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John D. Rockefeller: The Richest Man in the World

Modern large-scale organization of business in the United States first appeared in the railroad industry during the 1850s, and by the late nineteenth century, scale and managerial hierarchies had extended to other major industrial sectors as well. Although the precise mechanisms though which this change occurred often varied, it mainly involved horizontal integration, some form of legal or administrative centralization, followed by vertical integration. The history of Standard Oil represents the canonical example of corporate growth via combination, consolidation, and integration.

Standard Oil's history is also fully intertwined with the life and career of John D. Rockefeller (1839–1937), one of the most remarkable individuals to define the landscape of American business. John D. stood out for many reasons, not least of which was his wealth. Rockefeller's estimated $1.4 billion net worth in 1937 was equivalent to 1.5% of the total GDP of the United States. According to this metric, he was (and still is) the richest individual in American business and economic history.

Oil Industry Background

John D. played a transformative role in the oil industry, which grew from small beginnings. "Rock oil" had been found in Pennsylvania, Kentucky, Ohio, and West Virginia, and had been used in the early decades of the nineteenth century as a cure for an endless list of maladies. In the 1850s, petroleum refiners, building on the technology of the coal oil and natural gas industries, discovered the potentialities of refined petroleum as an illuminant. In 1859, Edwin Drake's drilling success at Titusville, Pennsylvania, resulted in a tumultuous rush to the oil fields of western Pennsylvania. Since little capital was required to enter the industry, many would-be millionaires flocked to the oil fields. Farmers became rich overnight, and boomtowns materialized.

Conservation of oil resources simply did not exist. Under the "Rule of Capture," a well owner could extract as much oil as possible from his own well regardless of the effect on the oil pool below or the wells of others. This legal sanction encouraged reckless exploitation of the resource. Instability, therefore, characterized the refining industry. It suffered not only from internal cutthroat competition, but from the uncertainties of crude oil production. Both the price and supply of oil fluctuated wildly. In 1862, the monthly price per barrel of crude oil ranged between $0.10 and $2.25; in 1864, between $4.00 and $12.13; and in 1871, between $3.83 and $4.83.

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Business organizations in the oil industry initially took the form of partnerships, but corporations became more frequent as capital requirements increased. In the early days of the industry, the functions of drilling, producing, transporting, marketing, and refining were in separate hands. Refiners often produced only one type of product, such as kerosene, naphtha, or lubricants.

Under the impact of competition, however, firms engaged in one operation often attempted to add others. Several efforts at building a variety of combinations, both vertical and horizontal, were made (usually by means of interlocking partnerships prior to the creation of the Standard Oil group). Nevertheless, most business units in the young oil industry were small and acted individually. As a result, voluntary efforts at cooperation by such means as informal agreements fell apart under the pressures of competition.

Transportation had an important place in the industry from its earliest days (**Exhibits 1** and **2**). Petroleum deposits were found far from existing population and export centers, and the physical problems of moving petroleum were a major challenge. Gradually this problem was solved. Small diameter pipelines, called gathering lines, collected oil in the fields and delivered it to railheads where it was moved to refineries in barrels and, later, tank cars. The rates charged for these services remained an extremely controversial issue long after the physical difficulties of transportation had been overcome.

Under these conditions, the location of refineries with respect to transportation as well as to the market frequently proved to be an important determinant of success. A refinery dependent on one railroad was not in nearly as good a competitive position as one that could choose among several railroads. The railroads themselves were intensely competitive, and large refiners could not only take advantage of rate wars but also could demand special concessions and rebates in return for using a particular line.

The petroleum industry as it emerged in the post–Civil War period was thus characterized by numerous small firms competing fiercely in an atmosphere of "anything goes." A wildly fluctuating market, whose unpredictability was based on perennial imbalance between supply and demand, caused both producers and refiners to seek some way of stabilizing their positions. It was John D. and his associates who successfully analyzed and manipulated this complex situation in order to control the competitive climate of the whole industry.

Personal Background

John D. Rockefeller was born in 1839 in Richford, New York, the eldest son of William Rockefeller and Eliza Davison. His father, a traveling salesman and con artist with a fun-loving personality and a disdain for conventional morality, was known as "Big Bill" or "Devil Bill." His love for money and business was an important influence for young John D. Bill Rockefeller lent money to his own sons at the prevailing interest rate and tacitly conveyed to them the message that commerce was a tough, competitive struggle and that you were entitled to outwit the other fellow by any means, fair or foul. "I trade with the boys and skin 'em and just beat 'em every time I can," he said. "I want to make 'em sharp."[1]

From his mother, a devout Baptist, John D. learned order, economy, and thrift, those Puritan virtues that prominently featured in his later business life and success in Standard Oil. She was also responsible for the deep religiosity and charitable giving that characterized him throughout his life. "I was trained from the beginning to work and to save," he explained. "I have always regarded it as a religious duty

to get all I could honorably and to give all I could. I was taught that way by the minister when I was a boy."[2]

Bill Rockefeller abandoned his family for weeks or months at a time, leaving Eliza alone to take care of the children and run credit bills. When he reappeared, he compensated with extravagant shows of generosity toward his children. John D.'s childhood was marked by a constant worry about money and a weight of responsibility for his mother and younger siblings. "I was taught to do as much business at the age of ten or eleven as it was possible for me to do," he later noted. Growing up in an America of economic opportunities and ongoing territorial annexations, he also shared the dream of many youths his age, of making a fortune. "Some day, sometime, when I am a man, I want to be worth a-hundred-thousand-dollars. And I'm going to be too—some day," he is reported to have told a friend one day in his early teens.[3]

He attended secondary school in Owego Academy, New York, and, later, Central High School in Strongsville. He was a very diligent student, though he never excelled in academic matters. He was, however, very good with numbers. Arithmetical problems most attracted him, for he had been taught at home to keep an accurate account of his gains and losses.

In 1854, the family moved to Cleveland. John D. had hoped to go to college, but his father dispelled that dream for him. In 1855, Bill Rockefeller married Margaret Allen in Nichols, New York, and then led a secret life as a bigamist, which forced him to reduce the expenses of his first family. "My father . . . conveyed an intimation that I was not to go [to college]. I felt at once that I must get to work, find a situation somewhere," John D. said. In 1855, 16-year-old John D. dropped out of high school and started looking for a job in business.[4]

"I went to the railroads, to the banks, to the wholesale merchants," he later said. "I did not go to any small establishments. I did not guess what it would be, but I was after something big." He was hired as a bookkeeper for Hewitt and Tuttle, commission merchants and produce shippers on Merwin Street in Cleveland. However modest an operation, Hewitt and Tuttle was an excellent training ground for an aspiring young businessman, for it exposed Rockefeller to a broad commercial universe. "My eyes were opened to the business of transportation," he said, alluding to the later controversial relations of Standard Oil with the railroads.[5]

In 1858, at age 18, Rockefeller partnered with Maurice B. Clark in starting a commission house for buying and selling produce. Each partner contributed $2,000. About $900 of Rockefeller's share was derived from savings; the remainder he borrowed from his father at a 10% rate. The first year of the new partnership was successful, as Clark and Rockefeller profited from the booming traffic in meat, grain, and other foodstuffs circulating through the Great Lakes.

