Volume Title: Corruption and Reform: Lessons from America's
Economic History

Volume Author/Editor: Edward L. Glaeser and Claudia Goldin,
editors

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-29957-0

Volume URL: http://www.nber.org/books/glae06-1

Conference Date: July 30-31, 2004

Publication Date: March 2006

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URL: http://www.nber.org/chapters/c9988

The Irony of Reform
Did Large Employers Subvert Workplace Safety Reform, 1869 to 1930?

Price V. Fishback

Workplace safety was a centerpiece of Progressive Era reforms. Between 1869 and the early 1900s state governments established safety regulations for mines and factories and reformed the liability for workplace accidents. In the 1910s nearly all state governments adopted workers' compensation laws that changed the employers' liability for workplace accidents from common law negligence liability to a form of strict liability. The safety reformers' stated aims were to reduce the risk faced by workers and ensure that the families of workers injured or killed in accidents received reasonable medical care and compensation for lost earnings. Yet large employers often wielded significant clout in state government during this period and likely worked to shape the legislation to aid their own interests. This paper explores the extent to which large employers, measured by average number of employees, subverted the safety reform process, including the adoption of safety legislation, its scope, and the resources devoted to enforcement of the laws.

Defining subversion is a controversial issue, and scholars have different opinions on the scope of what should be considered subversion. In their discussion of the rise of the regulatory state, Glaeser and Shleifer (2003, p. 402) suggest that "subversion" can be defined as a series of legal or illegal strategies that powerful interests might follow to weaken the impact of regulations or shape the rules to their benefit.

The legal ones include acquiring favorable legislation and regulation (even after an accident), lobbying for an appointment of friendly law enforcers (including both judges and regulators), hiring top lawyers, or us-

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ing delay tactics in case of a suit. Illegal subversion strategies include intimidating and bribing judges, regulators, or juries.

Their definition covers a broad range of activity, so it is useful to divide subversion into subcategories. The pressure for favorable legislation and regulation and lobbying for friendly enforcers might well be considered lobbying or "rent-seeking" behavior that would be followed by any interest group. Success in such lobbying has been described as "capture" of the legislature or the regulator in various studies.[1] Although unions and others might capture the legislature or the regulator, most discussions of capture examine ironic situations where the target of the regulation, the employer in this case, controls the process. The hiring of top lawyers and the legal use of delay tactics in suits or administrative hearings could be more narrowly defined as "gamesmanship," while the illegal practices are pure "corruption."

The workplace safety laws were the result of the conflicts and compromises that arose from the interest group struggles between reformers and employers, and large employers played a central role in the process. Reformers sought to impose the workplace safety changes on large employers because they saw the increased mechanization in their workplaces as a source of increased risk and they feared that large firms were wielding too much power over the existing system. Large employers might have followed two different strategies that would have subverted the reformers' goals: work to shape new laws in such a way to raise their rivals' costs, or follow a defensive strategy at every turn.

I follow a two-pronged approach to examining how large employers influenced the safety laws. First, I analyze the variation across states and time to establish the relationship between the average number of employees per establishment and the extent of regulation. A finding that large employers were associated with earlier adoption of regulation, more breadth of regulation, and more resources devoted to enforcement is consistent with either reformers imposing regulations on large firms or large firms' raising rivals' costs. Had large employers followed a defensive strategy, we would expect them to be associated with slower adoption, limited breadth, and fewer resources devoted to enforcement. Second, I supplement the quantitative analysis with analytical narratives that describe in more depth the extent to which employers shaped the legislation and the actual enforcement of the laws in various states. The results show that there is no single coherent story that can be told about all industries. In coal mining large employers followed a defensive strategy, limiting the breadth of regulation, pressing for regulations that were enforced more against workers than against em-

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1. Becker (1983), Stigler (1971), Pelzman (1976), and Buchanan, Tollison, and Tullock (1980) discuss how interest groups might capture the legislative process. Once the rules are in place we might also see both capture and corruption of the regulatory process (Kolko 1963, 1965).

ployers and managers, and weakening the enforcement of the laws. In manufacturing, on the other hand, safety regulations were introduced earlier in states with larger average establishment sizes. This finding suggests that reformers may have succeeded in imposing regulations on large manufacturing employers. However, the finding is also consistent with large firms working to raise rivals' costs. Analytical narratives suggest that manufacturing employers at times shaped the legislation to their benefit and that the regulations were often poorly enforced.

9.1   Large Firms and Regulation

Progressive Era social reformers, workers, and unions called for safety regulations as a means to resolve "market failures." They perceived that expansions in the use of machinery and increases in the pace of work, typically in large firms, increased the dangers that workers faced. They argued that employers profited by skimping on safeguards, that labor markets provided inadequate wages to compensate workers for workplace dangers, and that insurance and the legal system were designed, both in theory and even more so in practice, to limit payments to injured workers. They anticipated that the reforms they proposed would contribute to better workplace safety and increase the actual payments received by injured workers. These changes would leave workers better off because wages would not fully adjust downward.[2]

A number of Progressive leaders, including Woodrow Wilson, saw regulation as a means of curbing the worst excesses from the expansion of large firms. Using the reformers' claims as a guide, Glaeser and Shleifer (2003) built an elegant formal model that examines optimal accident prevention in a situation where amoral firms are willing to subvert the existing regulatory system when the benefits of subversion exceed the costs.[3] A set of rules that might be optimal in the absence of subversion could be suboptimal if firms have incentives to subvert the system. The rules under negligence liability in the late 1900s called for full compensation of the injured worker if the worker could show in court that the employer had not exercised due care. As employers increased the number of workers, the potential for large-scale accidents and thus the stakes for court decisions on liability rose accordingly. Even accidents with only a single accident victim could lead to high stakes for a larger firm because a negligence decision that went

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2. Fishback and Kantor (1995, 2000) find that when workers' compensation was introduced union members actually did not experience wage cuts that offset improvements in postaccident payments, while nonunion workers experienced reductions to varying degrees. Even nonunion workers who experienced reductions saw improvements in their welfare because they were better insured against accidents.

3. For discussions of optimal design of regulation and liability, see Landes and Posner (1987), Shavell (1987), Polinsky and Shavell (2000), and Glaeser and Shleifer (2003).

against the employer might set a precedent that raised the probability that the employer would lose in later cases. The greater stakes for large employers increased the benefit to the employer of subverting the process. By introducing safety regulations, which imposed smaller penalties prior to accidents for failure to follow established procedures, and workers' compensation, which called for workers to receive two-thirds or less of their lost earnings, the stakes of regulatory decisions were lowered.[4] Large employers had less incentive to subvert the process than before, so that regulations and workers' compensation might have worked better than negligence liability with no regulation.

The relationships described by these reform hypotheses suggest that reformers in states with larger employers would have anticipated greater benefits from regulation and thus pressed harder. If reformers imposed the regulations on larger employers, states with larger firms would have adopted regulations earlier and been more likely to have had a broader set of regulations. The impact of large firms on state decisions about enforcement resources is less clear. Reformers intent on making sure that the regulations were followed by large firms typically demanded more resources per worker for enforcement. But there may have been countervailing effects that would have weakened this demand. If the cost of inspection included a substantial fixed cost for visiting an establishment plus a cost per worker in the establishment, states with larger establishments could have reached the same level of enforcement as states with smaller establishments with a smaller budget per worker. This potential lower enforcement cost per worker might have offset the reformers' greater demand for enforcement resources in states with larger employers.

Reformers, however, were not the only groups determining safety legislation. The laws were forged through the interplay of interest group struggles, coalition formation, and compromise in state governments between 1869 and 1930. Large employers, in particular, wielded significant political clout.[5] Not only did they have more funds to lobby legislators and finance

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4. The stakes involved in many decisions were lower under workers' compensation than under negligence liability. Under negligence liability the stakes in each decision were high because each involved an all-or-nothing decision about fault. In contrast, most workers' compensation disputes arose over the extent of the injury and measures of the workers' wage in determining the appropriate values to plug into the state's formula for compensation. The remaining decisions, however, were all-or-nothing decisions with far-reaching consequences for workers' compensation policy. Decisions on what constituted a work-related injury and opinions on whether the employer was willfully negligent (which removed the restrictions on compensation) established the boundaries of workers' compensation and were similar in scope to the stakes in a major negligence case. Given the large number of settlements under negligence liability, the annual number of these boundary decisions may have been similar to the number of negligence cases that were actually decided by the courts.

5. For studies of the roles played by major employers during the Progressive Era, see, for example, Wiebe (1962), Weinstein (1967), Lubove (1967), Moss (1996), Graebner (1976), Aldrich (1997), and Fishback and Kantor (2000).

political campaigns, but large firms employed large proportions of workforce. In 1909 establishments with over 500 workers employed up to 58 percent of manufacturing workers in some states (24 to 28 percent nationwide) despite accounting for less than 2 percent of all establishments. To the extent that employers could influence their workers' votes, they could deliver a substantial part of the electorate. Thus, government officials faced lower political organizing costs in dealing with a few large firms than in negotiating with groupings of small firms.

