An Early Assessment of the Sherman Antitrust Act: Three Case Studies

By Anthony W. Orlando
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University of Pennsylvania, The Wharton School
Wharton Research Scholars Program

ABSTRACT

The majority of the research literature on early antitrust law focuses on prices and output, but few empirical studies decompose these symptoms into the causes that the underlying theory suggests. The literature has been equally silent about secondary effects, even when their derivative claims dependent on and could be proven (or disproven by) evidence in such data. This paper focuses on three case studies where the United States Supreme Court used the Sherman Antitrust Act to justify significant government intervention in an industry, resulting in the breakup of a major trust or cartel—Chesapeake & Ohio Fuel Co. v. United States, Standard Oil Co. of New Jersey v. United States, *and* United States v. American Tobacco Co.—*by measuring five industry metrics and their relation to the antitrust action: capital, number of establishments, employment, profit margin, and revenue.*

I owe many thanks to Daniel M.G. Raff for serving as my primary advisor despite his own hectic schedule and for teaching me everything I know about business history and research in general; Martin Asher for teaching me everything I know about antitrust, introducing me to Dr. Raff, and organizing the Wharton Research Scholars program; Frank Diebold for teaching me everything I know about econometrics; Jamshed Ghandhi for steering me toward the case study format and encouraging me to dig deeper than the usual price/output analysis; and Adrian Tschoegl for spending great time and effort brainstorming, editing, and finding relevant literature. The research conducted here is all my own work, and so all errors and shortcomings rest with me.

"The modern corporation," wrote antitrust economist George Bittlingmayer, "constitutes the single most important innovation in the organization of business. The modern corporate form is responsible in large part for the phenomenal increase in the standard of living of the last century. By means of limited liability, the corporation can raise large amounts of capital. By means of the holding company and merger, it solves problems of coordination and control, and allows valuable assets in the form of a going concern to be transferred to more valuable uses. We tend naturally to view our improved conditions as the result of a long list of specific technical advances—the automobile, the airplane, electrical appliances, or the computer. But we owe our well-being to organizational as well as physical innovation." (Sklar 1988)

This author seconds Bittlingmayer's call to expand our understanding of posterity to include the modern corporation; in such a critical revision, antitrust must play a significant role. "The trust question was the corporation question," explains historian Martin Sklar (1988). "The great antitrust debates were…in essence, debates about the role and power of the large corporations in the market and in society at large, and debates about the corresponding role and power of government in relation to the emergent corporate order." These debates continue today but all too often without an appreciation for their predecessors. This paper will dig deeper into the antitrust questions that loomed at the outset of this type of law by exploring effects that have heretofore been ignored by scholars—and in so doing hopefully shed a wider light on the making and influence of the modern corporation.

The majority of the research literature on early antitrust law focuses on prices and output, but few empirical studies decompose these symptoms into the causes that the underlying theory suggests. The literature has been equally silent about secondary effects, even when their

derivative claims dependent on and could be proven (or disproven by) evidence in such data.[1] This paper will focus on three case studies where the United States Supreme Court used the Sherman Antitrust Act to justify significant government intervention in an industry, resulting in the breakup of a major trust or cartel. Part I will give a brief history of the Sherman Antitrust Act, including the major Supreme Court cases that enforced it. Part II will discuss three papers published in peer-reviewed journals that have criticized the Sherman Antitrust Act or antitrust legislation similar to it; counterarguments will be offered that will serve as hypotheses for the analyses of the three case studies. Parts III, IV, and V will explore the three cases studies—*Chesapeake & Ohio Fuel Co. v. United States*, *Standard Oil Co. of New Jersey v. United States*, and *United States v. American Tobacco Co.*, respectively—by measuring five industry metrics and their relation to the antitrust action. Part VI will conclude with similar findings, caveats based on ambiguities, and implications for modern antitrust and historical understanding of the modern corporation.

I. The Sherman Antitrust Act

"People of the same trade seldom meet together, even for merriment and diversion," Adam Smith famously wrote, "but the conversation ends in a conspiracy against the public, or in some contrivance to raise prices." The American public of the late nineteenth century believed as much too. At the outset of the Gilded Age, "antitrust" was not even part of the legal system or the common lexicon. The base word "trust," as a legal notion, was known only to legal scholars as a personal device of wealthy citizens. One person would "entrust" his possessions to another. In

[1] The Shughart and Tollison (1991) paper mentioned in Part II is a good example of this phenomenon, where the authors made assertions about employment without considering the effects on employment in the immediate industries in question. If antitrust actions did not affect employment in those very industries in which legal action was taken, it is difficult to argue that a broad regression on national employment is significant and not simply the natural outcome of a dataset with too many exogenous variables.

1879, Henry M. Flager, John Rockefeller's right-hand man, adapted the trust form to Standard Oil of Ohio. Three years later, Flager and a lawyer named Samuel C.T. Dodd "drafted a new Standard Oil trust agreement that set up separate corporations in each state with major properties belonging to Standard Oil." (Gordon 2008) The result was a *de facto* monopoly and, unsurprisingly, populist backlash.

States took action against trusts before the federal government. Boudreaux, et al. (1995) show that the Sherman Act was based on a Missouri antitrust law that was itself the result of lobbying by cattlemen and butchers trying to "thwart competition from the newly centralized meat-processing facilities in Chicago." They succeeded. Senator John Sherman, a Republican from Ohio, faced strong pressure to bring the federal government into the mix, probably in large part because his constituents lived in a state housing the first and most dominant trust. Two pieces of evidence indicate the level of public outrage at these trusts. First, when Sherman introduced the antitrust act that bore his name, his speech on the Senate floor is particularly inflammatory, conjuring images of the few times in the nation's history when its citizens felt genuine fear. Second, the floor votes suggest a legislator would need a high degree of bravery to put his name on record against the bill. It passed the Senate on April 8, 1890, with 51 yea votes and 1 nay vote, and it passed the House of Representatives on June 20, 1890, unanimously (242-0). The text was brief and, as a result, rather vague. The main clause declared, "Every contract, combination in the form of trust or otherwise, or conspiracy, in restraint of trade or commerce among the several States, or with foreign nations, is declared to be illegal."

Initially, the courts struggled to interpret this law and were indeed resistant to interrupt economic activity based on ambiguous and untested statute of questionable constitutionality. "It was not until 1897," according to Sklar, "that the Supreme Court first construed the Sherman Act

as recognizing no distinction between reasonable and unreasonable restraints of trade. The Court declared both types of restraint illegal, and thereby construed the Sherman Act as reversing or superseding the common law with respect to restraints of trade and monopoly, not only procedurally but substantively as well." Sklar is referring to *United States v. Trans-Missouri Freight Association*, where the Court first acted against cartel behavior. For the preceding seven years, the Sherman Act had gone unenforced as the Court found reasons that it did not apply to case after case, culminating in the famous *United States v. E.C. Knight Company* in 1895 that "sustained the 'Sugar Trust.'" After *Trans-Missouri*, the Court took several major actions against trusts, including *United States v. Joint Traffic Association* in 1898 and *Northern Securities Co. v. United States*. These three cases all involved railroad companies and have been thoroughly addressed in Binder (1988) and so will go unexplored in this paper. Other major cases avoided by this analysis because the necessary data was either unavailable or fragmented are *Montague & Company v. Lowry* (1904), *Loewe v. Lawlor* (1908), and *Shawnee Compress Company v. Anderson* (1908).

The Sherman Antitrust Act would eventually come under fire for its generality and its inapplicability to mergers. In fact, Bittlingmayer (1985) argues compellingly that the success of the Sherman Act in warding off trusts encouraged companies to turn to the merger form instead, generating the famous Merger Wave at the turn of the century. The former criticism was voiced in scholarship as early as 1909, "The fact is that the reason why the Sherman Act has not been efficiently enforces is because it is an unenforceable statute. It is as useless to attempt to enforce it generally and uniformly, according to its plain provisions, as it would be to attempt to enforce a statute regulating the price of commodities or the intrinsic value of money. The Act is an attempt to control commercial and economic forces by statute, and like all similar Acts, must ultimately

either fall into entire disuse, or be repealed, after having caused, as such statutes always do, more or less injury to the community. The remedy for the evils of the Act is not in providing cumbrous, mischievous and unworkable methods for avoiding some of them, but by substituting for it, so far as the public welfare requires, a properly framed, guarded and workable Act, with proper provisions for its efficient and uniform enforcement." (Benton 1909) The Clayton Antitrust Act of 1914 would address many of these concerns—but not before the courts used the Sherman Act to its full potential. Looking back on one particular application, legal scholar Felix H. Levy wrote, "[T]he Sherman Law has been given a most comprehensive and drastic interpretation by the Federal courts, so that practically all agreements among competitors whereby competition among them is substantially reduced, are declared unlawful, without respect to the fact that such agreements may be based upon good motives and upon beneficial economic results."

II. Criticism in the Research Literature

Of course, flaws in the Sherman Act do not prove it had a *net* negative impact on the economy and society. The question, then, is whether its positive effects outweigh its drawbacks. Several scholars draw a strong "no" conclusion. A substantial portion of the remaining paper will address and test their concerns.