Through a friend of Clark's, Rockefeller first entered the oil business. Samuel Andrews, an Englishman from Clark's home county of Wiltshire and a self-taught chemist, was seeking financing for an oil-refining venture. Though he considered oil only a "side issue," Rockefeller agreed to join; in 1863, a new partnership, Andrews, Clark & Company, was formed.

In 1865, Rockefeller gave up the produce commission business and began to devote his full efforts to refining. He bought out Clark for $72,000, and the firm continued under the name of Rockefeller and Andrews. The latter was in charge of technical operations. In 1867, William Rockefeller, John's brother, went to New York to handle the firm's eastern business and its growing foreign trade. That same year, the firm added two important partners, Henry M. Flagler and Stephen V. Harkness. Flagler, who like Rockefeller had obtained his business experience as a commission merchant, took an active role in management. Harkness, who was an uncle of Flagler's wife, had accumulated capital in distilling

whiskey. He also invested in the enterprise, but did not participate in its management. Together they contributed approximately $110,000 to $140,000. In 1869, the various Rockefeller partnerships were consolidated, and, in the following year, the partnerships were replaced by a corporation.

Conquest of Cleveland

The Rockefeller venture grew rapidly between 1866 and 1869. Since 1865, the partnership's existing refinery in Cleveland had become the largest in the country and possibly the largest in the world. In the same year, a second refinery was completed in Cleveland. Between 1866 and 1869, the daily throughput of that refinery complex rose from 500 barrels to 1,500 barrels a day.[6] As of September 30, 1869, the partnership's gross receipts for the previous year were $2,433,689, a figure that was reported to be as large as that of the next three largest refineries in Cleveland combined.[7] By 1869, 10 years after oil was discovered in Pennsylvania, the Cleveland works comprised the largest refining complex in the world, producing 10% of the nation's output of refined petroleum (**Exhibits 3** and **4**).

The scale of the Cleveland refinery complex had several advantages. It could exploit technological innovations in the industry (**Exhibit 5**); it greatly reduced the unit cost of production and facilitated access to short-term loans from commercial banks to cover operating expenses.[8] It also gave the Rockefeller venture far greater leverage with the railroads, particularly those that transported refined oil east, than their small competitors could match. Standard Oil Company would exploit these advantages in order to completely dominate the oil business in Cleveland.

Standard Oil was incorporated in 1870 and almost immediately tried to use its large throughput to obtain more favorable rates from the railroads. Sometime in 1870, Flagler proposed to James H. Devereux, the general manager of the Lake Shore Railroad (which had just become a subsidiary of the New York Central), to ship 60 carloads of oil a day, every day, if the Lake Shore and the Central would give his company a rate of $1.30 a barrel from Cleveland to New York (the published rate was $2.00 a barrel) and 35 cents a barrel for crude from the Oil Region in the western part of Pennsylvania to Cleveland.[9] Devereux quickly accepted. As he later testified, the assured regular flow permitted him to run a single train daily made up wholly of oil cars, instead of putting oil cars on trains containing a mix of other types of freight cars. The improvement in scheduling meant that fewer cars were needed. The resulting lower investment and maintenance costs and the small cost of providing a locomotive and crew for the daily trip meant that the railroad could still make a good profit on the reduced rate. Of course, Devereux knew that if he refused, Flagler could certainly get the same deal from the Erie. When, after hearing of the rate cut, other Cleveland refiners protested, Devereux claimed these rates were not inequitable because "this arrangement was at all times open to any and all parties who would secure or guarantee the like amount of traffic or an amount to be treated and handled in the same speedy and economical manner."

Armed with this new contract, Flagler and Rockefeller first invited their two major competitors (Clark, Payne & Company and Westlake, Hutchins & Company) to join forces—an invitation the two readily accepted. Then Standard Oil approached the other Cleveland refiners. By the end of 1871, Standard had obtained control of five large and seven small firms, and the conquest of Cleveland was practically complete. Competent refiners such as O. H. Payne and J. A. Bostwick became senior executives of Standard Oil. On the other hand, smaller refineries not producing specialized products were closed down and their owners had to find a new business. By 1872, Standard's power in Cleveland gave it control over 25% of the total daily capacity of the entire industry.[10]

In buying out their Cleveland competitors, Rockefeller and his associates preferred to pay through an exchange of stock rather than in cash. Not only was this method cheaper for Standard Oil, it

permitted competitors who made the exchange to profit from Standard's growth. Many became very wealthy as the value of their Standard shares sharply increased. Whatever the form of payment, Standard Oil appraisers determined the value of the properties purchased. Inevitably the buyer and seller had different views. The seller thought in terms of the cost of their works, and the buyer in terms of the "use-value" of the plant and equipment to Standard Oil. But most of the sellers felt that they had little choice in the matter. Frank Rockefeller, who had joined one of his brother's competitors, remembers that John had threatened, "If you don't sell your property, it will be valueless because we have advantages of the railroads."[11] Another refiner who did not want to sell, Robert Hanna of a leading Cleveland industrial family, reported that Rockefeller told him, "You can never make money in my judgment. You can't compete with Standard. We have all the large refineries now. If you refuse to sell, it will end in your being crushed."

The acquisition of most of Cleveland's refiners by Standard Oil was carried out in secret and only became publicly known by accident, when another secret agreement, this time between refiners and the railroads, leaked out. The Pennsylvania Railroad had negotiated with Standard Oil and other major refiners the creation of a pool for oil shipments, which would be carried out by a new instrument, the South Improvement Company. Its role would be that of an "evener of oil shipments from the interior to the port cities," and it would guarantee a number of advantages for members of the pool, including differential rates for oil shipments; access to reports on all oil shipments, including those of nonmembers; and payments (drawbacks in the form of commissions) on all petroleum shipped by nonmembers. The proceedings from this last type of benefit would be used to "kill any attempt by rival railroad managers, producers, refiners, speculators, or foreign export agents to break down the contract" between the refiners and the railroads.[12] The South Improvement Company issued 2,000 shares, of which two large Pennsylvania oil brokers were each to have a 23.5% interest, and the Rockefeller group, a 45% block.

When news of this proposal became public, a national scandal broke out. Angry producers and refiners left out of the agreement asked, successfully, for the South Improvement Company's charter to be revoked. However, the essence of the proposal, aiming to ensure control over all refining output, would be reflected in the general strategy that Standard Oil would later undertake. Rockefeller and his associates had decided to achieve output and price stability for the nation as a whole.

Creating a National Monopoly

At first, efforts to control production and prices were voluntary. In 1872, after the collapse of the South Improvement Company, the National Refiners Association was formed, with Rockefeller as its president. Its job was to set and carry out policies for buying crude oil, allocating refining quotas, setting prices, and securing uniform railroad rates for all members. At the same time, the producers of crude oil formed a company to purchase at a set price all oil pumped by its members and then sell it to the refiners. On December 19, 1872, the two groups signed the "Treaty of Titusville." The price of crude was set at $4 a barrel if a gallon of refined was sold in New York City at 26 cents a gallon. If the price of refined increased 1 cent a gallon, the price of crude would go up 25 cents a barrel until it reached $5.