As large employers sought legislation favorable to their own interests, they would have followed one of two paths consistent with the broad definition of subversion: a defensive strategy of obstructionism against the demands of reformers or attempts to adopt and design regulations to raise rivals' costs. In following the defensive strategy employers would have prevented or slowed the adoption of safety legislation by pressuring legislators to kill the bills in committee or on the legislative floor. If that failed, they would have worked to limit the scope of the legislation through amendments or compromise proposals, while removing the teeth of the regulation by providing inadequate funds for enforcement. If legislation were enacted, employers would have sought to weaken it further by controlling regulators and actively fighting fines in court. If larger employers adopted a full-scale defensive strategy, states with larger employers would have adopted the regulations later, chosen regulations with less breadth, and provided fewer resources for enforcement.

Large employers might have adopted an alternative strategy to press for regulations that raised their rivals' costs.[6] By lobbying for regulations that codified their own practices they could have raised rivals' costs and not their own by forcing other employers to switch practices. To the extent that there were economies of scale or high fixed costs to compliance, the average costs of complying were larger for smaller firms. States with larger firms therefore would have been more likely to press for earlier adoption, an expanded scope of regulations, and more resources for enforcement to insure that the other firms were forced to comply. The attempt to raise rivals' costs might have benefited only large firms at the expense of other firms and workers. On the other hand, large employers would have found the political sledding smoother if their proposals had meant an improvement in the welfare of workers at the firms that had to change to comply with the new regulations. Large employers were more likely to pay higher wages, offer better benefits, provide model housing and towns, and provide safer workplaces (Jacoby 1997, chap. 1; Fishback 1992, chap. 9; Brandes 1970). Regulations raising safety standards with only limited loss in em-

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6. Ann Bartel and Lacy Glenn Thomas (1985) claim that the Occupational Safety and Health Administration's (OSHA) persistence despite relatively little measured impact on accident rates since 1971 is the result of lobbying by large and unionized employers.

ployment would have led reformers, workers in smaller firms, and unions to become willing members in a coalition with large firms to lobby for the new legislation.

9.2   Workplace Safety Regulation and Liability Reform, 1869–1930

Just after the Civil War the government's role in workplace safety was largely confined to adjudicating disputes over injury claims in the common law courts. Over the next several decades, the structure of common-law workplace accident compensation evolved through a series of court decisions.[7] Under the full-blown liability system in the late nineteenth century, workplace accident compensation was based on common law rules of negligence combined with the defenses of assumption of risk, fellow-servant, and contributory negligence. If a worker was injured on the job, he bore the burden of proving that his employer had failed to exercise due care in preventing the accident and that the employer's negligence was the proximate cause of the injury. Judge Learned Hand once described due care as requiring the employer to prevent accidents when his costs of accident prevention were lower than the expected costs of the accident. If an injured worker was able to show his employer's negligence, then he was theoretically entitled to compensation up to the amount of his financial losses from the accident (lost wages and medical expenses) plus remuneration for "pain and suffering." Even if the employer was found negligent he might not be liable if he could invoke any of three defenses: that the employee had assumed the risks associated with the employment (assumption of risk); that a coworker (fellow servant) had caused the accident; or that the worker himself was negligent or had not exercised due care (contributory negligence).[8] The studies of accident causes in the late 1890s and early 1900s often suggested that worker fault was the cause of a very large percentage of the accidents, so court rulings of no compensation were likely in a large number of cases.

Lawrence Friedman (1985, pp. 300–301) argues that the system developed to encourage industrial enterprise; the courts knew that imposing strict liability on industrial enterprises would have stunted the growth of industry.[9] Employers likely had a hand in the development of the system as

7. For discussions of the early evolution of the common law of workplace accident compensation cases, see Tomlins (1988 and 1993, chap. 10). The basic principles for liability would continue to evolve into the early 1900s. See Friedman (1985), Friedman and Ladinsky (1967), and Fishback and Kantor (2000, chap. 2).

8. See Posner (1972, p. 32), Landes and Posner (1987), and Fishback and Kantor (2000, pp. 30–33).

9. Gary Schwartz (1981) challenges this "industry subsidy" view with an ample number of exceptions from his analysis of cases in California and New Hampshire. Numerous economic analyses have suggested that negligence liability combined with the three defenses can be an optimal accident prevention system in theory under specific conditions. See Landes and Posner (1987), Glaeser and Shleifer (2003), Shavell (1987).

they defended themselves against negligence suits and lobbied elected officials in the selection of judges. In examining the actual operations of the system, Shawn Kantor and I (2000) found little or no documented evidence that bribery of judges and juries was a significant problem in negligence liability cases.[10]

On the other hand, the high costs of going to court might have contributed to significant gamesmanship in settlement negotiations. Empirical studies suggest that under the de facto system the legal rules provided a baseline guide as to what to expect when people went to court. The compensation in settlements was loosely correlated with the de jure rules, but there was a great deal of noise in the system. The fear of delay, of gamesmanship by the employer or the insurer, and the workers' own high costs of going to court (25 to 40 percent of the compensation in contingency fees plus emotional costs) might have prevented some workers with legitimate claims from receiving compensation. In the samples of settlements collected by various state employer liability commissions, few families received payments that might match the present value of a lifetime stream of earnings. On the other hand, some workers with more generous employers, with employers seeking to avoid the nuisance of a suit, or with better access to legal advice might well have fared better than the expected payments under the highly restrictive de jure rules (Fishback and Kantor 2000). The views of accident causation evolved away from blaming the worker in the early 1900s with the publication of Crystal Eastman's *Work Accidents and the Law.* Had workers' compensation not been adopted, it is probable that more workers would have received compensation after Eastman's findings had become widespread.

If there was gamesmanship and subversion of the negligence liability system, it might well have been practiced more by the middlemen than by the employer. In nearly every state liability commission report, employers and workers complained of the large transactions costs in the system. Lawrence Friedman (1985, p. 484) summarizes these claims: the system "siphoned millions of dollars into the hands of lawyers, court systems, administrators, insurers, claims adjusters. Companies spent and spent, yet not enough of the dollars flowed to injured workmen." We have no way of knowing how much of the transactions costs were devoted to gamesmanship, but the primary beneficiaries of the negligence system may well have been the trial attorneys, an interest group that opposed workers' compensation in some states.

10. To develop a sense of the publicity of judicial bribery just prior to the introduction of workers' compensation I created a sample of corrupt events using the ProQuest search engine on the *New York Times* index for the period 1900 to 1910 using the word combination "judge" and "bribe." The search unearthed five episodes where judges had reported to the press on attempts to bribe them but there was no evidence that they had accepted the bribe. In seven cases the judges were charged with and sometimes convicted of bribery or corruption, but only two could be related to workplaces.

9.2.1 Coal Safety Regulations

As the negligence system evolved, states began to supplement it with direct regulation soon after the Civil War. The first industry to be widely regulated was coal mining, among the most dangerous industries of the era. Pennsylvania led the way in adopting coal mining regulations in 1869 for anthracite mines. The states with significant bituminous coal production introduced regulations between 1872 and 1912 in the order presented in Table 9.1.[11] Federal involvement began with the formation of the Bureau of Mines in 1911, but the agency was informational and did not obtain coercive powers until 1941 (Graebner 1976).

As a rough guide to some of the correlates of the adoption of the law, table 9.1 includes information on workers per mine, the number of coal workers, and the number of coal union chapters as of 1880. Simple correlations suggest that states with larger mines tended to adopt earlier. The correlation between average mine size in 1880 and the year of adoption is –0.4. The simple correlation seems to be inconsistent with the defensive hypothesis, while being consistent with the reform and raising-rivals'-costs views of large firms. However, there were other important factors influencing the timing of adoption. For example, unionization and the overall size of industry in 1880 were also negatively correlated with the year of adoption; the simple correlations are –0.55 and –0.49, respectively. The multivariate analysis that follows isolates the impact of each, holding the other factors constant.

The early regulations were rudimentary and were focused on mapping the mines, providing appropriate ventilation, and preventing explosions. Often they were targeted at smaller operations where the operators' knowledge of customary safety practices was likely to be more limited. As the technology of mining improved with the introduction of cutting machines, electricity, and mechanical motors, the regulations expanded, particularly after 1900. To capture the major changes after 1900, I develop a mine regulation index that counts the number of regulations that the states had adopted from the following list: the mine must be sprinkled or rock dusted, a fire boss must examine the mine for gas daily in gaseous mines, mine management must provide adequate timbers to prop the roof, underground electric wires must be

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11. Although this paper focuses on industry, railroad regulation and liability also went through a series of transformations. The dangers in the railroad industry were a driving force in the development of the common law liability regime (Tomlins 1993, chap. 10). State railroad commissions between 1840 and 1890 imposed some rudimentary safety regulations. Federal safety regulations began in 1892 with the Railroad Safety Appliance Act. The safety laws for railroads were targeted specifically at railroading at the state and federal levels. Accidents for interstate railroad workers are still handled under a negligence liability system, although the fellow-servant defense and assumption-of-risk defenses have been eliminated and contributory negligence has been replaced with comparative negligence. See Clark (1891), Aldrich (1997), and Kim and Fishback (1993).