Delorme, et al. (1997) compared price and output levels in various large manufacturing industries in 1880-1890 versus 1891-1900. They concluded that "following the Sherman Act, only one trust (salt) was certainly acting competitively, lowering relative prices. Three other trust industries (copper, petroleum, and sugar) were acting less competitively by raising relative prices. These results suggest that the Sherman Act, once enacted, *was ineffective or was unenforced* in dealing with the trusts." *[emphasis added]* The theory behind this study rests upon a basic

microeconomic foundation. Monopolies can charge a price where marginal revenue equals marginal cost, but because of the lack of competitive pressure, that price is high enough that they earn economic profits. By charging a higher price, they are depriving the consumer of some of the consumer surplus from the lower price that they would pay under perfect competition. Because price is necessarily a function of quantity, this higher price implies that the monopoly is restricting output. Therefore, Delorme, et al. argue, if the Sherman Act was necessary, prices should be too high and output too low in several major industries prior to 1890. Once antitrust was on the books, though, these firms should have cleaned up their act to avoid government intervention to break them up by force; in other words, we should see prices fall and output increase after 1890.

This paper contends the above analysis is superficial and misdirected. Antitrust laws are only effective insofar as they are enforced by the courts, and as seen in Part I, meaningful judicial precedent related to the Sherman Act did not accumulate until *after* the period considered by the authors. In fact, the court decision in *E.C. Knight* specifically "sustained the 'Sugar Trust,'" which was one of the industries considered by Delorme, et al. Furthermore, the petroleum industry, which will be addressed in Part IV, did not experience antitrust action until 1911—after the period measured by Delorme, et al.—though their findings actually give *support* for the antitrust action taken in *Standard Oil Co. of New Jersey v. United States* because they found the petroleum industry "acting less competitively" in the time leading up to the Supreme Court case.

Shughart and Tollison (1991) studied antitrust actions taken by the Justice Department during 1947-1981. Their regression revealed that a 1% increase in antitrust cases was correlated with a 0.17% increase in the national unemployment rate. They concluded that causation must exist in the form of an "antitrust Phillips curve." Shughart and Tollison rely on a public choice

perspective for the theoretical explanation behind their empirical interpretation. Government intervention has several oft-overlooked side effects. First, the cartels may actually be efficient, as explained below. If they are more efficient than perfect competition, then antitrust action will raise the industry's costs, resulting in lower employment. Second, government intervention usually inflicts uncertainty on an industry. Because investors do not know whether the intervention will change the industry against their interests, they charge a higher risk premium and often shift their capital to another industry entirely. The result is slower growth and smaller companies, which in turn means lower employment. Third, antitrust action requires major government resources, which must come from tax revenues (either now or in the future). Increased antitrust implies increased taxes, which reduces economic activity and thus employment.

This paper should not need to point out that *correlation does not prove causation*, but alas, it seems to have been forgotten here. It is equally possible, for instance, that an increase in unemployment put more pressure on the Justice Department to crack down on monopolistic behavior. The above authors also neglect *private* antitrust cases, which Posner (1970) famously showed to be an order of magnitude greater than Justice cases; if private cases tell a different story, then one may more reasonably conclude an opposite direction of causation from the one they suggest. Regardless, it is impossible to isolate any one cause of unemployment, though antitrust actions can *increase* employment by multiplying firms in the industry.

Bittlingmayer (1985) argues that cartels may *increase* efficiency in industries with high fixed costs and low variable costs. "May" is the operative word. This paper does not dispute Bittlingmayer's general claim, but it does intend to use empirical evidence (in the form of total industry capital and number of establishments) to demonstrate that industry-level efficiency was

unharmed by antitrust actions, as it would logically be if the cartels in question were responsible for *decreased* efficiency. The analyses in Parts III, IV, and V will also test the claim made by Shughart and Tollison by measuring industry-level employment and the argument in Delorme, et al., by deconstructing price and output into revenue and profit margin.

III. Chesapeake & Ohio Fuel Co. v. United States

The Chesapeake & Ohio Fuel Co. was established by a contract binding several coal (or "coke") producers in cooperative behavior. "Ohio Coal Trust Sued," headlined *The New York Times* on April 6, 1899. "The Government Charges Sixteen Producers with Violation of the Anti-Trust Act of 1890." The article explained:

> It is alleged in the bill that the defendants on Dec. 15, 1897, entered into a contract and combination in the form of a trust and conspiracy in restraint of trade and commerce in regard to the sale and production of coal and coke, and in violation of law this agreement, it is said, went into effect about Jan. 1, 1898, and since that time they have monopolized and controlled the amount of coal and coke produced in the Kanawha district, and only permitted such amount of coal mined and coke made by the several defendants as could be sold by the Chesapeake and Ohio Fuel Company, and that the defendants were only permitted to ship their proportionate amount of coal at a stipulated price and figured upon the ratio designated in the contract, as fixed by the Executive Committee. By this action it is alleged that competition in the sale of the same has been wholly destroyed.

A few years later, "The Sixth Circuit Court of Appeals in Cincinnati…upheld the lower federal court's decision against the company." In 1902, the Supreme Court concurred that "Congress has seen fit to prohibit all contracts in restraint of trade. It was not left to the courts the consideration of the question whether such restraint is reasonable or unreasonable…"

The following graphs and regressions analyze the effect of this antitrust action on the five variables in question: capital, number of establishments, employment, profit margin, and revenue.[2] The regressions measure the dependent variable as a function of an intercept, a time

[2] Profit margin is calculated by dividing "product value" (which is a proxy for revenue) by "value added by manufacture" (which is a proxy for revenue minus cost of goods sold).

trend, gross domestic product, and a dummy variable that is “0” before the antitrust action and “1” afterward. The dependent variable has 9 observations, associated with 1860, 1870, 1880, 1890, 1900, 1905, 1910, 1915, and 1920, all taken from the 1920 Census of Manufactures; this means the regressions all have 7 degrees of freedom. With so few degrees of freedom, we will make only general, tentative claims based on this data.

Exhibit 1. Coke Industry, Capital, Graph

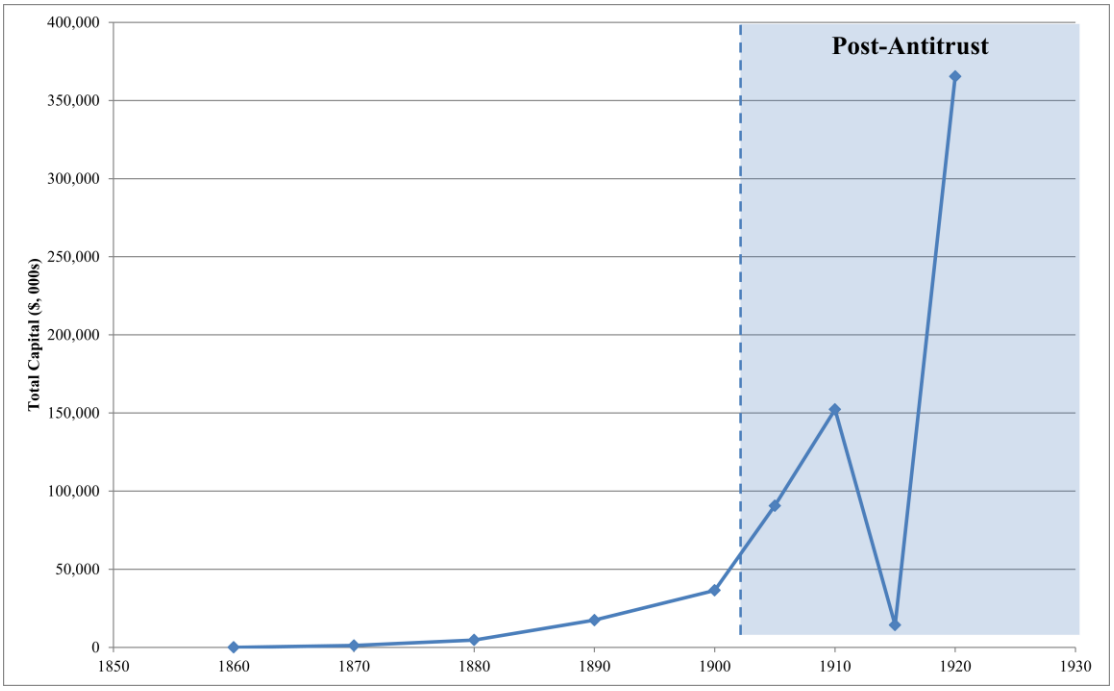

Exhibit 2. Coke Industry, Capital, Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-15287.12	38865.61	-0.393	0.710
TIME	-16880.87	18033.26	-0.936	0.392

GDP	5245.65	1219.31	4.302	0.007
ANTITRUST_DUMMY_1902	11329.61	62475.63	0.181	0.863

R-squared	0.8833	Mean dependent var	75852.56
Adjusted R-squared	0.8133	S.D. dependent var	119892.9
S.E. of regression	51804.37	Akaike info criterion	24.849
Sum squared resid	1.34E+10	Schwarz criterion	24.937
Log likelihood	-107.822	Hannan-Quinn criter.	24.660
F-statistic	12.616	Durbin-Watson stat	2.744
Prob(F-statistic)	0.009		

The antitrust dummy is statistically insignificant, but its coefficient—which is typically the maximum likelihood estimate if the antitrust action did have a marginal effect—is strongly positive. We cannot, of course, conclude that the antitrust action increased the coke industry's total capital, but we can conclude that it did not decrease its capital, indicating it did not hinder the industry's growth or efficiency.

