKEL & SCHMIDT, *supra* note 2, at 158–59. As a result, the original record was used in the case before the U.S. Supreme Court. According to the authors, the record was comprised of thirty volumes containing 12,151 pages, of which 5,969 pages were testimony. *Id.*

41. *United States v. United States Steel Corp.*, 251 U.S. 417, 441 (1920).

42. *See id.* at 458 (Day, J., dissenting). U.S. Steel has been described as a gigantic "merger of mergers," in which some fifteen holding companies (representing steel manufacturing, mining, and transportation) combined into a single holding company. CHANDLER, *supra* note 11, at 133. It is noteworthy that most of the consolidated companies prior to the merger with U.S. Steel were product groups. For example, American Tin Plate Company was formed in 1898 as a horizontal merger of 36 companies controlling about 75% of the country's tin plate capacity. This consolidation was not as efficient as, for example, Carnegie Steel Company (reorganized in 1900 as Carnegie Company), a vertically integrated enterprise comprised of 16 basic steel and raw material entities. *See* KENNETH WARREN, *BIG STEEL: THE FIRST CENTURY OF THE UNITED STATES STEEL CORPORATION 1901–2001* 7–19 (2001) [hereinafter WARREN, *BIG STEEL*] (discussing merger activity in the steel industry at the turn of the century).

43. *United States v. United States Steel Corp.*, 223 F. 55, 161 (D. N.J. 1915), *aff'd*, 251 U.S. 417 (1920).

44. *Id.* at 171 (Woolley, J., concurring).

Schwab advocated for the industry in 1901.⁴⁵ Additionally, the Court was unable to assess the impact of collusive pricing on the motivation of U.S. Steel to serve as a “first mover” in introducing new technological systems. The Court was unaware of the ramifications of the uniform pricing system, known as “Pittsburgh-Plus” pricing, which U.S. Steel had perfected upon its formation in 1901.

U.S. Steel, together with the independent companies, conceived and presented a very convincing case to the lower court. At the forefront was Charles M. Schwab, president of Bethlehem Steel, perhaps the leading and most resourceful independent company in the United States. The Circuit Court was greatly influenced by Mr. Schwab’s testimony.⁴⁶ On the other hand, the Government was greatly handicapped by a lack of expertise in and knowledge of the steel business. The Government recognized in its two-page report on “Concerning Improvements in the Manufacture of Steel” that the independent steel companies were the dominant source of “great developments” in the manufacture of steel since the formation of U.S. Steel.⁴⁷ However, except for open-hearth steel rails, the Government failed to support its conclusions with evidence.

The prosecution also failed to challenge the statements of senior management (then U.S. Steel president, James A. Farrell, and Chairman Elbert H. Gary) on the Company’s technological prowess or on the significance of its investment in new plant and equipment. Indeed, there was substantial evidence available that “Judge” Gary, U.S. Steel’s spokesman, was dismissive of inventions and innovations. The one person who was well versed in the Company’s policies and who could challenge Judge Gary was Charles Schwab, testifying for the defense. Perhaps the single most revealing fact was Judge Gary’s testimony that, in 1907, the Company possessed \$75 million in idle cash, an amount in current dollars equal to roughly \$1.8 billion.⁴⁸ And, yet, virtually all of the major R&D in the steel industry and innovations during the period 1901 to 1914 were introduced by independent companies. No doubt, the Supreme Court was influenced by Charles Schwab’s statement in 1901, and repeated on the record in 1913, that the steel industry in 1901 had “reached the limit, or nearly, at which economies from a metallurgical or mechanical standpoint could be made effective.”⁴⁹

Based on the new technology introduced by Schwab’s own company, the statement without further clarification was disingenuous. In the case of open-hearth steel, Schwab was correct that much of the metallurgical and scientific work had been achieved by the turn-of-the-century. However, there were important innovations thereafter in the application of the basic open-hearth process to steel

45. See Schwab, *supra* notes 7 & 8 and accompanying text.

46. United States v. United States Steel Corp., 223 F. 55, 69, 82 (D. N.J. 1915), *aff’d*, 251 U.S. 417 (1920).

47. Brief for Appellant at 1102–03, United States v. United States Steel Corp., 251 U.S. 417 (1920) (No. 6214), *in* U.S. SUPREME COURT RECORDS AND BRIEFS, 1832–1978.

48. Transcript of Record at 5355, United States v. United States Steel Corp., 223 F. 55 (D. N.J. 1915) (No. 6214), *in* U.S. SUPREME COURT RECORDS AND BRIEFS, 1832–1978 (testimony of Elbert H. Gary).

49. United States v. United States Steel Corp., 251 U.S. 417, 443 (1920).

rails and structural steel. These developments were accomplished, between 1901 and 1907, by TCI and Bethlehem in the production of steel rails, and by Bethlehem in structural steel.⁵⁰ This study also explores the advances in mechanical processes (e.g., improvements in rolling mills) and revolutionary new products resulting from Bethlehem's pioneering of the Grey mill and the wide-flanged beams, and Armco's R&D and experimentation with sheet steel for the automotive industry and later work of John Butler Tytus in contributing to the development of the continuous rolling technology.

The defendants argued that the decline in the Company's relative position in the industry between 1901 and 1911, in the production of structural steel for bridges and commercial buildings, reflected the level of keen competition in the industry. The defense provided statistical data showing that in 1911, the Company held only a 33% interest in structural steel, while its competitors accounted for the remainder of this industrial sector.⁵¹ In 1901, Carnegie Steel (a subsidiary of U.S. Steel) was predominant in the production of structural shapes.⁵² By 1911, U.S. Steel accounted for about 25% of the market for structural business.⁵³ What the defense omitted and the prosecution failed to establish was that the position of Bethlehem Steel, a major factor in structural steel, was due to its pioneering work and innovations on the H beam, on the one hand, and the disinterest of U.S. Steel in the very same technology, on the other. Warren explained the phenomena this way: "Carnegie was now operating an improved plant with an old technology whereas Bethlehem, with a new process and new product, continued to make headway at their expense."⁵⁴

The result of such indifference by U.S. Steel to technological advances was its serious decline in the industry, as evidenced by the Company's own internal study in 1938. The evidence before the Court was incomplete and misleading, and a better-informed prosecution and a more thorough and rigorous cross-examination of Charles Schwab, among others, would have provided the Circuit Court with a comprehensive picture of the industry. In summary, based on the evidence before it, the lower court and the Supreme Court were not in a position to evaluate and determine whether U.S. Steel's policies in favor of price fixing and against invention, innovation, and new steel products served the public interest.

V. THE ROLE OF INDEPENDENT COMPANIES IN DEVELOPING NEW TECHNOLOGY

[All of] our [steel industry] endeavors up to that time [1901] had been to perfect methods of manufacture. By that I mean metallurgical and

50. With respect to Bethlehem Steel, see KENNETH WARREN, *BETHLEHEM STEEL: BUILDER AND ARSENAL OF AMERICA* 88, 90 (2008) [hereinafter WARREN, *BETHLEHEM STEEL*]. For a discussion of TCI, see *infra* Part V.A.

51. *United States Steel Corp.*, 223 F. at 66.

52. WARREN, *BIG STEEL*, *supra* note 42 at 88.

53. *Id.* at 93.

54. *Id.* at 94.

*economical methods. By economies I mean that I believed that we had reached the limit, or very nearly so, at which economies from a metallurgical or mechanical standpoint could be made effective*⁵⁵

- Testimony of Charles M. Schwab before the Circuit Court in United States v. U.S. Steel Corporation, May 19, 1913

In defending the U.S. Steel merger, Charles Schwab testified before the House Stanley Committee in 1911 and convinced the U.S. Circuit Court in 1915 that the consolidation was good for the American industry and the public. According to Schwab, the steel industry at the turn-of-the-century had perfected the method of manufacturing steel, and future economies in the manufacturing process could only be achieved by larger-scale production.

Schwab in 1901 used the example of the structural steel industry and the infant industries of steel passenger cars and steel freight cars. Schwab asserted that the only way such new industries could be successful was for the steel manufacturer to structure its business so that operations were “rationalized,” which according to Chandler is the “concentration of production in a small number of large plants of optimal size.”⁵⁶

Essentially, in 1901, Schwab was predicting that the industry had already perfected the manufacturing process, whether it related to metallurgy, mechanical, engineering, or scientific methods. This position directly contradicted Schwab’s more accurate assessment of the industry as one that was constantly experiencing “new processes” and “new methods.” He stated in court testimony in 1913 that the “requirements of the public for higher grade steels in all lines . . . make the introduction of new processes necessary.”⁵⁷

It may help to understand the inherent contradiction in Schwab’s statements by closely examining a few critical metallurgical, mechanical/engineering, and scientific developments that took place between 1901 and 1913. Many of these developments have been described as revolutionary or radical improvements. Such advancements had a major impact on the auto industry and on the commercial construction industry, including the construction of tall buildings, bridges, ships and subways, as well as in the construction of rails and railroad cars. These achievements were not accomplished by large, consolidated enterprises. They were

55. Transcript of Record at 4135, United States v. United States Steel Corp., 223 F. 55 (D. N.J. 1915) (No. 6214), in U.S. SUPREME COURT RECORDS AND BRIEFS, 1832–1978 (testimony of Charles M. Schwab).

56. CHANDLER, *supra* note 11, at 73. Schwab appeared to be focusing on specialization of production, testifying that “the greatest economy would result from having one mill make one product, and make that product continuously.” *United States Steel Corp.*, 223 F. at 117.