However, for both producers and refiners, maintaining discipline and avoiding defections proved infeasible. Production increased and the price of crude and refined output fell, despite fines imposed on members by the National Refiners Association. As Rockefeller himself put it long afterward, "We proved that producers and refiners associations were ropes of sand."[13]

With the collapse of the National Refiners Association, Rockefeller and his associates decided early in 1874 to bring a large part of the industry directly under Standard's legal control. They proposed to

do this by obtaining, preferably through an exchange of stock, a controlling or at least a large minority share of the stock in major companies in the other refining areas besides Cleveland. Such control would permit Standard to have a say in setting the price and output of refined petroleum throughout the country.

Standard Oil's rise to a national monopoly proceeded in much the same way as its conquest of Cleveland: by control of transportation and shipping. It obtained control of shipping facilities in New York Central's oil terminal through leasing or acquisition, thus forcing competitors who shipped through New York to go through Standard. In 1874, too, the railroads formed a new oil pool, which equalized all rates from the interior to the seaboard. That is, the rates from Cleveland to New York and Philadelphia were the same as those from Pittsburgh and the Oil Region, despite the greater distance from Cleveland. Early in 1875, the three trunk lines carrying oil also agreed to give Standard and its allies a special extra 10% rebate in return for acting as the "evener" of the traffic. In 1874 and 1875, the gathering pipelines that brought oil to the railroad shipping points worked out comparable pools. Because Standard had increased its holdings in pipelines, its voice was the most powerful in defining these pooling arrangements.

Standard's executives then used these agreements, as they had used earlier ones in Cleveland, to persuade the largest and most efficient refiners to join them. They were careful to offer generous terms in the exchange of stock. In October 1874, the largest refining company in each of three major areas—Philadelphia, Pittsburgh, and New York—entered the Standard Oil alliance through an exchange of stock. With them came some of the most competent executives in the industry.[14] Then, in the first months of 1875, the biggest refinery in Parkersburg, West Virginia, and the largest in the Oil Region also joined the group. These moves were to be kept secret. Each firm was to continue operation under its existing name and to buy up other refiners when the opportunity appeared.

Standard Oil made a last attempt to revive the National Refiners Association, with the aim to control all purchases of crude and sales of refined, to make rate agreements with the railroads and pipelines, and to divide profits among its members. Though it now controlled the major refineries in the different areas and thus a majority of votes on the association's board, Pittsburgh refiners, supported by the Pennsylvania Railroad, refused to join its plan. From then on, members of the Standard Oil combination decided not to work through any associations. Rather they would rely wholly on the company's sheer economic power. That power derived from scale economies and from power leverage over transportation. Standard ruthlessly wielded its power to obtain control in those firms it wanted, through an exchange of stock, and drove those it felt it did not need out of the oil business.

Such lubricating oil and specialty firms as Vacuum Oil Company, the Chesebrough Manufacturing Company, and the Eclipse Lubricating Oil Company, Limited, joined the combination in those years. Minority interest was acquired in the marketing firms of Waters-Pierce Oil Company of St. Louis and the Consolidated Tank Line Company of Cincinnati. In Pittsburgh, Philadelphia, Baltimore, the Oil Region, and New England, the Standard Oil group enlarged or consolidated its position. By the end of 1878, the Standard Oil combination controlled over 90% of total refining capacity in the United States.

Challenges to the Standard Oil Combination

While the monopoly of Standard was growing, the company faced its challengers on different fronts. In 1876, the Pennsylvania Railroad supported the proposal of its subsidiary, the Empire Transportation Company (a "fast freight" line that handled the road's oil shipments) to build refineries and to contract extensively for crude to be processed at these new works. Standard quickly responded by withdrawing all shipments from the Pennsylvania Railroad and cutting the price of refined. In the midst of depression, labor strikes, and rioting, the Pennsylvania decided to give up the fight with

Standard. It dissolved the Empire Transportation Company, selling its pipelines and refineries to the Standard alliance; it meekly accepted the terms of the new pooling arrangements by which Standard received a rebate on all shipments, including those of its competitors, as payment for acting as the eveners for the railroads.

In 1878, the Tidewater Pipeline Company Ltd., an instrument of the Producers Union of independent crude oil producers, was incorporated to construct a line from the Bradford fields to the Reading Railroad at Williamsport. Despite Standard's failed attempts to stop the construction of the pipeline, which was completed in 1879, the Tidewater project was instructive in demonstrating that pipelines could carry crude oil over long distances at a far lower cost and in much greater volume than could the railroads. Standard immediately embarked on a major program to build a network of long-distance pipelines that would connect all its refineries to the producing Oil Region. In 1881, these new long-distance lines of the oil combination were consolidated in a new enterprise, the National Transit Company.

The Trust

The pipeline revolution had suddenly made possible a huge increase in scale and decrease in cost in the oil industry. When completed, Tidewater's line had a daily delivery capacity of 6,000 barrels. By 1881, both Tidewater and National Transit lines were pumping 7,000 to 8,000 barrels daily. Furthermore, the completion of Tidewater's pipeline, by breaking Standard's monopoly over long-distance transportation and ensuring independent refiners of a cheap, steady source of crude, was certain to increase overall competition within the oil industry. To exploit the opportunities and face the challenges created by the long-distance pipelines, but also to meet potential future competitive threats—such as the Baku–Black Sea Railroad project that threatened to make Russian oil competitive in the European market—required centralized administrative control. In 1881, Standard Oil, despite its scale, remained a combination of legally and administratively independent enterprises located in every major refining region in the country, held together only by stock ownership.

This structure created a number of administrative and legal problems. At the administrative level, there was no formal place where overall policies could be set, where activities could be coordinated, and where long-term plans could be decided for the combination as a whole. For example, no executive or group of executives had the responsibility of deciding how, where, and when to reorganize refining capacity or expand pipelines. Legally, issues arose because the responsibility for regulating business ventures lay at that time with the states and not the federal government. There was as yet no way to incorporate to do business on a national rather than a local scale. The rights of Standard Oil, an Ohio company, either to own property in other states or to hold stock in other companies had not yet been legally clarified. This weakness was dramatically illustrated in 1881, when Pennsylvania attempted to tax not only the Ohio company's physical property within Pennsylvania, but also the corporation's entire capital stock and dividends.

The situation clearly called for a centralized administrative structure, which would legally consolidate the many properties of the members of the Standard Oil alliance into a single, legally identifiable enterprise. The legal means to achieve such ends, however, was limited. A holding company was a possible solution, but in 1881, very few states granted charters for this type of organization and then only by a special act of the legislature. The existing arrangement in Standard Oil was for executives to hold the stock that they had exchanged for that of the companies coming into the combination as individual trustees acting for the stockholders of the Ohio company. In 1879, this arrangement was formalized through an agreement by which all the stock of other companies was transferred to three trustees, who then held it in trust for the 41 shareholders of Standard Oil of Ohio.

At that point, the three trustees had no specific authority to manage the properties and no arrangement existed for the election of trustees in case of the death of one of the three, nor for the transfer of ownership certificates. Standard Oil would expand and adapt this trusteeship device to achieve centralization and consolidation.

The trusteeship had a long history in English common law and encompassed several advantages. Trustees, because they were, in the legal sense, agents for stockholders and not for the corporations involved, could testify truthfully about Standard Oil without revealing information that investigators sought to uncover. This would prove particularly useful in obscuring the extent of Standard Oil's holdings in other companies.