Exhibit 3: Coke Industry, Number of Establishments, Graph

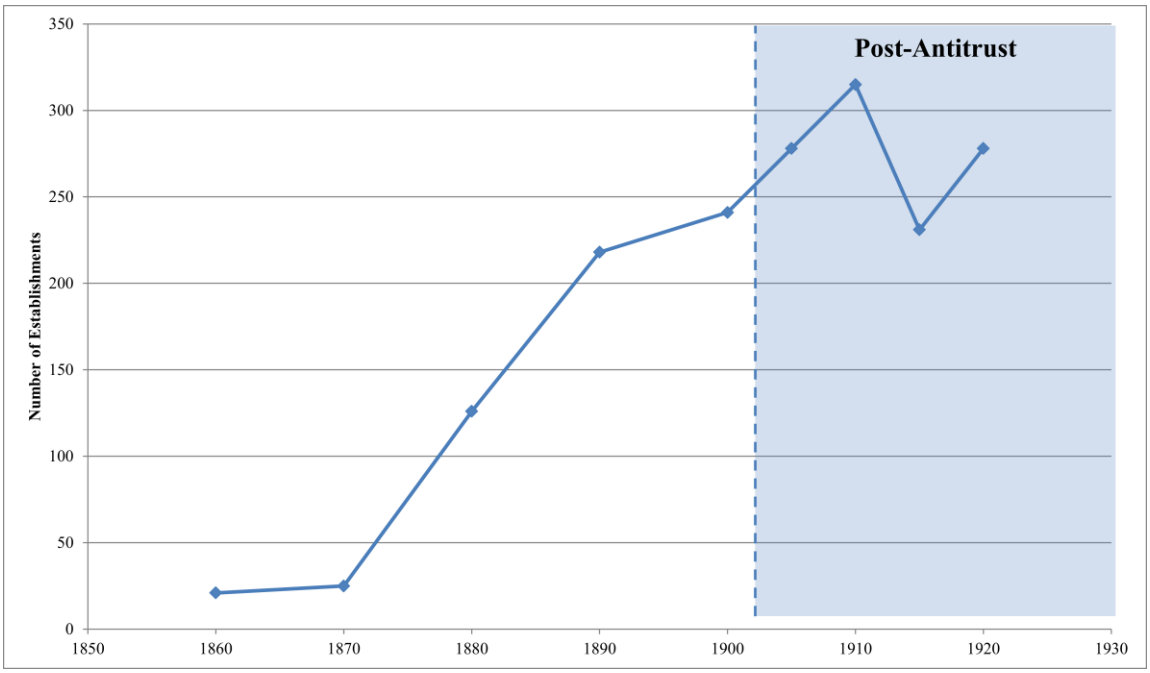

Exhibit 4: Coke Industry, Number of Establishments, Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	12.827	34.069	0.376	0.722

TIME	64.017	15.807	4.050	0.010
GDP	-1.260	1.0688	-1.179	0.292
ANTITRUST_DUMMY_1902	-13.800	54.765	-0.252	0.811

R-squared	0.892	Mean dependent var	192.556
Adjusted R-squared	0.828	S.D. dependent var	109.546
S.E. of regression	45.410	Akaike info criterion	10.770
Sum squared resid	10310.50	Schwarz criterion	10.858
Log likelihood	-44.467	Hannan-Quinn criter.	10.581
F-statistic	13.852	Durbin-Watson stat	2.5203
Prob(F-statistic)	0.0074		

The antitrust dummy is statistically insignificant, but in this case, the coefficient is negative. We cannot therefore conclude that the antitrust action decreased the number of establishments, but we can conclude that it did not increase the number of establishments, as one might expect if the antitrust action increased competition significantly.

Exhibit 5: Coke Industry, Employment, Graph

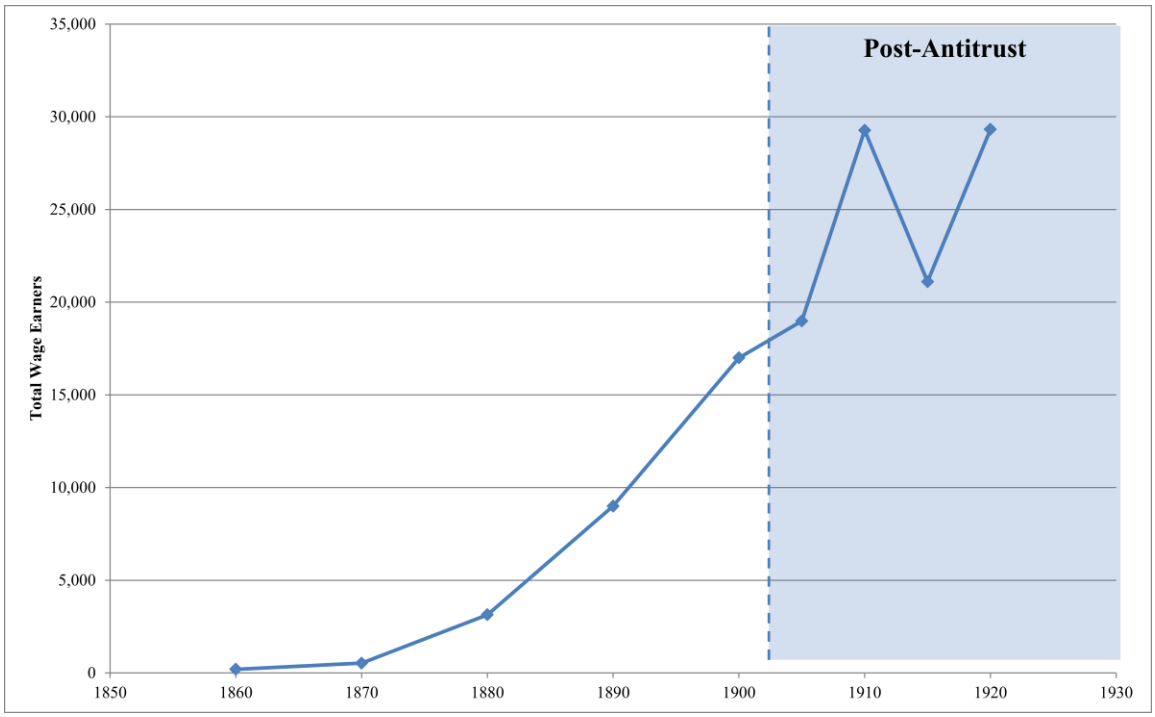

Exhibit 6: Coke Industry, Employment, Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2372.912	3067.540	-0.774	0.474

TIME	3933.258	1423.309	2.763	0.040
GDP	41.158	96.236	0.428	0.687
ANTITRUST_DUMMY_1902	4445.509	4931.004	0.902	0.409

R-squared	0.922	Mean dependent var	14282.56
Adjusted R-squared	0.875	S.D. dependent var	11546.00
S.E. of regression	4088.755	Akaike info criterion	19.771
Sum squared resid	83589587	Schwarz criterion	19.859
Log likelihood	-84.969	Hannan-Quinn criter.	19.582
F-statistic	19.598	Durbin-Watson stat	2.961
Prob(F-statistic)	0.003		

The antitrust dummy is statistically insignificant, but it has a strongly positive coefficient.[3] We cannot therefore conclude that the antitrust action increased employment, but we can conclude, *contra* Shughart and Tollison (1991), that it did not decrease employment in the coke industry.

Exhibit 7: Coke Industry, Profit Margin, Graph

[3] When I use the modifier "strongly" throughout the paper to qualify the direction of the coefficient, I am simply referring to its size relative to the other coefficients in the regression; it is not meant to be any comment on the statistical significance, which I will repeatedly show to be insignificant at any reasonable level (5% or 10%).

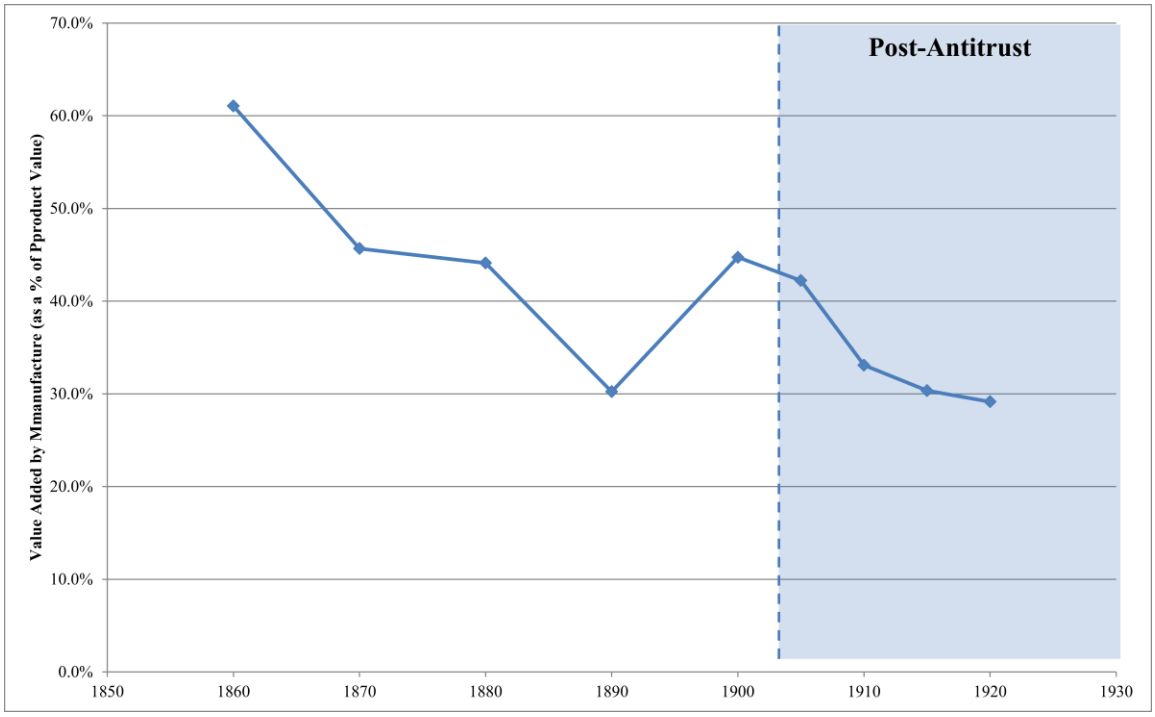

Exhibit 8: Coke Industry, Profit Margin, Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.555	0.056	9.961	0.000
TIME	-0.051	0.026	-1.965	0.107
GDP	0.000	0.002	-0.106	0.920
ANTITRUST_DUMMY_1902	0.057	0.090	0.639	0.551

R-squared	0.685	Mean dependent var	0.401
Adjusted R-squared	0.496	S.D. dependent var	0.105
S.E. of regression	0.074	Akaike info criterion	-2.060
Sum squared resid	0.028	Schwarz criterion	-1.972
Log likelihood	13.268	Hannan-Quinn criter.	-2.249
F-statistic	3.619	Durbin-Watson stat	2.384
Prob(F-statistic)	0.100		

The antitrust dummy is statistically insignificant, but its coefficient is positive. We cannot therefore conclude that the antitrust action increased profit margins, but we can conclude that it did not decrease profit margins, suggesting any effect on prices must have occurred through output.

