THE IMPACT OF STATE LABOR REGULATIONS
ON MANUFACTURING INPUT DEMAND
DURING THE PROGRESSIVE ERA

By

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ABSTRACT

The goal of this research is to determine how the regulatory burden represented by an entire class of laws impacts firm choice decisions. To achieve this end, a comprehensive list of 135 labor regulations that existed in at least one state between 1899 and 1924 was collected. Temporal and regional trends in the passage of labor legislation are described. Significant regional variability is found, with different parts of the nation favoring different classes of labor legislation. Evidence for the presence of regional homogeneity is found. Outlier states that do not fit the overall regional pattern are identified and discussed. Four summary variables are developed using principal components analysis. These variables represent first wave labor laws, second wave labor laws, mining laws, and anti-union laws. First wave laws were common laws passed in most states by 1909. First wave laws were general in nature and probably not binding on employers. Most states enacted second wave laws after 1909. The pattern of passage of these laws was more uniform than that of first wave laws, with most states adopting the more progressive second wave laws by 1924. Anti-union laws also experienced relatively little growth, but were most common in the Southeast. Three of the four summary variables were incorporated into a four-input translog cost function model of state manufacturing establishments over the 1899 to 1919 period. In addition, a variable representing state appropriations for labor programs and enforcement was included in the translog model. Increases in labor legislation resulted in an increase in demand for materials and salaried labor, and a decrease in demand for wage labor. Increases in the number of first wave laws led to an increase in salaried labor demand, possibly due to

bureaucratic requirements associated with regulatory compliance. First wave laws had no impact on wage labor, confirming the findings of many that these early laws codified existing practice. In contrast, second wave laws significantly reduced wage labor demand, suggesting that these laws were binding.

CHAPTER 1 : INTRODUCTION

In 1900, the United States was a nation facing rapid industrialization, urbanization, and technological change. At the turn of the century, the nation was primarily rural, with only 40 percent of the population living in urban areas. The 1920 Census marked the first year in which the majority of the population lived in cities, with 51 percent of the population living in urban areas.¹ Along with urbanization came industrialization and a movement from the farm to the factory. This transition brought with it change in how labor markets operated. Compared with the prior system of family farms and trade apprenticeship, the factory system employed labor in a more generic fashion. Mechanization and mass production resulted in production processes that increasingly employed unskilled labor. In addition to creating substantial declines in per unit cost, this aspect of industrialization increased the substitutability of labor. Factory managers could now replace the labor of any worker with only minimal investment in human capital. As the factory system spread, the negative implications of this aspect of industrialization became apparent, and reformers began to press for regulations that would improve working conditions. In *Socializing Security*, a study of early social regulation in the United States, David Moss described this problem as essentially a negative externality associated with the factory system:

When a machine breaks down in a factory, the reformers argued, the owner is responsible for fixing it. Indeed, industrialists take good care of their physical capital because regular maintenance is less costly than repair or replacement. The reformers suggested that one of the central problems of the new industrial order was that employers were not responsible for

¹ US Census Bureau, Decennial Census of 1900 and 1920.

their human capital. When a worker fell sick, even with an occupational disease, the employer assumed no responsibility. He simply found another worker and shifted the cost of health care and lost wages onto the sick worker's family and onto the community.²

During this early period of industrialization, labor markets were for the most part unregulated. Federal regulation was essentially nonexistent, with the courts striking down most attempts to regulate labor as a violation of state's rights. It was not until after 1920 that federal regulation became widely accepted.³ Because of the weakness of the Federal government, regulation occurred at the state level, resulting in an uneven regulatory burden across the nation. The level of regulation in different regions of the nation varied widely, reflecting the various political philosophies of the different states. The implication of this patchwork of regulations on the input choice decision of manufacturers is the subject of this study. It is clear from the public record that business people recognized that a higher regulatory burden would put them at a competitive disadvantage relative to their competitors in different states. Lois MacDonald, in a 1938 history of labor issues, discussed this matter:

Where producers in different states compete with one another in the same market, and where those in one states are subject to more stringent labor laws than those in another state, the situation is such as to arouse extreme dissatisfaction among the employers in states having the higher standards. These employers often assert that they are under a great handicap in that their labor costs are higher, and that as a consequence they find themselves unable to compete on anything like terms of equality with their competitors in other states.⁴

² David Moss. *Socializing Security: Progressive-Era Economists and the Origins of American Social Policy*. Cambridge: Harvard University Press, 1996, p. 61.

³ Moss, p. 96.

⁴ Lois MacDonald. *Labor Problems and the American Scene*. New York: Harper and Brothers, 1938, p. 651.

This issue, called “degenerative competition” by Moss, gave opponents to regulation a powerful argument that curbed the early growth of regulation in the United States relative to nations with a more centralized regulatory structure, and provides one explanation for the relative lack of regulation in this country as compared to other highly industrialized nations.⁵ Moss argues that the degenerative competition argument was successful in slowing the spread of protective regulations in the United States at the turn of the century.

This research exploits the variation in regulatory burdens amongst the different states described by Moss and others. In the following chapters, the total regulatory burden in effect in each state is quantified, allowing an empirical measurement of the impact of labor regulations on production cost and manufacturers’ input choice decisions. The results will provide a measure of the validity of the degenerative competition argument. The analysis proceeds in three steps. First, the body of protective legislation in force in each state between 1900 and 1920 is cataloged and described. Second, principal components analysis is employed to summarize each state’s body of legislation as index variables that describe the regulatory burden across four broad types of laws. Finally, three of the index variables are incorporated into a translog cost function model to measure the impact of the regulatory burden on manufacturers in each state. Each of these sections is described briefly in the sections that follow.

⁵ Moss, p. 10-11

1.1 Describing The Laws

The U.S. Commissioner of Labor and later the Bureau of Labor Statistics documented the extent of state labor legislation in the various states in a series of reports published in 1896, 1904, 1908, 1914, and 1925. In these reports, the Labor Department reported on roughly 135 laws that influenced labor markets and workplace conditions.

These laws fell into six general categories:

1. Hours, age and wage laws
2. Regulation of the employment contract
3. Administrative and social insurance
4. Regulation of labor supply
5. Safety Regulations
6. Unionization and bargaining regulations

In 1895, labor markets were relatively unregulated, with the average state having only 25 of the 135 laws in effect. By 1924, the average increased to 54 laws with the most rapid increase in regulation occurring between 1899 and 1915. In general, the earliest laws provided for the legal rights of employees or protected the moral standards of the time. For example, the most common law in 1895 was the law barring Sunday labor, in force in 43 states. Other common laws provided for a married woman's right to her earnings and prohibited employers from coercing their employees to vote a certain way in elections. By 1924, some protective laws had joined the most-popular list, including workman's compensation laws, some child labor laws, and railroad safety laws. The 1900 to 1920 period saw a rapid increase in the regulation of women and children, and an increase in the number of basic factory safety regulations in the more industrialized states. However,

the most protective laws, such as those requiring minimum wages or regulating the hours of work of male laborers, remained relatively uncommon.

Regionally, the North Central and MidAtlantic states led the nation in terms of the sheer volume of labor legislation in force in each year. The Pacific states experienced the most rapid growth in regulation so that by 1920 the average number of laws in force in the Pacific region rivaled the number in the MidAtlantic and North Central regions. The South, Mountain, and Midwest lagged these three more progressive regions in most years with the South and Mountain regions normally behind the Midwest in terms of total number of laws in effect. Not surprisingly, the amount of legislation in force in a state was correlated with the urbanization of the state. As a state becomes more urbanized, and presumably more industrialized, the amount of labor legislation grows. The level of unionization and strike activity also appeared to influence the amount of legislation; a larger union presence is associated with more regulation of labor. Finally, and significant to the concept of “degenerative competition,” a large amount of regional homogeneity existed. States located physically near one another had similar regulatory burdens. This may be due to similar industrial conditions, political philosophies, or due to the fact that lawmakers were cognizant of the need to keep their regulatory burden in line with “competitor states.” In several instances, “outlier” states within a region existed. These outliers had a significantly different regulatory burden than the rest of the region. In each instance where an outlier was identified, the state bordered a region with which it shared

a more similar regulatory burden, suggesting that geographic proximity was important to the amount of legislation passed in a state.

1.2 Development of Index Variables

Principal components analysis was employed to reduce the set of 135 laws into a smaller set of summary variables. Analysis suggested a selection of four, five, or eleven index variables, or factors. A four-factor design was chosen for use in the cost function analysis in order to keep the number of variables in the translog cost function manageable and to minimize errors associated with misinterpretation of factors.

Most of the laws fell into one of the four broad categories represented by the first four factors: first wave laws, second wave laws, mining regulations, and anti-union laws. The first wave law factor represents common laws passed in most states relatively early in the 1900 to 1920 period. This included hours limits for women and children, basic factory and railroad safety regulations, age limits for children, accident reporting laws, and common occupational licensing laws like those requiring licenses for barbers and plumbers. The second factor, named “second wave laws,” represents more progressive laws that either became common later in the period or were never passed by many states. The laws in this category included minimum wage laws, hours laws for all workers, the more restrictive factory safety regulations, and social insurance laws. The third factor represented mining regulations. All of the mining-related laws had significant loadings for this factor. Finally, the fourth factor represented union laws. The pattern of

significant factor loadings suggests an interpretation of this factor as representing anti-union sentiment. The anti-intimidation, anti-interference, and conspiracy laws have significant loadings for this factor. These laws were generally passed in an attempt to control unions and protect workers from union pressure.

Applying the PCA scores for the four-factor design to each state's profile of laws results in factor scores for each state and year. The regional pattern of these scores shows that factor scores for first wave laws were highest in the Northeast and the northern part of the Midwest. The states with the highest scores for first wave laws were urban, industrialized states. These states tended to be more progressive in nature and had more active labor movements. The lowest scores for first wave laws were in the South and West in mostly rural states with relatively little industrialization. Most of the growth in the level of first wave laws occurred before 1909.

In contrast, second wave laws originated in the West and spread towards the East. Most of the growth in second wave laws occurred after 1909. The temporal pattern of growth in second wave laws is more distinctive than the pattern of first wave laws. The highest scores for second wave laws occur in 1919 and 1924.

Factor scores for mining laws were relatively stable over time. Not surprisingly, the mining states had the highest scores. However, some states like Nevada, Pennsylvania, Idaho, and Kentucky had low scores for the mining factor despite their

large mining sectors. Conversely, a few states with relatively little mining employment had high scores for the mining factor. Mining laws passed early in most states so that most states' scores did not change by much after 1909.

Finally, the more agricultural Southeastern and Midwestern states scored highest for the anti-union factor. Like the mine factor, scores for this factor increased by the largest amount before 1909. High scores on this factor reflect higher levels of anti-union sentiment that in most states have persisted to modern times. Eleven of the eighteen states that had union factor scores in 1924 in the top third of all state-year observations are right to work states today.⁶ The states with the lowest scores on the union factor in 1924 all had strong union movements. Eight of the ten states with the largest number of strikes between 1899 and 1919 also had union factor scores in the bottom third of all state-year scores.⁷ This suggests that states with active and powerful unions were able to keep the number of anti-union laws in check.

1.3 Measuring Impacts on Input Choice and Costs

A translog cost function design was employed to estimate costs for manufacturers in each state as a function of four choice variables: wage labor, salaried labor, materials,

⁶ Right to work states are Alabama, Arizona, Arkansas, Florida, Georgia, Idaho, Iowa, Kansas, Louisiana, Mississippi, Nebraska, Nevada, North Carolina, North Dakota, Oklahoma, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, and Wyoming. Source: National Right to Work Legal Defense Foundation, Inc. <http://www.nrtw.org/rtws.htm>.

⁷ The ten states with the most strikes (in order): New York, Pennsylvania, Massachusetts, Illinois, Ohio, New Jersey, Connecticut, Missouri, Indiana, and California. Source: Price Fishback and Shawn Kantor, University of Arizona

and capital; and four labor variables: the three index variables developed using principal components analysis, and a measure of state spending per worker on labor departments and inspectors. In addition, a time variable was included to account for biased technological change, and output was included to allow for non-constant returns to scale. Various versions of this model were run, using different combinations of state and year fixed effects and the time variable. The model was run using a panel of state data for the years 1899, 1904, 1909, 1914, and 1919. Factor scores were lagged by one year to counteract the possible endogeneity of the laws.

Overall, increases in labor legislation resulted in a wage labor and capital-saving bias and a materials and salaried labor-using bias by manufacturers. First wave laws tended to result in a labor-using bias and a capital and materials-saving bias. These initial, more common labor laws had a relatively small impact on input choice decisions. This finding is consistent with the findings of other researchers⁸ that the passage of labor legislation did not occur until business conditions changed such that it was in the best interest of employers to obey the new law. Therefore, the new laws merely codified existing practices and did not significantly affect input choice by firms. In contrast, many of the second-wave laws placed stricter requirements on firms, and the estimated coefficients suggest that these laws had a more significant impact on input choice than the first-wave laws. In general, an increase in second-wave laws caused firms to substitute away from wage labor and capital and towards salaried labor and materials.

Second wave laws had the largest impact on the materials and wage shares, implying a large negative impact on the demand for wage labor balanced by an increase in materials demand. Anti-union laws had a capital and labor-saving bias that was balanced by a large materials-using bias. Finally, the coefficients on state spending on labor laws were very small and statistically insignificant in all four share equations. This suggests either that this variable is a poor proxy for enforcement efforts, or that enforcement had little additional impact on input choice decisions.

Other results from the translog model confirmed other researcher's findings that technological change was wage-labor saving and materials-using, but the results from this model failed to confirm capital-using technological change. This may result from the way that the capital variable was constructed, and provides an area for future research. With regard to scale effects, the estimated coefficients indicate a labor-saving, materials-using and capital-using bias as output increases. These results are consistent with the idea that there are labor productivity gains to scale; that output per worker will increase with output, reducing labor's share of total costs. This result also supports the idea that capital-intensive operations must be large to be profitable. With regard to the substitutability of inputs, the only complementary pairs were capital and wage labor; all of the other input pairs were substitutes.

⁸ See Chapter 2 for specific examples.

Labor laws were found to increase costs for firms, with increases in the level of first wave laws causing average costs for the United States to increase by about 1.5 percent between 1899 and 1919. Second wave laws resulted in another two percent increase in costs, and union laws increased costs by another percentage point, for a combined impact of almost 4.5 percent. Figure 1 shows the state-level combined impact on cost per manufacturing establishment of the empirically observed growth in the level of the four labor variables between 1899 and 1919. Impacts were largest in the West, followed by the Midwest, with the smallest impacts in the East. The combined impact on cost per establishment for all four laws ranged in size from a maximum of about eleven percent in Utah to a minimum of -0.2 percent for Louisiana.

In general, firms located in states with more anti-union laws used more materials and salaried labor and less wage labor. Firms located in states with more first wave laws used more labor and fewer materials. Higher levels of second wave labor laws caused firms to increase their use of salaried labor, decrease their use of wage labor, and increase their use of materials. State expenditures on labor legislation had a uniformly small impact on firm input choice. The results suggest that as a state increases its spending on labor legislation per establishment, firms may substitute away from labor and capital, and towards materials, but the magnitude of the substitution effect is negligible.

Figure 1: Combined Impact of All Labor Variables on Cost Per Establishment: 1899-1919

Figure 2 shows the combined impacts of the empirical changes in each labor variable on each of the four inputs. The maps show that for the majority of states, increased levels of legislation resulted in an increase in the use of salaried labor and materials and a decrease in the use of wage labor. Capital impacts were positive in about half the states and negative in the other half. The input that was the most affected by labor legislation was salaried labor. Increases in labor legislation were responsible for almost a third of the 100 percent increase in the use of salaried labor that occurred between 1899 and 1919. For materials, labor legislation contributed almost eight percent

to the 40 percent actual increase in materials use. Conversely, the 30 percent increase in wage labor during the 1899 to 1919 period would have been higher if it had not been for labor legislation. An estimated eight percentage points was subtracted from wage labor demand due to increases in labor variables. Finally, the impact of labor variables on capital demand averaged only -0.2 percent, suggesting that the 120 percent increase in capital demand that occurred during this period was largely unaffected by labor legislation.

Figure 2: Combined Impact of Labor Law Variables on Input Demand

CHAPTER 2 : LITERATURE REVIEW

2.1 Introduction

Although the body of literature on labor legislation is large, very little work describes the cumulative impact of regulations on economic variables. For this reason, this literature review will discuss the results of research conducted in specific areas of labor law. Because of the sheer size of the body of work in this area, the following discussion is not a comprehensive list of all relevant research. The research discussed here contains only samples from this body of work. This literature review will proceed in two sections. The first section discusses work studying the impact and political economy of state labor legislation during the study period. The second section describes work relevant to the approach described in Chapter 5, where a translog cost function model is used to measure the impact of labor legislation on manufacturers' input choice decisions.

2.2 Studies of Labor Legislation

There has been little work done on the aggregate impact of labor legislation on firm behavior. However, many authors have published work in specific areas of labor legislation. There have been many studies focusing on specific classes of labor laws such as child and women's labor laws, safety laws, and protective legislation. Their findings fall into several broad categories. First, several authors find that the impact of labor legislation is smaller than one would expect, leading to the hypothesis that the laws merely codify existing behavior and do not significantly change the behavior of firms. Second, other studies have found that the impact of a given law may be larger for groups

other than the primary target of the law or that laws that are ineffective alone have some impact on behavior in combination with other laws. Finally, some studies have found that laws pass only when it is in the mutual interest of all parties involved.

2.2.1 Studies Measuring the Impact of Legislation

Carolyn Moehling studied the impact of state child age restrictions on the labor force participation of children between 1880 and 1930 using a modified difference-in-differences approach. By comparing the labor force participation of children in states with minimum age laws with participation rates in states without laws both before and after age laws were passed, Moehling eliminated differences due to “industrial structures, demographic composition, and income levels that likely were correlated with the enactment of legislative restrictions.”⁹ Using this approach, she finds that child labor laws had little impact on the labor force participation rates of children. Although participation rates did decline at the turn of the century, in most states the decline began before the laws passed. According to Moehling:

The evidence frequently used to demonstrate the effectiveness of these laws is that the social reform objectives of many of these laws were achieved. However, the relationship between legislative change and social change is not as straightforward as this. Historians have maintained that, in many cases, social reform legislation, instead of preceding and precipitating social change, actually followed and was a response to social change.¹⁰

⁹ Carolyn Moehling. “State Child Labor Laws and the Decline of Child Labor.” *Explorations in Economic History*, 1999, 36, p. 73.

¹⁰ Moehling, p. 72.

According to Moehling, technological change, increased immigration, and rising real wages contributed to declining demand for child labor. “The enactment of state child labor laws, rather than being viewed as an indicator of change, has been viewed as a consequence of change; as the demand for child labor fell, so did industrial opposition to child labor legislation, allowing activists to push their reform legislation through state legislatures.”¹¹

Like Moehling, Clark Nardinelli found that Great Britain’s Factory Acts, passed in the 1830’s, only codified an existing declining trend in the use of child labor. He finds that it was technology, and not regulation, that was primarily responsible for a declining use of child labor by the turn of the century in Britain. According to Nardinelli, “Rising real income and technological change were the main causes of the decline of child labor.”¹² A 1992 study done by Martin Brown, Jen Christensen, and Peter Phillips, studying child labor in the United States fruit and vegetable canning industry during the 1900 to 1919 period found similar results. Brown, Christensen and Phillips found that child labor laws only reduced children’s participation rates in the technologically backwards canneries.¹³ This finding is consistent with the idea that successful passage of any law requires the support of a majority of manufacturers as well as labor. In the case of child labor, as some manufacturers made investments in equipment that led to a

¹¹ Moehling, p. 73.

¹² Clark Nardinelli. “Child Labor and The Factory Acts.” *The Journal of Economic History*. December 1980, 40 (4), p. 739.

decline in the productivity of child labor, they began to support restrictions on the use of child labor in order to reduce competition from manufacturers that had not employed the new technologies. By supporting a binding child labor law, the more technologically advanced manufacturers could reduce competition and protect their investment.

In 1972, Landes and Solmon studied the impact of turn of the century-era compulsory school attendance laws. They found that the average level of schooling was higher in states that had a compulsory school attendance law. However, like Moehling, Nardenelli, and others, they found that the laws were more of a reflection rather than a cause of behavior. Landes and Solmon concluded:

...compulsory school legislation was not the cause of the higher schooling levels observed in 1880 in states with laws. Instead, these laws appear to have merely formalized what was already an observed fact; namely that the vast majority of school age persons had already been obtaining a level of schooling equal to or greater than what was to be later specified by statute.¹⁴

As with child labor laws, compulsory schooling laws passed in states only after some level of compliance with the law had already been achieved. In the case of compulsory schooling, Landes and Solmon found that states with the lowest levels of schooling were the last to pass compulsory schooling laws, and that laws passed only after the average level of schooling had already begun to rise. They note "...the average

¹³ Martin Brown, Jens Christensen, Peter Phillips. "The Decline of Child Labor in the U.S. Fruit and Vegetable Canning Industry: Law or Economics?." *Business History Review*, Winter 1992, 66(4) p. 723-770.

levels of schooling in the South from 1900 to 1920, when most Southern states passed their laws, were roughly equal to levels in the non-South when schooling laws were passed, and only after reaching those levels did the South enact compulsory school laws.”¹⁵

Adding to work on the topic of compulsory schooling, a 1996 study by Margo and Finegan suggested the potential importance of the interaction between laws in examining impacts. Margo and Finegan used a similar approach to that of Moehling described above to determine the impact of compulsory school attendance laws in 1900. Although Margo and Finegan failed to find a statistically significant impact of compulsory attendance laws on school attendance when examining compulsory attendance laws alone, they did find a significant impact on attendance levels in states that had both compulsory attendance laws and minimum age laws for child labor.¹⁶ According to Moehling, “Margo and Finegan interpreted their findings as evidence that the combination of compulsory school attendance laws and restrictive child labor laws effectively increase the school attendance of children in 1900.”¹⁷

¹⁴ William Landes, Lewis Solmon. “Compulsory Schooling Legislation: An Economic Analysis of Law and Social Change in the Nineteenth Century.” *The Journal of Economic History*. March 1972, 32(1), p. 77.

¹⁵ Landes and Solmon, p. 88.

¹⁶ Robert Margo, Aldrich Finegan. “Compulsory Schooling Legislation and School Attendance in Turn of the Century America: A “Natural Experiment” Approach.” *Economic Letters*. October 1996, 53(1), pp. 103-110.

¹⁷ Moehling, p. 80.

As with the studies of women and child labor, work in the area of safety regulations has also found that legislation is often ineffective in changing the behavior of employers and employees. Several studies of safety regulations have concluded that these laws did not reduce accident rates. In the case of safety regulations, this could be due to ineffective enforcement, or because, as with the child labor laws, the safety regulations that successfully passed state legislatures only codified existing practices. For example, Price Fishback, in a study of safety regulations in the coal mining industry between 1903 and 1923, concluded:

Many of the specific regulations enacted had little impact on fatal accident rates, possibly because they just codified existing practices. Three specific regulations 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.¹⁸

In addition to these results, in later work Fishback found a negative relationship between the number of fatal coal mine accidents and the size of the state budget for mine inspectors.¹⁹ These results suggest that enforcement was key to determining the efficacy of safety regulations for coal mines. In contrast, it is not clear that greater spending for factory inspectors lowers accident risk in that industry. As noted by Fishback in a survey of studies on this topic, work by David Buffam (1992) and James Chelius (1977) failed to find a positive relationship between state spending on inspectors and reductions in

¹⁸Price Fishback. "Operations of 'Unfettered' Labor Markets: Exit and Voice in American Labor Markets at the Turn of the Century." *NBER Working Paper Series on Historical Factors in Long Run Growth*. Historical Paper 105. November 1997. p. 45.

¹⁹ Fishback, p. 45.

industrial accident risk.²⁰ For the railroad industry, Buffum found that regulations had a mixed impact on accident rates. Buffum found that “the Appliance Act of 1893, the Train Stoppage Act of 1922 and the Boiler Act of 1915 all statistically significantly lowered accident risk, but several other acts did not.”²¹

2.2.2 Studies Measuring Secondary Impacts of Regulation

The work of Claudia Goldin on women’s labor laws has shown that the impact of laws ostensibly aimed at one particular group of workers may in fact impact a seemingly unrelated group. In work done jointly with Kenneth Sokoloff, they find that the use of women and young men in manufacturing establishments in the Northeastern United States increased rapidly in the first half of the nineteenth century before stabilizing around 1850. “The radical shift in the composition of the industrial labor force was accompanied by nearly a doubling of the wage of females relative to that of adult males so that by 1850, this ratio had risen to almost 90 percent of the level it maintained between 1886 and 1960, when it was generally stable.”²² Goldin and Sokoloff found that compared to their productivity in other parts of the country, women and children were relatively less productive in the agricultural industries of the North. Therefore, the opportunity cost associated with the labor of women and children was lower. Goldin and Sokoloff hypothesize that this large supply of relatively underutilized labor contributed to

²⁰ Fishback, p. 45.

²¹ Fishback, p. 45.

²² Claudia Goldin, Kenneth Sokoloff. “Women, Children, and Industrialization in the Early Republic: Evidence From the Manufacturing Censuses.” *Journal of Economic History*. December 1982, 42(4), p. 743.

the concentration of manufacturing in the North during the nineteenth century.²³ Like Moehling and others, Goldin and Sokoloff found that the use of women and child labor in manufacturing began to decline by 1890, before widespread regulation of their labor became common.²⁴ Although they did find that as industrialization spread, the wage gap between females and young boys decreased relative to men, Goldin and Sokoloff document a persistent wage gap between the wages of men and those of women and children that is consistent with a higher skill level associated with male labor. Northern manufacturers used technology and different production technologies to reduce their use of the relatively more expensive skilled adult male labor and substituted towards the relatively cheaper less skilled labor of women and children. As a result of this shift in the relative demand for different classes of labor, the wages of women and children rose relative to those of men.²⁵

In later work, Goldin builds on her knowledge of women's labor issues to examine the impact of maximum-hours laws on female labor. Goldin examines the conclusions of Elisabeth Landes²⁶ that female hours laws both greatly reduced the hours worked per week by women and reduced their employment share in manufacturing. Goldin found that although these laws did impact labor markets, the measured effects

²³ Goldin and Sokoloff, p. 743.

²⁴ Goldin, p. 748.

²⁵ Goldin, p. 773.

²⁶ Elisabeth Landes. "The Effect of State Maximum-Hours Laws on the Employment of Women in 1920." *Journal of Political Economy*. June 1980, 88(3) p. 476-94.

were not as large as Landes' results suggest and impacts extended to outside the covered groups. Goldin found that

[a]lthough maximum hours legislation reduced scheduled hours, the impact was minimal and it operated equally for men....Legislation affecting only women was often symptomatic of a general desire by labor for lower hours....Legislation affecting only women was but one way labor sought to build a coalition in support of reduced hours.²⁷

According to Goldin's results, female hours laws reduced the hours worked of both male and female workers by about 1.8 hours.²⁸ Goldin concluded that protective legislation was one tool that labor used to achieve its goal of better conditions for all workers.

"Various types of protective legislation, such as child labor laws, compulsory attendance, and pay equity, which were once viewed as humanitarian in origin, have also been reinterpreted as directly benefiting certain groups, but not the ones to which the legislation directly applied."²⁹

In later work, Robert Whaples used city-level data to estimate the impact of women's hours laws. Using Goldin's regression equation, he found that hours laws enacted before 1914 reduced hours worked in 1919. However, when he added additional explanatory variables to the regression equation, the laws had little or no impact on hours worked.³⁰ Whaples also studied the general decline in hours for all workers between 1909 and 1919. He found that the most important factors in the transition to the eight-

²⁷Claudia Goldin. "Maximum Hours Legislation and Female Employment: A Reassessment." *The Journal of Political Economy*. February 1988, 96(1), p. 190.

²⁸ Goldin, p. 194.

²⁹ Goldin, p. 191.

³⁰ Fishback, p. 44.

hour day were related to the tightness of the labor market, union strength, and technology.³¹ Although state labor legislation did have a statistically significant impact on reducing hours worked, the relative contribution was small:

The influence of maximum hours laws is measured by *STATE LAW CHANGE*, the estimated amount which hours would have fallen if changes in the states' laws were binding. The coefficient, while significantly greater than zero, is significantly below one, suggesting that legislation was probably passed after other forces had reduced hours and had only a small additional effect. *STATE LAW CHANGE* reduced hours during the period by only 1 percent between 1914 and 1919 but by nearly 10 percent over the course of the decade.³²

2.2.3 The Political Economy of Legislation

In the final category of studies of labor legislation, authors typically focus on the political economy of the passage of different laws. In most cases, researchers have found that the laws that passed received the support of both labor and employers, and that these laws had advantageous aspects for all parties involved. For example, in a comprehensive study of workman's compensation laws, Price Fishback and Shawn Kantor find that employers, workers, and insurers supported workers' compensation legislation. Fishback and Kantor argued that all parties stood to benefit from legislation. Workers were willing to accept lower wages in exchange for the insurance, in order to gain greater income security in the event of an accident. Employers gained protection from accident liability

³¹ Robert Whaples, "Winning the Eight-Hour Day, 1909-1919" *Journal of Economic History*, June 1990, 50(2), pp. 393-406.

³² Whaples, 401-402.

claims, and insurers benefited from an improved risk pool that allowed them to increase the amount of accident insurance they could provide.³³

Stuart Brandes, in a study of “welfare capitalism” programs of early American businesses, argues that in many cases, employers voluntarily chose to improve workplace conditions in an effort to boost productivity and reduce turnover, strikes, and general labor strife.³⁴ Brandes finds that large companies like the Pullman Company, National Cash Register, Proctor and Gamble, Standard Oil, US Steel, and International Harvester all adopted some welfare measures by the 1890s. According to Brandes, welfare capitalism was a logical response to labor market pressures that was correlated with the business cycle. During expansions, when the labor market was tight, welfare capitalism increased as companies expanded fringe benefits in an effort to attract employees. In recessions, as the labor market loosened, interest in welfare capitalism waned. Brandes found that the recession of 1893-1897 brought a slowing of new companies adopting welfare capitalism, but renewed growth in the 1900s brought more attention to these programs. Strikes and increases in unionization between 1899 and 1904 brought more attention to working conditions. In addition to attracting workers in a tight labor market, Brandes also argues that some companies may have adopted welfare capitalism in order to reduce calls for passage and enforcement of antitrust laws.³⁵

³³ Fishback, p. 41.

The importance of positive public perception provided another reason for companies to voluntarily adopt improved working conditions and other fringe benefits.

For instance, a sympathetic public could help undermine political support for antitrust litigation or restrictive legislation. At least equally important, the outcome of a strike was often balanced on the crucial question of public sympathy, which meant of course that readings of the public sentiment could determine company and union strategy, including the question of whether there would be a strike at all.³⁶

Keeping out union organizers provided another strong reason to improve working conditions. Brandes quotes Elbert H Gray of US Steel: “We must make it certain that the men in our employ are treated as well as, if not a little better than, those who are working for people who deal with unions.”³⁷ By improving working conditions, companies could reduce the power of the union and hopefully avoid expensive strikes and other union-related costs in the future.

Once a company voluntarily adopts improved working conditions, that company now has the incentive to support mandatory legislation that forces competitors to do the same. Therefore, the spread of welfare capitalism amongst the largest companies at the turn of the century provided some incentives for these businesses to support progressive legislation, and may have facilitated the passage of some of the most common health and safety regulations. Fishback sums up this process:

³⁴ Stuart Brandes. *American Welfare Capitalism: 1880-1940*. Chicago: University of Chicago Press, 1976. p. 1.

³⁵ Brandes, 16-24.

³⁶ Brandes, 31-32.

³⁷ Brandes, p. 32.

Legislation like workers' compensation was passed in large part because employers, workers, and insurance companies all anticipated gains from its adoption. The measured impact of child labor laws and safety legislation often was not as large as the gains that reformers initially sought. Given the employer's political clout, the legislation was unlikely to pass unless a significant subset of employers supported it. In these cases the legislation passed after a number of employers begun to establish the practices to be required by the regulations. The progressive employers then agreed to the legislation to force recalcitrant employers to adopt the new policies. As a result, much of the legislation built on and extended changes that progressive employers were instituting in their workplaces.³⁸

2.3 Input Demand Studies

Few studies of input demand for the manufacturing sector focus on the pre-depression era. This section first contains a brief discussion of studies covering the 1900 to 1920 period. After that follows a description of work covering different time periods or industries but employing similar methodology as that employed in Chapter 5.

In 1965, David and van de Klundert used a two input production function to study of capital-labor substitution in United States manufacturing between 1899 and 1960 to test for the nature of the impact of technical change on factor inputs. Their specification allowed for "nonneutral" technical change so that they could study whether or not the history of technological change in the United States has favored one input over another.³⁹ In their study, they use a production function with the constant elasticity of substitution functional form. They find "that during the twentieth century technical change in the US

³⁸ Fishback, p. 5.

³⁹ Paul David, Th van de Klundert. "Biased Efficiency Growth and Capital-Labor Substitution in the U.S., 1899-1960." *The American Economic Review*. Jan 1965, 55(3), pp. 357-359.

Private Domestic Economy has not been Hicks-neutral, nor, for that matter has it been Harrod-neutral; although both labor-augmentation and capital-augmentation have been going on since 1900, these changes have been biased in a labor-saving direction.”⁴⁰

The assumption of a unitary elasticity of substitution implied by the Cobb-Douglas production function was rejected by their specification, which estimated a long-run elasticity of substitution of 0.32. David and van de Klundert estimated the relative growth of labor and capital efficiency over time and concluded that their time series has three distinct periods. The first lasted from 1900 to 1918. During this time “labor-saving technical changes took place more rapidly than the long-term trend rate of bias.”⁴¹ In the second period, from 1919 to 1945, no significant bias was identified. In the final period, from 1946 to 1960, the nation experienced an even more rapid rise in the relative efficiency of labor than experienced in the first period. The authors hypothesize that a drop in the relative efficiency of labor near the end of the second period corresponded to the Great Depression and World War II and was due to an increase in the utilization of capital due to first the slow economic recovery and then war-related demand pressures. In the third period, the relative efficiency of labor rose rapidly due to capital utilization falling back to normal levels after the war.⁴² They offered no explanation for the similarly rapid increase in labor efficiency during the 1900 to 1919 period.

⁴⁰ David and van de Klundert, p. 360.

⁴¹ David and van de Klundert, p. 383.

Louis Cain and Donald Paterson's 1981 study also examined biased technological change in American manufacturing at the turn of the century. Their study focused on manufacturing at the two-digit level between 1850 and 1919. In their specification, Cain and Paterson employed a translog cost function with four inputs: capital, labor, materials, and a residual input. Their goal was to test the hypothesis, based on earlier two-factor aggregate models of production, that technological change during this period was labor-saving and capital-using. They found labor-saving and capital-using biases in some industries, and materials-using biases in others. They concluded that although biased technological change was occurring during this time period, the direction of bias differed from industry to industry and a two-factor aggregate model may incorrectly estimate the true direction of technical change for some industries.⁴³

Cain and Paterson warn of the dangers of drawing conclusions from highly aggregated models. They point out that for certain industries, they reject the widely held assumption of labor-saving and capital-using technical change. They find that labor-saving bias was the most common, but they failed to find a capital-using bias in many of the industries they studied. Instead, they found a materials-using bias. These results underscore the importance of correct model specification, both in terms of choosing the correct number of factors and in choosing the level of aggregation.⁴⁴ These conclusions are also relevant for the results described in Chapter 5. Although a strong wage labor-

⁴² David and van de Klundert, p. 383.

saving bias was confirmed in Chapter 5, the aggregate four-input model specified in this analysis does not find a capital-using bias, instead identifying biases towards the use of salaried labor and materials.

In a later study, Cain and Paterson used the same data set and added an examination of economies of scale and substitution effects to their original analysis of biased technical change. To do this, they employed the use of a Generalized Leontief production function. Their results confirmed their earlier findings regarding biased technical change; they found a substantial labor-saving bias for most of the two-digit industries they studied. They also found substantial instances of economies of scale and joint factor substitution. Only two of the nineteen industries examined exhibited signs of constant returns to scale, underscoring the importance of size in manufacturing during this era. Joint factor substitutability was identified for fourteen of their nineteen industries, but they found low Allen elasticities of substitution, implying that ordinary factor substitution effects were minimal.⁴⁵

2.4 Studies Employing Relevant Methodology

The translog approximation is widely used in econometric estimation of cost functions because it requires no prior assumptions about the shape of the cost function.

⁴³ Louis Cain, and Donald Paterson. "Factor Biases and Technical Change in Manufacturing: The American System, 1850-1919." *The Journal of Economic History*. June 1981, 41(2), pp. 341-343.

⁴⁴ Cain and Paterson, p. 353-354.

⁴⁵ Louis Cain and Donald Paterson. "Biased Technical Change, Scale, and Factor Substitution in American Industry, 1850-1919." *The Journal of Economic History*. March 1986, 46(1), p. 164.

The function is based on a second order Taylor series expansion of a cost function of the form $C(\mathbf{w}, \mathbf{q})$ where $\mathbf{w}$ and $\mathbf{q}$ are vectors of input prices and output quantities, respectively. Because this expansion does not assume a functional form for the cost function, it does not require assumptions about the cost function such as constant returns to scale.⁴⁶

The flexibility of the translog form can also be a problem. Because the function is the approximation of an unknown true cost function, the econometric model is misspecified. Guilkey and Lovell (1980) performed simulations to test the robustness of the translog form in the face of different “true” underlying functional forms. A commonly quoted property of translog estimation is that estimating the system instead of a single cost equation increases efficiency of the estimates. However, this is only necessarily true if the translog form is the true form. If the translog form is an approximation (as is usually assumed) and is not the true form of the function, it is not clear that system estimation is superior to single equation OLS. Guilkey and Lovell find that the translog estimates perform well under a wide range of different “true” functional forms, but that estimates deteriorate as the partial elasticities of substitution become very different from unity. They also find that system estimation does not substantially improve the quality of results. Furthermore, OLS estimates of scale economies are superior to scale economy estimates derived from system estimation. Because of the similarity of the results from the two methods of estimation and the relative ease of

calculation of the OLS estimates, Guilkey and Lovell recommend the use of single equation OLS instead of system estimation.⁴⁷

Although theoretically, the dual nature of the production and cost functions makes estimation of either equivalent, there are empirical differences. Binswanger, in a 1974 application of the translog cost function to state level data for the farm sector, outlines five properties of the cost function that make cost function estimation superior to production function estimation. First, the condition that the cost function is homogeneous of degree one in input prices is less restrictive than the condition that the production function is homogeneous of degree one in input quantities. Second, in estimating a production function one must assume that input quantities are the exogenous variables, an assumption that is questionable given that producers' decisions about profit-maximizing input quantities depend on relative input prices. Cost function estimation requires only the less dubious assumption that input prices are exogenous. Third, estimation of elasticities of substitution or elasticities of factor demand is easier and result in smaller estimation errors when a cost function is used instead of a production function. Fourth, cost function estimation handles the problem of neutral or non-neutral efficiency differences among observations or of neutral or non-neutral economies of scale without resulting in biased estimates of the production parameters. Fifth, the translog

⁴⁶ William Greene, *Econometric Analysis*, 2nd Edition, New Jersey: Prentice-Hall, Inc., 1993, p. 503.

⁴⁷ David Guilkey and C.A. Knox Lovell. "On the Flexibility of the Translog Approximation." *International Economic Review*. February 1980, 21(1), 137 - 147.

cost function is linear in logarithms. Lastly, estimation of the cost function avoids the multicollinearity among input variables that occurs with production function estimation.⁴⁸

Binswanger points out that his use of time series and cross sectional data raises some concerns about efficiency differences in the observations. Ignoring efficiency differences between observations will result in biased results. Binswanger distinguishes between two types of efficiency differences. The first type comes from leaving out variables. In this case, the differences in efficiency can be related to a specific variable, such as education, management, technical change over time, or labor legislation. If the variable can be identified, this problem can be fixed by deriving the translog form as a function of these parameters in addition to input prices and output quantities. In this case, the cross-product coefficients will be estimates of the rates of bias. The new coefficients will give an idea of how the parameter in question affects the factor shares. For example, if the cross-product coefficient on time⁴⁹ were greater than zero for a given input, the share of that input would rise (given factor prices are constant) at the logarithmic rate corresponding to the value of the coefficient. Binswanger refers to this case as factor-i using technological change, and in this case, the technological change is non-neutral. If all cross-product coefficients are zero, the variable in question does not affect the factor shares, and the efficiency difference is defined as neutral. Efficiency differences across observations can be more problematic if data on a variable is not

⁴⁸ Hans Binswanger. "A Cost Function Approach to the Measurement of Elasticities of Factor Demand and Elasticities of Substitution." *American Journal of Agricultural Economics*. May 1974, 56(2) pp. 377.

available. In this situation, the system can still be estimated without bias only if the efficiency difference is neutral. The system estimation must exclude the cost function because the coefficient on the left-out variable is nonzero, and this coefficient appears in the cost equation. The share equations only include the cross-product terms on the left out parameter, and these coefficients are all equal to zero if the efficiency difference is neutral, so estimation of the share equations leads to unbiased results.

The second type of efficiency difference that Binswanger identifies is “differences among cross-sectional units which cannot be functionally related to a variable and which arise from past differences in technical change.”⁵⁰ In this case, the different units are no longer on the same isoquant. This problem can only be fixed if the efficiency differences are neutral. If the efficiency differences between the observational units are neutral, then the system can be estimated with only the share equations for the same reasons as above. Binswanger includes five regional dummies in his cost share equations to resolve this problem. He claims that by grouping the data into regions in which no non-neutral efficiency differences exist, he insures unbiased estimates of the parameters of the cost function because the dummy variables allow the system to predict different input shares for different states. Binswanger estimates his model with only the share equations and estimates elasticities of substitution and elasticities of factor demand for the four inputs he includes. He finds that the regional dummies he includes are all significant, evidence

⁴⁹ A time variable is commonly employed as a proxy for technological change

⁵⁰ Binswanger, p. 380.

for non-neutral efficiency differences among the inputs.⁵¹ In the translog specification employed in Chapter 5, state-level dummy variables are included to control for these differences. As in Binswanger, most of the coefficients on the state dummy variables are significant, suggesting the presence of non-neutral efficiency differences between states.

There are many examples of production or cost studies that take into account the impact of inputs or influences external to the firm. For example, Zvi Griliches studied specification issues for aggregate agricultural production functions in a series of papers using the Cobb-Douglas production function. He conducted both a cross-sectional analysis of 68 regions in the United States for 1949 and an analysis of 39 states in 1949, 1954, and 1959.^{52,53} In both studies, Griliches used a Cobb-Douglas production function to estimate output for five inputs. In the first study, Griliches included a variable to control for the effects of education. He found that education was a significant variable in the model and provided more explanatory power than the labor variable alone.⁵⁴ He expanded on this idea in his 1964 *American Economic Review* paper. In this paper, he used a Cobb-Douglas production function on state-level data over three years and he added in a variable to reflect the impact of spending on public research and extension (R&E) per farm. He found that both the education and spending on R&E were

⁵¹ Binswanger, p. 38.

⁵² Zvi Griliches, "Estimates of the Aggregate Agricultural Production Function From Cross-Sectional Data," *Journal of Farm Economics*, May 1963, v. 45, p. 419-28.

⁵³ Zvi Griliches. "Research Expenditures, Education, and The Aggregate Agricultural Production Function." *American Economic Review*. December 1964. 54(6), p. 961-974.

⁵⁴ Zvi Griliches. "Estimate of the Aggregate Agricultural Production Function from Cross-Sectional Data." *Journal of Farm Economics*. May 1963, 45(1), p. 424.

significant variables in his model. He noted that the estimated coefficient on R&E implied that doubling public expenditures on R&E would result in an increase on output of 5 percent. This translates to an estimated gross rate of return of 1300 percent for investment on agricultural research and extension. Griliches also measured marginal products for the 7 inputs he estimates and found that the marginal products are approximately equal for 3 of the 7 inputs, indicating that these inputs are in equilibrium. Marginal products were found to be substantially different for two inputs, fertilizer and R&E. Griliches noted that the marginal product for fertilizer has fallen over time, indicating that this input is moving towards equilibrium, but that since the level of R&E is politically controlled, farmers had no significant control over the marginal product of R&E.⁵⁵

In related work, Lynde and Richmond used a translog specification to study the impact of public capital on production in the United States nonfinancial corporate sector from 1958 to 1989. They used a three input model with labor and private capital determined by the firm and public capital exogenously determined. They also included a technology variable to allow for biased technical change and output to allow for non-constant returns to scale. They define public capital share equations in addition to the traditional factor share equations for private capital and labor. They found that public and private capital are complements in production rather than substitutes, and that public

⁵⁵ Griliches, 1964, p. 964-969.

capital is a significant input to production in the United States economy. Their work confirmed similar earlier studies.⁵⁶

Abala-Bertrand and Mamatzakis used a similar approach to study the impact of public infrastructure on productivity in the Chilean economy. Like Lynde and Richmond, they propose a three input model with firms choosing labor and private capital and public infrastructure capital exogenously determined. They include output, but do not include a variable to allow for biased technical change. They propose a share equation to represent public capital's share of total costs, and hypothesize a negative contribution of public infrastructure capital to firm costs. In other words, if the marginal product of infrastructure capital is positive, increasing the level of infrastructure capital will lower a firm's total costs. They define this new share equation as representing "the shadow price or willingness to pay for infrastructure capital."⁵⁷ Abala-Bertrand and Mamatzakis estimate the cost elasticity of infrastructure capital over time and the elasticity of input shares with respect to infrastructure capital. The latter elasticity gives the responsiveness of private capital and labor to increases in the level of public infrastructure. Like Lynde and Richmond, their findings confirm that public infrastructure capital lowers average costs, increasing the productivity of the economy.⁵⁸

⁵⁶ Catherine Lynde, and James Richmond. "The Role of Public Capital in Production." *The Review of Economics and Statistics*. February 1992, 74 (1), p. 37-44.

⁵⁷ Jose Miguel Albala-Bertrand, and Emmanouel Mamatzakis. "The Impact of Public Infrastructure on the Productivity of the Chilean Economy." Queen Mary University of London Department of Economics, Working Paper No. 435. February 2001, p. 7.

2.5 Conclusion

A large body of work exists examining the effectiveness of specific classes of labor legislation, the political economy of the passage of certain laws, and the impacts of specific laws on the employment of different inputs to production. Many authors have found the impact of laws to be smaller than expected, either because the laws codified existing practices, or because the laws were unenforceable and did not significantly change behavior. Other authors have found that laws ostensibly passed to protect one class of workers affected the working conditions of an unrelated class, or that combinations of laws affected working conditions but single laws passed alone did not. Other researchers have shown that successful passage of a law requires the support of all parties involved, including labor, employers, the general public, and politicians. This requirement helps to explain the finding that laws often have a smaller-than-expected impact on input choice. For a law to receive the backing of industry, a substantial portion of businesses must already be complying with the requirements. Passage of the law then acts as a way for “early adopters” to protect their investment and reduce competition from employers that have not chosen to voluntarily comply with the regulation.

The literature estimating production technology for turn-of-the century manufacturers has documented a labor-saving bias. The majority of the work done to date has included only the traditional choice variables in the production function: capital, labor, land, and materials. These studies have not attempted to integrate the influence of

⁵⁸ Albala-Bertrand and Mamatzakis, p. 10-11.

external variables such as labor legislation. Existing studies have focused on measuring the substitutability of different inputs, determining the direction of biased technical change, and determining the sources of productivity growth. No study done to date has integrated the impact on firm input choice decisions of the regulatory burdens that firms face. The work in the ensuing chapters will integrate these disparate areas of study by first describing the body of legislation in force in each state during the first two decades of the twentieth century, then summarizing this data in a small number of index variables and then integrating these variables into a cost function model of manufacturers' input demand.

CHAPTER 3 : DESCRIBING THE LAWS

3.1 Introduction

At the turn of the century, the political structure of the United States placed most of the regulatory power with the states. The federal government had limited power to regulate activities within the states. In most states, the popularity of the states' rights doctrine resulted in opposition to any attempt by the Federal government to regulate labor markets.⁵⁹ In many cases, the courts overturned early federal legislation, finding that these laws were not a valid exercise of the Federal government's power to regulate interstate commerce.⁶⁰ The weakness of the central government resulted in widely different regulatory climates across states, with some states having virtually unregulated labor markets, and others passing a large number of progressive regulations. By 1930, the idea of a stronger central government had become more widely accepted, and the Federal government became a more powerful regulatory body. This chapter describes the variability and breadth of labor regulation in each state during the first two decades of the century, documenting the rapid growth in the volume of laws in force and the marked regional variations in both the number and type of laws enacted during this period.

The first section of this chapter describes the 135 labor laws that were in force in at least one state during the 1895-1924 period. The laws were collected from compilations of state laws published by the United States Commissioner of Labor, later

⁵⁹ Moss, p. 96.

renamed the Bureau of Labor Statistics. Any law listed as being in force in any of the study years is included in the analysis.

The second section of this chapter describes the tremendous growth in regulation that occurred over this thirty-year period. In 1895, most states were minimally regulated, with most laws aimed at the most basic protection of workers and consumers. By 1924, many more comprehensive types of laws were in effect in most states. This era is unique in United States history because it represents a time period during which labor issues were beginning to get more attention in the legislatures, and because of this, the number of laws was increasing rapidly. Due to this rapid increase, the time period covered in this study includes years in which the majority of states had few regulations as well as years in which markets were more heavily regulated. This relatively high level of time series variation will allow a meaningful analysis of the impact of these laws on firm decisions.

Finally, the last section of this paper describes the regional variability in the volume and types of laws in force in each state. There are marked differences between the industrial Northeast and East North Central states as compared to the South, West North Central, Pacific, and Mountain regions. Not surprisingly, more urbanized states passed a larger volume of legislation in most years. However, rapid growth in legislation in the Pacific states meant that these states' labor markets moved from a relatively

⁶⁰ See, for example, U.S. Department of Labor. *Growth of Labor Law in the United States*. Washington, DC: Government Printing Office, 1962, p. 39.

unregulated condition at the turn of the century to a regulatory burden similar to the more urbanized Eastern states by 1924. Legislation in the Southeastern states lagged the nation in most years. The Midwestern agricultural states fell somewhere in between the relatively unregulated South and the more highly regulated Northeast.

The pattern of legislation in force across the nation displays significant intra-regional homogeneity and inter-regional variability. Some of the regional homogeneity is no doubt due to other underlying similarities in industrial structure, labor force composition, demographics, and other factors in states located within the same region. However, the pattern of “outlier” states—states whose regulatory burdens differ significantly from the rest of the region—suggests that a “contagion” effect may exist. In virtually every case, these outlier states border regions with very different regulatory burdens. This pattern suggests that state legislatures did consider the regulatory burden of neighboring states. For example, for states located within a progressive region but bordering a less regulated region, the competitive pressures exerted by the comparatively lax regulation in neighboring states may have affected the viability of labor legislation. This resulted in a regulatory burden in border states that was not as severe as the rest of the region or as lax as the neighboring region.

3.2 Description and Categorization

A law was included in the analysis if it was on the books in at least one state during this time period. There were 135 laws that were in effect in at least one year

between 1899 and 1924. These 135 labor laws were placed into 23 categories. These groups are in turn divided into six general categories:

1. Hours, age and wage laws
2. Regulation of the employment contract
3. Administrative and social insurance
4. Regulation of labor supply
5. Safety regulations
6. Unionization and bargaining regulations

Table 1 lists the laws included in this study by category.

The hours, age and wage laws contain laws regulating the workday, hours of work, and minimum wage laws. This category contains 36 laws, including nine men's hours laws, three holiday laws, five women's hours laws, two women's protection laws, six children's hours laws, eight children's age laws, and three minimum wage laws. These laws generally regulated the workday. Twenty-two of the 36 laws in this category protected women and children only, reflecting the fact that most early regulation of the workday began with women and children before moving to regulation of all workers.

The second group contains 23 laws that regulate the employment contract. Seven laws regulated the ways that employees could be paid. Four laws outlawed bribery and coercion of employees or regulated company stores. Two more provided protected employees' right to vote, by providing for time off and prohibiting employers from attempting to coerce the votes of other employees. Three laws prohibited discrimination

by employers, and two laws regulated employment agents. Finally, five employers' liability laws provided employees some protection in the event of an on-the-job injury.

The administrative and social insurance category is the smallest, with five laws mandating various government agencies. These laws fit into two categories. First are bureaucratic agencies intended to study labor issues or assist workers. The bureau of labor statistics, free employment offices, and boards of arbitration fit into this category. Second, assistance or social support programs intended to help injured or impoverished workers. The mother's pension and workman's compensation programs fit into this category.

The fourth group contains 18 laws regulating labor supply. Licensing laws make up the majority of laws in this category. The group also contains three laws restricting the use of alien labor and one law regulating the use of convict labor.

The fifth group contains safety laws. The majority of the 27 laws in this category covered manufacturing operations. There are 14 factory safety laws, three laws regulating the reporting of accidents, three railroad safety laws, and seven mine safety laws.

The sixth group contains 26 laws that protect the legal rights of unions and their members. About a fourth of these laws provided for the legal rights of unions by making

unionization legal or by providing for incorporation of unions, protecting union trademarks and cards, and protecting union members from embezzlement by officers. Another fourth of the laws increased union power by allowing strikes, prohibiting blacklisting or “yellow-dog” contracts,⁶¹ providing for injunction limits, outlawing the use of armed guards by employers, and outlawing wage fixing by employers. About half of the laws reduced union power. Seven laws prohibited intimidation or interference with workers in mines, railroads, or general employments or conspiring to keep a person from working. Seven more laws prohibited union activities like picketing or boycotting. These anti-labor laws set fines for trespassing on company property without consent, set fines for enticing employees away from their current employer, legalized the use of industrial police to control labor violence, and specifically make advocating the use of violence for political or industrial ends illegal.

Table 1: Labor Laws Included in Study

1. Regulation of Hours, Age, and Wages					
Child Labor			Women's Labor	Men's Hours	
• Minimum age general	• Child labor inspectors		• Seats for women	• General	
• Minimum age for manufacturing or mercantile	• No children in street trades		• Earnings of married woman belong to her	• Manufacturing	
• Certificate of age required	• No children cleaning moving parts			• Textiles	
• Penalty for false certificates	• Child welfare commission			• Public	
				• Mining	
				• Street Railroads	
				• Railroads	
				• Miscellaneous	
				• Public Roads	

⁶¹ A contract a worker must sign as a condition of employment that stipulates that the employee will not join a union.