57. Transcript of Record at 4167, United States v. United States Steel Corporation, 223 F. 55 (D. N.J. 1915) (No. 6214), in U.S. SUPREME COURT RECORDS AND BRIEFS, 1832–1978 (testimony of Charles M. Schwab).

the result of smaller, independent companies that were willing and able to engage in research and development, careful and persistent experimentation, and the establishment of user-producer relationships.⁵⁸

A. Open-Hearth Steel: The Role of Tennessee Coal & Iron Company (TCI)

At the turn-of-the-century, open-hearth steel was a new technology that had been “comprehensively analyzed” by Henry H. Campbell using scientific principles in explaining the open-hearth furnace.⁵⁹ Nevertheless, the new process had not been widely used for the manufacture of rails. Bessemer steel was still favored by the railroads in meeting their requirement for large output (tonnage and mass production). However, when Bessemer steel was used in the construction of railroad bridges, the brittle steel was considered “not suitable.”⁶⁰ Engineers were ruling out Bessemer steel for “all of the more important structural purposes.” Use of basic open-hearth steel for bridges and construction was gaining acceptance.⁶¹

Nevertheless, Andrew Carnegie in the 1890s had failed to follow his long-established policy of favoring innovation as a means of reducing production costs.⁶² By 1905, Carnegie Steel had acquired limited open-hearth capacity in the production of structural steel.⁶³

This lapse in innovation carried over to open-hearth rails. The Government in the steel case was able to introduce the following evidence. In 1906, Carnegie Steel (then a subsidiary of U.S. Steel) learned from its customers that Tennessee Coal & Iron Company (TCI) was producing open-hearth rails that were technologically superior. The Government introduced into evidence the minutes of Carnegie Steel containing the following statement:

58. The term “independent companies” as used in this article includes Bethlehem Steel and Armco because, during the period under study, these companies were experiencing rapid growth and essentially operating independent of U.S. Steel and its subsidiaries.

59. MISA, *supra* note 16, at 81–82.

60. *Id.* at 75.

61. The distinction between basic open-hearth steel and Bessemer steel is summarized as follows:

The open-hearth furnace had several advantages over the Bessemer converter: 1) the open-hearth process was slower, allowing better control over the final product; 2) it could use much more scrap, thereby recycling what was normally a waste product; 3) it could remove the high amounts of phosphorus typically present in American pig iron. Development of the process was characterized not by spectacular breakthroughs, but by incremental improvements.

Robert Casey, *Open-Hearth Furnace*, *ENCYCLOPEDIA OF AMERICAN BUSINESS HISTORY AND BIOGRAPHY: THE IRON AND STEEL INDUSTRY IN THE TWENTIETH CENTURY* 342 (Bruce E. Seely ed., 1994). With the “basic process,” phosphorus was removed, thereby eliminating the cause of brittle steel leading to broken Bessemer beams.

62. MISA, *supra* note 16, at 83. Joseph Wall summarizes Carnegie’s policy on technology as follows:

Carnegie was convinced that one way to keep costs down was to make sure that the equipment was the most modern and efficient that technology and inventive genius could provide. No matter how new or expensive the machinery for a particular process was, if that process became obsolete then his orders were to scrap the machinery and install new machinery for the more efficient process.

JOSEPH FRAZIER WALL, *ANDREW CARNEGIE* 473 (2d ed. 1989).

63. See WARREN, *BIG STEEL*, *supra* note 42, at 90 (citing Carnegie director comments in 1905 that the company would require additional open-hearth capacity to meet demands of the time).

*The General Superintendent of the Pittsburg & Lake Erie told us the other day that after testing Open Hearth rails furnished them by Tennessee Coal & Iron Company and our Bessemer rails, they have decided that Open Hearth are twice as good as Bessemer rails. He wanted to know when we would be able to make Open Hearth rails, and said they would be willing to pay a little more for Open Hearth than for Bessemer. The same thing has come to us from two or three other people, indicating that the railroads are paying a little attention to the matter . . . but I imagine that when the demand for rails falls off, which will probably be in 1907 on account of the heavy purchases made last year and this, then we will be up against the Open Hearth proposition good and hard.*⁶⁴

U.S. Steel would later acquire TCI as a result of J. P. Morgan's intervention, allegedly, to save the investment banking firm Moore & Schley from collapse during the Panic of 1907.⁶⁵ The result of the transaction was to grant U.S. Steel control of a

64. Brief for Appellant at 730–31, *United States v. United States Steel Corp.*, 251 U.S. 417 (1920) (No. 6214), in *U.S. SUPREME COURT RECORDS AND BRIEFS, 1832–1978* (referencing the Minutes of Carnegie Company, Mar. 19, 1906).

65. VINCENT P. CAROSSO, *THE MORGANS: PRIVATE INTERNATIONAL BANKERS 1854–1913* 544 (1987). Carosso indicates three reasons for Morgan appealing to U.S. Steel to intervene: “It would save Moore & Schley, which could use the bonds to secure its bank loans, forestall the likelihood of another damaging shock to a badly depressed stock market, and allow United States Steel to absorb a competitor.” *Id.* at 545. Moore and Schley had substantial loan obligations to banks in the form of callable loans totaling \$25 million. *Id.* at 544. The loan obligations were secured by common stock of TCI. If the banks forced Moore & Schley to sell the TCI stock, at a distressed price, the firm would have defaulted on its loans. *Id.* The solution proposed by J.P. Morgan was for U.S. Steel to acquire TCI by purchasing the TCI stock, with U.S. Steel bonds valued at \$30 million. WARREN, *BIG STEEL*, *supra* note 42, at 80–81. In addition, U.S. Steel would assume an estimated \$3 million in TCI debts. *Id.* In cross-examination of Judge Gary, the prosecution used the figure of \$35,407,000 in identifying the stock purchase price paid by U.S. Steel for TCI stock. Transcript of Record at 5393–94, *United States v. United States Steel Corp.*, 223 F. 55 (D. N.J. 1915) (No. 6214), in *U.S. SUPREME COURT RECORDS AND BRIEFS, 1832–1978* (testimony of Elbert H. Gary).

The Government might have influenced the Circuit Court by the testimony of Grant B. Schley of the firm of Moore & Schley, before the Stanley Committee, in evaluating the motive of U.S. Steel in acquiring TCI stock. Judge Gary and Henry Frick negotiated with Mr. Schley over the price of the TCI stock. Initially, the price of \$60 per share was discussed, but later Mr. Schley convinced them of the opportunity for U.S. Steel to penetrate the southern market. The following colloquy occurred between the Chairman of the Committee and Mr. Schley:

The Chairman. There was a unity of interest between the Republic, the Sloss-Sheffield, and the T.C. & I., was there not, and a community of ownership – I mean the best of feeling?

Mr. Schley. There was the best of feeling; yes.

The Chairman. And a unity of interest in that respect? Those three concerns were more favorably located as to the assembling of raw materials than any like concern on this continent?

Mr. Schley. Yes; at that time. . . .

The Chairman. Was there any place between Ashland and el Paso, Tex., where the United States Steel Corporation, under sharp competition, could sell a single ton of pig iron?

Mr. Schley. That is so.

The Chairman. And, of course, in presenting this case to Mr. Frick and Mr. Gary, when they wanted to give you 60 for that stock, you presented those facts to them, did you not?

Mr. Schley. I spoke of some of those things.

The Chairman. And many more?

major potential competitor in the southern market at a bargain price. TCI represented a first mover and pioneer in the use of open-hearth steel in the production of steel rails.⁶⁶ TCI had not only developed breakthrough technology, but owned large iron ore and coal deposits, estimated in 1907 to have a market value of \$90 - \$100 million.⁶⁷ It was generally agreed that U.S. Steel had acquired TCI for a “bargain price.”⁶⁸ The benefits to U.S. Steel were enormous. First, the vast iron ore and coal resources of TCI (together with TCI’s advanced technology and U.S. Steel’s \$32 million of capital improvements at Ensley Works) made the plant at Birmingham, Tennessee the Corporation’s most efficient facility and most profitable facility for making steel, exceeding even the Gary Works.⁶⁹ This transaction not only eliminated significant potential competition from the southern-based company, but enabled U.S. Steel to acquire important new technology (in the production of open-hearth rail) which it would also utilize in its new Gary Works in Indiana.

The Circuit Court appears to have relied on the testimony of the Corporation that TCI was not a potential competitor to U.S. Steel.⁷⁰ Undoubtedly, the Court was also influenced by the fact that President Theodore Roosevelt had sanctioned the acquisition.⁷¹

As a result of the TCI transaction, U.S. Steel was in a position to control the Birmingham market, fulfilling Henry Frick’s prediction that Birmingham was the country’s greatest potential center for steel production.⁷²

Here was example of U.S. Steel, behind the technological curve in the production of a basic steel commodity, using its great resources and political influence to eliminate an important competitor, rather than contributing to technological advancement. It was the Government’s most impressive piece of evidence that was not neglected in its prosecution of the case, but nevertheless had little influence on the Court.⁷³ The Government had failed to reinforce its case with

Mr. Schley. Yes. . . .

The Chairman. . . . When you presented those facts, and when you showed them the intrinsic value of your stock, and the fact that if they did not get the T. C. & I., they could never get a foothold on that region, then they gradually rose from 60 to 75 and from 75 to 90 and from 90 to par, did they not?

Mr. Schley. That is right.

United States Steel Corp.: Hearings Before the Comm. on Investigation of United States Steel Corp., 62nd Cong. 1115–16 (1911) (statement of Grant B. Schley before the House Stanley Committee).