Exhibit 9: Coke Industry, Revenue, Graph

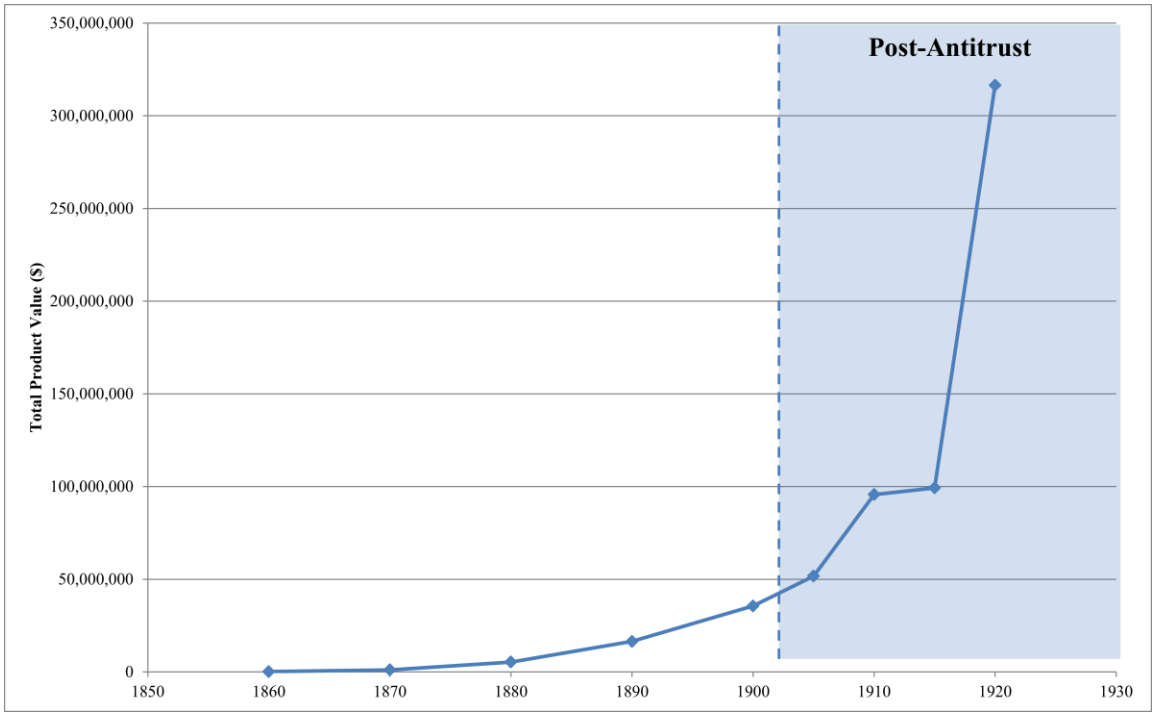

Exhibit 10: Coke Industry, Revenue, Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-22864251	6813330.	-3.355	0.020
TIME	-8598857.	3161319.	-2.720	0.042
GDP	4452225.	213751.3	20.829	0.000
ANTITRUST_DUMMY_1902	-1889251.	10952281	-0.172	0.870

R-squared	0.995	Mean dependent var	69109049
Adjusted R-squared	0.992	S.D. dependent var	1.00E+08
S.E. of regression	9081557.	Akaike info criterion	35.182
Sum squared resid	4.12E+14	Schwarz criterion	35.270
Log likelihood	-154.321	Hannan-Quinn criter.	34.993
F-statistic	323.506	Durbin-Watson stat	3.064
Prob(F-statistic)	0.000		

The antitrust dummy is statistically insignificant, but its coefficient is strongly negative. We cannot therefore conclude that the antitrust action decreased revenue in the coke industry, but we can conclude that it did not increase revenue in the coke industry. This conclusion has ambiguous implications for industry growth and efficiency.

IV. Standard Oil Co. of New Jersey v. United States

As mentioned earlier, Standard Oil's trust consisted of a *de facto* monopoly in the petroleum industry. John D. Rockefeller founded the company in 1870; in less than thirty years, he had captured 90 percent market share in the petroleum industry. Standard employed four tactics in eating up the American petroleum market: the "trust" form, acquisitions on favorable terms, localized predatory pricing, and most potent, cartelization of the *transportation* of petroleum.

The trust form existed in common law well before Standard adopted it, but in the past, it had been exclusively used between individuals, not firms. It simply allowed one individual to entrust his assets to another individual. In 1879, Henry M. Flager, John Rockefeller's right-hand man, adapted the trust form to Standard Oil of Ohio. Three years later, Flager and a lawyer named Samuel C.T. Dodd "drafted a new Standard Oil trust agreement that set up separate corporations in each state with major properties belonging to Standard Oil." (Gordon 2008) With this new arrangement, Standard could gobble up smaller competitors by entrusting their assets to Standard Oil of Ohio. Throughout the 1890s and 1900s, "Mergers continued to be Standard's tool of choice for growth." (Manns 1998)

Part of Standard's ability to overpower competitors and coerce them into mergers stemmed from its ability to lower its prices in specific geographies to undercut those competitors until they submitted, but that causation does not explain from where Standard derived this pricing advantage. "Standard enforced the transportation cartel," explain Granitz and Klein (1996), "by shifting its refinery shipments among railroads to stabilize individual railroad market shares at collusively agreed-on levels. This method of cartel policing was effective because Standard possessed a dominant share of refining, a dominance made possible with the assistance of the railroads. The railroads facilitated Standard's refinery acquisitions and prevented new refiner entry by charging disadvantageously high rates to non-Standard refiners."

The Supreme Court decided that Standard Oil violated the Sherman Act and ordered it broken up into several smaller companies. The following graphs and regressions follow the same methodology used in Part III.

Exhibit 11. Petroleum Industry, Capital, Graph

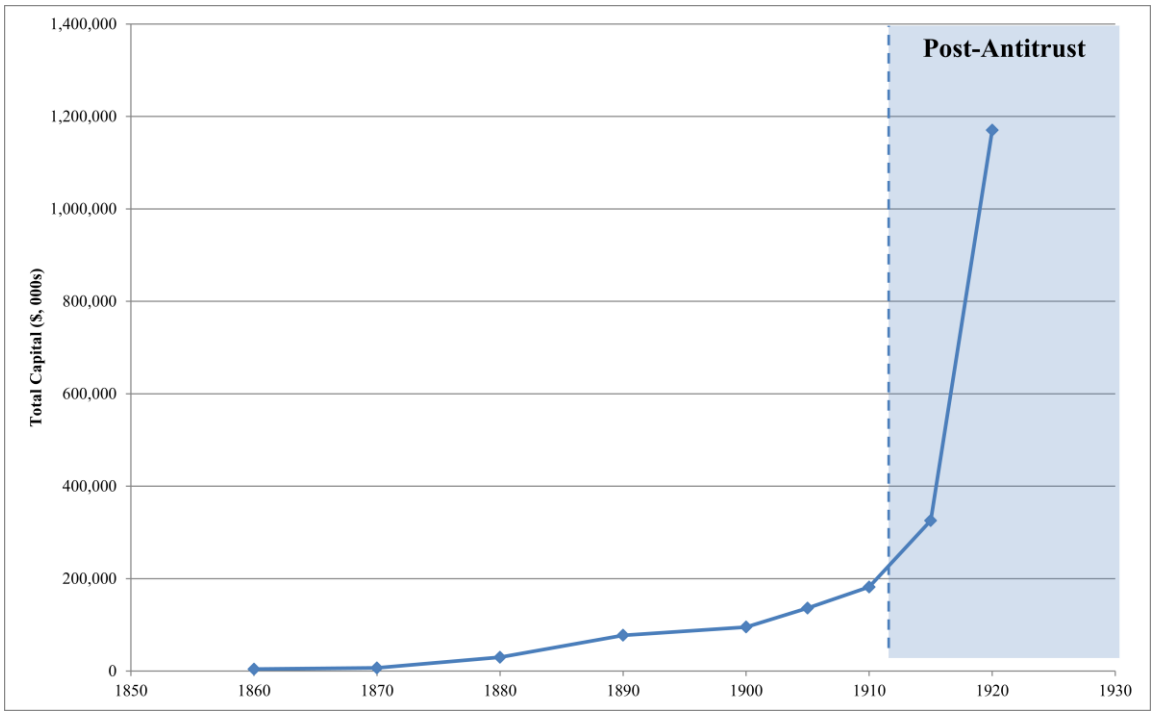

Exhibit 12. Petroleum Industry, Capital, Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-47576.13	28178.79	-1.688	0.152
TIME	-61123.08	11191.21	-5.462	0.003
GDP	17084.79	1163.18	14.688	0.000
ANTITRUST_DUMMY_1911	61257.37	52072.51	1.176	0.292

R-squared	0.993	Mean dependent var	225314.3
Adjusted R-squared	0.989	S.D. dependent var	368510.6
S.E. of regression	39402.21	Akaike info criterion	24.302
Sum squared resid	7.76E+09	Schwarz criterion	24.390
Log likelihood	-105.360	Hannan-Quinn criter.	24.113
F-statistic	231.587	Durbin-Watson stat	1.090
Prob(F-statistic)	0.000		

The antitrust dummy is statistically insignificant, but the coefficient is strongly positive. We cannot therefore conclude that the antitrust action increased the total capital in the petroleum

industry, but we can conclude that it did not decrease capital, suggesting it did not impede growth or efficiency.