Table 1: Labor Laws Included in Study

Child Hours <ul style="list-style-type: none">• General• Manufacturing• Mercantile• Textiles• Night Labor• Miscellaneous	Holidays <ul style="list-style-type: none">• No Sunday Labor• Labor Day holiday law• No work on state holidays	Women's Hours <ul style="list-style-type: none">• General• Manufacturing• Mercantile• Textiles• Night Labor	Minimum Wages <ul style="list-style-type: none">• Commission• For women and children• For public employees
2. Regulation of the Employment Contract			
Employer's Liability Laws <ul style="list-style-type: none">• Main law• Railroad workers• Miners• Main law restates the common law• Prohibits contracts waiving damages	Bribery, Coercion, or Gouging <ul style="list-style-type: none">• Foremen accepting fees for employment illegal• No bribing of employees• No coercion of employees• Company store regulations	Wage Payment <ul style="list-style-type: none">• No forced contributions• Notice of reduction of wages• Notice of discharge• Employees must repay advances• Nonpayment of wages illegal• Wages must be paid in cash• Wage payment frequency	
Political Protections <ul style="list-style-type: none">• No coercing the votes of employees• Time off to vote	Employment Agents <ul style="list-style-type: none">• Regulation of employment agencies• Emigrant agent regulations	Anti-discrimination Laws <ul style="list-style-type: none">• General anti-discrimination law• Sex discrimination• Age discrimination	
3. Administrative Programs and Social Insurance			
Administrative Programs <ul style="list-style-type: none">• Bureau of labor statistics• Free employment office• Board of arbitration		Social Insurance <ul style="list-style-type: none">• Mother's Pension• Workman's compensation	
4. Regulation of the Labor Supply			
Licensing Laws <ul style="list-style-type: none">• Barbers• Plumbers• Electricians• Aviators• Chauffeurs• Railroad telegraph• Other Railroad• Elevator Operator• Motion Picture Operators• Steam Engineer (fireman)• Mine Managers• Stevedores• Horseshoers• Miscellaneous			
Convict Labor <ul style="list-style-type: none">• Convict labor regulations		Alien Labor Laws <ul style="list-style-type: none">• No aliens in pubic employment• No importing alien labor• No Chinese labor	

Table 1: Labor Laws Included in Study

5. Safety Regulations			
Factory Safety <ul style="list-style-type: none">• Factory Inspectors• Guards• Ventilation• Sanitation• Electrical• Steam Boiler regulations• Other Safety regulations		Mines <ul style="list-style-type: none">• Construction workers• Bakeries• Sweatshops• Fire escapes• Industrial safety commission• Occupational disease reporting• Rehabilitation commission• Mine Inspector• Regulations for the company or owner• Regulations for individual miners• Fine for mine inspector malfeasance• No women/children in mines• Coal weighing regulations• Miner's hospital	
Accident Reporting <ul style="list-style-type: none">• Factories• Railroads• Mines		Railroad Safety <ul style="list-style-type: none">• General railroad safety• Street railroad safety• Railroad inspectors	
6. Unionization and Bargaining			
<ul style="list-style-type: none">• No false use of union cards• Incorporation of unions legal• Unions exempt from antitrust• Strikes legal• Labor agreements not a conspiracy• No blacklisting• No yellow-dog contracts	<ul style="list-style-type: none">• No armed guards• No falsely representing the presence of a strike• Injunction limits• Union trademark protection• Illegal for labor union officials to embezzle funds• No wage fixing by employers	<ul style="list-style-type: none">• General anti-intimidation law• No intimidating miners• No interfering with railroad workers• No interfering with street railroad workers• No conspiring to keep someone from working	<ul style="list-style-type: none">• No boycotts• No picketing• Industrial police legal• Criminal syndicate laws• No trespassing: mines/factories• No abandoning railroad equipment (locomotives)• Anti-enticement law

3.3 Growth in Total Volume of Labor Legislation

In 1899, each state had an average of 28 of the 135 laws in effect, with that number ranging from a maximum of 67 in Pennsylvania to a minimum of two in Alaska.

By 1924, the average number of laws in effect jumped to 54. New Jersey led the nation in 1924 with 80 laws, and Hawaii trailed with 21. The near doubling in the average number of labor laws within this 25-year span reflects the increased attention state legislatures were giving to labor issues.

Most of the early labor laws protected the legal right to contract of workers and employers. These laws enforced labor contracts and punished employers for acts of gross negligence. The laws in force in 1899 were generally the least restrictive laws in each category. For example, 46 states passed a Sunday labor law by 1899, making it the most common law. The motivation behind this law related more to the perceived immorality of working on a Sunday than any labor issue. In 1899, only 15 laws were in force in 25 or more states. Of these laws, five protected the legal rights of employees (protecting the earnings of married women, prohibiting coercing the votes of employees, requiring wage payment in cash, protecting union trademarks, and the general employer's liability law), four protected women or children (prohibiting employment in mines, in immoral occupations, age limits for manufacturing or mercantile professions, and requiring seats for women), two provided for the bureaucratic framework of labor regulation (by establishing a labor bureau and setting aside Labor Day as a holiday), and two provided for basic safety regulations; one for mines and one regulating fire escapes in factories. The only law in this list protecting employers was a law prohibiting the abandonment of trains by railroad employees. Table 2 presents the most common laws in the early, middle, and late part of the period under study.

By 1909, there were significant increases in legislation, with 34 laws in place in 25 or more states. Seven of the 20 new laws protected children.⁶² Laws setting age restrictions for children in all occupations became widespread, reflecting the growing public support for regulating the labor of children. In order to enforce the age restrictions, child labor inspectors, laws requiring children to present certificates of age in order to work and laws setting penalties for the use of false certificates of age also became popular. In the child hours category, laws setting maximum hours for children in manufacturing and textiles, as well as limits on night labor of children became widespread.

Safety and employers' liability laws also gained widespread acceptance during the period before 1909. In the safety category, five additional laws passed in 25 or more states, reflecting rising public concern regarding working conditions. Laws requiring safety apparatus on railroads and street railroads enjoyed substantial growth between 1895 and 1924, as do most of the mine safety laws. The early regulation of safety apparatus on railroads was done more in the interest of protecting the public than in order to protect railroad employees. Similarly, the male hours laws for railroad workers also became common before 1910. Regulation of the hours of railroad workers may have been motivated more out of concern for public safety than by labor issues. These laws commonly stated that railroad employees could not work consecutive shifts or could not

work unless they have had a reasonable time off for sleep. The language of these laws makes it clear that the primary reason for passing these laws was concern for public safety.

In contrast, the intent of the mining laws was to protect the miners, not the public. Early regulation of mines is logical given the inherently dangerous nature of the industry. Three of the seven mine safety laws are in force in 25 or more states by 1909, and there is little growth in mine safety laws after 1914. Compared to the other two categories of safety laws, the factory safety category experiences the least growth, with laws requiring fire escapes and factory inspectors passed in 25 or more states by 1909. These are the least stringent of the factory safety regulations, suggesting that factory safety was amongst the last issues that legislatures turned to, after child labor, the protection of public safety, and mining safety.

The last major area of growth in legislation by 1909 was employer's liability legislation. Four of the five employer's liability laws were all in force in 25 or more states by 1909.⁶² Finally, boards of arbitration, laws regulating employment agencies, wage frequency regulations, laws requiring wage payment in cash, and convict labor limitations all passed in 25 or more states by 1909. Table 2 lists all laws that were enacted in at least 25 states in any year between 1899 and 1924.

⁶² The law penalizing employees for abandoning railroad equipment drops off the list.

⁶³ The employer's liability law for miners never became widespread during the 1899-1924 period.

Table 2: Number of States with the Most Common Laws, 1899-1924¹

Law and Category	States With Law In Year:						cg. ²
	'99	'04	'09	'14	'19	'24	
Regulation of hours, age, and wages							
Child Labor Laws							
Child labor inspector	15	18	31	42	41	41	26
No children in manufacturing, mercantile, or mechanical jobs	25	32	42	43	42	44	19
Minimum Age	19	25	34	36	40	42	23
Penalty for false certificate of age	18	28	36	39	38	38	20
Certificates of Age required for employment	21	29	38	44	45	46	25
No children cleaning or handling moving parts	12	14	20	34	36	39	27
No children in street trades	26	27	30	34	34	34	8
Child Hours Laws							
General	7	10	18	28	31	35	28
Mechanical	20	24	31	31	30	28	8
Textile	18	21	27	28	27	26	8
Minimum Age for night labor for children	8	18	31	42	44	45	37
Women's Regulations							
Special accommodations (seats)	27	32	35	45	44	44	17
Earnings of married women belong to her	38	40	43	45	46	46	8
Women's Hours Laws							
General/All Employment	5	6	8	21	26	28	23
Mercantile	5	7	11	23	25	27	22
Mechanical	15	17	19	26	26	28	13
Textiles	12	15	16	26	25	27	15
Holidays							
Labor Day a holiday	30	42	48	48	51	51	21
Sunday labor fines	46	47	48	48	50	50	4
Hours Laws							
Railroads	9	14	26	29	27	27	18
Public Employment	18	22	22	31	29	30	12
Public Roads	8	24	24	25	16	16	8
Regulation of the Employment Contract							
Employer Liability Laws							
Restates Common Law	23	32	26	23	23	21	-2
General	32	44	47	49	48	47	15
Railroads	21	25	32	33	32	32	11
Can't require employees to sign contracts waiving damages	17	19	27	29	28	28	11

Table 2: Number of States with the Most Common Laws, 1899-1924¹

Law and Category	States With Law In Year:						cg. ²
	'99	'04	'09	'14	'19	'24	
Political Protections							
Coercing the votes of employees illegal	31	35	33	38	38	38	7
Time off to Vote	20	20	22	27	24	24	4
Employment Agents							
Regulation of Employment Agencies	15	24	28	32	37	42	27
Wage Payment							
Wages in cash	25	28	28	30	29	30	5
Wage payment frequency	21	25	27	34	35	37	16
Administrative Programs and Social Insurance							
Social Insurance							
Workers' Compensation Law	0	0	0	20	40	42	42
Mother's pension	0	0	4	21	33	43	43
Administrative Laws							
Bureau of labor Statistics or Department of Labor	32	35	34	40	44	44	12
State board of arbitration	21	25	27	33	32	33	12
Free employment offices	3	10	16	19	25	32	29
Regulation of Labor Supply							
Convict Labor							
Convict Labor Regulations	23	26	27	30	32	33	10
Occupational Licensing							
Chauffeurs	0	0	4	22	29	36	36
Safety Regulations							
Factory Safety							
Sanitation/bathroom regulations	16	20	23	32	35	35	19
Ventilation	14	18	22	24	25	26	12
Guards required on machines	15	20	23	30	35	35	20
Bakery Regulations	7	11	14	22	28	32	25
Fire escapes	25	29	31	34	36	37	12
Factory Inspector	21	24	29	36	41	41	20
Reporting of Accidents							
Mine accidents	21	24	26	33	33	32	11
Railroad accidents	4	8	23	33	38	39	35
Railroad Regulations							
Safety Regulations	24	30	33	41	45	45	21
Street Railroad safety regulations	13	26	28	31	30	30	17

Table 2: Number of States with the Most Common Laws, 1899-1924¹

Law and Category	States With Law In Year:						cg. ²
	'99	'04	'09	'14	'19	'24	
Mining Regulations							
Mine inspectors	24	25	30	33	33	33	9
Mine Safety Regulations: Employees/Individuals	19	21	24	30	32	32	13
Mine Safety Regulations: Companies	25	28	30	33	35	35	10
No Women and Children in Mines	25	28	32	35	35	35	10
Unionization and Bargaining							
Interfere with or intimidate in railroads or workers abandoning trains or obstructing track	25	14	11	12	9	9	-16
Anti-intimidation	19	20	23	25	26	27	8
No blacklisting	17	21	24	26	25	25	8
Union trademark fine	31	40	42	43	43	44	13
Number of laws in force in at least 25 states	15	25	34	46	52	52	37
¹ A law is listed if it was in force in at least 25 states (and Washington DC) during the 1899-1924 period.							
² cg: Increase in number of laws between 1899 and 1924							

By 1924, there were 52 laws that were in place in 25 or more states. The main areas of increase relative to 1909 were in women's hours, government, and factory safety legislation. Four women's hours laws became widespread: general, textiles, mercantile, and manufacturing. In the government and social insurance area, workman's compensation, mother's pensions, and free employment offices became common, and in the factory safety category, laws regulating ventilation, sanitation, guards, and bakeries were passed by at least 25 states. The other laws that became popular were: general anti-intimidation laws, anti-blacklisting laws, laws preventing children from cleaning moving parts, child hours laws for general occupations, male hours for public employments, railroad accident reporting requirements, and licenses for chauffeurs. This growth represents a continuation in the trend of protecting public safety and protection of women and children, and an increase in attention to workplace safety. In the children's category,

the two children's laws represented another increase in the stringency of child labor regulations, reflecting the growing acceptance of the regulation of child labor.

The only male hours law to make the "most popular" list was the law for public employees. Although the regulation of the hours of men was receiving some legislative attention by 1924, it had not yet gained enough general acceptance that laws limiting hours for private employees were politically viable. It is interesting to note that there are only three union-related laws on this list of "most popular" laws: the anti-intimidation, anti-blacklisting, and union trademark laws. This relative scarcity of union-related laws indicates that union issues had not become widespread in the United States before 1924.

The increased popularity of protective legislation in 1924 resulted in a change in the composition of the ten most common laws compared to the top ten laws of 1895. Laws prohibiting coercing the votes of employees, abandoning trains, prohibiting the employment of children in mines or in immoral occupations, laws requiring fire escapes and laws requiring mine inspectors dropped out of the top 10. These were replaced by employer's liability laws, laws requiring children to have certificates of age, railroad safety regulations, laws regulating the night labor of children, and age requirements for manufacturing or mercantile jobs. Of these five new most common laws, three protect women and children, and all of them protect workers. This is evidence of the increasingly protective nature of labor laws. Over this time period, the intent of laws changed from protecting the legal right of the employee to contract to laws protecting the

employee from exploitation in the nature of the contract. Table 3 lists the top 10 laws in force in 1895 and 1924.

Table 3: Top 10 Laws in 1895 and 1924

Rank	1895		1924		
	Law	States	Rank	Law	States
1	Sunday Labor	43	1	Labor Day is a holiday	51
2	Wages of married women are hers	31	2	Sunday Labor	50
3	No coercing the votes of employees	30	3	Main employer's liability law	47
4	Labor Day is a holiday	29	4 (Tie)	Wages of married women are hers Certificates of age required	46
5	Bureau of labor statistics or department of labor	28	6 (Tie)	Railroad safety regulations Child night labor restrictions	45
6 (Tie)	No abandoning locomotives No children in street trades Union trademark protection No women or children in mines	25	8 (Tie)	Bureau of labor statistics or department of labor Union trademark protection Seats for women Minimum ages for manufacturing or mercantile jobs	45
10 (Tie)	Fire escape regulations Mine inspectors Seats for women	23			

Note: Laws in bold are present on both lists. In the case of ties, multiple laws are listed in a cell and assigned the same rank

3.4 Growth in Labor Legislation by Category

Table 4 presents the growth in the average number of laws in force in each category over time. The table shows the average number of laws in effect in each category for the 50 states and the District of Columbia in 1899, 1909, 1919, and 1924,

and the growth in laws for three periods: 1899 to 1909, 1909 to 1919, and 1899 to 1924.

Most of the categories of laws can be described as “early” or “late” stage. Activity in passage of the early stage categories of laws peaked before 1909, while activity for late stage laws peaked after 1909. For most categories, the period between 1919 and 1924 saw only small increases in legislation. A few of the late-stage categories saw significant activity in legislation during this five-year period, but for the most part, the level of legislation in effect increased only modestly during this period.

Table 4: Growth of Categories of Laws Over Time

Category of Laws	N ²	State-Laws ¹				Growth		
		'99	'09	'19	'24	'99-'09	'09-'19	'99-'24
Regulation of hours, age, and wages	36	9.2	14.3	18.2	18.6	5.1	3.9	9.4
Child Labor Laws	8	2.7	4.5	5.7	5.8	1.8	1.2	3.1
Child Hours Laws	6	1.2	2.6	3.2	3.3	1.4	0.6	2.1
Women's Regulations	2	1.3	1.5	1.8	1.8	0.2	0.3	0.5
Women's Hours Laws	5	0.8	1.2	2.2	2.4	0.4	1.0	1.6
Holidays	3	1.5	1.9	2.0	2.0	0.4	0.1	0.5
Hours Laws	9	1.7	2.5	2.6	2.6	0.8	0.1	0.9
Minimum Wages	3	0.0	0.1	0.6	0.7	0.1	0.5	0.7
Regulation of the Employment Contract	23	4.9	6.9	8.0	8.2	2.0	1.1	3.3
Employer Liability Laws	5	1.8	2.7	2.6	2.6	0.9	-0.1	0.8
Bribery, Coercion, or Gouging	4	0.4	0.8	1.1	1.1	0.4	0.3	0.7
Political Protections	2	1.0	1.1	1.2	1.2	0.1	0.1	0.2
Employment Agents	2	0.4	0.7	0.9	1.1	0.3	0.2	0.7
Anti-discrimination Laws	3	0.1	0.1	0.1	0.2	0.0	0.0	0.1
Wage Payment	7	1.2	1.6	1.9	2.0	0.4	0.3	0.8
Administrative Programs and Social Insurance	5	1.1	1.6	3.4	3.8	0.5	1.8	2.7
Social Insurance	2	0	0.1	1.4	1.7	0.1	1.3	1.7
Administrative Laws	3	1.1	1.5	2.0	2.1	0.4	0.5	1.0

Table 4: Growth of Categories of Laws Over Time

		State-Laws ¹				Growth		
Regulation of Labor Supply	18	1.7	2.4	3.5	3.8	0.7	1.1	2.1
Convict Labor	1	0.5	0.5	0.6	0.6	0.0	0.1	0.1
Alien Labor Laws	3	0.2	0.4	0.4	0.4	0.2	0.0	0.2
Occupational Licensing	14	1.1	1.5	2.5	2.8	0.4	1.0	1.7
Safety Regulations	27	6.6	9.4	12.9	13.2	2.8	3.5	6.6
Factory Safety	14	2.7	3.8	5.9	6.2	1.1	2.1	3.5
Reporting of Accidents	3	0.7	1.3	1.8	1.8	0.6	0.5	1.1
Railroad Regulations	3	0.8	1.3	1.6	1.6	0.5	0.3	0.8
Mining Regulations	7	2.4	3.0	3.5	3.5	0.6	0.5	1.1
Unionization and Bargaining	26	4.4	5.0	5.9	6.4	0.6	0.9	2.0
Total	135	27.9	39.6	51.9	54.0	11.7	12.3	26.1
¹ The average number of laws per state in each category								
² The number of laws in the category								

3.4.1 Regulation of Hours, Age, and Wages

Although activity in the passage of laws in this category occurred throughout the 1899 to 1924 period, the timing of activity varied across sub-categories. For five of the seven categories of laws in this group, the majority of the legislative activity occurred before 1909. The two exceptions are women's hours laws and minimum wage laws, where activity peaked in the post-1909 period.

In 1899, the nation had an average of nine laws regulating hours, ages and wages. By 1909, the number increased to 14.3, an increase of 55 percent. By 1924, the national average increased by another 4.3 to 18.6 laws for a total increase of 9.4 laws over the entire period. Within this category, children's age laws were first to gain widespread

attention. Attention had turned to child labor as early as the mid 1800s in industrialized states in the Northeast and MidAtlantic areas. There were several reasons that states focused on the regulation of children early in the period. First, unlike the regulation of adults, laws governing children were more likely to hold up to legal challenges, so early reformers focused on child labor as a way to move towards their ultimate goal of shorter workdays and better working conditions for all workers. Second, supporters of early child labor regulations stressed the importance of education, and claimed that the long workdays of factory children did not allow sufficient time for schooling. Finally, labor organizations supported restrictions on child labor in order to restrict the labor supply.⁶⁴

In her 1938 book describing the history of the American labor movement, Lois MacDonald explains labor's support for the regulation of child labor:

Thus children at work constitute a serious factor in competition for jobs. Prohibition or strenuous regulation of child labor is one way of easing the burden of unemployment and spreading available work among adults. The trade unions, while they have not ignored the other aspects of the problem, have tended to stress the importance of regulation of child labor in order to create more jobs for unionists.⁶⁵

In his book *Socializing Security: Progressive-Era Economists and the Origins of American Social Policy*, David Moss cites a 1914 report written by Irene Osgood Andrews⁶⁶ on the impact of irregular employment by young women on older women's wages. According to Andrews, the employment of young women in temporary or seasonal work put downward pressure on the wages of all women, forcing wages below a

⁶⁴ Macdonald, p. 645-646.

⁶⁵ Macdonald, p. 646.

“livable” level. Because she believed that the majority of these young workers worked only to earn “pin money” and were not dependant on their wages for survival, she felt the best solution to this problem was to exclude all young workers from the labor market.⁶⁷

In 1848, Pennsylvania became the first state to pass minimum age restrictions with a law setting a minimum age of twelve in textile factories. In the next few years, New Jersey, Rhode Island, and Connecticut followed with minimum age laws of their own.⁶⁸ In most states, laws requiring compulsory school attendance and providing for free public schools went into effect by 1913.⁶⁹ This data set includes two laws regulating the minimum age of children; one law setting forth general age limits, and one setting forth limits for only specific types of jobs.⁷⁰ Both laws experienced rapid growth, gaining passage in 15 and 17 additional states respectively during the 1899 to 1909 period. However, the law setting forth general age limits was less popular, passing in 34 states by 1909, compared to the 42 states that had passed the industry-specific version of the law by 1909. Although minimum age laws were widespread by 1909, laws providing mechanisms for enforcing age restrictions lagged somewhat, suggesting that in many states, sidestepping age restrictions was not difficult. Laws requiring certificates of age and setting forth penalties for falsifying age certificates were in place in 38 and 36 states,

⁶⁶ Irene Osgood Andrews. “The Relation of Irregular Employment to the Living Wage for Women.” *American Labor Legislation Review*. 5(2) June 1915, p. 308-309.

⁶⁷ Moss, p. 53.

⁶⁸ U.S. Department of Labor, p. 11-13, 50.

⁶⁹ U.S. Department of Labor, p. 50.

⁷⁰ This law denotes a minimum age law that only applied to manufacturing, mercantile, or mechanical professions, as opposed to a general law covering any occupation.

respectively, by 1909. Similarly, the creation of child labor inspectors had occurred in only 31 states by 1909. Evidence indicates that lax enforcement continued to characterize child labor issues for many years. Lois MacDonald describes inadequate enforcement as one of three problems⁷¹ that surrounded child labor legislation in her 1938 book:

In some states, the enforcement agencies have been so poorly equipped and supported by the government that the passage of laws is nothing more than a gesture of good will toward a cause....States have on the whole shown themselves unwilling to make large appropriations for this purpose [inspections], and have in many cases evidenced the attitude of being far less concerned with the enforcement of these statutes than with their mere passage.⁷²

Federal attention had turned to child labor issues by 1906. The United States Congress published studies on the condition of women and children laborers during the 1910 to 1912 period.⁷³ In 1912, Congress established the Federal Children's Bureau. The Bureau had a broad mission that included many children's issues, including "...dangerous occupations, accidents and diseases of children, employment [and] legislation affecting children."⁷⁴ Eventually, in 1916, the Keating-Owen Bill passed. This law prohibited interstate shipment of goods produced using the labor of children under 14 or children between 14 and 16 working more than a set maximum number of

⁷¹ The other two problems were incompleteness and inadequacy of the laws and lack of uniformity among the states.

⁷² MacDonald, p. 648-649.

⁷³ U.S. Congress. *Report on Condition of Women and Child Wage-Earners in the United States*. Senate Document No. 645, Sixty-First Congress, Second Session. "Volume VI: The Beginnings of Child Labor Legislation in Certain States; a Comparative Study" 1910, "Volume III: Glass Industry," 1911, "Volume XIX: Labor Laws and Factory Conditions," 1912.

hours. This law was declared unconstitutional by 1918. By 1919, a second law passed levying a 10 percent tax on manufacturers in violation of the same hours and age standards. This law was declared unconstitutional in 1922.⁷⁵ Although the Federal laws failed, the attention that the Federal government brought to the issue undoubtedly increased pressure on the states to regulate child labor.

Regulation of the hours of work of children followed age limits but were less common than age restrictions in most states. According to an analysis of the history of labor laws done by the United States Department of Labor in 1962:

Opposition to the reduction of hours was stronger than to any other type of child labor regulation. Because everyone worked long hours, employers who were dependent on child labor could not see how they could continue to employ youngsters under 16 if such children worked 8 hours while other employees worked 10 or more.⁷⁶

As with the age limit laws, more states passed laws restricting the hours of children in specific professions than in general professions. By 1909, over half of all states had passed restrictions on the hours of children in manufacturing and textiles and restricting night work by children, but only 18 states had passed a general hours law for children. However, as acceptance of the regulation of child labor grew, general hours laws became more common than industry-specific laws. By 1924, the number of states with a general hours law nearly doubled to 36, while the number of states with industry-specific laws did not increase significantly beyond the 1909 level for these laws. The regulation of

⁷⁴ U.S. Department of Labor, 1962, p. 38.

⁷⁵ U.S. Department of Labor, p. 38-39.

night work by children increased fairly steadily throughout the 1899-1924 period, eventually passing in 45 states by 1924.

The two general laws regulating the labor of women gained fairly widespread support by 1909. By 1909, the laws declaring that the earnings of a married woman belong to her was in force in 43 of the 46 states that passed the law by 1924. Similarly, by 1909 the law requiring employers to provide seats for female workers had already passed in 35 of the 44 states that would eventually pass this law. In contrast, laws limiting the hours of women did not become widespread until after 1909. In general, the early courts viewed regulations limiting the hours of labor as violations of the “liberty-of-contract” principle. The principle stated: “workers engaged freely in labor contracts, which determined hours and wages and other working conditions, and that the state had no right to interfere.”⁷⁶ Laws limiting the hours of women often met with legal challenges as violations of this principle. Supporters of regulation of the hours of women often invoked several arguments to justify a suspension of the liberty-of-contract principle in the case of women. According to Moss:

Most judges maintained that the wage contract normally should stand free of state interference. Only in extraordinary circumstances, when the public safety was directly at risk or where workers faced especially dangerous conditions, was such interference legitimate. One major exception related to the protection of workers regarded as wards of the state—a category including not only children and the mentally disabled but also adult women. Numerous judges ruled that the protection of working women served a public purpose regardless of the nature of the

⁷⁶ U.S. Department of Labor, p. 15-16.

⁷⁷ Moss, p. 99.

employment involved. Women, they maintained, suffered distinctive frailties and served a unique maternal role in society, which justified special protection by the state.⁷⁸

Even though they generally accepted the “mothers of the race” and “inherent weakness” arguments as valid reasons to regulate the hours of women, the early courts⁷⁹ rarely upheld women’s laws that specified a workday with significantly fewer hours than the customary number. Early women’s hours laws typically specified maximum workdays of 10 to 12 hours, and may not have been binding for many workers.⁸⁰ Partially for these reasons, few states had passed hours regulations for women in 1899. Four states regulated night labor by women, and five states had a general hours law. In the industry-specific categories, 15 states had hours laws for mechanical industries, 12 for textiles, and five for mercantile professions. The 1899 to 1909 period saw little growth in the regulation of the hours of women. In 1909, the law regulating women’s hours in mechanical professions was in force in 19 states, making it the most common women’s hours law.

Much of the progress in the regulation of the hours of women did not occur until after 1909. In 1908, the United States Supreme Court heard the *Muller v. Oregon* case, which tested the constitutionality of an Oregon women’s hours law. In this case, Louis Brandeis and Josephine Goldmark submitted the Brandeis-Goldmark brief to the courts.

⁷⁸ Moss, p. 98.

⁷⁹ Before 1908.

⁸⁰ Moss, p. 101.

In the brief, Brandeis and Goldmark collected statistical evidence to prove the truth of the “mothers of the race” and “inherent weakness” arguments. The Court found the evidence compelling enough to uphold the law.⁸¹ Probably as the result of the precedent set in *Muller*, most of the success in the passage of general hours laws for women occurred after 1909. The number of states with general laws increased from 8 to 28 states in 1924. In addition, a similar number of states had restrictions for specific professions. The regulation of night labor by women was the least common women’s hours law, passing in only 13 states by 1924. The success of legislation regulating the hours of women was related to the child labor issue, and the Federal attention paid to the issue during the 1910 to 1912 period undoubtedly contributed to the rapid increase in states passing women’s hours laws during this period.

The success of women’s hours legislation came partially due to the support of labor groups and reformers. Reform groups like the American Association of Labor Legislation (AALL) supported the regulation of the hours of women only as a gateway into the regulation of the hours of all workers. Moss describes their political philosophy:

Although reformers supported the regulation of the hours of women, they believed that the laws should be gender neutral. They based their argument on the fundamental bargaining inequities between the worker and the employer. They argued that because workers were at such a disadvantage, it justified state intervention in the form of mandatory hours limits.... Though uncomfortable with the prospect of protective legislation exclusively for women, AALL reformers nonetheless joined the political struggle for gender-specific laws. They regarded themselves as political pragmatists and, given the unyielding position of the courts,

⁸¹ Moss, p. 101. *Muller v. Oregon*, 208 U.S. 412, 1908.

preferred legislation for women alone to no legislation at all. They also thought that laws for women might serve as an opening wedge into protective legislation for both sexes.⁸²

Although reform groups like the AALL supported the regulation of the hours of women largely because they believed it would eventually lead to the regulation of all workers, as more and more states passed laws protecting women concern began to grow amongst women's groups regarding the competitive disadvantage these laws created for women's labor. In 1915, Ella M. Sherwin, first president of the Women's League for Equal Opportunity in New York remarked on this problem: "Welfare legislation, if persisted in, will protect women to the vanishing point." Opposition by women's groups grew in the post-1915 period as more and more states passed restrictive laws.⁸³

Probably due to widespread support for the liberty-of-contract principle, regulation of the workday of men remained relatively uncommon throughout the 1899 to 1924 period. Most of the activity in passing laws that applied to men occurred before 1909, and the laws that passed were either declaratory, non-binding laws, or were intended to either protect public safety or protect workers in hazardous occupations.

Despite support from labor groups, laws regulating the hours of all workers remained uncommon during the 1899 to 1925 period. Mary Beard, in her history of the American labor movement written in 1920, describes labor's early support for a ten-hour

⁸² Moss, 102-104.

⁸³ Moss, 113.

day. According to Beard, labor groups argued: “long hours reduced workmen to the status of slaves, with neither time nor leisure to improve their minds or enjoy the benefits of civilization.”⁸⁴ Efforts to achieve this shorter workday met with mixed success. Laws setting a 10-hour day for public employees passed in many states. In 1840, President Van Buren signed a law setting the workday at ten hours for Federal employees.⁸⁵ By 1899, fourteen states had passed a general hours law that covered all workers. However, the vast majority of these laws were declaratory in nature; they set forth the customary number of hours in a workday but allowed workers and employers to contract for a different number of hours without penalty. Binding hours laws typically could not withstand a court challenge and were ruled as an inappropriate use of the police power of the state. Exceptions were typically only made in the case of hazardous occupations or in the name of public safety.⁸⁶ At the same time as some states were passing declarative hours laws, the American Federation of Labor took up support for an eight-hour day as a major policy goal. The AFL’s Samuel Gompers saw restrictive hours laws as a way to restrict the labor supply, eliminating the problem of unemployment:

The answer to all opponents of the reduction of hours of labor could well be given in these words: ‘that so long as there is one man who seeks employment and cannot obtain it, the hours of labor are too long.’ Hundreds of thousands of our fellows through ever-increasing inventions and improvements in the modern methods of production, are rendered ‘superfluous’ and we must find employment for our wretched Brothers and Sisters by reducing the hours of labor or we shall be overwhelmed and destroyed.⁸⁷

⁸⁴ Beard, p. 38.

⁸⁵ Beard, p. 39.

⁸⁶ MacDonald, p. 682-683.

⁸⁷ Beard, p. 92-93.

Despite the support of labor, eight-hour day laws remained uncommon. The courts typically upheld only those laws that protected workers in the most dangerous professions. For example, in 1898, the U.S. Supreme Court upheld in *Holden v Hardy* a Utah eight-hour day law for miners and metalworkers on the grounds that the workers in these ultra-hazardous occupations did not have sufficient bargaining power to negotiate fair labor contracts. In contrast, a 1905 decision struck down a New York law limiting the hours of bakers on the grounds that bakeries were not sufficiently hazardous to warrant protection.⁸⁸ The most common laws regulated the hours of railroad employees and public workers. By 1924, 27 states had laws regulating the hours of railroad workers, and 30 had laws covering public employees. In 1892, an 8-hour day law for Federal workers passed. The Federal law required overtime for any hours worked over eight. In 1907, a Federal law passed regulating the hours for trainmen and train dispatchers.⁸⁹

Binding regulation of the general hours of work of men met with substantial opposition. A 1913 Oregon law mandating 10-hour days for manufacturing workers was challenged, and eventually upheld in the United States Supreme Court in 1917. The Oregon Supreme Court found that the law could be justified in the public interest because “The safety of a country depends on the intelligence of its citizens, and if our institutions are to be preserved the state must see to it that the citizen shall have some leisure which

⁸⁸ Moss, p. 100.

⁸⁹ Moss, p. 82-83.

he may employ in fitting himself for those duties which are the highest attributes of good citizenship.”⁹⁰ This precedent eventually paved the way for the passage of more laws regulating the hours of all workers, but the controversy surrounding the constitutionality of binding hours laws kept many states from passing them during the 1899 to 1924 period.

Two of the three holiday laws became common by 1909, with 48 states imposing fines for Sunday labor and declaring an official Labor Day holiday. The third holiday law, prohibiting labor on any legal holiday, had passed in only one state in 1909, and only three by 1924.

Sunday labor laws existed in every virtually state by 1924. Although supporters of Sunday law restrictions often appealed to labor for support, religious belief motivated these laws. Dennis Pettibone, in his study of the early history of Sunday labor laws, described the argument posed by advocates of Sunday closing laws:

Although they supplemented their religious reasoning with arguments that Sunday laws were physically and socially beneficial, especially to the working man, it was obvious that they were not as much concerned with the secular welfare of the man as they were with honoring the day. Generally cool or even hostile to the other movements for bettering the workingman’s lot, they seemed to share the sentiment of the Western Christian Advocate editor who declared, “I have not as much interest in the laboring man on the six days as I have on the Sabbath-day”⁹¹.

⁹⁰ *State of Oregon v. Bunting*, 139 Pacific Reporter 731 (also U.S. Bureau of Labor Statistics, p. 84).

Pettibone notes that significant non-secular support for Sunday closing laws existed within the retail trade sector. This sector contained a large number of small establishments employing retail clerks, barbers, grocers, and the like. For these workers, a Sunday closing law allowed a coordinated day off; proprietors could close their establishment without worrying about losing business to a competitor.⁹²

Finally, minimum wage laws were virtually unknown in 1899 and gained moderate acceptance fairly late in the study period. Only two states, California and Massachusetts, had any form of minimum wage law in 1899. Both states had laws regulating minimum wages for public employees. By 1924, eight additional states enacted a law for public employees. In 1911, a minimum wage bill that covered all workers was introduced in the Wisconsin legislature. Although this bill did not pass, it allowed reformers to make their case for the regulation of all workers. The justification for the bill's constitutionality hinged on the existence of unequal bargaining power between employer and employee. According to one supporter: "The principle of classification is, therefore, not that of sex, or age, but of bargaining power in protecting themselves against conditions which it is the interest of the public that they should be protected against."⁹³ Despite these arguments, little support for gender-neutral laws existed in either the courts or the state legislatures, so supporters of minimum wage

⁹¹ Dennis Pettibone, *Caesar's Sabbath: The Sunday-Law Controversy in the United States, 1879-1892*. Riverside, California: University of California, Riverside. Ph.D., 1979, p. 61.

⁹² Pettibone, p. 169-179

⁹³ Moss, p. 102.

legislation turned their support towards laws protecting women and children as the most practical way of advancing the cause of minimum wage legislation. The first minimum wage law for women and children was passed in Massachusetts in 1912.⁹⁴ The American Association of Labor Legislation reflected this sentiment in their annual *Review of Labor Legislation* when they called the Massachusetts law “the first step in the direction of legislative control of wages.”⁹⁵ Most states with minimum wage laws for women and children preceded the law with the establishment of a commission to study the problem and propose wage rates. By 1924, 14 states had minimum wage laws for women and children and 10 states had established minimum wage commissions. Despite this progress, in most states the laws were ineffective because they had no appropriations or enforcement mechanism. Additionally, these laws met with constitutional challenges, and by 1925, four states and Washington DC had declared their laws unconstitutional.⁹⁶

One reason for the lack of success of minimum wage legislation is the lack of widespread support for the concept. Although progressive organizations like the American Association for Labor Legislation supported minimum wages for all workers, labor leaders and employers often did not:

Labor leaders generally were suspicious of protective labor laws because they feared state encroachment in the arena of industrial bargaining. Some labor officials endorsed minimum-wage laws that would apply only to women; only a few supported wage laws for men as well. Many others—including Samuel Gompers—opposed on principle wage legislation for

⁹⁴ Moss, p. 105.

⁹⁵ Moss, p. 54.

⁹⁶ U.S. Department of Labor, 1962, p. 107-117.

either sex.... Although employer support for minimum wage legislation was not unknown, most employers opposed such regulation. Some lamented that a minimum wage would force them to dismiss all of their “girls” who were not worth the minimum. Others claimed that a wage law would put their industries at a competitive disadvantage relative to comparable industries in other states, thus placing all of their workers’ jobs at risk.⁹⁷

Without the support of a broad constituency, minimum wage laws remained rare, and these laws did not gain widespread acceptance until the 1930s and 40s.⁹⁸

3.4.2 Regulation of The Employment Contract

The most common laws in this category were intended to protect employers and employees from fraud and provide for the enforcement of employment contract. Most of the activity for the laws in these six categories occurred in the early period. An average of 5.5 of the 23 laws in this category were present in 1899. During the 1899 to 1924 period, the average number of laws increased by only 2.8 laws, with 70 percent of that increase occurring before 1909. The majority of the legislative activity for employers’ liability laws, political protection laws and wage payment laws occurred before 1909, while activity in bribery, coercion and gouging laws, and employment agents was spread fairly evenly throughout the 1899 to 1924 period. The majority of the activity in anti-discrimination laws occurred after 1909.

⁹⁷ Moss, p. 108.

⁹⁸ U.S. Department of Labor, p. 120.

States passed employer's liability laws in order to provide workers with more protection in the event of an on-the-job accident. In the absence of specific laws, the common law outlined the legal protection for employees injured on the job. Under the common law, employers had three defenses that limited their liability: assumption of risk, the fellow-servant rule, and contributory negligence. The broad scope of these defenses, combined with the expense and time required to recover damages in court, made it difficult for injured employees to recover damages from employers in the event of an injury. Public concern for the plight of injured workers led to the growth of employers' liability laws, which generally narrowed the allowable defenses employers could use, improving an injured employee's chances of recovering damages.⁹⁹ In 1899, 32 states had a general employer's liability law. However, in 23 of those states, the general law only restated the common law, so it did not give workers any additional protection. In the early years of employers' liability legislation, most of the laws that actually provided additional protection to workers protected only railroad or mine employees. In 1899, 22 states had laws that covered workers in one of these two industries. By 1909, that number jumped to 36. As employers' liability laws became more popular, more states passed laws that were stricter than the common law. By 1909, 15 more states had passed a general law, bringing the national total to 47 states. The number of states in which that law merely restated the common law had increased by

⁹⁹ Assumption of risk stated that employees accepted ordinary risk associated with a job when they agreed to the employment contract. The fellow-servant rule stated that employers were not liable for injuries to an employee caused by the negligence of a coworker. The contributory negligence rule stated that employers were not liable for damages if injury was due to negligence by that employee. See Bureau of Labor Statistics, 1962, p. 158.

only 3, to 26. The activity in employer's liability after 1909 consisted mostly of states strengthening their laws. Between 1909 and 1924, the number of states with a general law restating the common law dropped from 26 to 21. Employer's liability laws were the precursor to workman's compensation laws, which became popular and passed in most states after 1909. Fishback and Kantor, in a series of papers examining the origin of workman's compensation legislation, show that the increasingly stringent requirements of the new employer's liability legislation increased the uncertainty of the legal environment surrounding damages, resulting in an increase in court cases, damage awards, and employer's liability insurance premiums. According to Fishback and Kantor, the increasingly unfavorable legislative environment created by stricter employer's liability laws contributed to the success in the passage of workman's compensation laws occurred after 1910.¹⁰⁰

Activity in laws protecting the political rights of workers also occurred relatively early. In 1899, 31 states outlawed coercing the votes of employees, and 20 states had laws requiring time off for voting. By 1924, only seven more states passed laws outlawing coercion, and all of these states enacted their law by 1909. Only four more states passed mandatory time off laws by 1924, and two of those states had acted by 1909.

¹⁰⁰ Price Fishback and Shawn Kantor, "The Adoption of Workmans Compensation in the United States, 1900-1930." *Journal of Law and Economics*. October 1998, 41(2), p. 314-319.

The majority of activity in the passage of laws regulating wage payment also occurred before 1909. Of the seven wage payment laws, only two had passed in at least half of the states by 1924, and only two more passed in 10 or more states. The most common wage payment law, in force in 25 states by 1899, required payment in cash. By 1909, this law spread to 28 states, and by 1924, two additional states passed this law. These laws were intended to address reported abuses by company-owned stores. In many company towns, employees were paid in scrip that could only be used in company stores.¹⁰¹ By requiring payment in cash, these laws attempted to give employees more shopping options, limiting the market power of the company store.¹⁰²

The second most common wage payment law regulated the frequency of wage payment. These laws differed from state to state, but all laws required employers to pay wages at some set interval, and imposed fines for failing to make scheduled wage payments. A wage payment frequency law was in force in 21 states in 1899, and spread to 27 by 1909. Between 1909 and 1924, ten additional states passed a law of this type. Two other wage payment laws were fairly common: laws requiring employees to repay advances, and laws requiring employers to give employees notice of discharge if those employees are also required to give notice of intent to quit. The remaining three laws in this category did not pass in more than eight states by 1924. These laws fined employers

¹⁰¹ Company stores typically paid scrip in advance of payday and cash on payday.

¹⁰² U.S. Department of Labor, 1962, p. 89.

for nonpayment of wages, prohibited employers from forcing employees to make contributions, and required railroad employers to give notice of a reduction of wages.

The number of states with laws prohibiting bribery, coercion, and gouging of employees, and laws regulating employment agents increased fairly uniformly throughout the 1899 to 1924 period. The most common law within these two categories was the law regulating employment agencies. In 1899, 15 states had laws regulating employment agents. By 1924, 42 states had this law. These laws protected job seekers from fraudulent practices by agents. Most of these laws requiring employment agents to have licenses. In some states, they were required to post a bond as a condition of their license. Other states regulated the types of fees that agents could charge. In 1912, the U.S. Bureau of Labor conducted a study outlining some of the more common abuses by employment agents. The list included collecting fees but not performing a job search, sending applicants to distant locations where no work exists, bribing the agent, or collusion between agents and foremen to continually hire and fire workers in order to receive fees.¹⁰³ Also in 1912, The United States Congress established the Commission on Industrial Relations. This commission estimated that between three and five thousand private employment agencies operated in the United States. According to a report published by the Commission, the main complaints lodged against these agencies were:

...related to fees that were out of all proportion to the services rendered, to discrimination in the charges made for the same jobs, to men being sent to places where there were no jobs, and to collusion with foremen to

¹⁰³ U.S. Department of Labor, p. 135.

maintain artificially high turnover rates. The most frequent abuse was misrepresentation of the terms and conditions of employment... The final report of the Commission on Industrial Relations asserted that the private employment business “as a whole reeks with fraud, extortion, and flagrant abuses of every kind.”¹⁰⁴

Some states passed specific laws to address these abuses. In 1899 one state had a law that fined foreman for accepting fees for employment. By 1924, 14 states had a law of this type. Despite these attempts, proponents of public “free” employment agencies believed that legislative remedies had not curbed abuses by private agencies. In a study of the early history of public employment offices, William Breen notes that the perceived ineffectiveness of legislative action in controlling abuses by employment agents resulted in a call for more drastic action:

Although a number of states required private employment offices to obtain special licenses, this practice had not proved very effective in controlling abuses. Some members of the AAPEO [American Association of Public Employment Offices] opposed this regulatory approach and wanted to concentrate on building up the public employment offices so that they would, over time, drive out most of the private agencies by providing better service at no cost. However, a sizable body of opinion was in favor of more drastic action. At the second annual meeting of the association in Indianapolis, in September 1914, a resolution was adopted favoring the elimination, through federal and state legislation, of all private employment agencies.¹⁰⁵

Despite the dissatisfaction that employment agency workers in the public sector expressed with their private sector counterparts, public agencies also had problems. In many states the free employment offices were not viewed as particularly effective:

¹⁰⁴ William Breen. *Labor Market Politics and The Great War: The Department of Labor, the States, and the First US Employment Service, 1907-1933*. Kent: Kent State University Press, 1997. p. 6.

¹⁰⁵ Breen, p. 14.

In the main, the state employment offices were poorly funded, staffed by untrained personnel, badly administered, and served relatively few workers or employers. Most of their clients were casual or unskilled laborers, and the majority of positions they had to offer were short-term.... Union men were suspicious of state employment offices, fearing they might be used “as strike-breaking agencies, or to lower wage rates.” Employers, for their part, worried that such offices might be used “to fill their shops with union men and labor agitators.”¹⁰⁶

World War I and the ensuing labor shortages brought the Federal government into the employment agent business. The United States Employment Service (USES) was originally formed in 1907 with the main purpose of disseminating information about jobs in outlying areas to immigrants in port cities.¹⁰⁷ The outbreak of war in 1914 and the labor market pressures that followed resulted in a widening of the mission of the USES to include all workers.¹⁰⁸ Attempts to create a national system of employment offices were met with opposition on several fronts. First, some Midwestern states like Wisconsin, Ohio, and Illinois had well established free public employment offices. In these states, Federal authorities found that cooperation with state agencies was crucial, and in some instances, Federal-state coordination was slow to emerge.¹⁰⁹ Second, both employers and employees were suspicious of state-run employment offices:

Many employers' associations had organized their own employment agencies, which were used to discriminate against union labor, and they did not want them supplanted. On the other hand, the stronger unions operated unofficial employment services for their members through their

¹⁰⁶ Breen, p 14.

¹⁰⁷ Originally known as the Bureau of Immigration and Naturalization's Division of Information within the Department of Commerce and Labor.

¹⁰⁸ Breen, p. 9.

¹⁰⁹ Breen, p. 121-122, 14-15.

business agents and felt that the development of public employment agencies might weaken their own organizations.¹¹⁰

Finally, in many states, concern was mounting over labor shortages. For policymakers in these states, a Federal system of employment agencies represented a potential threat to their labor supply if these offices placed workers outside of the state.¹¹¹ In many states, this final concern was not new, and had led to passage of emigrant agent regulations. Emigrant agents were employment agents that placed workers in jobs located outside of the state in which they lived. The number of states with these laws increased from three in 1899 to 12 in 1924. The majority of these laws were passed in Southern states in an attempt to reduce outflows of labor, not protect workers. Emigrant agent laws were structured similar to employment agent regulations. They required agents to pay a license fee and often to post a bond. However, it is clear that in the case of emigrant agents, the fees were structured to be prohibitive, not to provide protection for potential victims of fraud. Probably due to the large wage differentials that existed relative to the rest of the nation, emigrant agent laws were most common in the South. Breen gives some examples of the types of emigrant agent laws enacted in the South:

In Macon, Georgia, in an effort to keep out all labor agents, the city council passed an ordinance setting “the license fee for agents at the laughably high figure of \$25,000 and compounded the impossible by requiring that agents be recommended by ten local ministers, ten manufacturers, and twenty-five businessmen.” Other cities and states passed similarly stringent measures....

¹¹⁰ Breen, p. 17.

¹¹¹ Breen, p. 68.

By 1918 a situation of near panic over the labor supply gripped large sections of the South. By the time of the armistice, six southern states had imposed taxes of up to \$2,000 on the shipment of labor out of the states and most southern states had laws making it an offense even to invite someone to quit employment. Florida, Georgia, Mississippi, and Virginia required a license tax of \$500 in each county in which an agent operated for the purpose of securing labor to be sent interstate. North Carolina required both an annual state tax and a tax of \$100 in each county where such business was transacted. South Carolina was even more severe; its law imposed a tax of \$2,000 per year for each county in which the labor agent worked. This space of restrictive legislation had begun prior to the U.S. entry into the war as a response to the exodus of labor moving to the northern industrial states which were experiencing boom conditions because of European war orders. Since late 1915, private labor recruiters had been active throughout the Southeast. Large numbers of blacks were willing to move and by 1916 the Great Migration was well underway.¹¹²

The most common laws in the bribery category prohibited coercion or bribery of employees. Laws prohibiting coercion were fairly common in 1899, with 12 states having this type of law. By 1924, 19 states had passed an anti-coercion law. In contrast, no state had passed a law banning bribing employees in 1899, but by 1924, 17 states had this type of law. Most of the activity in the passage of anti-bribery laws occurred after 1909. Finally, most states chose to regulate company stores through their wage-payment laws instead of through laws prohibiting gouging. Only nine states had a law prohibiting company stores from gouging during the 1899 to 1924 period.

The three anti-discrimination laws were extremely rare. In 1899 only four states had one of these three laws. Three states, California, Illinois, and Washington, prohibited

¹¹² Breen, p 126.

sex discrimination, and one state, Indiana, had a general anti-discrimination law. By 1909, only one additional state had acted: Colorado passed a law prohibiting employers from firing an employee due to age. By 1924, Massachusetts, Michigan, and Montana passed laws prohibiting sex-based discrimination. The Knights of Labor called attention to sex discrimination as early as 1868, calling for a Federal and state resolution “to pass laws securing equal salaries for equal work to all women employed under the various departments of government.”¹¹³ Age discrimination did not become a major issue until the latter part of the 1920’s.¹¹⁴

3.4.3 Administrative Programs and Social Insurance

Activity in creating administrative programs occurred before social insurance programs became popular. By 1899, 32 states had established bureaus of labor statistics, and 21 states had formed boards of arbitration. Only three states had set up free employment offices by 1899, but these programs spread fairly quickly, and by 1909, sixteen states had created free employment offices. Between 1909 and 1924, sixteen more states created free employment offices, bringing the total number to 32. As described above, war-related labor shortages and a desire to provide workers with an alternative to private employment agencies drove the growth in free employment offices. The number of bureaus of labor statistics increased more slowly, with an increase of two, to 34, by 1909. By 1924, 44 states had established labor departments. The number of

¹¹³ U.S. Department of Labor, p. 278.

¹¹⁴ U.S. Department of Labor, p. 272.

state boards of arbitration rose more uniformly, increasing by six between 1899 and 1909, and another six by 1924, to 33. These administrative programs met with very broad acceptance compared to the other laws of the time.

In comparison, California became the first state to pass a social insurance law when it passed its mother's pension law in 1906. Although mother's pensions and workman's compensation laws were unknown before 1906, they increased quickly, becoming some of the most common laws in the nation by 1924. Between 1909 and 1914, the number of states with mother's pensions increased from four to 21, and the number of states with workers' compensation laws increased from zero to 20. In the next 10 years, 22 more states passed each of these laws, increasing the number of states with mother's pensions to 43, and increasing the number with workman's compensation to 42.

The success of workman's compensation legislation reflects several factors. Fishback and Kantor argued that the passage of workman's compensation held benefits for workers, employers, and insurers, creating a broad base of support for the legislation that improved its political viability. Fishback and Kantor also found that workman's compensation legislation passed earlier in states with stronger progressive movements.¹¹⁵ Reformers viewed social insurance as crucial to their goal of eliminating poverty. In addition to providing protection against income disruptions, reformers believed that workman's compensation programs would actually reduce accident rates by forcing

employers to internalize the negative externality generated by their failure to protect workers. Because employers pay the cost of social insurance programs, these programs force employers to bear the cost of workplace accidents, unemployment, and sickness. Reformers argued that this shift would cause employers to voluntarily adopt safety measures. As a consequence, employer opposition to safety regulations would fall.¹¹⁶

Although a wide range of constituents stood to benefit from workman's compensation legislation, some still opposed the legislation. Labor organizations expressed dissatisfaction with the limited coverage and benefits of proposed bills. Employers opposed the legislation on the grounds that it would put them at a competitive disadvantage relative to firms in states without the law. In response to this argument, reformers launched a campaign to enact laws in states without workman's compensation legislation. These efforts may have contributed to the widespread acceptance of workman's compensation in the teens and twenties.¹¹⁷

3.4.4 Regulation of the Labor Supply

The laws in this category were the least common of the six major categories. Only two of the 18 laws passed in 25 or more states by 1924. The largest increase in the number of laws regulating the supply of labor occurred after 1909, with the majority of the increase in the licensing law category. Laws regulating the use of convict labor and

¹¹⁵ Fishback and Kantor, 1998. See Chapter 2, literature review.

¹¹⁶ Moss, p. 60.

alien labor laws increased moderately during the 1899 to 1924 period. In 1899, 23 states had some sort of regulation regarding the use of convict labor. Ten additional states passed convict labor laws by 1924. Alien labor laws were less common. The most widespread law prohibited alien employment in public service. Seven states had passed a law of this nature in 1899, and that number increased to 17 by 1924. The other two laws prohibiting importation of alien labor and prohibiting the employment of Chinese workers passed in only two and four states, respectively, during the 1899 to 1924 period.