66. WARREN, *BIG STEEL*, *supra* note 42, at 78–79.

67. *Id.* at 79, 82.

68. *Id.* at 81–82.

69. *U.S. Steel Corporation*, *FORTUNE MAGAZINE*, Mar. 1936, at 200, 202.

70. *United States v. United States Steel Corp.*, 223 F. 55, 148 (D. N.J. 1915), *aff’d*, 251 U.S. 417 (1920).

71. *Id.* at 148–49.

72. WARREN, *BIG STEEL*, *supra* note 42, at 83.

73. The Government argued as follows: “It is another striking fact that the most important improvement in the steel industry since the formation of the combination, the open-hearth rail, was introduced not by the combination but by one of its smaller competitors.” Brief for Appellant at 230, *United States v. United States Steel Corp.*, 251 U.S. 417 (1920) (No. 6214), *in* U.S. SUPREME COURT RECORDS AND BRIEFS, 1832–1978.

other examples of U.S. Steel as the follower in introducing revolutionary new processes and methods.

The remainder of the Government's case on technological developments since the formation of U.S. Steel is set forth in a two-page summary ("summary"), with the heading "Concerning Improvements in the Manufacture of Steel."⁷⁴ Except for reference to TCI, the summary is significant only in its conclusion that "[t]he great developments in the art of steel manufacture in the United States . . . have to a very large extent been brought about by small independent companies"⁷⁵ This observation, if supported by evidence, could have greatly strengthened the Government's case.

However, the Government failed to identify those other "great developments" by independent companies, thereby allowing U.S. Steel to assert in its brief, that as to an alleged "deterioration" in the quality of U.S. Steel products, the Government has offered "[n]o testimony."⁷⁶

Representatives for the industry, on the other hand, identified certain efficiencies and savings in the production and transportation of steel. Thus, locating steel plants near the finishing mills, as in the case of the Gary Works, offered savings in transportation. U.S. Steel introduced the by-product coke oven, replacing the wasteful beehive method of production and utilizing gases from coke ovens and blast furnaces as a way of "saving between 1,700,000 and 1,800,000 tons of coal a year."⁷⁷ New bookkeeping procedures were introduced, enabling different departments within the U.S. Steel enterprise to compare their performance. All of these changes offered improvements in the transportation or manufacture of steel, with resulting cost savings, but none of these developments, with the possible exception of the by-product coke oven, resulted in changes that led to new products or had a "great" impact on the steel industry or on other industries.⁷⁸ In testimony

74. *Id.* at 1102–03.

75. *Id.* at 1102.

76. Brief for Respondents at 133–34, *United States v. United States Steel Corp.*, 251 U.S. 417 (1920) (No. 6214), in U.S. SUPREME COURT RECORDS AND BRIEFS, 1832–1978.

77. Brief for Respondents at 208–09, *United States v. United States Steel Corp.*, 251 U.S. 417 (1920) (No.6214), in U.S. SUPREME COURT RECORDS AND BRIEFS, 1832–1978. The Corporation's Statement also indicates that approximately 3,000,000 tons of coal a year were conserved by the use of by-product coke ovens. In an *Iron Age* series of articles on the Gary Works, U.S. Steel was given credit for introducing furnace gas as a fuel for gas engines at the Company's Gary Works, South Chicago Works and the Edgar Thomson mills. *The Greatest Steel Plant in the World – II*, IRON AGE, Feb. 4, 1909, at 373. The article describes the Company as a prime mover in this field. *Id.*

78. Gerhard Rosseger provided one explanation for the technological progress offered by the by-product oven:

In the by-product branch, we can observe a pronounced increase in capacity per plant. At the same time this fourfold growth in average plant capacity was accompanied by not even a doubling in the number of ovens per plant, a finding that substantiates the earlier statement that increases in the size of individual ovens formed one of the major aspects of technological progress. Thus the diffusion of the by-product process was clearly accompanied by a very steady increase in the scale of plants, as measured by annual capacity.

before the Circuit Court, industry representatives pointed to open-hearth steel and the Jones mixer as processes fundamentally changing the mechanical or metallurgical qualities of steel.⁷⁹ With the exception of by-product coking, none of U.S. Steel's innovations rose to this level of technological breakthroughs or revolutionary changes in methods or processes.

Judge Gary ended his testimony with the following embellishment:

*Then the great study [by U.S. Steel] that has resulted by an aggregation of men represented in different departments by individuals has enabled us to improve methods and to invent new ways of producing at less cost. Then the discovery of and applying of new methods of producing, carrying, delivering and utilizing in the mills, has improved from time to time. The cash resources of the company have been of decided benefit.*⁸⁰

Similarly, James Farrell testified as to the economies and improvements in the Company's manufacture of steel:

*[The open-hearth steel committee members] meet here [once] every one or two months. I meet here with them, together with the assistants to the President and the vice-presidents of the corporation, and our executive people. These men study all new processes, and if some one comes to us and offers a process that is going to revolutionize the industry—at least most of the inventors think their processes will – we give it very careful study and attention, because we never know but what [sic] there is something in these things, and everything brought to us is carefully worked out. We have committees who are studying the quality of rails and the quality of steel.*⁸¹

However, as will become evident from this study, James Farrell was not disclosing why U.S. Steel had twice rejected acquiring Henry Grey's "radical" new technology that "helped to revolutionize the American construction industry" or why the Company was not pursuing development of sheet steel for the automotive

BELA GOLD, WILLIAM S. PIERCE, GERALD ROSEGGER & MARK PERLMAN, *TECHNOLOGICAL PROGRESS AND INDUSTRIAL LEADERSHIP: THE GROWTH OF THE U. S. STEEL INDUSTRY, 1900–1970*, 455 (1984) [hereinafter GOLD ET AL.].

Kenneth Warren described the significance of by-product coking as having a great impact on the steel industry by "changing the whole energy balance of the fully integrated iron and steel works." Email from Kenneth Warren, author and historian, to author (Nov. 18, 2011) (on file with author).

79. *United States v. United States Steel Corporation*, 223 F. 55, 122–23 (D. N.J. 1915), *aff'd*, 251 U.S. 417 (1920).

80. Transcript of Record at 4780, *United States v. United States Steel Corporation*, 223 F. 55 (D. N.J. 1915) (No. 6214), *in* U.S. SUPREME COURT RECORDS AND BRIEFS, 1832–1978 (testimony of Elbert H. Gary).

81. *Id.* at 4067 (testimony of James A. Farrell) (emphasis added).

industry.⁸² These two technological developments, alone, would propel Bethlehem Steel and Armco, respectively, into major American steel producers.⁸³

U.S. Steel summarized its case on implementing economies in the manufacture and distribution of steel products in a five-page report as part of its Statement of the Case. Essentially, it is a summary of the testimony of Judge Gary and James Farrell. Clearly, U.S. Steel studied by-product coke ovens and introduced the technology in its Gary plant, with considerable cost savings.⁸⁴ Farrell testified that the Company spent approximately \$80 million on the Gary Works (of which \$65 million was derived from earnings).⁸⁵ Farrell also testified that, since formation in 1901, U.S. Steel had expenditures on new equipment and plant extensions of \$424 million, in addition to approximately \$123 million for “replacements and rehabilitations.”⁸⁶ No doubt these expenditures along with the utilization of by-product coke ovens, and the location of new plants near its fabrication facilities, produced efficiencies in the production and transportation of steel. The Gary Works alone would have been recognized by Chandler for its “capacity and throughput.”⁸⁷

In response to these numbers, the Government could have cited the Report on the Corporation, prepared by the U.S. Commissioner of Corporations, in 1913, which concluded: “in the case of crude steel and most leading steel products, with the exception of steel rails, the Corporation, notwithstanding the great additions to its plant capacity, both through new construction and through acquisition, has not kept pace with its competitors, but has suffered more or less pronounced retrogression.”⁸⁸

U.S. Steel’s assertions of technological achievement raise two questions. Were these improvements or efficiencies of such importance as to rise to the level of “great developments” or “radical improvements” in technology, such as described

82. Lance E. Metz, *The Grey Mill*, in *ENCYCLOPEDIA OF AMERICAN BUSINESS HISTORY AND BIOGRAPHY* 185 (Bruce E. Seely ed., 1994) [hereinafter Metz].

83. Fortune Magazine, in its 1936 study of U.S. Steel, designated the “last decade” as the period for the rise of the “two most striking phenomena in the steel world”: the emergence of the automobile industry and the development of the continuous strip mill. *U.S. Steel Corporation*, *FORTUNE MAGAZINE*, Mar. 1936, at 182. In fact, the user-producer relationship between steel producers and the auto industry and the experimentation, development and production of sheet steel were well underway by 1913, although continuous rolling technology would not emerge until the 1920s. WARREN, *BIG STEEL*, *supra* note 42, at 137–38.

84. Brief for Respondents at 208–09. *United States v. United States Steel Corp.*, 251 U.S. 417 (1920) (No. 6214), in *U.S. SUPREME COURT RECORDS AND BRIEFS, 1832–1978*. Farrell also indicated in his testimony that U.S. Steel was engaged in the study of the electrical steel process. However, the evidence seems to indicate that Halcomb Steel Company was the first mover in utilizing electric steel on a commercial scale in the United States. John A. Matthews, *The Electronic Furnace in Steel Manufacture*, in *YEAR BOOK OF THE AMERICAN IRON AND STEEL INSTITUTE* 75–76 (1916).