Exhibit 13: Petroleum Industry, Number of Establishments, Graph

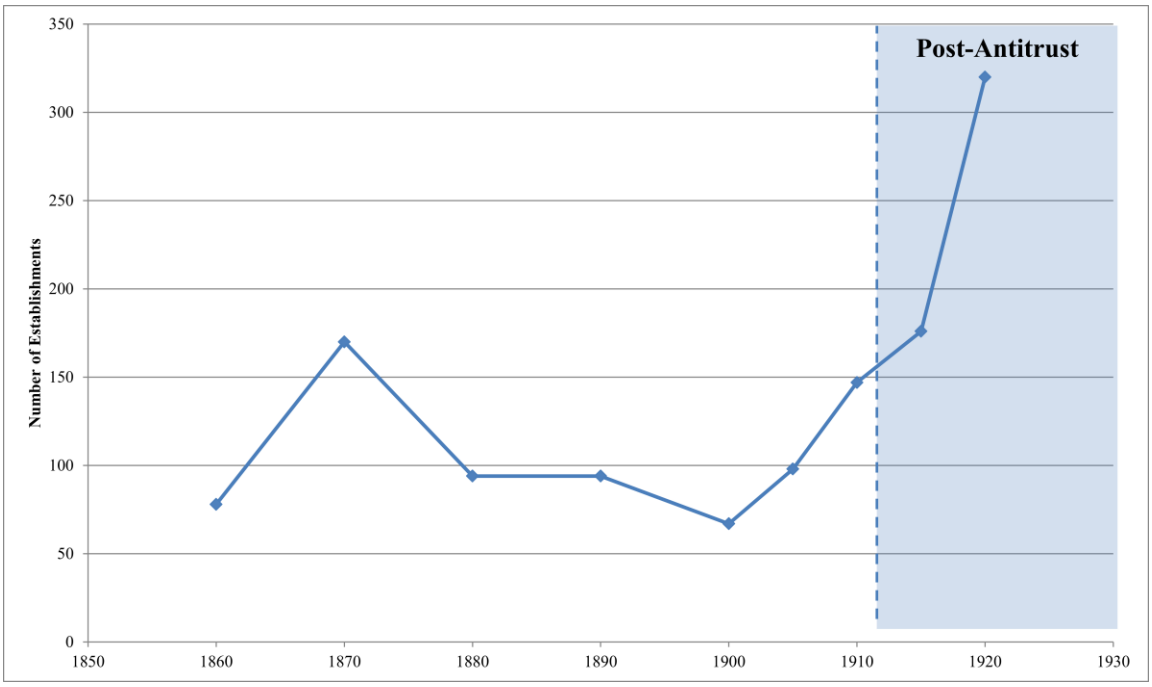

Exhibit 14: Petroleum Industry, Number of Establishments, Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	102.019	26.941	3.787	0.013
TIME	-17.926	10.699	-1.675	0.155
GDP	3.185	1.112	2.864	0.035
ANTITRUST_DUMMY_1911	46.659	49.784	0.937	0.392

R-squared	0.857	Mean dependent var	138.222
Adjusted R-squared	0.772	S.D. dependent var	78.887
S.E. of regression	37.671	Akaike info criterion	10.397
Sum squared resid	7095.431	Schwarz criterion	10.484
Log likelihood	-42.785	Hannan-Quinn criter.	10.208
F-statistic	10.028	Durbin-Watson stat	2.498
Prob(F-statistic)	0.015		

The antitrust dummy is statistically insignificant, but the coefficient is strongly positive. We cannot therefore conclude that the antitrust action increased the number of establishments in the

petroleum industry, but we can conclude that it did not decrease establishments, indicating it had no negative effect on competition (and as a result, reducing the odds that the trust was efficient).

Exhibit 15: Petroleum Industry, Employment, Graph

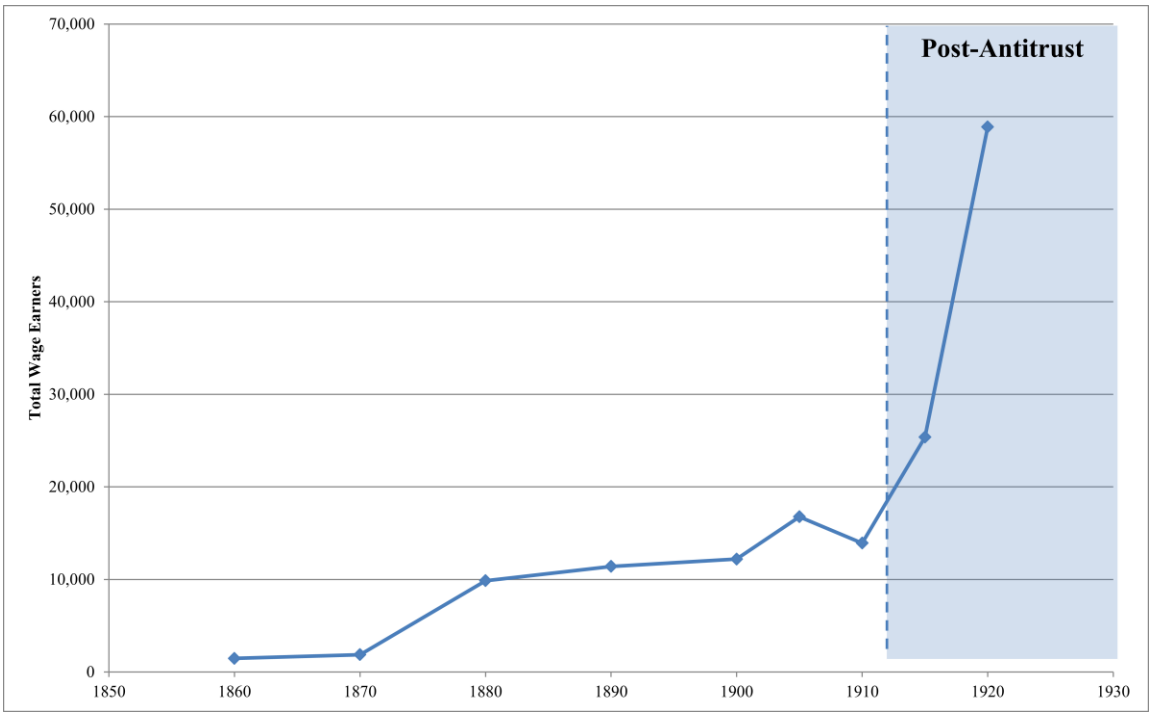

Exhibit 16: Petroleum Industry, Employment, Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	370.903	2560.470	0.144857	0.891
TIME	-625.813	1016.891	-0.615418	0.565
GDP	640.585	105.6929	6.060814	0.002
ANTITRUST_DUMMY_1911	4645.845	4731.577	0.981881	0.371

R-squared	0.973	Mean dependent var	16863.11
Adjusted R-squared	0.957	S.D. dependent var	17353.77
S.E. of regression	3580.287	Akaike info criterion	19.505
Sum squared resid	64092284	Schwarz criterion	19.593
Log likelihood	-83.774	Hannan-Quinn criter.	19.316
F-statistic	60.983	Durbin-Watson stat	1.595
Prob(F-statistic)	0.000		

The antitrust dummy is statistically insignificant, but the coefficient is strongly positive. We cannot therefore conclude that the antitrust action increased employment in the petroleum industry, but we can conclude that it did not decrease employment.