In 1899, the national average for occupational licensing laws was 1.1 laws per state. By 1924, the average increased to 2.8 laws per state, with the majority of the 1.7-law increase happening after 1909. In 1899, the most commonly licensed professions were plumbers and steam engineers (firemen), with 15 and 14 states, respectively, requiring licenses. Other licensed professions included mine managers (nine states), horseshoers and railroad telegraph operators (five states), barbers (three states), stevedores (two states), and railroad employees (one state). By 1909, barbers saw the largest increase, with a 12-state increase, to 15 states requiring licenses. No other profession had more than a four-state increase. From 1909 to 1924 licensing requirements for some of the newer professions increased. The number of states requiring licenses for chauffeurs increased from four to 36, reflecting the increased popularity of the automobile. Similarly, the number of states requiring licenses for motion picture operators increased from one to eight, and six states passed licensing laws for airplane pilots. Licensing laws

¹¹⁷ Moss, p. 120-129.

for mine managers and plumbers increased relatively steadily throughout the period. By 1924, 16 states required licenses for mine managers and 23 states required plumbers to have licenses.

3.4.5 Safety Regulations

For many progressive reformers, the provision of a safe workplace was a crucial component of labor policy because they believed that industrial accidents were a major contributor to poverty. They believed that safety regulations reduced the negative externality that employers imposed on society by creating a hazardous workplace that leads to injured employees who become unable to work. For these reformers, since workplace accidents were one cause of poverty, improving safety is an important step in achieving their goal of eliminating poverty.¹¹⁸ This sentiment was echoed in an analysis done in 1932 by Edwin Witte, in which he estimated that industrial accidents cost the public between three and five billion dollars per year.¹¹⁹

Overall, the average number of safety regulations per state increased fairly steadily from 6.6 in 1899 to 13.2 in 1924. Often, states passed safety regulations in response to high profile industrial accidents.¹²⁰ Early safety laws focused on mines and railroads, regarded as the most dangerous industries. Factory safety laws became popular relatively later in the period.

¹¹⁸ Moss, p. 43.

¹¹⁹ Witte, p. 1.

By 1899, virtually all of the states with mining as a significant source of employment ¹²¹ had created mine inspectors, outlined basic mine safety regulations for companies, prohibited women and children from working in mines, and required accident reporting for mines. Almost half of all states had passed basic safety regulations for railroads, but only four states had created railroad inspectors or required railroad accident reporting. Between 1899 and 1909, the majority of the states that would eventually pass mine safety regulation had already acted, with five of the seven mine safety laws in place in 21 or more states.¹²² The dangerous nature of these industries was coming under public scrutiny during this time. For example, a 1908 study of accidents in Allegheny County Pennsylvania found that the majority of the 526 work-accident fatalities that occurred between July 1, 1906 and June 30, 1907 were in the mining industry (71), steel mills (195), or on the railroads (125). Furthermore, the study found that the fatal accident rate in the United States exceeded that of Great Britain, France, or Belgium.¹²³ In the post-1909 period, regulation of mines continued to grow. Laws imposing penalties for employee violations of the mine safety laws experienced their largest increase during this time, with eight additional states passing this law, bringing the total to 32.

¹²⁰ U.S. Department of Labor, p. 147-150.

¹²¹ About half of all states had these laws.

¹²² Laws requiring mine inspectors, 30 states; mine safety regulations for individuals, 24 states; for companies, 30 states; fines related to weighing coal, 21 states; no women or children in mines, 32 states.

¹²³ U.S. Department of Labor, p. 148-149.

By 1909, the number of states with basic railroad regulations increased from 24 to 33, and the number requiring accident reporting increased from four to 23. The majority of the increase in street railroad safety regulations occurred during this time, with 15 additional states passing laws, raising the total to 28. Compared to mine regulations, there was more activity with regard to railroad regulations between 1909 and 1924. Twelve additional states passed general safety regulations and 15 more states passed accident-reporting regulations, bringing the total number of states with these two laws to 45 and 39, respectively. The earliest railroad regulations required railroad companies to protect their employees against only the most dangerous working conditions. These regulations involved requirements for safety apparatus onboard trains, and required guards and blocks to protect employees working in and around railroad cars. Later regulations protected employees from less dangerous conditions. These laws included requirements for seats or for heated or covered vestibules for drivers. Later safety regulations were stricter, with regulations covering more aspects of railroad operations.

Factory safety laws became popular later than safety laws for mines or railroads. In 1899, only two factory safety laws were in place in 20 or more states. Twenty-five states required fire escapes on factories, and 21 states authorized the creation of factory inspectors. The 1899 to 1909 period saw gradual increases in basic factory regulations, with eight states adopting regulations requiring ventilation, guards on machines, and factory inspectors. Nine states passed laws regulating building construction; seven states passed sanitation or bakery regulations. Laws requiring fire escapes and factory accident

reporting passed in six states, and two additional states passed sweatshop regulations. The 1909 to 1924 saw an even larger increase in factory safety laws. During this time, six of the fourteen laws passed in ten or more additional states. These laws mandated standards for sanitation, required guards on machines, outlined bakery regulations, created factory inspectors, required occupational disease reporting, and created industrial safety commissions. Rehabilitation commissions and electricity regulations only passed in a few states by 1924, but all of that activity occurred after 1909.

The number and scope of safety regulations increased dramatically during this period as public attention turned to industrial safety. Not only did the number and type of laws in force vary from state to state, but also enforcement was uneven across states, so the presence of a law did not necessarily indicate compliance. This problem persisted well into the twentieth century. In a book written in 1938, Lois MacDonald describes the problem: "Such legislation requires an elaborate system of inspection and administration. The laws vary greatly from state to state. Efficiency of administration and standards of enforcement are even more variable, some of the laws having little, if any, enforcement."¹²⁴ Furthermore, according to MacDonald, enforcement through random inspections was considered an unreasonable use of the police power of the state, making it even more difficult to increase compliance amongst businesses: "For a surprisingly long time after the passage of laws protecting workers, the idea of an agent of government investigating the actions of employers in the absence of complaints was

considered an unwarranted interference and an invasion of the private affairs of citizens, smacking of an un-American form of government.”¹²⁵

3.4.6 Unionization and Bargaining

The 26 unionization and bargaining laws can be broken into four major groups. Six of the laws concern the legal structure of unions. Seven laws prohibited or allowed different tactics taken by unions and employers with regard to strikes. Nine laws outlawed intimidation, interference, violence against workers, or trespassing on company property. Four miscellaneous laws prohibited enticement of workers, blacklisting, yellow dog contracts, and wage fixing by employers. In many states, union activities were controversial, leading to violence in some instances. Many employers were threatened by the power of unions, and pushed for legislation to limit union power. The 26 laws described here reflect the antagonistic nature of the relationship between employers and unions that existed during this time.

Throughout most of the 1800's, American labor unions had gone through cycles of strengthening and weakening that largely mirrored the business cycle. During expansions, when labor market conditions tightened, union bargaining power increased, and union membership swelled. During recessions, the opposite occurred. The cyclical nature of their membership reduced union power. In 1886, the American Federation of

¹²⁴ MacDonald, p. 697.

¹²⁵ Macdonald, p. 739.

Labor (AFL) was formed, with Samuel Gompers elected as president. Under Gompers, the AFL instituted a system of dues designed to provide benefits to members during economic downturns. The system was tested during the downturn of 1892, with positive results. According to Gompers: "It is noteworthy that while in every industrial crisis the trade unions were literally mowed down and swept out of existence, the unions now in existence have manifested, not only the powers of resistance, but of stability and permanency."¹²⁶ In essence, the AFL's system of high dues and benefits became a form of social insurance for its members. This characteristic of unions, as well as their traditional role in collective bargaining, contributed to early union leaders' indifference to protective legislation. MacDonald states the position of union leaders at the time: "Child labor laws, laws applying to the labor of women or of men engaged in especially dangerous industries have been favored; but legislation for adult males has been considered unnecessary in the past on the theory that such workers needed no means of achieving benefits in addition to those obtained through collective bargaining."¹²⁷ In a 1923 AFL report, the group expressed its dissatisfaction with government encroachment into industrial relations:

The threat of state invasion of industrial life [the federation declared] is real. Powerful groups of earnest and sincere persons constantly seek the extension of state sovereignty over purely industrial fields. Such ignorant encroachments as the Esch-Cummings Act, the Kansas Court of Industrial Relations, and the Colorado Industrial Commission Act, each a blundering gesture of government acting under the spur of organized propaganda or of political appetite for power, are examples of what all industry has to fear. The continuing clamor for extension of state regulatory powers

¹²⁶ Beard, p. 88-89.

¹²⁷ MacDonald, p. 625-626.

under the guise of reform and deliverance from evil can but lead into greater confusion and more hopeless entanglements.¹²⁸

As union membership grew, so did the body of legislation governing union activities. In response, union leaders became more active in the political realm. By 1908, the AFL's Gompers was publicly supporting candidates for office, something he had avoided earlier in the history of the organization.¹²⁹

State laws governing union and collective bargaining issues remained relatively scarce throughout the 1899-1924 period. In 1899, the average state had 4.4 of these laws in effect. By 1909, that number had increased slightly to 5.0. The next 14 years saw a larger increase to an average of 6.4 laws in 1924. The laws in force in each state within this category varied widely from state to state. Only three of the 26 unionization and bargaining laws were in force in 25 or more states by 1924: 25 states had passed anti-blacklisting laws, 44 states had laws protecting union trademarks, and 27 states had laws prohibiting intimidation of workmen. Additionally, in 1899, 25 states had a law prohibiting employees from abandoning railroad equipment, but this number dropped to only nine by 1924. These popular laws reflect the sentiment of the nation towards unionization. The most popular laws protected employees' right to work, and protected the basic legal rights of unions, but did not provide any group special protections.

¹²⁸ Walling, p. 105.

¹²⁹ Beard, p. 105-110.

Laws protecting employees from intimidation or coercion were fairly common in 1899 and increased in popularity between 1899 and 1924. In 1899, in addition to the 25 states with a law prohibiting interference with or abandonment of railroad equipment, 19 states had a general law prohibiting intimidation of workers, 16 states had an anti-interference law, 13 state had an anti-interference law specific to railroad employees, and 12 states had a law prohibiting conspiring to prevent a person from working. The popularity of these laws reflected a rising concern about violence against workmen related to unionization efforts. For example, the most common anti-interference law in 1899 prohibited abandonment or interference with railroad equipment. This law passed in most states in response to the great railway strike of 1877.¹³⁰ According to Witte, writing in 1932, the 1877 experience prompted laws that covered industries outside of the railroads as well:

...nearly all the states have laws which prohibit coercion, intimidation, and threats, whether these acts are committed singly or collectively. These laws are couched for the most part in general language, but many of them owe their enactment to labor difficulties, especially to the railroad strike of 1877 and the strikes and riots of 1886.¹³¹

These anti-intimidation laws were intended to protect strikebreakers or other non-union workers from being forcibly pressured to join a union or obey a work stoppage. The courts interpreted these laws broadly, holding that “Though no word is spoken, the conduct of strikers may be intimidating; their number alone may be sufficient to create

¹³⁰ Witte, p. 283.

¹³¹ Witte, p. 78.

fear. Regardless of how the fear is produced, the simple fact of its existence among employees and prospective employees condemns the strikers. Nor is it necessary to prove that any particular person was intimidated.”¹³² This strict interpretation of the intimidation laws gives employers and police broad authority to prosecute striking employers, and limits the power of unions to use tools like picketing to further their cause. For this reason, these laws met with significant opposition from organized labor.¹³³

By 1924, anti-intimidation laws had been passed by eight additional states, bringing the total to 27. General anti-interference laws were in force in five more states by 1924. The number of states with anti-interference laws specific to railroad workers declined. Five more states passed laws prohibiting conspiring to prevent a person from working. In addition, criminal syndicalism laws passed in 19 states between 1909 and 1924. These laws were mainly enacted between 1917 and 1921. The laws prohibit advocating violence for political or social gain and were aimed mainly at members of the Industrial Workers of the World and communist organizations.¹³⁴

With the exception of the law protecting union trademarks, laws providing legal protections to unions were only moderately widespread by 1924. Only three of the six laws experienced significant growth during the 1899 to 1924 period. Union trademark

¹³² Witte, p. 32.

¹³³ Witte, p. 78.

laws were adopted by 13 states during this period, laws setting penalties for false use of union cards were adopted by 10 states, and laws exempting labor organizations from the antitrust laws were adopted by eight states. These laws were passed in most states in response to confusion about whether or not Congress intended the 1890 Sherman Antitrust Act to apply to labor unions. According to Witte, "It appears from an examination of the *Congressional Record* that every member in both houses who discussed the question of the application of this act to labor, with the exception of Senator Edmonds and Congressman Stewart, took the position that the antitrust law should not be applied to labor unions."¹³⁵ Despite this fact, by 1924, fourteen states had passed laws explicitly exempting unions from the antitrust laws. Laws permitting incorporation of labor unions were present in nine states in 1899, but increases to only eleven by 1924.

Witte explains a reason for the lack of success of these laws:

At that time, [1880s] incorporation was thought of as a method of gaining legal recognition and of getting away from the common law doctrine of conspiracy. Once these laws were enacted, labor lost all interest in them, and but few unions have incorporated. Of much greater practical value are the laws in force in most states protecting union labels from infringement, and the laws of a somewhat smaller number of states prohibiting forgery of union cards, the unauthorized wearing of union buttons, or any false representation of union membership. Less numerous are special laws to protect union funds from embezzlement, and to prohibit bribery of union members.¹³⁶

In the miscellaneous category, the anti-blacklisting law was adopted by eight states during the 1899 to 1924 period. These laws prohibited employers from exchanging

¹³⁴ Witte, p. 79.

¹³⁵ Witte, p. 61.

blacklists or refusing to hire people due to their presence on a blacklist. The details of the anti-blacklisting statutes varied from state to state, but the intent in most states was to prohibit employers from seeking to prevent discharged employees from finding new positions.¹³⁷ These laws were popular, with half of all states passing a law of this type by 1924. Although anti-blacklisting legislation should have strengthened unions by providing leadership with some protection from punitive actions against them by employers, the laws proved difficult to enforce.

Despite the many statutes against blacklisting and the decisions at common law against maliciously procuring the discharge of a workman, there have been few cases in which persons blacklisted because they were strikers or union men have secured any redress. Only two successful criminal prosecutions for blacklisting are known, and there have been less than a dozen cases in which strikers or union men have recovered damages, with but one instance of an injunction issued against a blacklist. Nearly all of these cases are old and are greatly outnumbered by unsuccessful actions. The explanation lies partly in the wording of some of the anti-blacklist laws, but more in the difficulty of proving the charge.¹³⁸

Compared to the anti-blacklisting laws, progress in passing laws prohibiting yellow-dog contracts was slower. These laws prevented employers from forcing employees to agree not to join a union as a condition of employment. In 1899, 12 states had laws prohibiting these contracts. That number increased to 16 by 1909, but fell back to 12 by 1924. In many states, these laws did not withstand legal challenge and were invalidated by the courts as “an arbitrary interferences with the liberty of contract which

¹³⁶ Witte, p. 80.

¹³⁷ F.J. Stimson. *Handbook to the Labor Law of the United States*. New York: Charles Scribner's Sons, 1907. p. 300-301.

¹³⁸ Witte, p. 215.

no government can legally justify in a free land.”¹³⁹ Not surprisingly, labor unions opposed the use of yellow-dog contracts, and by 1900 had publicly begun pushing for laws outlawing their use.¹⁴⁰ Despite their efforts, these contracts remained in wide use until 1932, when they were made unenforceable in Federal courts by the Norris-LaGuardia Act.¹⁴¹

Although labor unions were relatively unsuccessful in securing the passage of laws outlawing yellow dog contracts, the evidence suggests that these contracts were of limited effectiveness to employers in their battle against unionization. According to Witte:

Treating yellow-dog contracts as lawful, however, was not sufficient to make them very useful to employers in combating labor unions. This established only that the employer was within his rights in insisting that his employees should sign such contracts and that he could sue them for any breach if he could prove damages. Such proof is most difficult, if not impossible and, as a matter of fact, it has never occurred in the entire history of yellow-dog contracts that any employer has sued any workman for violating such a contract. Employees who sign non-union agreements may feel morally obligated to observe them, but for practical purposes, such contracts are not legally enforceable against the signers. It is as a restraint upon third parties—the labor unions and their organizers—that yellow-dog contracts are valuable to employers.¹⁴²

The U.S. Supreme Court’s 1917 decision in the *Hitchman* case¹⁴³ increased the value of yellow dog contracts to employers. The Court held that union organizers could be held

¹³⁹ MacDonald, p. 797.

¹⁴⁰ U.S. Department of Labor, 1962, p. 237-238.

¹⁴¹ U.S. Department of Labor, p. 248.

¹⁴² Witte, p. 223-224.

¹⁴³ *Hitchman Coal and Coke v Mitchell*, 245 U.S. 229, Sup. Ct. 65.

liable for damages for encouraging employees' breach of contract. Employers could now get injunctions against union organizers that were inciting employees to violate the contracts by joining the union. As the result of this decision, the use of yellow dog contracts peaked between 1919 and 1922.¹⁴⁴

Finally, of the seven strike-related laws, three protected employers and four protected unions. The three pro-employer laws prohibited picketing and boycotting and allowed for the use of industrial police by companies. The four pro-union laws allowed strikes, prohibited the use of armed guards, provided for limits on the scope of injunctions, and prohibited employers from misrepresenting the presence of a strike in advertising for jobs. In 1899, 17 states had the law prohibiting hiring armed guards, making it the most common strike-related law. By 1924, the law allowing the use of industrial police was in force in 22 states, making it the most common law. The number of state with laws banning the use of armed guards had declined to nine. This shift towards greater support for the use of guards may reflect the impact of rising labor tensions and an increase in violent industrial conflicts. As a result, employers had a greater incentive to push for the legal right to protect their property through the use of industrial police.¹⁴⁵ The use of industrial police was widespread in heavily unionized areas. In many cases, the company guards had police powers:

¹⁴⁴ Witte, p. 222.

¹⁴⁵ Stuart Brandes. *American Welfare Capitalism: 1880-1940*. Chicago: The University of Chicago Press. 1984. p. 2.

[Guards are common in] non-union coal fields...the steel mills of Pennsylvania, on the railroads, and in numerous industrial plants. In West Virginia and Colorado, the company guards, at least formerly, constituted veritable private armies which, in the 1913-1914 strikes and the 1920 and 1922 mine marches, met the union miners in pitched battles. In West Virginia, these guards held commissions as sheriffs' deputies, although paid by the coal corporations. In Pennsylvania, a similar arrangement has existed under the term "coal and iron police," the members of which receive their commissions from the governor but are privately selected, paid, and controlled.¹⁴⁶

Federal authorities at the time generally condemned the practice of endowing company guards with the police power of the state:

The U.S. Coal Commission summarized the objections in this unanswerable sentence: "That a public official should be privately paid is indefensible." Some have gone further and have advocated the complete abolition of strike and company guards. In support of such a position, it is urged that the private guard system amounts to a tolerance of private armies for industrial warfare. Policing is properly a function of the government, and it is dangerous to vest private parties with this authority.¹⁴⁷

On the other side of the debate, employers defended their use of company guards as well within their right to defend their property:

They employ guards because they expect attacks upon their employees and property in labor troubles and fear that they will not receive adequate police protection in such emergencies. That these fears are not groundless is undeniable. As long as this is true, private guards cannot well be prohibited.¹⁴⁸

¹⁴⁶ Witte, p. 192.

¹⁴⁷ Witte, p 193-194.

¹⁴⁸ Witte, p. 194.

A large body of legislation surrounded the issue of strikes and boycotts. Different states passed laws allowing strikes, or prohibiting boycotts and picketing. Injunction limits passed in many states to protect unions from what was viewed by union leaders as an abuse of the power of the judicial system that reduced the ability of unions to strike. After laws regulating company guards, the second most common strike-related law in 1924 fined employers for misrepresenting the presence of a strike. This pro-labor law was in force in only three states in 1899, but 13 states had passed the law by 1924. This law protected workers from employers who brought them in as unwitting strike-breakers to isolated company towns. The law allowing employees the right to strike was the third most common law, present in 10 states by 1924. The anti-labor laws prohibiting boycotts and picketing were rare, present in only five and six states in 1924, respectively.

After the passage of the Sherman Act in 1890, many states passed laws declaring the legal status of strikes, boycotts, picketing, and injunctions. Ludwig Teller, in his 1945 book *A Labor Policy For America: A National Labor Code*, describes the issue:

In 1895, the Supreme Court of the United States in the famous *Debs* case, assumed the right to issue injunctions in restraint of assertedly unlawful labor activity. The labor injunction thereupon became an increasingly popular employers' weapon throughout the land. Criminal prosecution of labor unions became a subordinate procedure, indeed, almost ceased, injunctions being preferred because they were swift and could be secured at the instance of private parties. Then, in 1908 the Supreme Court held in the *Danbury Hatters'* case that labor came within the purview of the Sherman Act, and that the anti-trust laws could be used to condemn illegal strikes, picketing and boycotting. Labor denied that it was a commodity or an article of commerce censurable under anti-trust legislation aimed primarily at business monopolies. An end was also sought to what labor

called “government by injunction.” The Clayton Act, passed by Congress in 1914, was the outcome of these contentions.¹⁴⁹

The period between the passage of the Sherman and Clayton Acts was filled with controversy. Labor organizations decried the over-use of injunctions by employers, and various sometimes-conflicting decisions by the different state courts failed to resolve much of the controversy over the use of injunctions and the legality of boycotts, picketing, and strikes.¹⁵⁰ For the most part, labor leaders focused their efforts on securing legislation that would limit injunctions, which were increasingly used to squelch union activities. Although they succeeded in getting laws passed in many states, in many cases the laws had little impact on the use of injunctions.¹⁵¹ Witte tracked injunctions sought and granted in federal and state courts, and his estimates illustrate their popularity:

.... Of the grand total of 1,845 injunctions, 28 were issued in the 1880's, 122 in the 1890's, 328 from 1900 to 1909, 446 from 1910 to 1919, and 921 between Jan 1, 1920, and May 1, 1930.... The author believes the impression of a steadily increasing number of injunctions, created by the figures cited, to be substantially correct.¹⁵²

Although many labor leaders believed the passage of the Clayton Act would solve the injunction problem, the use of injunctions did not subside substantially in the post-1914 period. For this reason, the American Federation of Labor began to push for similar legislation in the states. The legislation:

¹⁴⁹ Ludwig Teller. *A Labor Policy For America: A National Labor Code*. New York: Baker, Voorhis, and Co., Inc., 1945. p. 25.

¹⁵⁰ Witte, p. 17-61.

¹⁵¹ Witte, p. 270-271.

¹⁵² Witte, p. 84.

...declared unions to be lawful organizations and provided that no person should be indicted or prosecuted for any agreement or combination to improve working conditions.... From 1915 to 1919, this model state antiinjunction bill was introduced in nearly every state legislature, in many of them more than once. It was enacted into law in 1917 or 1919 in North Dakota, Oregon, Utah, Washington, and Wisconsin, and in part in Iowa and Minnesota.¹⁵³

Despite the concerted efforts of labor and the significantly negative impact that the widespread use of injunctions to break strikes had on the power of unions, legislation limiting the use of injunctions remained uncommon during this time.

3.4.7 Summary: Growth in Legislation

The majority of the fastest-growing laws during the 1899 to 1924 period protected workers in some way. However, many of these laws increased the bureaucratic structure of the government instead of imposing direct requirements on employers.¹⁵⁴ Most of the laws that did interfere with the labor contract concerned the labor of women and children, an area where public sentiment supported government intervention. Because public support for wide ranging labor regulations was still not present by 1924, labor activists pushed for more government assistance programs and regulation in areas that were politically viable, such as the regulation of the labor of women and children or the protection of public safety. Some successful laws, such as workman's compensation, held significant benefits for a broad range of constituents and met with less resistance in

¹⁵³ Witte, p. 272.

¹⁵⁴ Examples: mother's pension, workman's compensation, free employment offices, regulation of employment offices, accident reporting, inspectors, licenses for chauffeurs.

the state legislatures than regulations with more one-sided benefits, such as laws limiting the use of injunctions. In general, although the level of legislation increased dramatically during this period, a respect for the right of adult males to freely contract for their labor and the general doctrine of laissez-faire government persisted throughout the entire period.

The laws with lower growth rates over this period can be divided into several groups. The first group contains laws where legislative activity occurred early and was slow in later years, like male holiday laws and male hours laws. Early on, most states passed laws regulating Sunday labor and declared Labor Day a holiday. Early general declaratory hours laws were also common. There was little support for more restrictive hours laws so male hours laws experienced little growth over this period. Other laws fitting this pattern are mine safety laws, anti-intimidation laws, laws regulating wage payment and outlawing fraud against employees, and laws protecting unions. All of these groups contained laws that were relatively popular in 1895 but experienced relatively slow growth in subsequent years. The second group contains laws that were passed so late that the period of highest growth occurs after 1924. Minimum wage laws, licensing laws, anti-discrimination, and some union laws fall into this category. Finally, the alien labor laws were specific to certain states and did not spread nationally.

The laws that met with the most success were not the strictest laws. For example even by 1924, there was not widespread support for the regulation of the hours of work of

men or for union-related laws. Licensing laws and minimum wage laws were also uncommon. The most common laws in 1924 protected women and children or basic workplace safety. For the most part, voters were still uncomfortable with government intrusion in the labor contract, and only supported regulations that protected either the most basic rights of male workers or the public health. Regulation of women and children and public workers constituted the main exception to this rule. The labor of these groups was regulated much more stringently. It was viewed as acceptable to regulate the labor of women and children due to their relatively weaker social and political status. The regulation of government workers was seen as an acceptable exercise of government power over its employees. Laws controlling these groups grew quickly during the 1895-1924 period, as did general government programs to assist labor. This indicates that state legislatures were increasingly sympathetic to labor issues, but still faced significant opposition to wide-ranging general labor laws. In reaction to this opposition, legislatures enacted compromise legislation that contained weak provisions or covered only the least controversial groups.

3.5 Regional Differences in Amount of Legislation

A significant amount of regional variation exists in both the number and the temporal pattern of the passage of laws. Figure 3 shows the regional definitions that will be used to describe regional differences. With the exception of the South, the eight regions depicted in Figure 3 are Census sub-regions. Because of the homogeneity amongst the Southern states, the three Southern sub-regions (West South Central, East

South Central, South Atlantic) are combined and these regions will be discussed together. Also, Washington, DC is excluded from this discussion and not included as a member of the South, where it is included under the Census classification system.

Figure 3: Original Regions

Table 5 shows the average number of laws in effect in each region in 1895 and 1924. Significant regional differences existed. The industrialized Northern states had a significant early lead in labor regulations. The East North Central and MidAtlantic regions led the nation in the number of laws in every year. The New England and West North Central Regions followed in second place, and the South, Mountain, and Pacific states trailed the nation. Alaska and Hawaii always had the fewest laws and for the most part are dropped from this analysis because they were not states in any of the years included in the study.

Table 5: Average Number of Laws in Effect Over Time in Regions¹

Region	Total Number of Laws			1895-1924 Change		Average All Years ²
	1895	1910	1924	Num	Growth	
New England	30.8	42.2	55.0	24.2	78%	43.3
MidAtlantic	58.3	64.7	72.7	14.3	25%	66.1
South	17.7	35.7	46.8	29.1	165%	34.0
East North Central	43.6	63.4	67.6	24.0	55%	59.9
West North Central	27.6	46.7	58.9	31.3	113%	45.2
Mountain	14.9	31.0	52.9	38.0	255%	33.9
Pacific	19.3	49.7	69.0	49.7	257%	47.1
Alaska Hawaii	N/A	8.5	24.0	24.0	N/A	12.4
United States	25.6	41.5	54.5	28.9	113%	41.2
¹ See Figure 3 for regional definitions						
² Average number of total laws from 1895-1924						

Not surprisingly, the largest percentage increase in legislation occurred in states with the fewest laws in 1895. In the Pacific region, the total number of laws in effect between 1895 and 1924 increased by 257 percent, or about 50 state-laws. The Mountain states posted the second-largest increase, with a 255 percent increase between 1895 and 1924. These areas were experiencing rapid growth and urbanization during this period, and an increase in regulation went along with that urbanization. The more established South and West North Central experienced slightly slower growth than the Mountain states, but still above the national average. The regions that led the nation in early adoption of labor legislation experienced the least additional growth between 1895 and 1924. The New England, East North Central, and MidAtlantic regions all experienced below-average growth in total legislation during this period. The states in these regions

had well-established governmental structures and passed many of their labor regulations prior to 1895.

For the most part, states within each region follow a similar pattern in terms of the total number of laws in force in each year. However, there are some inconsistencies. In almost every region, at least one state does not conform to the regional pattern. In the vast majority of the cases, the “outliers” are border states. Often these states have more in common with the neighboring region than with states in their own region. Figure 4 through Figure 11 contain graphs for each census region showing the number of laws in force in each year for each state within the region and the new regional graphs after reclassifying the outlier states into the regions they more closely resemble.

3.5.1 New England

The top graph in Figure 4 shows the total number of laws in force in each of the six New England states. In this region, Massachusetts and Connecticut lead in terms of number of laws in force in each year. Maine and Vermont trail the region in the early years, but experience relatively rapid growth so that by 1907 Rhode Island, Vermont, Maine, and New Hampshire have similar levels of legislation. With the exception of Massachusetts and Connecticut, the New England states had an average level of legislation in most years.

In every year, the number of laws in force in Massachusetts and Connecticut exceed the other four states in the region. The total number of laws in these states more closely resembles the number in the MidAtlantic states than in the rest of New England. This is not surprising given the fact that these two states share a border with New York and were similar to the MidAtlantic states in that they were urbanized manufacturing states with active labor movements. In 1900, more than half of the population of all three of the MidAtlantic states (New York, New Jersey, and Pennsylvania) lived in cities.¹⁵⁵ In New England, only Connecticut, Massachusetts, and Rhode Island had over half of their populations in urban areas. The New England and MidAtlantic states were similar in that all states had an above average share of employment in manufacturing. Between 1900 and 1920, the MidAtlantic states averaged about 41 percent of their employment in manufacturing jobs. At 43 percent, New England's share of total employment in manufacturing was similar.¹⁵⁶

Despite this high degree of manufacturing activity across the Northeast, union activity was not uniform across all states. Between 1900 and 1924, the nation averaged almost 2,800 strikes per year, or about 58 per state each year. By far the most activity occurred in the MidAtlantic region, with almost 40 percent of all strikes taking place in the three MidAtlantic states. The New England region saw less activity, with about 16 percent of all strike activity occurring in these six states. However, strike activity within

¹⁵⁵ Data from 1900 U.S. Census. In 1900, urbanization rates were: NY 71%, NJ 68%, PA 51%, CT 66%, MA 87%, RI 92%, NH 47%, ME 36%, VT 21%.

New England was concentrated in Massachusetts and Connecticut, with about 80 percent of the strikes that occurred in the region happening in these two states. Massachusetts averaged 252 strikes per year between 1900 and 1924, and Connecticut averaged 98 strikes per year. This far outpaced the average number (48) in Rhode Island, the next-most-active New England state.¹⁵⁷ This underscores the importance of a strong labor movement in the successful passage of labor regulations.

Based on their total amount of labor legislation, Massachusetts and Connecticut more closely resemble the MidAtlantic states than the rest of New England. The similarity of these two states to the MidAtlantic region states is evident in the bottom graph in Figure 5, where Massachusetts and Connecticut are reclassified as MidAtlantic states. The bottom half of Figure 4 depicts the “New” New England region, excluding these two “outlier” states.

3.5.2 MidAtlantic Region

New Jersey, New York, and Pennsylvania led the nation in most years in terms of average number of laws in effect. The top half of Figure 5 shows the number of laws in effect in these three states between 1895 and 1924. In 1895, Pennsylvania and New Jersey had the first and second-highest number of laws in effect in the nation, at 67 and 58, respectively. New York was tied with Minnesota, Ohio, and Indiana for the number

¹⁵⁶ U.S. Census Data. Average of 1900, 1910, and 1920 numbers.

¹⁵⁷ Source: Price Fishback and Shawn Kantor, University of Arizona.

three place, with 50 laws in force⁰ in each of these states. By 1924, Pennsylvania and New Jersey experienced only modest growth in legislation, with increases of seven and six laws, respectively. In contrast, New York experienced a 30-law increase. By 1924, New York led the nation, with 80 labor laws in place.

The large amount of legislation in the MidAtlantic region reflects the strength of the pro-labor movement in these states. New York led the nation virtually every year in terms of the number of strikes that occurred in the state. Between 1900 and 1924, the state averaged 600 strikes per year, more than ten times the national average. Pennsylvania averaged 285 strikes per year, and New Jersey averaged 155.¹⁵⁸

The bottom half of Figure 5 provides some evidence for the hypothesis that the political influence of the pro-labor movements in the three MidAtlantic states spilled over into surrounding regions. The regulatory burdens in Maryland, Connecticut, and Massachusetts exceed the levels for the Southern and New England regions, suggesting that these border states could be reclassified as MidAtlantic states with respect to labor regulations. Although the total number of laws in these three reclassified states falls below the higher levels of the original MidAtlantic states, the numbers more closely resemble the MidAtlantic totals than the much lower totals for New England or the South.

Figure 4: New England Region, Total Laws In Force 1895-1924
Original New England Region

Reclassified New England Region

Added: None. Removed: CT, MA.

¹⁵⁸ Source: Fishback and Kantor.

Figure 5: MidAtlantic Region, Total Laws In Force 1895-1924

3.5.3 Southern Region

The Southern region consists of 16 states. Figure 6 shows the number of laws over time for the Southern region. The majority of the states in the South have a below average number of laws in place in every year. Three states do not fit this pattern: Maryland, Texas, and Oklahoma. For the most part, the Southern states had below average levels of urbanization, manufacturing, and labor activity.

Maryland is a clear outlier, with more laws than any other state in almost all of the years. Except for Maryland's fairly low number of laws in early years, it more closely resembles a MidAtlantic state than a Southern state. Maryland and Delaware were the only two Southern states with levels of urbanization and manufacturing activity that exceeded the national average. In 1900, 48 percent of Maryland's population and 41 percent of Delaware's lived in urban settings. The average for the rest of the South was 13 percent. By 1920, Maryland had 60 percent of its population in urban areas, and Delaware had 54 percent. The average for the rest of the Southern states had increased to 25 percent. These two states also employed about a third of their workers in manufacturing jobs between 1900 and 1920. The average for the rest of the South was about half that, about 15 percent. In terms of union activity, Maryland averaged about 36 strikes per year. Although this was significantly lower than the average for the MidAtlantic region, this was an unusually high number for a Southern state. In the South, Maryland was second only to much larger Texas for the total number of strikes per year. It is in the number of strikes that Maryland and Delaware are the most different.

Delaware averaged only eight strikes per year between 1900 and 1924. This lower level of union activity may be one explanation for why the amount of legislation in place in Delaware resembles the rest of the South instead of the MidAtlantic states, as with Maryland. The bottom half of Figure 5 shows Maryland reclassified as a MidAtlantic state.

Texas and Oklahoma also do not follow the Southern pattern. Both of these states have very low scores in the early years, but increase rapidly. Between 1895 and 1910, these states have a similar or lower number of laws than the rest of the South, but in the 1910 to 1924 period, rapid growth causes these two states to exceed the rest of the South. This pattern of higher relative growth fits with the West North Central region better than the Southern region, suggesting that the legislatures of Texas and Oklahoma were influenced by the actions of Midwest lawmakers. These two states are shown in the West North Central region at the bottom of Figure 8.

The bottom half of Figure 6 shows the thirteen remaining Southern states after the reclassification of Maryland, Texas and Oklahoma. In these states, Mississippi stands out as below average, with fewer laws than the Southern average. Mississippi had significantly less growth in legislation than the rest of the South, so that by 1910, the number of laws in force in Mississippi was significantly below the rest of the states in the region. In general, Southeastern states like Mississippi, Alabama, Florida, Georgia, and

the Carolinas trailed the South while the more central Southern states like Tennessee, Kentucky, West Virginia, and Louisiana passed more laws.

Figure 6: Southern Region, Total Laws In Force 1895-1924

Added: None. Removed: MD. OK. TX.

3.5.4 East North Central Region

The five East North Central states joined with the MidAtlantic states in leading the nation for total laws in place in most years. The five states in this region all had very similar numbers of laws in place in every year, and growth in legislation was uniformly low. The top graph in Figure 7 shows the growth in legislation for Illinois, Indiana, Ohio, Michigan, and Wisconsin.

3.5.5 West North Central

Figure 8 shows growth in legislation for the seven West North Central states. These states had more growth compared to the South, and also more heterogeneity in the states in the region. Minnesota and Missouri are clear outliers, with more laws in every year than the rest of the states in the region. These high scores are probably due to the influence of the East North Central Region, which bordered both of these states to the east. Iowa, the other state that borders the North Central region, had a relatively high number of laws in the 1895 to 1907 period, but after 1907, the number of laws flattened out. This state seems to follow a pattern that is intermediate between the Midwest and the North Central states. Minnesota, Missouri, and Iowa are reclassified as East North Central states at the bottom of Figure 7. The bottom of Figure 8 shows the “New” West North Central region, including Oklahoma and Texas, which were moved from the Southern region due to their higher number of laws and faster growth than the rest of the South.

Figure 7: East North Central Region, Total Laws In Force 1895-1924

Added: MN. MO. Removed: None.

Figure 8: West North Central Region, Total Laws In Force 1895-1924
Original West North Central Region

Reclassified West North Central Region

Added: OK. TX. Removed: MN. MO.

3.5.6 Mountain Region

The Mountain region is both the largest region geographically and the most sparsely populated region in the nation. It covers eight states. Figure 9 depicts the growth of the number of laws in these states. Colorado, and to a lesser extent, Montana, exceed the rest of the region in terms of number of laws in every year. Between 1895 and 1905, the rest of the Mountain region had a very similar number of laws. From 1905 to 1910, New Mexico and Arizona fall below Idaho, Nevada, Utah, and Wyoming. These two states continue to lag the region for the rest of the time period, but in 1910, Arizona experiences a sharp increase that brings it into line with the rest of the region. New Mexico continues to fall below all of the other states.

The two main outliers in this region are Colorado and Montana. In every year, these two states exceed the rest of the region for the total number of laws passed. The explanation for why these states differ so widely from the rest of the region is difficult given the geographic isolation of these two outlier states relative to other regions, but it appears that these states were influenced by the Pacific states. Especially in Colorado, the number of laws in force follows California very closely, and in many cases, the wording of similar laws in the two states was identical, indicating that the two states influenced each other. Colorado and Montana are re-classified as Pacific states at the bottom of Figure 10, and the remaining Mountain states are shown at the bottom of Figure 9.

3.5.7 Pacific Region

The three Pacific states appear to be very similar in the number of laws enacted in every year. Their growth is depicted in Figure 10. In all years, Oregon lags behind, and California consistently has the most laws. This region experienced the fastest growth of any region, and the bulk of the growth happens before 1910.

Figure 9: Mountain Region, Total Laws In Force 1895-1924

Added: None. Removed: CO. MT.

Figure 10: Pacific Region, Total Laws In Force 1895-1924

Added: CO. MT. Removed: None.

3.5.8 Alaska-Hawaii

Figure 11 shows the number of laws in force in Alaska and Hawaii between 1897 and 1924. Because Alaska and Hawaii were not states during this period, their legislative processes were significantly different from the rest of the nation. In general, there was little activity in these two states during the 1895 to 1924 period. Activities in these states will not be discussed in detail.

Figure 11: Alaska-Hawaii Region, Total Laws In Force 1895-1924

3.5.9 Summary: Regional Differences

Figure 12 shows a reclassification of the Census regions after moving outlier states into regions they more closely resemble. With the exception of the Pacific region, all of the outlier states bordered the regions into which they were reclassified.

Figure 12: Reclassification of Outlier States

Overall, in early years, the North Central and MidAtlantic states were clear leaders in labor law legislation. In later years, the Pacific states passed a significant amount of labor legislation. The South, West, and much of the Midwest lagged these more progressive regions in virtually every year. The amount of labor legislation present in a year is strongly correlated to the urbanization of the region, with more rural states

lagging behind the more industrialized states in the amount of legislation present. As states became more urbanized, the number of laws in force increased. As one would expect, there is also a correlation between the amount of union activity as measured by the number of strikes that occurred in the state, and the number of labor laws passed. Furthermore, there are clear geographic differences in the number of laws in force, with “border” effects present. States in more rural regions bordering more progressive regions almost always have a higher level of legislation than their interior counterparts. This indicates a sort of “contagion” effect, where legislation spreads from more progressive regions to less progressive regions.

3.6 Regional Differences by Category

For most of the six categories of laws, regional differences resemble the patterns discussed above for total laws. Table 6 shows the average number of laws in force over time in each region for each of the six main categories of laws. Appendix Table 17A through Table 21A show the average number of laws in each of the 22 sub-categories of laws over the study period, the number in 1899, 1909, and 1924, and the increase from 1899 to 1924, broken out by region.

Not surprisingly given the high level of total legislation enacted in these regions by 1900, either the MidAtlantic or East North Central region leads the nation in every major labor law category if the regulatory burden is measured as an average over the entire 1899 to 1925 period. However, rapid growth in legislation in the Pacific results in

a first-place ranking for this region in three of the six categories for the average number of laws in force in 1924. The Alaska-Hawaii region trails the nation in every category in all years. The South and Mountain regions generally had a below average number of laws, and the East North Central and New England regions generally had an average number of laws in most categories. The number of laws grew the fastest in the Pacific region, and the slowest in Alaska-Hawaii and the MidAtlantic region. Because Alaska and Hawaii were not states for any of the years under study, this region will not be discussed in the following sections.

Table 6: Growth in Category Scores over Time

Category	Num ²	Time	Region ¹								
			NE	MA	ENC	WNC	S	MT	P	AH	US
Regulation of hours, age, and wages	36	Avg ³	17.8	22.8	20.1	16.0	12.6	11.9	19.5	4.8	15.0
		1899	14.5	21.3	16.8	10.9	5.6	4.8	8.0	2.0	9.3
		1909	16.2	22.7	19.4	16.7	11.9	9.6	19.0	4.0	14.2
		1924	20.0	23.3	21.4	19.0	16.6	18.3	24.3	7.0	18.6
		Cg ⁴	5.5	2.0	4.6	8.1	11.0	13.5	16.3	5.0	9.2
Regulation of the employment contract	23	Avg ³	6.1	8.7	9.3	6.9	7.4	7.3	6.8	2.4	7.2
		1899	3.8	8.0	7.4	5.1	5.1	4.5	3.7	0.5	5.0
		1909	6.2	8.3	9.0	7.1	7.2	6.8	6.0	2.0	7.0
		1924	6.8	9.0	10.2	7.7	8.4	9.0	8.7	4.5	8.3
		Cg ⁴	3.0	1.0	2.8	2.6	3.3	4.5	5.0	4.0	3.3
Administrative programs and social insurance	5	Avg ³	2.6	3.2	3.6	2.9	1.5	2.4	2.8	1.2	2.3
		1899	1.2	1.7	2.0	1.7	0.5	1.3	1.0	0.5	1.1
		1909	1.8	1.7	3.0	2.3	0.9	1.6	2.0	0.5	1.6
		1924	4.5	5.0	5.0	4.3	2.9	4.1	4.0	2.5	3.9
		Cg ⁴	3.3	3.3	3.0	2.6	2.4	2.9	3.0	2.0	2.8

Table 6: Growth in Category Scores over Time

Category	Num ²	Time	Region ¹								
			NE	MA	ENC	WNC	S	MT	P	AH	US
Regulation of labor supply	18	Avg ³	3.3	5.2	4.1	2.9	2.0	2.6	4.0	1.6	2.9
		1899	1.5	3.3	4.0	1.9	1.1	1.6	1.3	0.5	1.7
		1909	2.8	4.7	3.4	2.4	1.5	2.5	3.3	1.5	2.4
		1924	4.7	5.7	4.4	3.7	3.0	3.3	6.3	3.0	3.8
		Cg ⁴	3.2	2.3	0.4	1.9	1.9	1.6	5.0	2.5	2.1
Safety regulations	27	Avg ³	9.4	18.2	17.9	13.1	8.2	8.4	11.2	1.6	10.5
		1899	5.7	14.7	13.4	9.1	4.7	4.0	5.7	0.5	6.7
		1909	8.2	17.0	18.0	12.9	7.1	6.8	9.7	0.0	9.5
		1924	12.3	21.3	19.4	16.0	10.8	12.4	15.0	3.5	13.4
		Cg ⁴	6.7	6.7	6.0	6.9	6.1	8.4	9.3	3.0	6.7
Unionization and bargaining	26	Avg ³	6.1	9.1	7.0	6.0	4.8	4.0	7.0	1.4	5.5
		1899	4.5	10.3	6.8	5.6	3.8	2.9	2.7	0.0	4.5
		1909	6.0	9.0	6.6	5.3	4.7	3.5	5.7	0.5	5.1
		1924	6.7	8.3	7.2	8.1	5.1	5.9	10.7	3.5	6.5
		Cg ⁴	2.2	-2.0	0.4	2.6	1.3	3.0	8.0	3.5	2.1
All laws	135	Avg ³	45.2	67.2	62.0	47.7	36.4	36.7	51.2	13.0	43.4
		1899	31.2	59.3	50.4	34.3	20.8	19.0	22.3	4.0	28.3
		1909	41.2	63.3	59.4	46.7	33.2	30.8	45.7	8.5	39.8
		1924	55.0	72.7	67.6	58.9	46.8	52.9	69.0	24.0	54.5
		Cg ⁴	23.8	13.3	17.2	24.6	26.1	33.9	46.7	20.0	26.2

¹NE: New England; MA: MidAtlantic; ENC: East North Central; WNC: West North Central; S: South; Mt: Mountain; P: Pacific; AH: Alaska-Hawaii; US: U.S. Total.
²Number of laws in each category
³Average number of laws in force between 1899 and 1924.
⁴Increase from 1899 to 1924.

3.6.1 Regulation of Hours, Age and Wages

The MidAtlantic region led the nation in the adoption of laws regulating the length of the workday and the labor of women and children. In 1899, the three states in this region had an average of 21.3 of the 36 laws in this category. The East North Central region had the next highest average, at 16.8, followed by New England at 14.5. The South, and Mountain regions had the fewest laws in this category in 1899, with the

number of laws in force in all three regions below the national average of 9.3 laws. Because the MidAtlantic and East North Central regions adopted so many of the laws in this category prior to 1899, these two regions also experienced the smallest increase in legislation between 1899 and 1924. The Pacific region experienced the most rapid increase, adding an additional 16.3 laws so that by 1924 the Pacific region led the nation, with 24.3 workday regulations.

Much of the increases in the Pacific states occurred in the regulation of child labor. In 1899, the Pacific region had an average of 1.3 child labor laws and 1.7 child hours laws, compared to 6.7 and 4.0 laws in these categories in the MidAtlantic. By 1924, the average number of child labor laws in the MidAtlantic region increased by only 0.7 laws. In the Pacific region, the average score increased by 6.3 laws. In 1924, the Pacific region equaled the MidAtlantic region for the most child labor laws, at 6.7, but trailed for the regulation of the hours of children. The Pacific region had an average of 2.7 child hours laws, compared to 4.7 in the MidAtlantic region. The MidAtlantic region also had more women's hours laws than the Pacific region in most years. In 1924, the MidAtlantic states had an average of six laws regulating the labor of women, one more than the five laws in force in the Pacific region.

The Pacific states outpaced the MidAtlantic states in the regulation of hours for all workers and in minimum wage regulations. In 1924, the Pacific states passed an average of 2.3 of the three minimum wage laws and 5.7 of the nine hours laws, compared

to an average of 0.3 and 3.3 in the MidAtlantic states. The popularity of these laws in the West is reflected in the Mountain states, which had an above average number of minimum wage and male hours laws, despite having a below average number of laws regulating the workday in general. The West North Central region also had an above average number of minimum wage laws, but unlike the Mountain and Pacific regions, the West North Central states had a below average number of hours laws.

Although the Mountain states trailed all of the other regions for average number of workday regulations over all years, this region experienced above-average growth so that by 1924, the Mountain states had surpassed the South and had an average number of workday regulations. Although the Southern states had slightly more laws regulating the labor of women and children than the Mountain states, the above average number of hours and minimum wage laws caused the Mountain states' total to exceed the average for the South.

3.6.2 Regulation of The Employment Contract

The East North Central Region led the nation for most years for the 23 laws regulating the employment contract. Very little regional variation existed in this category; average scores over all years ranged from a low of 6.1 in New England¹⁵⁹ to a high of 9.3 in the East North Central region. The New England and Pacific regions had the fewest laws in most years. More rapid increases in legislation after 1909 brought the

average in the Pacific region above the national average by 1924. This was the only category in which the Southern region had an above average number of laws. Within this category, the Southern region exceeded the national average for employer's liability laws, regulation of employment agents, and wage payment regulations.

The MidAtlantic region's overall average number of laws in this category was second only to the East North Central region. However, the MidAtlantic region scored below the national average in two of the six sub-groups in this category: employer's liability laws and anti-discrimination laws. The two North Central regions and the South led the nation for employer liability laws. In many of the states in these regions, states had general employer's liability laws that restated the common law or several industry-specific employer's liability laws instead of one general law. In these states, although the coverage provided to the general workforce lagged behind states with only one comprehensive law, the total number of laws in force would have been higher. Anti-discrimination laws were extremely rare during the 1899 to 1924 period, with a handful of states in the Pacific, Mountain, East North Central, and New England regions enacting at least one of the three laws.

Laws regulating bribery, coercion, and gouging of employees were most common in the MidAtlantic states and least common in the West North Central states and the South. Since most of the laws in this category related to abuses in wage payment in

¹⁵⁹ The Alaska-Hawaii region had fewer laws than New England, but are excluded from this discussion.

company towns, these laws were more popular in industrial or mining states, and less common in agricultural states. Wage payment regulations were also most common in the MidAtlantic states, but the Southern states had an average number of these laws. The West North Central region had the fewest wage payment regulations. Laws granting employees political protections were most common in the two North Central regions, and the least common in New England. Laws regulating employment agents were most common in the MidAtlantic region, and least common in the West North Central states.

3.6.3 Administrative Programs and Social Insurance

The East North Central region led the nation for these five laws, followed by the MidAtlantic region. These laws were the least common in the South, which had both the lowest average in most years and the smallest increase between 1899 and 1924. The spread in average number of laws over the 1899 to 1924 period ranged from a low of 1.5 in the South to a high of 3.6 in the East North Central states. In 1899, no social insurance laws were in force. The East North Central states had an average of two of the three administrative laws, and the South had an average of only 0.5 administrative laws.¹⁶⁰ By 1924, substantial progress in the passage of these laws occurred. All of the MidAtlantic and East North Central states had all five of these laws by 1924, and the New England region had an average score of 4.5 of the five laws. The West North Central, Mountain, and Pacific regions all had average scores over four. In the South, average growth

¹⁶⁰ They were bureaus of labor statistics and boards of arbitration. Free employment offices were established later.

between 1899 and 1924 kept the regional average below the rest of the nation, with an average of only 2.9 laws in 1924. The South lagged in both of the sub-categories, with an average of 1.3 of the two social insurance laws and 1.6 of the three administrative laws. The South lagged the nation in all of the individual laws, but its provision of boards of arbitration fell the most behind the national average (0.28 Southern average versus 0.57 national average).

3.6.4 Regulation of the Labor Supply

Regional averages in this category ranged from a low of 2.0 in the South to a high of 5.2 in the MidAtlantic region. As with workday regulations, the MidAtlantic and East North Central regions led the nation in the early years, but rapid growth in legislation in the Pacific region propelled this area into the number one position by 1924. The Southern region had the fewest laws in this category throughout the period.

In 1899, all of the MidAtlantic states had convict labor laws, and the MidAtlantic region led the nation for alien labor laws with an average score of 0.7 out of three laws. The East North Central region led for occupational licensing laws, with an average of 2.6 out of the fourteen laws in this category. The South trailed the nation for convict labor laws, with only 30 percent of the states having this law. The West North Central region had no alien labor laws in 1899, placing this region in last place in this category. The Pacific region had the fewest licensing laws, with a regional average of only 0.3 laws. By 1924, more states passed laws regulating the labor of convicts so that the South and

New England tied for last place, with 50 percent of the states in these two regions passing this law. The Pacific region joined the MidAtlantic region with 100 percent of these states passing the law. Alien labor laws spread fastest in the Pacific region, with a 1.3-law increase. By 1924, the Pacific region led the nation in this category, followed by the MidAtlantic region, with an average of one law. The East North Central region still had not passed any alien labor laws by 1924, and only a few states in the West North Central and Southern regions had an alien labor law in force.

Occupational licensing laws grew fastest in the Pacific and New England regions, with increases of 3.3 and 2.8 laws, respectively, between 1899 and 1924. In 1924, these two regions joined the MidAtlantic region with the most laws, at 3.7. The East North Central region's average was similar, at 3.6. The Mountain region had the lowest average, with only 2.0 laws in 1924, followed by the South at 2.3 and the West North Central region at 2.9.

3.6.5 Safety Regulations

The nation averaged 10.5 safety regulations over the 1899 to 1924 period. The MidAtlantic and East North Central regions led with an average of 18.2 and 17.9 laws, and the South and Mountain regions trailed with 8.2 and 8.4 laws, respectively. Growth in the Pacific and Mountain regions outpaced the rest of the nation, with increases of 9.3 and 8.4 laws, above the national average increase of 6.7 laws.

In 1899, the MidAtlantic, and two North Central regions exceeded the national average for all categories of safety regulations. The more industrialized MidAtlantic and East North Central states had more laws than the West North Central region. The New England region exceeded the national average for factory safety regulations and railroad regulations. The Mountain region had the fewest laws, followed by the South and Pacific regions. Although the Mountain states had very few accident and factory safety laws, and no railroad safety regulations, these states had an above-average number of mine safety laws, reflecting the importance of mining in this region. Similarly, the Pacific region had a higher average number of laws in each category compared to the Mountain states, but had an above average number only for mine safety laws. The Southern region fell below the national average in every category.

By 1924, factory safety laws increased by about four laws on average for the nation. The increase was slightly above average in the Pacific and New England regions, and was below average in the South. By 1924, the MidAtlantic states' average score had increased to 12 out of the 14 laws, and the East North Central region's average increased to 9.8. The Mountain states continued to trail, with only 3.9 laws, followed by the South with 4.4. Accident reporting regulations increased in all regions so that only New England and the South had averages below two laws. Most regions also experienced substantial progress in passing the three railroad regulations, with only three regions

having averages below two in 1924.¹⁶¹ For mine regulations, an increase of 2.1 laws between 1899 and 1924 pushed the Mountain states' average number of laws to first in the nation, with 5.3 laws. The MidAtlantic and East North Central regions trailed with 4.7 and 4.8, respectively. With an average of 3.0 laws in 1924, the Pacific region ranked above only New England in this category.