85. Transcript of Record at 4074, *United States v. United States Steel Corporation*, 223 F. 55 (D. N.J. 1915) (No. 6214), in *U.S. SUPREME COURT RECORDS AND BRIEFS, 1832–1978* (testimony of James A. Farrell).

86. *Id.* at 4078.

87. CHANDLER, *supra* 11, at 24. According to Chandler, “the two decisive figures in determining costs and profits were (and still are) rated capacity and throughput, or the amount actually processed within a specified time period.” *Id.*

88. REPORT OF THE COMMISSIONER OF CORPORATIONS ON THE STEEL INDUSTRY, H.R. REP. NO. 62–1127, Part III, at 373 (1913).

in industry testimony regarding basic open-hearth steel or, as discussed below in this study, with respect to Charles Schwab's introduction of the Grey mill and wide-flanged steel beam? Second, were these economies and lower costs in steel production and transportation passed along to consumers in the form of lower prices? These issues are addressed in this study of Bethlehem Steel and American Rolling Mill Company (Armco).

B. Structural Steel: Bethlehem Steel as a First Mover and Pioneer

Bethlehem Steel ("Bethlehem" or "company") in 1901 had previously undergone a reorganization and its ownership was acquired by Charles Schwab as "a flier." At the time, federal projects were the company's main source of revenue, concentrating in the manufacture of shipbuilding, armor, and guns. Schwab's goal was "to build a firm base in commercial products."⁸⁹ While Schwab was president of U.S. Steel, he assigned his interest in Bethlehem to a syndicate controlled by J.P. Morgan, who recommended that "US Steel should absorb Bethlehem, but the idea was not taken up."⁹⁰

Once Schwab left U.S. Steel, he became president of Bethlehem and made the business decision to introduce open-hearth steel for structural products.⁹¹ Most significant was Schwab's decision, in 1905, to contract with the inventor, Henry Grey, to build the Grey universal beam mill and produce the so-called wide-flanged beams.

Grey's invention had been brought to the attention of U.S. Steel's finance committee by Schwab while he was president of U.S. Steel. The Corporation rejected the proposal to acquire the invention and again in 1905, when Schwab was president of Bethlehem Steel, it was reported that Schwab offered the Corporation the rights to the technology, but, again, the Corporation rejected its adoption.⁹² It wasn't until 1926 that U.S. Steel finally constructed a mill at its Homestead plant that was "able to roll the largest-sized wide flanged beams."⁹³

There were many advantages to the Grey mill: the mill's rolling equipment achieved "excessive" speed (producing up to 1,200 tons of finished beams per day) and replaced the expensive method of fabricating structural beams by eliminating "a [large] number of angles, channels, . . . [or] plates [that had to be] riveted together."⁹⁴ The result was a wide-flanged beam that "possessed greater strength

89. WARREN, BETHLEHEM STEEL, *supra* note 50, at 87.

90. *Id.* at 73.

91. *Id.* at 76, 87–88.

92. WARREN, BIG STEEL, *supra* note 42, at 91–92.

93. *Id.* at 94–96. Unfortunately, Carnegie Steel's Homestead plant was selling so-called "Carnegie beams," but using the Grey technology (owned by Bethlehem) without a license. It would take another two years and an infringement suit before U.S. Steel would enter into a licensing arrangement. *Id.* at 96.

94. Thomas Jay Misa, Science, Technology and Industrial Structure: Steelmaking in America, 1870-1925, at 250–51 (Jan. 1, 1987) [hereinafter Misa dissertation] (unpublished Ph.D. dissertation, University of Pennsylvania) (on file with University of Pennsylvania libraries).

and rigidity with less weight and production costs.”⁹⁵ It was reported that the Grey beam (later to be named the Bethlehem beam) would require reinforcement “only if a building exceeded fifteen stories.”⁹⁶

If Henry Grey was the inventor, Schwab was the first mover and pioneer. Bethlehem’s construction of the Grey structural mills at its Saucon Works in 1908 was the beginning of fierce competition in the market for structural steel between U.S. Steel’s standard beam and Bethlehem’s Grey beam. By 1910, management at Carnegie Steel had reduced its market position in structural steels from 51% to about 25% of the market.⁹⁷ Henry Bope, Vice President of Carnegie Steel, reported:

*These people [at Bethlehem] have been very active in their work among architects towards having their sections specified, and we have been unable to counteract this work in many localities . . . In this connection I might say that the structural situation throughout the country has been giving me a good deal of concern. There was a time when there was probably not a single user of structural material in the United States who was not on our books for more or less of his tonnage, but today we are not getting any of this business.*⁹⁸

Schwab’s building of the Saucon Works with the Grey structural mill was not accomplished without the challenge of financing the Saucon project.⁹⁹ By 1907, with a financial panic underway, it appeared that Schwab would have to sacrifice his plans for the Grey mill. There were a series of other problems that could have defeated Schwab’s plans, but his close advisers reminded him that “we have always figured that our profits would come from Structural Steel, and principally from the Grey Sections.”¹⁰⁰

By 1908, Bethlehem Steel was working to promote its structural products while attempting to work with the structural steel pool and its principal competitor, Carnegie Steel. The fact is that Bethlehem could not conduct business while being restricted to some arbitrary market allocation. In its dealing with Carnegie Steel, Bethlehem Steel was given an “allotted tonnage of shapes,” and encouraged to raise its price of light structural shapes.¹⁰¹ In addition, Carnegie Steel recommended that Bethlehem “consider abandoning” the new beams.¹⁰² It attempted to impose upon

95. Metz, *supra* note 82, at 185.

96. Misa dissertation, *supra* note 94, at 251.

97. WARREN, BIG STEEL, *supra* note 42, at 93.

98. *Id.*

99. Misa dissertation, *supra* note 94, at 266.

100. *Id.* at 264.

101. *Id.* at 273.

102. *Id.* at 275.

Bethlehem a redesigned beam, so that all light I-beam sections would be uniform.¹⁰³ Bethlehem rejected these proposals as a threat to its technological advantage.

Schwab, like his mentor Andrew Carnegie, engaged in various forms of salesmanship and promotion of his products. Like Carnegie, he issued a 40-page pocket size pamphlet “that indicated the wide range and light weight of these beams.”¹⁰⁴ Both pamphlets were considered a “powerful competitive tool.”¹⁰⁵ Schwab also established business relationships with architects, contractors, and engineers in the awarding of commercial contracts – recognizing that “user-producer relationships” were a “necessary asset for technological innovation.”¹⁰⁶

If the above-described efforts by Carnegie Steel to eliminate price competition and technological advantage were not enough, U.S. Steel resorted to a discriminating use of its own Pittsburgh-Plus pricing system. Under the single-point pricing system, steel products were sold at the base price at Pittsburgh, plus the freight from Pittsburgh to the destination in question. Essentially, this system eliminated any advantage a manufacture might have had by being located close to its market. It also resulted in the buyer of structural steel, located close to the manufacturer, in paying excessive freight charges. Carnegie Steel was even able to manipulate this system:

Carnegie Steel gave Bethlehem stiff competition for a new contract with Bettendorf in September 1908. Whereas Bethlehem emphasized the technical capabilities of its beams, the Carnegie firm manipulated the freight rates, thereby gaining a small but decisive margin on price. On 26 September Blakeley [representing Bethlehem] reported that [he] had not secured a contract before W. P. Bettendorf had left Chicago for his works in Davenport, Iowa. Carnegie Steel had given Bettendorf “prices on standard sections which left nothing of advantage to him in the lesser weight of our shapes.” From a chance remark and information from “other sources,” Blakeley reasoned out a “probable plan” of the Carnegie firm: the steel concern could “take advantage of their Chicago plant on the question of freight, that is, they practically may establish Chicago (or Illinois Steel Co.) as the basing point of price. . . .”¹⁰⁷

In summary, the Government in cross-examination could have elicited from Schwab a complete history of the Grey mill, as discussed above, and the “revolutionary wide-flanged structural beam.” There was an abundance of public information on Bethlehem’s Saucon Works. For example, in “The Iron Trade Review,” in 1907, an article on the Saucon Works had the following information:

103. *Id.* at 275.

104. *Id.* at 274.

105. MISA, *supra* note 16, at 71.

106. *Id.* at 88.

107. Misa dissertation, *supra* note 94, at 288.

*The new [Grey] structural shapes which will be rolled by these works are especially designed to fit the needs of structural practice in this country . . . The question of these new structural shapes has been considered by many of the leading engineers and architects in the country who regard the innovation as a radical improvement, and have strongly endorsed it as a distinct advance in the field of structural work. These shapes will offer great economy in the construction of steel work, and at the same time will permit of an improvement in the design of such work. They will extend the application of rolled steel shapes to construction in a wider field, will simplify the detail of such work and reduce the cost of fabrication.*¹⁰⁸

It was a case of missed opportunities for the Government to establish that U.S. Steel had repeatedly rejected one of the “radical improvements” in steel technology. Andrew Carnegie is reported to have said, “Pioneering don’t pay.”¹⁰⁹ Despite the fact that Andrew Carnegie was renowned for investing heavily in new technology, he was acknowledging the fact that “any radical change in steel technology would render worthless hundreds of millions of dollars of the corporation’s plant investment.”¹¹⁰ In addition, the single overriding economic objective of U.S. Steel, particularly during the 1901-1914 period, was “tonnage business,” whether in steel rail or structural beams.¹¹¹ This policy may explain, in part, why the Company was slow to adopt basic open-hearth steel or to acquire the Grey technology.¹¹²

The Government could have cited the findings of the U.S. Commissioner of Corporations, referred to previously in this article, or extracted further testimony of Charles Schwab to explain U.S. Steel’s reluctance to invest in new technology. In his court testimony, Schwab answered a question regarding the depreciation of steel plant:

The changes in methods and processes have been so frequent as to make obsolete and useless practically new plants. For example, the introduction of

108. *New Saucon Plant of Bethlehem Steel Co.*, 41 THE IRON TRADE REVIEW 735, 744–45 (1907) (emphasis added). See *The Bethlehem Steel Company’s Recent Extensions*, 78 THE IRON AGE 1142, 1142 (1906) (discussing construction of the Saucon plant); see also *The Bethlehem Steel Company’s New Plant*, 80 IRON AGE 831, 831–38 (1907); *The Grey Structural Mill at South Bethlehem*, 81 THE IRON AGE 1, 1 (1908) (stating how the new Great Structural Mill at the Saucon plant allowed for a rise in the use of steel for construction); *Bethlehem Sections in New York Buildings*, 43 THE IRON TRADE REVIEW 549, 549 (1909) (discussing the wide use of Bethlehem products in various New York construction projects).