Exhibit 17: Petroleum Industry, Profit Margin, Graph

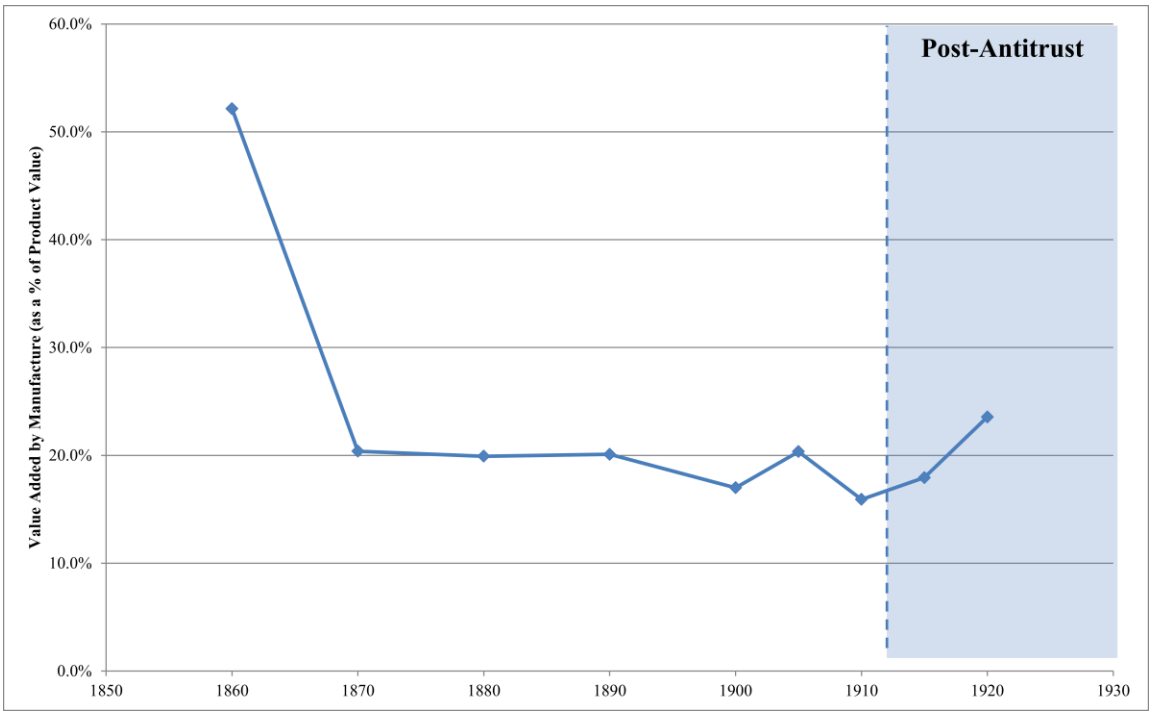

Exhibit 18: Petroleum Industry, Profit Margin, Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.370	0.066	5.574	0.003
TIME	-0.063	0.026	-2.374	0.064
GDP	0.002	0.003	0.874	0.422
ANTITRUST_DUMMY_1911	0.045	0.123	0.368	0.728

R-squared	0.565	Mean dependent var	0.230
Adjusted R-squared	0.305	S.D. dependent var	0.111
S.E. of regression	0.093	Akaike info criterion	-1.615
Sum squared resid	0.043	Schwarz criterion	-1.528
Log likelihood	11.269	Hannan-Quinn criter.	-1.804
F-statistic	2.168	Durbin-Watson stat	1.820
Prob(F-statistic)	0.210		

The antitrust dummy is statistically insignificant, but the coefficient is positive, again suggesting no beneficial effect on profit margins.

Exhibit 19: Petroleum Industry, Revenue, Graph

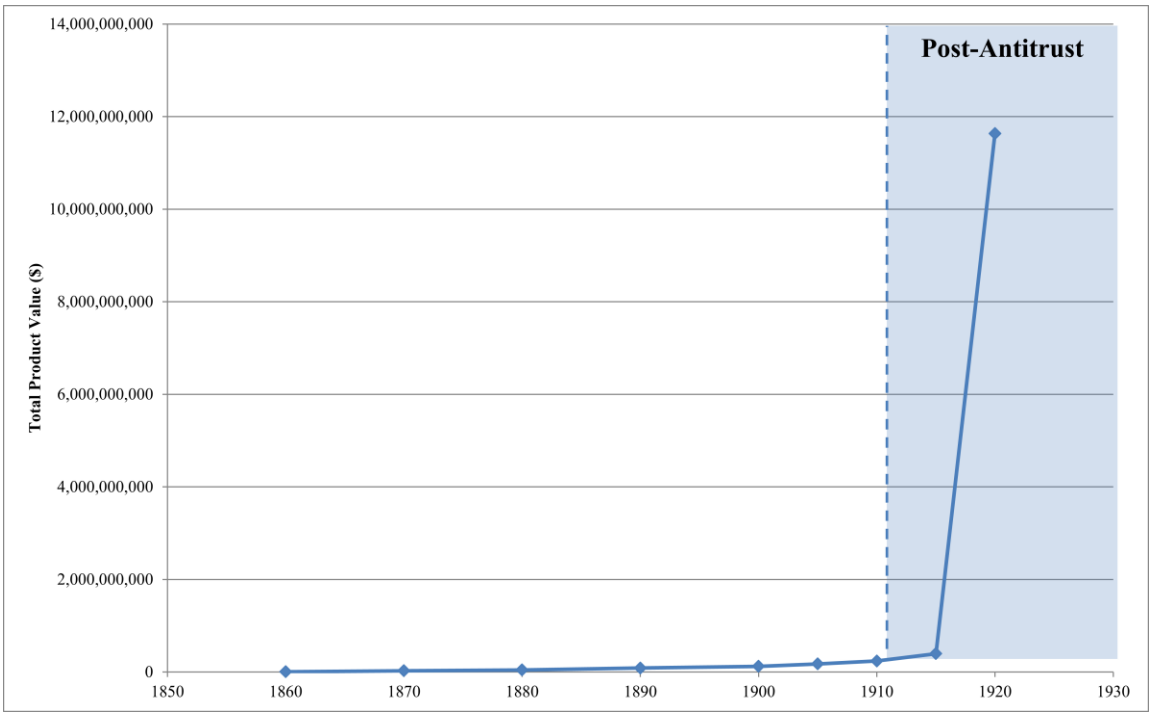

Exhibit 20: Petroleum Industry, Revenue, Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.93E+08	5.31E+08	-0.739	0.493
TIME	-1.23E+09	2.11E+08	-5.837	0.002
GDP	2.28E+08	21937574	10.40	0.000
ANTITRUST_DUMMY_1911	-1.01E+09	9.82E+08	-1.029	0.351

R-squared	0.977	Mean dependent var	1.41E+09
Adjusted R-squared	0.962	S.D. dependent var	3.83E+09
S.E. of regression	7.43E+08	Akaike info criterion	43.992
Sum squared resid	2.76E+18	Schwarz criterion	44.079
Log likelihood	-193.963	Hannan-Quinn criter.	43.803
F-statistic	69.311	Durbin-Watson stat	1.037
Prob(F-statistic)	0.000		

The antitrust dummy is statistically significant, but the coefficient is negative. We cannot therefore conclude that the antitrust action decreased revenue, but we can conclude that it did not increase revenue, suggesting little, if any, beneficial effect on growth and efficiency.

V. United States v. American Tobacco Co.

Like Standard Oil, the Supreme Court decided that American Tobacco was an illegal monopoly and ordered it divided into smaller firms. From its creation in 1890 to its breakup in 1911, American Tobacco acquired over 200 competitors, most notably the Lucky Strike Company. By 1896, it had become so large that it was named one of the twelve original members of the Dow Jones Industrial Average. (Porter 1969) Similar to *Chesapeake*, the Supreme Court decided that the broad prohibitions of the Sherman Act barred the sheer size of American Tobacco, let alone any restrictive practices in which it may have engaged:[4]

> The public policy manifested by the Anti-Trust Act is expressed in such general language that it embraces every conceivable act which can possibly come within the spirit of its prohibitions, and that policy cannot be frustrated by resort to disguise or subterfuge of any kind. The record in this case discloses a combination on the part of the defendants with the purpose of acquiring dominion and control of interstate commerce in tobacco by methods and manners clearly within the prohibition of the Anti-Trust Act, and the subject matters of the combination and the combination itself are not excluded from the scope of the act as being matters of intrastate commerce and subject to state control. In this case the combination in all its aspects, both as to stock ownership and as to the corporations independently, including foreign corporations to the extent that they became cooperators in the combination, come within the prohibition of the first and second sections of the Anti-Trust Act.

Again, the graphs and regressions follow the same methodology used in Part III.

[4] This interpretation was narrowed by subsequent antitrust legislation.