3.6.6 Unionization and Bargaining

With an average of 9.1 laws over the 1899 to 1924 period, the MidAtlantic region led the nation for unionization and bargaining laws. The East North Central and Pacific regions followed with 7.0 laws each, and the Mountain region trailed with an average of 4.0 laws. Over time, the Pacific region experienced the most growth, and as a result, this region's rank changed from last to first between 1899 and 1924. The MidAtlantic region actually experienced a decline in the number of union laws between 1899 and 1924 as laws were repealed or declared unconstitutional. The East North Central region's average number of union laws increased by only 0.4 laws during this time. The South had a slightly below average number of union laws in 1899, ranking it fifth out of the eight regions. By 1924, the region experienced only a 1.3-law increase so that the Southern states had the lowest average number of union laws in the nation.

¹⁶¹ West North Central: 1.7; South: 1.4; Mountain: 1.1.

3.7 Conclusion

Regionally, the East North Central, MidAtlantic, and Pacific regions had the most laws, and the Alaska-Hawaii, South, and Mountain regions had the least. The West North Central and New England regions were closest to the average in most categories. The states in the East North Central and MidAtlantic regions are the most homogenous. The lack of “outlier” states in these regions raised the regional averages, contributing to the high number of categories in which these two regions ranked first and second in the nation. All of the states in these regions have a large number of labor laws in force in every year. Within specific sub-groupings, the MidAtlantic states led the nation for regulation of women, child hours laws, holiday laws, factory safety regulations, licensing laws, regulation of employment agents, wage payment laws, anti-bribery laws, convict labor laws, and accident reporting regulations. The East North Central region was first for child age laws, administrative programs, railroad regulations, and employer’s liability laws. This list of laws reflects a high level of government intervention and indicates a bias towards protectionism in these states. The MidAtlantic and East North Central states were urban and industrialized, and the laws in force reflect this fact. These states scored first and second for the number of union laws, suggesting that unionization was important, and probably contributed to the high level of labor legislation enacted. The East North Central region had no sub-category of laws in which it ranked less than sixth out of the eight regions. The MidAtlantic region ranked seventh for employer’s liability laws and eighth for minimum wage laws.

New England had no category of laws in which it ranked first out of the eight regions. The region ranked second for both categories of women's laws, and for holiday regulations, and third for child labor laws, factory and railroad safety laws, and licensing laws. The region ranked last for mine safety laws and for male hours laws. Since the region has no mines, the lack of mine safety laws is not surprising. The categories in which the region has high average scores reflect the industrialized nature of many New England states and a desire to protect women and children while preserving the right to work of male laborers. The region scores high relative to the rest of the nation for anti-intimidation laws, suggesting a possible anti-union sentiment. The other high-scoring categories for this region are consistent with the pattern of the MidAtlantic region, but tempered by the less urban nature of many of the New England states. This region was led by Massachusetts and Connecticut in terms of the number of laws in force, with the less urban Vermont, New Hampshire, and Maine trailing the region. The New England states were also strong in safety regulations. The region exceeded the rest of the nation for railroad and factory safety laws. This was probably due to the established railroad infrastructure of the region combined with the urban nature of many of the states. To score high in the railroad safety category, a region would have had to have both a railroad safety law and a street railroad safety law, so both urbanization and an established railroad system were necessary for a high score.

Because the Pacific region started with a low level of legislation and experienced a great deal of growth, this region's overall scores were not large. For most of the

categories, this region was not significantly different from the rest of the nation in its average scores. The exceptions to this rule are the alien labor laws, anti-discrimination laws, minimum wage laws, and male hours laws. These four categories of laws were more prevalent on the West Coast than in the rest of the nation. As with the MidAtlantic region, the alien labor laws were common in the Pacific states due to a high level of immigration. The Pacific states were experiencing a high level of Asian immigration, and because of that, these states passed anti-Chinese laws in addition to the more general anti-alien laws. The minimum wage and anti-discrimination laws originated with the Pacific states and spread later to the rest of the nation. Male hours laws were quite controversial during this period, and were declared unconstitutional in many states. The fact that the Pacific region has the highest score in the nation for this category suggests a highly progressive sentiment in these states. The Pacific region did not rank seventh or eighth for any category of laws, but did rank sixth for political protections, employers' liability laws, and laws regulating employment agents.

The Southern states were significantly below the nation in most categories, ranking seventh for minimum wage legislation, administrative laws, accident reporting regulations, social insurance programs, convict labor laws, women's hours laws, and alien labor laws. The region's highest rankings were for employer's liability laws and wage payment regulations, for which the South ranked third in the nation. Part of the reason for these low scores stems from the relatively rural nature of the South. Since most states were primarily agricultural, factory safety laws were less necessary.

However, the region also was politically more oriented towards nonintervention by the government and protection of the right to work, and this political philosophy kept the number of labor laws in check. The above average score for employer's liability laws is somewhat difficult to interpret, since one of the laws in this category designates a state having an employer's liability law that restates the common law. Other laws in this category are for specific industries. A state with an employer's liability law that only restates the common law and a railroad employer liability law would have fairly low overall employer's liability coverage, but its score in this category would be higher than a state that had one universal law. For this reason, it may be correct to interpret a high score in this category as indicating a lower degree of coverage for employer liability. In fact, the only individual employer liability law for which the South significantly exceeded the rest of the nation was for the variable indicating that the main employer liability law was only a restatement of the common law. The South's average of 0.69 was significantly higher than the rest of the nation's 0.38 average. Overall, this region's consistently low scores can be attributed to politics more than population (or lack thereof), making this region the most "anti-labor" region in the nation.

In contrast to the South, the Mountain states also scored below the national average in many categories, but these low scores are more due to a lack of government structure in the early years of the study period than a lack of political support for labor issues. The Western states ranked seventh for factory and railroad safety, child and women's laws, licensing laws, regulation of employment agents, and union laws. The

region ranked eighth for holiday laws. These categories reflect the general lack of urbanization and industrialization in these states. As the states became more populous and industrialized, these laws became more common. Although the Mountain states had low overall average for union laws, the region experienced an above-average increase, which may suggest that unionization came slowly to that region. This region ranked first in the nation for mining laws, second for political protections, and third for minimum wage and anti-discrimination laws.

The West North Central is the “typical” region. In most categories, this region ranked in the middle of the eight regions. The region ranked first for political protections, and second for employer’s liability and minimum wage laws. This region contains some very progressive states, such as Minnesota, as well as some states with extremely low levels of labor legislation, such as the Dakotas. This combination of states with high and low levels of legislation results in a regional score that resembles the nation in most cases. The West North Central ranked last in the nation for alien labor laws and for regulation of employment agents, reflecting the lack of importance of immigration in these states. The region ranked seventh for laws prohibiting bribery or coercion of employees.

Overall, the East North Central and MidAtlantic regions were the most progressive. These heavily industrialized, populous states had high levels of legislation in most categories for most years. Both regions show strong support for the regulation of

women and children and safety regulations. The New England and West North Central regions fall in the middle, with New England states focusing more on protecting the right to contract for workers while still protecting the health and safety of women, children, and the general public. The West North Central states resemble the national average in most categories. Low initial levels of legislation followed by relatively more rapid growth in the Western states causes their overall average scores to be lower than their Eastern counterparts. The Pacific region is the most progressive Western region, with these states making large gains in the number of laws in force over the study period. The Mountain states lag consistently behind the Pacific states, probably due to a general lack of urbanization and industrialization. The Alaska-Hawaii region trails the rest of the nation in every major category. The South has a consistently low level of legislation. The low average scores in this established, mature region might be partially due to the rural nature of most of the Southern states, but could also be attributed to a general laissez-faire sentiment amongst Southerners.

CHAPTER 4 : SUMMARIZING THE LAWS

4.1 Introduction

The goal in this section is to develop a set of variables that adequately capture the variability present in the 135 labor laws. In order to estimate a model examining the impact of labor legislation on firm production costs, the dimension of the problem must be reduced. Principal components analysis is used to develop summary variables that reduce the number of variables representing labor legislation from 135 variables to four. The resulting factor scores are interpreted as index numbers that describe the amount of labor legislation present in any given state for four different categories of laws.

Two methods of developing summary variables were considered: principal components analysis and factor analysis. Principal components analysis (PCA) is a data reduction technique where the goal is to reduce the number of variables to a smaller group that still captures most of the variability in the data. Factor analysis is similar to PCA, but factor analysis distinguishes between variance that is unique to a variable and variance that is shared amongst all the variables. The factors that are developed from factor analysis only explain the variance in the data that is shared variance. In contrast, the factors that result from PCA are an expression of all of the variance in the data whether it is shared or unique. The main idea behind both of these methodologies is that many variables are influenced by one underlying common factor.

In the context of this paper, the latent variables that are present are “labor attitudes.” These attitudes could be driven by the sociological, economic, political, or demographic elements of the different states. The laws that are enacted in a state can be viewed as manifestations of the underlying labor attitudes present in that state. The factors that will be uncovered will represent different aspects of these attitudes.

4.2 Methodology

4.2.1 Principal Components Analysis

The most basic type of factor analysis is called principal components analysis. The main goal in principal components analysis is to describe the variation that is observed in a large number of variables using a smaller number of variables. The procedure assumes that all of the variation observed in the variables is due to common factors, and the principal components that are developed summarize this variation. In this method, the goal is to find a vector u_1 that maximizes the sum of squares of the orthogonal projections of the data points onto u_1 . The vector u_1 is constrained to have a unit length. This becomes a maximization problem where the objective function is the sum of squares of the projection of each data point onto u_1 . In this analysis, the data point x_{it} corresponds to the row vector representing whether or not state i had each of the 135 laws in year t . Symbolically:

$$p_{it} = x_{it} \cdot u_1, \quad i = 1 \dots 48 \text{ states}^{162}; t = 1 \dots 30 \text{ years}; \text{ and } m = 135 \text{ laws.} \quad (4.1)$$

$(1 \times m)$ $(m \times 1)$

¹⁶² Alaska, Hawaii, and Washington, DC were excluded from the analysis since they were not states for any of the years under study.

where p represents the orthogonal projection of x_{it} onto u_l . The objective function of the maximization function maximizes the sum of these p_{it} points subject to the restriction that $u_1' u_1 = 1$. In matrix form, the Lagrangian is:

$$L = \underset{(1 \times m)}{u_1'} \underset{(m \times i)}{X'} \underset{(i \times m)}{X} \underset{(m \times 1)}{u_1} - \lambda (u_1' u_1 - 1) \quad (4.2)$$

Taking derivatives, the first order conditions are:

$$2X'Xu_1 - 2\lambda u_1 = 0 \quad \text{or} \quad X'Xu_1 = \lambda u_1 \quad (4.3)$$

From (4.3) above, it is clear that λ and u_l are an eigenvalue and unit eigenvector of the symmetric matrix $X'X$. Because we are maximizing the objective function, the largest eigenvalue and its corresponding eigenvector should be chosen. (Since $X'X$ is an $m \times m$ matrix, there will be m positive eigenvectors if $X'X$ is of full rank). By repeating the procedure, it can be shown that the eigenvectors make up a new set of axes, and the coordinates of the points on these new axes are defined as $T_{(itp)} = \underset{(i \times m)}{X} \underset{(m \times p)}{U}$. If the matrix is not of full rank, then there will be $p < m$ positive eigenvectors, and the dimensionality of the problem has been reduced.¹⁶³

If the X matrix is converted into a matrix Y containing deviations from the mean, (each element is of the form $x_{itm} - \bar{x}_m$) and the same maximization problem from above is applied to the matrix $1/n Y'Y$, the problem becomes one of maximizing the variance of

¹⁶³ R. Corluy. *Factor Analysis and Cluster Analysis*. Brussels: Center For Biomathematics, 1982, p. 22-25.

the X matrix. The matrix of principal components is $W = \underset{(itxp)}{Y} \underset{(itxm)(mxp)}{U}$. The U matrix contains the p eigenvectors of $1/nY'Y$ ordered by the size of their corresponding eigenvalues. It can be shown that these principal components have mean zero and variance Λ , and that the covariance between any two components (any two columns of W) is zero. Furthermore, the trace of Λ equals the total variance, so the ratio of $\lambda_i/\text{tr}(\Lambda)$ represents the proportion of the total variance that is represented by principal component i . The typical procedure is to select only the first n principal components, where the total variation accounted for by those components is $\sum_{i=1}^n \frac{\lambda_i}{\text{tr}(\Lambda)}$. As this proportion gets higher, the principal components that were selected do a better job of describing the variation present in the original data.¹⁶⁴

4.2.2 Factor Analysis

Factor analysis differs from principal components analysis in that it allows there to be some variation that is unique to each variable, as well as some variation that is common to all or some of the variables. With factor analysis, the factors seek to explain only the portion of the total variance that is shared by other variables in the model. For example, a two factor model using five observed variables Y_1 through Y_5 could have the following underlying form:

¹⁶⁴ Corluy, p. 26-30.

$$\begin{aligned}
Y_1 &= a_{11}F_1 + a_{12}F_2 + b_1U_1 + e_1 \\
Y_2 &= a_{21}F_1 + a_{22}F_2 + b_2U_2 + e_2 \\
Y_3 &= a_{31}F_1 + e_3 \\
Y_4 &= a_{42}F_2 + b_4U_4 + e_4 \\
Y_5 &= a_{52}F_2 + e_5
\end{aligned}
\tag{4.4}$$

The structure in (4.4) implies that variables Y_1 - Y_3 are functions of factor one, and variables Y_1 , Y_2 , Y_4 , and Y_5 are functions of factor 2. In addition, all variables have an error term reflecting measurement error and variables Y_1 , Y_2 , and Y_4 have unique factors U_1 , U_2 , and U_4 . These variables influence only one variable. In principal components analysis, all of the variance of the Y matrix would be considered in estimating the factors. With factor analysis, only the common variance is considered, and the variance that can be attributed to e_1 - e_5 and U_1 , U_2 , and U_4 will not be reflected in the factors.¹⁶⁵

Factor analysis starts by standardizing the data. This transforms the $\frac{1}{n} X'X$ variance-covariance matrix into a $\frac{1}{n} Z'Z$ correlation matrix. Suppose the correlation matrix is of full rank. The eigenvalues and eigenvectors for the correlation matrix are then calculated. The matrix of factor scores is $F = Z U \Lambda^{-1/2}$. This is different from the matrix of principal components in that the Z matrix is standardized, and the ZU matrix is also standardized by dividing by $\Lambda^{1/2}$, the standard error of F . Now the Z scores of the original data matrix can be expressed as linear functions of the factors in the following way:

¹⁶⁵University of Texas at Austin. "Factor Analysis Using Proc Factor (Stat-53)." ACITS, University of Texas at Austin Statistical Services, 26 June 1995, p. 1-3.

$$z_{ij} = F_{it1} u_{j1} \sqrt{\lambda_1} + F_{it2} u_{j2} \sqrt{\lambda_2} + \dots + F_{itm} u_{jm} \sqrt{\lambda_m} \quad (4.5)$$

Where $u_{jk} \sqrt{\lambda_k}$ represents the factor loading on factor F_{itk} for element z_{ij} (corresponding to the a_{ij}^{th} element of X). This term also represents the correlation coefficient of z_{ij} with F_{itk} . This gives a more intuitive interpretation for the factor loadings. They represent the correlation of each variable in the data matrix with each factor. In matrix notation, the matrix of factor loadings or correlation coefficients can be referred to as

$$L_{(mxm)} = U_{(mxm)} \Lambda_{(mxm)}^{-1/2}. \text{ After an orthogonal rotation of the factor axes, the factor loadings are}$$

interpreted in order to assign meaning to the factors. Once the number of factors to be used is selected and the factors are interpreted, the factor scores are computed as

$$F_{(itxm)} = Z_{(itxm)} U_{(itxm)} \Lambda_{(itxm)}^{-1/2}. \text{ These scores are used as index variables in the later analysis.}^{166}$$

In this analysis, principal components analysis and a varimax rotation were used. The rotation aids in the interpretation of the factors by seeking to assign a high loading to only one factor for each law. The method is an orthogonal rotation, which means that the factors remain uncorrelated after the rotation.¹⁶⁷ Uncorrelated factors are desirable in this analysis since the factor scores will be used as explanatory variables in later regression models. Because the primary goal in developing these factors was to reduce the dimensionality of the data while still expressing all of the variability (shared and unique) that is present in the 135 laws, principal components analysis was chosen over factor

¹⁶⁶ Corluy, p. 24-36.

¹⁶⁷ Corluy, p. 42-47.

analysis. Results of the factor analysis approach were similar to the PCA results that are described below. Factor analysis results are reported in Appendix C.

4.3 Results

Selecting the appropriate number of factors to represent the data involves using judgment. The first part of this section discusses commonly used methods for choosing the appropriate number of factors. The next section discusses the interpretation of the factors that emerge from the four-factor design. The final section discusses index values developed for each state-year from the four-factor model. Results for PCA versions with higher numbers of factors are contained in Appendix B.

4.3.1 Factor Selection

All methods of determining the proper number of factors to extract involve examination of the eigenvalues of the correlation matrix. There are several methods for determining the correct number of factors, and the process is somewhat subjective. The discussion below describes the results from selection of four factors. Principal components analysis was also performed using more factors. Those results are reported in Appendix B.

Table 7 lists the top 37 eigenvalues from the correlation matrix of labor laws. All 135 eigenvalues can be found in Table 22A in Appendix B. In the table, the eigenvalues are ordered from largest to smallest, and the proportion of the total variability in the data

that is explained by each eigenvalue is listed in the column labeled “Proportion.” One commonly used rule for determining the correct number of factors is to use the number equal to the number of eigenvalues greater than one. An eigenvalue less than one indicates that the factor that corresponds to this eigenvalue would explain less of the variance present in the data than any given law by itself. Therefore, including a factor with an eigenvalue less than one would not help in the goal of reducing the dimensionality of the problem. In this analysis, there were 37 eigenvalues that were greater than one. These 37 factors account for approximately 80 percent of the total variability present in the data. The analysis of these 37 factors is difficult, with many of the 37 factors having no obvious interpretation. This indicates that fewer factors would be better.

Table 7: Eigenvalues of the Correlation Matrix

Number	Eigenvalue	Difference	Proportion	Cumulative
1	18.731	9.943	13.9%	13.9%
2	8.788	2.570	6.5%	20.4%
3	6.218	1.175	4.6%	25.0%
4	5.043	0.753	3.7%	28.7%
5	4.291	0.485	3.2%	31.9%
6	3.806	0.249	2.8%	34.7%
7	3.558	0.421	2.6%	37.4%
8	3.136	0.034	2.3%	39.7%
9	3.102	0.180	2.3%	42.0%
10	2.922	0.067	2.2%	44.1%
11	2.855	0.092	2.1%	46.3%
12	2.763	0.099	2.1%	48.3%
13	2.664	0.085	2.0%	50.3%
14	2.578	0.099	1.9%	52.2%
15	2.480	0.180	1.8%	54.0%
16	2.299	0.096	1.7%	55.7%

Table 7: Eigenvalues of the Correlation Matrix

Number	Eigenvalue	Difference	Proportion	Cumulative
17	2.203	0.035	1.6%	57.4%
18	2.168	0.108	1.6%	59.0%
19	2.060	0.147	1.5%	60.5%
20	1.913	0.074	1.4%	61.9%
21	1.840	0.118	1.4%	63.3%
22	1.722	0.067	1.3%	64.6%
23	1.655	0.068	1.2%	65.8%
24	1.587	0.040	1.2%	67.0%
25	1.546	0.021	1.2%	68.1%
26	1.525	0.041	1.1%	69.2%
27	1.484	0.074	1.1%	70.3%
28	1.410	0.083	1.0%	71.4%
29	1.327	0.013	1.0%	72.4%
30	1.313	0.072	1.0%	73.3%
31	1.242	0.076	0.9%	74.2%
32	1.166	0.006	0.9%	75.1%
33	1.160	0.035	0.9%	76.0%
34	1.125	0.038	0.8%	76.8%
35	1.087	0.015	0.8%	77.6%
36	1.072	0.066	0.8%	78.4%
37	1.007	0.033	0.8%	79.2%

A second method for determining the correct number of eigenvalues calls for looking at the “scree” plot of the eigenvalues ordered by size, and selecting the number of factors that correspond to the “elbow” or bend in the scree plot. This is equivalent to selecting only the factors with the largest eigenvalues that make up the largest proportion of the total variance. Using these methods, it appears that 4, 5, 11, 15, 20, or 27 factors could be appropriate for this model. As more factors are added, a larger proportion of the total variance is explained. Figure 13 illustrates this method.

The scree plot and Table 7 both show a major drop-off in the value of the eigenvalues after about 4 or 5 eigenvalues. Although four factors only capture 29 percent of the total variance and five only explain 32 percent, each additional factor adds little in terms of explaining variance. No eigenvalue after the fifth accounts for more than 3 percent of the total variance, and no eigenvalue after the 13th accounts for more than 2 percent. Because of the relative inability of additional factors to reflect the variability present in the set of labor laws, and the need to keep the number of variables small, the version with four factors was chosen. The factor patterns resulting from the selection of larger numbers of factors are discussed in Appendix B.

Using the scree plot as a guide, PCA analyses were run with 4, 5, 11, 15, 20, 27, and 37 factors. In general, as the number of factors increased above 11, interpretation became more difficult. The majority of the laws had significant loadings for at least one factor in all versions. For the most part, as more factors were added, the new factors that emerged were subcategories of earlier factors. Most of the factors had a fairly straightforward interpretation, and followed the category lines that were described in Chapter 3. Following common practice, a factor loading was considered to be significant if the absolute value of the factor score exceeded 0.3.

Figure 13: Eigenvalues of the Correlation Matrix

4.3.2 Four Factor Design: Factor Description

In this design, 98 of the 135 laws had significant factor scores. Each of the four factors has a clear interpretation, and three of these four factors are extremely stable in designs where more factors are added. The first factor was interpreted to represent first wave laws, the second factor represents second wave laws, the third factor represents laws related to mining, and the fourth factor represents laws related to union issues, specifically intimidation laws and employer's liability laws. Table 8 shows the number of laws from each of the 23 major categories with significant loadings for each of the four factors.

Table 8: Number of Significant Laws By Category: Four Factor Design

Category	Total Num Laws	First Wave (1)	Second Wave (2)	Mines (3)	Anti-union (4)	Not Sig. ¹	Total Sig. ²
Employer Liability Laws	5		1		3	2	4
Social Insurance	2	2	2				4
Factory Safety	14	10	3			2	13
Reporting of Accidents	3	2	1	1			4
Railroad Regulations	3	2				1	2
Mining Regulations	7			6	1		7
Child Labor Laws	8	7	1				8
Child hours laws	6	5	1		1	1	7
Women's Regulations	2	1				1	1
Women's Hours Laws	5	5	1				6
Holidays	3	2				1	2
Hours Laws	9	2	4	1	2	3	9
Unionization and Bargaining	26	4	6	1	5	13	16
Convict Labor	1	1		1			2
Bribery, Coercion, or Gouging	4	2	1	1	1		5
Political Protections	2			2			2
Administrative Laws	3	3	1	1			5
Alien Labor Laws	3		1		1	1	2
Employment Agents	2	1				1	1
Occupational Licensing	14	5	1	2	1	7	9
Anti-discrimination Laws	3		1	1		1	2
Wage Payment	7	2		3		3	5
Minimum Wages	3		3				3
Total	135	56	28	20	15	37	119

¹ Number with loadings for all factors that are less than 0.3 and greater than -0.3.
² Number of significant factor loadings for each category. Can be larger than total laws because some laws load on multiple factors.

4.3.2.1 Factor 1: First Wave Laws

The first factor had 56 laws with significant scores. Table 9 lists all the laws by category and the significant loadings. If a law did not have a significant loading for any of the four factors, the loading with the largest magnitude is listed. The first factor has 56 laws with significant loadings and another eleven laws where all loadings were insignificant but the largest loading was on Factor 1. The laws with large loadings for Factor 1 are the most common laws. Many of these laws were enacted early in the 1899 to 1924 period and include general safety regulations, particularly factory safety regulations and laws protecting women and children. Most of the safety, age and hours laws load on Factor 1. Ten of the fourteen factory safety laws, two of the three railroad safety laws, two of the three accident reporting laws, twelve of the fourteen children's laws, six of the seven women's laws, all of the social insurance laws, administrative laws, and convict laws, and two of the three holiday laws had significant loadings for this factor.

Within these categories, the laws that do not load on this factor are either the most progressive laws in the category or laws that clearly belong in a different group. For example, within the category for children's laws, the law creating a child welfare commission and the children's hours laws for "other" occupations are the only laws that do not load on Factor 1. The first law was quite uncommon during the study period and loads on the factor representing second wave laws. The second law was not significant, probably because the catchall "other" category has little interpretable meaning. Within

the accident-reporting category, the law requiring accident reporting in mines loads on the mine factor instead of the first wave factor. Of the four insignificant factory safety laws, two were progressive laws requiring rehabilitation and industrial commissions, one specified safety regulations for electricity in factories, and one was for “other” safety regulations. The commission and electricity laws were rare and were adopted late by most states. All three of these laws have their highest loadings on the factor representing second wave laws.

Other categories with a large number of laws with significant loading on the first factor were union laws, with four significant laws; two laws regulating bribery, coercion or gouging; two laws regulating wage payment; and five occupational licensing laws. Very few of the licensing laws were significant for any of the four factors; the general factor had the most significant licensing laws. Of the five significant licensing laws, four were common laws whose intent was to protect public safety. These laws licensed plumbers, steam engineers, barbers and chauffeurs. The final licensing law loading on the general factor was a license for motion picture operators; this law was neither common nor would seem to protect public safety. In the union category, the laws with significant loadings for the general factor were common laws protecting the rights of unions and their workers. These included laws prohibiting yellow dog contracts,¹⁶⁸ protecting union trademarks, allowing incorporation of labor unions, and outlawing misuse or forgery of union cards.

Although all of the women's hours laws and most of the children's hours laws load on this factor, very few of the men's hours laws are significant for this factor. Of the nine laws, only two were significant. Interestingly, they were the general hours law and the law for street railroad operators. The motivation for regulating the hours of street railroad operators was to protect the public safety, so the significant loading on the first factor is consistent with its interpretation as representing the earlier safety and protection laws. However, the regulation of the hours of men was uncommon during this time. A law that was binding on all workers would have been quite progressive. The general hours laws passed in most states were voluntary; binding laws were generally industry-specific. These industry-specific laws loaded on other factors.

Table 9: Significant¹ Loadings for Four Factor Model

Category and Law	First Wave (1)	Second Wave (2)	Mines (3)	Union (4)
Employer Liability Laws				
Restates Common Law				0.35
General		0.42		-0.33
Railroads				0.47
Mines			0.26	
Can't require employees to sign contracts waiving damages				0.25
Social Insurance				
Workers' Compensation Law	0.35	0.59		
Mother's pension	0.35	0.60		
Factory Safety				

¹⁶⁸ A yellow dog contract requires or prohibit membership in a union as a condition of employment.

Table 9: Significant¹ Loadings for Four Factor Model

Category and Law	First Wave (1)	Second Wave (2)	Mines (3)	Union (4)
Rehabilitation commission		0.25		
Industrial safety commission		0.52		
Sanitation/bathroom regulations	0.68			
Ventilation	0.62			
Guards required on machines	0.62			
Electrical Regulations		0.62		
Building Regulations	0.57	0.32		
Other	0.23			
Bakery Regulations	0.63			
Sweatshop Regulations	0.68			
Fire escapes	0.69			
Factory Inspector	0.72			
Occupational disease reporting	0.50			
Steam boiler inspector/violation of safety laws.	0.48			
Reporting of Accidents				
Mine accidents			0.79	
Railroad accidents	0.38	0.43		
Factory accidents	0.64			
Railroad Regulations				
Safety Regulations	0.54			
Street Railroad safety regulations	0.54			
Railroad Inspectors	0.27			
Mining Regulations				
Mine inspectors			0.83	
Mine Safety Regulations: Employees/Individuals			0.81	
Mine Safety Regulations: Companies			0.80	
Fine for failure to weigh coal-no screening			0.80	
Fine for mine inspector failing to do his job			0.65	
Miners' Hospital and or Home				-0.39
No Women and Children in Mines			0.73	
Child Labor Laws				
Child safety commission		0.58		
Child labor inspector	0.67			
Children in manufacture/mercantile/mechanical jobs	0.68			
Minimum Age	0.57			
Penalty for false certificate of age	0.58			

Table 9: Significant¹ Loadings for Four Factor Model

Category and Law	First Wave (1)	Second Wave (2)	Mines (3)	Union (4)
Certificates of Age required for employment	0.64			
No children cleaning or handling moving parts	0.63			
No children in street trades	0.53			
Child hours Laws				
General	0.32	0.31		
Mercantile	0.41			-0.44
Mechanical	0.54			
Textile	0.54			
Other				-0.22
Minimum Age for night labor for children	0.54			
Women's Regulations				
Special accommodations (seats)	0.56			
Earnings of married women belong to her		0.15		
Women's Hours Laws				
Night labor	0.46			
General/All Employment	0.36	0.42		
Mercantile	0.46			
Mechanical	0.54			
Textiles	0.49			
Holidays				
No work on legal holidays	0.28			
Labor Day a holiday	0.44			
Sunday labor fines	0.32			
Hours Laws				
Textiles				0.25
Mines		0.43		
Manufacture				0.30
Railroads		0.35		
Street Railroads	0.39			-0.42
Public Employment		0.42	0.36	-0.41
Other		0.41		
General Hours Law	0.40			
Public Roads			0.21	
Unionization and Bargaining				
False use of union cards or employers' certificates	0.35	0.46		

Table 9: Significant¹ Loadings for Four Factor Model

Category and Law	First Wave (1)	Second Wave (2)	Mines (3)	Union (4)
Incorporation of labor unions.	0.34			-0.33
Labor organizations exempt from antitrust		0.28		
Enticement fines	-0.30			
Interfere with or intimidate in railroads or workers abandoning trains or obstructing track		-0.31		
Interference with railroad employees		-0.27		
Interference with street railroad employees			-0.16	
No intimidation of miners				0.26
Illegal to interfere with a business or the employment of others				0.49
Anti-picketing				0.25
Anti-boycott			0.34	
Strikes: Agreements not to work allowed	0.28			
Conspiracy vs. workmen (conspiring to prevent someone from working)				0.49
Labor agreement is not a conspiracy		0.29		
Anti-intimidation				0.53
No blacklisting		0.33		0.41
Yellow dog contract (illegal for anyone to coerce to join or not to join a union)	0.37			
Prohibition on hiring armed guards			0.23	
Industrial police are legal	0.30			
Misrepresentation about a strike or other job characteristics		0.46		
Limits on injunctions		0.49		
Criminal Syndicalism (advocating violence or sabotage for political or industrial ends)		0.51		
Labor organizations--embezzlement of funds by officers	0.25			
Combinations of employers to fix wages illegal				-0.10
Trespass on mines, factories, without consent of owner			0.18	
Union trademark fine	0.49			
Convict Labor				
Convict Labor Regulations	0.38		0.31	
Bribery, Coercion, or Gouging				

Table 9: Significant¹ Loadings for Four Factor Model

Category and Law	First Wave (1)	Second Wave (2)	Mines (3)	Union (4)
Foreman accepting fees for employment illegal		0.39		
Bribing Employees	0.41			
Coercion of Employees is illegal			0.39	
Company Stores Cannot Gouge	0.30			-0.34
Political Protections				
Coercing the votes of employees illegal			0.38	
Time off to Vote			0.54	
Administrative Laws				
Bureau of labor Statistics or Department of Labor	0.54			
State board of arbitration	0.46		0.32	
Free employment offices	0.48	0.32		
Alien Labor Laws				
Importing alien labor illegal		-0.15		
No aliens in public employment				-0.62
Chinese labor illegal		0.40		
Employment Agents				
Emigrant agent license				0.22
Regulation of Employment Agencies	0.57			
Occupational Licensing				
Railroad telegraph operators (also minimum age)				0.09
Plumbers	0.48			
Horseshoers			0.31	
Chauffeurs	0.41	0.43		
Aviators		0.30		
Other		0.21		
Motion Picture Operator	0.33			
Barbers	0.30			0.44
Steam engineers (firemen)	0.44			
Mine manager			0.60	
Elevator operators		0.21		
Railroad employees				0.11
Electricians		0.22		
Stevedores		-0.07		
Anti-discrimination Laws				
Cannot fire due to age only			0.20	

Table 9: Significant¹ Loadings for Four Factor Model

Category and Law	First Wave (1)	Second Wave (2)	Mines (3)	Union (4)
Sex discrimination		0.33		
Anti-discrimination			0.31	
Wage Payment				
Nonpayment		0.26		
Wages in cash			0.34	
Wage payment frequency	0.45			
Repayment of advance made by employer				0.27
No forced contributions by employers			0.30	
Railroad workers: Notice of reduction of wages required				0.24
Fine for no notice of discharge if employee has to give notice	0.46		-0.33	
Minimum Wages				
Minimum wage for public work		0.38		
Minimum wage for women/children (<18)		0.71		
Minimum Wage Commission		0.68		
Total Laws	63	40	26	27
¹ Absolute value of the loading is greater than 0.3. If a law did not have a significant loading for any factor, the largest loading is listed.				

4.3.2.2 Factor 2: Second Wave Laws

The second factor has 28 laws with significant loadings and another twelve that were insignificant but had their largest loading on factor two. Laws loading on this factor were more progressive and less widespread in the early part of the period compared to the laws loading on factor one. Many of these laws were not present at all at the beginning of the century and were passed by only a minority of states during the study period. Often, these laws required the highest level of governmental involvement

in the marketplace. These laws tended to be more spread out over the different categories. Because the majority of the laws with large positive loadings on factor two became common relatively late in the study period, this factor will be referred to as representing second wave laws.

The minimum wage, hours, factory safety, and union categories had largest number of laws loading on this factor. All of the minimum wage laws loaded on this factor. Minimum wage laws were basically unknown at the beginning of the study period, and even by the 1920's, few states had any minimum wage legislation. In addition to the minimum wage laws, laws setting up commissions all had high loadings for the progressive factor. Four "commission" laws were passed by at least one state during the study period. They were: minimum wage commissions, industrial safety commissions, child welfare commissions, and rehabilitation commissions. These commissions were intended to study worker conditions and recommend improvements, often through increased regulation. All four of these commission laws had their largest loadings for the second factor, and three of the four were significant. Also, both of the social insurance laws and the general employer's liability law all have significant loadings for this factor, adding to the interpretation of this factor as representing later-stage protective laws.

Within the hours category, laws for railroads, mines, public workers, and miscellaneous workers had significant loadings for this factor. This was the largest

concentration of male hours laws with significant loadings on any of the four factors, and indicates that there is some degree of commonality between these laws. All of these laws were industry-specific, and unlike the general hours law for men, which often just declared the customary length of a workday with no penalty for working longer, these industry-specific laws were more stringent in their requirements. These laws were less common and were enacted later in the study period in most states, so it is fitting that these laws would load on the second wave factor. However, the factor loadings are not stable in designs with more factors. In some versions, male hours laws break off onto their own factor, and in other versions, these laws group with other industry-specific laws. This instability reflects the very different underlying reasons that male hours laws were passed. For an industry like railroads, the motivation may have been related to public safety. In industries like mining or textiles, union pressure may have played a role. For public employees, a political desire to promote improved worker conditions may have been the motivating force. The general hours laws for women and children also load on this factor, but none of the industry-specific laws do. This is in contrast to the pattern with men's laws described above, and may indicate that the general laws for women and children were more stringent than the general hours laws for men.

Finally, the union category had four significant laws and five more insignificant laws whose largest loading was for Factor 2. Most of these laws protected the legal rights of union and their members. These laws were: laws providing for injunction limits, prohibiting employers from falsely representing the presence of a strike, laws prohibiting

blacklisting, laws prohibiting false use of union cards, laws exempting labor organizations from the antitrust laws, and laws providing that labor agreements are not conspiracies. These were more restrictive pro-union laws compared to the fairly basic pro-union laws loading on the general factor. In addition, two laws prohibiting interference with railroads or their employees loaded on factor two with a negative sign. The negative sign means that the presence of one of these laws would lower a state's factor score, and suggest that these two laws are negatively correlated with the underlying latent variable represented by Factor 2. Both of these laws have an anti-union interpretation. They are intended to protect workers and railroads from union pressure. A negative sign on these laws then provides evidence that factor two represents pro-labor laws.

4.3.2.3 Factor 3: Mining Factor

The third factor clearly represents mining laws. This factor had 20 significant laws and six more insignificant laws whose largest factor score is for factor three. All of the mining regulations except for the law providing for a miner's hospital or home load on this factor, and mining laws from other categories also load on this factor.

In the accident-reporting category, reporting of mining accidents had a large loading for this factor. The law requiring licenses for mine managers was also significant. In the union category, only the law prohibiting boycotting was significant. However, three other laws had their largest loading on factor three. These laws

prohibited yellow dog contracts, trespassing on company property, and interfering with street railroad employees. These were all laws that were hostile to union efforts, suggesting that anti-union sentiment was common in mining states.

Three wage payment laws had large loadings for this factor: laws requiring payment in cash, laws prohibiting forced contributions, and laws fining employers for not giving notice of discharge if employees are required to give notice. Both of the laws protecting the political rights of employees were significant for the mining factor, as was the law prohibiting coercion of employees. These laws reflect issues that were common in mining company towns.

In the employer's liability category, the largest loading for the employer's liability law for miners was on the mining factor. Similarly, the loading on the miner's hours law was almost significant at 0.29. Other mining laws that were not significant for this factor included laws regulating company stores (0.29), miner's hospitals (0.26), and laws prohibiting intimidation of miners (0.10). Most of the insignificant mining laws were more progressive, less common laws. The laws with the highest loadings on factor three were common to all mining states.

4.3.2.4 Factor 4: Anti-union Factor

This factor is somewhat unstable, breaking into multiple factors in versions with more than four factors. In the four-factor design, this factor has 15 laws with significant

loadings and another 12 insignificant laws with their largest loading on the fourth factor. Of these 27 laws, 10 had negative loadings and 17 had positive loadings. In general, laws with positive loadings on this factor are anti-union laws and laws with negative loadings are pro-labor laws. This means that states with laws that are the most hostile to unions and the least supportive of labor will have the largest score for this factor. Given this pattern, this factor was interpreted as representing union issues, where a high score indicates more anti-union sentiment. While the other three factors maintain most of the same core laws in subsequent designs as more factors are added, this factor breaks apart into two or three sub-factors in all of the designs with more than four factors. In designs with more factors, the 10 laws with significant negative loadings in this design group onto a new pro-labor factor, leaving the anti-union laws grouping on this factor alone.

A negative loading on a factor means that if a state has that law, its factor score will be lower than if it does not have the law. If Factor 4 represents a state's attitude towards a particular issue, then a negative sign means that states with these laws have less of this particular underlying attitude. The following laws had negative loadings for the fourth factor: general employer's liability laws, laws providing for miners' hospitals, child hours laws for mercantile employment and miscellaneous employments, hours laws for street railroad workers and public employees, laws allowing incorporation of labor unions, laws prohibiting employers from fixing wages, laws prohibiting company stores from gouging, and laws prohibiting aliens from public employment. All of these were

relatively progressive pro-labor laws, and states that passed these laws would have lower scores on factor four than states without these laws.

In contrast, most of the laws with positive sign are anti-labor laws. Three of the four significant union laws with positive loadings were anti-union laws, as were the two insignificant laws that had their largest loading on factor four. These six laws prohibited intimidation, conspiracy, interference, and picketing. The three anti-intimidation laws work to reduce union power by protecting non-union workers from harassment. The anti-blacklisting law was the sole pro-union law with a positive loading on factor four.

Furthermore, the employer's liability laws with positive signs for factor four were the weakest laws in that category. The employer's liability category has positive signs for the railroad law and for the law indicating that the law in force merely restated the common law. The sign on the main employer's liability law is negative. This means that a state with a main employer's liability law that merely restates the common law, would have a net score of +0.02 for this factor, while a state with a stricter form of employer's liability law that does not just restate the common law would have a score of -0.33. States with the least stringent employer's liability laws would then have higher scores on this factor, furthering the interpretation of this factor as representing anti-labor sentiment.

This factor also seems to be selecting states with a more rural composition. Laws like the regulation of the hours of children in mercantile trades or street railroad workers

are more necessary in urban areas. This means that the more rural states will probably have higher scores for this factor even if union attitudes were equal across states.

4.3.3 Developing Index Values

The four-factor model was chosen for several reasons. First, the translog cost function employed in Chapter 5 requires a relatively small number of independent variables. The translog function requires that each independent variable is interacted with every other independent variable, so as the number of independent variables increases, the number of degrees of freedom required increases rapidly.¹⁶⁹ With only 240 observations available to estimate the model, keeping the number of labor variables small was a priority. Additionally, as designs with more factors were analyzed, it became clear that the new factors were not capturing any new dimension of labor sentiment. For the most part, the new factors were subsets of the initial four. Finally, the interpretation of factors is subjective. Because the factor scores will be used in Chapter 5 to estimate the impact of labor legislation on input demand, it is desirable to keep the number of categories of laws to a minimum in order to avoid errors associated with misinterpretation of factors.

Figure 14 through Figure 17 show the index values for the four labor variables: first wave laws, second wave laws, mining laws and anti-union laws for the six census periods from 1899 through 1924. The maps for each labor variable are divided into three

categories representing the top third, middle, and bottom third of the index values for all state-year observations.¹⁷⁰ This shows both the geographic distribution and temporal distribution of scores.

Figure 14 shows first wave laws. In all years, the highest values for first wave laws concentrate in the MidAtlantic, New England and North Central regions. Pennsylvania was the early leader in first wave laws, with a score of 1.42 in 1899, followed closely by New Jersey at 1.4. In the North Central region, Minnesota, Michigan, and Ohio had the highest scores. All of the Western states had low scores in 1899, with the highest scores in the Pacific region. Over time, factor scores increased in all regions, with the largest increase between 1899 and 1909. For the nation, the average first wave score increased by 0.91 points between 1899 and 1919. About 60 percent of this increase occurred between 1899 and 1909.

Over time more of the Northern states moved into the highest third of the observations. By 1924, Vermont was the only state in these three regions¹⁷¹ whose factor score did not place it in the top third of state-year observations. Several states bordering these three high-scoring regions also ranked in the top third by 1924. In the South, Tennessee, Maryland, and Delaware had high scores for first wave laws. In the West North Central region, Minnesota had one of the highest scores in the nation, and Missouri

¹⁶⁹ See Chapter 5 for a description of the translog model.

and Nebraska also ranked in the top third by 1924. In the West, the Pacific states ranked in the middle for most years, while most of the Mountain states ranked in the bottom third for most years. The exception was Colorado, which ranked in the top third from 1914 through 1924. Like the West, most of the non-border Southern states stayed in the bottom third of the nation for most years. The exception was Louisiana, which ranked in the top third from 1909 forward. Overall, the data shows that first wave laws originated in the Northeast in 1899 or before and spread towards the West and South as time progressed. This pattern may indicate that the politics of one state “migrate” to neighboring states, or may be due to similar industries locating in geographically proximate states.

Figure 15 shows factor scores for second wave laws. Here the pattern is noticeably different than the pattern of first wave factor scores. Second wave laws were relatively rare in 1899, with the highest scores in the West and Southeast. Only Nevada and Utah had factor scores for 1899 that ranked in the top third of state-year observations. The lowest scores in 1899 were in the Northeastern and North Central states. By 1909, second wave laws had spread throughout the West so that the Pacific states, Montana and Colorado joined Utah and Nevada in the top third. In the Midwest, Minnesota and Wisconsin were in the top third, as was New York in the Northeast. Scores in the rest of the Northeast and Midwest remained low in 1909. Most states experienced their largest

¹⁷⁰ The 48 contiguous states were ranked over six years for a total of 288 observations, and then divided into three groups. The categories on each map reflect those groupings.

increase in the level of second wave laws after 1909. Of the total 1.3-point increase in the national average score for second wave laws that occurred between 1899 and 1919, 1.02 or 80 percent of the increase happened after 1909. By 1919, all of the Western states and much of the West North Central region ranked in the top third of all state-year observations for second wave laws. By 1924, only Kentucky, Tennessee, and South Carolina ranked in the bottom third. Compared to first wave laws, factor scores for second wave laws were distributed less uniformly across time. The scores for most state-years were clustered in a fairly narrow band between -0.5 and $+0.5$. However, the maximum factor score for second wave laws was high, at 4.75 for Oregon in 1924. The next highest factor score was for the mining factor at 2.3 for Indiana in 1904. Despite the fact that the maximum scores for second wave laws were higher than the maximums for other factors, there were fewer state-years with these high scores. The other three factors had about 20 percent of their scores above one. For second wave laws, only fifteen percent of the total state-year scores were above one. This pattern suggests that the level of second wave laws was fairly low in most states throughout the study period with the exception of a few early adopters in the West. These laws spread only modestly throughout the country during the 1899 to 1924 period, so factor scores in the majority of states remained fairly low and uniform. Unlike first wave laws, the temporal pattern of the second wave factor scores suggests that as these laws began to spread, they were adopted fairly uniformly across most of the nation.

¹⁷¹ East North Central, MidAtlantic, and New England.

Figure 16 shows the scores for the mining factor. With this factor, the regional pattern of factor scores stays fairly constant over time. As one would expect, states with more mining activity have higher scores for this factor, and the states with little or no mining have the lowest scores. In the West, the Mountain region states of Colorado, Utah, and Montana were consistently in the top third. In the Midwest, Indiana, Illinois, Ohio, and West Virginia had high scores. The Southern and New England regions are consistently in the bottom third of scores for this factor. The majority of the mining laws in place by 1924 were passed before 1909 in most states so scores for the mining factor were fairly stable across time. The average factor score for mining laws increased by only 0.15 points between 1899 and 1919, with all of that increase occurring before 1909. Between 1899 and 1909, average scores increased by 0.19 points. After 1909, average scores fell slightly.

Not all mining states had high scores for the mining factor. Nevada and Arizona had the highest share of total employment in mining in the nation, with about 17 and 15 percent of all workers employed in mining between 1899 and 1919, respectively. However, Nevada's score for the mining factor was in the bottom third of state-year observations in 1899. By 1919, Nevada's score had increased by enough to place it in the middle third of all state-year observations, but the state's score lagged behind many states with a much smaller share of total employment in mining. Like Nevada, Arizona's 1899 score ranked in the bottom third of all state-year observations. Unlike Nevada, Arizona's score increased rapidly enough to place it in the top third of the nation by 1914.

Similarly, Pennsylvania, Idaho, and Kentucky's factor scores were in the middle third for each of the six years despite the fact that these states ranked seventh, ninth, and twelfth respectively in terms of mining's share of total employment.

Conversely, Arkansas, with less than one percent of total employment in mining, had a score in the top third of all state-year observations for 1919 and 1924. Minnesota, Missouri, Iowa, and Maryland also had scores in the top third of all state-year observations for most of the six time periods despite the fact that mining employment made up less than one percent of total employment in these states. The range in factor scores even across the "mining" states underscores the fact that the regulatory climate differed across states and that industry mix alone does not determine the regulatory structure of the state.

Figure 17 shows the factor scores for the anti-union factor. The South and Central states scored the highest for this factor. As with the mining factor and with first wave laws, the largest increase in anti-union scores occurred before 1909. The national average score for the anti-union factor increased by 0.37 points from 1899 to 1919. Of that increase, 88 percent occurred before 1909.

In 1899, the states with the highest scores for the anti-union factor were in the industrial Midwest. Michigan, Wisconsin, Minnesota, and Illinois all had scores in the top third of all state-year observations in 1899. States with scores in the bottom third

were scattered throughout the nation, with all of the West except Montana, and much of the MidAtlantic falling into the lowest category. By 1909, factor scores had increased in most of the South so that a large proportion of these states were in the top third of all state-year observations. By 1924, scores in all of the West North Central states except Iowa were in the top third. The lowest scores were in the industrialized states of the Northeast and North Central such as Indiana, Ohio, Pennsylvania, New York, New Jersey, Connecticut, and Massachusetts. It is not surprising to see that states with the most successful union movements had low scores for this factor. Eight of the ten states with the largest number of strikes between 1899 and 1919 also had anti-union factor scores in the bottom third of all state-year observations for most years.¹⁷² Illinois and Missouri were the exceptions to this rule. Both states had factor scores in the top third in all six years despite a high level of strike activity in both states. The fact that many of today's right to work states had high scores for the anti-union factor strengthens the interpretation of this factor as representing anti-union sentiment.

¹⁷² The ten states with the most strikes (in order): New York, Pennsylvania, Massachusetts, Illinois, Ohio, New Jersey, Connecticut, Missouri, Indiana, and California.

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Second Wave Laws: 1899

Legend: Low (white), Mid (cross-hatch), High (black)

Second Wave Laws: 1909

Legend: Low (white), Mid (cross-hatch), High (black)

Second Wave Laws: 1919

Legend: Low (white), Mid (cross-hatch), High (black)

Second Wave Laws: 1924

Legend: Low (white), Mid (cross-hatch), High (black)

Figure 16: Mining Laws, Factor Scores

Figure 17: Anti-union Laws, Factor Scores

4.4 Conclusion

Principal components analysis of the 135 labor laws was performed using 4, 5, 11, 15, 20, 27, and 37 factors. Interpretation of factors became difficult with designs with more than 11 factors. The design with four factors was chosen for use in the cost function analysis in order to keep the number of variables in the translog cost function manageable and to minimize errors associated with misinterpretation of factors. However, designs with more factors do explain more of the total variability present in the data, and some interesting patterns emerge as more factors are added.

Most of the laws fall into one of the four broad categories that the first four factors represent: first wave laws, second wave laws, mining regulations, and anti-union laws. However, as more factors are added, factors that represent subclasses of these broad categories emerge: a specific factor for women's hours laws emerges in the eleven-factor design, and factors for children's age and hours laws emerge in the 27-factor design. These laws previously loaded on the factor for first wave laws before they split off into their own factors. Although a factor that loosely represents male hours laws emerges with the five-factor design, it is not particularly stable in later designs. This is in stark contrast to the very consistent way the women's and children's hours group on one or two factors in every design, and suggests that unlike women's and children's laws, the circumstances under which male hours laws were successfully passed in a state were different from law to law.

Employer's liability laws, which are negatively correlated with the anti-union factor (Factor 4) in the four-factor design, split off onto two factors in the 15 and 20-factor designs. In the 15-factor design, a factor develops which has significant loadings for all the employer's liability laws except the miner's law. In the 20-factor design, a factor emerges that seems to be specific to miner's protection, and the miner's employer's liability law loads on this factor.

Half of the licensing laws were insignificant in the four- and five-factor designs, indicating that these laws did not fit into the broad categories of labor laws identified in the early designs. Licensing laws with significant loadings in early designs were common laws largely intended to protect the health or safety of the public. These laws loaded on the factor for first wave laws. As factors are added, three groups of licensing laws emerge. First are the protective laws described above. Licensing laws for plumbers, barbers, and chauffeurs fall into this category. Second are the laws for steam engineers, elevator operators, electricians, and in some designs, horseshoers. These are urban professions and licensing in these areas could still be intended primarily to protect public safety. The third category contains laws for railroad employees and stevedores. These licensing laws were probably more related to controlling entry into the profession than protecting the public. Like the male hours laws, the fact that most of the licensing laws do not cluster neatly onto one or two factors indicates that the motivation for the passage of each law was different.

In early designs, the significant union and bargaining laws group on the first or second wave factors. Laws grouping on the first wave factor were the most common. These laws protected the basic legal rights of union workers by allowing incorporation of unions, protecting union trademarks, and prohibiting yellow dog contracts. The laws loading on the factor for second wave laws placed more restrictions on employers and gave even more protection to unions. Laws setting forth injunction limits, prohibiting employers from falsely representing the presence of a strike, and preventing the blacklisting of employees loaded on this factor. Laws that were insignificant in early designs were even more progressive and less common. These included laws allowing strikes, setting limits on the use of armed guards by employers, and exempting labor organizations from antitrust laws. These laws load on various different pro-labor factors in designs with more than five factors.

For 19 of the 23 major categories of laws, a majority of the significant laws in the category grouped on one of the first four factors. The four categories that did not meet this criterion were the anti-discrimination laws, the alien labor laws, the bribery laws, and the union and bargaining laws. In general, these categories did not group together because of the diversity of the laws within each of these four categories. For example, the majority of the 13 significant union laws were scattered across three of the four factors. This reflects the diversity of the laws in this category. The four laws grouping on the first wave factor were fairly common laws that allowed for the creation of unions and protected the legal rights of unions and their member. The six significant second wave

laws were generally more pro-union and went beyond the basic protections provided by the significant first-wave union laws. Most of the five laws loading on the anti-union factor had an anti-union interpretation. This diversity in the intent of the union laws means that this category never loads neatly on one factor.

Five of the 23 categories contained a large number of insignificant laws in the four-factor design. These were the employer's liability, hours, occupational licensing, wage payment categories, and union and bargaining laws. In designs with more factors, the insignificant laws became significant and grouped on new factors. These new factors cut across the 23 categories, representing regulation of industries like mining, railroads, or manufacturing, or reflecting geographic divisions like rural or urban issues. Overall, the factors groupings were not surprising. Laws that grouped together were commonly passed together in a state, either due to the mix of industries present in that state, or due to the political philosophies that were dominant in that state.

Applying the PCA scores for the four-factor design to each state's profile of laws results in factor scores for each state and year. The temporal and regional pattern of these scores shows that the level of first wave laws was highest in the Northeast and the North Central regions of the United States. The states with the highest scores for first wave laws were urban, industrialized states. These states tended to be more progressive in nature and had more active labor movements. The lowest scores for first wave laws were in the

South and West in mostly rural states with relatively little industrialization. Most of the growth in the level of first wave laws occurred before 1909.