The Standard Oil Trust Agreement (January 2, 1882) established a trust to be the sole and central holding agency for all the securities of 41 participating investors in 40 named companies. Rockefeller and his associates put the value of the trust at $70 million, against which they issued 700,000 trust certificates (par value $100) to Ohio Standard's stockholders. Since the net book value of the corporations involved stood at only $55,221,738, the trust's capitalization reflected capitalized earning power, prices paid for properties in excess of market value, or "watered" stock. Actual earnings, however, soon proved that the valuation was conservative. The nine original trustees (a third of whom were to be elected annually) were John D. Rockefeller, O. H. Payne, William Rockefeller, J. A. Bostwick, H. M. Flagler, W. G. Warden, Charles Pratt, Benjamin Brewster, and John D. Archbold. The agreement vested these persons with a wide range of powers and duties, among them an outstanding innovation—fully centralized administrative control. As the Standard Oil Trust Agreement stated:

> It shall be the duty of said Trustees to exercise general supervision over the affairs of said Standard Oil Companies and as far as practicable over the other companies or partnerships, any portion of whose stock is held in said trust. It shall be their duty as stockholders of said companies to elect as directors and officers thereof, faithful and competent men.
>
> They may elect themselves to such position when they see fit so to do, and shall endeavor to have the affairs of said companies managed and directed in the manner they may deem most conducive to the best interests of the holders of said Trust Certificates.[15]

The trust agreement thus permitted centralization and systematization of the preexisting combination of firms engaged in the buying, transporting, storing, refining, and marketing of petroleum. The largest stockholders received authority as trustees. The arrangement facilitated the transfer of holdings and the maintenance of secrecy and, in general, constituted a major step toward the more efficient administration of a far-flung alliance of refineries and pipelines. In business, the use of the trust as a means of controlling a variety of holdings was an organizational innovation that had a number of imitators. In politics, the trust device brought into existence the word "antitrust," culminating in the Sherman Antitrust Act of 1890 and a vast new field of American law.

After the formation of the Standard Oil Trust in 1882, new subsidiaries were incorporated in different states. The most important were the Standard Oil Company of New Jersey (later Exxon) and the Standard Oil Company of New York (later Mobil). Once the legal arrangements were completed, Rockefeller and other members of the trust took up their headquarters in New York City at offices on 26 Broadway.

Evolution of the Trust's Organizational Structure

The management of the new trust was organized on the basis of committees. Committees decided on the various policies and coordinated all activities regarding one specific function or product.[16] Their

members were senior executives or directors of subsidiary companies, so they usually were responsible for carrying out the policies agreed upon. In the late 1870s, leading executives of different firms in the alliance who dealt with railroads and pipelines met regularly, though informally, as a Transportation Committee. Others concerned with the European wholesalers formed what became the Export Trade Committee. Then, as discussions were underway in 1881 to work out ways to reorganize refining facilities, a Manufacturing Committee was formed. After the trust's headquarters moved to New York, a Cooperage and a Case and Can Committee were organized. The Lubricating Oil Committee came into being in 1885, when the sale of lubricants was centralized in New York. As the trust moved into new functions, its board set up new committees. The Domestic Trade Committee appeared in 1886, and the one for production of crude in 1889.

The senior committee that determined Standard's basic policies was the Executive Committee, located at 26 Broadway. Among others, it was responsible for allocating funds to operating units, appointing managers, and approving all salaries above $600. Three of its members also voted, as a Proxy Committee, the shares in all elections of directors of the Standard companies.

The Executive Committee's decisions were implemented mostly as suggestions to the responsible representatives of involved companies. In the event of disagreement or protest by local executives, compromise was favored over autocratic decree. This route of discussion and agreement was not always the fastest and most efficient, but it was essential in maintaining unity and cooperation in the context of the trust.

In the mid-1880s, an extensive staff was brought together at 26 Broadway to support efficient executive organization. By 1886, there were 11 major staff units: Auditing, Legal, Crude Stock (purchasing), Cooperage, Domestic Trade, Southern and Western Domestic Trade, Chief Oil Inspector, Barrel Preparing, Lubricating Oil and Paraffin Wax, Lubricating Oil and Western Sales, and Foreign Barrel (foreign shipping and sales). Staff support was particularly important for the accounting function, as Standard required every subsidiary to show a profit, and plant superintendents, office managers, and other executives were evaluated on the basis of their costs and profits.[17]

Finally, a large amount of information was shared between various committees and the Executive Committee. Production and marketing data was systematically collected and organized in various reports, such as the daily "crude oil report," prepared by the crude stock department, or the monthly "Barrelling and Marketing Report," prepared for the first time in 1884 by the Cooperage Committee. Overall, Standard's network of refineries, producing and buying offices, pipelines and shipping points, as well as its marketing offices provided an impressive intelligence network that covered the United States and, indeed, most of the world.

Expansion and Integration

The new Standard Oil Trust concentrated capacity in three major refineries in Bayonne, New Jersey; Philadelphia; and Cleveland and shut down capacity in Pittsburgh and the Oil Region. The three remaining refineries were the largest in the world, producing together between 20% and 25% of the world's total production of kerosene. These economies of scale permitted a dramatic reduction of unit costs, well below those of any of Standard's American competitors.

The Extension of Pipelines and the Centralization of Purchasing

At the same time, the trust continued expanding Standard's pipeline network. National Transit, headed by Daniel O'Day, and its gathering subsidiary, United Pipelines, improved old lines and built

new ones for the storage and transportation of crude oil. By 1884, the trust operated 1,300 miles of pipeline and had storage space for 40 million barrels of oil, a vast total for that time. Though the costs of shipping by pipeline were far below those of the railroads, Standard maintained open rates at the same level as rail carrier's rates; its own refineries paid about half of those rates. Thus, the few independents that used Standard's pipelines for shipping were effectively subsidizing Standard.

Standard did, however, compensate railroads for the loss in traffic and revenue caused by the extensive use of pipelines. In 1884, National Transit agreed to credit the Pennsylvania Railroad with 26% of the total transportation revenue for Standard's crude oil shipments to the seaboard, even if the Pennsylvania actually carried no oil at all. The Erie received a direct subsidy. The trust had a strong incentive for this generosity. It needed the Pennsylvania's cooperation in "granting rights of way for pipelines, leasing sites for and laying spur tracks to build distributing plants, carrying raw materials other than petroleum to refineries, hauling coal to pumping stations, and transporting refined oil, naphtha, lubricants, and waxes to market."[18]

Some railroads chafed under Standard's power. Although the trust continued to demand and get rebates through 1887, lines such as the Baltimore & Ohio sought out Standard's competitors and discriminated against the trust in tank car supply. In 1887, when the Interstate Commerce Act banned rebates, the trust ceased taking them. Instead, it reduced its reliance on rail transportation by expanding its pipelines, refineries, and ships for oil movements along the Atlantic Coast.

As the trust expanded its control over transportation, it began to centralize its purchases of crude oil more effectively. Before 1882, Standard, as nearly all other refiners, bought crude from producers in the open market, either through the purchase of certificates at oil exchanges or at wells, on the basis of the price of certificates at the exchanges. These certificates had been the object of wild speculation since the beginning.