Exhibit 21. Tobacco Industry, Capital, Graph

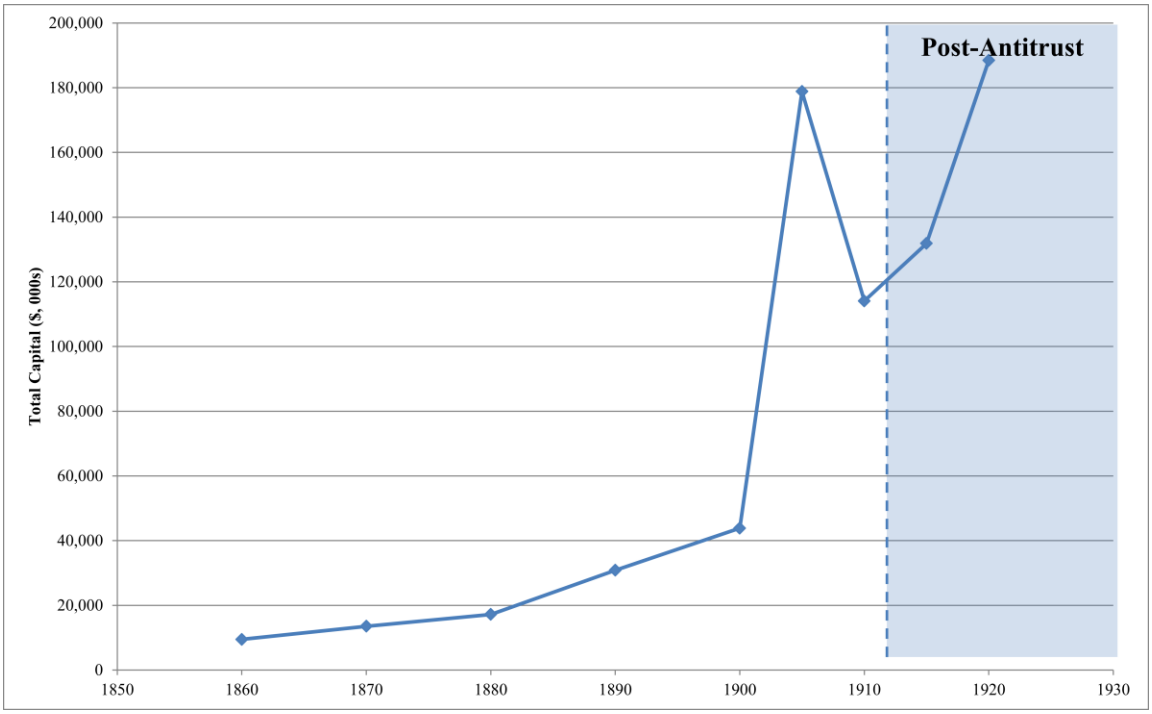

Exhibit 22. Tobacco Industry, Capital, Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-17039.86	30077.15	-0.567	0.596
TIME	18770.81	11945.14	1.571	0.177
GDP	1338.44	1241.55	1.078	0.330
ANTITRUST_DUMMY_1911	-15799.37	55580.56	-0.284	0.788

R-squared	0.792	Mean dependent var	80909.89
Adjusted R-squared	0.666	S.D. dependent var	72823.70
S.E. of regression	42056.68	Akaike info criterion	24.433
Sum squared resid	8.84E+09	Schwarz criterion	24.520
Log likelihood	-105.946	Hannan-Quinn criter.	24.243
F-statistic	6.329	Durbin-Watson stat	2.406
Prob(F-statistic)	0.037		

The antitrust dummy is statistically insignificant, but its coefficient is strongly negative. We cannot therefore conclude that the antitrust action decreased total capital in the tobacco industry, but we can conclude that it did not increase capital. Its effect on growth and efficiency is thus ambiguous.

Exhibit 23: Tobacco Industry, Number of Establishments, Graph

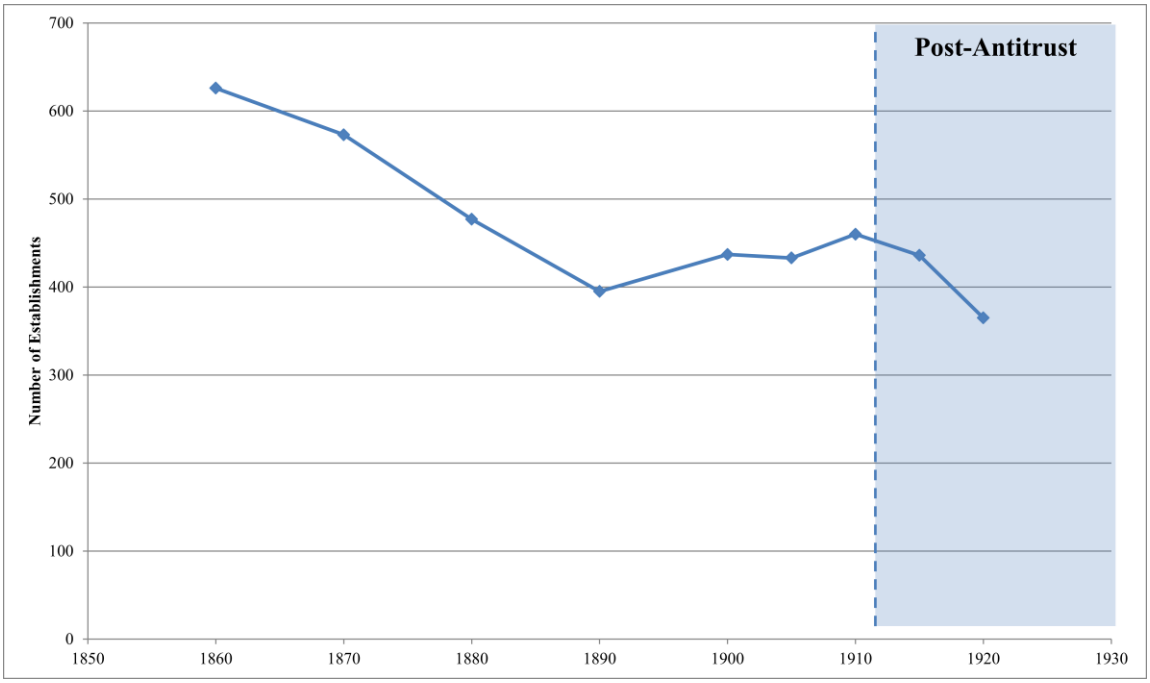

Exhibit 24: Tobacco Industry, Number of Establishments, Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	589.5268	38.59455	15.27487	0.0000
TIME	-34.50851	15.32782	-2.251364	0.0742
GDP	-0.438338	1.593133	-0.275142	0.7942
ANTITRUST_DUMMY_1911	37.25351	71.32013	0.522342	0.6237

R-squared	0.736536	Mean dependent var	466.8889
Adjusted R-squared	0.578457	S.D. dependent var	83.11956
S.E. of regression	53.96649	Akaike info criterion	11.11571
Sum squared resid	14561.91	Schwarz criterion	11.20336
Log likelihood	-46.02068	Hannan-Quinn criter.	10.92655
F-statistic	4.659300	Durbin-Watson stat	1.195161
Prob(F-statistic)	0.065359		

The antitrust dummy is statistically insignificant, but its coefficient is strongly positive. We cannot therefore conclude that antitrust action increase the number of establishments in the tobacco industry, but we can conclude that it did not decrease establishments, indicating it was not harmful to competition.

Exhibit 25: Tobacco Industry, Employment, Graph

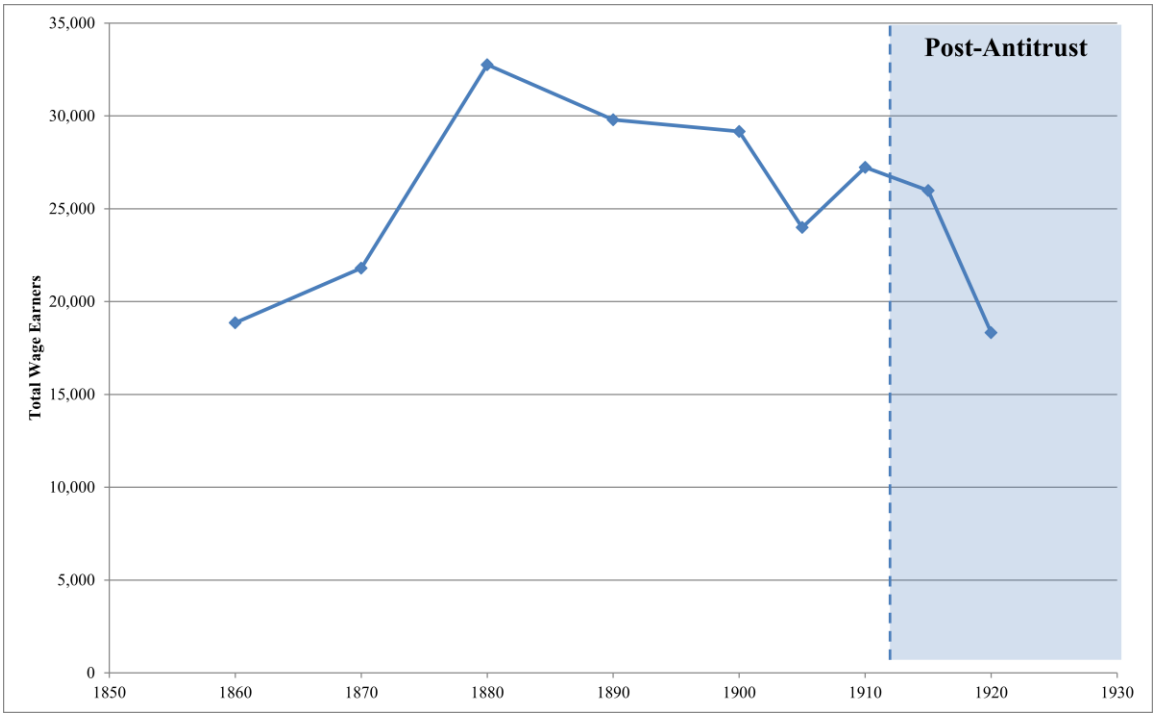

Exhibit 26: Tobacco Industry, Employment, Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	23039.84	3022.925	7.622	0.001
TIME	2510.49	1200.555	2.091	0.091
GDP	-221.33	124.783	-1.774	0.136
ANTITRUST_DUMMY_1911	-1257.38	5586.163	-0.225	0.831

R-squared	0.551	Mean dependent var	25321.22
Adjusted R-squared	0.282	S.D. dependent var	4987.165
S.E. of regression	4226.936	Akaike info criterion	19.837
Sum squared resid	89334922	Schwarz criterion	19.9251
Log likelihood	-85.269	Hannan-Quinn criter.	19.648
F-statistic	2.0455	Durbin-Watson stat	1.579
Prob(F-statistic)	0.226		

The antitrust dummy is statistically insignificant, but its coefficient is strongly negative. We cannot therefore conclude that antitrust action decreased employment in the tobacco industry, but we can conclude that it did not increase employment. Its effect on employment, regarding the claims of Shughart and Tollison (1991), is thus ambiguous.