In contrast, second wave laws originated in the West and spread East. Most of the growth in second wave laws occurred after 1909. Second wave factor scores were highest in the Pacific states and lowest in the Northeast. The temporal pattern of growth in second wave laws is more distinctive than the pattern of first wave laws. Most of the highest scores for second wave laws occur in 1919 and 1924. Only two states in 1899 had second wave factor scores in the top third of all state-year observations, compared with seven states in the top third for first wave scores, thirteen for mining laws, and eight for union laws. By 1924, only three states had scores in the bottom third of all state-year observations for second wave laws, compared to seven states in the bottom third of first wave observations, thirteen for union laws, and sixteen for mining laws.

Factor scores for mining laws were relatively stable over time. Not surprisingly, the mining states had the highest scores. However, some states like Nevada, Pennsylvania, Idaho, and Kentucky had low scores for the mining factor despite their large mining sectors. Conversely, a few states with relatively little mining employment had high scores for the mining factor. Mining laws passed early in most states so that most states' scores did not change by much after 1909.

Finally, the more agricultural Southeastern and Midwestern states scored highest for the anti-union factor. Like the mine factor, scores for this factor increased by the largest amount before 1909. High scores on this factor reflect higher levels of anti-union sentiment that has persisted to modern times in many states. Eleven of the eighteen states that had anti-union factor scores in 1924 in the top third of all state-year observations are right to work states today.¹⁷³ The states with the lowest scores on the anti-union factor in 1924 all had strong union movements. Eight of the ten states with the largest number of strikes between 1899 and 1919 also had anti-union factor scores in the bottom third of all state-year scores. This suggests that states with active and powerful unions were able to keep the number of anti-union laws in check.

This chapter has focused on the classification of the 135 laws into four discernable categories, each with a different regional and temporal pattern. The next chapter will use these factor scores in a translog cost function model in order to determine if the different regulatory climates implied by these scores affected input choice decisions for manufacturers operating during the 1899 to 1919 period.

¹⁷³ Right to work states are Alabama, Arizona, Arkansas, Florida, Georgia, Idaho, Iowa, Kansas, Louisiana, Mississippi, Nebraska, Nevada, North Carolina, North Dakota, Oklahoma, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, and Wyoming. Source: National Right to Work Legal Defense Foundation, Inc. <http://www.nrtw.org/rtws.htm>.

CHAPTER 5 : THE IMPACT OF LABOR LAWS ON MANUFACTURING INPUT DEMAND

5.1 Introduction

Typical studies of the effect of regulation on firm input choice focus on the impact of one law or class of laws. This approach allows a thorough analysis of one particular aspect of regulation, and allows researchers to answer questions about the cost of imposing specific regulations. However, these types of studies do not address the broader issue of the cumulative impact of a class of regulations on firm input choice decisions. This study analyzes the impact of a set of variables representing the cumulative levels of labor legislation on the input choice decisions of manufacturers at the turn of the century in the United States.

The period between 1899 and 1919 was a time of rapid change for the U.S. manufacturing sector. Industrialization led to changing production technology, affecting the optimal input choice mix for firms. Additionally, issues related to working conditions moved to the forefront of social policy, and brought with them increases in labor regulation. The cost of compliance with these regulations also affected firm input choice. This paper will attempt to isolate the impacts of regulatory change from other non-regulatory impacts, and quantify the cumulative role that state labor regulations played in impacting input choice decisions made by manufacturing establishments in the different states during the 1899 to 1919 period.

5.2 Methodological Approach

A translog cost function approach was chosen for estimation of the model. Costs for each manufacturing establishment were assumed to be a function of the three labor law variables,¹⁷⁴ state spending per member of the labor force on labor regulations, output per establishment, and four inputs: the average wage, the average salary, the price of materials, and the price of capital.

The advantages of the translog form are well established in the literature.¹⁷⁵ The translog cost function is a flexible functional form, so it is unnecessary to make assumptions about the form of the production function. Unlike the Cobb-Douglas functional form, the translog functional form places no restrictions on the elasticities of substitution. The translog cost function is derived from the duality of costs and production. A cost function approach was chosen over a production function approach in order to avoid problems with endogenous input quantities that occur with the estimation of a production function. Additionally, estimating elasticities using the translog production function exaggerates estimation errors relative to elasticities estimated using the translog cost function.¹⁷⁶

¹⁷⁴ The four-factor principal components analysis specification described in Chapter Four was used to develop labor law variables. The four categories suggested by the PCA analysis were: first wave labor legislation, second wave legislation, anti-union legislation and mine regulations. Since the cost data represents only manufacturing establishments, the mine factor was not used in the model.

¹⁷⁵ See Binswanger, 1974, Christensen et al., 1971, 1973, Berndt and Christensen 1973, Guilkey et. al., 1983.

¹⁷⁶ See Berndt and Christensen 1973, Binswanger 1974.

5.3 Theoretical Framework

Firms are faced with an arbitrary production function of the following form:

$$Y = f(\mathbf{X}, \mathbf{F}, E, T) \quad (5.6)$$

Where:

$\mathbf{X}$ = a vector of input quantities (wage labor, salaried labor, capital, materials)

$\mathbf{F}$ = a vector of factor scores; proxy for level of legislation (first wave laws, second wave laws, anti-union laws)

E = State expenditures on labor laws /labor force

T = Time (proxy for technological change)

In this model, the firm chooses quantities of labor, materials, capital, and output.

The labor variables are assumed to be exogenous to the firm. These variables are assumed to affect costs indirectly through their impact on the productivity of the inputs to production. For example, the level of legislation is hypothesized to affect the marginal products of the four inputs to the production process. If an increase in the level of first wave labor legislation lowers the marginal product of labor, a profit maximizing firm will respond to such a change by substituting away from labor and towards other inputs until the equality between the marginal rate of technical substitution and the exogenous input price ratios between labor and all other inputs is restored.

Firms are faced with a cost function of the following form:

$$\text{Cost function: } C = f(\mathbf{P}, \mathbf{X}) \quad (5.7)$$

Where:

P=vector of factor prices (P_S, P_W, P_M, P_K)
X=vector of inputs (S, W, M, K above)

In this cost function, prices are assumed to be exogenous to the firm, and the industry is assumed to be perfectly competitive. Firms are then faced with the classic cost minimization problem:

$$\min C = \sum_{i=1}^4 P_i X_i \quad \text{subject to } Y = f(\mathbf{X}, \mathbf{F}, E, T) \quad (5.8)$$

The solution to this problem is the set of cost-minimizing factor demands:

$$\begin{aligned} S^* &= s(Y, \mathbf{P}, \mathbf{F}, E, T) \\ W^* &= w(Y, \mathbf{P}, \mathbf{F}, E, T) \\ M^* &= m(Y, \mathbf{P}, \mathbf{F}, E, T) \\ K^* &= k(Y, \mathbf{P}, \mathbf{F}, E, T) \end{aligned} \quad (5.9)$$

Using these factor demand equations, a minimum cost function can be constructed as:

$$C^* = \sum_{i=1}^4 P_i X_i^* (Y, \mathbf{P}, \mathbf{F}, E, T) \quad (5.10)$$

or alternatively:

$$C^* = g(Y, \mathbf{P}, \mathbf{F}, E, T) \quad (5.11)$$

The translog cost function is a second-order Taylor series approximation of the function C^* around the point $\ln(\mathbf{P}) = 0$. By identifying the derivatives as coefficients, and assuming equality of cross-product derivatives, this function takes the following form:

$$\begin{aligned}
\ln C^* = & \alpha_0 + \sum_{i=1}^4 \alpha_i \ln P_i + \sum_{q=1}^3 \beta_q \ln F_q + \sum_{r=1}^3 \delta_r \ln Z_r + \frac{1}{2} \sum_{i=1}^4 \sum_{j=1}^4 \alpha_{ij} \ln P_i \ln P_j + \\
& \frac{1}{2} \sum_{q=1}^3 \sum_{l=1}^3 \beta_{ql} \ln F_q \ln F_l + \frac{1}{2} \sum_{r=1}^3 \sum_{n=1}^3 \delta_{rn} \ln Z_r \ln Z_n + \sum_{i=1}^4 \sum_{q=1}^3 \eta_{iq} \ln P_i \ln F_q + \\
& \sum_{i=1}^4 \sum_{r=1}^3 \tau_{ir} \ln P_i \ln Z_r + \sum_{q=1}^3 \sum_{r=1}^3 \kappa_{qr} \ln F_q \ln Z_r + \varepsilon
\end{aligned} \tag{5.12}$$

Where:

- $Z_{r,n}$ $r,n=1 \dots 3$ output, time¹⁷⁷, and state spending per establishment on labor legislation
 $F_{q,l}$ $q,l=1 \dots 3$ factors (first wave laws, second wave laws, anti-union laws)
 $P_{i,j}$ $i,j=1 \dots 4$ prices (average wages, average salaries, materials price, capital price)
 C^* = profit-maximizing total cost
 ε = remainder of the Taylor series

5.3.2 Restrictions

Symmetry restrictions require $\alpha_{ij} = \alpha_{ji}$, $\beta_{ql} = \beta_{lq}$, and $\delta_{rn} = \delta_{nr}$ for all i,j , l,q , and r,n pairs. Additionally, the cost function should be homogeneous of degree one in prices.

This condition imposes the following restrictions on the coefficients:

$$\sum_{i=1}^4 \alpha_i = 1; \sum_{i=1}^4 \alpha_{ij} = 0; \sum_{j=1}^4 \alpha_{ij} = 0; \sum_{i=1}^4 \eta_{iq} = 0; \sum_{i=1}^4 \tau_{ir} = 0; \text{ for all } j, i, q, r \tag{5.13}$$

It is common to estimate the translog cost function either as a single equation or as a system of share equations with or without the cost function. These share equations are derived from the cost function in the following way:

$$\frac{\partial \ln C^*}{\partial \ln P_i} = s_i = \alpha_i + \sum_{j=1}^4 \alpha_{ij} \ln P_j + \sum_{k=1}^3 \eta_{ik} \ln F_k + \sum_{r=1}^3 \tau_{ir} \ln Z_r \quad (5.14)$$

Applying the principle that $\frac{\partial \ln C^*}{\partial \ln P_i} = \frac{\partial C^*}{\partial P_i} * \frac{P_i}{C^*}$ and Shephard's lemma which says that

$$\frac{\partial C^*}{\partial P_i} = X^*, \text{ you get the result that } \frac{\partial \ln C^*}{\partial \ln P_i} = \frac{X^* P_i}{C^*} = s_i, \text{ or factor } i\text{'s share of total cost.}$$

Therefore, these partial derivatives of the cost function are interpreted as cost shares and take the following form:

$$\begin{aligned} W_s &= \alpha_1 + \alpha_{11} \ln P_w + \alpha_{12} \ln P_c + \alpha_{13} \ln P_s + \alpha_{14} \ln P_m + \eta_{11} \ln F_1 + \eta_{12} \ln F_2 \\ &\quad + \eta_{13} \ln F_3 + \tau_{11} \ln Y + \tau_{12} \ln T + \tau_{13} \ln E \\ C_s &= \alpha_2 + \alpha_{12} \ln P_w + \alpha_{22} \ln P_c + \alpha_{23} \ln P_s + \alpha_{24} \ln P_m + \eta_{21} \ln F_1 + \eta_{22} \ln F_2 \\ &\quad + \eta_{23} \ln F_3 + \tau_{21} \ln Y + \tau_{22} \ln T + \tau_{23} \ln E \\ S_s &= \alpha_3 + \alpha_{13} \ln P_w + \alpha_{23} \ln P_c + \alpha_{33} \ln P_s + \alpha_{34} \ln P_m + \eta_{31} \ln F_1 + \eta_{32} \ln F_2 \\ &\quad + \eta_{33} \ln F_3 + \tau_{31} \ln Y + \tau_{32} \ln T + \tau_{33} \ln E \\ M_s &= \alpha_4 + \alpha_{14} \ln P_w + \alpha_{24} \ln P_c + \alpha_{34} \ln P_s + \alpha_{44} \ln P_m + \eta_{41} \ln F_1 + \eta_{42} \ln F_2 \\ &\quad + \eta_{43} \ln F_3 + \tau_{41} \ln Y + \tau_{42} \ln T + \tau_{43} \ln E \end{aligned} \quad (5.15)$$

Where:

- W_s = Wage share of total cost
- S_s = Salary share of total cost
- M_s = Material share of total cost
- K_s = Capital share of total cost
- $F_1..F_3$ = First wave, second wave, and anti-union variables
- Y = Output (value of products)
- T = Time¹⁷⁸
- E = State expenditures per establishment on labor legislation

¹⁷⁷ This variable was omitted in several of the specifications that were run.

¹⁷⁸ This variable was omitted in several of the specifications that were run.

5.3.3 Elasticities

The coefficients of the translog cost function have little economic meaning. It is common for most researchers to instead focus on the elasticities that are calculated from the coefficients. In order to better understand how regulation impacts costs, elasticities with regard to the labor variables are developed. These new elasticities allow an estimation of the response of manufacturer's input demand to changes in labor legislation or state spending on labor regulations. Derivation of these elasticities is straightforward and will be described below.

Traditionally, the Allen elasticity of substitution (AES) is used to describe the degree of substitutability or complementarity between inputs. These elasticities describe the impact of a change in the price of one input on the quantity demanded of the other input, holding output constant. AES elasticities give the impact of a change in the factor price ratio on the optimal factor quantity ratio for any two inputs.¹⁷⁹ This elasticity can be derived from the parameters of the translog cost function in the following way:

$$\sigma_{ij} = (1 + \alpha_{ij}) / s_i s_j \text{ and} \quad (5.16)$$

$$\sigma_{ii} = (\alpha_{ii} + s_i^2 - s_i) / s_i^2 \quad (5.17)$$

In addition to AES elasticities, elasticities of demand are also commonly calculated.

These are defined as the impact of a change in factor price on optimal factor demand in the following way:

¹⁷⁹ Defined as $\sigma_{ij} = \partial(X_i^*/X_j^*) / \partial(P_j/P_i) (P_j/P_i) / (X_i^*/X_j^*)$

$$\varepsilon_{ij} = \frac{\partial \ln X_i}{\partial \ln P_j} = \frac{\partial X_i}{\partial P_j} * \frac{P_j}{X_i}; \quad i, j = 1..4 \quad (5.18)$$

The demand elasticities can be derived from the coefficients of the share equations and take the following form:

$$\varepsilon_{ij} = s_j + \alpha_{ij} / s_i; \quad i, j = 1..4, i \neq j \quad (5.19)$$

$$\varepsilon_{ii} = \alpha_{ii} / s_i + s_i - 1; \quad i = 1..4 \quad (5.20)$$

In a similar way, it is also possible to derive the elasticity of input demand with respect to the labor legislation variables. These elasticities are defined as:

$$\varepsilon_{iq} = \frac{\partial \ln X_i}{\partial \ln F_q} = \frac{\partial X_i}{\partial F_q} * \frac{F_q}{X_i}; \quad q = 1..3, i=1..4 \quad (5.21)$$

These elasticities can be derived from the coefficients of the translog system in the following way:

$$\varepsilon_{iq} = s_q + \eta_{iq} / s_i; \quad q = 1..3, i=1..4 \quad (5.22)$$

The calculation of these elasticities requires the development of three s_k equations, the “regulatory share” equations. These are defined as:

$$\frac{\partial \ln C^*}{\partial \ln F_q} = s_q = \beta_q + \sum_{j=1}^4 \eta_{qj} \ln P_j + \sum_{i=1}^3 \beta_{qi} \ln F_i + \sum_{r=1}^3 \tau_{qr} \ln Z_r \quad (5.23)$$

See Appendix E for the derivation of these demand elasticities. The coefficients for the regulatory share equations can be recovered from the cost equation, so that estimated

regulatory shares can be calculated and used in the elasticity estimates if the cost function is included with the share equations in the system of estimation equations.

The assumption of perfect competition allows an interesting economic interpretation for the regulatory shares themselves. The regulatory shares can be rewritten in the following way:

$$\frac{\partial \ln C^*}{\partial \ln F_q} = s_q = \frac{\partial C^*}{\partial F_q} * \frac{F_q}{C^*}. \quad (5.24)$$

These are cost elasticities with respect to the labor law index variables and give the impact on costs of an increase in labor legislation, all else constant. Because we assume that the labor legislation affects costs indirectly through the production function and not directly through costs, we can apply the envelope theorem to the minimization problem described in (5.8). If λ is the Lagrange multiplier associated with this minimization problem, the envelope theorem tells us that:

$$\frac{\partial C^*}{\partial F_q} = -\lambda \frac{\partial f}{\partial F_q}, \text{ where } \frac{\partial f}{\partial F_q} \text{ is the "marginal product" of labor legislation.}$$

If this marginal product is less than zero, an increase in the level of labor legislation will reduce output due to the negative impact on the marginal products of the legislation, all else equal. If the marginal product of labor legislation were positive, then imposing the law would benefit manufacturers through increased productivity.

Another application of the envelope theorem shows that λ is the marginal cost of production. If firms are profit-maximizing in a perfectly competitive environment, then λ should be equal to P_Y , the output price. Making these substitutions into (5.24), you get the following:

$$s_q = \frac{-\frac{\partial f}{\partial F_q} * P_Y}{C^*} * F_q \quad (5.25)$$

Therefore, (5.25), the regulatory share equation, can be interpreted as the value of output lost due to the level of labor legislation as a percent of total costs. If the marginal product of labor legislation, $\partial f / \partial F_q$, is less than or equal to zero, these regulatory shares would be greater than or equal to zero, implying that an increase in the level of legislation would increase costs, all else equal. Conversely, legislation that increased productivity would have a positive marginal product, and the estimated regulatory share would be negative, implying reduced costs with higher levels of regulation.

The regulatory shares can be better understood by considering a new elasticity, the output elasticity with regard to the factors. This will be defined in the following way:

$$\varepsilon_{Yq} = \frac{\partial \ln f}{\partial \ln F_q} = \frac{\partial f}{\partial F_q} * \frac{F_q}{Y}; \quad q = 1..3. \quad (5.26)$$

Rearranging (5.25) to solve for $\frac{\partial f}{\partial F_q}$ and substituting into (5.26), you get:

$$\varepsilon_{Yq} = -\frac{s_q C^*}{P_Y F_q} * \frac{F_q}{Y} \quad \text{or} \quad \varepsilon_{Yq} = -\frac{s_q C^*}{P_Y Y}. \quad (5.27)$$

The ratio $\frac{C^*}{P_Y Y}$ can be interpreted as the inverse of the profit margin, or total cost as a percentage of total revenues. With our assumption of perfect competition, total revenues equal total costs, and this term disappears, leaving $\varepsilon_{Yq} = -s_q$. Therefore, the regulatory shares can be interpreted interchangeably as the negative of the output elasticities of the factors, or the cost elasticity with respect to the factors.¹⁸⁰

5.4 Data

The cost function was estimated on a cross section of data for 48 states¹⁸¹ for the years 1899, 1904, 1909, 1914, and 1919. All cost data are summary data for manufacturers in each state as reported in the *Statistical Abstract of the United States*. Price data was either derived from the *Statistical Abstract* data or was collected from the National Bureau of Economic Research's historical database. Data on state labor laws were collected from compilations of state labor laws prepared by the the Department of Labor Statistics¹⁸² and published in 1896, 1904, 1908, 1914, and 1925.¹⁸³

The cost function specification requires prices as the exogenous inputs and cost shares as the dependant variable in each share equation. The *Statistical Abstract* reported

¹⁸⁰ Note that this interchangeability does not exist absent the assumption of zero profits ($C^*=P_Y Y$).

¹⁸¹ Alaska, Hawaii, and the District of Columbia were excluded due to data constraints.

¹⁸² Known as the US Commissioner of Labor before 1914.

four categories of inputs for the entire time period: cost of wages, cost of salaries, cost of materials, and cost of capital. Prices were derived for wages and salaries by dividing the reported total cost of the input by the reported quantity for that input, then deflating using the CPI. The materials price was set equal to the national wholesale price index and did not vary between states. For capital, the appropriate price would be the real interest rate plus the depreciation rate on capital. However, since no state-level interest rate data are available, a simplifying assumption had to be made. Using the assumption of perfect competition, total costs equal the total revenue of a company. Using total value of products as a proxy for total revenue, the total cost of capital was derived using a “remainder” method, where the cost of capital is assumed to be equal to total value of products minus other costs (cost of wages, salaries, and materials). This total was then divided by the reported quantity of capital to get a capital price for a given state-year. A uniform depreciation rate of 7 percent was then added, and the rate of inflation was subtracted to get a real price of capital.¹⁸⁴ This “remainder” methodology has been used in different ways by other researchers in translog studies (see Filippini, 2001; Friedlaender and Wang, 1983; Cain and Paterson, 1981). Appendix D describes in detail how each variable was constructed.

¹⁸³ These reports were titled *Bulletin of the United States Bureau of Labor Statistics* after 1914 and *Special Report of the Commissioner of Labor* before 1914. See Chapter 4 for more information on the labor law variables.

¹⁸⁴ The depreciation rate is based on Solomon Fabricant, *Capital Consumption and Adjustment*, NBER, 1938, p. 34.

The use of the remainder method for calculating capital prices makes interpretation of the “capital” input more difficult, and may call into question the validity of the estimated elasticities with respect to capital. In order to check the seriousness of error implied by the assumption of zero profits used to calculate capital prices, a second method for estimating the share equations was undertaken. In this method, a capital price variable was constructed in the following way:

$$r = i + d - p, \quad (5.28)$$

where:

r = the real price of capital
 i = yield on AAA corporate bonds
 d = the depreciation rate, set to 7% for all years and states
 p = rate of inflation of the CPI

This approach is similar to that of Cain and Paterson in their study of manufacturing from 1850-1919.¹⁸⁵ Total costs were calculated from reported costs of wages, salaries, materials and computed capital costs. This approach does not assume that total costs are equal to value of products. The two approaches yielded similar results for the factors, but results for the coefficients on the inputs were often quite different between the two approaches. The results for the interest rate method are reported in Appendix G.

The labor laws were compiled into three variables that represent different dimensions of labor legislation. Principal component analysis (PCA) was used to determine the most appropriate groupings for the 135 laws (see Chapter 4 for a detailed

description of the development of the labor law variables). The variables can be thought of as index variables, where the score represents the level of legislation in each group. The PCA analysis suggested that four variables were appropriate. The groups were interpreted to represent first wave laws, second wave laws, mining laws, and anti-union laws. Since the cost functions that are being estimated apply to the manufacturing sector only, the mining factor was dropped in this analysis.

A variable representing real state expenditures on labor legislation per employed worker was also included in the model. The factors are based on only the presence or absence of a particular law on the books of a state; they do not indicate at all whether or not the laws are actually enforced through the use of inspectors or other regulatory oversight. The expenditures variable was included in order to measure the degree to which each state enforced the laws that were on the books. This data was collected from the legislative statutes on the appropriations for the state labor department, board of arbitration, free employment offices, mining inspection,¹⁸⁶ boiler inspection and other factors related to labor markets. The variable was defined as total state spending on labor legislation divided by the labor force in each state and deflated using the CPI.¹⁸⁷

¹⁸⁵ See Cain and Paterson, p. 358.

¹⁸⁶ Because states did not break out appropriations by industry type, it was impossible to separate expenditures for mining and other non-manufacturing industries from expenditures for the manufacturing industry.

¹⁸⁷ See Appendix 5B for a description and source for this data.

5.5 Estimation Procedure

Because coefficients that are included in the cost function but not the input share equations are necessary to the labor law elasticities, the cost function was included in addition to the share equations in the estimation of the model. The following system of four equations was estimated:

$$\begin{aligned}
 \ln C_{st}^* &= \alpha_0 + \sum_{i=1}^3 \alpha_i \ln P_{ist} + \sum_{q=1}^3 \beta_q \ln F_{qst} + \sum_{r=1}^3 \delta_r \ln Z_{rst} + \frac{1}{2} \sum_{i=1}^3 \sum_{j=1}^3 \alpha_{ij} \ln P_{ist} \ln P_{jst} \\
 &+ \frac{1}{2} \sum_{q=1}^3 \sum_{l=1}^3 \beta_{ql} \ln F_{qst} \ln F_{lst} + \frac{1}{2} \sum_{r=1}^3 \sum_{n=1}^3 \delta_{rn} \ln Z_{rst} \ln Z_{nst} + \sum_{i=1}^3 \sum_{q=1}^3 \eta_{iq} \ln P_{ist} \ln F_{qst} \\
 &+ \sum_{i=1}^3 \sum_{r=1}^3 \tau_{ir} \ln P_{ist} \ln Z_{rst} + \sum_{q=1}^4 \sum_{r=1}^3 \kappa_{qr} \ln F_{qst} \ln Z_{rst} + \varepsilon_{st} \\
 s_{wst} &= \alpha_w + \sum_{j=1}^3 \alpha_{wj} \ln P_{jst} + \sum_{q=1}^3 \eta_{wq} \ln F_{qst} + \sum_{m=1}^3 \tau_{wr} \ln Z_{rst} + \varepsilon_{wst} \\
 s_{mst} &= \alpha_m + \sum_{j=1}^3 \alpha_{mj} \ln P_{jst} + \sum_{q=1}^3 \eta_{mq} \ln F_{qst} + \sum_{m=1}^3 \tau_{mr} \ln Z_{rst} + \varepsilon_{mst} \\
 s_{kst} &= \alpha_k + \sum_{j=1}^3 \alpha_{kj} \ln P_{jst} + \sum_{q=1}^3 \eta_{kq} \ln F_{qst} + \sum_{m=1}^3 \tau_{kr} \ln Z_{rst} + \varepsilon_{kst}
 \end{aligned} \tag{5.29}$$

Where:

- s = state 1..48 (excludes Alaska, Hawaii and the District of Columbia)
- t = year 1899, 1904, 1909, 1914, 1919
- i = 1..3 wage, materials, and capital inputs
- $s_{wst}, s_{mst}, s_{kst}$ = wage, materials and capital share equations, respectively¹⁸⁸

In order to make the model operational, one equation must be eliminated.¹⁸⁹ The error terms of the three equations that were estimated are not independent since all of the

¹⁸⁸ The selection of the input to exclude is arbitrary and does not affect the results.

share equations may share the same left out variables that influence firm input choice. In addition, the presence of cross-equation restrictions required by the symmetry homogeneity requirements means that OLS is no longer efficient, and the seemingly unrelated regression problem applies. Errors are assumed to be correlated across equations but not across observations.¹⁹⁰

The four cost share equations were estimated as a system of seemingly unrelated equations using the SAS software package. The FIML procedure was used. This iterative procedure ensures that the coefficient estimates are invariant to the left-out equation. Six versions of the model were estimated. The first version of the model served as a baseline version and included prices for wage labor, salaried labor, capital and materials, the three factors, output, and the state labor spending variable.

A second version of the model added a time variable as a proxy for technological change. The use of a time variable to represent technological change is common in translog specifications.¹⁹¹ The inclusion of this variable allows for the possibility of non-neutral technological change, or a change in production technology that does not result in a homothetic shift in the isoquant. The coefficients on the time variables that are

¹⁸⁹ Because of the homogeneity constraint, the four share equations are linearly dependant. The application of the homogeneity constraint involves dividing all prices and cost by the left-out price. For this reason, the left-out price drops out of the remaining share equations.

¹⁹⁰ Binswanger, (1974) has suggested that this assumption might be suspect for panel data in that error interdependence over time is likely. A correction for this error would be to specify an equation for each share in each year and impose the restriction that coefficients of the share and cost equations are constant over time. This is not possible given the available degrees of freedom.

estimated for each share equation give an estimate of the direction of efficiency gain bias as the result of technological change.¹⁹²

A third version used a year fixed effects specification in lieu of the time variable. The fourth version included state effects and no year effects or time counter. A fifth version included state effects and the time counter, and the last version contained state and year effects. In all of the fixed effects specifications, fixed effects were included only in the cost equation. In order to also include fixed effects in the share equations, fixed effects-price interactions would also have to be included in the cost equation. This was impossible given the number of available degrees of freedom. This limitation is equivalent to assuming that the coefficients on all of the left-out interaction terms are equal to zero. This implies a Hicks-neutral state and year impact.

In all of the versions, factor values were lagged by one year to correct for the possibility that the factors are endogenous. In general, coefficient values were not significantly different between the six models. Results for all methods are reported. The use of lagged factors tended to reduce the significance of the coefficients on the factors, but did not result in any substantial changes in the signs or magnitudes of the coefficients. Although results for all six versions were similar, the results for the state and year fixed effects version (version 6) will be the focus of the discussion.

¹⁹¹ See Binswanger, 1974, Ray, 1982, Cain and Paterson, 1981.

¹⁹² See Binswanger, p. 377.

5.6 Results

Because the coefficient estimates have little economic meaning on their own, the estimates will not be discussed in depth in this section. Appendix F contains the coefficient estimates and a discussion of results for each share equation. In this section, coefficient results for some key variables will be briefly discussed before turning to a discussion of elasticities, presented in Table 10 through Table 14. Table 15 combines the elasticities with the empirical increase in the independent variables to show the impact of changes in labor legislation and relative prices on input demand. Finally, Figure 18 through Figure 27 contain estimates of elasticities and the impact of changes in the four labor variables on input demand for each state over the 1899-1919 period.

5.6.1 Coefficient Estimates

The coefficients on output, time, and the labor law variables in each share equation describe the direction of bias caused by changes in scale, technology, or legislation. For example, a positive coefficient on output in the wage equation indicates a wage-labor using bias with respect to scale. As output increases, firms increase their use of wage labor.

Overall, the results indicate that increases in labor legislation resulted in a wage labor-saving and capital-saving bias and a materials-using and salaried labor-using bias by manufacturers. First wave laws tended to result in a labor-using bias and a capital and

materials-saving bias. These initial, more common labor laws had a relatively small impact on input choice decisions. This finding is consistent with the findings of other researchers¹⁹³ that suggest that the passage of labor legislation did not occur until business conditions changed such that it was in the best interest of employers to obey the new law. Therefore, the new laws merely codified existing practices and did not significantly affect input choice by firms. In contrast, many of the second-wave laws placed stricter requirements on firms, and the estimated coefficients suggest that these laws had a more significant impact on input choice than the first-wave laws. In general, an increase in second-wave laws caused firms to substitute away from wage labor and capital and towards salaried labor and materials. Second wave laws had the largest impact on the materials and wage shares, implying a large wage labor-saving bias and a materials-using bias. Finally, anti-union laws were associated with capital-saving and wage and salaried labor-saving biases that were balanced by a materials-using bias. The coefficients on state spending on labor laws were very small and statistically insignificant in all four share equations. This suggests either that this variable is a poor proxy for enforcement efforts, or that enforcement had little additional impact on input choice decisions.

The results indicate that the addition of the factors to the cost function is appropriate. As a state's score on any of the labor law factors increases, firms adopt more wage labor-saving technologies. There is evidence that passage of first and second

wave laws caused firms to increase their use of salaried labor, possibly at the expense of wage labor. Surprisingly, the analysis indicates that as the level of labor legislation increases, firms also adopt capital-saving technology. This result runs counter to the conventional belief that as labor regulations become more onerous, firms will substitute capital for labor. The results also suggest that an increase in labor legislation resulted in a materials-using bias for firms.

Three of the four models included a time variable. This variable is commonly used as a proxy for technological change. The sign of the coefficient on time in each of the four share equations indicates the direction of the technological change relative to each of the input shares. In versions of the model where this variable was included, the coefficients indicate that technology was causing a shift away from wage labor and capital and towards salaried labor and materials. The results for labor and materials are consistent with results from other similar work, but the result for capital is not.¹⁹⁴ This counterintuitive finding may be the result of how the capital variables were constructed. By using a residual method, the capital share represents not only payment to capital, but also payments to entrepreneurs. If technological change increased the competitiveness of the manufacturing industry, then this measure of “capital” share would decline as profitability declines in the industry. In the versions of this model using bond prices to

¹⁹³ Fishback and Kantor, 1992, p. 826-848. See Chapter 2 for more examples.

¹⁹⁴ See Cain and Paterson, 1986, p. 341-360.

calculate capital share, the coefficient on time in the capital share equation is insignificant.

Output per establishment was included in all of the model versions. Models that exclude output impose the restriction of constant returns to scale on the production technology. This is a dubious assumption for the manufacturing industry, so this variable was included. The coefficients for output were significant at the ten percent level in all of the share equations. These coefficients indicate that as a firm increases its output, it engages in labor-saving technologies and materials-using and capital-using technologies. These results are consistent with the idea that there are labor productivity gains to scale; that output per worker will increase with output, reducing labor's share of total costs. This result also supports the idea that capital-intensive operations must be large to be profitable.

5.6.2 Elasticities

Traditional elasticities of demand and substitution are presented in Table 10 through Table 12. Table 13 and Table 14 contain elasticity estimates for the four labor variables. Table 15 is an impact analysis that combines these elasticities with the empirical increase in the level of the labor variables between 1899 and 1919.

Own price elasticities of demand calculated from the coefficients of the share equations are shown in Table 10. Elasticities were calculated for the average of the

estimated regulatory shares over the 1899 to 1919 sample period. As expected, all own price elasticities of demand were negative. The elasticity of demand for salaried labor was the largest, at -0.941 . Materials had the lowest elasticity, at -0.461 . Elasticities for all inputs were statistically significant at the 10 percent level.

Table 10: Own Price Elasticity of Demand

Input	Base	Time Counter	Year Effects	State Effects, Time Counter	State Effects	State, Year Effects
Materials	-0.176	-0.444	-0.414	-0.639	-0.607	-0.461
p	0.004	0.000	0.000	0.000	0.000	0.000
Salary	-0.789	-0.589	-0.519	-0.647	-0.787	-0.941
p	0.000	0.000	0.000	0.000	0.000	0.000
Wage	-0.315	-0.664	-0.580	-0.841	-0.772	-0.619
p	0.002	0.000	0.000	0.000	0.000	0.000
Capital	-0.489	-0.541	-0.514	-0.593	-0.463	-0.523
p	0.000	0.000	0.000	0.000	0.000	0.000

Elasticities and standard errors are calculated according to Binswanger, page 380-383 as:

$$\hat{e}_{ii} = \frac{\hat{\alpha}_{ii} + s_i^2 - s_i}{s_i}; \quad SE(\hat{e}_{ii}) = \frac{SE(\hat{\alpha}_{ii})}{s_i};$$

where s_i $i=1..4$ is the i^{th} estimated share. Elasticities are evaluated at the mean of the years in the sample.

Allen partial elasticities are listed in Table 11. Capital and wage labor were the only complements; the rest of the inputs were substitutes. The best substitutes were wage labor and materials, followed by salaried labor and materials, capital and salaried labor, and capital and materials. Wage and salary labor had a positive elasticity, indicating a substitute relationship, but the estimate was insignificant in all but the base model version. These results suggest that wage and salary labor were quite different types of

inputs. The poor substitutability of wage and salary labor suggests that firms did not just change their classification of workers from wage to salary in response to increased regulation of wage labor. If firms were substituting towards salaried labor in response to labor legislation, they were making a change to their production technology that required hiring more salaried workers with a skill set that differed from wage labor.

Table 11: Allen Partial Elasticity of Substitution

Input 1	Input 2	Base	Time Counter	Year Effects	State Effects, Time Counter	State Effects	State, Year Effects
Capital	Salary p	1.072	0.760	-0.303	1.166	0.326	1.018
		0.000	0.015	0.330	0.001	0.345	0.005
Capital	Wage p	0.405	-0.484	-0.118	-1.508	-1.436	-0.629
		0.190	0.146	0.639	0.000	0.000	0.049
Capital	Materials P	0.620	1.025	0.930	1.392	1.206	1.016
		0.000	0.000	0.000	0.000	0.000	0.000
Wage	Materials P	0.242	1.243	1.056	1.914	1.804	1.232
		0.273	0.000	0.000	0.000	0.000	0.000
Wage	Salary p	1.269	0.616	-0.456	0.266	-0.171	0.468
		0.000	0.269	0.450	0.679	0.781	0.492
Materials	Salary p	0.866	0.555	1.123	0.630	1.284	1.121
		0.000	0.001	0.000	0.000	0.000	0.000

Elasticities are symmetric and are best used to evaluate substitute-complement relationships between inputs. Elasticities and standard errors are calculated according to Binswanger, page 380-383 as:

$$\hat{e}_{ij} = \frac{\hat{\alpha}_{ij} + s_i s_j}{s_i s_j}; \quad SE(\hat{e}_{ij}) = \frac{SE(\hat{\alpha}_{ij})}{s_i s_j};$$

where s_i $i=1..4$ is the i^{th} estimated share. Elasticities are evaluated at the mean of the years in the sample.

Partial elasticities of demand for the four inputs are listed in Table 12. These elasticities give the change in demand for the first input after an increase in price of the

second input. These elasticities are not symmetric. The difference in the elasticity values between e_{ij} and e_{ji} depends on the share of total cost of each input in the pairing. In a pairing of two inputs i and j , when the input i makes up a relatively smaller share of total costs than input j , the elasticity e_{ij} will be larger than the elasticity e_{ji} . As with the Allen partial elasticities of demand, only wage labor and capital were compliments. All other inputs were substitutes or the elasticities were not significant. All elasticities were less than one, indicating an inelastic price response. The statistically significant substitutes were the same pairs that were identified in Table 11. The largest elasticity was for wage labor and materials, at 0.72. With a value of 0.02, the elasticity for wage and salary labor was the smallest, again indicating that these inputs were not easily substitutable for firms. All of the input elasticities with respect to salary labor were small due to salary labor's small share of total cost. A large increase in the price of salaried labor does not result in much substitution towards other inputs since salaried labor does not represent a large proportion of the inputs used in production. Conversely, materials make up the largest proportion of total costs, and the elasticity response of the other inputs with respect to an increase in the materials price are the largest elasticities in Table 12.

Table 12: Partial Elasticities of Demand, Non-Labor Inputs

Demand for Input (i)	After a Price Change in Input (j)	Base	Time Counter	Year Effects	State Effects, Time Counter	State Effects	State, Year Effects
Wage	Materials	0.142	0.731	0.620	1.125	1.060	0.724
p		0.273	0.000	0.000	0.000	0.000	0.000

Table 12: Partial Elasticities of Demand, Non-Labor Inputs

Demand for Input (i)	After a Price Change in Input (j)	Base	Time Counter	Year Effects	State Effects, Time Counter	State Effects	State, Year Effects
Wage	Salary	0.248	0.024	-0.017	0.010	-0.007	0.018
p		0.000	0.269	0.450	0.679	0.781	0.492
Wage	Capital	0.079	-0.094	-0.023	-0.294	-0.280	-0.123
p		0.190	0.146	0.639	0.000	0.000	0.049
Salary	Materials	0.509	0.326	0.660	0.370	0.754	0.659
p		0.000	0.001	0.000	0.000	0.000	0.000
Salary	Capital	0.210	0.148	-0.059	0.228	0.064	0.199
p		0.000	0.015	0.330	0.001	0.345	0.005
Salary	Wage	0.227	0.110	-0.082	0.048	-0.031	0.084
p		0.000	0.269	0.450	0.679	0.781	0.492
Materials	Salary	0.169	0.021	0.043	0.024	0.049	0.043
p		0.000	0.001	0.000	0.000	0.000	0.000
Materials	Wage	0.043	0.223	0.189	0.343	0.323	0.221
p		0.273	0.000	0.000	0.000	0.000	0.000
Materials	Capital	0.122	0.200	0.182	0.272	0.235	0.198
p		0.000	0.000	0.000	0.000	0.000	0.000
Capital	Wage	0.073	-0.087	-0.021	-0.270	-0.257	-0.113
p		0.190	0.146	0.639	0.000	0.000	0.049
Capital	Materials	0.365	0.602	0.546	0.818	0.708	0.597
p		0.000	0.000	0.000	0.000	0.000	0.000
Capital	Salary	0.209	0.029	-0.012	0.044	0.012	0.039
p		0.000	0.015	0.330	0.001	0.345	0.005

These elasticities are not symmetric and should be interpreted as the elasticity of demand for the first column (ith) input after a price change in the second column (jth) input. Elasticities and standard errors are calculated according to Binswanger, page 380-383 as:

$$\hat{e}_{ij} = \frac{\hat{\alpha}_{ij} + s_i s_j}{s_i}; \quad SE(\hat{e}_{ij}) = \frac{SE(\hat{\alpha}_{ij})}{s_i};$$

where s_i $i=1..4$ is the i th estimated share. Elasticities are evaluated at the mean of the years in the sample.

Table 13 lists the ε_{ij} elasticities of demand for the inputs with respect to the labor variables and output. These elasticities give the percent change in demand for each input after a one percent change in the labor laws, state spending on labor legislation, or output per establishment. For the labor law-input elasticities that were statistically significant at the ten percent level, the direction of response is identical to the sign for that variable in the share equations. However, unlike the coefficients of the share equations, the magnitude of the elasticities now gives the input quantity response to a change in the level of the labor variable instead of the input share response. The magnitude of the elasticities gives a clearer picture of the true impact on quantity demanded of different inputs in response to changes in labor legislation.

The largest significant elasticity was for salaried labor and first wave laws, at 2.06. This indicates that a one percent increase in first wave laws would generate a two percent increase in demand for salaried labor. The elasticity response for salaried labor with regard to second wave laws was also large, at 0.84. The elasticity of salaried labor with regard to anti-union laws was statistically insignificant, but positive at 0.20. For state spending on labor issues, the elasticity was insignificant, and was very close to zero. These elasticities suggest that passage of first wave laws had the largest magnitude of impact on firms, causing a large increase in demand for salaried workers. Combining this result with the earlier finding that wage and salaried labor were poor substitutes, this suggests that these salaried workers were necessary for compliance with the new laws. As second wave laws became more prevalent, firms may have realized economies of

scale with respect to salaried workers. As the regulatory burden increased, firms were able to comply with more laws with a smaller increase in salaried labor compared with the demand response that was necessary under first wave laws.

For wage labor, the pattern is different. The elasticity response of wage labor with respect to first wave laws is insignificant and positive (0.35), suggesting no impact of early labor laws on wage labor demand. However, the elasticity response of wage labor with respect to second wave laws is negative and significant (0.73), suggesting that these laws did lead firms to reduce their use of wage labor. The elasticity response with respect to anti-union laws is insignificant and negative (-0.24) in the state and year effects version, but is significant and negative in three of the six versions that were estimated. This suggests that increasing levels of anti-union legislation may have led firms to substitute away from wage labor. The elasticity response with respect to state spending on labor issues was negative and insignificant. This pattern of responses indicates that the initial regulatory burden generated by first wave laws did not have a significant impact on firm input demand for wage labor. This is consistent with the idea that many of the first wave laws merely codified existing practices and did not significantly affect firm behavior. However, the more stringent second wave laws did have a significant negative impact on employment of wage labor. Because these laws did affect firm input choice, they were more likely than the first wave laws to face opposition by the business community. For this reason, these laws took longer to gain the necessary support to be

enacted by state legislatures. Most second wave laws were not common nationally until after 1909, as compared to the pre-1909 passage of most of the first wave laws.

None of the estimated elasticities for capital were significant in the state and year effects version. In addition, the signs of the estimated elasticities were not consistent amongst the six versions of the model estimated for any of the capital-labor law pairings. This suggests that labor laws did not significantly affect the capital choice decisions of firms, and is a bit surprising given the conventional notion that firms will substitute capital for labor as regulations on labor become more onerous. The failure to find significance for the capital-labor elasticities may be the result of a poorly constructed capital variable. However, the alternative measure of capital price and quantity employed in Appendix G gives similar results.

Materials demand responded positively to increases in all of the labor laws. For first wave laws, the elasticity was 0.02 but was statistically insignificant at the ten percent level. For second wave laws, the elasticity was statistically significant and larger, at 0.484. For anti-union laws, the elasticity was 0.374. In addition, the materials-state spending on labor elasticity was statistically significant at the ten percent level. At 0.016, the magnitude of the response is small, but is consistent with the other labor law findings. This indicates that firms are substituting towards materials in response to increases in labor legislation.

The elasticities with respect to output describe the response of each input to an increase in output. These elasticities are significant, and positive, as one might expect. An elasticity less than one indicates that input demand is increasing more slowly than output, and an elasticity greater than one indicates that input demand is increasing more quickly than output. These elasticities reveal that demand for labor increases the most slowly in response to an increase in output, with elasticities around 0.8 for both wage and salaried labor. This confirms the idea that there were increasing returns to scale for labor during this time frame. The largest elasticity was for capital, at 1.02. This indicates that as output increases, firms begin to employ a larger proportion of capital relative to labor. Interestingly, the elasticity of demand for materials with respect to output was almost exactly one, indicating that a one percent increase in output results in a one percent increase in materials demand.

Table 13: Partial Elasticities of Demand, Labor Variables and Output

Demand for Input (i)	After a change in Variable (j)	Base	Time Counter	Year Effects	State Effects, Time Counter	State Effects	State, Year Effects
Wage p	Factor 1	1.138	0.202	0.251	0.603	-0.169	0.347
		0.012	0.641	0.478	0.201	0.659	0.367
Capital p	Factor 1	0.354	-0.235	-0.122	0.018	-0.135	0.021
		0.156	0.302	0.516	0.938	0.522	0.922
Salary p	Factor 1	0.791	1.508	1.815	1.682	2.081	2.060
		0.000	0.000	0.000	0.000	0.000	0.000
Materials p	Factor 1	-0.161	-0.286	-0.369	-0.128	0.816	0.022
		0.437	0.113	0.008	0.470	0.000	0.886
Wage p	Factor 2	0.327	-0.857	-1.049	-0.113	-0.935	-0.732
		0.482	0.030	0.003	0.796	0.003	0.015

Table 13: Partial Elasticities of Demand, Labor Variables and Output

Demand for Input (i)	After a change in Variable (j)	Base	Time Counter	Year Effects	State Effects, Time Counter	State Effects	State, Year Effects
Capital p	Factor 2	0.470 0.139	-0.437 0.173	-0.505 0.046	0.248 0.408	0.618 0.023	-0.059 0.822
Salary p	Factor 2	0.654 0.000	-0.259 0.448	0.260 0.454	0.253 0.532	1.185 0.002	0.839 0.017
Materials p	Factor 2	0.389 0.068	-0.127 0.478	-0.055 0.689	-0.180 0.341	1.278 0.000	0.484 0.000
Wage p	Factor 4	-0.586 0.079	-0.800 0.008	-0.643 0.030	-0.297 0.389	-0.511 0.127	-0.238 0.428
Capital p	Factor 4	-0.187 0.384	-0.306 0.145	-0.193 0.344	0.007 0.977	0.014 0.941	0.074 0.764
Salary p	Factor 4	0.102 0.031	-0.222 0.210	-0.081 0.676	0.014 0.943	0.168 0.405	0.202 0.325
Materials p	Factor 4	0.412 0.006	0.524 0.000	0.412 0.001	0.439 0.004	0.727 0.000	0.374 0.009
Wage p	Spending	-0.085 0.000	-0.029 0.138	-0.029 0.109	-0.004 0.852	-0.002 0.936	-0.022 0.290
Capital p	Spending	-0.044 0.008	-0.017 0.237	-0.018 0.196	0.012 0.451	0.021 0.134	-0.001 0.933
Salary p	Spending	-0.029 0.000	-0.028 0.055	-0.016 0.361	-0.011 0.553	0.004 0.856	-0.003 0.899
Materials p	Spending	0.010 0.382	0.001 0.949	0.004 0.577	-0.006 0.543	-0.002 0.849	0.016 0.051
Wage p	Output	0.751 0.000	0.756 0.000	0.765 0.000	0.781 0.000	0.833 0.000	0.771 0.000
Capital p	Output	1.031 0.000	1.024 0.000	1.025 0.000	1.043 0.000	1.107 0.000	1.017 0.000
Salary p	Output	0.962 0.000	0.740 0.000	0.727 0.000	0.746 0.000	0.801 0.000	0.753 0.000

Table 13: Partial Elasticities of Demand, Labor Variables and Output

Demand for Input (i)	After a change in Variable (j)	Base	Time Counter	Year Effects	State Effects, Time Counter	State Effects	State, Year Effects
Materials	Output	1.096	1.097	1.089	1.030	1.045	0.993
p		0.000	0.000	0.000	0.000	0.000	0.000

These elasticities are not symmetric and should be interpreted as the elasticity of demand for the first column (i^{th}) input after a change in the level of the variable in the second column (j^{th}) input. Elasticities and standard errors are adapted from Binswanger, page 380-383 as:

$$\hat{e}_{if} = \frac{\hat{\alpha}_{if} + s_i \hat{s}_f}{s_i}; \quad SE(\hat{e}_{if}) = \frac{SE(\hat{\alpha}_{if})}{s_i}$$

where s_i $i=1..4$ is the i^{th} estimated share, and s_f $f=1..4$ is the f^{th} estimated factor or output share. Elasticities are evaluated at the mean of the years in the sample.

Table 14 lists the estimated “regulatory shares” that were used in the calculation of labor law-input elasticities in Table 13. These shares can be interpreted as the cost elasticity with respect to the labor variables. The values in the table are the percentage increase in costs after a one percent increase in the level of labor laws. If labor laws reduce the productivity of firms, these elasticities should be greater than or equal to zero. In the state and year fixed effects version, all of the elasticities were greater than zero. The estimated elasticities for the three labor law variables were all around 0.2, indicating that a one percent increase in legislation would increase costs by about 0.2 percent. As with the other results, the estimated cost elasticity for state spending on labor legislation was very close to zero.

Table 14: Cost Elasticities With Respect to Labor Laws

Inputs		Base	Time Counter	Year Effects	State Effects, Time Counter	State Effects	State, Year Effects
Cost	Factor 1	0.289	-0.120	-0.126	0.098	0.500	0.155
Cost	Factor 2	0.438	-0.324	-0.309	-0.069	0.748	0.172
Cost	Factor 4	0.104	0.096	0.086	0.205	0.344	0.200
Cost	Spending	-0.021	-0.009	-0.007	-0.002	0.003	0.005

Table 15 combines the estimated elasticities from the state and year fixed effects model version and the observed increases in the independent variables to predict the change in the quantity demanded of each input that would have resulted from the empirical change in the independent variables from 1899 to 1919. The table shows that the combined impact of the three labor laws and state spending on labor laws was to reduce the demand for wage labor by about seven percent, increase materials demand by eight percent, and increase demand for salaried labor by 30 percent. The impact on capital was essentially zero (−0.2 percent). This is balanced against input price changes and increases in output whose combined effects were to increase demand for all inputs.

Table 15: Impact Analysis: Predicted Change in Input Demand Attributable to Empirical Change in Exogenous Variables

Variable	Empirical Change 1899-1919	Impact of Observed Change on Quantity Demanded of: ¹			
		Materials	Wage Labor	Salary Labor	Capital
Non-Labor Variables					
Materials Price	97.2%	-44.8%*	70.3%*	64.0%*	58.0%*
Wage Price	16.9%	3.7%*	-10.4%*	1.4%	-1.9%*

Table 15: Impact Analysis: Predicted Change in Input Demand Attributable to Empirical Change in Exogenous Variables

Variable	Empirical Change 1899-1919	Impact of Observed Change on Quantity Demanded of: ¹			
		Materials	Wage Labor	Salary Labor	Capital
Salary Price	-13.4%	-0.6%*	-0.2%	12.6%*	-0.5%*
Capital Price	-48.8%	-9.7%*	6.0%*	-9.7%*	25.5%*
Real Value of Products per Establishment	52.7%	52.4%*	40.6%*	39.7%*	53.6%*
Total Change: Non-labor Variables		1.0%	106.3%	108.0%	134.7%
First Wave Laws	9.8%	0.2%*	3.4%	20.1%*	0.2%
Second Wave Laws	11.3%	5.5%*	-8.3%*	9.5%*	-0.7%
Anti-union Factor	3.9%	1.4%*	-0.9%	0.8%	0.3%
Labor Law Expenditures per Worker	38.5%	0.6%*	-0.8%	-0.1%	0.0%
Total Change: Labor Variables		7.7%	-6.7%	30.3%	-0.2%
Total Predicted Change		8.8%	99.6%	138.3%	134.5%
Empirical Change		40.1%	29.7%	101.8%	120.2%
*Significant elasticity at p=0.10					
¹ Impact is percentage point change in input demand resulting from the empirically observed percentage change in each variable between 1899 and 1919. Uses elasticities from run using output, spending, three factors, and states and year fixed effects.					

For materials, the largest labor-related impact was from second wave laws, which worked to increase materials demand by almost six percent. Anti-union laws had the next largest impact, with a 1.4 percent increase in materials demand resulting from the almost four percent increase in the national average level of anti-union laws that occurred during this time. The observed increase in the level of first wave laws increased demand for materials by only 0.2 percent. The combined 7.7 percent increase in materials demand attributable to labor legislation was balanced by flat demand for materials that was primarily attributable to the rising relative price of the materials input that occurred

during this period balanced by an increase in materials demand attributable to output effects.

Demand for wage labor increased by only 30 percent during the 1899 to 1919 period. This was the smallest percentage increase observed of any of the inputs, and the small increase cannot be entirely explained by relative price changes. According to elasticity estimates, relative price changes would have resulted in a 66 percent increase in the use of wage labor, and increases in output would have accounted for another 40 percent increase, for a total predicted increase in the demand for wage labor of 106 percent. The combined impact of labor law changes reduced wage labor demand by about 7 percent, with negative elasticities for all variables but first wave laws. The impact of second wave laws on wage labor demand was the largest, at -8.3 percent, and was the only statistically significant elasticity ($p=0.10$).

Demand for salaried labor increased by 102 percent during the 1899 to 1919 period, with an estimated 30 percent of this total attributable to labor laws. Increases in first wave laws accounted for 20 percent of the increase, and second wave laws accounted for another 10 percent. This analysis underscores the result that labor legislation had its largest impact on the use of salaried labor, either due to the administrative burden of compliance that required more administrative workers, or due to a conscious shift on the part of manufacturers towards salaried labor in order to sidestep labor regulations.

Finally, the combined impact of labor laws on capital demand was neutral, with the predicted demand for capital falling by only 0.2 percent as the result of the empirical increase in legislation over the twenty-year period studied. Overall, capital use increased by 120 percent during this time, mostly due to declines in the relative price of capital and increases in output by firms.

5.6.3 State Level Elasticity Estimates

Figure 18 through Figure 22 show the state-level estimates for the elasticities listed in Table 13 and Table 14.