Table 9.1   Year of adoption of state coal mining law, early coal production and inspection budgets per coal worker in early 1900s

State	Year of adoption	1880 information			Coal law index		Inspection budget per worker (1967$)		UMWA share, 1902–23
		Coal workers	Workers per mine	Coal union chapters	1902	1930	1902	1930	
Pennsylvania Anthracite	1869	70,069	255	33.5	n.a.	n.a.	n.a.	n.a.	0.90
Illinois	1872	16,301	28	15	6	9	1.02	0.81	0.94
Iowa	1873	5,024	22	9	4	6	1.39	2.28	0.87
Ohio	1874	16,331	26	32	1	8	1.03	3.07	0.80
Maryland	1876	3,677	115	0	2	9	0.99	6.06	0.13
Pennsylvania Bituminous	1877	33,248	50	33.5	8	10	1.39	2.27	0.37
Indiana	1879	4,496	21	0	6	9	1.05	2.23	0.82
Missouri	1881	2,599	18	4	3	4	0.59	2.04	0.74
Tennessee	1881	1,092	55	0	0	6	0.63	2.17	0.19
Kansas	1883	3,617	19	2	4	5	1.95	4.08	0.69
West Virginia	1883	4,497	35	0	3	8	0.85	1.93	0.1
Colorado	1883	1,434	57	0	4	9	1.50	4.04	0.10
Washington	1883	261	65	0	2	9	1.31	8.14	0.61
Kentucky	1884	2,826	43	0	1	6	0.67	0.55	0.19
Wyoming	1886	1,009	168	0	4	8	1.47	4.37	0.66
Michigan	1887	412	69	1	4	5	1.80	2.78	0.79
Arkansas	1889	130	9	0	1	4	1.60	1.30	0.72
Montana	1889	3	3	0	3	8	3.97	2.40	0.97
Alabama	1891	1,513	80	0	3	8	0.91	2.54	0.13
Oklahoma	1891	0	0	0	2	9	1.38	3.10	0.72
New Mexico	1891	0	0	0	2	4	4.16	1.65	0.10

(*continued*)

Table 9.1   (continued)

State	1880 information				Coal law index		Inspection budget per worker (1967$)		UMWA share, 1902–23
	Year of adoption	Coal workers	Workers per mine	Coal union chapters	1902	1930	1902	1930	
Utah	1896	91	15	0	5	5	4.21	n.a.	0.65
North Dakota	1905	0	0	0	0	8	0.00	3.97	n.a.
Texas	1907	0	0	0	0	3	0.00	3.07	0.72
Virginia	1912	4,497	35	0	0	7	0.00	1.32	0.19

Notes and sources: Information that was not available is marked as n.a. Year of law adoption is from Aldrich (1997, p. 70). Information on production, number of mines, and employees in 1880 is from the U.S. Bureau of the Census (1886, pp. 681–87). The number of coal union chapters is the number of local unions and chapters of national unions associated with coal mining from the Weeks Report (Weeks, 1886, pp. 14–19). The regulation index is the number of coal safety regulations enacted in the state by that date from the following list: the mine must be sprinkled or rock dusted, a fire boss must examine the mine for gas daily in gaseous mines, mine management must provide adequate timbers to prop the roof, underground electric wires must be insulated, miners must not ride on coal cars underground, permissible explosives must be used, state inspectors must pass a qualifying exam, inspectors can close the mine immediately for some violations, inspectors have the power to make arrests for safety violations, mine foremen must be licensed by a state board, all miners must be licensed by a state board, foremen must ensure that all men have training, and the foreman must make a minimum number of visits to the workplace each day. A table showing the dates of enactment of each regulation for each state can be found in Fishback (1986, pp. 284–85, and 1992, pp. 114–15). The inspection budget per miner divides the appropriations for coal mining inspection by the number of miners in the state and adjusts for inflation using the Consumer Price Index (1967 = 1) from U.S. Bureau of the Census (1975, series E-135, p. 211). Information on the laws and inspection budgets came from various issues produced by the U.S. Commissioner of Labor (1892, 1896, 1904, 1908) and the U.S. Bureau of Labor Statistics (1914, 1925) with titles similar to "Labor Laws in the United States" and the legislative statute volumes for each state. The number of miners in 1902 and 1930 are from U.S. Geological Survey (1902) and U.S. Bureau of Mines (1930). See Fishback (1992, pp. 238–40) for a lengthy description of the sources and methods used. Membership in the United Mine Workers of America (UMWA) as a share of employment is from the U.S. Coal Commission (1925, pp. 1052).

insulated, miners must not ride on coal cars underground, permissible explosives must be used, state inspectors must pass a qualifying exam, inspectors can close the mine immediately for some violations, inspectors have the power to make arrests for safety violations, mine foremen must be licensed by a state board, all miners must be licensed by a state board, foremen must ensure that all men have training, and the foreman must make a minimum number of visits to the workplace each day. As seen in table 9.1, the number of clauses varied between zero in some states without mining laws to eight in Pennsylvania. By 1930 most states had expanded coverage, and the number ranged from three in Texas to ten in Pennsylvania.

A key to effective laws is their enforcement. Table 9.1 contains the inspection budget in 1967 dollars per coal worker, which is based on the salaries and the number of inspectors listed in the mining law or in appropriations bills for each state. Most inspection budgets in 1902 were less than $2 per worker, although New Mexico and Utah were spending over $4 per worker. Generally, the budgets had expanded along with the breadth of the laws by 1930.

9.2.2   Manufacturing Safety Regulations

The states' interest in regulating safety in factories also developed soon after the Civil War. Massachusetts led the way in 1869 in establishing a bureau to collect information on wages and working conditions for factory workers, and roughly half of the states had followed suit by 1890 (see table 9.2). Massachusetts was the first state to add teeth to the law by establishing factory inspectors in 1879. Roughly 40 percent of the states added a factory inspector within five to fifteen years after creating a labor bureau or department (see table 9.2). Some states like West Virginia and Tennessee provided for an inspector without actually appointing one. Table 9.2 also contains information on average establishment size, total manufacturing workers, and the number of chapters of trade unions in 1880. As was the case for the coal regulations, simple correlations show that all three were associated with earlier adoption (–0.43, –0.51, and –0.40, respectively, with the initial laws and –0.51, –0.56, and –0.35, respectively, with the factory inspector laws). The factory safety laws were amended during the Progressive Era in response to new technologies as well as to the grisly lessons learned from horrible accidents like the Triangle Shirtwaist Factory fire in New York in 1910.

9.2.3   Liability Law Changes

The increasing use of factory and mine inspectors coincided with the states' experimentation with employer liability laws that limited one or more of the three defenses in the 1890s and 1910s.[12] Unions and workers

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12. See Fishback and Kantor (2000, appendix G) for categorizations of the state laws.

Table 9.2   Year of introduction of labor commission, factory inspectors, departments of labor, and industrial commissions

State	First labor bureau	Factory inspection adopted	1880 information for manufacturing			Industrial commission introduced	Extent of code writing by industrial commission	Permanent workers' compensation law
			Mean workers per establishment	Total workers	Union chapters			
Alabama	1907[a]	1907[a]	4.8	10,019	22			1919
Arizona	1925[b]	[b]	3.3	220	0	1925	Few	1913
Arkansas	1913	[c]	3.8	4,557	1			1939
California	1883	1885	7.4	43,693	18	1913	Extensive	1911
Colorado	1887	1911	8.5	5,074	24	1915	No codes	1915
Connecticut	1887	1887	25.2	112,915	44			1913
Delaware	1893	1893	16.9	12,638	9			1917
Florida	1893[d]	[e]	12.9	5,504	0			1935
Georgia	1911	[c]	6.9	24,875	5			1920
Idaho	1890[f]	[g]	2.4	388	0	1917	No codes	1917
Illinois	1879	1893	9.9	144,727	179			1911
Indiana	1879	1899	6.2	69,508	61			1915
Iowa	1884	1897	4.1	28,372	21			1913
Kansas	1885	1901	4.3	12,062	20			1911
Kentucky	1892[h]	1903	7.0	37,391	53			1914
Louisiana	1900	1908	7.8	12,167	11			1914
Maine	1887	1887	11.8	52,954	14			1915
Maryland	1888[i]	1898	11.0	74,945	40	1928	No codes	1912
Massachusetts	1869	1879	24.5	352,255	105	1913	Extensive	1911
Michigan	1883	1893	8.7	77,591	45			1912
Minnesota	1887[j]	1891	6.1	21,247	12			1913
Mississippi	1914	1914	3.9	5,827	3			1948
Missouri	1879	1891[k]	7.4	63,995	127			1926
Montana	1893[l]	[l,m]	2.9	578	0	1915	No codes	1915
Nebraska	1887[n]	1895[n]	3.4	4,793	5	1929	No codes	1913
Nevada	1915	1915	3.1	577	4	1919	Few	1913
New Hampshire	1893	1917	15.4	48,831	2	1917	No codes	1911
New Jersey	1877	1878	17.7	126,038	2			1911
New Mexico	[o]	[o]	3.9	557	112			1917
New York	1882	1883	12.4	531,533	187	1913	Extensive	1913
North Carolina	1887	[e]	4.8	18,109	1	1931		1929
North Dakota	1899	1905			0.5	1919	No codes	1919
Ohio	1877	1884	8.9	183,609	199	1913	Extensive	1911
Oklahoma	1907	1910			0			1915
Oregon	1903	1907	3.2	3,473	12	1920	Few	1913