Exhibit 27: Tobacco Industry, Profit Margin, Graph

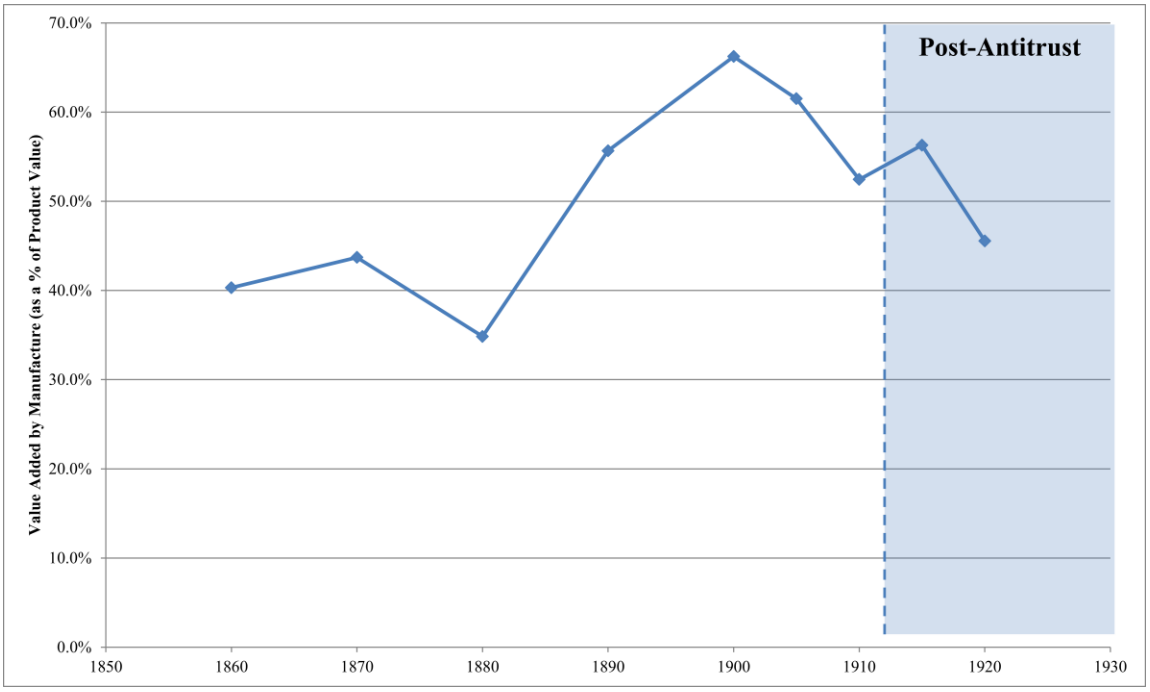

Exhibit 28: Tobacco Industry, Profit Margin, Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.383	0.059	6.537	0.001
TIME	0.063	0.023	2.699	0.043
GDP	-0.003	0.002	-1.223	0.276
ANTITRUST_DUMMY_1911	-0.046	0.108	-0.426	0.688

R-squared	0.607	Mean dependent var	0.507
Adjusted R-squared	0.371	S.D. dependent var	0.103
S.E. of regression	0.0819	Akaike info criterion	-1.866
Sum squared resid	0.0335	Schwarz criterion	-1.778
Log likelihood	12.398	Hannan-Quinn criter.	-2.055
F-statistic	2.572	Durbin-Watson stat	2.071
Prob(F-statistic)	0.167		

The antitrust dummy is statistically insignificant, but its coefficient is negative. We cannot therefore conclude that antitrust action decreased profit margins, but we can conclude that it did not increase profit margins. Its effect on prices via profit margins was thus not harmful and possibly beneficial.

Exhibit 29: Tobacco Industry, Revenue, Graph

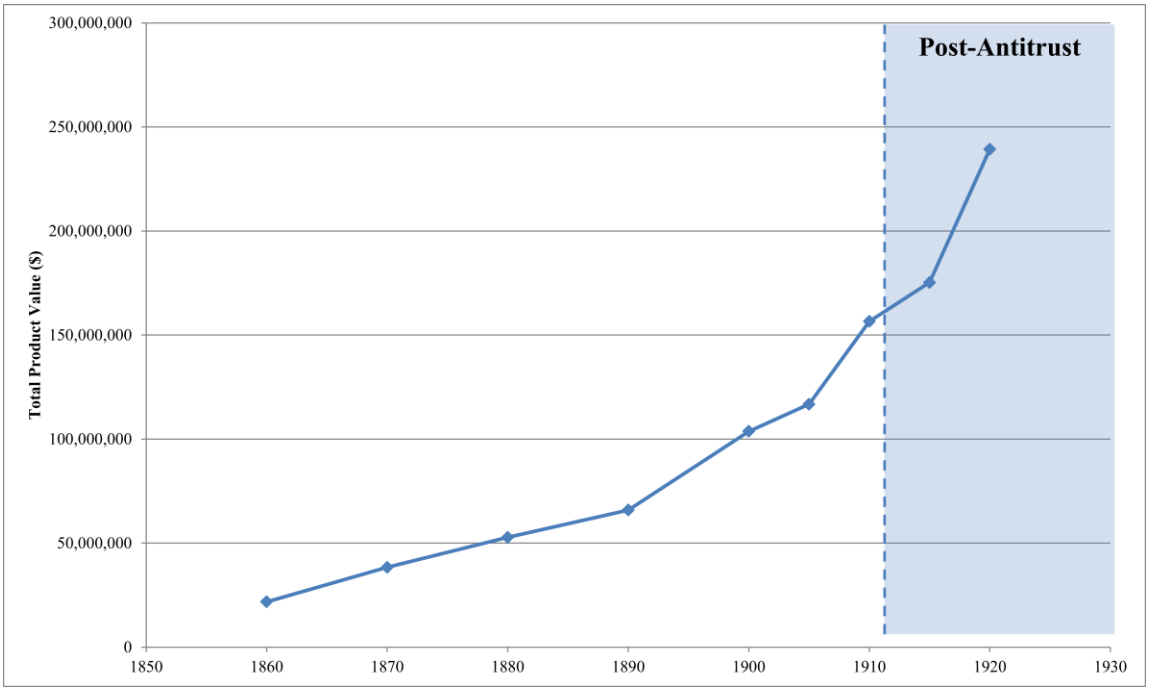

Exhibit 30: Tobacco Industry, Revenue, Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8998241	8435006	1.067	0.335
TIME	17696227	3349962	5.283	0.003
GDP	1229252	348186	3.530	0.017
ANTITRUST_DUMMY_1911	18405365	15587325	1.181	0.291

R-squared	0.983	Mean dependent var	1.08E+08
Adjusted R-squared	0.973	S.D. dependent var	71856650
S.E. of regression	11795	Akaike info criterion	35.705
Sum squared resid	6.96E+14	Schwarz criterion	35.793
Log likelihood	-156.674	Hannan-Quinn criter.	35.516
F-statistic	97.311	Durbin-Watson stat	1.865
Prob(F-statistic)	0.000		

The antitrust dummy is statistically insignificant, but its coefficient is strongly positive. We cannot therefore conclude that antitrust action increased revenue in the tobacco industry, but we can conclude that it did not decrease revenue, suggesting a beneficial effect on efficiency.

VI. Conclusions and Implications

Before comparing findings across cases, a few caveats must be stated. None of the antitrust dummies were statistically significant, so these conclusions are phrased so as to indicate that the regressions do not prove correlation (or causation)—though they do discredit some claims made by other authors, as indicated in Part II. The R-squared variables are very high, suggesting the models explain most of the data, though the high selection criteria indicate its ability to predict out-of-sample data may be poor; the corollary is that other exogenous independent variables do in fact affect these dependent variables, but the models in question are comparable and sufficient to draw some temperate conclusions. The Durbin-Watson statistics are mostly close to 2, so cyclicality and serial correlation are not causes for concerns. The F-statistics also confirm that the full model is statistically significant, which brings us to the final statistical point: Despite having low t-statistics, the coefficients are the result of a least-squares estimate and therefore represent the maximum likelihood estimate of each variable's respective contribution to the dependent variable in question. This paper will use these coefficients as such, not to construe them as proof of correlation (as indicated above) but rather to suggest the probable direction of correlation or lack thereof.

In two of the three cases, the antitrust coefficient for capital was positive, so we can conclude that antitrust action more often did not decrease capital, suggesting on balance it did not impede growth or efficiency. In two of the three cases, the antitrust coefficient for the number of establishments was positive, so we can conclude the antitrust action more often did not decrease establishments, suggesting on balance it did not hinder growth or competition. In two of the three cases, the antitrust coefficient for employment was positive, so we can conclude that antitrust action more often did not impede employment growth. In two of three cases, the antitrust

coefficient for profit margins was positive, so we can conclude that antitrust action more often did not decrease profit margins, suggesting on balance its effect on prices was either negligible or caused via output. In two of three cases, the antitrust coefficient for revenue was negative, so we can conclude that antitrust action more often did not increase revenue, suggesting on balance the industry growth did not translate into higher sales, probably due to lower prices.

These data suggest there is much more to the story than the study by Delorme, et al. (1997). They also indicate the employment claims by Shughart and Tollison (1991) do not stand up to a close inspection and are probably more a result of various exogenous variables or reverse causation. They furthermore give little credence to the efficiency concerns of Bittlingmayer (1985). The effects of antitrust actions are, of course, complicated and deserve further analyses along these lines; hopefully this paper paves the way for such research.

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