To better control the price of crude and centralize purchases, the trust began a policy of building up its stocks of crude when the prices of certificates were low and then refraining from buying when the prices rose. In 1884, to assure better control, the trustees placed all its buying in the hands of a wholly owned firm, the Joseph Seep Agency. That agency announced that its "prices would be an average of the daily high and low quotations for certificates on the 'leading oil exchanges.'"[19] The purchasing unit, however, increasingly bought directly from producers, so that transactions on the oil exchanges dwindled. By the early 1890s, the exchanges no longer played a part in the sale of crude. In January 1895, in a move that came as no surprise to industry experts, Seep closed the era of the oil exchanges in a famous public circular:

> The small amount of dealing in certificates on the oil exchanges renders the transactions there no longer a reliable indication of the value of the product. . . . Hereafter . . . the price paid will be as high as the markets of the world justify, but will not necessarily be the price bid on the exchanges for certificate oil.[20]

Reorganization of Marketing

After reorganizing capacity, expanding pipelines, and centralizing purchases, the trust turned its attention to marketing. Until that time, Standard had depended for distribution on independent wholesalers, which had contacts with local retailers and knew local conditions better than refiners, both at home, but especially abroad. Standard had bought a 20% interest in Chess, Carley & Company in 1873 and later acquired 40% of the stock of Waters-Pierce Company, the largest distributor in the Southwest, and comparable interests in other major wholesalers. The trust had, however, made little effort to actively administer the activities of the marketing affiliates.

The mid-1880s seemed like a good period to consider a change in marketing strategies. Internal demand for illuminating oil and lubricants was increasing, while in the European market, competition from the Nobels and Rothschilds, who were exploiting the Russian oil fields, was becoming a real challenge. Coordination of product flow to major distribution points was also increasingly important for Standard, in order to keep its refineries running at full capacity. Finally, changes in bulk shipment methods that were reducing the cost of distribution altered relations between refiners and wholesalers.

After 1875, the tank car rapidly replaced the barrel, can, and case for long-distance shipments. A tank car carried twice the volume of an average box car loaded with barrels or cases. Lower handling charges, cheaper rate classification, and smaller losses from evaporation made the tank car even more economical. Still, the use of the tank car required distributors to make large investments not only in fleets of tank cars, but also in facilities for storage and packaging, and in delivery wagons for the retail trade. The resulting economies gave the large wholesalers a decisive advantage over smaller competitors and strengthened their position vis-à-vis the refiner. The wholesaler, rather than the refiner, came to package, brand, and set the quality and price of the product sold to the customer. Chess, Carley, Waters-Pierce, and other Standard affiliates could and often did buy from independents. In addition, the refiners and wholesalers had conflicting interests. The first wanted large sales to permit the refineries to run full and steady, while the wholesalers were more interested in a large markup on each sale. As the wholesalers' bargaining position improved, they began to act more independently of the trust.

In 1884, the trust made its first major move into marketing by setting up two wholly owned companies—the Continental Oil Company and the Standard Oil Company of Iowa—to distribute in the Rocky Mountain and Pacific Coast areas. Then, in 1886, its officers decided to create a centrally controlled marketing organization. They planned to buy out all outside interests in jointly held companies and purchase major independent wholesalers. To execute this plan and to coordinate and control the trust's marketing activities, they formed a Domestic Marketing Committee. That committee, assisted by a new marketing staff housed at 26 Broadway, was to coordinate the distribution, see that marketing policies for quality and price were carried out, collect information on markets, and eliminate clashes between the different distributing agencies. By 1890, the committee had allocated the trust's marketing activities to eight regional subsidiaries.[21] By that time, the trust had obtained full control of all its former marketing affiliates except Waters-Pierce and had bought out 15 independents. The Standard Oil Trust thus had created a centralized marketing organization that distributed the huge output of Standard's refineries at decreasing costs.

To deal with the Russian threat in the European market, Standard improved its shipping facilities and built a more closely controlled foreign marketing organization. By 1888, a new fleet of steam tankers was cutting Standard's trans-Atlantic transportation costs. The new tankers made seven round trips a year, whereas the sailing ships, which carried their oil cargo in barrels, made three.[22] In building its own marketing organization abroad, the trust did not attempt to obtain the full control that it had at home. It seemed better to get experienced nationals to work with resources provided by the trust. The Anglo-American Petroleum Company, set up in 1888, was wholly owned. In 1890, the trust joined with two leading importers to form the largest oil marketing enterprise in Germany. Similar joint enterprises were created in Holland, Italy, and Denmark. By the early 1890s, the Russian threat had been effectively met. During that decade, Russian kerosene was never able to increase its share of the critical European market much above 20%.[23] By World War I, Standard Oil still accounted for over 75% of the oil products sold in Europe.

The Move into Crude Oil Production

A final change in Standard's strategy in the late 1880s was its move into the production of crude oil. One minor reason for this move was the excellent return the trust was getting on the production of natural gas, which occurred as a convenient joint product at oil well sites. Early in the decade, executives connected with the trust's pipeline affiliates recognized the profits to be made by supplying natural gas to large mills and factories. In 1883, the trust authorized National Transit to expand its gas pipelines and to go into production as well. By 1886, National Transit controlled nine natural gas companies in Pennsylvania, New York, and Ohio, representing a total investment of more than $7 million. Profits from this venture helped convince the trust that ownership of oil production was not only feasible, but desirable.

Far more influential in convincing the board to move into crude oil production was the opening of new fields in northern Ohio and Indiana—the Lima fields—and the simultaneous decline in output of the older Appalachian fields. Discovered in 1886, the output of the Lima fields increased so rapidly that in two years, Ohio and Indiana accounted for 35% of all crude oil production in the United States. If other companies proved successful in developing transportation and refining Lima crude, Standard might have had to face major new domestic competitors. Therefore, in March 1886, Standard's board authorized creation of the Buckeye Pipeline Company. This corporation, which received its management and capital from National Transit, rapidly developed a gathering and storage system that ultimately handled 85% of the new region's oil.[24] Simultaneously, Standard Oil began extensive purchases of Lima crude, and soon tanks and pipelines nearly overflowed with oil seeking a market.

Lima crude had a high sulfuric content, which not only increased refining costs but resulted in a sour-smelling, inferior kerosene. Standard hired Herman Frasch, the outstanding expert in the field, to find an economical means to remove sulfur from the oil. Frasch spent over $200,000 before he found the solution in 1888 and perfected it by 1890. Despite this hard-won success, the trust's patent monopoly on the Frasch process provided the basis for the high earnings of many Standard units for at least 15 years (**Exhibit 5**). Meanwhile, the trust attempted to push the sale of Lima oil as an industrial fuel to replace coke and coal. By 1887, strong promotion and advertising developed a substantial market, and in 1888, over 3 million barrels (nearly 33% of all Ohio-Indiana production) were sold as fuel.

To move from purchase and transportation of Lima crude to production, an extra stimulus was required for Standard. In 1887, for the first time, producers in the Pennsylvania regions carried out a successful shutdown by agreeing to reduce daily offtake from 60,000 to 42,500 barrels. Standard agreed to buy at their increased prices, partly because it was troubled by the producers' threat to integrate forward into transportation and refining. It also did not want supplies to be cut off just as it was trying to meet Russian competition. The incident, however, convinced Standard that it must have supplies of its own.