State								
Pennsylvania	1872	1889	12.4	387,072	530	1913 for mines only	Extensive	1915
Rhode Island	1887	1887	28.5	62,878	8			1912
South Carolina	1912	1912	7.6	15,828	2			1935
South Dakota	[p]	1890			0.5			1917
Tennessee	1897[r]	1881–84[q]	5.2	22,445	9	1923	Few	1919
Texas	1911	1911	4.1	12,159	5			1913
Utah	1917	1892[s]	3.9	2,495	1	1917	Extensive	1917
Vermont	1912	1912	6.1	17,540	2			1915
Virginia	1919	1897	7.0	40,184	9			1918
Washington	1910	1903	4.4	1,147	8	1919	Few	1911
West Virginia	1899[r]	1890[t]	6.0	14,311	81			1913
Wisconsin	1883	1883	7.4	57,109	14	1911	Extensive	1911
Wyoming	1917	1917	6.9	391	0			1915

Notes and sources: "First labor bureau" refers to the introduction of either a commissioner of labor, a bureau of labor statistics, or a factory inspector. "Factory inspection adopted" refers to the first statutory provision for a factory inspector. For dates of adoption of inspectors and departments of labor I started with evidence from Brandeis (1935, pp. 628–45), Holmes (2003), and the U.S. Commissioner of Labor (1896). When the precise date of introduction was unknown, the microfiche for the State Session Laws of American States and Territories was searched until the original act was found. The earliest commissioner of labor was in Massachusetts in 1869, and the earliest factory inspector was in Massachusetts in 1879. Information on workers and establishments for 1880 is from the Report on Manufacturing for the Eleventh Census (U.S. Bureau of the Census 1895, pp. 67–69). Information on Industrial Commissions is from Brandeis (1935, p. 654), who was citing work of John Andrews of the American Association of Labor Legislation. The information on the adoption of workers' compensation is from Fishback and Kantor (2000, pp. 103–4).

[a] Alabama had a mine inspector and later a board of arbitration but no official department of labor.

[b] Arizona had a mine inspector as of 1908.

[c] Arkansas had an inspector of mines in 1894 or earlier.

[d] The Florida agriculture department was given the responsibility to collect statistics on manufactures.

[e] No law as of 1924.

[f] Idaho established commission in constitution. No record of laws passed between 1879 and 1890.

[g] Idaho had an inspector of mines in 1893 or earlier.

[h] The Kentucky commissioner was to devote efforts to collect statistics on agriculture, manufacturing, and mining.

[i] The initial Maryland law in 1868 was for agriculture and industry, with most of the focus on agriculture. The code of 1888 with amendments in 1892 is more specific to industry.

[j] The Minnesota law included language about enforcing laws and prosecuting violations by the commissioner, but only funds for the commissioner were provided.

[k] Missouri statute for inspector in 1891. Not found in earlier years.

[l] The Montana act established a bureau of agriculture, labor, and industry.

[m] Montana had a mine inspector in 1895 or earlier.

[n] Nebraska gave the commissioner the power to inspect workplaces.

[o] New Mexico had a mine inspector as of 1908.

[p] South Dakota had a mine inspector as of 1903.

[q] The Tennessee Law called for the Bureau of Agriculture, Mining, and Statistics to collect information on labor. The original Bureau of Agriculture was established in 1871 and became the Bureau of Agriculture, Mining, and Statistics in 1875 but appears to have obtained the role of collecting labor statistics sometime between 1881 and 1884. We have had trouble pinning down the date.

[r] In Tennessee and West Virginia there were no regular inspectors. Commissioner merely had the power to inspect.

[s] The Utah legislature had authorized a bureau of labor statistics or labor department earlier.

[t] West Virginia gave the commissioner the power to inspect workplaces but only to report on findings there.

quickly became dissatisfied with the inadequacy of employer liability laws. In addition, employers sought relief from increasing uncertainty about the three defenses and a seeming increase in "jackpot" awards. Insurers, furthermore, sought ways to resolve problems with moral hazard and adverse selection in insuring workers. The solution for all was workers' compensation.

The move to workers' compensation in most states in the 1910s altered the liability rules in mining and manufacturing from negligence liability to strict liability. The laws established that all workers injured in the course of employment or in activities arising out of employment were expected to receive compensation from employers. Unlike negligence liability, which was supposed to fully compensate workers for their loss, workers' compensation imposed limits so that injured workers were to be paid a maximum of two-thirds or less of their income loss. Maximums on weekly payments meant that many workers received substantially less than two-thirds of their income while injured.

Ultimately, large employers strongly influenced the adoption of workers' compensation legislation. Fishback and Kantor (2000) find that the majority of people in each of the major interest groups—employers, workers, and insurers—gained from its passage. Employers saw a reduction in uncertainty about large jury awards and managed to pass much of their increased insurance premiums back to their workers in the form of higher wages. Workers on average received higher accident payments than under negligence liability and were better insured even if their wages adjusted downward. Insurers saw an expansion in their business, despite the introduction of state insurance in a number of states.

Most states developed some form of administrative body to replace the courts in administering workers' compensation. A handful of states, led by Wisconsin in 1911, carried the process a step further and created industrial safety commissions that not only administered workers' compensation but expanded into a rule-making body that wrote an extensive safety code for Wisconsin industry. As seen in table 9.2, eighteen states had established industrial commissions by 1930. However, only California, Massachusetts, New York, Ohio, Pennsylvania, and Utah had made substantial use of their rule-making ability.

9.3   The Role of Average Employer Size in the Development of Safety Regulations

The simple correlations between the year of adoption and average size from 1880 using the data from tables 9.1 and 9.2 suggest that safety legislation was adopted earlier in states with larger employers. Yet we also know that earlier adoption was related to more unionization and the overall number of workers to be regulated, so a multivariate analysis is needed to

Table 9.3   **Predicted signs of the relationship between average workers per establishment (mine) and safety regulations**

Motives	Probability of adoption	Enforcement budget	Breadth of laws
Reform	Positive	Uncertain	Positive
Large employers' defensive strategy	Negative	Negative	Negative
Large employers raise rivals' costs	Positive	Positive	Positive

isolate the impact of larger employers. The adoption of legislation was a dynamic process that took place over at least thirty years, so it is also important not only to capture the differences in key variables in cross-section in 1880 but also to take into account the changes in the key variables over time. Finally, the models of the relationship between large employers and regulation predict relationships that extend beyond the adoption of the laws to their scope and the resources devoted to enforcement. Therefore, I developed a state-level panel data set to examine the relationship between the average size of employers and the timing of adoption of safety legislation, the breadth of coverage of regulations, and the resources devoted to enforcing the rules.

Table 9.3 shows the predictions from the various models for the relationship between large employers and changes in safety regulations. It is important to consider how well the measure of employer size fits the theoretical concepts of employer size in the models. The measure of size used is the average number of workers per establishment (or per mine) because it is the only measure of size that is consistently available for the years 1870 through 1912, when the leading mining and manufacturing safety regulations were first adopted.[13] Average establishment size might differ in two states because the entire distribution of establishments in one state has shifted upward or because the distribution in one state is more skewed toward larger establishments.

In the hypothesis that reformers imposed regulation on large employers, both general increases in size and skewness toward very large firms might be considered important. Reformers worried about general increases in size across the entire distribution because larger establishment size was typically associated with increased mechanization that might have contributed to greater accident risk. Meanwhile, Glaeser and Shleifer (2003)

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13. Information was not available on the size of multi-establishment firms. The average establishment size understates the average size of firms because it does not take into account firms that had multiple establishments. My impression is that multi-establishment firms more commonly ran large establishments so that the measurement error might not be a serious problem. Further, multiestablishment firms tended to own establishments in multiple states. Their political influence in those states was likely to be influenced by the size of their establishments in those states.

emphasize the importance of very large firms in their descriptions of re-
form in the face of potential subversion. In the employer defense hypothe-
sis both a skewed distribution with a few very large firms or a general in-
crease in the size of all firms would have made it easier for employers to
resist reform efforts. In the skewed distribution a few large firms with many
employees faced low costs of organizing and would have greater resources
with which to mount their defenses. This result would hold even if larger
average firm size represents larger size across the entire distribution of
firms. The increase in size meant that each firm might have more resources
to devote to lobbying, while successful employer lobbies would face lower
costs of organizing because fewer firms would be necessary to reach criti-
cal mass. The raising-rivals'-costs hypothesis depends primarily on skew-
ness toward large firms in the distribution because one set of employers is
seeking to impose regulations that would be costly to another set of em-
ployers. In that case one might expect that large firms would have more
success in raising rivals' costs when the share of very large establishments
is higher either as a share of the number of establishments or as the share
of employment in those firms.

When the data are available to make comparisons after 1900, it appears
that the measure of average establishment size used here likely captures
some of the differences in skewness toward large establishments. The cor-
relation between average number of workers per establishment and the per-
centage of establishments with more than 500 workers in manufacturing in
the states is 0.887 in 1904, 0.928 in 1909, and 0.928 in 1914. The correlation
between average workers per establishment and the share of workers in es-
tablishments employing over 500 workers is 0.68 in 1909 and 0.65 in 1914.