109. *U.S. Steel Corporation*, FORTUNE MAGAZINE, Mar. 1936, at 73.

110. *Id.*

111. See WARREN, *BIG STEEL*, *supra* note 42, at 44–45 (“Between 1902 and 1913 US Steel shipments of steel products increased from 8.9 to 13.4 million tons. This far outpaced any other company in absolute terms . . .”).

112. Gerhard Rosegger made the following observation:

An existing major technology represents not only a commitment of large amounts of capital but also an accumulation of operating experience that producers are reluctant to abandon. Thus, the persistence of this technology in the face of newer ones is frequently assured by a series of defensive innovations aimed at upgrading the obsolete process.

GOLD ET AL., *supra* note 78, at 588–89.

*open hearth rails made practically useless all Bessemer converting plants for the making of rails. The Bessemer converter plant itself has been frequently changed within the last twenty years. That is an example of the progress in steel that has made depreciation very heavy, because of the necessity for changes in process due to the introduction of new processes or new methods; and especially is that true with respect to the general requirements of the public for higher grade steels in all lines, which made the introduction of new processes necessary, and therefore making useless the plants established for a different process. So that depreciation in steel plants in this past twenty years has been very heavy indeed.*¹¹³

Yet, the testimony of James Farrell made it very apparent that U.S. Steel had the resources to invest in new plant equipment (\$424 million) and replacements and rehabilitations (\$123 million) and still retain a \$75 million bank balance, without even taking into account the Corporation's enormous working capital. Twenty-five years later in 1938, U.S. Steel's own consultants would conclude that the Company's depreciation policy resulted in an inadequate allowance for obsolescence and for the installation of new processes and methods, thereby weakening the Company's competitive position.¹¹⁴ The study found that U.S. Steel's products were not "equal to the best in the trade."¹¹⁵

C. *Automotive Steel: The Role of Armco*

The Government's ability to investigate Armco's early role in the production of automotive steel (also "sheet steel") would have been more difficult than its investigation of Bethlehem's role in the market for structural steel. It appears that Armco had a more protective policy regarding its R&D and likely would have been less cooperative in disclosing its progress to the Government.¹¹⁶

113. Transcript of Record at 4167, *United States v. United States Steel Corporation*, 223 F. 55 (D. N.J. 1915) (No. 6214), in *U.S. SUPREME COURT RECORDS AND BRIEFS, 1832-1978* (testimony of Charles M. Schwab) (emphasis added).

114. See *infra* note 138 and accompanying text.

115. See *infra* note 137 and accompanying text.

116. See DOUGLAS ALAN FISHER, *EPIC OF STEEL* 145 (1963) [hereinafter FISHER]. According to Fisher, Armco "with[e]ld the secrets of their experiments from the outside world." *Id.* Regarding Armco's policy with respect to the manufacture of silicon steel, a senior engineer of the company made this observation:

As much experimental work was being carried on through the years by Armco and considerable activity evident because of the desire to improve the quality of steel, and as the quality was being improved, competitors soon found out that The American Rolling Mill Company was progressing along this line. Efforts were being made by competitors to find out what was being done in the manufacture of silicon steel. After giving the subject much thought, as well as policing the grounds and watching for unwelcome visitors at the time of tapping of heats, it was decided to do something at the tapping time of the heats that would throw a question in their minds, as to just what was the real cause for the improvement of this steel from a magnetic standpoint.

W. J. BECK, *A STORY OF THE MANUFACTURE OF ELECTRICAL SHEET STEEL: 1903-1940*, at 201 (1947) (on file with author).

Nevertheless, Armco was not a reclusive organization. Its metallurgists worked closely with Westinghouse in 1902 in developing silicon steel.¹¹⁷ In addition, Armco favored working closely with automotive manufacturers in creating a user-producer relationship. Armco described its policy as follows:

*... [I]t was decided that the operating department should know more about the requirements of individual [automotive] customers, especially as regards the different conditions existing in different plants. A member of the [Armco] operating department was detailed to work in conjunction with the inspection department for this work and a great amount of time was spent in [automotive] customer's plants. As a result of this intensive study Armco was able to satisfy the demands of its customers to a much greater extent and consequently to give them better service.*¹¹⁸

This reputation for working with users of steel products was confirmed by Misa: “American Rolling Mill had a record of developing latent market niches through extensive interaction with consumers and effective use of scientific research.”¹¹⁹

Armco’s history reveals an organization devoted to R&D.¹²⁰ Armco’s success in developing new processes and new products can be attributed to its early attention to R&D. The Government could have searched trade journals, which in 1910 and 1911 disclosed the company’s spectacular growth during the first decade of its operations,¹²¹ its reputation as a “manufacturer of special high grade products in iron and steel,”¹²² and its reputation as a research laboratory “claimed to be the best equipped iron and steel research laboratory in the United States.”¹²³

Trade articles should have provided a clue to the prosecution that there were significant metallurgical discoveries taking place during the 1901-1912 period, such as the discovery of two new alloys (silicon and stainless steel), the development of procedures “for the heat treatment of the forgings, stampings, and castings that composed an automobile,”¹²⁴ and the application of heat treatment for steel,

117. MISA, *supra* note 16, at 257. See also BECK, *supra* note 116, at 166.

118. ARMCO, *THE FIRST TWENTY YEARS: A HISTORY OF THE GROWTH AND DEVELOPMENT OF THE AMERICAN ROLLING MILL COMPANY, MIDDLETOWN, OHIO, BEGINNING 1901 AND ENDING 1922*, 100–01 (1922).

119. MISA, *supra* note 16, at 214. Misa repeatedly took the position that “[v]igorous user-producer relations continued to be the essence of technical innovation.” *Id.* at 255.

120. One scholar offered the following information: “The American Rolling Mill lab is often described as the first true industrial research laboratory in the steel industry, or the first lab recognized as such.” Janet T. Knoedler, *Market Structure, Industrial Research, and Consumers of Innovation: Forging Backward Linkages to Research in the Turn-of-the-Century*, 67 *BUS. HISTORY REV.* 98, 109 n.34 (1993)

121. *American Rolling Mill Company: New East Side Works at Middletown, Ohio*, 88 *THE IRON AGE* 478, 478 (1911).

122. *The American Rolling Mill Company’s Research Laboratory*, 86 *THE IRON AGE* 1152, 1152 (1910).

123. *Seeing How American Ignorance Is Made*, 90 *THE IRON AGE* 516, 516 (1912). See also *id.* at 1152 (detailing the company’s new “splendidly equipped research laboratory”).

124. MISA, *supra* note 16, at 214, 255, 257. Armco described its program for making auto sheets for drawing (shaping) auto parts:

described as “the greatest example of the application of scientific methods to the [steel] industry.”¹²⁵

It was R&D that led to Armco’s development of “Silver Finish” sheet steel. This product was used “in half of all Ford bodies” by 1913, with Ford Model T being one of the most successful automobiles at the time.¹²⁶ Demand for steel sheets and plates closely followed automobile production, which began to “soar in the 1910s.”¹²⁷ It was about this time that Armco began making automotive sheets “in earnest.”¹²⁸ Armco described its experimentation with automotive steel as follows:

*[I]t will be seen that Armco’s early experience in making sheets for drawing auto parts was a series of desperate emergencies similar to the experience with the radiator cases, and these emergencies had often to be met by desperate expedients. There was a time when Armco was making auto sheets by so many different treatments that it was almost impossible to keep track of them. In time, with a better understanding of the customer’s requirements, the different grades and treatments were standardized so that for several years past[,] Armco has seldom found it necessary to make anything special to meet its customer’s requirements, no matter how severe these may be.*¹²⁹

Demand for Armco’s steel sheets was not limited to a few motor car companies. In 1919, Armco issued a list of eighteen auto manufacturers using a wide variety of Armco steel products.¹³⁰

Armco became a pioneer in R&D and steel metallurgy in its formative years, a major contributor to the development of silicon steel, and a successful first mover in the development of steel sheet for the automotive industry.¹³¹ Armco, like Bethlehem Steel, was also a pioneer in the application of user-producer relations, considered to be “the essence of technical innovation.”¹³²

Increasing the severity of draws, in addition to changing the grades of steel, early suggested a very close investigation of the heat treatment of sheets for drawing purposes. A committee was formed under the direction of the research department of the American Rolling Mill Company to study the problem. Extensive experiments and investigations were carried out and the results were applied to Armco practice as rapidly as possible.