In moving into production in the Lima fields, the trust preferred to buy existing units, like the Ohio Oil Company and the Carter Oil Company, rather than purchase new oil lands on its own. In this way, it obtained the experience and expertise of successful producers. Some of these people were put on Standard's Production Committee, which was formed in 1889 to coordinate and control the activities of this new function. Within three years, Standard was producing 25% of the nation's crude oil. In 1889, the board decided to set up a new refinery at Whiting, Indiana, outside of Chicago, to process Lima crude. Connected to the fields by a 205-mile trunk pipeline, the Whiting refinery, with its 10,000- and ultimately 36,000-barrel daily throughput, became and long remained the largest in the world. It was the heart of a new trust subsidiary, Standard Oil of Indiana.

Standard Oil's financial resources made possible its decisive moves into the Indiana-Ohio fields (**Exhibit 6**). As of December 1891, the trust had expended over $32 million on the "Ohio Crude Business," an amount equal to 60% of its net assets in 1882. Book profits varied from more than 57% on the pipelines to less than 144% on fuel oil sales. Creating a market for a new product and developing new refining methods had been costly, but the rise in overall earnings seemed to justify the risks.[25]

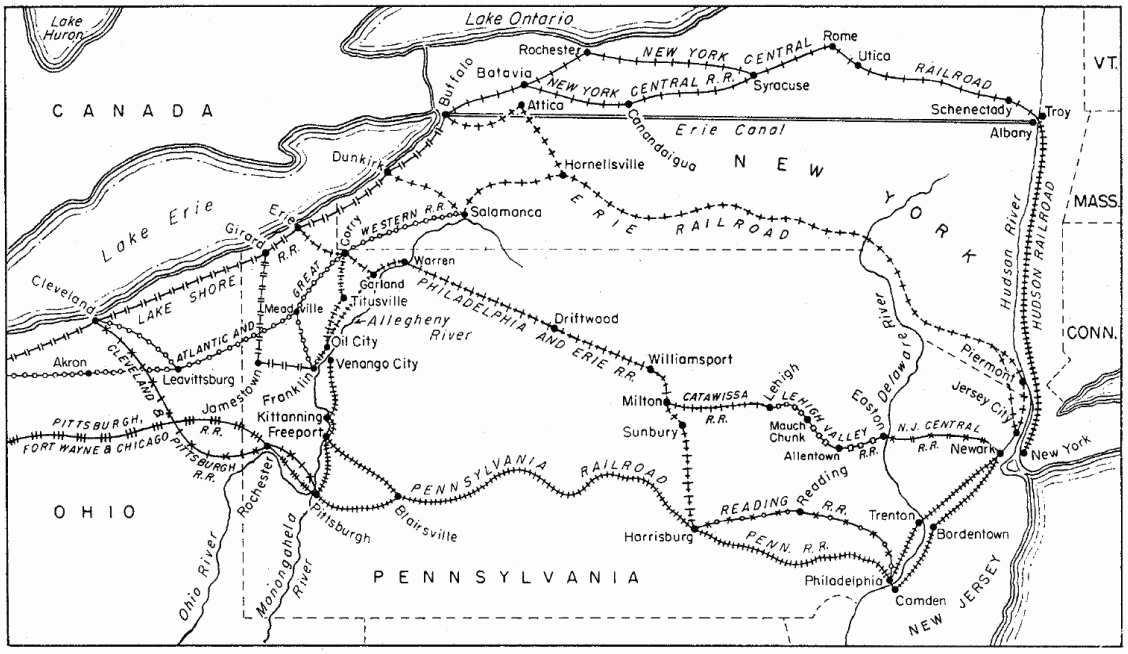
The move was further justified when, in the early 1890s, the producers in the Pennsylvania fields were able to carry out an earlier threat by constructing a pipeline to the seaboard, building large refineries, and making arrangements with European wholesalers to market abroad. This important new enterprise, which, in 1895, became the Pure Oil Company, did not, as Tidewater had done earlier, make a deal with Standard on prices and output. Standard's earlier move into production, therefore, had been crucial to its continuing dominance in the American oil industry (**Exhibits 7** and **8**). Standard's backward move into production, like Tidewater's and Pure Oil's forward moves into refining and marketing, also foreshadowed the structure of the oil industry worldwide. Competition would be among a few vertically integrated giant enterprises. It would be oligopolistic rather than monopolistic.

Conclusion

As a result of Standard Oil's development, entry into the industry became increasingly difficult. A new firm not only required considerable capital for the construction of large refineries, but also had to make costly arrangements to obtain transportation and supplies of crude oil. The discovery of new fields in the Southwest at the turn of the century would justify such investment, and firms such as Texaco would be born. As the century came to a close, proportionately less oil was used for illuminating purposes and more for fuel and lubricants. Then, in the late 1890s, the greatest threat to the oil industry's future appeared with the successful development and spread of Thomas Edison's electric lighting system. Fortuitously, however, the disappearance of the kerosene market was far more than offset in the next decade with the coming of the automobile.

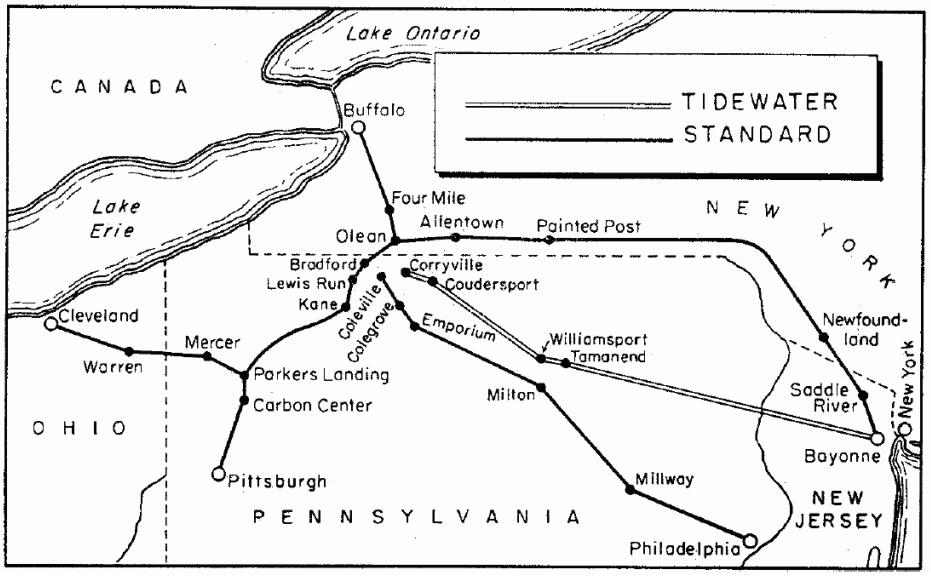
Standard Oil, tracing its birth back to a small partnership in the grocery business, grew into a leading refiner in a new industry and then matured into a multimillion-dollar, integrated industrial enterprise dominating its industry throughout the world. Other firms in other industries followed the same route to great size and power. In the last years of the nineteenth century and the first years of the twentieth, enterprises in rubber, steel, copper, lead, sugar, salt, whiskey, explosives, and biscuits, to name a few such industries, grew by combination, then consolidation, and then vertical integration. But none of these enterprises are as good an example of the causes and process of becoming a modern industrial business corporation as the story of Standard Oil.