In estimating the impact of large employers, the analyses control for in-
terest group pressure from unions, who wielded influence in the states
where they had a strong presence, as well as the number of workers in-
volved in the activity to be regulated. Mulligan and Shleifer (2004) suggest
that there may be substantial fixed costs to regulation; efficiency concerns
imply that regulations will not be established until the population to be reg-
ulated is large enough that the benefits of regulation overcome these fixed
costs. Larger populations might also be associated with more regulation in
the raising-rivals'-cost model. The returns to large firms from using regu-
lation to keep rivals out would rise significantly as the overall size of the in-
dustry increased. In several empirical tests Mulligan and Shleifer (2004)
find regulatory populations to be associated with expanded regulations in
a series of settings. In the analysis that follows, larger regulatory popula-
tions also contributed to earlier adoption of the initial manufacturing and
coal regulations. Finally, regional differences in attitudes toward regula-
tion are controlled with a dummy for the southern states in the adoption
regressions and state fixed effects when examining coal inspection budgets
and the breadth of coal regulations. The analysis that follows suggests that

southern states were slower to adopt factory inspection regulation and coal mining regulations.[14]

9.3.1 Establishment Size and the Introduction of Manufacturing Regulations

Analysis of the correlates related to the adoption of manufacturing regulations and workers' compensation show that states with more workers per establishment tended to adopt the new policies earlier. Using the panel information in manufacturing, I estimated a proportional hazard model with time-varying covariates for the introduction of the two types of manufacturing regulations: first, the initial introduction of some form of labor administrative body with or without coercive power; second, the introduction of factory inspectors to enforce regulations. Since most states had their own mine inspection departments, most of the bureaus and factory inspectors specialized in manufacturing; therefore, the correlates in the adoption analysis are focused on measures of manufacturing activity. In the underlying panel of data, states who have not yet adopted are observed at the end of each decade and matched with information on average size and the number of manufacturing workers from the beginning of the decade. The state's final year in the panel is its year of adoption, which is matched with information from the prior census. See the notes to table 9.4 for a more detailed description.

The results in table 9.4 show that larger establishments were associated with earlier adoption of both factory administrations and factory inspectors. Hazard ratios greater than one imply increased probability of adoption in any year given no prior adoption (consistent with earlier adoption), and ratios less than one imply decreased probability of adoption in any year (consistent with later adoption). At the margin an increase of one worker per establishment was associated with a 5.8 percent higher probability of adoption of some form of labor administration, and 5.3 percent higher probability of adopting a factory inspector law. Both are statistically significant at the 10 percent level. It is relatively common to see differences in correlates across states of 1 standard deviation in either direction. A one standard deviation increase in average firm size of 5.3 workers per establishment was associated with roughly a one-third increase in the

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14. In the regressions, I have experimented with other control variables, but none were found to be statistically significant in the analysis. I tried several measures of political activity in all of the adoption and coal regulation equations, including shares of votes for populist presidential candidates in the 1890s, voting for Republicans and Socialists for president in the 1900s, and Poole and Rosenthal's (1993) spatial coordinates for the location of U.S. senators along conservative/liberal spectrums and rural/urban spectrums at various times. The measures generally had small and statistically insignificant effects. Since Mark Aldrich (1997) and William Graebner (1976) suggest that large explosions contributed to expanded regulations, I developed a measure of large-scale accidents for the study in table 9.6, but its impact was always small and statistically insignificant.

Table 9.4   **Hazard ratios for factors influencing the introduction of state labor administrations and factory inspectors, 1869–1930**

			(1)		(2)	
Variable	Mean	SD	Hazard ratio	1 SD effect	Hazard ratio	1 SD effect
A. Introduction of some form of labor administration						
Manufacturing workers per establishment	7.57	5.34	1.058 (3.24)	0.31	1.056 (2.83)	0.30
Manufacturing workers (000s)	33.82	63.92	1.005 (2.48)	0.32	1.006 (4.03)	0.38
Manufacturing union chapters, 1880	30.91	68.86	1.003 (0.71)	0.21		
Union index	6.11	3.05			1.019 (0.55)	0.06
Southern state	0.29		0.734 (–1.06)		0.725 (–1.14)	
p			2.811		2.736	
Wald chi-square			47.30		45.82	

			(3)		(4)	
Variable	Mean	SD	Hazard ratio	1 SD effect	Hazard ratio	1 SD effect
B. Introduction of factory inspector						
Manufacturing workers per establishment	7.90	5.26	1.053 (1.74)	0.28	1.054 (1.65)	0.28
Manufacturing workers (000s)	41.66	68.32	1.009 (5.91)	0.61	1.008 (7.51)	0.55
Manufacturing union chapters, 1880	32.36	73.18	0.998 (–1.49)	–0.15		
Union index	6.67	3.35			0.973 (–0.62)	–0.09
Southern state	0.29		0.419 (–2.06)		0.429 (–1.99)	
p			3.254		3.420	
Wald chi-square			110.63		110.29	

Notes and sources: The 1 standard deviation (SD) effect is the change in the probability of adoption in a specific year given that the state had not yet adopted associated with a one standard deviation increase in the variable. The values are hazard ratios from a Weibull hazard estimation with time-varying covariates. The *z*-scores in parentheses below the hazard ratios are based on robust standard errors and the null hypothesis that the hazard ratios are equal to one. If $h(t) = h_0(t)\, e^{X(t)\beta}$, then each hazard ratio reported above equals e^b, where b is an element of β. Time zero ($t = 0$) is 1860 in the model. The Weibull model assumes that the hazard takes the form $h(t) = p\, t^{p-1} e^{X(t)\beta}$. Time zero ($t = 0$) is 1860 in the model. Estimates for *p* in all of the models are statistically different from one in Wald chi-square tests with four degrees of freedom, implying that the probability of adoption rose substantially over time.

    Information on the timing of adoption is in table 9.2. Observations in the data set were constructed the following way. States were observed in the last year of the decade with information on workers and workers per establishment from the beginning of the decade. In the year the state adopted, the year for that observation is the year of adoption. For example, Maine adopted its first labor administrative law in 1887. The first Maine observation is for the end of the 1860s, the year is recorded as 1869, the adoption indicator is zero, and values for average workers per establishment and total workers are from 1860.

Table 9.4   (continued)

The second Maine observation records the year as 1879, the adoption indicator is zero, and the census values are from the 1870 census. Since Maine adopted in 1887, the final Maine observation shows the year as 1887, the adoption indicator as one, and the values for workers per establishment and total workers are from the 1880 census. For Massachusetts, which adopted in 1869, I included a value for 1865 with census information from 1860 attached; the 1869 observation uses 1870 census information. There were 179 observations for the analysis of the introduction of any labor administration, with three of the forty-eight states not adopting by 1930. In the factory inspector analysis there were 229 observations, with eight of the forty-eight states not adopting by 1930. Information on workers and establishments from the censuses for 1860, 1870, 1880, and 1890 is from U.S. Bureau of the Census (1895, pp. 67–69). Data on workers and establishments from the 1900, 1910, and 1920 censuses are from U.S. Bureau of the Census (1933, pp. 43–600, and 1902, pp. 58–61). In the 1904 manufacturing census, the Census Bureau focused the survey on factories and eliminated the hand trades. I spliced the data for total workers and workers per establishment after 1900 with the earlier series by multiplying by the ratio in 1900 of workers in factories and hand trades to workers in factories. The same procedure was followed for workers per establishment. Information on unionization at the state level is sparse, and two measures of unionization were tried. Neither fully covers the period. The union index is described by Fishback and Kantor (2000, p. 263), who developed it for 1899, 1909, 1919, and 1929 for their workers' compensation study. High values of the index imply that the state has a higher share of workers in industries that at the national level were more unionized. For observations prior to 1899, the 1899 values of the index were used to approximate the union index for observations. In the other version of the estimation, the number of manufacturing union chapters is the number of local unions and chapters of national unions associated with manufacturing in the state as of 1880 from the Weeks Report (Weeks, 1886, pp. 14–19). States were given the same value in each year observed. Southern states included Maryland, Virginia, Kentucky, Arkansas, Oklahoma, Texas, and all states south and east of those states.

conditional probability of adopting some form of labor administration in any year and a one-fourth increase in the probability of introducing a factor inspector.

The findings are inconsistent with the view that large firms were successful at obstructing the introduction of legislation. The adoption of the early labor administrations without inspection might have been a situation where both large firms and unions anticipated benefits, or where unions succeeded in imposing the legislation on larger employers. The union hazard ratios are all greater than one, consistent with unions contributing to earlier adoption. Although we cannot reject the hypothesis of no effect in the statistical model, extra qualitative evidence from Elizabeth Brandeis (1935) suggests that these early labor bureaus were often created in response to pressures from the National Labor Union and the Knights of Labor.

The adoption of factory inspection is more consistent with the raising-rivals'-costs model in a situation where reformers and reformers were not anticipating much gain. While large firms were associated with earlier adoption, unions were not. The hazard ratios for the union measures were both less than one, and increases of 1 standard deviation in the union measures reduced the probability of adoption in any one year by 9 to 15 percent. The effects are not statistically significant, so it is too strong at this point to say that unions were categorically opposed to the introduction of the factory inspectors. Yet there is evidence that union leaders circa 1900

were skeptical of the benefits of regulation on the grounds that business interests wielded significant clout in the legislatures and were likely to strongly influence the writing of the regulations. Instead, they focused on organizing drives in which they argued that workers would benefit more through the collective bargaining process than they would by relying on legislatures (Weinstein 1967, p. 159; Skocpol 1992, pp. 205–47; Asher 1969, p. 457).