ARMCO, *supra* note 118, at 100.

125. George B. Waterhouse, *Some Recent Metallurgical Developments*, in YEARBOOK OF THE AMERICAN IRON AND STEEL INSTITUTE 1912, at 94 (James T. McCleary ed., 1913).

126. MISA, *supra* note 16, at 243.

127. *Id.* at 214.

128. ARMCO, *supra* note 118, at 98.

129. *Id.* at 100.

130. *Armco in the Automobile*, 6 ARMCO BULLETIN 364, 364–65 (1919).

131. Kenneth Warren has informed this author that, up to post World War I, “American Sheet and Tin Plate [a subsidiary of US Steel] had done more work in pioneering improved methods of sheet rolling than Armco.” Email from Kenneth Warren to author (Nov. 18, 2011) (on file with author). However, the company eventually abandoned this effort. WARREN, *BIG STEEL*, *supra* note 42, at 136–37.

132. MISA, *supra* note 16, at 255.

In 1936, Fortune Magazine conducted a comprehensive study of U.S. Steel. Its principal observations are summarized as follows:

*The two most striking phenomena in the steel world of the last decade have been the rise of the automotive industry to first place among steel consumers and the development of the continuous strip mill, which produces automobile sheet and strip steel in huge quantities at low cost. When Chairman Taylor took over [in 1928], the Corporation was doing very little business in automobile steel and it had only one continuous strip mill. And as late as 1934 a mere 9 per cent of the Corporation's sales were in automobile steels, whereas the industry as a whole that year sold 21 per cent of its steel to automobile manufacturers.*¹³³

The article further observed that U.S. Steel's largest subsidiary, Illinois Steel Company, which included the Gary Works, one of the Corporation's most efficient plants, sold only twelve percent of its steel to Detroit's automobile manufacturers, "for Illinois could never pay much attention to this market, lacking the new wide rolling mills."¹³⁴ All of these conclusions were again confirmed by U.S. Steel's own internal study in 1938 ("Study"), conducted by the private engineering firm of Ford, Bacon & Davis.¹³⁵

The Study concluded that the Company's failure to keep pace with new technology led to the following results:

(1) Production of automotive steel: "The Corporation, judged by its adoption of continuous rolling mill facilities, was slow in recognizing the potentialities of wide strip and sheet business. This failure was a leading factor in preventing it from being fully competitive in the automobile trade market and accounted in part for the diminishing participation of Carnegie-Illinois in the Detroit area."¹³⁶

(2) New production processes and methods: "Failure to improve production methods and manufacturing facilities whereby the market would be supplied with a finished product equal to the best in the trade."¹³⁷

133. *U.S. Steel Corporation*, FORTUNE MAGAZINE, Mar. 1936, at 182.

134. *Id.* at 200.

135. See generally FORD, BACON & DAVIS INC., UNITED STATES STEEL CORPORATION: FINAL STUDY SUMMARIZING THE SURVEY, REPORT NO. 200 (1938).

136. *Id.* at 74–75.

137. *Id.* at 173–74.

(3) Pittsburgh-Plus pricing system: “The Pittsburgh plus system . . . contributed to rigidity [in improving production methods and manufacturing facilities] as did also a depreciation policy which made inadequate allowance for obsolescence and tended to make the management delay decisions on installing the new equipment required by competitive conditions.”¹³⁸

Admittedly, it would have been difficult, in 1911-1914, to fully evaluate U.S. Steel’s policies with respect to R&D. Even one of the Corporation’s severest critics is forced to hedge on this subject:

*It is not clear that U.S. Steel’s research effort was really designed to promote technical innovation, which it did with selective success. Industrial research may have been intended to serve as a foil against antitrust proceedings, a perennial concern, by appearing to promote industrial activity in the public interest. Or research may have been seen as an investment whose currency of return was in company prestige rather than technological innovation.*¹³⁹

U.S. Steel was one of the early steel companies to experiment in rolling sheet steel in a continuous mill. According to Warren, there were three separate projects by U.S. Steel, in 1902, in 1905, and in 1917.¹⁴⁰ One of the projects was conducted by American Sheet and Tin Plate Company, a subsidiary of U.S. Steel. However, the Corporation abandoned its experiments in 1917, leaving Armco to make the breakthrough in 1923 at its plant in Ashland, Kentucky.¹⁴¹

Nevertheless, the prosecution could have presented a stark contrast between Armco, on the one hand, as a relatively small independent steel company with limited resources, that as early as 1913 had achieved an important position in the steel industry by its emphasis on R&D and its persistent experimentation with alloy steel and automotive sheet steel. In contrast, the Government could have introduced evidence, through due diligence and cross-examination, that U.S. Steel had a general disinterest in technology, was a follower in the development of silicon steel, and was disinterested in the technology required for producing automotive sheet steel, thereby failing to meet the demands of the automotive industry as a potential major consumer of steel sheets. Likewise, the Company repeatedly rejected the opportunity to acquire the technology of Henry Grey, resulting in the “Bethlehem beam” which became the standard of excellence for the construction industry. The Government’s failure to investigate the principal consumer markets for steel (automotive steel and structural steel) was a glaring failure in due diligence.¹⁴²

138. *Id.* at 160.

139. MISA, *supra* note 16, at 261.

140. WARREN, BIG STEEL, *supra* note 42, at 136–37.

141. *Id.* at 137–38.

142. Fetter made an interesting observation:

There was one other critical omission in the Government's case: the investigation of Pittsburgh-Plus pricing.

VI. PITTSBURGH-PLUS PRICING

A. *The Circuit Court*

The opinion of the Circuit Court in *United States Steel Corp.* was written by Judge Buffington, who concluded that the "Gary Dinners" constituted "a combination or common action forbidden by law."¹⁴³ Nevertheless, Judge Buffington made the observation that the participants in that combination "did not intend to act illegally" and the "period of co-operation had passed away before the bill was filed."¹⁴⁴ The Court chose not to enjoin the defendants against engaging in price fixing, but decided to retain jurisdiction of the case.¹⁴⁵

Judge Woolley wrote a concurring opinion in which he reached the same conclusion but with considerably stronger language. He concluded that between 1901 and 1911 (with the "Gary Dinners" ending on January 11, 1911), U.S. Steel and its competitors engaged in price fixing, first, through pools, then by trade meetings, and lastly by the "Gary Dinners" and related committee meetings.¹⁴⁶ U.S. Steel provided "the leadership . . . in promulgating and perfecting the policy."¹⁴⁷

What the Court failed to address in its opinion was the so-called Pittsburgh-Plus pricing system. Neither Judge Buffington nor Judge Woolley mentioned this pricing arrangement, even though the Court record contained a description of the system by James Farrell, then president of U.S. Steel.¹⁴⁸ The significance of Pittsburgh-Plus pricing was later revealed in the 1924 FTC proceedings against U.S. Steel and its subsidiaries. The FTC made the following finding:

While the Pittsburgh-Plus system was used as the basis for the agreed prices fixed by the original pools, trade meetings and Gary dinners, it was found later that such price system obviated the necessity of such pools, price-fixing trade meetings and Gary dinners; so it finally succeeded these three plans, and as such successor it still continues From 1903 to 1909 the Pittsburgh Plus system of quoting and selling said steel products was used in

Defendants' counsel were much more awake to some important economic aspects of the case than were the attorneys for the Government, and they had taken the precaution to engage economic experts to make an *ex parte* study of the case for nearly two years before it came to trial in the Circuit Court . . .

FETTER, *supra* note 5, at 85.

143. *United States v. United States Steel Corp.*, 223 F. 55, 160–61 (D. N.J. 1915), *aff'd*, 251 U.S. 417 (1920).

144. *Id.* at 161.

145. *Id.*

146. *Id.* at 175–76 (Woolley, J., concurring)

147. *Id.* at 177.

148. Transcript of Record at 4082, *United States v. United States Steel Corp.*, 223 F. 55 (D. N.J. 1915) (No. 6214), *in* U.S. SUPREME COURT RECORDS AND BRIEFS, 1832–1978 (testimony of James A. Farrell).

*connection with and as a basis for the price-fixing activities of the steel producers. From 1909 to the present time, with minor interruptions the Pittsburgh Plus system has been used by the steel producers independently of such pools, price-fixing trade meetings and Gary dinners for the purpose and with the effect of reaching uniform delivered prices.*¹⁴⁹

In 1913, James Farrell, in direct examination by defense counsel in court proceedings, entered into the following exchange:

Q. So that I can understand what is meant by Pittsburgh base, let us take a concrete case. Suppose material is produced in Pittsburgh for delivery at, we will say, Omaha, Nebraska. What would be the price at Omaha?

A. It would be the Pittsburgh price, plus the freight to Omaha.

Q. It has appeared in the testimony that steel manufactured in other manufacturing centers has been sold also on the Pittsburgh base?

A. Yes.

Q. Now, suppose that steel is manufactured at Chicago, we will say, sold on the Pittsburgh base for delivery in Omaha, what would that mean, as to the price paid in Omaha for the steel so manufactured in Chicago?

A. It would be the Pittsburgh price plus freight to Omaha.

Q. From Pittsburgh?

A. Yes.

Q. Assuming that freight from Chicago to Omaha is less than the freight from Pittsburgh, which I suppose is not a very violent assumption, would the steel net the Chicago mill more money, at the mill, than it would in Pittsburgh?

A. More

Q. On account of that difference in freight as between Pittsburgh to Omaha, and Chicago to Omaha; is that a fair illustration?