Exhibit 1 Transportation Connections, 1864



Source: Harold F. Williamson and Arnold F. Daum, *The American Petroleum Industry: The Age of Illumination, 1859–1899* (Evanston, IL, 1959), p. 299.

Exhibit 2 Standard Oil and Tidewater Pipelines, 1884



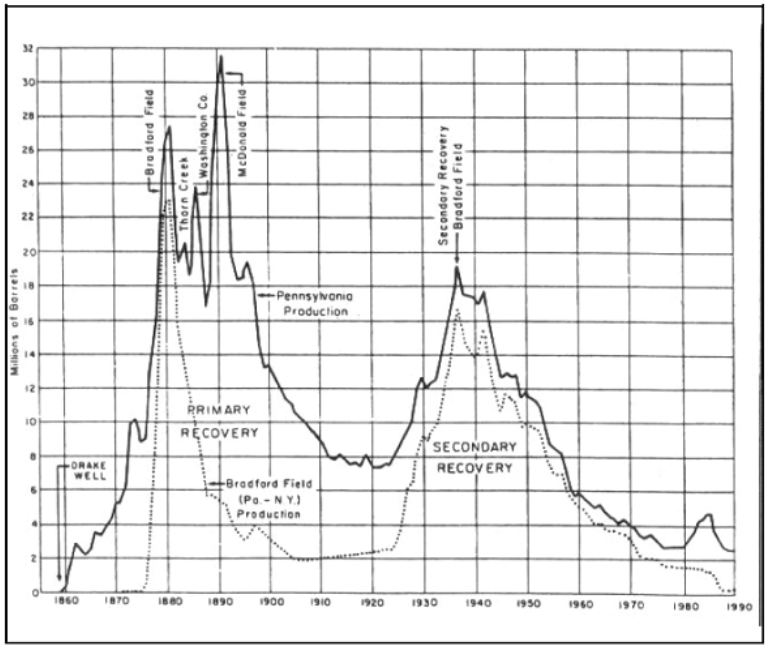
Source: Harold F. Williamson and Arnold F. Daum, *The American Petroleum Industry: The Age of Illumination, 1859–1899* (Evanston, IL, 1959), p. 444.

Exhibit 3 Location of Daily Crude Charging Capacity of Major Refining Areas, 1864–1873

	1864-65	% of Total	1872-73	% of Total
Pittsburgh	4,500	39%	10,000	23%
Philadelphia	600	5%	2,000	5%
Boston	500	4%	600	1%
New York-New Jersey	3,100	27%	10,000	23%
Cleveland	800	7%	12,500	28%
Oil Region (Western Pennsylvania)	2,160	19%	9,200	21%

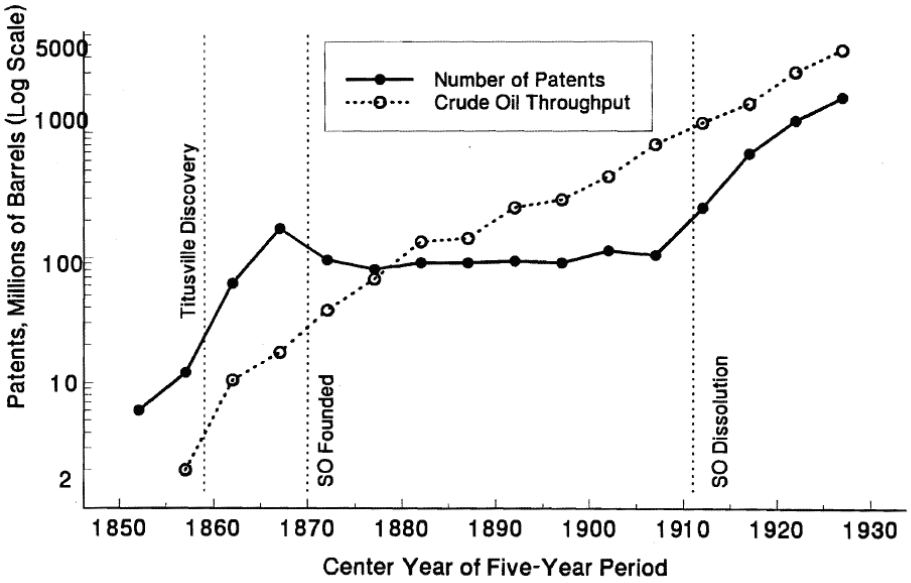
Source: Harold F. Williamson and Arnold F. Daum, *The American Petroleum Industry: The Age of Illumination, 1859–1899* (Evanston, IL, 1959), p. 291.

Exhibit 4 Pennsylvania Crude Oil Production



Source: Michael Caplinger, "Allegheny Oil Heritage Project: A Contextual Overview of Crude Oil Production in Pennsylvania," Historic American Engineering Record, No. PA-436 (1997).

Exhibit 5 Trends in Refining Patents and Crude Oil Throughput



Source: F. M. Scherer, "Standard Oil as a Technological Innovator," *Review of Industrial Organization* 38, no. 3 (May 2011): 225–233.

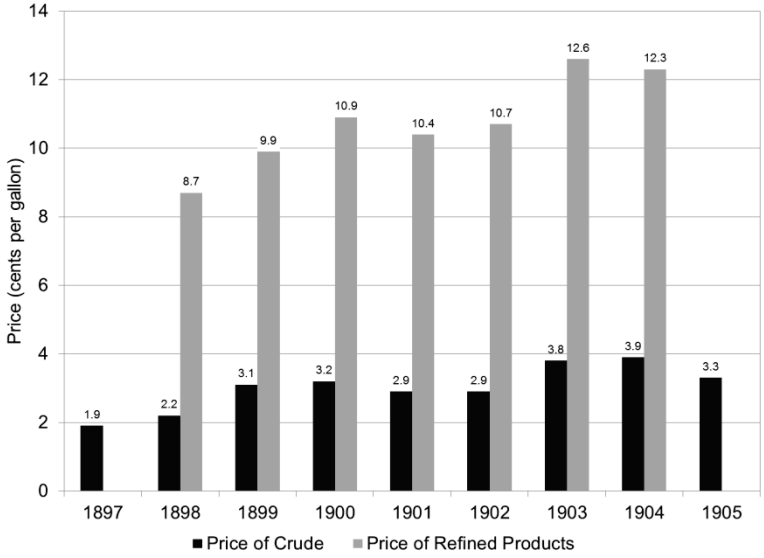
Note: The dotted lines in 1870 and 1911 represent the founding of Standard Oil and its dissolution under antitrust laws, respectively. The number of patents is for the industry as a whole.