The adoption of workers' compensation in the 1910s, on the other hand, was a win-win situation for large firms, unions, and reform groups. In statistical work on the timing of adoption of workers' compensation Shawn Kantor and I (Fishback and Kantor 1998, 2000, pp. 106–11, 256–57) found that large firms, unions, and reform groups all were associated with earlier adoption of the laws. These relationships showed up in comparisons of means for groups of states who adopted earlier, as well as in multivariate analysis with a wide range of controls. In addition, there was ample qualitative evidence that all three groups after 1909 lobbied for the general concept of workers' compensation although in some states there were intense struggles over the choice of benefit levels and the state's role in insuring workplace accident risk.

9.3.2   Average Mine Size and Coal Regulations

The results are quite different for the relationship between average mine size and the adoption of coal mining regulations from 1869 to the mid-1890s. I estimated a similar proportional hazards model for a panel of data for the twenty-four states that produced more than 500,000 tons of bituminous coal consistently by 1925. An additional cross-sectional observation has been added for Pennsylvania anthracite coal because Pennsylvania adopted separate regulations and inspection departments at different times for the two types of coal. More details on this panel are found in the notes of table 9.5. Larger coal mines were not associated with earlier adoption of the coal safety legislation, whether large mines are measured in terms of workers per mine or output per mine. The hazard ratios in table 9.5 are not statistically significantly different from one, and the effects of changes of 1 standard deviation are very small. The absence of a relationship between adoption and mine size suggests that either large firms were indifferent to the coal regulations or they were unsuccessful at staving off the efforts of reformers. The impact of unionization suggests that it might have been the latter. An increase of 1 standard deviation in the number of coal union chapters in the state raised the probability of adoption in a specific state by 40 to 47 percent.

More insight into the role played by large firms can be gained by examining their impact on the breadth of regulation and the resources devoted to enforcement. I created a panel data set for the years 1902, 1910, 1920, and 1930 for the twenty-three leading bituminous coal mining states with

Table 9.5 **Factors influencing the introduction of coal mine safety laws, 1869–1912**

	Mean	SD	(1) Hazard ratio	(1) OSD effect	(2) Hazard ratio	(2) OSD effect
Coal workers per mine	42.41	51.34	1.001 (0.38)	0.05		
Coal workers in state (000s)	2.28	6.85	1.047 (2.11)	0.32		
Tons per mine (000s)	18.67	27.41			0.999 (–0.08)	–0.03
Total tons in state (millions)	0.89	2.29			1.164 (2.09)	0.38
Coal union chapters	3.38	8.99	1.052 (2.50)	0.47	1.044 (1.72)	0.40
Southern state	0.28		0.400 (–1.74)		0.398 (–1.80)	
p			3.417		3.271	
Wald chi-square (4)			86.19		62.24	

Notes and sources: A 1 standard deviation (OSD) effect is the change in the probability of adoption in a specific year, given that the state had not yet adopted, associated with a 1 standard deviation increase in the variable. The values are hazard ratios from a Weibull hazard estimation with time-varying covariates. The z-scores in parentheses below the hazard ratios are based on robust standard errors and the null hypothesis that the hazard ratios are equal to one. For notes on the Weibull hazard model see table 9.4. Time zero is 1860. Estimates for p in all of the models are statistically different from one in Wald chi-square tests with four degrees of freedom, implying that the probability of adoption rose substantially over time. Observations in the data set were constructed the following way. States were observed in the last year of the decade and were matched with information on miners, miners per mine, tons produced, and tons per mine from the beginning of the decade. In the decade when the state adopted, the year of the observation was the year of adoption. For example, West Virginia adopted its mine safety law in 1883. The first West Virginia observation is for the end of the 1860s, the year is recorded as 1869, the adoption indicator is zero, and values for miners et al. are from 1860. The second West Virginia observation records the year as 1879, the adoption indicator is zero, and the census values are from the 1870 census. Since West Virginia adopted in 1883, the final West Virginia observation shows the year as 1883 and the adoption indicator as one, and the values for workers per establishment and total workers are from the 1880 census. For Pennsylvania anthracite, which adopted in 1869, I included a value for 1865 with census information from 1860 attached; the 1869 observation uses 1870 census information. States were not included in the sample unless they consistently produced more than 100,000 tons of coal by the 1920s. Anthracite and bituminous coal in Pennsylvania are treated as two separate state observations because Pennsylvania had separate regulatory codes and inspection staffs for the different types of coal. Southern states were Alabama, Arkansas, Kentucky, Maryland, Oklahoma, Tennessee, Texas, and Virginia. The twenty-five states led to seventy-nine observations, and all states adopted the law during the period under study. Information on production, number of mines, and employees is from the following U.S. mining censuses: U.S. Bureau of the Census (1865, pp. clxxiii–clxxiv) for 1860; (1872, pp. 760–67) for 1870; (1886, pp. 681–87) for 1880; (1892, pp. 347–48) for 1890; and (1905, 709–17) for 1902. Information for 1910 came from U.S. Geological Survey (various years). The coal union chapters figure is the number of local unions and chapters of national unions associated with coal mining from the Weeks Report (Weeks, 1886, pp. 14–19). The number of chapters in Pennsylvania were split evenly between the anthracite and bituminous observation. The number of chapters was the same for each state for all years that they were observed.

evidence on the breadth of coal mining regulations and the appropriations for coal mining inspection per coal worker in the state measured in 1967 dollars (see table 9.1).[15] The information on regulations and inspection budgets was then matched in the panel with evidence on the average number of employees per mine in the state, the United Mine Workers of America (UMWA) membership as a percentage of the coal workforce in the state, and the number of miners in the state. Estimations are also performed with firm size and industry scale measured as production per mine and total production.

The model is estimated both without and with state and year fixed effects. The fixed-effects estimation controls for some types of unmeasured heterogeneity across states and time. The year effects are incorporated to control for shocks to the national economy and technological shocks to mining technology common to the entire mining industry in each year that would have influenced the choice of safety regulations and the level of inspection at particular points in time. The state effects are included to capture geological differences in mining deposits that influenced mining practices as well as long-term attitudes toward political reform that were invariant across time within the states.

The panel regression results in table 9.6 are consistent with the view that large coal employers worked to limit breadth of the legislation, possibly offsetting efforts by coal unions to expand the regulations. The law index displays a negative relationship with average mine size that is stronger with controls for state and time effects. The coefficients are statistically significant at confidence levels of roughly 15 percent in two-tailed tests. Increases of 1 standard deviation in average mine size led to reductions in the law index of close to half of a law. The large employers' efforts to restrict the breadth of laws appear to have been counteracting lobbying by the UMWA. In the estimation without state and year effects, increases of 1 standard deviation in the percentage of miners in the UMWA were associated with a more than half a law increase in the regulatory index. The UMWA's efforts appear to have been correlated with time-invariant features in the states, because the inclusion of fixed effects in the model reduces the size and statistical significance of the UMWA coefficient.

Even after limiting the breadth of legislation, larger mines were also associated with reduced resources for enforcement. Average mine size displays a negative relationship with the inspection budget per coal worker that increases in size and in statistical significance with the inclusion of state and year effects. The fixed effects estimates in panel A in table 9.6 suggest that a 1 standard deviation increase of 35.7 workers per mine is associated with a reduction in the inspection budget of 64¢ per worker in 1967

15. North Dakota was in the adoption sample, but missing data forced its elimination from the study of inspection budgets and coverage of the laws.

Table 9.6   Ordinary least squares and fixed effects estimates for inspection budgets per coal worker (1967$) and coal regulation index, 1902, 1910, 1920, 1930

| | Mean | Standard deviation | Inspection budget per coal worker (1967$) | | | | Coal mining law index | | | |
| | | | (1) | | (2) | | (1) | | (2) | |
			Coefficient	OSD effect	Coefficient	OSD effect	Coefficient	OSD effect	Coefficient	OSD effect
			A. Correlates based on number of workers							
Constant			2.408		2.574		3.938		3.984	
			(4.62)		(4.46)		(4.96)		(4.18)	
Workers per mine	70.9	35.7	−0.005	−0.18	−0.018	−0.64	−0.005	−0.17	−0.010	−0.37
			(−1.49)		(−2.98)		(−0.69)		(−1.42)	
Number of workers	20.5	33.96	−0.006	−0.20	0.005	0.16	0.036	1.23	0.013	0.45
			(−2.12)		(0.73)		(7.05)		(0.99)	
Percent UMWA	49.5	32.3	−0.004	−0.14	−0.003	−0.11	0.016	0.53	0.004	0.14
			(−0.95)		(−0.48)		(2.11)		(0.41)	
Year 1910					0.518				1.373	
					(1.56)				(2.62)	
Year 1920					−0.383				3.373	
					(−1.30)				(7.40)	
Year 1930					1.594				3.938	
					(4.26)				(8.60)	
State effects					Included				Included	
R^2			0.134		0.658		0.239		0.796	
No. of observations			90		90		92		92	
			B. Correlates based on tons of coal produced							
Constant			2.243		2.030		3.505		3.839	
			(4.77)		(4.90)		(4.86)		(4.79)	
Tons per mine (000)	56.6	36.1	−0.004	−0.15	−0.015	−0.55	0.002	0.06	−0.012	−0.42
			(−1.09)		(−2.66)		(0.23)		(−1.50)	

(continued)

Table 9.6 (continued)