5.6.3.1 State Labor Law-Cost Elasticities

Figure 18 shows the cost elasticity estimates for the three labor law factors and state spending on labor laws. For first wave laws, the highest estimated cost elasticities are in the mining states in the West and Midwest and mining and industrial states in the East. The lowest elasticities were in agricultural states in the Southeast and Midwest. Surprisingly, Michigan, Illinois, Minnesota and Wisconsin had low cost elasticities, in contrast to higher elasticities in other industrialized states like New Jersey. The lowest estimated elasticity was in Minnesota, at -0.007 . This suggests that first wave laws had little impact on costs for Minnesota manufacturers, and may help to explain why Minnesota was an early leader in the passage of first wave laws. In contrast, Wyoming's

0.35 estimated first wave cost elasticity was the highest in the nation and Wyoming was consistently in the bottom third of the nation for the number of laws in force.

Second wave cost elasticities were highest in the Mountain states, followed by the industrialized states in the Northeast and Midwest. As with first wave laws, the lowest elasticities were found in agricultural states in the Southeast and Midwest. The magnitudes of these elasticities were similar to the first-wave cost elasticities. Most states had higher estimated cost elasticities for second wave laws as compared to first wave laws, suggesting that these laws had a larger impact on costs.

For anti-union laws, estimated cost elasticities were highest in the Southeast and Southwestern states, where anti-union sentiment was strong. The lowest estimated elasticities were in the more heavily unionized Northeast and Midwestern states. Michigan's estimated elasticity was the lowest in the nation, at 0.09. South Carolina's elasticity of 0.31 was the highest in the nation. This implies that manufacturing costs in the more unionized states were less sensitive to an increase in union-related legislation than in less unionized states, and may explain why opposition to unions was stronger in the Southeast than in the Northeast. Finally, cost elasticities for state spending on labor laws were uniformly low, with elasticities that were not appreciably different from zero for most states. This is true for all of the elasticities that were estimated with respect to state spending, so these graphs will be included but not discussed.

5.6.3.2 State Labor Law-Wage Elasticities

Figure 19 shows the estimated elasticities for wage labor. All of the state estimates for first wave-wage elasticities are positive, suggesting that an increase in first wave laws would drive manufacturers to increase their use of wage labor. However, only three of the state estimates were statistically significant at the ten percent level, calling into question the accuracy of the estimates. The elasticities were smallest in the Southeast and largest in the West. The positive sign may indicate that these initial laws reduced the productivity of wage labor, requiring manufacturers to hire more workers to produce the same output.

Most of the second wave-wage labor elasticities were statistically significant, and all of the estimates were negative, indicating that higher levels of second wave laws would lower demand for wage labor. The magnitudes of these elasticities were largest in the Midwest, with most of the Central states having elasticities larger than -1 . The states with the least sensitive response to second wave laws were scattered throughout the nation and included mining states in the West, New England states and Southeastern states. Most of the industrial states in the Midwest and Northeast had elasticity responses close to average. Of all of the estimated wage labor elasticities, the wage-second wave elasticities were the largest, suggesting that in most states, wage labor demand was impacted the most severely by second wave laws.

Although the estimates are not statistically significant, the state estimates of wage-anti-union elasticities suggested that increased levels of anti-union legislation also decreased demand for wage labor. In contrast to the anti-union-cost elasticities, the highest estimated elasticities were in the Midwest, and the lowest elasticities were in the Southeast and the West. One explanation for this is that as increases in the level of anti-union legislation made wage labor less productive, manufacturers in the Midwestern states were better able than their counterparts in the South to substitute away from wage labor without raising total costs, thus generating higher wage labor-anti-union elasticity but a smaller wage labor-cost elasticity.

5.6.3.3 State Labor Law-Salary Elasticities

Figure 20 shows the estimated elasticities with respect to salaried labor. Because salaried labor made up the smallest share of total costs of the four inputs, these elasticities are higher than elasticities for the three other inputs. For first wave laws, the states with the highest elasticities were mostly in the Mountain and Plains regions. The lowest measured elasticities were in the Midwest. All states had estimated salary-first wave elasticities greater than one. For second wave laws, the elasticities were smaller. As with the salary-first wave elasticities, the Mountain and Plains states had the highest measured elasticities for salary-second wave elasticities. However, the states with the lowest elasticities were scattered throughout the rest of the nation.

The states with the smallest salary-anti-union law elasticities were in the Northeast and Midwest. As with the other elasticities relating to the anti-union law index variable, the highly unionized states tended to have the lowest measured elasticities for this law. The Southeast and Southwest states had the highest measured salary-anti-union elasticities, implying that a relatively small increase in the level of antiunion legislation would lead to a comparatively large increase in demand for salaried labor in these states. However, the magnitude of the salary-anti-union elasticities was small throughout the nation, ranging from 0.09 in Michigan to 0.32 in South Carolina. This suggests that compared to other types of laws, anti-union legislation had little impact on the use of salaried labor.

5.6.3.4 State Labor Law-Materials Elasticities

Figure 21 shows the materials-labor law elasticities. Measured values for the materials-first wave elasticities varied from a low of -0.14 in Florida to a high of 0.17 in Pennsylvania. In general, the Southeast and much of the industrial Midwest had low or negative measured elasticities while the elasticities were positive in the Northeast and West. For second wave laws, elasticities were positive in all states. The geographic pattern of relative elasticities was not particularly clear. The Mountain states had the highest elasticities. High elasticities were also found in states in the South, the Pacific region, and the Northeast. The lowest elasticities were found mostly in the Southeast, the Midwest, and the West. Materials-anti-union elasticities were highest in the Southeast and Mountain region and lowest in the Northeast and Midwest. Materials-state spending

elasticities were highest in the West and Southeast, and lowest in the Midwest and MidAtlantic region, suggesting that state spending on labor laws had its greatest impact in some of the states with the fewest laws in place.

5.6.3.5 State Labor Law-Capital Elasticities

Figure 22 shows the state capital-labor elasticities. For first wave laws, estimated elasticities were negative in almost half of the states. Minnesota had the largest measured elasticity, at -0.17 . Most of the states in the Midwest and Southeast had negative estimated elasticities. Most of the states in the Northeast and MidAtlantic regions had positive elasticities, as did most of the mining states of the Midwest and West. For second wave laws, the pattern was similar, but the elasticities were uniformly lower. Most of the state elasticities for capital-second wave laws were negative. Only eleven states had elasticities greater than zero. Idaho, Wyoming, and West Virginia had the highest elasticities. The lowest elasticity was in Kansas, at -0.33 . For anti-union laws, the capital-anti-union elasticities were mostly positive, suggesting that an increase in anti-union laws may have encouraged some substitution towards capital. The largest elasticities were in the Southeast and West. North Carolina had the largest estimated elasticity, at 0.22 . Many states in the Midwest and Northeast had small negative capital-anti-union elasticities. Kansas had the largest negative elasticity, at -0.07 . The small magnitude of these elasticities and the imprecision of the estimates suggest that anti-union laws in these states most likely had little impact on capital.

Figure 18: State Labor Law-Cost Elasticities: 1899-1919 Average

Figure 19: State Labor Law-Wage Elasticities: 1899-1919 Average

Figure 20: State Labor Law Salary Elasticities 1899-1919 Average

Figure 21: State Labor Law Materials Elasticities: 1899-1919 Average

Figure 22: State Labor Law-Capital Elasticities: 1899-1919 Average

5.6.4 State-Level Impacts

Figure 23 through Figure 27 show the estimated impact that labor laws had on input demand in each state between 1899 and 1919. These maps combine the empirical change in each state's level of legislation with the elasticity measure for each state to get an estimated percentage change in demand for each input that can be attributed to changes in the level of each labor variable.

5.6.4.1 Impact of Labor Regulations on Cost per Establishment

Figure 23 shows the estimated percentage increase in cost per establishment that can be attributed to the empirical increase in the level of the labor variables. Not surprisingly, the pattern of relative impacts is similar to the regional distribution of elasticities. For first wave laws, the cost impact was estimated to range from zero percent in Minnesota to five percent in Idaho. There were a few exceptions. For example, Pennsylvania, New Jersey, and New Mexico had high cost elasticities, but were amongst the lowest for estimated impacts. Conversely, Nebraska had a relatively low estimated cost elasticity but relatively high estimated impacts due to a large increase in the level of first wave laws.

For second wave laws, cost impacts ranged from a high of almost seven percent in Massachusetts to a low of -1 percent in Arizona. The highest cost impacts were in the West and in industrialized states in the Midwest and Northeast. In the Southeast, the increase in the level of second wave laws was below the national average so that the cost

impact was small, even in Southeastern states like Alabama and Tennessee with relatively high elasticities.

Anti-union laws also had their largest impact on costs in the West, with estimated impacts ranging from a high of 3.3 percent in Nevada to a low of –2.1 percent in Maine. For much of the Northeast and industrial Midwest, estimated cost impacts were negative. These negative impacts were due to a drop in the level of the anti-union factor in these states. This was due in some cases to a reduction in the number of laws but more often to the adoption of more pro-union laws, which had negative loadings for this factor. This factor may better be interpreted as representing the level of anti-union sentiment or labor tension in the state. Therefore, higher levels would negatively impact costs due to the negative impact on productivity created due to uneasy labor relations in the state.¹⁹⁵

State spending impacts ranged from a low of –1.2 percent in North Dakota to a high of 1.4 percent in Washington. An impact estimate was not calculated for states with no spending in 1899, so no value is reported in Figure 23 through Figure 27 for these states.

¹⁹⁵ See chapter 4 for a description of the anti-union factor.

5.6.4.2 Impact of Labor Regulations on Wage Labor Demand

Figure 24 shows the estimated impacts on wage labor demand. Impacts were highest for second wave laws, with Arizona leading the nation with an estimated –31.7 percent drop in wage labor demand as the result of the increase in second wave laws that occurred in Arizona between 1899 and 1919. The estimated second wave law impact was closest to zero in the Southeast, with demand for wage labor in this region ranging from a one percent increase in South Carolina to a 2.2 percent drop in Louisiana. In the Northeast, the largest impacts were in New York and Massachusetts, with declines of 12 and 20 percent, respectively. In the Midwest, the largest impacts were in Minnesota, with a 32 percent decline in wage labor demand, and in Wisconsin, with a 16 percent drop. The three Pacific states also had large drops in demand, from California’s decline of about 30 percent, to Washington’s 13 percent drop.

First wave laws were estimated to increase demand for wage labor in most states. The smallest estimated impact was in Minnesota, at –0.6 percent, and the largest was in Nebraska, at 9.8 percent. In general, more industrialized states had smaller estimated impacts on wage labor demand, with most of the Northeast and industrial Midwest experiencing impacts of less than 5 percent.

The estimated impact of anti-union laws on wage labor was mixed, with demand dropping in most of the Western and Southern states and wage labor demand increasing in the Northeast and in the Northern Midwestern states. The largest positive impact was

in New York, with an estimated 6.3 percent increase in wage labor demand as the result of the 17 percent drop in the anti-union factor score that occurred in this state. At the other extreme was Kansas, with a 10.4 percent drop in wage labor in response to the 20 percent increase in the level of the anti-union factor that occurred between 1899 and 1919.

5.6.4.3 Impact of Labor Regulations on Salaried Labor Demand

Figure 25 shows the impacts on salaried labor. Because of the relatively high estimated elasticities for salaried labor, these are the highest impacts of any of the inputs. For first wave laws, impacts range from a low of -4.7 percent in Minnesota to a high of 56 percent in Nebraska. The highest impacts were in the West and South. The smallest impacts were in Northern states. Virtually all of the traditional manufacturing states in the Northeast and Midwest experienced below average increases in salaried labor as the result of their adoption of first wave laws. This is probably because many of these states had enacted some of the first wave laws prior to 1899, so their increase in first wave laws between 1899 and 1919 was smaller than in other states that did not enact these laws until after 1899.

As with first wave laws, the impact of second wave laws was largest in the West, with the highest estimated impact in Montana at 30 percent. However, unlike the first wave law impacts, the smallest impacts were experienced in the South. Most of the Southern states had estimated impacts less than four percent, well below the national

average of around 10 percent. Impacts in the Northern manufacturing states were mixed, with most states experiencing average increases in salaried labor demand. Anti-union impacts on salaried labor were modest, with the largest positive impact in Nevada at 3.4 percent and the largest negative impact in Maine at -2.1%. The largest impacts were in the West, and the smallest impacts were in the North.

5.6.4.4 Impact of Labor Regulations on Materials Demand

Figure 26 shows impacts on materials demand. Second wave laws had the largest estimated impact, with Massachusetts' 18 percent increase leading the nation. South Carolina and Florida were the only two states with negative estimated impacts, at -0.5 and -0.3 percent, respectively. Impacts in the rest of the Southeast were also small, ranging from 0.2 percent in Virginia to 1.6 percent in Alabama. Anti-union impacts on materials were the next largest, with Colorado's six percent increase in materials demand leading the nation on the positive side and New York leading the nation for negative impacts, at -5 percent. First wave laws had a relatively small impact on materials demand. Idaho's 2.5 percent increase in demand was the largest in the nation, and Florida's 1.8 percent drop was the smallest. Most states had average impacts under one percent.

5.6.4.5 Impact of Labor Regulations on Capital Demand

Finally, Figure 27 shows estimated capital impacts. The estimated impacts of labor laws on capital demand were small for all variables in all states. The largest impact was for second wave laws, where the 5.4 percent estimated reduction in capital demand in Kansas was the largest in the nation. For first wave laws, the largest estimated impact was in Idaho, at 3.2 percent, and the smallest impact was in Nebraska, at -2 percent. Although the magnitudes differed, the pattern of impacts was the same for first and second wave laws. The impact on capital demand was positive in most of the Mountain and MidAtlantic states and negative in most of the Northern, Southern, and Pacific states. This may reflect the very different industry mixes in these states and their differing ability to employ capital as a substitute for other inputs.

For anti-union laws, the estimated impacts were small, with the largest impact in North Carolina, at 1.6 percent, and the smallest in Kansas at -0.9 percent. Positive or zero impacts on capital demand occurred in most states with the exception of the Midwest, where several states had small negative impacts.

Figure 23: Impact of Labor Regulations on Cost per Establishment: 1899-1919

Figure 24: Impact of Labor Regulations on Wage Labor Demand: 1899-1919

Figure 25: Impact of Labor Regulations on Salaried Labor Demand: 1899-1919

Figure 26: Impact of Labor Regulations on Materials Demand: 1899-1919

Figure 27: Impact of Labor Regulations on Capital Demand: 1899-1919

5.7 Conclusion

Labor legislation during the early part of the 20th century had an impact on the input decisions of manufacturing firms. Labor laws were found to increase costs for firms, with increases in the level of first wave laws causing average costs for the United States to increase by about 1.5 percent between 1899 and 1919. Second wave laws resulted in another 2 percent increase in costs, and anti-union laws increased costs by another percentage point, for a combined impact of almost 4.5 percent. Figure 28 shows the state-level combined impact of all four labor variables on costs. Impacts were largest in the West, followed by the Midwest, with the smallest impacts in the East. The combined impact on cost per establishment for all four categories of labor laws ranged in size from a maximum of about eleven percent in Utah to a minimum of -0.2 percent for Louisiana.

In general, firms located in states with more anti-union laws tend to use more materials and salaried labor and less wage labor. Firms located in states with more first wave laws tend to use more labor and fewer materials. Higher levels of second wave labor laws caused firms to increase their use of salaried labor, decrease their use of wage labor, and increase their use of materials. State expenditures on labor legislation had a uniformly small impact on firm input choice. The results suggest that as a state increases its expenditures per establishment, firms substitute away from labor and capital, and towards materials.

Figure 28: Combined Impact of Labor Regulations on Cost per Establishment

Figure 29 shows the combined impacts of the empirical changes in each labor variable on each of the four inputs. The maps show that for the majority of states, increased levels of the labor variables resulted in an increase in the use of salaried labor and materials and a decrease in the use of wage labor. Capital impacts were positive in about half the states and negative in the other half. The input that was the most affected by labor legislation was salaried labor. Increases in labor legislation were responsible for almost a third of the 100 percent increase in the use of salaried labor that occurred

between 1899 and 1919. For materials, labor legislation contributed almost eight percent to the 40 percent actual increase in materials use. Conversely, the 30 percent increase in wage labor during the 1899 to 1919 period would have been higher if it had not been for labor legislation. An estimated eight percentage points was subtracted from wage labor demand due to increases in labor variables. Finally, the impact of labor variables on capital demand averaged only -0.2 percent, suggesting that the 120 percent increase in capital demand that occurred during this period was unaffected by labor legislation.

Figure 29: Combined Impact of Labor Law Variables on Input Demand

CHAPTER 6 : CONCLUSION

In the study of regulation, the traditional approach of looking only at the incremental impact of one law or class of laws allows for an in-depth look at the consequences of regulating one particular aspect of the marketplace. This approach has many advantages. It has yielded a body of literature that illustrates how democratic governments regulate their marketplaces, and provides many examples of why this form of government may pass laws when all parties stand to gain from regulation. It allows for an extensive and precise measurement of the direct cost of any given regulation. However, this very focused study of only one aspect of an increasingly complex regulatory structure may not fully capture the true cost to firms of regulation. As an alternative, the approach described in the preceding chapters is an attempt to take a more holistic view of labor market regulation and attempt to measure the cumulative impact of the body of regulations on firm input choice decisions.

The work of others has hinted at the importance of considering this type of approach. In some cases, researchers have found that laws aimed at one group will have an impact on the working conditions of an entirely separate class of workers. For example, in an analysis of women's hours laws, Claudia Goldin found that these laws did reduce hours worked, but affected men and women equally.¹⁹⁶ This result is consistent with the sentiment of progressive reformers. These activists acknowledged that their ultimate goal was a reduction in hours and other working-condition improvements for all

workers, but the political realities of the day forced them to limit their scope to women and children.¹⁹⁷ The findings of Goldin suggest that this strategy of using women's laws as the gateway to reform for all workers met with some success. Other studies found that laws that have no effect when studied independently do have an impact when taken together with a related law. Margo and Finegan report this sort of result in their study of compulsory school attendance laws, which were not found to impact school attendance in states unless those states also had minimum age laws.¹⁹⁸ The goal of the approach described here is to understand the cumulative impact of regulation, taking into account interaction effects and impacts on unrelated groups. Because of the aggregate nature of the labor law variables, this approach sacrifices the precision of the more focused work done by Goldin, Margo and Finegan, and others, but contributes insight into the impact that the overall state regulatory burden has on firms. The relative levels of the labor law variables reflect the political philosophy of the citizens of each state, uniquely placing each state within the regulatory continuum depending on the mix of laws in force. Including aggregate variables in specific policy analyses may improve results. Controlling for the existing regulatory burden in the state allows for a more precise measurement of the marginal impact of an additional regulation, avoiding biases caused by the failure to consider the existing regulatory burden in estimating marginal impacts.

¹⁹⁶ Goldin, p. 190.

¹⁹⁷ Moss, p. 102-104.

¹⁹⁸ Margo and Finegan, p. 103-110.

The aggregate analysis performed here covers a time period during which the volume of legislation doubled in most states. Many states had virtually unregulated labor markets in 1899, with marked increases in the regulatory burden by 1919. The results of the principal components analysis described in Chapter 4 suggest that the body of labor legislation can be divided into four categories: first wave legislation, second wave legislation, anti-union legislation, and mining regulations. The increases in factor scores over time imply that the increase in regulatory burden was smaller than the doubling of laws would suggest. Over the 1899 to 1919 period, the average level of the variable representing first wave legislation increased by ten percent, second wave legislation increased by eleven percent, and anti-union legislation increased by four percent.¹⁹⁹ Estimates of the “cost elasticities” associated with the three labor variables imply a modest impact of regulation on total cost for firms. All estimated elasticities were less than one, with average cost elasticities ranging from a low of 0.16 for first-wave laws to a high of 0.20 for anti-union laws. Combining these elasticities with the empirical increase in the factor scores gives an estimate of the average impact on cost per establishment of the increase in regulatory burden during the 1899 to 1919 period. Again, impacts were small, with a one percent increase in costs attributable to anti-union legislation, a 1.5 percent increase due to first wave laws and a two percent increase due to second wave laws. The combined impact on average cost per establishment of all three laws was only 4.3 percent over the twenty-year period covered by the study. This very

¹⁹⁹ Mining regulations increased by slightly less than two percent. These laws were excluded from the cost function since that analysis focused on manufacturing.

modest estimated impact provides further support for the findings of many that labor legislation was either not enforced, codified existing practices, or was only binding on a minority of firms.²⁰⁰

Compared to their modest impact on cost per establishment, labor regulations impacted input demands more significantly. Most strikingly, the observed increase in the three labor legislation variables resulted in a predicted 30 percent increase in the use of salaried labor, accounting for about a third of the 100 percent increase in the use of salaried labor per establishment that occurred between 1899 and 1919. This may reflect the increasing need for administrative workers, either to meet the increased reporting and monitoring requirements of the new legislation, or the need for more supervisory or skilled workers as manufacturers shifted to more capital-intensive technologies. In contrast, according to elasticity estimates, increases in labor regulations shaved an estimated seven percentage points from the growth in wage labor that occurred over this time period. During the 1899 to 1919 period, wage labor usage increased by about thirty percent, by far the smallest increase of the four inputs. When combined with the fact that real output per establishment increased by about 53 percent during the same period, a clear wage labor-saving technological trend becomes apparent. The increasing regulatory burden likely reinforced the preexisting trend towards less labor-intensive manufacturing technologies. Finally, manufacturers responded to labor legislation by substituting

²⁰⁰ For example, Fishback, Moehling, Nardenelli. See Chapter 2.

towards materials. Materials usage increased by about 40 percent over the twenty-year period between 1899 and 1919, with labor legislation contributing about eight percentage points to that increase. As with all of the other inputs, the major driver of the increase in demand for materials was an overall increase in scale. However, as with salaried labor, the increase in labor legislation further increased the demand for materials beyond the requirements resulting from increased scale and changes in relative prices. This increase may have resulted from the same technological change that drove the increase in demand for salaried labor. New technologies may have required more raw material inputs in the form of fuels and other precursors, or the increase may reflect the cost of compliance to firms in the form of more safety equipment and other supplies for employees.

Given this possibility, the finding that labor legislation had no impact on capital demand is perplexing. This result may be related to the measure of capital employed in this study. The residual approach employed in Chapter 5 includes all payments to capital and entrepreneurship. A better measure would separate capital from entrepreneurial payments and attempt to estimate the impact of legislation on capital and on profitability separately.

Overall, labor legislation had a modest impact on the cost of firms and a relatively larger impact on their input choice. Firms reduced their use of wage labor and increased their use of salaried labor and materials. The total usage of all four inputs increased during this period due to scale effects, masking the impacts of legislation. These two

results provide an explanation for why progressive reformers met with success during this period: their proposals were not particularly detrimental to manufacturers or workers. Because of technological change and scale effects, manufacturers were already substituting away from wage labor and towards capital and materials. Increasingly stringent labor regulations reinforced that trend, and may have further induced innovations that further reduce the intensity of labor demand. In addition, the reduction in demand for wage labor caused by increasing regulatory burdens and technological change was masked by the increase in demand generated by scale effects so that on balance, labor demand rose, and workers did not perceive a significant impact on the job market from increasingly stringent regulations. Since neither workers nor employers were significantly damaged by increased regulation, reformers' proposals met with relatively less opposition during this period, and regulatory burdens increased.

The insignificance of the variable representing state spending on labor regulations poses an area for future work. The obvious question is whether the insignificance of this variable was due to data construction or to the ineffectiveness of enforcement efforts at the time. Because intervention in labor markets was so new in most states during this period, a large portion of the budget for labor regulation may have been associated with administrative overhead and not enforcement, reducing the value of this variable as a proxy for enforcement efforts. A better measure of the enforcement of the law might be total fines collected or number of violations recorded. A related refinement to the factor scores involves modifying the state's factor score to take into account the severity of the

law. The penalties associated with labor law violations differed widely from state to state; one would expect that these differences would have an impact on compliance rates, and could provide one proxy measure for the relative severity of the law.

The geographic clustering of labor laws described in Chapters 3 and 4 also merits further study. Clear regional similarities and differences exist in the timing, number, and types of laws in effect. Although this result is not surprising, further study into the reasons behind these similarities and differences may yield interesting insights into the political economy of regulation. A further analysis of the PCA scores developed in Chapter 4 may provide insights into the determinants of the regulatory climate of different states. Political and philosophical differences between states are one driver of the regulatory bias of a state legislature; competitive pressures between states are another. The consequences of the interplay between these often opposing forces appear in the historical literature frequently. Businesses located in progressive states that were early leaders in the passage of protective regulation complained frequently about competition from firms located in less-regulated states, and this argument remains in use to this day when state governments contemplate raising regulatory standards.

Related to this issue is the “border state” phenomenon described in Chapter 3. States that border regions with significantly different regulatory climates than their own region often tend to pass a volume of legislation that is somewhere in between the state’s home region and the adjacent region. For example, the MidAtlantic region led the nation

in many of the categories of labor legislation. States bordering the MidAtlantic region like Maryland in the South and Connecticut and Massachusetts in New England appear to have been influenced by the relatively high level of regulation in the MidAtlantic states. These border states had a significantly higher regulatory burden than the non-border states in their regions. This pattern of influence held for all regions but the Mountain region. In this region, Montana and Colorado had regulatory burdens that differed significantly from the remainder of the Mountain states. Although both states border the West North Central region, the regulatory burdens in Montana and Colorado appear more closely related to the Pacific region than any other. Further study is necessary to understand the connection between these two states and the Pacific region. One possibility relates to the inter-regional flows of trade and commerce in the West. The Mountain states were the least densely populated during this time, and as a result, the linkages between bordering states may have been much weaker than in the more densely populated East and even in the Midwest and South. Trade or demographic links between Montana and Colorado and the West Coast states may explain the similarities.

Further, in examining the specific laws passed in each region, significant inter-regional variation existed in the types of laws passed. Much of this variation was related to the types of industries present in the different regions. For example, the heavily industrialized MidAtlantic and East North Central states led the nation in factory safety laws, and the mining states in the East North Central and Mountain regions led the nation for mining laws. These differences reflect the industrial makeup of these regions. Other

differences amongst regions are more difficult to attribute to industrial mix. For example, the Pacific region led the nation in the passage of minimum wage laws, hours laws that applied to men as well as women, and social insurance laws. The East North Central region led for laws regulating the employment contract, and administrative laws. The MidAtlantic region had the most unionization and bargaining laws, laws regulating the labor supply, and women's and children's laws. These regional differences hint at the differing political philosophies that existed throughout the nation at this time; differences that in many cases have persisted to modern times.

The goal of this research has been to document the transition of the U.S. labor market from a largely unregulated state to a more regulated state and to measure the cumulative impact of the increased regulatory burden on firms. This research is unique in that it takes an aggregate view, attempting to measure the cumulative, rather than the marginal impact of regulation. The findings described here confirm what many researchers have reported regarding specific laws: the most common laws had only small impacts on costs, probably because employers were either already in compliance or the laws were not adequately enforced. However, the aggregate level of legislation in force in a state was found to have a significant impact on costs, with higher levels of labor legislation raising costs for firms. Furthermore, regulation affected input choice by firms, causing them to substitute away from wage labor and towards salaried labor and materials. In this way, regulation reinforced the existing labor-saving technological change that has been documented by other researchers. As suggested by Cain and

Paterson, an analysis of manufacturers at the two-digit level may yield significant differences from the aggregate results described here. Clearly, regulation impacts different industries in widely different ways, and a more detailed analysis would provide a clearer picture of the relative cost impacts of labor regulation. However, the high-level results described here provide some evidence that the regulatory climate plays an important role in influencing production technology and input decisions by manufacturers.

This analysis has not attempted to answer the dual questions of why and how regulations become law, or to even determine if employers obeyed the law once a state enacted it. The variables chosen to represent labor regulations were developed in as straightforward a method as possible, and only represent a fraction of the total variability that existed between states and over time. The fact that the labor variables had explanatory power in the production model even with these constraints provides compelling evidence of the importance of considering the regulatory environment when developing production models. This conclusion is interesting in a historical context, but may be even more important in the modern world. As the body of regulation grows, it becomes increasingly important to consider the possible interaction effects from adding an additional regulation. In today's complex regulatory environment, the effect that a new regulation has on any one firm may differ depending on the existing body of regulation the firm faces.

Today's regional distribution of industries and the technologies employed by them was influenced by past regulatory burdens. In many states, the 1899 to 1919 period was a time when states began to seriously regulate industrial activity. The choices made by these turn of the century legislators in turn affected the production technologies adopted by firms within their state, with manufacturers in more regulated states choosing less labor-intensive production methods than their counterparts in less regulated states. These early decisions by politicians and manufacturers created differences in capital stock, human capital, and production technology that have persisted to this day.

APPENDIX A : THE LAWS

A.1 Description of the Laws

Table 16A provides a brief description of each labor law for which data was collected. The table describes the most common provisions of each law as enacted by the different state legislatures.

Table 16A: Description of Laws	
Law or Category	Description
<u>Regulation of hours, age, and wages</u>	
Child Labor Laws	
Child safety commission	A state-sanctioned organization that studied child safety issues and made recommendations to the legislature regarding the need for regulation.
Child labor inspector	State authorized inspectors charged with enforcing child labor laws.
Children in manufacture/mercantile/ mechanical jobs	Laws setting minimum age limits for manufacturing, mercantile, or mechanical professions.
Minimum Age	Laws setting minimum age limits for all professions.
Penalty for false certificate of age	Penalty for forging children's age certificates.
Certificates of Age required for employment	Law requiring that employers require children to provide official proof of age.
No children cleaning or handling moving parts	Law setting minimum age for children working around dangerous machinery.
No children in street trades	Law prohibiting children from street trades such as acrobats.
Child Hours Laws	
	These laws set maximum hours of work for children, either on a daily or a weekly basis. States varied both in the maximum number of hours allowed and the age groups to which these laws applied.
General	Laws setting hours in all professions.
Mercantile	Laws for retail employment (merchants).

Table 16A: Description of Laws

Law or Category	Description
Mechanical	Laws for professions involving machinery, mostly manufacturing.
Textile	Laws specific to the textile industry.
Other	Miscellaneous laws for specific industries.
Minimum Age for night labor for children	Law setting a minimum age for work at night (after some designated hour).
Women's Regulations	
Special accommodations (seats)	Law requiring employers to provide seats for women workers.
Earnings of married women belong to her	Law providing that the earnings of married women were legally hers and not her husband's.
Women's Hours Laws	All women's hours laws set the maximum number of hours that could be worked. The number of hours varied from state to state and was usually set as a weekly or daily limit.
Night labor	Laws prohibiting women from working after some designated hour in the evenings.
General/All Employment	Hours limits for women in all employments.
Mercantile	Hours limits for women in retail (merchant) professions.
Mechanical	Hours limits for women in professions involving machinery, mostly manufacturing.
Textiles	Hours limits for women in the textile industry.
Holidays	
No work on legal holidays	Law prohibiting work on state-designated holidays.
Labor Day a holiday	Law proclaiming Labor Day as an official state holiday.
Sunday labor fines	Law setting forth fines for working on Sunday.
Hours Laws	These laws applied to all workers, and set the maximum number of hours per day or per week.
Textiles	Maximum hours in the textiles industry.
Mines	Maximum hours in mines.
Manufacture	Maximum hours for manufacturers.
Railroads	Maximum hours for railroad employees.
Street Railroads	Maximum hours for street railroad employees.
Public Employment	Maximum hours for state government workers.
Other	A catchall for uncommon industry-specific laws.

Table 16A: Description of Laws

Law or Category	Description
General Hours Law	This was a declarative law that stated the length of a legal day's work. In most states, these laws were not binding. An employer and employee normally had the right to contract for a different number of hours.
Public Roads	This law declared the number of hours of labor required in the construction of public roads. This was a form of taxation in which citizens were required to provide labor to aid in road construction.
Minimum Wages	
Minimum wage for public work	Minimum wage for state employees.
Minimum wage for women/children (<18)	Minimum wages for women and children.
Minimum Wage Commission	Set up a commission to study wage rates and make recommendations for minimum wage standards. In most states, these recommendations were not binding.
<u>Regulation of the Employment Contract</u>	
Employer Liability Laws	
Restates Common Law	This variable indicates that the general employer's liability law in force in the state only restates the common law. This means that this is the weakest form of employer's liability law that gives the most protection to the employer, making recovery of damages by employees the most difficult.
General	The general employer's liability law. This law could be a restatement of the common law or a stricter version that eliminates some or all of the traditional common law protections used by employers.
Railroads Mines	These industry-specific employer's liability laws provided protections that went beyond the common law, but applied to workers in specific industries.

Table 16A: Description of Laws

Law or Category	Description
Can't require employees to sign contracts waiving damages	These contracts were generally employed in the most dangerous industries, such as the railroads, to get around employer's liability laws. These laws nullify any contract that an employee might sign that waives that employee's rights to damages in the event of an on-the-job injury.
Bribery, Coercion, or Gouging	
Foreman accepting fees for employment illegal	These laws make it illegal for foreman to accept fees from any second party (the employee, or an employment agent) in return for hiring a worker.
Bribing Employees	Makes it illegal to bribe an employee.
Coercion of Employees is illegal	Makes it illegal to coerce an employee.
Company Stores Cannot Gouge	Prohibits company stores from charging excessively high prices.
Political Protections	
Coercing the votes of employees illegal	Illegal to pressure an employee to vote in a certain way.
Time off to Vote	Requires employers give employees a certain amount of time off during voting hours so that the employee can get to the polls on election day.
Employment Agents	
Emigrant agent license	Requires licenses for employment agents that place workers outside of the state. Often required agents to post a bond or pay license fees to the state.
Regulation of Employment Agencies	Regulations for employment agents. These included requiring licenses and bonds.
Anti-discrimination Laws	
Cannot fire due to age only	Prohibited the firing of employees solely due to age.
Sex discrimination	Prohibited discrimination in hiring based on gender.
Anti-discrimination	General law prohibiting discrimination based on age, gender or race.

Table 16A: Description of Laws

Law or Category	Description
Wage Payment	
Nonpayment	Law setting forth penalties for nonpayment of wages within a certain time period.
Wages in cash	Law requiring wages to be paid in cash or other legal tender.
Wage payment frequency	Law setting forth the maximum amount of time between pay periods.
Repayment of advance made by employer	Law setting forth penalties for nonpayment of advances paid by employers.
No forced contributions by employers	Laws prohibiting employers from requiring employees to make contributions to specific funds out of their wages.
Railroad workers: Notice of reduction of wages required	Required that employers of railroad workers provide workers with advance notice of wage reductions.
Fine for no notice of discharge if employee has to give notice	Fines employers for firing employees without notice if the law also requires employees to give notice of resignation.
<u>Administrative Programs and Social Insurance</u>	
Social Insurance	
Workers' Compensation Law	Sets up a workman's compensation fund for workers injured on the job.
Mother's pension	The state provides a payment to women with dependant children but no husband.

Table 16A: Description of Laws	
Law or Category	Description
Administrative Laws	
Bureau of labor Statistics or Department of Labor	These organizations are responsible for labor matters including the causes of strikes, lockups, or other employee relations issues, as well as the or collection of labor related statistics and reporting on the industries within the state. In some states, the commissioner of labor has additional responsibilities in other areas.
State board of arbitration	“For the adjustment of grievances and disputes between employers and employees by conciliation or arbitration.” Boards are typically appointed by the governor and confirmed by the Senate. Boards usually consisted of three people. In the most common structure, one person was selected from each of the two largest parties (measured by number of votes cast in the most recent election for governor), and the third person came from a labor organization. In another structure, one person came from a labor organization, one came from an employer’s organization, and the third is selected by the other two members or by the governor if the two members cannot agree. In some states, the labor commissioner performs the functions of the state board of arbitration. In some states, the decision of the labor board is binding (MA IL MT WI CA). In others, it is not (OH, LA). In most states, decisions of arbitration boards can be appealed. ²⁰¹
Free employment offices	Employment agencies set up by the state whose services were available to job seekers free of charge.

²⁰¹ Stimson, F.J. *Handbook to The Labor Law of The United States*. New York: Charles Scribner’s Sons, 1907, p. 348-358.

Table 16A: Description of Laws

Table 16A: Description of Laws	
Law or Category	Description
<u>Regulation of Labor Supply</u>	
Convict Labor	
Convict Labor Regulations	Laws regulating what goods can and cannot be produced and sold using convict labor. These laws were intended to protect companies from undercutting by the state's use of free labor to produce similar goods. Many of these laws required the labeling of products produced with convict labor.
Alien Labor Laws	
Importing alien labor illegal	Prohibited employers from recruiting non-citizen workers and bringing them to the worksite.
No aliens in public employment	Prohibited the employment of non-citizens by the state government.
Chinese labor illegal	Outlawed the use of Chinese labor.
Occupational Licensing	
Railroad telegraph operators	These industry-specific laws required licenses for workers employed in these professions.
Plumbers	
Horseshoers	
Chauffeurs	
Aviators	
Other	
Motion Picture Operator	
Barbers	
Steam engineers (firemen)	
Mine manager	
Elevator operators	
Railroad employees	
Electricians	
Stevedores	
<u>Safety Regulations</u>	
Factory Safety	
Rehabilitation commission	Set up a commission to study the problem of rehabilitating and retraining injured workers.

Table 16A: Description of Laws

Law or Category	Description
Industrial safety commission	A commission to study safety standards and the need for additional health and safety regulations in factories.
Sanitation/bathroom regulations	Laws requiring factory owners to provide bathroom facilities for workers and to maintain some minimum level of sanitation on site.
Ventilation	Laws requiring factories to have ventilation systems that provided dust control and fresh air in factories.
Guards required on machines	Laws requiring safety guards on machines with blades and moving parts.
Electrical Regulations	Laws providing for inspection of the electrical wiring of factories employing electricity.
Building Regulations	Laws regulating construction of buildings, including requirements for scaffolding.
Other	Miscellaneous safety regulations.
Bakery Regulations	Laws requiring minimum sanitation regulations for bakeries, including where bakeries can operate.
Sweatshop Regulations	Laws regulating sweatshops. These are homes where the residents are engaged in piecework. Often, non-residents would also work at these establishments.
Fire escapes	Laws requiring fire escapes on factories.
Factory Inspector	Laws authorizing factory inspectors to enforce safety regulations.
Occupational disease reporting	Laws requiring doctors to report instances of occupational diseases.
Steam boiler inspector/violation of safety laws	Laws requiring inspection of steam boilers and setting penalties for violation of the regulations.
Reporting of Accidents	
Mine accidents	Laws requiring accident reporting for workers in these three industries.
Railroad accidents	
Factory accidents	
Railroad Regulations	
Safety Regulations	General safety regulations for railroads, including requirements for brakes, lights, track safety, and other common safety apparatus.
Street Railroad safety regulations	Requirements for safety equipment on street railroads.

Table 16A: Description of Laws

Law or Category	Description
Railroad Inspectors	Authorization of inspectors to enforce railroad safety laws.
Mining Regulations	
Mine inspectors	Authorization of inspectors to enforce mine safety laws.
Mine Safety Regulations: Employees/Individuals	Safety regulations for mine employees. These laws set forth penalties for miners that fail to obey regulations
Mine Safety Regulations: Companies	Safety regulations for mine owners. These laws set forth penalties for companies that disobey the regulations.
Fine for failure to weigh coal-no screening	Fine for mine companies that screen coal or do not weigh coal properly. "Screening" coal was the practice of passing coal through a screen of some sort that eliminated the smaller pieces of coal before weighing. This reduced wages by lowering the weight of coal.
Fine for mine inspector failing to do his job	Fine for malfeasance by the mine inspector.
Miners' Hospital and or Home	Provision for a hospital or home for injured miners.
No Women and Children in Mines	Law prohibiting women and children under a certain age from working in mines.
<u>Unionization and Bargaining</u>	
False use of union cards or employers' certificates	Makes it illegal to use a false or forged union card in applying for employment.
Incorporation of labor unions	Allowed labor unions to be incorporated. This allowed unions to enjoy the advantages of incorporation such as protection of assets.

Table 16A: Description of Laws

Law or Category	Description
Labor organizations exempt from antitrust	Under the antitrust laws of most states, any combination to fix prices or to conspire to act in concert to improve the condition of the agents is considered to be a conspiracy in violation of the antitrust laws. These laws were often applied to unions to keep them from using collective action to negotiate for higher wages or better working conditions. As a result, some states passed laws exempting labor organizations from antitrust laws.
Enticement fines	Makes it illegal to persuade an employee out of the service of one employer into the service of another when an employment contract exists between the employee and the original employer. The contract can be written or oral, explicit or understood. It is not always necessary that the "enticer" know about the contract to be subject to pay damages. According to common law, enticement of a laborer out of service of an employer may make the employer eligible for damages. These laws were common in the South, and the laws applied to sharecroppers as well as other laborers. ²⁰²
Interfere with or intimidate in railroads or workers abandoning trains or obstructing track	Law disallowed interfering with or intimidating railroad workers (see general laws for descriptions). These laws also outlawed workers from abandoning railroad equipment such as locomotives or obstructing tracks.
Interference with railroad employees	Laws prohibiting interfering with railroad or street railroad workers. See "Illegal to interfere with a business or the employment of others."
Interference with street railroad employees	
No intimidation of miners	Prohibits intimidation of miners. See anti-intimidation.

²⁰² These laws were present in: SC, GA, AL, TN, MS, FL, AR, KY, LA. Stimson, p. 26-29.

Table 16A: Description of Laws

Law or Category	Description
<p>Illegal to interfere with a business or the employment of others</p> <p>Anti-picketing</p>	<p>These laws make it illegal for anyone to interfere with another person in the execution of their jobs or with another person's securing of a job.</p> <p>According to the common law, picketing was considered illegal in most states if it involved a large number of people or threats of violence. However, peaceful picketing by a small number of people was considered legal. The number of acceptable people varied from state to state. Picketing by people who were not employees of the company being picketed was usually considered illegal. Even with this strict definition, many states still found it necessary to pass laws explicitly outlawing picketing.²⁰³</p>
Anti-boycott	<p>A boycott is an organized agreement amongst a group of people to not purchase goods or services from a specific company. Before the turn of the century, it was recognized in the common law that boycotts were illegal. However, many states passed laws explicitly outlawing boycotts. In some states, the law states that it is illegal "to commit any act injurious to trade or commerce."²⁰⁴</p>
<p>Strikes: Agreements not to work allowed</p> <p>Conspiracy vs. workmen (conspiring to prevent someone from working)</p> <p>Labor agreement is not a conspiracy</p>	<p>These laws legalized strikes, which were considered illegal under the common law.</p> <p>These laws prohibited one or more people from conspiring to prevent someone from working.</p> <p>In early labor law, there were many examples of cases where groups of laborers got together and agreed to work only under a set of circumstances (usually, setting wages or hours). When these agreements were challenged, the courts often found that they were illegal, based on laws that stated that conspiracies that interfere with commerce are illegal. This led to the adoption of laws explicitly exempting organizations of laborers whose purpose is to set wages, hours or other working conditions from conspiracy laws.²⁰⁵</p>

²⁰³ Stimson, p. 290-300.

²⁰⁴ Stimson, p. 285.

²⁰⁵ Stimson, p. 172-181.

Table 16A: Description of Laws

Law or Category	Description
Anti-intimidation	The common law implied that any threat or intimidation used against a worker in order to control employers' or employees' ability to enter into and carry out labor contracts is a civil wrong, and injured parties can recover damages. The common law does not make intimidation a criminal offense, so many states passed laws which criminalized intimidation of workers. The definition of intimidation varied from statute to statute but could mean threats of violence, use of strong persuasion tactics, or even ridicule. In some states, if the intimidation is carried out by more than one party, the group can be found guilty of conspiracy under the law. The laws can apply to intimidation of the employee to force him not to work, or intimidation of the employer to force him not to employ some individual or to limit employment or change terms of employment. ²⁰⁶
No blacklisting	Blacklisting is the formulation and exchange of lists of names with other employers with the intention of preventing the employment of the people on the list. These laws outlawed this practice. In some states, it is legal to provide a truthful description of why an employee was dismissed, but it is always illegal under these laws for an employer to try and keep an individual from being hired by another firm. ²⁰⁷
Yellow dog contract (Illegal for anyone to coerce to join or not to join a union) Prohibition on hiring armed guards	These are contracts which an employee must sign as a condition of employment. In the contract, the employee guarantees that he will not join a union as a condition of employment. No armed body or unarmed body of men can be used for the suppression of domestic violence, except under the order of the legislature or the executive branch of the state. Some states made it illegal to have any sort of private guard. This meant that employers could not hire guards to protect their property.

²⁰⁶ Stimson, p. 22-24.²⁰⁷ Stimson, p. 300-303.

Table 16A: Description of Laws

Law or Category	Description
Industrial police are legal	These laws allowed the use of industrial police by employers to control violence or vandalism on company property.
Misrepresentation about a strike or other job characteristics	These laws make it illegal for employers to misrepresent the facts of a strike to potential strikebreakers. This includes not mentioning that a strike is underway in the establishment when advertising for new positions.
Limits on injunctions	These laws put stricter limits on the circumstances under which courts could grant injunctions against labor leaders and labor organizations. These laws were a reaction to the use of injunctions to stop all union activity and the lack of ability on the part of the labor leader or organization to answer to the injunction in a court. The widespread use of injunctions was seen as an abuse of judicial power and was believed by many labor advocates to deny due process to the party the injunction was placed against.
Criminal Syndicalism (advocating violence or sabotage for political or industrial ends)	These laws set forth penalties for some forms of radical, violent labor protests such as advocating violence or sabotage against a company.
Labor organizations—embezzlement of funds by officers	Set forth fines for embezzling funds from labor organizations by officers.
Combinations of employers to fix wages illegal	Made it illegal for employers to explicitly agree to fix wages.
Trespass on mines, factories, without consent of owner	Set forth penalties for trespassing on company property by non-employees. These laws were intended to keep out labor organizers.
Union trademark fine	This is a union label law. These laws allow labor organizations to adopt symbols that identify products marked with these labels as products made with union labor. The laws impose a penalty on items falsely marked with the union label and often give the unions the right to use injunctions to stop false use of union labels. ²⁰⁸

²⁰⁸ Stimson, p. 184-185.

A.2 Regional Growth in Major Categories of Laws

Table 17A lists the national and regional average number of laws in force between 1899 and 1924 for each of the 29 categories and sub-categories of laws discussed in the text. Table 18A through Table 20A list this information for 1899, 1909, and 1924, and Table 21A lists the increase in the regional average for these categories of laws between 1899 and 1924.

Table 17A: Average Number of Laws in Each Region by Category, 1899-1924

Category of Laws	N ²	Region ¹								
		NE	MA	ENC	WNC	S	MT	P	AH	US
Regulation of hours, age, and wages	36	17.8	22.8	20.1	16.0	12.6	11.9	19.5	4.8	15.0
Child Labor Laws	8	6.0	6.8	6.8	5.1	4.1	3.3	5.0	0.0	4.7
Child Hours Laws	6	3.2	4.6	3.3	2.7	2.4	1.3	2.6	0.3	2.5
Women's Regulations	2	1.9	2.0	1.6	1.7	1.5	1.5	1.8	1.0	1.6
Women's Hours Laws	5	2.7	3.3	2.3	1.7	0.9	1.0	2.4	-	1.6
Holidays	3	2.1	2.2	2.0	1.9	1.9	1.5	2.0	1.6	1.9
Hours Laws	9	1.5	3.8	3.9	2.3	1.8	3.0	4.3	1.5	2.5
Minimum Wages	3	0.3	0.1	0.2	0.5	0.1	0.4	1.3	0.3	0.3
Regulation of the Employment Contract	23	6.1	8.7	9.3	6.9	7.4	7.3	6.8	2.4	7.2
Employer Liability Laws	5	2.1	1.3	3.0	3.0	2.9	2.5	1.9	0.7	2.5
Bribery, Coercion, or Gouging	4	0.9	1.9	1.2	0.4	0.7	1.0	1.2	0.2	0.9
Political Protections	2	0.5	1.3	1.5	1.6	1.1	1.5	0.9	0.4	1.2
Employment Agents	2	0.8	1.2	0.9	0.5	0.8	0.6	0.6	0.9	0.7
Anti-discrimination Laws	3	0.1	0.0	0.4	0.0	0.0	0.1	0.7	0.0	0.1
Wage Payment	7	1.7	3.0	2.3	1.4	1.8	1.5	1.4	0.3	1.7
Administrative Programs and Social Insurance	5	2.6	3.2	3.6	2.9	1.5	2.4	2.8	1.2	2.3
Social Insurance	2	0.7	0.9	0.9	0.8	0.4	0.7	1.0	0.3	0.7
Administrative Laws	3	1.9	2.3	2.7	2.2	1.1	1.6	1.8	0.8	1.7

Table 17A: Average Number of Laws in Each Region by Category, 1899-1924

Category of Laws	N ²	Region ¹								
		NE	MA	ENC	WNC	S	MT	P	AH	US
Regulation of Labor Supply	18	3.3	5.2	4.1	2.9	2.0	2.6	4.0	1.6	2.9
Convict Labor	1	0.5	1.0	0.8	0.6	0.4	0.6	0.9	0.2	0.6
Alien Labor Laws	3	0.4	1.0	0.3	0.0	0.1	0.6	1.0	0.9	0.3
Occupational Licensing	14	2.4	3.2	3.0	2.2	1.5	1.5	2.1	0.5	2.0
Safety Regulations	27	9.4	18.2	17.9	13.1	8.2	8.4	11.2	1.6	10.5
Factory Safety	14	6.2	9.6	8.7	5.9	2.9	1.8	4.7	0.5	4.6
Reporting of Accidents	3	1.3	2.6	2.4	1.8	1.0	1.3	1.3	0.5	1.4
Railroad Regulations	3	1.9	1.8	2.2	1.6	1.1	0.7	2.0	0.0	1.4
Mining Regulations	7	0.0	4.2	4.5	3.8	3.2	4.6	3.2	0.6	3.2
Unionization and Bargaining	26	6.1	9.1	7.0	6.0	4.8	4.0	7.0	1.4	5.5
All Laws	135	45.2	67.2	62.0	47.7	36.4	36.7	51.2	13.0	43.4

¹NE: New England; MA: MidAtlantic; ENC: East North Central; WNC: West North Central; S: South; MT: Mountain; P: Pacific; AH: Alaska-Hawaii; US: U.S. Total.

²Number of laws in each category

Table 18A: Average Number of Laws in Each Region by Category, 1899

Category of Laws	N ²	Region ¹								
		NE	MA	ENC	WNC	S	MT	P	AH	US
Regulation of hours, age, and wages	36	14.5	21.3	16.8	10.9	5.6	4.8	8.0	2.0	9.3
Child Labor Laws	8	5.0	6.7	6.2	3.1	1.2	1.1	1.3	0.0	2.7
Child Hours Laws	6	2.3	4.0	2.6	1.3	0.6	0.0	1.7	0.0	1.3
Women's Regulations	2	1.7	2.0	1.4	1.4	1.0	1.1	1.0	1.0	1.3
Women's Hours Laws	5	2.2	2.3	1.4	1.3	0.3	0.0	0.0	0.0	0.8
Holidays	3	1.8	2.0	1.6	1.7	1.4	1.0	1.7	1.0	1.5
Hours Laws	9	1.3	4.3	3.6	2.0	1.0	1.5	2.0	0.0	1.7
Minimum Wages	3	0.2	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
Regulation of the Employment Contract	23	3.8	8.0	7.4	5.1	5.1	4.5	3.7	0.5	5.0
Employer Liability Laws	5	1.3	1.0	2.8	1.9	2.3	1.9	1.0	0.0	1.9
Bribery, Coercion, or Gouging	4	0.0	1.3	0.6	0.4	0.4	0.4	0.3	0.0	0.4
Political Protections	2	0.5	1.7	1.4	1.4	0.8	1.4	0.7	0.5	1.0
Employment Agents	2	0.5	1.0	0.2	0.3	0.4	0.4	0.0	0.0	0.4
Anti-discrimination Laws	3	0.0	0.0	0.4	0.0	0.0	0.0	0.7	0.0	0.1
Wage Payment	7	1.5	3.0	2.0	1.1	1.3	0.5	1.0	0.0	1.3
Administrative Programs and Social Insurance	5	1.2	1.7	2.0	1.7	0.5	1.3	1.0	0.5	1.1
Social Insurance	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Administrative Laws	3	1.2	1.7	2.0	1.7	0.5	1.3	1.0	0.5	1.1
Regulation of Labor Supply	18	1.5	3.3	4.0	1.9	1.1	1.6	1.3	0.5	1.7
Convict Labor	1	0.5	1.0	0.8	0.4	0.3	0.5	0.7	0.0	0.5
Alien Labor Laws	3	0.2	0.7	0.6	0.0	0.1	0.4	0.3	0.5	0.2
Occupational Licensing	14	0.8	1.7	2.6	1.4	0.8	0.8	0.3	0.0	1.0

Table 18A: Average Number of Laws in Each Region by Category, 1899

Category of Laws	N ²	Region ¹								
		NE	MA	ENC	WNC	S	MT	P	AH	US
Safety Regulations	27	5.7	14.7	13.4	9.1	4.7	4.0	5.7	0.5	6.7
Factory Safety	14	3.5	8.0	5.8	4.0	1.4	0.5	1.3	0.5	2.7
Reporting of Accidents	3	0.5	2.0	1.4	0.9	0.6	0.4	0.3	0.0	0.7
Railroad Regulations	3	1.5	1.0	2.0	1.3	0.4	0.0	0.7	0.0	0.8
Mining Regulations	7	0.2	3.7	4.2	3.0	2.2	3.1	3.3	0.0	2.5
Unionization and Bargaining	26	4.5	10.3	6.8	5.6	3.8	2.9	2.7	0.0	4.5
All Laws	135	31.2	59.3	50.4	34.3	20.8	19.0	22.3	4.0	28.3

¹NE: New England; MA: MidAtlantic; ENC: East North Central; WNC: West North Central; S: South; MT: Mountain; P: Pacific; AH: Alaska-Hawaii; US: U.S. Total.