A. Yes.¹⁵⁰

149. *In re United States Steel Corp.*, 8 F.T.C. 1, 36–37 (1924). The Findings are referred to herein as “FTC Findings.” The FTC defined Pittsburgh-Plus as follows:

In the course of the interstate business done by respondents as aforesaid, they generally quote, contract for the sale of, sell and invoice their rolled steel products manufactured at and shipped from their plants outside of the city of Pittsburgh at the said Pittsburgh base price plus an amount *equivalent* to what the railroad freight charge on said products would be from Pittsburgh to the customer’s destination if such products were actually shipped from Pittsburgh. These last-named prices are known as “Pittsburgh Plus” prices. . . . In the case of respondents’ Pittsburgh Plus prices, respondents pay the actual freight charges on the said products from their mills to the customers’ destinations, but the customers pay the Pittsburgh Plus prices as above defined.

Id. at 19.

150. Transcript of Record at 4082, *United States v. United States Steel Corp.*, 223 F. 55 (D. N.J. 1915) (No. 6214), *in* U.S. SUPREME COURT RECORDS AND BRIEFS, 1832–1978 (testimony of James A. Farrell).

Defense counsel used another example of a fabricator (steel user) in Buffalo:

Q. Suppose that a manufacturer in Buffalo, I mean the man who consumes the steel, was charged by the Lackawanna Steel Company the Pittsburgh price plus the freight to Buffalo, would it embarrass him in competition with similar manufacturers in Pittsburgh.

A. He would confine his business to Buffalo.¹⁵¹

In fact, Mr. Farrell was testifying as to how competition was being impaired by the Pittsburgh-Plus pricing system. The company in Buffalo (a bolt and nut manufacturer) purchasing steel from a Buffalo manufacturer of steel (Lackawanna) was forced to pay phantom freight equal to the cost of freight from Pittsburgh to Buffalo, even though the manufacturer delivering the steel was located in Buffalo. The result was that the steel user was forced to limit its market to its own home town. The FTC specifically referred to this testimony in its report.¹⁵²

B. The Federal Trade Commission

The FTC Findings identify a number of anti-competitive results from Pittsburgh-Plus pricing, including the case of the Buffalo steel fabricator whose natural market outside of the city of Buffalo was extinguished. That case also exemplifies the fact that the steel mill in Buffalo (Lackawanna), selling its product to the steel user, received a windfall approximately equal to the phantom rate charge.

In other circumstances, Pittsburgh manufacturers could engage in “destructive competition” by engaging in what Andrew Carnegie previously described as “running full.” If steel prices were depressed during hard times, eastern manufacturers were able to sell their products at-cost or below-cost in order to keep their plants operating at full or near full capacity, as a way of spreading “their overhead charges over a large production.”¹⁵³ In this manner, western manufacturers would lose much of their needed business.

It was ironic that U.S. Steel in its court testimony raised vigorous objection to Andrew Carnegie’s practice of “run[ning] full” and his “ruinous price-cutting,” when the industry adopted the very same practice in utilizing the Pittsburgh-Plus system.¹⁵⁴

The most egregious effect of Pittsburgh-Plus pricing was the uniform pricing that precluded highly efficient (low cost) manufacturers of steel in Birmingham or Chicago from competing with the Pittsburgh base prices:

151. *Id.* at 4083–84.

152. *In re United States Steel Corp.*, 8 F.T.C. at 23.

153. *Id.* at 25.

154. *United States v. United States Steel Corp.*, 223 F. 55, 92–93 (D. N.J. 1915), *aff’d*, 251 U.S. 417 (1920).

*If the base price at Birmingham were lower than the Pittsburgh base price by the extent of the lesser cost of production at Birmingham, the southern steel user's territory would be extended very much beyond the halfway point between Birmingham and Pittsburgh, whereas, now the line is drawn a few miles north of the plants of the southern steel users. With the differential eliminated, the capacity and production of the plants of the southern steel users would be very materially increased.*¹⁵⁵

Furthermore, if the Chicago steel mill were part of Illinois Steel (a subsidiary of U.S. Steel) and the fabricator were American Bridge Company (also a subsidiary), the latter could bid on a job at cost, while Illinois Steel would make double profit: “[T]he ordinary profit derived from the manufacture of steel and the extra profit due to the Plus system.”¹⁵⁶ Alternatively, consider the situation previously described in this paper.¹⁵⁷ Carnegie Steel (a U.S. Steel subsidiary) as a manufacturer of structural steel for buildings and bridges could not compete with the quality of steel manufactured by Bethlehem Steel, so Carnegie Steel would adjust the phantom freight to its customers as a means of making the price so attractive as to overcome the benefit of Bethlehem’s superior quality products.

The uniformity of pricing under Pittsburgh-Plus precluded price competition. The FTC found that:

*Pittsburgh Plus uniformity is a uniformity of delivered prices at every delivery point in the country from every mill in the country. . . . [S]teel producing respondents and their competitors employ uniform contract provisions, uniform extras, and differentials, and . . . the sheet manufacturers, particularly, including respondents' sheet manufacturing subsidiary, use the same freight rate books, the same tolerances, and the same sheet bar rate books, and use the Pittsburgh Plus system in their price fixing activities . . .*¹⁵⁸

Moreover, a later study in 1936 by A. R. Burns concluded that between 1904 and 1921 there was approximately 90% adherence to the Pittsburgh pricing in “all sales of plates, shapes, bars, wire products, and sheets . . . made on a ‘Pittsburgh Plus’ basis.”¹⁵⁹ These findings appear to challenge the testimony of James Farrell suggesting that steel manufacturers deviated significantly from the Pittsburgh base.

It may be concluded from the FTC Findings that the Circuit Court was misled regarding the Pittsburgh-Plus system that was in effect from 1902 to 1922. Defense counsel shrewdly and openly informed the court of the price fixing mechanism without being challenged by the prosecution in cross-examination. Apparently, the

155. *In re United States Steel Corp.*, 8 F.T.C. at 53.

156. *Id.* at 29.

157. See *supra* note 107 and accompanying text.

158. *In re United States Steel Corp.*, 8 F.T.C. at 32–33.

159. WARREN, *BIG STEEL*, *supra* note 42, at 45.

prosecution failed to understand the significance of the Pittsburgh-Plus pricing system that would have been required in order to challenge Mr. Farrell's testimony. Had the prosecution conducted its due diligence and revealed the fact that Pittsburgh-Plus was the foundation for all price-fixing activities of the Corporation, and that such system remained in effect at the time of the court proceeding, the revelation could well have resulted in a ruling against the Corporation.

VII. CONCLUSION

The steel industry in the United States was an important part of the Technological Revolution at the turn-of-the-century. Despite its enormous resources, U.S. Steel was not a key participant. As Alfred Chandler described the situation, Elbert Gary dissipated the Company's "first mover" advantage.¹⁶⁰ Fortunately, there were the independent steel companies willing and able to pursue technological breakthroughs in important areas of steel production, including metallurgy (chemistry), mechanical/engineering, and scientific method (including experimentation). This study has examined the experience of three steel producers – Bethlehem Steel, Armco, and U.S. Steel during the period 1901 to 1914.

The question is whether (despite the ruling of the U.S. Supreme Court in the *United States Steel Corp.* case), the performance of U.S. Steel, in disregarding technology in its operations, and its leadership in "promulgating and perfecting" the Pittsburgh-Plus pricing system, violated the rule of reason articulated in the Supreme Court decision in *Standard Oil* (1911). The lower court in *United States Steel Corp.* established two tests for determining whether the Corporation engaged in an unreasonable restraint of trade: (1) whether the merger of U.S. Steel contributed to a deterioration in the quality of its steel products, and (2) whether the combination resulted in an increase in steel prices.

The Circuit Court and the U.S. Supreme Court on appeal ruled that U.S. Steel had not engaged in an unreasonable restraint of trade under the *Standard Oil* and *American Tobacco* rule of reason. Despite the lengthy court record and the presence of some evidence that U.S. Steel was weak in the area of technological advancement, and despite an abundance of evidence of price-fixing, the Court was unable to conclude that the Company had violated the Sherman Act.

The Corporation prevailed for a number of reasons. The Government performed poorly in its preparation of the case, affecting its ability to cross-examine key witnesses and present the evidence. On the other hand, the Corporation conducted a well-conceived defense, using disguise and obfuscation, thereby covering-up the true nature of U.S. Steel's anti-competitive activities.¹⁶¹ Foremost, the Company was

160. CHANDLER, *supra* note 11, at 139.

161. There were other factors. The Corporation appeared to garner industry-wide support for its case, including the skillful testimony of Charles Schwab. Also, the Corporation had not blatantly relied on predatory practices to exclude existing competition or potential competition. Bickel and Schmidt made the observation that *Standard Oil* and *American Tobacco* were dissolved for their monopolization of trade rather than merely having their predatory practices enjoined. BICKEL & SCHMIDT, *supra* note 2, at 166.

able to obscure the fact that, over a period of eleven years, with the possible exception of by-product coke ovens, the Corporation had not qualified as a “first mover” in a single technological breakthrough. The Government appears to have recognized this fact when it stated in its Brief that “the great developments in steel manufacture in the United States . . . have to a very large extent been brought about by smaller independent companies . . .”¹⁶² Had the Government pursued its case by introducing substantial evidence in support of this proposition, it is tenable that the Court would have found that the Corporation failed to produce “quality” steel products, because its manufacturing plants were not using the most advanced methods and processes for steel production. As Warren observed, Carnegie Steel (a U.S. Steel subsidiary) was operating with improved plant but old technology.¹⁶³

The example of the Bethlehem beam has direct bearing on the issue of “quality.” This steel beam, manufactured with the Henry Grey technology, became the industry standard for excellence in structural steel used in a variety of commercial construction projects. The evidence indicates that Carnegie Steel had to rely on manipulating the phantom freight rates in order to overcome the advantage of Bethlehem’s superior product. It was a clear case of Carnegie Steel (a subsidiary of U.S. Steel) selling an inferior product.