	Mean	Standard deviation	Inspection budget per coal worker (1967$)				Coal mining law index			
			(1)		(2)		(1)		(2)	
			Coefficient	OSD effect	Coefficient	OSD effect	Coefficient	OSD effect	Coefficient	OSD effect
Tons produced (millions)	17.8	32.5	−0.005 (−1.80)	−0.16	0.003 (0.47)	0.11	0.037 (7.63)	1.21	0.014 (1.03)	0.44
Percent UMWA	49.5	32.3	−0.005 (−1.05)	−0.15	−0.004 (−0.52)	−0.13	0.018 (2.25)	0.58	0.005 (0.41)	0.15
Year 1910					0.178 (−0.690)				1.244 (2.70)	
Year 1920					−0.353 (−1.25)				3.404 (7.70)	
Year 1930					1.553 (3.96)				4.007 (8.59)	
State effects					Included				Included	
R^2			0.043		0.635		0.243		0.800	
No. of observations			89		89		91		91	

Notes and sources: A 1 standard deviation (OSD) effect is the change in the probability of adoption in a specific year given that the state had not yet adopted associated with a 1 standard deviation increase in the variable. The *t*-statistics in parentheses below the coefficients are based on robust standard errors and on the null hypothesis that the coefficients are equal to zero. The data set is a panel for the twenty-three leading bituminous coal mining states for the years 1902, 1910, 1920, 1930. North Dakota appeared in the adoption regressions in table 9.5 but is absent here due to missing data. The regulation index is the number of coal safety regulations enacted in the state by that date from the list described in the notes to table 9.1. A table showing the dates of enactment of each regulation for each state can be found in Fishback (1986, pp. 284–85, and 1992, pp. 114–15). The inspection budget per miner divides the appropriations for coal mining inspection by the number of miners in the state and adjusts for inflation using the Consumer Price Index (1967 = 1) from U.S. Bureau of the Census (1975, series E-135, p. 211). Information on the laws and inspection budgets came from various issues produced by the U.S. Commissioner of Labor (1892, 1896, 1904, 1908) and the U.S. Bureau of Labor Statistics with titles similar to "Labor Laws in the United States" and the legislative statute volumes for each state. See Fishback (1992, pp. 238–40) for a lengthy description of the sources and methods used. The number of mines in 1902 is from U.S. Bureau of the Census (1905, pp. 709–17). Information on total employment and tons produced for all years and on the number of mines for 1910, 1920, and 1930 come from various issues of the annual report *Mineral Resources of the United States, Nonmetals,* issued by the U.S. Geological Survey (various years) through 1922 and by the U.S. Bureau of Mines (various years) after 1922. Specific page numbers for each year are reported in Fishback (1992, pp. 234–36). Information on membership in the United Mine Workers of America is from the U.S. Coal Commission (1925, p. 1052). The source did not provide information for 1930, so the 1923 values, the latest available, were assumed for that year.

dollars. Similarly, a 1 standard deviation increase in tons produced per mine in panel B in table 9.6 was associated with 55¢ per worker less in the inspection budget. There may be other explanations for the negative relationship between average mine size and inspection budgets. If there were substantial economies of scale in inspecting each mine, a smaller inspection budget per mine worker might have achieved the same results as the average mine increases in size. However, there was plenty of evidence that reformers were pressing for large budgets per worker to enhance enforcement and reduce accident rates. They were right to do so, as empirical studies show that increased inspection budgets inspection per worker (or per ton) were associated with lower accident rates (see Aldrich 1997, pp. 337–38, and Fishback 1986 and 1992).

Meanwhile, the UMWA share of employment had no positive relationship with the size of mine inspection budgets. Problems with inadequate inspections and the emphasis on prosecutions of miners in some of the states documented later in the paper might have led the UMWA to shift their efforts away from pressing for stronger government enforcement of the laws. Instead, they relied on their own negotiations with employers to press for compliance with the aspects of the code that the union was interested in enforcing.

9.4   Narrative Evidence on Employer Influence in Coal Mining

The quantitative analysis suggests that larger coal employers adopted a defensive strategy against coal mining regulations rather than one of raising rivals' costs. Large firms were not associated with later adoption of the early coal regulations, but they were negatively related with the breadth of coal regulations and the size of the inspection budget. The view that large employers were following a defensive strategy receives ample support from narrative evidence from various states at various times.

The leading studies of coal mining legislation all suggest that employers significantly influenced the writing of coal regulations.[16] Mark Aldrich (1997, pp. 69–71), for example, finds that most of the early laws were "incomplete, poorly written, and hard to enforce" and often bore "the strong imprint of operator influence." In Colorado, mine inspectors considered the original 1883 law to be "very incomplete" and "wholly inadequate." When the law was revised in 1913, it was "the product of a committee dominated by large operators . . . and it largely codified their practices."

William Graebner's (1976, pp. 72–87) description of the evolution of West Virginia mining law suggests that through 1907 the law had little or no bite. Mine operators and even the mine inspectors were opposed to new legislation. In cases where proposed laws limited their mining methods, the

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16. See Aldrich (1997), Fishback (1992), and Graebner (1976).

workers themselves actively opposed change. In response to a series of large mine explosions, the legislature passed a revision in 1907 in which mine operators played a major role. Two additional explosions led the chief mine inspector to become more of an activist in proposing legislation, yet an investigative committee that studied many of the explosions published a report that concluded that changes in the law would do no good. The legislature, in response to the demands of mine operators, rejected all of the chief mine inspector's recommendations for new regulations.

One sign that the mining laws were influenced by employers is that a number of them restricted the behavior of miners in ways that employers had had trouble enforcing within their mines. These restrictions often promoted safety but required extra effort for no obvious gain in pay on the part of the miners. For example, both Illinois and West Virginia banned the practice of "shooting off the solid," in which miners blasted without making an undercut at the base of the seam. The practice required more explosives, produced smaller, less valuable chunks of coal, and generally was considered more dangerous. It was popular with miners because it was much less strenuous than lying on one's side and hacking away at a wall of coal and rock for several hours before blasting the coal. The miners' response was to routinely disregard these and other restrictions that they found onerous.[17] When I estimated the impact of coal mining laws on accident rates (Fishback 1986, 1992, pp. 115–20) there were only three regulations that passed statistical significance tests in reducing accident rates: requirements that foremen visit workplaces more often, that miners use permissible explosives, and that miners not ride on coal cars. All of these are devoted at least in part to monitoring and changing the behavior of miners, which is consistent with a view that employers used regulations to help them enforce their own desired limits on the miners' behavior.

Lobbyists who are trying to take the teeth out of legislation often seek to limit the funds available for enforcement. In a number of states, there were not enough inspectors budgeted to meet the minimum number of visits of mines required in the mining statutes.[18] Low salaries led to high turnover of inspectors and limited the department's ability to attract talented inspectors. Inspectors earned only about 50 percent more than the average salaried worker in manufacturing in 1910 and less than 10 percent more in 1920.[19] West Virginia Governor John Cornwell in 1919 described their rate of pay as "less than that of men who drive mules" (quoted in Graebner 1976, p. 90). With larger budgets, the mine departments likely would have

17. See Aldrich (1997, pp. 58–73) and Graebner (1976, pp. 94–95).
18. See Fishback (1992, p. 113) and Graebner (1976).
19. Comparisons are based on mine inspector salaries in state mining laws and average annual earnings of coal miners (Fishback 1992, pp. 80–81) and average annual earnings for salaried workers in manufacturing from the manufacturing census (U.S. Bureau of the Census 1933, vol. 3, pp. 43–600).

had an impact on accident rates, as econometric studies by Fishback (1986, 1992) and Aldrich (1997, pp. 337–38) find that expansions in resources for inspection were associated with lower accident rates.[20]

Although much of Graebner's (1976) work on mine safety implies that many mine inspectors were honest advocates for safer mines, there were still worries about a revolving door between mine management and the inspection service. There were few opportunities to move up within the inspection bureaucracies, so some state mine inspectors accepted positions with coal companies at 50 to 100 percent pay increases. Many state inspectors were already sympathetic to the problems mine owners faced in running mines because they had moved to the job from posts as mining managers or superintendents. Union leaders were livid when the coal mine operators in 1908 "engineered" the appointment to West Virginia chief mine inspector of John Laing, himself the owner of several mining properties. After leaving office, Laing became the head of the Kanawha County Coal Operators' Association.[21]

Mine owners were not shy about pressuring the inspectors. In 1908 a West Virginia inspector stated "there are coal operators who will endeavor to have a district inspector removed from office rather than obey the mining laws, or carry out the recommendations made by an inspector." As a general rule, the mine owners appear to have had the advantage in the interest group struggle over inspector appointments, even in highly unionized states. In Illinois, where the UMWA was strong and the inspection staff had a reputation for being somewhat radical, a frustrated miner claimed: "There is not an inspector in the state who is not holding his job through the influences of some coal operator" (Graebner 1976, p. 91).

Most mining laws contained fines and potential jail sentences for offenders, but the inspectors could not impose these unilaterally. Instead, they disclosed their findings to a state or local government prosecutor who decided whether to take the offenders to court. The courts determined whether there was a violation and set the size of the fine.[22] There is little evidence of prosecutions of employers for mining violations in Pennsylvania, Ohio, and West Virginia prior to 1904. The number of prosecutions then rose to a peak at 395 in 1910 and 312 in 1911 (compared with approximately 3,200 mines and 250,000 employees) before trailing off to zero after 1912. Nearly all of these prosecutions were targeted at miners and not supervisors or mine owners. Miners accounted for 159 of the 163 prosecu-

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20. Spending on factory inspection may have been less effective than spending on mine inspection. Estimates of the impact of state inspection budgets by David Buffum (1992) and James Chelius (1977) on measures of fatal accidents in industry do not find statistically significant reductions in accident risk.