²Number of laws in each category

Table 19A: Average Number of Laws in Each Region by Category, 1909

Category of Laws	N ²	Region ¹								
		NE	MA	ENC	WNC	S	MT	P	AH	US
Regulation of hours, age, and wages	36	16.2	22.7	19.4	16.7	11.9	9.6	19.0	4.0	14.2
Child Labor Laws	8	5.7	7.0	6.8	5.3	4.0	2.5	5.3	0.0	4.5
Child Hours Laws	6	3.0	4.3	3.4	3.0	2.4	1.1	3.0	0.0	2.5
Women's Regulations	2	1.7	2.0	1.6	1.7	1.4	1.3	2.0	1.0	1.5
Women's Hours Laws	5	2.3	3.7	1.6	2.0	0.3	0.0	2.7	0.0	1.2
Holidays	3	2.0	2.3	2.0	2.0	2.0	1.5	2.0	1.5	1.9
Hours Laws	9	1.3	3.3	4.0	2.7	1.8	3.1	3.7	1.0	2.5
Minimum Wages	3	0.2	0.0	0.0	0.0	0.0	0.1	0.3	0.5	0.1
Regulation of the Employment Contract	23	6.2	8.3	9.0	7.1	7.2	6.8	6.0	2.0	7.0
Employer Liability Laws	5	2.2	1.7	3.0	3.3	3.2	2.5	2.0	0.5	2.7
Bribery, Coercion, or Gouging	4	1.0	1.7	1.2	0.6	0.5	0.9	1.0	0.0	0.8
Political Protections	2	0.3	1.0	1.4	1.6	1.2	1.4	0.7	0.0	1.1
Employment Agents	2	0.8	1.0	1.0	0.4	0.6	0.6	0.3	1.0	0.7
Anti-discrimination Laws	3	0.0	0.0	0.4	0.0	0.0	0.1	0.7	0.0	0.1
Wage Payment	7	1.8	3.0	2.0	1.3	1.8	1.3	1.3	0.5	1.6
Administrative Programs and Social Insurance	5	1.8	1.7	3.0	2.3	0.9	1.6	2.0	0.5	1.6
Social Insurance	2	0.0	0.0	0.2	0.1	0.0	0.1	0.3	0.0	0.1
Administrative Laws	3	1.8	1.7	2.8	2.1	0.9	1.5	1.7	0.5	1.5
Regulation of Labor Supply	18	2.8	4.7	3.4	2.4	1.5	2.5	3.3	1.5	2.4
Convict Labor	1	0.5	1.0	0.8	0.6	0.3	0.6	1.0	0.0	0.5
Alien Labor Laws	3	0.3	1.0	0.2	0.0	0.1	0.8	0.7	1.0	0.4
Occupational Licensing	14	2.0	2.7	2.4	1.9	1.1	1.1	1.7	0.5	1.5

Table 19A: Average Number of Laws in Each Region by Category, 1909

Category of Laws	N ²	Region ¹								
		NE	MA	ENC	WNC	S	MT	P	AH	US
Safety Regulations	27	8.2	17.0	18.0	12.9	7.1	6.8	9.7	0.0	9.5
Factory Safety	14	5.2	8.3	8.4	5.3	2.3	0.8	4.3	0.0	3.8
Reporting of Accidents	3	1.2	2.7	2.8	1.9	0.9	1.0	0.7	0.0	1.3
Railroad Regulations	3	1.8	1.7	2.4	1.9	0.9	0.6	1.7	0.0	1.3
Mining Regulations	7	0.0	4.3	4.4	3.9	3.1	4.4	3.0	0.0	3.1
Unionization and Bargaining	26	6.0	9.0	6.6	5.3	4.7	3.5	5.7	0.5	5.1
All Laws	135	41.2	63.3	59.4	46.7	33.2	30.8	45.7	8.5	39.8

¹NE: New England; MA: MidAtlantic; ENC: East North Central; WNC: West North Central; S: South; MT: Mountain; P: Pacific; AH: Alaska-Hawaii; US: U.S. Total.

²Number of laws in each category

Table 20A: Average Number of Laws in Each Region by Category, 1924

Category of Laws	N ²	Region ¹								
		NE	MA	ENC	WNC	S	MT	P	AH	US
Regulation of hours, age, and wages	36	20.0	23.3	21.4	19.0	16.6	18.3	24.3	7.0	18.6
Child Labor Laws	8	6.5	6.7	7.2	6.3	5.8	5.1	6.7	0.0	5.8
Child Hours Laws	6	4.0	4.7	3.4	3.4	3.3	2.3	2.7	1.0	3.2
Women's Regulations	2	2.0	2.0	1.6	1.7	1.8	1.8	2.0	1.0	1.8
Women's Hours Laws	5	3.2	4.0	3.2	2.1	1.6	2.8	3.0	0.0	2.4
Holidays	3	2.3	2.3	2.0	2.0	2.0	2.0	2.0	2.0	2.1
Hours Laws	9	1.5	3.3	3.6	2.0	2.0	3.5	5.7	2.5	2.7
Minimum Wages	3	0.5	0.3	0.4	1.4	0.2	0.9	2.3	0.5	0.7
Regulation of the Employment Contract	23	6.8	9.0	10.2	7.7	8.4	9.0	8.7	4.5	8.3
Employer Liability Laws	5	2.3	1.3	3.0	3.0	3.0	2.6	2.0	1.0	2.6
Bribery, Coercion, or Gouging	4	1.3	2.0	1.6	0.3	0.9	1.5	2.0	0.5	1.2
Political Protections	2	0.5	1.3	1.6	1.7	1.1	1.6	1.0	0.5	1.2
Employment Agents	2	0.8	1.3	1.2	0.9	1.3	0.8	1.0	1.5	1.1
Anti-discrimination Laws	3	0.2	0.0	0.6	0.0	0.0	0.3	0.7	0.0	0.2
Wage Payment	7	1.7	3.0	2.2	1.9	2.1	2.3	2.0	1.0	2.1
Administrative Programs and Social Insurance	5	4.5	5.0	5.0	4.3	2.9	4.1	4.0	2.5	3.9
Social Insurance	2	2.0	2.0	2.0	1.9	1.3	1.9	2.0	1.0	1.7
Administrative Laws	3	2.5	3.0	3.0	2.4	1.6	2.3	2.0	1.5	2.2
Regulation of Labor Supply	18	4.7	5.7	4.4	3.7	3.0	3.3	6.3	3.0	3.8
Convict Labor	1	0.5	1.0	0.8	0.7	0.6	0.6	1.0	0.5	0.7
Alien Labor Laws	3	0.5	1.0	0.0	0.1	0.1	0.6	1.7	0.5	0.4
Occupational Licensing	14	3.7	3.7	3.6	2.9	2.3	2.0	3.7	2.0	2.8

Table 20A: Average Number of Laws in Each Region by Category, 1924

Category of Laws	N ²	Region ¹								
		NE	MA	ENC	WNC	S	MT	P	AH	US
Safety Regulations	27	12.3	21.3	19.4	16.0	10.8	12.4	15.0	3.5	13.4
Factory Safety	14	8.7	12.0	9.8	7.4	4.4	3.9	7.3	1.5	6.3
Reporting of Accidents	3	1.7	2.7	2.8	2.4	1.3	2.1	2.0	0.5	1.9
Railroad Regulations	3	2.0	2.0	2.0	1.7	1.4	1.1	2.7	0.0	1.6
Mining Regulations	7	0.0	4.7	4.8	4.4	3.6	5.3	3.0	1.5	3.6
Unionization and Bargaining	26	6.7	8.3	7.2	8.1	5.1	5.9	10.7	3.5	6.5
All Laws	135	55.0	72.7	67.6	58.9	46.8	52.9	69.0	24.0	54.5

¹NE: New England; MA: MidAtlantic; ENC: East North Central; WNC: West North Central; S: South; MT: Mountain; P: Pacific; AH: Alaska-Hawaii; US: U.S. Total.

²Number of laws in each category

Table 21A: Average Number of Laws in Each Region by Category, 1899 to 1924
Increase

Category of Laws	N ²	Region ¹								
		NE	MA	ENC	WNC	S	MT	P	AH	US
Regulation of hours, age, and wages	36	5.5	2.0	4.6	8.1	11.0	13.5	16.3	5.0	9.2
Child Labor Laws	8	1.5	0.0	1.0	3.1	4.6	4.0	5.3	0.0	3.1
Child Hours Laws	6	1.7	0.7	0.8	2.1	2.7	2.3	1.0	1.0	1.9
Women's Regulations	2	0.3	0.0	0.2	0.3	0.8	0.6	1.0	0.0	0.5
Women's Hours Laws	5	1.0	1.7	1.8	0.9	1.3	2.8	3.0	0.0	1.5
Holidays	3	0.5	0.3	0.4	0.3	0.6	1.0	0.3	1.0	0.6
Hours Laws	9	0.2	-1.0	0.0	0.0	1.0	2.0	3.7	2.5	0.9
Minimum Wages	3	0.3	0.3	0.4	1.4	0.2	0.9	2.0	0.5	0.6
Regulation of the Employment Contract	23	3.0	1.0	2.8	2.6	3.3	4.5	5.0	4.0	3.3
Employer Liability Laws	5	1.0	0.3	0.2	1.1	0.7	0.8	1.0	1.0	0.8
Bribery, Coercion, or Gouging	4	1.3	0.7	1.0	-0.1	0.5	1.1	1.7	0.5	0.7
Political Protections	2	0.0	-0.3	0.2	0.3	0.4	0.3	0.3	0.0	0.2
Employment Agents	2	0.3	0.3	1.0	0.6	0.9	0.4	1.0	1.5	0.7
Anti-discrimination Laws	3	0.2	0.0	0.2	0.0	0.0	0.3	0.0	0.0	0.1
Wage Payment	7	0.2	0.0	0.2	0.7	0.9	1.8	1.0	1.0	0.8
Administrative Programs and Social Insurance	5	3.3	3.3	3.0	2.6	2.4	2.9	3.0	2.0	2.8
Social Insurance	2	2.0	2.0	2.0	1.9	1.3	1.9	2.0	1.0	1.7
Administrative Laws	3	1.3	1.3	1.0	0.7	1.1	1.0	1.0	1.0	1.1
Regulation of Labor Supply	18	3.2	2.3	0.4	1.9	1.9	1.6	5.0	2.5	2.1
Convict Labor	1	0.0	0.0	0.0	0.3	0.3	0.1	0.3	0.5	0.2
Alien Labor Laws	3	0.3	0.3	-0.6	0.1	0.1	0.3	1.3	0.0	0.2
Occupational Licensing	14	2.8	2.0	1.0	1.4	1.6	1.3	3.3	2.0	1.7

Table 21A: Average Number of Laws in Each Region by Category, 1899 to 1924
Increase

Category of Laws	N ²	Region ¹								
		NE	MA	ENC	WNC	S	MT	P	AH	US
Safety Regulations	27	6.7	6.7	6.0	6.9	6.1	8.4	9.3	3.0	6.7
Factory Safety	14	5.2	4.0	4.0	3.4	3.0	3.4	6.0	1.0	3.6
Reporting of										
Accidents	3	1.2	0.7	1.4	1.6	0.6	1.8	1.7	0.5	1.1
Railroad Regulations	3	0.5	1.0	0.0	0.4	1.0	1.1	2.0	0.0	0.8
Mining Regulations	7	-0.2	1.0	0.6	1.4	1.4	2.1	-0.3	1.5	1.1
Unionization and										
Bargaining	26	2.2	-2.0	0.4	2.6	1.3	3.0	8.0	3.5	2.1
All Laws	135	23.8	13.3	17.2	24.6	26.1	33.9	46.7	20.0	26.2

¹NE: New England; MA: MidAtlantic; ENC: East North Central; WNC: West North Central; S: South; MT: Mountain; P: Pacific; AH: Alaska-Hawaii; US: U.S. Total.

²Number of laws in each category

APPENDIX B : PRINCIPAL COMPONENTS ANALYSIS DETAIL

Section B.1 lists the full set of eigenvalues from the principal components analysis conducted in Chapter 4. Sections B.2, B.3, and B.4 describe the results for PCA analyses conducted with five, eleven, fifteen, twenty, twenty-seven, and thirty-seven factors.

B.1 Eigenvalues

Table 22A lists all of the 135 eigenvalues from the PCA analysis, ordered by the proportion of the total variance accounted for by that eigenvalue. The table lists the individual and cumulative proportion of total variance accounted for by that eigenvalue.

Table 22A: Eigenvalues of the Correlation Matrix, Principal Components Analysis				
<u>Number</u>	<u>Eigenvalue</u>	<u>Difference</u>	<u>Proportion</u>	<u>Cumulative</u>
1	18.731	9.943	13.9%	13.9%
2	8.788	2.570	6.5%	20.4%
3	6.218	1.175	4.6%	25.0%
4	5.043	0.753	3.7%	28.7%
5	4.291	0.485	3.2%	31.9%
6	3.806	0.249	2.8%	34.7%
7	3.558	0.421	2.6%	37.4%
8	3.136	0.034	2.3%	39.7%
9	3.102	0.180	2.3%	42.0%
10	2.922	0.067	2.2%	44.1%
11	2.855	0.092	2.1%	46.3%
12	2.763	0.099	2.1%	48.3%
13	2.664	0.085	2.0%	50.3%
14	2.578	0.099	1.9%	52.2%
15	2.480	0.180	1.8%	54.0%
16	2.299	0.096	1.7%	55.7%
17	2.203	0.035	1.6%	57.4%
18	2.168	0.108	1.6%	59.0%
19	2.060	0.147	1.5%	60.5%

Table 22A: Eigenvalues of the Correlation Matrix, Principal Components Analysis

<u>Number</u>	<u>Eigenvalue</u>	<u>Difference</u>	<u>Proportion</u>	<u>Cumulative</u>
20	1.913	0.074	1.4%	61.9%
21	1.840	0.118	1.4%	63.3%
22	1.722	0.067	1.3%	64.6%
23	1.655	0.068	1.2%	65.8%
24	1.587	0.040	1.2%	67.0%
25	1.546	0.021	1.2%	68.1%
26	1.525	0.041	1.1%	69.2%
27	1.484	0.074	1.1%	70.3%
28	1.410	0.083	1.0%	71.4%
29	1.327	0.013	1.0%	72.4%
30	1.313	0.072	1.0%	73.3%
31	1.242	0.076	0.9%	74.2%
32	1.166	0.006	0.9%	75.1%
33	1.160	0.035	0.9%	76.0%
34	1.125	0.038	0.8%	76.8%
35	1.087	0.015	0.8%	77.6%
36	1.072	0.066	0.8%	78.4%
37	1.007	0.033	0.8%	79.2%
38	0.973	0.081	0.7%	79.9%
39	0.892	0.002	0.7%	80.5%
40	0.891	0.025	0.7%	81.2%
41	0.866	0.021	0.6%	81.8%
42	0.845	0.024	0.6%	82.5%
43	0.820	0.026	0.6%	83.1%
44	0.794	0.022	0.6%	83.7%
45	0.772	0.016	0.6%	84.2%
46	0.756	0.047	0.6%	84.8%
47	0.709	0.014	0.5%	85.3%
48	0.695	0.037	0.5%	85.8%
49	0.659	0.021	0.5%	86.3%
50	0.637	0.016	0.5%	86.8%
51	0.621	0.018	0.5%	87.2%
52	0.604	0.027	0.5%	87.7%
53	0.577	0.010	0.4%	88.1%
54	0.567	0.013	0.4%	88.5%
55	0.554	0.035	0.4%	89.0%
56	0.519	0.010	0.4%	89.3%
57	0.509	0.022	0.4%	89.7%
58	0.487	0.013	0.4%	90.1%
59	0.474	0.013	0.4%	90.4%

Table 22A: Eigenvalues of the Correlation Matrix, Principal Components Analysis

<u>Number</u>	<u>Eigenvalue</u>	<u>Difference</u>	<u>Proportion</u>	<u>Cumulative</u>
60	0.461	0.013	0.3%	90.8%
61	0.448	0.023	0.3%	91.1%
62	0.425	0.016	0.3%	91.4%
63	0.408	0.002	0.3%	91.7%
64	0.406	0.021	0.3%	92.0%
65	0.385	0.010	0.3%	92.3%
66	0.375	0.016	0.3%	92.6%
67	0.359	0.009	0.3%	92.8%
68	0.349	0.004	0.3%	93.1%
69	0.345	0.011	0.3%	93.4%
70	0.335	0.016	0.3%	93.6%
71	0.319	0.006	0.2%	93.8%
72	0.313	0.014	0.2%	94.1%
73	0.299	0.007	0.2%	94.3%
74	0.292	0.004	0.2%	94.5%
75	0.288	0.007	0.2%	94.7%
76	0.281	0.007	0.2%	94.9%
77	0.274	0.008	0.2%	95.1%
78	0.265	0.008	0.2%	95.3%
79	0.257	0.011	0.2%	95.5%
80	0.246	0.008	0.2%	95.7%
81	0.238	0.007	0.2%	95.9%
82	0.231	0.011	0.2%	96.1%
83	0.220	0.006	0.2%	96.2%
84	0.214	0.005	0.2%	96.4%
85	0.208	0.012	0.2%	96.5%
86	0.196	0.010	0.2%	96.7%
87	0.186	0.008	0.1%	96.8%
88	0.178	0.001	0.1%	96.9%
89	0.177	0.000	0.1%	97.1%
90	0.177	0.006	0.1%	97.2%
91	0.171	0.018	0.1%	97.3%
92	0.153	0.001	0.1%	97.4%
93	0.152	0.001	0.1%	97.6%
94	0.150	0.003	0.1%	97.7%
95	0.147	0.002	0.1%	97.8%
96	0.145	0.006	0.1%	97.9%
97	0.139	0.005	0.1%	98.0%
98	0.134	0.005	0.1%	98.1%
99	0.129	0.004	0.1%	98.2%

Table 22A: Eigenvalues of the Correlation Matrix, Principal Components Analysis

<u>Number</u>	<u>Eigenvalue</u>	<u>Difference</u>	<u>Proportion</u>	<u>Cumulative</u>
100	0.125	0.001	0.1%	98.3%
101	0.125	0.003	0.1%	98.4%
102	0.121	0.006	0.1%	98.5%
103	0.115	0.002	0.1%	98.5%
104	0.113	0.006	0.1%	98.6%
105	0.107	0.005	0.1%	98.7%
106	0.102	0.003	0.1%	98.8%
107	0.100	0.004	0.1%	98.9%
108	0.096	0.007	0.1%	98.9%
109	0.089	0.006	0.1%	99.0%
110	0.083	0.001	0.1%	99.1%
111	0.082	0.001	0.1%	99.1%
112	0.081	0.004	0.1%	99.2%
113	0.077	0.002	0.1%	99.2%
114	0.075	0.007	0.1%	99.3%
115	0.068	0.003	0.1%	99.3%
116	0.066	0.002	0.1%	99.4%
117	0.063	0.001	0.1%	99.4%
118	0.062	0.003	0.1%	99.5%
119	0.059	0.001	0.0%	99.5%
120	0.058	0.001	0.0%	99.6%
121	0.056	0.003	0.0%	99.6%
122	0.053	0.003	0.0%	99.7%
123	0.051	0.003	0.0%	99.7%
124	0.047	0.002	0.0%	99.7%
125	0.045	0.002	0.0%	99.8%
126	0.044	0.003	0.0%	99.8%
127	0.040	0.001	0.0%	99.8%
128	0.040	0.002	0.0%	99.8%
129	0.037	0.001	0.0%	99.9%
130	0.036	0.001	0.0%	99.9%
131	0.035	0.003	0.0%	99.9%
132	0.032	0.006	0.0%	100.0%
133	0.026	0.001	0.0%	100.0%
134	0.026	0.007	0.0%	100.0%
135	0.019	NA	0.0%	100.0%

B.2 Five Factor Design

In the five-factor design, the four factors described above retain their interpretations. The loadings for first wave, second wave, and mine factors were similar to the four-factor loadings. The anti-union factor from the four-factor design loses some laws so that it more clearly represents anti-union sentiment. Also, laws prohibiting boycotts and trespassing became significant, as did a fourth law prohibiting intimidation of workers. The new fifth factor represents male hours laws and railroad union laws. Table 23A lists the number of laws in each category with significant loadings for factors 1-5.

Table 23A: Number of Significant¹ Laws By Category: Five Factor Design

Category	N ²	First Wave (1)	Second Wave (2)	Mines (3)	Anti-union (4)	Male Hr/ RR Union (5)	Not Sig. ³	Total Sig. ⁴
Employer Liability Laws	5		1		1	2	2	4
Social Insurance	2	2	2					4
Factory Safety	14	10	3			2	2	15
Reporting of Accidents	3	2	1	1				4
Railroad Regulations	3	2					1	2
Mining Regulations	7			6			1	6
Child Labor Laws	8	7	1					8
Child hours laws	6	5			3			8
Women's Regulations	2	1					1	1
Women's Hours Laws	5	5	2	2				9
Holidays	3	2					1	2
Hours Laws	9	3	3	2	1	5	1	14
Unionization and Bargaining	26	3	6	1	7	4	7	21
Convict Labor	1	1		1		1		3

Table 23A: Number of Significant¹ Laws By Category: Five Factor Design

Category	N ²	First Wave (1)	Second Wave (2)	Mines (3)	Anti-union (4)	Male Hr/ RR Union (5)	Not Sig. ³	Total Sig. ⁴
Bribery, Coercion, or Gouging	4	1	1	1		1		4
Political Protections	2			2	1			3
Administrative Laws	3	3	2	1				6
Alien Labor Laws	3		2		1	1	1	4
Employment Agents	2	1				1		2
Occupational Licensing	14	5	2	1	1		7	9
Anti-discrimination Laws	3		1	1			1	2
Wage Payment	7	2		3		1	2	6
Minimum Wages	3		3		1			4
Total	135	55	30	22	16	18	27	141
¹ Number with loadings for all factors that are less than 0.3 and greater than -0.3.								
² Total laws in the category								
³ Number of laws in the category that did not have a significant loading on any of the five factors.								
⁴ Number of significant factor loadings for each category. Can be larger than total laws because some laws load on multiple factors.								

B.2.1 Factor Five: Male Hours/Railroad Union

The new fifth factor represents male hours laws and union laws related to the railroads. In the male hours category, five of the nine laws had significant loadings for the fifth factor. Of that five, the general and public hours laws were the only ones with positive signs. The loadings on the industry-specific laws for textiles, manufacturing, and railroads were negative. Therefore, states with the highest scores for factor five would have the general hours law, but none of the industry-specific laws. In most states, the general hours law was merely declarative, and as such, was the weakest of the male hours laws. This pattern of factor loadings suggests that factor five is associated with

anti-labor sentiment. In addition, positive loadings for several union laws related to the railroad industry leads to an interpretation of this factor as representing male hours and railroad union issues, with an anti-union bias.

Many of the non-hours laws in this category relate to railroads and the unionization of railroad workers. The laws barring interference with railroad workers and prohibiting workers from abandoning railroads both have positive loadings. These laws presumably work against union efforts. However, the law allowing strikes loads positively on this factor, possibly indicating some balance in the political power of railroad unions and railroad executives. The other pro-labor railroad-related laws had negative signs. These include the male hours law for railroad workers, and the railroad employer's liability law. Again, if unions play a crucial role in the passage of these pro-labor laws, then a negative sign indicates that this factor represents anti-union sentiment. The significant loadings for the five-factor model are listed in Table 24A.

Table 24A: Significant Loadings for Five Factor Model

Category and Law	1 First Wave	2 Second Wave	3 Mines	4 Union	5 Male Hours/RR
Employer Liability Laws					
Restates Common Law		-0.27			
General		0.42		-0.32	
Railroads					-0.41
Mines			0.25		

Table 24A: Significant Loadings for Five Factor Model

Category and Law	First Wave 1	Second Wave 2	Mines 3	Union 4	Male Hours/RR 5
Can't require employees to sign contracts waiving damages					-0.45
Social Insurance					
Workers' Compensation Law	0.35	0.59			
Mother's pension	0.37	0.59			
Factory Safety					
Rehabilitation commission		0.27			
Industrial safety commission		0.54			
Sanitation/bathroom regulations	0.69				
Ventilation	0.60				
Guards required on machines	0.62				
Electrical Regulations		0.63			
Building Regulations	0.54	0.34			
Other				0.22	
Bakery Regulations	0.60				
Sweatshop Regulations	0.63				0.32
Fire escapes	0.68				
Factory Inspector	0.71				
Occupational disease reporting	0.47				
Steam boiler inspector/violation of safety laws.	0.42				0.33
Reporting of Accidents					
Mine accidents			0.80		
Railroad accidents	0.40	0.42			
Factory accidents	0.63				
Railroad Regulations					
Safety Regulations	0.56				
Street Railroad safety regulations	0.54				
Railroad Inspectors	0.24				
Mining Regulations					
Mine inspectors			0.83		
Mine Safety Regulations: Employees/Individuals			0.81		
Mine Safety Regulations: Companies			0.81		
Fine for failure to weigh coal-no screening			0.78		
Fine for mine inspector failing to do his job			0.65		

Table 24A: Significant Loadings for Five Factor Model

Category and Law	First Wave 1	Second Wave 2	Mines 3	Union 4	Male Hours/RR 5
Miners' Hospital and or Home			0.29		
No Women and Children in Mines			0.73		
Child Labor Laws					
Child safety commission		0.59			
Child labor inspector	0.68				
Children in manufacture/mercantile/mechanical jobs	0.70				
Minimum Age	0.58				
Penalty for false certificate of age	0.62				
Certificates of Age required for employment	0.67				
No children cleaning or handling moving parts	0.65				
No children in street trades	0.49				
Child hours Laws					
General	0.36				
Mercantile	0.39			-0.52	
Mechanical	0.55				
Textile	0.53			-0.30	
Other				-0.42	
Minimum Age for night labor for children	0.60				
Women's Regulations					
Special accommodations (seats)	0.59				
Earnings of married women belong to her					0.19
Women's Hours Laws					
Night labor	0.41				
General/All Employment	0.36	0.41			
Mercantile	0.44	0.32			
Mechanical	0.50		-0.33		
Textiles	0.45		-0.32		
Holidays					
No work on legal holidays		0.26			
Labor Day a holiday	0.48				
Sunday labor fines	0.34				
Hours Laws					
Textiles					-0.43
Mines		0.39	0.32		

Table 24A: Significant Loadings for Five Factor Model

Category and Law	First Wave 1	Second Wave 2	Mines 3	Union 4	Male Hours/RR 5
Manufacture	0.30				-0.31
Railroads					-0.30
Street Railroads	0.36			-0.45	
Public Employment		0.47	0.38		0.36
Other		0.41			
General Hours Law	0.33				0.40
Public Roads			0.23		
Unionization and Bargaining					
False use of union cards or employers' certificates	0.30	0.50			
Incorporation of labor unions.					
Labor organizations exempt from antitrust		0.25			
Enticement fines					-0.49
Interfere with or intimidate in railroads or workers abandoning trains or obstructing track					0.59
Interference with railroad employees					0.46
Interference with street railroad employees			-0.19		
No intimidation of miners				0.43	
Illegal to interfere with business/employment of others				0.55	
Anti-picketing					0.20
Anti-boycott				0.37	
Strikes: Agreements not to work allowed					0.34
Conspiracy vs. workmen (conspiring to prevent someone from working)				0.54	
Labor agreement is not a conspiracy		0.33			
Anti-intimidation			-0.35	0.57	
No blacklisting		0.31		0.42	
Yellow dog contract (illegal for anyone to coerce to join or not to join a union)	0.32				
Prohibition on hiring armed guards			0.22		
Industrial police are legal	0.27				
Misrepresentation about a strike or other job characteristics		0.46			
Limits on injunctions		0.48			

Table 24A: Significant Loadings for Five Factor Model

Category and Law	First Wave 1	Second Wave 2	Mines 3	Union 4	Male Hours/RR 5
Criminal Syndicalism (advocating violence or sabotage for political or industrial ends)		0.48			
Labor organizations--embezzlement of funds by officers				0.28	
Combinations of employers to fix wages illegal					-0.19
Trespass on mines, factories, without consent of owner				0.33	
Union trademark fine	0.48				
Convict Labor					
Convict Labor Regulations	0.33		0.30		0.31
Bribery, Coercion, or Gouging					
Foreman accepting fees for employment illegal		0.40			
Bribing Employees	0.43				
Coercion of Employees is illegal			0.41		
Company Stores Cannot Gouge					0.36
Political Protections					
Coercing the votes of employees illegal			0.43	-0.33	
Time off to Vote			0.54		
Administrative Laws					
Bureau of labor Statistics or Department of Labor	0.54				
State board of arbitration	0.41	0.31	0.32		
Free employment offices	0.50	0.31			
Alien Labor Laws					
Importing alien labor illegal				0.17	
No aliens in public employment		0.32		-0.47	0.40
Chinese labor illegal		0.41			
Employment Agents					
Emigrant agent license					-0.50
Regulation of Employment Agencies	0.55				
Occupational Licensing					
Railroad telegraph operators (also minimum age)					0.11
Plumbers	0.46				
Horseshoers			0.28		
Chauffeurs	0.39	0.44			

Table 24A: Significant Loadings for Five Factor Model

Category and Law	First Wave 1	Second Wave 2	Mines 3	Union 4	Male Hours/RR 5
Aviators		0.33			
Other		0.22			
Motion Picture Operator	0.31				
Barbers	0.33			0.41	
Steam engineers (firemen)	0.39				
Mine manager			0.59		
Elevator operators		0.25			
Railroad employees					0.09
Electricians		0.21			
Stevedores				-0.10	
Anti-discrimination Laws					
Cannot fire due to age only			0.19		
Sex discrimination		0.37			
Anti-discrimination			0.31		
Wage Payment					
Nonpayment		0.26			
Wages in cash			0.37		
Wage payment frequency	0.42				
Repayment of advance made by employer					-0.37
No forced contributions by employers			0.32		
Railroad workers: Notice of wage reduction required					0.29
Fine for no notice of discharge if employee has to give notice too	0.44		-0.32		
Minimum Wages					
Minimum wage for public work		0.37		-0.32	
Minimum wage for women/children (<18)		0.70			
Minimum Wage Commission		0.68			
Total	57	38	29	20	24
*Significant loadings (absolute value greater than 0.3) are listed in bold. If a law did not have a significant loading for any factor, the largest loading is listed.					

B.3 Eleven Factor Design

In the eleven-factor design, the five factors from the previous version are joined by three new factors and three factors which split off from the original five. Table 25A lists the number of laws loading on each of the eleven factors by category and Table 26A lists the significant factor loadings for each law. The interpretation of the five factors formed in previous versions has not changed, so only the six new factors will be discussed.

Table 25A: Number of Significant Laws By Category: Eleven Factor Design

Category	Total Laws	1 First Wave	2 Second Wave	3 Mines	4 Union	5 Male Hr/ RR Union	6 Public Laws	7 Women's Hours	8 License/ Legal Union	9 Urban Union	10 Mine Union	11 License/ Strike Union	Not Sig. ²	Total Sig. ³
Employer Liability Laws	5					2	3				1			6
Social Insurance	2	2	2									1		5
Factory Safety	14	10	2					1	2	1				16
Reporting of Accidents	3	2	1	1	1									5
Railroad Regulations	3	2							1					3
Mining Regulations	7			7										7
Child Labor Laws	8	7	1								1			9
Child hours laws	6	6	1		1		2			1				11
Women's Regulations	2	1						1						2
Women's Hours Laws	5	5	1					3		1				10
Holidays	3	2											1	2
Hours Laws	9	2		1		3	3		1	1	2		1	13
Unionization and Bargaining	26	2	5	1	6	5	1	1	5	3	3	3	3	35
Convict Labor	1	1					1							2

Table 25A: Number of Significant Laws By Category: Eleven Factor Design

Category	Total Laws	1 First Wave	2 Second Wave	3 Mines	4 Union	5 Male Hr/ RR Union	6 Public Laws	7 Women's Hours	8 License/ Legal Union	9 Urban Union	10 Mine Union	11 License/ Strike Union	Not Sig. ²	Total Sig. ³
Bribery, Coercion, or Gouging	4	1		2				1		1				5
Political Protections	2			2		1								3
Administrative Laws	3	3	1				1				1			6
Alien Labor Laws	3		1				2			1				4
Employment Agents	2	1			1	1					1			4
Occupational Licensing	14	3	3	1	2				3		1	3	2	16
Anti-discrimination Laws	3		1							1		1	1	3
Wage Payment	7	2		2	1				1		3		1	9
Minimum Wages	3		2				1							3
Total	135	52	21	17	12	12	14	7	13	10	13	8	9	179
¹ Number with loadings for all factors that are less than 0.3 and greater than -0.3.														
² Number of significant factor loadings for each category. Can be larger than total laws because some laws load on multiple factors.														

B.3.1 Factor Six: Public Progressive Labor Laws

The sixth factor contains laws that previously loaded on the anti-union, first wave, and second wave factors. Nine of the fourteen factors previously loaded on the anti-union factor. The remaining five laws came from the first and second wave factors.

This factor represents progressive sentiment. Factor six has a close negative relationship with the anti-union factor, suggesting that the majority of the laws loading on this factor are negatively correlated with the anti-intimidation laws that load on the anti-

union factor. In this specification the anti-union factor loses all of the generally pro-labor laws that had negative loadings in previous versions, leaving behind only laws with an anti-union or pro-employer connotation.

The significant laws for factor six relate to improving the condition of workers. Additionally, all of the laws that relate to public workers load on this factor. These include laws regulating the hours of work and minimum wages of public employees, and a law prohibiting aliens from public employment. Therefore, this factor is interpreted as representing public progressive laws. For many states, the first step in imposing more restrictive labor regulations was to impose those regulations first on public employees. Therefore, the level of regulation imposed on government workers can serve as a signal of the labor attitudes of elected officials, and presumably voters. A state with a strong progressive contingent in their elected officials but not enough political power to pass more sweeping regulation of labor may be able to pass those regulations for public employees when the same laws would not pass if imposed on the general workforce.

Three of the five employer's liability laws are significant for this factor, with a positive sign on the main law only. The negative signs on the railroad law and the law restating the common law indicate that these two laws were weaker alternatives to passage of a stricter main law. States with the weaker versions of employer liability legislation were therefore less progressive states.

Table 26A: Significant Loadings for Eleven Factor Model

Category and Law	First Wave 1	Second Wave 2	Mines 3	Union 4	Male Hr/ RR Union 5	Public Laws 6	Women's Hours 7	License/ Legal Union 8	Urban Union 9	Mine Union 10	License/ Strike Union 11
Occupational disease reporting	0.48										
Steam boiler inspector/ safety violation	0.33						0.38				
Reporting of Accidents											
Mine accidents			0.82								
Railroad accidents	0.40	0.37		0.37							
Factory accidents	0.63										
Railroad Regulations											
Safety Regulations	0.53										
Street Railroad safety regulations	0.55										
Railroad Inspectors								0.32			
Mining Regulations											
Mine inspectors			0.88								
Mine Safety Regulations: Employees/ Individuals			0.86								
Mine Safety Regulations: Companies			0.83								
Fine for failure to weigh coal-no screening			0.81								
Fine for mine inspector failing to do his job			0.71								
Miners' Hospital and or Home			0.38								
No Women and Children in Mines			0.75								

Table 26A: Significant Loadings for Eleven Factor Model

Category and Law	First Wave 1	Second Wave 2	Mines 3	Union 4	Male Hr/ RR Union 5	Public Laws 6	Women's Hours 7	License/ Legal Union 8	Urban Union 9	Mine Union 10	License/ Strike Union 11
Child Labor Laws											
Child safety commission		0.65									
Child labor inspector	0.66										
Children in manufacture/ mercantile/jobs	0.69										
Minimum Age	0.55										
Penalty for false certificate of age	0.60									-0.36	
Certificates of Age required for employment	0.67										
No children cleaning or handling moving parts	0.68										
No children in street trades	0.48										
Child hours Laws											
General	0.38										
Mercantile	0.41					0.47					
Mechanical	0.55										
Textile	0.52	-0.30									
Other	0.33					0.36			-0.35		
Minimum Age for night labor for children	0.60			0.30							
Women's Regulations											
Special accommodations (seats)	0.58										
Earnings of married women belong to her							0.33				

Table 26A: Significant Loadings for Eleven Factor Model

Category and Law	1 First Wave	2 Second Wave	3 Mines	4 Union	5 Male Hr/ RR Union	6 Public Laws	7 Women's Hours	8 License/ Legal Union	9 Urban Union	10 Mine Union	11 License/ Strike Union
Industrial police are legal											-0.33
Misrepresentation about a strike or other job characteristics		0.38									0.41
Limits on injunctions		0.49									
Criminal Syndicalism		0.45									
Labor organizations--embezzlement of funds by officers							0.55				
No combinations of employers to fix wages					-0.25						
Trespass on mines, factories, without consent of owner					-0.30						0.45
Union trademark fine	0.49										
Convict Labor											
Convict Labor Regulations	0.38					0.33					
Bribery, Coercion, or Gouging											
Foreman accepting fees for employment illegal							0.35				
Bribing Employees	0.41										
Coercion of Employees is illegal			0.35								
Company Stores Cannot Gouge			0.33						0.47		
Political Protections											
Coercing the votes of employees illegal			0.33		0.33						
Time off to Vote			0.45								

Table 26A: Significant Loadings for Eleven Factor Model

Category and Law	1 First Wave	2 Second Wave	3 Mines	4 Union	5 Male Hr/ RR Union	6 Public Laws	7 Women's Hours	8 License/ Legal Union	9 Urban Union	10 Mine Union	11 License/ Strike Union
Administrative Laws											
Bureau of labor Statistics or Department of Labor	0.56										
State board of arbitration	0.42					0.37				0.30	
Free employment offices	0.47	0.33									
Alien Labor Laws											
No importing alien labor									0.37		
No aliens in public employment						0.67					
Chinese labor illegal		0.33				0.35					
Employment Agents											
Emigrant agent license				0.34	0.38					-0.40	
Employment agency regulation	0.57										
Occupational Licensing											
Railroad telegraph operator				0.37							
Plumbers	0.43										0.37
Horseshoers											0.32
Chauffeurs	0.38	0.38									
Aviators		0.32									
Other			0.29								
Motion picture operator											-0.33
Barbers	0.34	0.31								0.32	
Steam engineers (firemen)								0.44			
Mine manager			0.60								

B.3.2 Factor Seven: Women's Hours Laws

The seventh factor splits off from laws that previously loaded on the first wave laws, and represents women's hours laws. Of the seven laws with significant loadings for this factor, four are women's laws. However, the general hours laws and the law regulating night labor of women are not significant for this factor. The significant women's hours laws were the industry-specific laws for manufacturing, mercantile, and textiles. In addition, the law stating that the earnings of a married woman belong to her loaded on this factor. The three non-women's laws with significant loadings were: the law regulating steam boilers, prohibiting foremen from accepting fees, and prohibiting embezzlement from labor organizations. These laws were most common in unionized manufacturing states, indicating a possible connection between the industry-specific women's hours laws and union activity.

B.3.3 Factor Eight: Union Legal Rights/Licensing

The eighth factor has thirteen significant laws and represents pro-union laws and licensing laws. Five of the thirteen laws with significant loadings for this factor are in the union category. These laws protect the legal rights of unions, allow incorporation and strikes, protect unions from the conspiracy laws, punish users of forged union cards, and prohibit conspiring to preventing a person from working.

Three licensing laws are significant for this factor. These licensing laws were for firemen, electricians, and elevator operators, professions most common in urban, industrialized areas. Additionally, the presence of the male hours law for street railroads suggests that states with more urban areas would be more likely to pass these laws. The grouping of licensing and pro-union laws together suggests a connection. States interested in the protection of labor can achieve that goal by supporting unions or by protecting workers through licensing laws.

B.3.4 Factor Nine: Urban Union

The interpretation of this factor is difficult, as only three of the ten significant laws for this factor are in the same category. Many of the laws are associated with union issues, but this factor cannot be interpreted as a pro-union factor. Only one of the three significant laws in the union category was a pro-union law (the law banning yellow dog contracts; the other two laws prohibited abandoning railroad equipment and boycotts). However, all of the laws outside of the union category were pro-labor laws. These laws prohibited the importation of alien labor, regulated company stores and sweatshops, prohibited discrimination, regulated night work by women and controlled the hours of men and children. This factor is interpreted as representing urban union issues since regulations involving sweatshops and the night work by women were more common in the more urban, industrialized states.

B.3.5 Factor Ten: Mine Union

This new factor is formed from thirteen laws that previously loaded on the male hours, mine, and union factors. The two laws with the largest loadings are protective laws for miners: the employer's liability law for miners, and the hours law for miners. Other laws with large positive loadings were the law requiring employers to give notice of reduction of wages, male hours laws for manufacturing, and anti-intimidation laws. These protective laws suggest a pro-labor connotation for this factor. Additionally, two laws that were only present in the South have large negative loadings for this factor: the emigrant agent licensing law and the anti-enticement law. This may indicate that this factor is correlated with those mining states that did not have these laws, i.e. the Midwestern states like Ohio, Indiana and Pennsylvania. These states were more heavily unionized, thus the interpretation of this factor as representing union issues pertaining to mines.

B.3.6 Factor Eleven: Union Strikes/Licensing Laws

This new factor represents licensing laws and laws related to strikes. In contrast to factor eight, which represented pro-union laws and licensing laws, the union laws that load on this factor do not protect the legal rights of unions. Instead, these laws regulate the rights of employers in response to union activity. The law prohibiting trespassing was passed in most states to keep union organizers from entering factory property, and laws prohibiting employers from misrepresenting the presence or absence of a strike were also passed in response to employer's attempts to hire strikebreakers. The law

authorizing the use of industrial police allows employers to hire armed guards to protect their property. Employers used these guards during strikes to provide additional protection for strikebreakers. The licensing laws that correlate positively with these union laws are the laws for horseshoers and plumbers. In contrast to the relatively more sophisticated licensing laws loading on factor 8, the licensing laws loading on this factor were passed earlier and may have been intended to protect the public from faulty workmanship rather than protecting the worker by creating barriers to entry into his profession. This fact, combined with the negative signs on the more progressive laws licensing motion picture operators and creating workman's compensation, contributes to the interpretation of this factor as representing protections of workers, employers and consumers, and not laws intended to influence the condition of workers.

B.4 Fifteen To Thirty-Seven Factors

Most of the additional factors that are formed after the eleven-factor design have difficult interpretations or interpretations that are similar to previously formed factors. For this reason, only a brief discussion of these versions will be included here.

B.4.1 Fifteen Factors

In this design, most of the original eleven factors are stable. The exceptions are Factors 10 and 11. In the eleven-factor design, Factor 10 was the mine union factor. In the fifteen-factor design, this factor now represents pro-employer laws or Southern laws.

The mining factor re-emerges in the twenty-factor design. The eleventh factor was interpreted as representing strike laws and licensing laws in the eleven-factor design. In the fifteen-factor version, this factor breaks apart. The new factor 11 represents anti-union laws.

The twelfth factor contains significant loadings for progressive laws. Three urban licensing laws load on this factor (motion picture operators, chauffeurs, steam engineers), as do two factory safety regulations and male street railroad hours regulations. All of the laws are protective in nature, and many pertain to urban professions or industries.

The thirteenth factor clearly represents employer's liability and railroad union laws. This factor has significant loadings for the two licensing laws for railroad employees, the railroad accident reporting law, and three employer's liability laws, including the two that pertained most often to railroad employees (the law disallowing contracts waiving damages, and the railroad-employees specific employer's liability law). Additionally, the laws prohibiting picketing and boycotts, and prohibiting intimidation of employees also load on this factor, rounding out its interpretation as a railroad union-related factor.

Factor fourteen is an unstable factor without a clear interpretation. The laws with the largest positive loadings are union related; the law prohibiting employers from using armed guards, and requiring wage payment in cash. This factor also contains hours laws

for street railroad and textiles workers. Because most of the laws are protective in nature, this factor will be interpreted as representing pro-union and urban protection laws.

Factor fifteen represents pro-labor and licensing laws. Three licensing laws and two male hours laws load on this factor in addition to two other pro-labor laws. This factor is also unstable, so it will not be discussed in depth.

B.4.2 Twenty Factors

There are several interesting developments in the twenty-factor design. All of the factors from the fifteen-factor design except factor 15 keep their interpretation from the twenty-factor design. Factor 15 loses its meaning as a licensing and male hours factor and is now interpreted as an anti-union factor. Both the anti-picketing and anti-boycotting laws load on this new factor.

Factor 16 represents male hours laws and is formed from the splitting apart of factor 5. Factor 5 was previously interpreted as representing male hours and railroad union laws. In this design, the railroad union laws continue to load on factor 5, and the male hours laws for textiles, manufacturing, and mining split off onto factor 16. Factor 17 represents pro-union and urban protection laws. Two railroad laws and the law allowing union incorporation as well as a law prohibiting employers from fixing wages load on this factor. These laws are intended to protect the public either through safety regulation or through curbing an employer's power.

Factor 18 represents protective mining laws. This factor previously existed in the eleven-factor design as factor 11, but disappeared in the 15-factor design. This factor contains laws for licensing mine managers, employer's liability for miners, and mining hours laws. As more factors are added, this factor remains largely intact. Factors 19 and 20 do not have clear interpretations in this design. Factor 19 seems to represent union antitrust laws. In this design factor 19 has only three significant laws, making interpretation difficult. These laws were the law exempting unions from the antitrust law, laws prohibiting the coercion of workers, and street railroad safety laws. Finally, factor 20 also has only three significant laws, but seems to represent morality laws.

B.4.3 Twenty-Seven Factors

Factor 20 picks up several more significant laws in this design, aiding in its interpretation. For the most part, the laws loading on this factor were common, and fairly uncontroversial. Some of the significant laws were: laws requiring seats for women, and prohibiting children from street trades like acrobats, as well as laws establishing a labor day holiday. This factor has been labeled the morality factor because it seems to capture very basic laws that are intended to enforce minimum standards of morality, safety, and protection.

Most of the new factors that are formed in this version have clear interpretations. Factors 21 and 22 represent women and children's laws. Factor 21 clearly represents

child hours laws with significant loadings for four child's hours laws, a child age law, and a male hours law. Factor 22 contains the general hours laws for women and children, laws prohibiting children from night work and working around moving parts, and mother's pensions. Although this factor is very similar to factor 21, these laws are slightly more protective in nature, and not solely focused on regulating hours of work. For this reason, this factor has been identified as representing protective laws for women and children.

Factor 23 is a railroad pro-union factor. Like factor 5, the laws loading on this factor are predominately related to railroad issues. However, the laws loading on factor 23 are pro-union in nature, while the laws on factor 5 are more pro-employer or anti-union laws. Laws loading on factor 23 include male hours laws for railroads, laws requiring railroad inspectors, laws imposing penalties for false use of union cards, anti-coercion laws, and laws requiring wage payment in cash.

Factor 24 is a fairly unstable factor that seems to represent wage payment laws. Two wage payment laws are significant for this factor (the prohibition of forced contracts, and penalties for nonpayment of wages). Factor 25 is a pro-union factor that represents mine issues. Laws establishing miner's hospitals, allowing the use of industrial police, and regulating company stores load on this factor. Factor 26 has only four significant laws and no clear interpretation. It is interpreted as representing

progressive laws. Factor 27 also represents wage payment laws, with laws regulating frequency of wage payment and requiring payment in cash loading on this factor.

B.4.4 Thirty-Seven Factors

Of the additional 10 factors added in this design, only four were interpretable. The other six had less than three laws loading on them, making interpretation impossible. The four new factors are described below.

Factor 28 contains laws establishing industrial safety commissions and requiring occupational disease reporting. These were very progressive and fairly uncommon laws. For this reason, this factor is interpreted as representing progressive factory safety laws. Factor 29 represents basic pro-labor laws. It contains the two most common pro-union laws, anti-blacklisting laws and laws prohibiting employers from falsely representing the presence of a strike. Factor 30 represents laws regulating public workers. Laws setting hours for public workers and setting minimum wages for public workers load on this factor. Finally, factor 31 represents railroad anti-union laws. This factor is similar to Factor 5 in that intimidation laws load on this factor. However, this factor has more of an urban focus, with the intimidation law for street railroads and the regulation of steam boilers also loading on this factor.

APPENDIX C : FACTOR ANALYSIS RESULTS

In addition to the principal components analysis described in Chapter 3, factor analysis was performed for 3, 6, 9, 11, 23, and 57 factors. Although this methodology was not chosen as the preferred method for use in the cost equation, the factor analysis results are described below. For the most part, results are not appreciably different from the principal components approach.

C.1 Methodology and Factor Selection

The factor analysis methodology used a maximum likelihood estimation technique to estimate factor scores. This is an iterative technique that estimates the communalities, or proportion of the total variation of each variable that is common variance. The procedure estimates these communalities using the R^2 statistics that result from regressions of each variable on all of the other variables as priors. Once the estimation procedure converges, communality estimates are substituted into the $1/nZ'Z$ correlation matrix and eigenvectors and eigenvalues are estimated from this new matrix.

In order to account for 100 percent of the variance present in the data, 57 factors would be needed. However, this huge number of factors is too many to be useful in this analysis, so an analysis of the scree plot is used. This approach takes account of the fact that the vast majority of these 57 eigenvalues account for a tiny percent of the total variance on their own. In fact, 32 of the 57 factors account for less than one percent of the

total variation. Using the “scree” plot approach, it appears that 3, 6, 9, 11, 18, or 23 factors are appropriate for this model.

Figure 30A illustrates this method. From the chart, it is clear that there is a large drop after the 3rd and the 6th eigenvalue. The other drops are not as clear, but there is some flattening of the plot after the 11th and 23rd eigenvalues. Although the following discussion will describe the factors that result from designs with eighteen or more factors, the scree plot suggests that eleven or fewer factors are probably acceptable.

Figure 30A: Scree Plot of Eigenvalues, Factor Analysis

C.2 Factor Interpretation

In interpreting the factors, the rotated factor loadings are used. Any variable that has a factor loading with an absolute value of 0.3 or above is considered to have a significant loading for that factor. Interpretation of a factor is determined by analysis of the types of laws that have significant factor loadings for that factor.

Models were run using 3-9, 11, 18, 23, and 57 factor designs. In the first few models, many of the laws have insignificant loadings for all factors. As new factors are added these laws become significant and load on the new factors. In later designs, existing factors split apart and more laws change from one factor to another. Overall, the factors are fairly stable and easy to interpret. The following section describes the factors associated with each model.

C.2.1 Three Factors

In this design, the first factor represents first wave laws, the second factor represents second wave laws, and the third factor represents mining laws. The first wave factor consistently has the most laws in every design. This factor includes virtually all of the railroad accident laws, child age laws, child hours laws, women's hours laws, male day laws, government laws, and factory safety laws. The laws in these categories that do not load on factor one are normally insignificant. The following laws are exceptions:

- 1) The law for women and children in mines belongs in mining,
not child age laws

- 2) The laws for child welfare commissions and industrial welfare commissions always group with the second wave laws, indicating these laws are significantly different from the rest of the child and factory legislation.
- 3) The law for electrical safety legislation always groups with the second wave factor
- 4) The law for miner's hospitals groups with the mining factor

In addition to these laws, the most common laws from almost every category are also included in this factor. The exceptions are the employer's liability, alien labor, minimum wage, and anti-intimidation categories. No laws from these categories load on factor one. For male hours laws, the general male hours law loads on factor one, but none of the industry-specific laws load on this factor. These laws either load on the second factor or are insignificant. This is consistent with the idea that the general male hours law was actually a weak and non-binding law that passed in many states quite early but served mainly a declaratory purpose. The industry-specific laws passed later and were binding.

The second factor in this design represents second wave labor laws. This factor contains the minimum wage legislation, the commissions listed above in (2), and other more stringent labor laws such as injunction limits, false representation about a strike, blacklisting laws, penalties for foremen accepting fees for employment, and the main employer liability law. There is some overlap of the laws in this category with the laws in factor one, but in general, the laws that load on factor two are more progressive, stricter and less common than those loading on factor one. The alien labor laws,

discrimination laws, and minimum wage laws all loaded on this factor or were insignificant. Since many of these laws originated in the Pacific or Western states, this factor is also associated with the Western states.

The third factor in this design represents mining laws. This factor is remarkably stable in all of the designs. All of the mining related laws are significant for this factor. This includes the five laws specifically classified as mining laws, plus the following: a law banning women and children in mines, regulations for company stores, miner's hospitals, licenses for mine managers, laws prohibiting coercion of employees or coercing the votes of employees, laws allowing time off to vote, laws requiring payment in cash, and laws regulating the weighing of coal. All of these laws are related to the mining industry.

C.2.2 Four Factors

In the four-factor design, the first three factors stay the same. The fourth factor has significant loadings for all of the women's hours laws except for the law prohibiting night labor. This factor is interpreted as representing women's hours laws. The pattern of factor loadings suggests that the regulation of the workday of women was significantly different from the other general factors, and that regulation of women's night labor should not be grouped in with other women's hours laws. The four hours laws that group on this new factor continue to load on the general factor as well, but their factor loadings for the general factor are significantly lower than in the three-factor model.

C.2.3 Five Factors

The first four factors in this design have the same interpretation as in the four-factor design. With the fifth factor in this design, the first union-related variable arises. The new factor five contains four dimensions. First, it contains three of the five employer's liability laws, with positive loadings on the general law and negative loadings on the railroad law and the variable representing a law that is just a restatement of the common law. This indicates that this factor is related in a positive way to employer's liability laws, which were supported by unions. Also, the law contains the company store and miner's hospital laws, both with positive signs. These mining-state laws were often passed due to union influence, further indicating that this factor represents union sentiment. Another indication that this factor represents unions is that three of the anti-intimidation laws (interference, intimidation, and conspiracy versus workmen) have negative loadings for this factor. Since these intimidation laws were usually passed to curb the power of unions, a negative sign indicates a pro-union sentiment for this factor. Other union-related laws that load on this factor are the laws banning aliens on public employments and anti-blacklisting laws. Several male hours laws also have significant loadings for this factor. The laws for miscellaneous, street railroad, and public employees all load on factor five, perhaps indicating that passage of hours laws was related to unionization in a state.

C.2.4 Six Factors

In this design, the first four factors (general, progressive, women hours, mine) stay the same, but the union factor (factor five) from the five-factor design becomes an anti-union factor, and a new pro-labor factor develops from laws which previously loaded on the general factor. The new factor five has most of the same significant laws as the pro-union factor five in the previous design, but the signs on most of the laws are reversed in this design. For employer's liability laws, the main law has a negative sign, and the railroad law has a positive sign. The variable representing a weak employer's liability law is insignificant in this version. Also, four of the six intimidation laws have positive loadings for factor five (the street railroad and railroad laws are insignificant). Other indications that this factor may represent anti-union sentiment are negative loadings for two child hours laws, for men's street railroad hours and for the law prohibiting aliens in public employment.