Exhibit 6 Dividends and Profits for Standard Oil

	Trust certificates or capital stock at end of year (000 omitted)	Amount of dividends (000 omitted)	Rate of dividends	Net earnings (000 omitted)	Per cent of net earnings to capital stock	Per cent of net earnings to mean net assets
1882	$ 71,116	$ 3,695	5%	$ 12,388	17%	21%
1883	$ 71,730	$ 4,268	6%	$ 11,231	16%	16%
1884	$ 71,230	$ 4,288	6%	$ 7,778	11%	11%
1885	$ 71,230	$ 7,479	10%	$ 8,382	12%	11%
1886	$ 73,355	$ 7,226	10%	$ 15,350	21%	19%
1887	$ 90,187	$ 8,463	9%	$ 14,026	16%	16%
1888	$ 90,293	$ 10,236	11%	$ 12,757	14%	13%
1889	$ 90,344	$ 10,620	12%	$ 14,845	16%	15%
1890	$ 96,941	$ 11,200	12%	$ 19,131	20%	18%
1891	$ 97,219	$ 11,648	12%	$ 16,131	17%	14%
1892	$ 97,250	$ 11,874	12%	$ 19,174	20%	15%
1893	$ 97,250	$ 11,670	12%	$ 15,457	16%	12%
1894	$ 97,250	$ 11,670	12%	$ 15,544	16%	12%
1895	$ 97,250	$ 16,532	17%	$ 24,078	25%	17%
1896	$ 97,250	$ 30,147	31%	$ 34,077	35%	24%
1897	$ 97,250	$ 32,092	33%	$ 47,443	49%	28%
1898	$ 97,250	$ 29,175	30%	$ 47,443	49%	28%
1899	$ 97,250	$ 32,092	33%	$ 47,443	49%	28%
1900	$ 97,448	$ 46,691	48%	$ 55,501	57%	28%
1901	$ 97,448	$ 46,775	48%	$ 52,291	54%	25%
1902	$ 97,448	$ 43,851	45%	$ 64,613	66%	29%
1903	$ 97,448	$ 42,877	44%	$ 81,336	83%	32%
1904	$ 98,338	$ 35,188	36%	$ 61,570	63%	22%
1905	$ 98,338	$ 39,335	40%	$ 57,459	58%	19%
1906	$ 98,338	$ 39,335	40%	$ 83,122	85%	25%

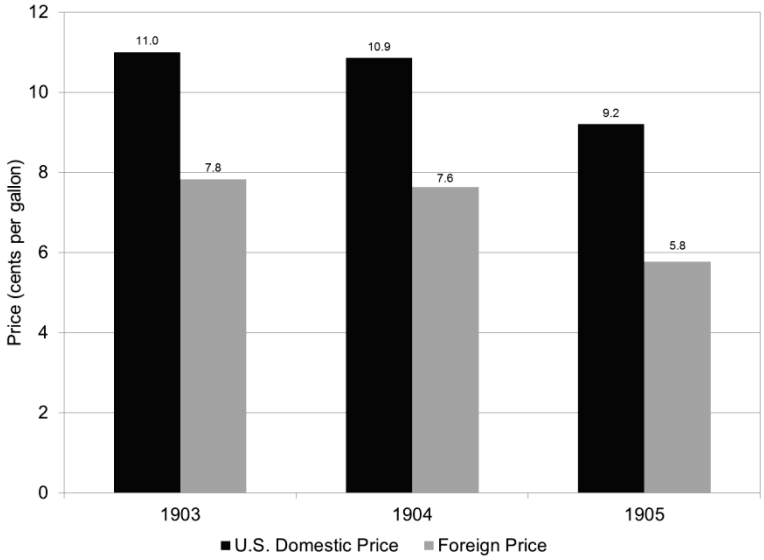
Source: Compiled by casewriters from Eliot Jones, *The Trust Problem in the United States* (New York: Macmillan Company, 1921), p. 88. Data for Standard Oil Trust (1882–1899) and the Standard Oil Company (1899–1906).

Exhibit 7 Price of Pennsylvania Crude and Its Principal Products



Source: Compiled by casewriters from data in *Report of the Commissioner of Corporations on the Petroleum Industry: Part II Prices and Profits* (Washington, DC: United States Bureau of Corporations, 1907), p. 10. The report estimates that the sum of both cost of goods sold and operating expenses equaled approximately 2.5 cents per gallon. The report also states that Standard Oil sold approximately 1.4 billion gallons of refined products in the U.S. in 1904. The term "refined products" refers to the following: illuminating oil, gasoline oil, gas oil, lubricating oil, and paraffin wax.

Exhibit 8 U.S. Domestic and Foreign Prices for Illuminating Oil



Source: Compiled by casewriters from data in *Report of the Commissioner of Corporations on the Petroleum Industry: Part II Prices and Profits* (Washington, DC: United States Bureau of Corporations, 1907), p. 19. These prices are directly comparable prices net of transportation costs and duties. The foreign price is given as the average prevailing in the following markets: the U.K., Germany, and Denmark.

Endnotes

[1] Ron Chernow, *Titan: The Life of John D. Rockefeller Sr.* (New York: Random House, 1998), p. 64.

[2] Chernow, *Titan*, p. 19.

[3] Chernow, *Titan*, pp. 32–33.

[4] Chernow, *Titan*, p. 43.

[5] Chernow, *Titan*, p. 47.

[6] Allan Nevins, *John D. Rockefeller: The Heroic Age of American Enterprise*, vols. I and II (New York, 1940). Nevins, *Rockefeller*, I, p. 59, 75. The daily capacity may have been larger. Rockefeller's estimate for 1869 is for barrels of oil refined, while the company bankers' estimate in their correspondence was 3,000 barrels of crude capacity.

[7] Nevins, *Rockefeller*, I, p. 74.

[8] Nevins, *Rockefeller*, I, pp. 74–75.

[9] Affidavit of James H. Devereux in the case of *Standard Oil Company v. William C. Schofield, et al.*, quoted in Ida M. Tarbell, *History of the Standard Oil Company* (New York: McClure, Phillips & Co., 1905), vol. I, pp. 277–279.

[10] Harold F. Williamson and Arnold F. Daum, *The American Petroleum Industry: The Age of Illumination, 1859–1899* (Evanston, IL, 1959), p. 353.

[11] This and the following quotation are from Tarbell, *History of the Standard Oil Company*, I, pp. 64, 66–67.

[12] Williamson and Daum, *American Petroleum Industry*, pp. 349–350.

[13] Nevins, *Rockefeller*, I, p. 431.

[14] These included individuals like John D. Archbold, the general manager of Porter, Morehouse & Company of Titusville, who was long an implacable foe of Standard Oil, but became one of the alliance's most influential executives.

[15] Williamson and Daum, *American Petroleum Industry*, p. 469.

[16] Ralph W. Hidy and Muriel E. Hidy, *Pioneering in Big Business, 1882–1911* (New York, 1955), pp. 59, 63.

[17] Hidy and Hidy, Pioneering in Big Business, p. 71.

[18] Hidy and Hidy, Pioneering in Big Business, p. 86.

[19] Williamson and Daum, *American Petroleum Industry*, p. 620.

[20] Williamson and Daum, *American Petroleum Industry*, p. 620.

[21] Indicated on map in Williamson and Daum, *American Petroleum Industry*, p. 689.

[22] Williamson and Daum, *American Petroleum Industry*, pp. 642–643.

[23] Williamson and Daum, *American Petroleum Industry*, p. 660; and Robert W. Tolf, *The Russian Rockefellers* (Stanford, CA: Hoover Institution Press, 1976), p. 185.

[24] Hidy and Hidy, *Pioneering in Big Business*, pp. 158–159.

[25] Hidy and Hidy, *Pioneering in Big Business*, p. 166.