21. See Graebner (1976, pp. 90–91) and Corbin (1981, p. 17).

22. In a handful of states the coal mine inspector had the power to close a mine considered unsafe, but even here the inspector had to secure an injunction through the proper court (Graebner 1976, pp. 97–100).

tions in West Virginia in 1910. Of 489 prosecutions between 1908 and 1911 in Pennsylvania, 392 were directed at mine workers, only 27 at superintendents, and 70 at foreman and fire bosses (Graebner 1976, pp. 97–100). Further, the probability of paying penalties was even lower. In Ohio in 1911 the total amount collected in fines under a new mining law came to $400, and this was a law described as having strong penalty provisions.

One reason for the lack of prosecutions may have been the intransigence of the courts. According to Graebner (1976, p. 99), when coal inspectors closed mines, which they did infrequently, they "received as much opposition as aid from local courts":

> West Virginia inspectors, moreover, evidently ceased prosecuting operators and managers when it became clear that they could not be convicted. . . . A district inspector reported that workers had 'completely lost all confidence in the local courts . . . [and were] thoroughly convinced that justice could not be obtained towards the enforcement of the mining laws.'

9.5   Employer Influence of Legislation and Enforcement in Manufacturing

Earlier adoption of the initial manufacturing regulations in states with larger establishments is consistent with both the reform and raising-rivals'-costs hypotheses. A completed data set on the factory inspection resources and the breadth of the specific manufacturing safety regulations is not yet available, so I cannot do the same tests that I did for coal mining. Qualitative evidence, however, suggests that at least in some states manufacturers wielded the same types of influence as coal employers did over the type of laws adopted. Problems with enforcement of regulations also carried over into manufacturing.

The introduction of factory safety legislation in Washington State in 1903 offers an example of how manufacturing employers influenced the writing of safety legislation. Safety regulations often served as focal points in negligence cases for issues related to "due care" and "assumption of risk." Employer violation of regulations eased the burden for workers in demonstrating employer negligence, while the absence of a violation could prevent recovery. When workers violated regulations targeted at their activities, employers were better able to invoke the contributory negligence defense.

Washington employers pressed for factory safety legislation in reaction to a series of court decisions related to the negligence liability system. One aspect of the assumption of risk defense had always been a major irritant to workers and reformers. In a number of cases workers reported malfunctions or lack of safeguards that increased their risk of injury, were told to return to work, and then were injured. Compensation had been denied on the basis that the workers had known the risk in the now more dangerous

setting and assumed it when they returned to work. In *Green v. Western American Company* (1902) the Washington Supreme Court eliminated the assumption of risk defense in these situations. Fearing the complete elimination of the assumption of risk defense, employers played a significant role in the passage of Washington's Factory Inspection Act in 1903. Under the new act employers were to be considered negligent for accidents in settings where they violated the inspection acts. However, the law also provided for certifications that the employers' workplace was "safe." A number of lower courts then invoked the assumption of risk defense to prevent recovery by injured workers in several cases involving mines so certified. The Washington State Supreme Court disagreed and reaffirmed that lack of safeguards on machines was negligence whether the mine was certified or not. In 1905 the employers went back to the legislature and succeeded in altering the language of the Inspection Act so that employers had only to provide a "reasonable" safeguard (as opposed to a "proper" one). This change in language may have worked for a while but ultimately proved to be of little help to the employers, because the Supreme Court finally eliminated the assumption of risk defense by arguing that a machine lacked necessary safeguards by virtue of being the cause an accident (Tripp 1976, p. 535).

Inadequacy of inspection resources might have been an even more severe problem for the factory inspectors than for coal inspectors. There were far more factories than mines, and Brandeis (1935, pp. 632–33) notes that inspectors typically investigated only upon complaint. Rarely were the factory inspectors in a position to routinely and randomly inspect a significant share of the factories. Problems with enforcement likely contributed to the conditions that led to the deaths of 146 garment workers in the horrendous Triangle Shirtwaist Fire in New York City in 1911.[23] On the day of the fire, many workers reported that a key door to a stairway was locked, a violation of the factory regulations.

Just prior to the fire a State Labor Department inspector had reported an inadequate fire escape (Stein 1962, pp. 181–89), but jurisdictions over fire escapes were not well established. The factory inspection laws gave the inspector the power to demand a proper fire escape, but the factory inspectors claimed that the courts had ruled that fire escapes were outside the labor department's jurisdiction. Building safety therefore came under the jurisdiction of the New York City superintendent of buildings, to whom a report had been forwarded by the labor inspector. When the Asch building, where the fire broke out, was planned in 1900, the building inspector had agreed to allow the architects to forgo a required staircase because they promised that the fire escape they planned would act as a third staircase all the way to the ground. When the building was erected, the

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23. These accounts are largely based on Stein (1962) and McEvoy (1995).

agreement was violated and the fire escape only reached the second floor. When this was pointed out in 1911, Building Department officials defended themselves by saying that their resources were inadequate. The department had only forty-seven inspectors to inspect 50,000 buildings. They claimed: "We do not hear of violations of the law in the old buildings unless they are particularly called to our attention." In that year the Fire Department had designated over 13,000 buildings as dangerous, but the department could only inspect 2,051. Once they found a violation, the building inspectors argued, they still faced significant obstacles in punishing the violators. "We must enforce all our rulings through the civil courts. When we bring an action, there is invariably a long fight. The record will show the owner is usually the victor." In other cases they hesitated to call for changes because "It would work a great hardship on the owners of buildings to require changes. This is especially true of fire escapes."[24]

In the aftermath of the Triangle Fire the State Labor Department was overhauled and New York State adopted a series of new fire-related regulations. Appropriations for labor issues in New York quadrupled between 1911 and 1915 to over a million dollars, but this coincided with expansions of duties in other areas and the development of workers' compensation. Although this is described as the golden era of labor regulations in New York, the inspection budgets per manufacturing worker were lower there than inspection budgets per miner in most coal mining states.[25] The increase in budgets still did not resolve the enforcement issue. A February 1916 editorial in the *New York Times* claimed that of 3,711 violations by factories of the new stairway regulations, "only 246 owners complied with the law, and two prosecutions were begun!" (The Industrial Commission," *New York Times,* February 23, 1916, p. 12).[26]

9.6   Summary

Did large employers subvert workplace safety reform? I found few examples of documented bribery or other illegal corruption, but there was considerable evidence that a number of actions by large employers met the broader definition of subversion in the introduction. The quantitative analysis of the relationship between average establishment size and regula-

24. Quoted in Stein (1962, p. 116).
25. The new million-dollar budget in New York came to only about 69¢ per manufacturing worker. Probably no more than half of the budget was devoted to inspections. Thus, 35¢ per worker in 1914, which translates into $1.16 in 1967 dollars, was below many of the figures for mining inspection in 1902 in table 9.1.
26. Problems with inadequate inspections remain today, but the sanctions when such problems are caught are much greater. See McEvoy (1995, pp. 648–50).

tions in the states and the analytical narratives suggest that we cannot tell one coherent story about the influence of large employers. Rather, we must tell one story for coal mining and another for manufacturing. In the coal industry, large employers practiced a defensive strategy, limiting the breadth of mining regulation and inspection resources per miner. Large employers in manufacturing, on the other hand, were associated with earlier adoption of safety regulations and workers' compensation.

A question remains as to why large employers adopted a defensive strategy in coal mining and less so in manufacturing. My sense is that there were two key factors, the focus on one industry in the coal regulations and the lack of women working in the mines. Coal regulations were targeted narrowly at a specific industry, while manufacturing regulations and workers' compensation often covered a broad range of industries. Labor relations in mining were more fractious than in most industries, and the reform proposals that employers opposed were often made by unions. The organization of opposition to objectionable laws was made easier by the narrowly defined interests of the large coal employers, who were already organized into coal associations to deal with labor relations and other issues specific to the industry. Since mines were often in isolated areas, coal employers wielded much greater political clout locally and thus likely had more influence over the enforcement of the laws in the courts (Fishback 1992, 1995). Manufacturing safety regulations, on the other hand, covered a broader range of industries, and the regulations might have left many industries only mildly constrained. Large employers interested in fighting the laws therefore found it more difficult than in coal mining to organize the fight across a set of employers in different industries.

Another key factor explaining the difference in strategies was the gender of the workers involved. Coal mines employed no women. Reformers found protective labor legislation of all kinds easier to sell for women and children, while employers found such legislation harder to obstruct. A number of the manufacturing safety regulations were designed to improve safety and workplace conditions for women and children in textiles and other industries. Thus, large employers who had moved away from employing women and children found it fruitful to join with reformers in pressing for regulations that raised the costs to employers who still relied on them. The protection of women and children likely played an important role in the introduction of workers' compensation, as well. Workers' compensation received so much support in part because it insured that the share of women and children receiving compensation when their breadwinners were injured or killed rose to 100 percent from less than 50 percent under negligence liability. This move dovetailed with Progressive Era mothers' pension programs that provided benefits to widows and children.

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