The Company’s Gary Works may have been touted as the world’s greatest steel plant,¹⁶⁴ but it was Bethlehem’s Saucon Works that possessed the advanced technology. U.S. Steel would not legitimately acquire rights to produce the Bethlehem beam until 1927. Undoubtedly, the Gary Works was an efficient plant that would have met Chandler’s standard for “capacity and throughput,”¹⁶⁵ but it was also a mill that lacked the capacity to compete in the production of automotive steel until Armco designed and licensed its prototype continuous wide hot-strip mill around 1927.¹⁶⁶ Again, U.S. Steel was a follower in an important area of steel technology.

In summary, the Government should have been able to contrast U.S. Steel’s operations with those of Bethlehem Steel and Armco, with their emphasis on invention, R&D, and pioneering. There was substantial evidence that these two entities were first movers. There was also evidence from the Commissioner of Corporations and from the Court records that U.S. Steel’s business outlook was short-term: high tonnage business, price controls for its products through elaborate price-fixing arrangements, and plant and equipment using “old technology.”¹⁶⁷

162. Brief for Appellant at 1102–03, *United States v. United States Steel Corp.*, 251 U.S. 417 (1920) (No. 6214), in *U.S. SUPREME COURT RECORDS AND BRIEFS, 1832–1978*.

163. WARREN, *BIG STEEL*, *supra* note 42, at 94.

164. *The Greatest Steel Plant in the World – I*, *IRON AGE*, Jan. 7, 1909, at 1, and *The Greatest Steel Plant in the World – II*, *IRON AGE*, Feb. 4, 1909, at 373.

165. CHANDLER, *supra* note 11, at 24.

166. MISA, *supra* note 16, at 246–47.

167. Gerhard Rosegger provided this observation regarding the “fascination” with tonnage business: “The decision makers’ fascination with the achievement of high output levels, often at the expense of economic considerations, can be understood in the light of the competitive conditions prevailing at the time. Nevertheless, the industry was criticized for this attitude . . .” GOLD ET AL., *supra* note 78, at 508.

Schwab reiterated in testimony before the Circuit Court that the steel industry up until 1901 had concentrated on perfecting “methods of manufacture” and that “[the industry in 1901] reached the limit, or very nearly so, at which economies from a metallurgical or mechanical standpoint could be made effective.”¹⁶⁸

Consider the following steel technology introduced during the period 1901-1914:

- Stainless steel
- Silicon steel
- Electric steel
- Automotive (sheet) steel
- Heat treatment of auto parts
- Grey beam mill (structural steel)
- Open-hearth rails
- By-product coking (coke technology)¹⁶⁹

Not all of these developments are meaningfully related to “economies”, but each represents a significant breakthrough or a “great development” in manufacturing processes or methods, or a new or greatly improved product.

Finally, this study has not addressed the question of the relevance of technology to foreign competition. The Justices examined the issue in the context of the “public interest.” The majority concluded that the public interest would not be served by a dissolution of the Company, resulting in a “material disturbance” to foreign trade.¹⁷⁰ On the other hand, the Court was not given the opportunity to consider the fact that European innovators were pioneers and first movers in many of the new technologies: in building the Grey mill;¹⁷¹ in developing electric furnaces and refining steel electrically;¹⁷² and even in utilizing furnace gas and by-product coking.¹⁷³ Other prominent inventor/pioneers were Robert Hadfield (silicon steel and manganese steel) of Sheffield, England,¹⁷⁴ and Harry Brearley (stainless steel) of England.¹⁷⁵

168. Transcript of Record at 4135, *United States v. United States Steel Corp.*, 223 F. 55 (D. N.J. 1915) (No. 6214), in *U.S. SUPREME COURT RECORDS AND BRIEFS, 1832–1978* (testimony of Charles M. Schwab).

169. The by-product coke oven is identified as “the primary technological advancement in the American coke industry in the twentieth century.” Terry S. Reynolds, *By-Product Coke Ovens*, in *ENCYCLOPEDIA OF AMERICAN BUSINESS HISTORY AND BIOGRAPHY* 73 (Bruce E. Seely ed., 1994).

170. *United States v. United States Steel Corp.*, 251 U.S. 417, 457 (1920).

171. Misa dissertation, *supra* note 94, at 249–50.

172. Eugene B. Clark, *Electric Furnaces*, in *YEAR BOOK OF THE AMERICAN IRON AND STEEL INSTITUTE* 1912, at 76–77 (James T. McCleary ed., 1913).

173. *The Greatest Steel Plant in the World – II*, *IRON AGE*, Feb. 4, 1909, at 373.

174. MISA, *supra* note 16, at 257.

175. FISHER, *supra* note 115, at 159.

These foreign competitors had the advantage of being “well down the learning curve,” while U.S. manufacturers were experimenting with the same technology. The Government should have been able to make the argument that U.S. Steel, as the predominant manufacturer of steel in the United States, with huge resources, was conducting business contrary to the public interest. The Company, by failing to contribute to new methods and processes in steel production, was not advancing the competitive position of the United States steel industry in the world market.

Throughout this study, this author has considered the question of what constitutes a “great development” in the steel industry, as those terms were used by the Government to explain the technological progress of the independent companies. One test was offered by Schwab that the new technology would have a significant impact on other industries in the economy. Bethlehem’s pioneering and innovation had a major impact on the commercial construction industry. Scholars have identified this technology as revolutionary. Armco’s R&D and experimentation resulted in advanced technology for the automotive industry and for the household appliance industry.¹⁷⁶ These developments were similar to those in basic open-hearth steel, in that they occurred without necessarily a significant breakthrough, but as a result of an excellent research program, persistent experimentation, and producer-user relationships.

In the case of Armco, its technological feats were revolutionary. Armco had the benefit of the engineering services of John B. Tytus. Tytus was an inventor and pioneer in the new technology of heat treatment of roll sheets. As early as February 1916, Tytus described his work in the *Armco Bulletin*:

Many attempts have been made to hot roll sheets in a manner which would require less physical labor in handling, by using a continuous arrangement of rolls and passing the sheets from one stand to another by conveyors, instead of passing and repassing the sheets through the same stand by hand.

All such attempts have failed, however, due to the sudden changes in the shape of the rolls as explained above. It is practically impossible to get any two stands of rolls to hold the same shape, therefore each continuous stand of rolls presented a new shape to the pack, which is entirely contrary to the principles of sheet rolling as now understood.

It is still the opinion of some practical men, however, that such improvements could be made providing it were not necessary to roll sheets in any but the heavier gauges.¹⁷⁷

176. MISA, *supra* note 16, at 242.

177. John B. Tytus, *Sheet and Jobbing Mill Departments*, 3 ARMCO BULLETIN 67, 76 (1916).

Tytus was later to successfully develop a continuous-sheet mill, such that the combination of his metallurgical work on heat treatment of steel and his mechanical/engineering work on continuous rolling technology resulted in the continuous wide hot-strip mill.¹⁷⁸ These experiments and discoveries, together, ultimately led to the mass production of sheet steel.¹⁷⁹ It was not a coincidence that Armco achieved these great developments in continuous rolling technology. This company began its operations in 1901 with a focus on R&D, and expanded that program during the first two decades of the twentieth century. It may be said that the company's success emanated from its work ethic, that is, a discipline for careful and persistent experimentation.

While all of these developments took place after 1915, and therefore would not have contributed to the Government's case, they explain and substantiate why U.S. Steel's policies against new technology and innovation resulted (over the short term) in inferior products. Fortunately, the independent steel companies did not follow suit. Nevertheless, U.S. Steel's own practices, as the largest steel corporation in the United States,¹⁸⁰ resulted in a major segment of steel industry resources being misdirected away from pursuing new technology, thereby contributing to a misallocation of resources. The Company's leadership in price-fixing, while not necessarily predatory, resulted, at a minimum, in commercial consumers of steel (such as the fabricator in Buffalo) paying excessive prices for basic steel products and manufacturers of steel (such as the producers in Birmingham) forced to limit their natural market.

Arguably, U.S. Steel fell squarely within the *Standard Oil's* rule of reason: its combination resulted in public injury, suppression of competition (both product and price competition), and controlled prices.

178. MISA, *supra* note 16, at 214, 246–47.

179. Armco's plant at Ashland, Kentucky produced steel sheets, while it was the Butler plant at Butler, Pennsylvania that, according to Warren, developed the true prototype of the strip mill, producing coiled wide strip. WARREN, *BIG STEEL*, *supra* note 42, at 138. Armco acquired the Butler strip mill and it was the combined experience gained through Ashland and Butler that enabled Armco "to mass produce autobody sheet." Email from Kenneth Warren, author and historian, to this author (Jan. 23, 2012) (on file with author).

180. At the 1910 year-end, the Corporation controlled over 50% of the entire crude steel and finished steel business in the United States. REPORT OF THE COMMISSIONER OF CORPORATIONS ON THE STEEL INDUSTRY, H.R. REP. NO. 62–1127, at 373 (1911).