The new factor six created in this design represents urbanization or pro-union sentiment. Most of the laws that load significantly on this factor either come from the general factor or were insignificant in earlier models. This factor contains many laws that were common in cities. In the factory safety category, steam vessel regulation, regulation of construction workers, and sweatshop regulations all load on this factor. In the women and children category, the law regulating children employed in street trades and the law regulating night labor for women have a significant positive loading. These are all regulations that are common in urban areas. Also, many laws associated with the

South load negatively on this factor (anti-enticement, emigrant agents, repayment of advances), further reinforcing the interpretation of this factor as urban or non-South.

Other laws with positive and significant loadings on factor six were: laws banning aliens in public employment, boards of arbitration, general and public male hours laws, convict labor laws, laws prohibiting abandoning locomotives, and laws prohibiting yellow dog contracts.

C.2.5 Seven Factors

At this level, the anti-intimidation factor (factor five) from the previous model splits into two factors—one for anti-intimidation laws, and one for protective labor laws. The laws that have significant loadings for these two factors either loaded on factor five in previous designs or were insignificant in previous models. The interpretation of the other factors is unchanged.

In this version, factor five represents anti-intimidation laws or anti-union sentiment. The laws with significant loadings on this factor are the four non-railroad intimidation laws, the anti-boycott law, and a law for the licensing of railroad employees. It is clear that this is to be interpreted as an anti-union, anti-intimidation law.

Factor seven should be interpreted as representing protective legislation. Many of the laws with significant loadings on this factor were interpreted as pro-union laws in the five and six factor designs for factor five. Now, the signs are reversed from the six-factor

case. In the six-factor model, the employer's liability and some children's and men's hours laws loaded negatively on the anti-intimidation factor, indicating that states with more intimidation laws had fewer of these laws. In this seven-factor design, a new factor develops, and the laws that loaded negatively on the anti-intimidation factor in the previous design now load positively on this new factor. This factor has a positive loading for the main employer's liability law, and a negative loading for the employer's liability law that restates the common law and the railroad employer's liability law. Both of these laws are less stringent than the main employer's liability law, so the negative loading is consistent with the interpretation of this factor as a pro-labor factor. Also, the children's hours laws for mercantile, textiles, and other employments, and the men's hours laws for public employments, street railroads, and miscellaneous load on this factor. Other laws with significant positive loadings were the laws setting forth a minimum wage in public employments, and the law prohibiting aliens in public employment. All of the laws regulating public employees (men's hours, aliens, and minimum wages) all load on this factor. This may suggest that this factor should be interpreted as representing a pro-labor state legislature.

C.2.6 Eight Factors

In this model, there are several significant changes. First, factor seven from the previous model, which was previously interpreted as representing protective labor laws, loses all significant loadings except the four child hours laws for specific professions and the minimum wage law for public employees. As a result, the new interpretation of this

factor is that it represents child hours laws. The majority of the other laws that previously loaded on this factor move to the urban factor 6.

The anti-intimidation factor (factor five) is basically unchanged from the seven factor design, but the anti-boycotting and anti-picketing laws become significant for this factor at this stage, solidifying the interpretation of this factor as an anti-union factor. Factor six represents urbanization or pro-union sentiment. Many of the laws that were previously classified as union or urban laws plus the protective laws from Factor seven (with the exception of the child hours laws) now load on factor six. The employer's liability laws, prohibition of aliens for public works, and male hours for public employees all switch to this factor from the protective factor (factor seven) in the previous design. Additionally, laws allowing strikes and laws declaring that labor agreements are not conspiracies become significant and load on this factor at this point, further strengthening the interpretation of this factor as union-related.

The new factor eight represents union issues and the protection of male workers' right to work. This factor contains three of the male hours laws for specific professions: mining, manufacturing, and textiles. The male hours laws loading on this factor are completely different from those listed for factor seven in the seven-factor design. In the previous design, the male hours laws were for street railroads, miscellaneous, and public employees. In the case of the street railroads and miscellaneous employments, the main motivation for passing the laws was to protect the public, not the worker. These laws

would have been less controversial for that reason. Similarly, hours laws for public employees indicates a legislature that is sympathetic to labor issues but perhaps cannot get a general hours law passed. These laws were less controversial than the regulation of private industry. The other laws with significant positive loadings on this factor are two intimidation laws, the law requiring notice for reduction of wages, and the employer's liability law for miners. The law allowing industrial police and the law regulating company stores both had negative signs for this factor. The presence of these laws suggests that these laws were related to unionization, and that the factor may represent mining-state issues.

C.2.7 Nine Factors

In this model, the intimidation factor from previous models (factor five above) now represents Southern laws. The enticement, emigrant agent, and law requiring repayments of advances become significant for this factor. These are all Southern, pro-employer laws. Both of the licensing laws for railroad employees also load on this factor. Since both Southern and intimidation laws load significantly on this factor, the interpretation of this factor is that it represents both.

Factor eight from the previous design splits into two factors—one that represents right to work laws and one that represents mine and railroad union laws. The mine and railroad union laws become factor nine, and the intimidation laws become factor eight. The hours law for textiles becomes insignificant in this design, moving to factor nine.

The law preventing conspiracy versus workmen becomes significant, and the emigrant agent and anti-enticement laws are negative and significant. This suggests an “anti-South” interpretation for factor eight and supports the continued interpretation of this factor as being related to unions. The mining and manufacturing hours laws continue to load on this factor. Because of this, Factor 8 will continue to be interpreted as a right to work or union-related factor.

As the number of factors increases, laws that previously were significant for factor two (second wave laws) become insignificant, and move their loadings onto new factors. This factor experiences more of this type of “attrition” than the mining or first wave factors. The laws that become insignificant for the second wave law factor in the seven- through nine-factor designs include: male hours for railroads (nine factor design), minimum wage for public employees (seven factor design), male hours for miscellaneous (seven, nine factor designs), male hours for mining (eight factor design), construction regulations, and the main employer’s liability law (seven, nine factor designs). The laws that endure in all designs for this factor are the laws setting up commissions, minimum wage laws for women and children, general hours laws for children, injunction limits, criminal syndicate laws, mother’s pensions, regulation of electricity at factories, and workman’s comp. All of these laws are fairly uncommon, and are interpreted as representing progressive beliefs in a state. Most of these laws also passed fairly late in the study period, so the interpretation of factor two as representing second wave laws remains valid in all designs.

In this model, the interpretation of factor six as representing pro-union sentiment or urbanization is reinforced by the addition of several significant loadings. Several of the male hours laws that originally loaded on the union factor in the five-factor model again load on this factor. The male hours law for public employments has loaded on this factor all along, but now the male hours law for miscellaneous and street railroads also load on this factor. Also, the minimum wage law for public employees switches from the child hours law factor to this factor in this model. This factor is now the main factor representing union issues and pro-labor laws common in urban areas.

The new factor nine clearly represents union issues relevant to miners and railroad employees. The laws that are significant for this factor include: laws outlawing abandonment of railroads, laws outlawing interference with railroad employees, laws outlawing contracts waiving damages and hours laws for railroad employees. The first two laws in this list have negative signs, which indicates that this factor may represent a pro-union sentiment, since the first two laws are typically passed to limit the power of unions. The last two have positive signs. Both of these laws are pro-labor laws that are specific to the railroad industry. The male hours law for textiles and manufacturing also load significantly on this factor, as do the mining-influenced laws prohibiting coercion of the votes of employees and male hours for mining. A law prohibiting the intimidation of miners has a negative sign, which is again consistent with interpretation of this factor as a pro-union factor. The final law loading on this factor is the emigrant agent law, which

indicates that this factor may also represent rural areas. The presence of the three hours laws on this factor suggests that male hours issues are important to this factor as well.

C.2.8 Eleven Factors

The main developments in this design are the addition of a factor to represent employer's liability laws and Southern laws, and a change to the male hours factor. After the disappearance of the employer's liability factor in the eight-factor design, these laws loaded on the union factor. In this design, a unique factor re-emerges, and continues through the 23 and 57 factor designs.

The interpretation of factor five as representing Southern laws becomes stronger in this design. Two of the intimidation laws become insignificant for this factor in this design (interference, intimidation), leaving the conspiracy versus workmen law as the only significant intimidation law left on this factor. The anti-boycotting and anti-picketing laws also become insignificant for this factor in this design, leaving only the three Southern laws that were added in the previous model, and supporting the continued interpretation of this factor as representing Southern or rural laws.

With the development of the employer's liability factor and the Southern factor, the urban or union factor (factor six) loses these laws. The Southern laws that used to load negatively on this factor (emigrant agent, enticement, repayment of advance) move to the Southern factor, and the employer's liability laws move to their own factor. Factor

six is unstable, with laws moving in and out from design to design. In addition to the laws mentioned above, the hours laws for miscellaneous employments, minimum wages for public works, convict labor, and boards of arbitration laws become insignificant for this factor in this design.

The following laws were insignificant in earlier models and become significant for factor six in this model: no work on holidays, strikes are legal, license for elevator operators, other safety regulations, industrial police are legal, incorporation of labor unions. The following laws previously loaded on the general factor: night labor for women, company stores, general male hours law, steam boiler regulations, licenses for steam engineers, regulations for construction workers, bakery regulations. All of these laws are pro-labor, urban laws, and many are union-related as well. Despite the instability of the laws loading on this factor, it can consistently be interpreted as a union-related, urban factor.

In this design, the interpretation of factor eight as representing anti-intimidation or right to work laws becomes stronger. The male hours laws shift to factor nine, which emerged in the nine-factor design. The three specific intimidation laws all load on this new factor (no intimidation, no interference, conspiracy vs. workmen), and only the manufacturing hours law continues to be significant for this factor. The only other significant laws for this factor are the employer's liability law for miners, licenses for

barbers, and notice for reduction of wages. The best interpretation for this factor is that it represents intimidation laws.

Additions to factor nine described above have changed the interpretation of this factor slightly. It should now be interpreted as representing male hours laws and union issues in rural areas. The new factor ten is clearly interpreted as representing employer's liability laws. It contains all of the employer's liability laws except the mining law, plus the law banning aliens from public employments, and the board of arbitration. The presence of the last two laws suggests a union influence on employer's liability issues.

The new factor eleven contains the following laws: anti-boycotting, anti-trespassing, sex discrimination, and licensing laws for railroad telegraph employees. These laws were either insignificant in earlier designs or loaded on union factors. These laws support the interpretation of this factor as representing anti-union sentiment.

C.2.9 Eighteen Factors

At this stage, factor nine from the eleven-factor design (male hours and railroad/mine unions) splits into two factors. One represents male hours laws and the other represents railroad union laws. Factor eleven from the previous model (anti-union) also splits into two anti-union factors. Finally, a new factor develops from the progressive and general factors and represents "super progressive" laws, and a new factor

develops from the urban “pro-union” factor. A new employer’s liability factor develops, a factory safety factor develops, and a new factor develops out of the mining laws.

C.2.10 Twenty-Three Factors

The most interesting factor that develops here is the licensing factor. There are no significant changes to any of the existing factors at this stage. For the most part, either the new factors develop from laws that were previously insignificant or the laws load jointly on the new factor and on a previous factor. The exception to this is the urban/union factor six, which continues to be unstable. Laws that were previously significant for this factor become insignificant in this design, and now load on the new factors twenty and twenty-one.

C.2.11 Fifty-Seven Factors

At this level, there is a great deal of splintering of established factors. Many of the new factors that develop contain only one or two laws, suggesting that this design is not appropriate for this data.

The mining factor and the general factor are by far the most stable. The progressive factor is the least stable of the original factors. Most of the factors present in previous designs are still present in this design. The new factors typically split existing factors into many groups, and many of the new factors do not have clear interpretations. For that reason, this design is not discussed in detail.

APPENDIX D : DATA APPENDIX

D.1 Variable Construction and Average Values

All independent variables were converted into index values by dividing by the median value. This did not yield significantly different results than alternative methods of indexing the data such as dividing by the mean value. Average values for the variables used in the residual approach are listed in Table 27A, and average values for variables used in the bond price approach are listed in Table 28A.

Table 27A: National Average Values For Data – Residual Method

Variable	1899	1904	1909	1914	1919
Raw Data					
Materials Price	\$0.52	\$0.60	\$0.68	\$0.68	\$1.39
Wage Price	\$561	\$594	\$575	\$606	\$664
Salary Price	\$1,274	\$1,256	\$1,230	\$1,301	\$1,114
Capital Price	\$0.32	\$0.32	\$0.25	\$0.26	\$0.20
State Labor Law Expenditures/ Thousand Labor Force	\$45.44	\$40.38	\$51.47	\$76.95	\$66.77
Real Value of Products/Establishment	\$62,131	\$71,013	\$70,042	\$75,951	\$105,266
Output Shares					
Materials Share	0.57	0.57	0.58	0.60	0.61
Wage Share	0.19	0.19	0.18	0.17	0.17
Salary Share	0.03	0.04	0.04	0.05	0.04
Capital Share	0.22	0.21	0.20	0.18	0.17
Index Values					
Materials Price	0.77	0.88	1.00	1.00	2.04
Wage Price	0.96	1.02	0.99	1.04	1.14
Salary Price	1.05	1.04	1.02	1.08	0.92
Capital Price	1.23	1.22	0.95	1.00	0.75
Labor Law Expenditures/Thousand Labor Force	1.22	1.08	1.38	2.06	1.79
Real Value of Products/Establishment	0.88	1.01	0.99	1.08	1.50

Table 28A: National Average Values For Data – Bond Price Method

Variable	1899	1904	1909	1914	1919
Raw Data					
Materials Price	\$0.52	\$0.60	\$0.68	\$0.68	\$1.39
Wage Price	\$561	\$594	\$575	\$606	\$664
Salary Price	\$1,274	\$1,256	\$1,230	\$1,301	\$1,114
Capital Price	\$0.066	\$0.113	\$0.076	\$0.112	\$0.013
State Labor Law Expenditures/ Thousand Labor Force	\$45.44	\$40.38	\$51.47	\$76.95	\$66.77
Real Value of Products/Establishment	\$62,131	\$71,013	\$70,042	\$75,951	\$105,266
Output Shares					
Materials Share	0.65	0.64	0.64	0.64	0.67
Wage Share	0.21	0.21	0.20	0.18	0.19
Salary Share	0.03	0.04	0.05	0.05	0.04
Capital Share	0.10	0.11	0.12	0.12	0.10
Index Values					
Materials Price	0.77	0.88	1.00	1.00	2.04
Wage Price	0.96	1.02	0.99	1.04	1.14
Salary Price	1.05	1.04	1.02	1.08	0.92
Capital Price	0.87	1.48	1.00	1.56	0.17
Labor Law Expenditures/Thousand Labor Force	1.22	1.08	1.38	2.06	1.79
Real Value of Products/Establishment	0.88	1.01	0.99	1.08	1.50

D.2 Variable Definition and Sources

Real Wage and Real Salaries: Value of wages or salaries divided by the number of wage earners or the number of salaried workers and deflated using CPI. Wage and salary data was from the US Department of Commerce's *Statistical Abstract Of The United States*. The CPI (1913=100) is from the National Bureau of Economic Research's

Macrohistory Database and was originally collected by the Federal Reserve Bank of New York.

Materials Price: Price index for wholesale prices from NBER (1926=100).

Original source: BLS, *Handbook of Labor Statistics*, 1947, "Index of Wholesale Prices", BLS.

Capital Price: In the residual approach, it was assumed that total value of products is equal to total cost. If this is true, then capital costs are equal to the value of products minus all other costs (wages, salaries and materials). Capital price is then capital cost/capital stock. All data was collected from the *Statistical Abstract of the United States*. Capital prices were calculated in the following way:

$$\text{Capital Price} = (\text{Value of products} - \text{cost of materials-salaries-wages}) / (\text{Capital Stock} - \text{inflation rate} + \text{depreciation rate})$$

The nominal price was deflated using CPI by subtracting inflation rate from capital price. A seven percent depreciation rate was then added to the real capital price.

In the bond price approach, capital price was calculated in the following way:

$$\text{Capital Price} = \text{Interest rate on high grade industrial bonds} - \text{inflation rate} + \text{depreciation}$$

Real Output: Value of products per establishment divided by CPI.

Total Cost: In the residual approach, total cost was assumed to be equal to the value of products per establishment. Real output and total cost data were collected from the *Statistical Abstract of The United States*. In the bond price approach, total cost is the sum of expenditures per establishment on materials, salary labor, wage labor, and the value of the capital stock times the capital price.

Cost Shares: Wage share was calculated as total wage cost per establishment divided by total cost per establishment. Materials share was materials cost per establishment divided by total cost per establishment. Salary share was salary cost per establishment divided by total cost per establishment. Capital share in the residual approach was calculated as one minus the sum of the wage, materials, and salary share. Capital share in the bond price approach was calculated as capital price times the capital stock per establishment divided by total costs per establishment.

Expenditures on Labor Programs: State government spending on labor programs. The data were collected from appropriations to state labor departments reported in the states' volumes of statutes. For each state-year observation data includes the appropriations for factory inspection, boards of conciliation and arbitration, bureaus of labor, bureaus of labor or industrial statistics, free employment bureaus, boiler inspection (but not ship boiler inspection), mining inspection, industrial welfare commissions, and industrial commissions from the states' session laws. In many states appropriations were given for all labor spending without separating out what share went to each division. In a

few states, Iowa for example, the statute volumes offered the exact amounts spent by the state treasurer. Some states were either missing appropriations volumes or the appropriations were unnecessarily obtuse. In those states we used interpolations to fill any gaps. In interpolating we tried to be sensitive to the fact that many states were on a two-year cycle and often gave the same amount of appropriations in both years of the cycle. Maryland and Michigan offered extremely uninformative appropriations information. For Michigan we collected the appropriations data from the Michigan Auditor General's Annual Report for years between 1900 and 1920. For Maryland we collected information from the Maryland Bureau of Statistics and Information, Annual Reports.

Expenditures were deflated using the CPI (1913=100). Real expenditures were then divided by an estimate of the number of workers gainfully employed in the state. The employment estimate was determined by calculating the share of total U.S. gainfully employed in each state for the years 1900, 1910, 1920, 1930, and 1940 from series D-26 in U.S. Bureau of Census (1975, 129-31). The shares between the census years were calculated using straight-line interpolations. We then multiplied the shares for each state and year by total employment in the U.S. in each year (series D-5 in U.S. Bureau of Census 1975, 126) to create an estimate of employment in each state. Missing data required estimation of 38 states in 1899 and 33 states in 1919. Expenditures for these states were estimated by using either 1900 or 1918 data or the year closest to the missing year if 1900 or 1918 data was also missing.

Factor Scores: Factor scores were developed using the principal components analysis described in Chapter 4. Scores were lagged by one year and scaled by adding 10 to eliminate negative numbers. Raw factor scores for each state in 1899, 1919, and average values for the three factors used in the translog model are listed in Table 29A

Table 29A: State Factor Scores For 1899 and 1919

State	First Wave Laws			Second Wave Laws			Anti-union Laws		
	1899	1919	Avg*	1899	1919	Avg*	1899	1919	Avg*
Alabama	8.476	9.398	9.173	9.751	10.037	9.784	10.301	11.316	11.135
Arkansas	8.180	9.220	8.992	9.665	10.543	9.832	9.385	10.072	9.907
Arizona	8.224	8.856	8.567	9.662	11.896	10.497	9.071	9.856	9.468
California	9.282	9.815	9.766	10.025	14.078	11.792	7.685	8.431	7.975
Colorado	9.147	10.879	10.108	10.123	11.575	10.626	9.683	11.932	10.857
Connecticut	10.520	11.599	11.390	8.956	10.343	9.531	9.643	9.449	9.683
Delaware	9.120	10.447	9.778	9.181	9.934	9.404	9.655	10.004	9.894
Florida	8.571	9.732	9.194	9.780	9.876	9.855	10.395	10.677	10.521
Georgia	8.941	10.061	9.446	9.811	9.685	9.739	11.136	11.556	11.326
Iowa	9.778	10.495	10.248	8.941	10.292	9.439	9.985	10.043	9.871
Idaho	8.274	9.934	9.246	9.901	10.989	10.209	8.515	8.673	8.726
Illinois	10.307	11.116	10.965	8.992	9.874	9.363	11.013	11.520	11.385
Indiana	10.341	10.761	10.772	8.662	10.325	9.234	8.438	9.355	8.976
Kansas	8.864	10.223	9.943	9.441	11.115	9.876	9.370	10.785	10.047
Kentucky	8.895	10.464	9.831	9.030	9.424	9.174	9.415	9.999	9.988
Louisiana	9.984	10.919	10.602	9.523	9.630	9.525	8.759	8.471	8.749
Massachusetts	11.059	11.454	11.428	9.137	12.773	10.721	8.916	7.963	8.529
Maryland	9.665	10.927	10.441	8.857	10.270	9.382	8.493	9.892	9.584
Maine	10.010	11.419	10.770	9.139	9.659	9.234	10.441	9.267	9.739
Michigan	10.959	11.620	11.376	9.466	10.515	9.833	11.064	10.611	10.922
Minnesota	10.988	10.769	10.879	9.505	12.513	10.801	11.707	11.614	11.628
Missouri	10.592	11.409	11.066	9.179	9.730	9.469	11.045	11.562	11.471
Mississippi	8.665	9.448	9.130	9.620	9.935	9.726	10.412	10.649	10.655
Montana	9.212	9.476	9.263	9.731	12.292	11.031	9.973	10.328	10.138
North	8.304	9.491	9.064	9.423	9.938	9.541	9.957	11.057	10.597

APPENDIX E : DERIVATION OF INPUT-FACTOR ELASTICITIES

The input-factor elasticities will predict the impact of an increase in the level of labor legislation (measured as the level of first wave, second wave, or anti-union laws, or the level of state spending on labor regulation per worker) on input quantity demand.

The elasticity is described as:

$$\varepsilon_{ik} = \frac{\partial \ln X_i}{\partial \ln F_k} = \frac{\partial X_i}{\partial F_k} * \frac{F_k}{X_i} \quad (\text{E.1})$$

One can recover an expression for factor demand from the share equations by solving the share equations for X_i in the following way:

$$s_i = \frac{X_i P_i}{C} \quad \text{or} \quad X_i = \frac{s_i C}{P_i} \quad \text{and}$$

$$s_i = \alpha_i + \sum_{j=1}^4 \alpha_{ij} \ln P_j + \sum_{q=1}^3 \eta_{iq} \ln F_q + \sum_{r=1}^3 \tau_{ir} \ln Z_r$$

Taking derivatives,

$$\frac{\partial X_i^*}{\partial F_q} = \frac{1}{P_i} \left[s_i \frac{\partial C^*}{\partial F_q} + C^* \frac{\partial s_i}{\partial F_q} \right]$$

$$\frac{\partial X_i^*}{\partial F_q} = \frac{s_i F_q \frac{\partial C^*}{\partial F_q} + C^* \eta_{iq}}{P_i F_q} \quad (\text{E.2})$$

Applying to the elasticity formula:

$$\begin{aligned}
 \varepsilon_{iq} &= \frac{s_i F_q \frac{\partial C^*}{\partial F_q} + C^* \eta_{iq}}{P_i F_q} * \frac{F_q}{X_i} \\
 \varepsilon_{iq} &= \frac{s_i F_q \frac{\partial C^*}{\partial F_q} + C^* \eta_{iq}}{P_i X_i} \\
 \varepsilon_{iq} &= \frac{s_i \left(\frac{F_q}{C^*} * \frac{\partial C^*}{\partial F_q} \right) + \eta_{iq}}{s_i}
 \end{aligned} \tag{E.3}$$

The first term in the numerator in parentheses is the “regulatory share”; it is equivalent to $\partial \ln C^* / \partial \ln F_q$. Therefore, we can define these regulatory shares in the following way:

$$\frac{\partial \ln C^*}{\partial \ln F_q} = s_q = \beta_q + \sum_{j=1}^4 \eta_{qj} \ln P_j + \sum_{i=1}^3 \beta_{qi} \ln F_i + \sum_{m=1}^3 \tau_{qm} \ln Z_m \tag{E.4}$$

These factor demand equations can be recovered from the coefficients of the translog cost function and estimated regulatory shares can be used in the calculation of factor demand elasticities.

APPENDIX F : SHARE EQUATION COEFFICIENTS

In the translog model, the coefficients on the share equations have little meaning of their own, and are typically used to derive elasticities, which were the focus of the discussion in Chapter 5. The share equation coefficients and their associated p-values and standard errors are described below.

F.1 Wage Equation

Table 30A lists the coefficients for the wage equation for each version of the model. In this equation, the coefficient for second wave laws was negative and significant at the ten percent level in the state and year fixed effects version. None of the other labor law variables were statistically significant in this version of the model. The coefficient for anti-union laws was negative and significant in four of the six versions estimated. The coefficient for first wave laws was only significant in one version estimated, and the coefficient for state spending on labor legislation was not significant in any version.

The coefficient for second wave laws was -0.162 in the state and year fixed effects version. The negative sign indicates that an increase in the level of second wave laws results in a wage labor-saving bias. During the 1899-1919 period, the national average value of second wave laws increased by 11 percent. The impact of this increase would be to reduce wage labor's share of total cost by about 2 percentage points. The coefficient for anti-union laws was much smaller at only -0.078 . Combining this with the

3.9 percent increase in anti-union legislation between 1899 and 1919 generates a 0.3 percentage-point decrease in wage labor's share of total cost.

The coefficient for first wave laws was insignificant, suggesting that these variables had little impact on wage labor's share of total cost. This is an interesting result since most of the safety laws and women's and children's hours laws load on this factor. The insignificance of this coefficient suggests that these laws had no impact on a firm's choice of wage labor. One explanation is that this result provides some additional evidence for the findings of other researchers that the passage of these laws merely codified existing industry practices and did not materially impact firm's usage of wage labor.²⁰⁹ The coefficient for state labor expenditures was also insignificant in all versions. This may indicate that expenditures are not a reasonable proxy for enforcement efforts.

The coefficient on output was significant and negative in the wage equation. The value of -0.032 indicates that for every ten percent increase in output, wage labor's share of total output will fall by three tenths of a percentage point. The negative sign on this variable is consistent with the idea of increasing returns to labor; as a firm increases output, output per employee increases. At constant wages, labor's share of total cost will fall as output per worker increases. Given the 53 percent increase in output that occurred from 1899 to 1919, wage share of total costs would have fallen by approximately 1.7

percentage points. Finally, the time variable was negative and significant in the state effects and time counter version. This suggests that technological change was labor-saving. Between 1899 and 1919, technological change resulted in an 11 percentage-point drop in wage share. This is broadly consistent with the results of Cain and Paterson, who found a labor-saving bias in 14 of the 19 industries they examined during this time period.²¹⁰

Table 30A: Wage Equation Coefficients

Coefficient	Variable (p)	Model Version					
		Base	Time Counter	Year Effects	State Effects, Time Counter	State Effects	State, Year Effects
α_1		0.167 <.0001	0.162 <.0001	0.167 <.0001	0.158 <.0001	0.159 <.0001	0.169 <.0001
α_{11}	Pw	0.043 0.005	0.028 0.158	0.043 0.005	-0.004 0.863	0.009 0.598	0.036 0.046
α_{12}	Pc	-0.039 <.0001	-0.052 <.0001	-0.039 <.0001	-0.088 <.0001	-0.085 <.0001	-0.057 <.0001
α_{13}	Ps	-0.010 0.017	-0.003 0.492	-0.010 0.017	-0.005 0.254	-0.008 0.058	-0.004 0.436
α_{14}	Pm	0.006 0.688	0.026 0.331	0.006 0.688	0.096 <.0001	0.085 <.0001	0.024 0.150
η_{11}	F1	0.068 0.286	0.057 0.457	0.068 0.286	0.090 0.284	-0.120 0.081	0.034 0.618
η_{12}	F2	-0.133 0.038	-0.095 0.175	-0.133 0.038	-0.008 0.920	-0.301 <.0001	-0.162 0.003
η_{13}	F3	-0.131 0.014	-0.160 0.003	-0.131 0.014	-0.090 0.145	-0.153 0.011	-0.078 0.145

²⁰⁹ See Goldin, 1990 for women's hours laws, and Moehling (1997) for children's hours laws.

²¹⁰ Cain and Paterson, p. 347-348.

Table 30A: Wage Equation Coefficients

Coefficient	Variable (p)	Model Version					
		Base	Time Counter	Year Effects	State Effects, Time Counter	State Effects	State, Year Effects
τ_{11}	Y	-0.043 <.0001	-0.045 0.000	-0.043 <.0001	-0.035 0.004	-0.032 0.006	-0.032 0.001
τ_{12}	T	na na	-2.916 0.275	na na	-10.845 <.0001	na na	na na
τ_{13}	E	-0.004 0.221	-0.004 0.312	-0.004 0.221	0.000 0.933	-0.001 0.845	-0.005 0.193

F.2 Capital Equation

Table 31A lists the coefficients on the capital equation. None of the labor variables were significant at the ten percent level in the state and year fixed effects version. The coefficient on first wave laws was positive and significant in one of the six versions, and the coefficient on anti-union laws was significant and negative in two of the six versions. The lack of significance may be due to the imprecise way that the capital share was estimated, or it may indicate that capital choice decisions were not heavily influenced by labor legislation. Even though the coefficients were not estimated precisely, the signs on the three labor law variables were negative in most of the versions estimated. This provides some evidence that increased levels of labor legislation led to a capital-saving bias by firm.

Table 31A: Capital Equation Coefficients

Coefficient	Variable (p)	Model Version					
		Base	Time Counter	Year Effects	State Effects, Time Counter	State Effects	State, Year Effects
α_2		0.190 <.0001	0.187 <.0001	0.190 <.0001	0.183 <.0001	0.187 <.0001	0.189 <.0001
α_{12}	Pw	-0.039 <.0001	-0.052 <.0001	-0.039 <.0001	-0.088 <.0001	-0.085 <.0001	-0.057 <.0001
α_{22}	Pc	0.057 <.0001	0.051 <.0001	0.057 <.0001	0.041 <.0001	0.067 <.0001	0.055 <.0001
α_{23}	Ps	-0.010 <.0001	-0.002 0.439	-0.010 <.0001	0.001 0.613	-0.005 0.051	0.000 0.960
α_{24}	Pm	-0.008 0.373	0.003 0.854	-0.008 0.373	0.045 <.0001	0.024 0.022	0.002 0.859
η_{21}	F1	0.001 0.982	-0.023 0.611	0.001 0.982	-0.016 0.728	-0.124 0.003	-0.026 0.541
η_{22}	F2	-0.038 0.436	-0.022 0.725	-0.038 0.436	0.062 0.289	-0.025 0.632	-0.045 0.375
η_{23}	F3	-0.054 0.171	-0.078 0.056	-0.054 0.171	-0.039 0.398	-0.064 0.081	-0.024 0.613
τ_{21}	Y	0.004 0.498	0.003 0.632	0.004 0.498	0.013 0.027	0.019 0.001	0.013 0.031
τ_{22}	T	na na	-1.010 0.611	na na	-6.200 <.0001	na na	na na
τ_{23}	E	-0.002 0.428	-0.001 0.602	-0.002 0.428	0.003 0.362	0.004 0.194	-0.001 0.671

In addition to the labor variables, the coefficient on output was positive and significant at the ten percent level in the capital share equation, indicating that scale effects generated a capital-using bias. As output per firm increases, firms' capital share of total cost increases. The size of the coefficient (0.013) combined with the observed 53

percent increase in output per establishment between 1899 and 1919 indicates that capital share increased by 0.7 percentage points due to increased output. The coefficient on time was negative and significant in one version that included this variable. The size of the coefficient indicates a fairly large capital-saving bias over time. Using the coefficient in the state effects and time counter version, a 6.5 percentage point reduction in the capital share can be contributed to technological change between 1899 and 1919. This result is counterintuitive and contradicts results found by others.²¹¹ This may be the result of the way the capital variable was constructed. Since a residual approach was used to measure capital share, the negative sign may be better interpreted as indicating that it is capital plus entrepreneurial share that is declining, not just capital share. Using this interpretation, the declining share may be due to increased competition that would lower profit margins and payments to owners. In the alternative version of the model that used bond prices as a proxy for capital price, the sign on time is still negative, but it is much smaller and insignificant (See Appendix G).

F.3 Salary Equation

Table 32A lists the coefficients on the salary equation. In this equation, the coefficients on the first and second wave laws, output and time were significant at the ten percent level. The coefficients on the labor variables were all positive, indicating that an increase in legislation caused salaried labor's share of total costs to increase. The combined impact on salary share of the increase in labor laws between 1899 and 1919

was only about one percentage point, with increases in first-wave laws responsible for about two-thirds of the total. This is a relatively large increase given that salaried workers' share of costs averaged only four percent over the entire period studied. Firms may substitute towards salaried labor as the level of general labor laws increases for several reasons. One possibility is that salaried workers may not have been subject to the same laws that wage laborers were (like hours laws) so firms found that they could sidestep the law by switching some classes of workers to salaried labor from wage labor. Another possibility is that the increased regulatory burden generated by an increase in labor laws created the need for more supervisory or management workers, who were normally salaried. The coefficient on salaried labor for the anti-union variable was positive but insignificant in most versions. This suggests that more anti-union legislation may have also increased the use of salaried labor, but the coefficient was quite small, indicating that the impact was negligible.

Results for the non-labor variables' impact on salary share were mixed. The coefficient on time was positive and significant at the ten percent level in the two versions in which it was included. The size of the coefficient suggests that salaried labor's share would have increased by almost two percentage points due to technological change. Working against this force, the coefficient on real output was negative and significant. The magnitude of the variable indicates that salary's share would have fallen by almost half of a percentage point as a result of the empirical increase in output per

²¹¹ See Cain and Paterson, 1981.

establishment that occurred during this period. As with wage labor, increases in scale may allow increases in output per salaried worker, lowering the per-unit cost of a salaried worker and reducing salary share of total costs.

Table 32A: Salary Equation Coefficients

Coefficient	Variable (p)	Model Version					
		Base	Time Counter	Year Effects	State Effects, Time Counter	State Effects	State, Year Effects
α_3		0.036 <.0001	0.037 <.0001	0.036 <.0001	0.037 <.0001	0.035 <.0001	0.036 <.0001
α_{13}	Pw	-0.010 0.017	-0.003 0.492	-0.010 0.017	-0.005 0.254	-0.008 0.058	-0.004 0.436
α_{23}	Pc	-0.010 <.0001	-0.002 0.439	-0.010 <.0001	0.001 0.613	-0.005 0.051	0.000 0.960
α_{33}	Ps	0.017 <.0001	0.014 <.0001	0.017 <.0001	0.012 0.000	0.007 0.017	0.001 0.767
α_{34}	Pm	0.003 0.284	-0.010 0.005	0.003 0.284	-0.008 0.029	0.006 0.029	0.003 0.347
η_{31}	F1	0.074 <.0001	0.062 <.0001	0.074 <.0001	0.060 <.0001	0.060 <.0001	0.073 <.0001
η_{32}	F2	0.022 0.103	0.002 0.849	0.022 0.103	0.012 0.425	0.017 0.244	0.025 0.058
η_{33}	F3	-0.006 0.389	-0.012 0.073	-0.006 0.389	-0.007 0.339	-0.007 0.380	0.000 0.990
τ_{31}	Y	-0.011 <.0001	-0.010 <.0001	-0.011 <.0001	-0.009 <.0001	-0.008 <.0001	-0.008 0.000
τ_{32}	T	na na	1.963 <.0001	na na	1.850 <.0001	na na	na na
τ_{33}	E	0.000 0.611	-0.001 0.197	0.000 0.611	0.000 0.647	0.000 0.962	0.000 0.711

F.4 Materials Equation

Table 33A shows the coefficients for the materials share equation. In the state and year fixed effects version, the coefficients on output and second wave laws were significant and positive at the ten percent level, indicating a materials-using bias as the result of increases in the level of these variables. The coefficient on anti-union laws was positive in all versions, and was significant in four of the six versions, suggesting a materials-using bias related to anti-union legislation. The coefficient on first-wave laws was significant in three of the four versions estimated, but the sign was positive in one of the three significant versions and negative in two, making interpretation of the relationship between materials and first wave laws impossible. The coefficient on time was positive and significant in one of the two versions estimated that contained that variable.

For second-wave laws, the estimated coefficient of 0.183 combined with the empirical increase in second wave laws between 1899 and 1919 of 11 percent results in a predicted two percentage-point increase in materials share as the result of increased second-wave labor legislation. For anti-union laws, the different versions suggest a statistically significant coefficient of around 0.2. The insignificant coefficient in the state and year fixed effects version was 0.103. This smaller coefficient, combined with the 3.9 percent increase in anti-union laws, would generate almost a half-point increase in the materials share.

The impact of technological change on material's share was positive. The size of the coefficient in the state fixed effects and time counter version indicates that technological change alone would have increased materials share by about 16 percentage points. This materials-using bias is similar to the results of Cain and Paterson.²¹² The impact of real output on materials share was also positive and significant at the ten percent level. With a coefficient of 0.026, the 53 percent increase in output per establishment would have generated another one point increase in materials share. This reflects the increasing productivity of labor and capital as output increases, lowering the per-unit cost of these inputs. Since the amount of per-unit material input needed for production is fairly fixed, material's share of total cost will rise as other inputs become more productive and therefore less expensive on a per-unit basis.

²¹² Cain and Paterson, p. 352.

Table 33A: Materials Equation Coefficients

Coefficient	Variable (p)	Model Version					
		Base	Time Counter	Year Effects	State Effects, Time Counter	State Effects	State, Year Effects
α_4		0.608 <.0001	0.614 <.0001	0.608 <.0001	0.623 <.0001	0.618 <.0001	0.606 <.0001
α_{14}	Pw	0.006 0.688	0.026 0.331	0.006 0.688	0.096 <.0001	0.085 <.0001	0.024 0.150
α_{24}	Pc	-0.008 0.373	0.003 0.854	-0.008 0.373	0.045 <.0001	0.024 0.022	0.002 0.859
α_{34}	Ps	0.003 0.284	-0.010 0.005	0.003 0.284	-0.008 0.029	0.006 0.029	0.003 0.347
α_{44}	Pm	-0.001 0.975	-0.018 0.639	-0.001 0.975	-0.133 <.0001	-0.115 <.0001	-0.029 0.213
η_{41}	F1	-0.143 0.079	-0.098 0.354	-0.143 0.079	-0.133 0.202	0.186 0.040	-0.078 0.385
η_{42}	F2	0.149 0.064	0.116 0.270	0.149 0.064	-0.065 0.558	0.311 0.000	0.183 0.007
η_{43}	F3	0.192 0.011	0.252 0.002	0.192 0.011	0.137 0.123	0.225 0.006	0.103 0.216
τ_{41}	Y	0.050 <.0001	0.052 0.001	0.050 <.0001	0.031 0.037	0.021 0.145	0.026 0.036
τ_{42}	T	na na	1.981 0.635	na na	15.183 <.0001	na na	na na
τ_{43}	E	0.006 0.130	0.006 0.244	0.006 0.130	-0.002 0.720	-0.003 0.625	0.006 0.183

Because coefficients from the cost equation will be needed to calculate elasticities for the labor law variables, the cost equation was included with the share equations in the system of equations to be estimated. The coefficients that are included in the cost

equation but not found in any of the share equations can be found in Table 34A. These coefficients have little economic meaning by themselves, so they will not be discussed directly.

Table 34A: Cost Function Coefficients*

Coefficient	Variable 1 Variable 2 (p)	Model Version					
		Base	Time Counter	Year Effects	State Effects, Time Counter	State Effects	State, Year Effects
α_0		4.119 <.0001	4.215 <.0001	4.119 <.0001	4.301 <.0001	4.388 <.0001	4.238 <.0001
β_1	F1	-0.129 0.077	-0.134 0.080	-0.129 0.077	0.136 0.287	0.523 0.000	0.167 0.186
β_2	F2	-0.311 0.002	-0.304 0.008	-0.311 0.002	-0.020 0.873	0.732 <.0001	0.181 0.173
β_4	F4	0.083 0.198	0.095 0.175	0.083 0.198	0.183 0.039	0.359 0.020	0.186 0.108
δ_1	Y	1.001 <.0001	1.005 <.0001	1.001 <.0001	0.973 <.0001	1.014 <.0001	0.951 <.0001
δ_2	T	na na	26.075 <.0001	na na	21.546 <.0001	na na	na na
δ_3	E	-0.011 0.058	-0.013 0.047	-0.011 0.058	-0.004 0.577	0.003 0.737	0.002 0.777
β_{11}	F1F1	-0.573 0.685	-0.844 0.576	-0.573 0.685	-0.834 0.465	-1.713 0.319	-0.322 0.797
β_{12}	F1F2	0.551 0.452	0.689 0.499	0.551 0.452	-0.842 0.297	-1.490 0.160	-0.509 0.503
β_{14}	F1F4	-1.329 0.095	-1.556 0.073	-1.329 0.095	-0.071 0.911	-0.862 0.458	-0.625 0.455
β_{22}	F2F2	0.479 0.583	0.060 0.968	0.479 0.583	-0.571 0.540	-0.596 0.571	-0.058 0.942
β_{24}	F2F4	-0.452 0.446	0.008 0.992	-0.452 0.446	0.584 0.314	-0.547 0.425	0.008 0.989
β_{44}	F4F4	0.206 0.792	0.524 0.548	0.206 0.792	-0.110 0.887	0.777 0.543	-0.182 0.836

Table 34A: Cost Function Coefficients*

Coefficient	Variable 1 Variable 2 (p)	Model Version					
		Base	Time Counter	Year Effects	State Effects, Time Counter	State Effects	State, Year Effects
δ_{11}	YY	-0.133 <.0001	-0.123 0.000	-0.133 <.0001	0.004 0.867	0.029 0.477	-0.010 0.724
δ_{12}	TY	na na	-0.136 0.976	na na	-5.098 0.029	na na	na na
δ_{13}	EY	0.009 0.171	0.008 0.266	0.009 0.171	0.001 0.844	-0.001 0.912	0.008 0.084
δ_{22}	TT	na na	4318.393 0.000	na na	945.341 0.211	na na	na na
δ_{23}	TE	na na	-0.164 0.920	na na	0.762 0.410	na na	na na
δ_{33}	EE	-0.006 0.163	-0.003 0.528	-0.006 0.163	-0.002 0.596	0.001 0.820	-0.004 0.338
κ_{11}	F1Y	0.273 0.054	0.306 0.077	0.273 0.054	0.127 0.349	0.250 0.223	-0.025 0.879
κ_{12}	F1T	na na	-29.248 0.239	na na	12.372 0.455	na na	na na
κ_{13}	F1E	-0.008 0.895	-0.025 0.733	-0.008 0.895	0.026 0.599	0.022 0.739	0.027 0.612
κ_{21}	F2Y	-0.210 0.221	-0.220 0.358	-0.210 0.221	0.140 0.294	-0.216 0.238	-0.076 0.546
κ_{22}	F2T	na na	22.517 0.537	na na	30.544 0.224	na na	na na
κ_{23}	F2E	0.130 0.010	0.154 0.022	0.130 0.010	0.065 0.183	0.054 0.423	0.092 0.064
κ_{41}	F4Y	0.111 0.411	0.184 0.193	0.111 0.411	0.006 0.959	-0.099 0.566	0.013 0.924
κ_{42}	F4T	na na	-29.860 0.106	na na	-23.548 0.059	na na	na na
κ_{43}	F4E	-0.023 0.658	0.001 0.986	-0.023 0.658	-0.003 0.960	0.064 0.426	-0.015 0.803
	1904	na na	na na	0.032 0.006	0.000 0.000	0.000 0.000	0.006 0.582
	1909	na na	na na	0.123 <.0001	0.000 0.000	0.000 0.000	0.049 0.003

Table 34A: Cost Function Coefficients*

Coefficient	Variable 1 Variable 2 (p)	Model Version					
		Base	Time Counter	Year Effects	State Effects, Time Counter	State Effects	State, Year Effects
	1914	na na	na na	0.170 <.0001	0.000 0.000	0.000 0.000	0.061 0.004
	1919	na na	na na	0.304 <.0001	0.000 0.000	0.000 0.000	0.213 <.0001
	AL	na na	na na	na na	-0.012 0.649	-0.012 0.649	0.010 0.811
	AR	na na	na na	na na	-0.024 0.236	-0.024 0.236	-0.023 0.364
	AZ	na na	na na	na na	-0.086 0.038	-0.086 0.038	-0.104 0.008
	CA	na na	na na	na na	-0.067 0.108	-0.067 0.108	-0.083 0.098
	CO	na na	na na	na na	-0.120 <.0001	-0.120 <.0001	-0.110 0.001
	CT	na na	na na	na na	-0.028 0.527	-0.028 0.527	0.010 0.839
	DE	na na	na na	na na	-0.024 0.397	-0.024 0.397	0.003 0.922
	FL	na na	na na	na na	0.029 0.251	0.029 0.251	0.038 0.244
	GA	na na	na na	na na	-0.045 0.115	-0.045 0.115	-0.018 0.636
	IA	na na	na na	na na	-0.160 0.000	-0.160 0.000	-0.158 <.0001
	ID	na na	na na	na na	-0.012 0.416	-0.012 0.416	-0.007 0.656
	IL	na na	na na	na na	-0.144 0.000	-0.144 0.000	-0.126 0.006
	IN	na na	na na	na na	-0.089 0.018	-0.089 0.018	-0.079 0.034
	KS	na na	na na	na na	-0.180 <.0001	-0.180 <.0001	-0.166 <.0001
	KY	na na	na na	na na	-0.093 0.000	-0.093 0.000	-0.085 0.004

Table 34A: Cost Function Coefficients*

Coefficient	Variable 1 Variable 2 (p)	Model Version					
		Base	Time Counter	Year Effects	State Effects, Time Counter	State Effects	State, Year Effects
	LA	na	na	na	-0.054	-0.054	-0.015
		na	na	na	0.106	0.106	0.695
	MA	na	na	na	-0.039	-0.039	-0.023
		na	na	na	0.502	0.502	0.666
	MD	na	na	na	-0.088	-0.088	-0.067
		na	na	na	0.002	0.002	0.033
	ME	na	na	na	-0.008	-0.008	0.014
		na	na	na	0.761	0.761	0.676
	MI	na	na	na	-0.100	-0.100	-0.084
		na	na	na	0.006	0.006	0.046
	MN	na	na	na	-0.183	-0.183	-0.159
		na	na	na	<.0001	<.0001	0.001
	MO	na	na	na	-0.145	-0.145	-0.131
		na	na	na	<.0001	<.0001	0.002
	MS	na	na	na	-0.013	-0.013	-0.004
		na	na	na	0.574	0.574	0.908
	MT	na	na	na	-0.108	-0.108	-0.118
		na	na	na	0.001	0.001	0.002
	NC	na	na	na	-0.019	-0.019	0.005
		na	na	na	0.441	0.441	0.866
	ND	na	na	na	-0.223	-0.223	-0.242
		na	na	na	<.0001	<.0001	<.0001
	NE	na	na	na	-0.196	-0.196	-0.183
		na	na	na	<.0001	<.0001	<.0001
	NH	na	na	na	-0.007	-0.007	0.022
		na	na	na	0.828	0.828	0.565
	NJ	na	na	na	-0.080	-0.080	-0.049
		na	na	na	0.140	0.140	0.379
	NM	na	na	na	0.002	0.002	0.004
		na	na	na	0.870	0.870	0.848
	NV	na	na	na	-0.074	-0.074	-0.098
		na	na	na	0.003	0.003	0.002
	NY	na	na	na	-0.113	-0.113	-0.114
		na	na	na	0.017	0.017	0.005

Table 34A: Cost Function Coefficients*

Coefficient	Variable 1 Variable 2 (p)	Model Version					
		Base	Time Counter	Year Effects	State Effects, Time Counter	State Effects	State, Year Effects
	OH	na	na	na	-0.094	-0.094	-0.075
		na	na	na	0.021	0.021	0.084
	OK	na	na	na	-0.172	-0.172	-0.174
		na	na	na	<.0001	<.0001	<.0001
	OR	na	na	na	-0.090	-0.090	-0.103
		na	na	na	0.000	0.000	0.001
	PA	na	na	na	-0.027	-0.027	-0.017
		na	na	na	0.651	0.651	0.763
	RI	na	na	na	-0.010	-0.010	0.030
		na	na	na	0.776	0.776	0.457
	SC	na	na	na	0.063	0.063	0.116
		na	na	na	0.012	0.012	0.000
	SD	na	na	na	-0.207	-0.207	-0.229
		na	na	na	<.0001	<.0001	<.0001
	TN	na	na	na	-0.087	-0.087	-0.066
		na	na	na	0.001	0.001	0.028
	TX	na	na	na	-0.132	-0.132	-0.129
		na	na	na	<.0001	<.0001	0.026
	UT	na	na	na	-0.102	-0.102	-0.112
		na	na	na	<.0001	<.0001	0.000
	VA	na	na	na	-0.043	-0.043	-0.023
		na	na	na	0.089	0.089	0.464
	VT	na	na	na	-0.043	-0.043	-0.036
		na	na	na	0.090	0.090	0.291
	WA	na	na	na	-0.075	-0.075	-0.089
		na	na	na	0.002	0.002	0.002
	WI	na	na	na	-0.091	-0.091	-0.071
		na	na	na	0.002	0.002	0.035
	WV	na	na	na	-0.025	-0.025	-0.018
		na	na	na	0.377	0.377	0.507

*Coefficients not present in share equations

APPENDIX G : RESULTS FOR BOND PRICE APPROACH

An alternative to the residual method for measuring capital costs uses bond prices to derive capital prices. This method uses the interest rates on high-grade industrial bond from NBER adjusted for inflation and depreciation as a proxy for capital price. This is a national series, so there is no variation in prices between states. Total cost was calculated as the sum of labor costs, materials costs, and capital stock multiplied by capital price. For this reason, total cost in this version of the model is not the same as total cost in the body of the paper, which was assumed to be equal to the value of products. Table 30A through Table 34A from Appendix F are reproduced here as Table 35A through Table 39A using the bond price methodology instead of the residual method employed in the body of the paper. As one would expect, the coefficients on the capital variables are quite different in many instances, but elasticities and coefficients on the factors are stable between the two methodologies. The construction of the variables used in this approach is described in Appendix D.

Table 35A: Wage Equation Coefficients, Bond Price Method

Coefficient	Variable (p)	Model Version	
		State Effects, Time Counter	State, Year Effects
α_1		0.176 <.0001	0.191 <.0001
α_{11}	Pw	-0.038 0.123	0.028 0.223
α_{12}	Pc	-0.030 <.0001	-0.017 0.008
α_{13}	Ps	-0.008 0.160	-0.006 0.232
α_{14}	Pm	0.076 0.002	-0.005 0.821
η_{11}	F1	-0.007 0.939	-0.041 0.623
η_{12}	F2	0.000 0.996	-0.155 0.054
η_{13}	F3	-0.132 0.074	-0.105 0.103
τ_{11}	Y	-0.037 0.005	-0.028 0.021
τ_{12}	T	-10.521 <.0001	na na
τ_{13}	E	0.000 0.972	-0.006 0.150

Table 36A: Capital Equation Coefficients, Bond Price Method

Coefficient	Variable (p)	Model Version	
		State Effects, Time Counter	State, Year Effects
α_2		0.108 <.0001	0.111 <.0001
α_{12}	Pw	-0.030 <.0001	-0.017 0.008
α_{22}	Pc	0.010 0.002	0.007 0.030
α_{23}	Ps	-0.001 0.437	0.003 0.123
α_{24}	Pm	0.021 0.002	0.007 0.208
η_{21}	F1	-0.005 0.885	0.012 0.688
η_{22}	F2	0.004 0.914	-0.009 0.772
η_{23}	F3	-0.039 0.163	-0.019 0.434
τ_{21}	Y	-0.001 0.886	0.001 0.822
τ_{22}	T	-0.228 0.833	na na
τ_{23}	E	0.001 0.699	-0.001 0.726

Table 37A: Salary Equation Coefficients, Bond Price Method

Coefficient	Variable (p)	Model Version	
		State Effects, Time Counter	State, Year Effects
α_3		0.040 <.0001	0.041 <.0001
α_{13}	Pw	-0.008 0.160	-0.006 0.232
α_{23}	Pc	-0.001 0.437	0.003 0.123
α_{33}	Ps	0.010 0.061	-0.004 0.377
α_{34}	Pm	-0.002 0.806	0.007 0.083
η_{31}	F1	0.063 <.0001	0.064 <.0001
η_{32}	F2	0.009 0.686	0.017 0.395
η_{33}	F3	-0.010 0.292	-0.005 0.637
τ_{31}	Y	-0.010 0.000	-0.006 0.014
τ_{32}	T	0.973 0.096	na na
τ_{33}	E	-0.001 0.479	-0.001 0.437

Table 38A: Materials Equation Coefficients, Bond Price Method

Coefficient	Variable (p)	Model Version	
		State Effects, Time Counter	State, Year Effects
α_4		0.676 <.0001	0.656 <.0001
α_{14}	Pw	0.076 0.002	-0.005 0.821
α_{24}	Pc	0.021 0.002	0.007 0.208
α_{34}	Ps	-0.002 0.806	0.007 0.083
α_{44}	Pm	-0.096 0.001	-0.009 0.692
η_{41}	F1	-0.051 0.662	-0.036 0.705
η_{42}	F2	-0.013 0.912	0.147 0.105
η_{43}	F3	0.182 0.047	0.130 0.091
τ_{41}	Y	0.048 0.001	0.033 0.007
τ_{42}	T	9.775 0.002	na na
τ_{43}	E	0.000 0.955	0.007 0.137

Table 39A: Cost Function Coefficients, Bond Price Method*

Coefficient	Variable 1 Variable 2 (p)	Model Version	
		State Effects, Time Counter	State, Year Effects
α_0		11.013 <.0001	10.775 <.0001
β_1	F1	-0.315 0.306	-0.274 0.203
β_2	F2	0.077 0.813	0.204 0.400
β_4	F4	0.493 0.013	0.206 0.232
δ_1	Y	0.976 <.0001	0.926 <.0001
δ_2	T	31.598 <.0001	na na
δ_3	E	0.001 0.967	0.010 0.433
β_{11}	F1F1	-1.586 0.610	0.029 0.988
β_{12}	F1F2	-1.294 0.596	-0.498 0.734
β_{14}	F1F4	-1.694 0.395	-1.377 0.294
β_{22}	F2F2	-1.934 0.408	-0.913 0.474
β_{24}	F2F4	0.507 0.710	-0.199 0.820
β_{44}	F4F4	2.645 0.166	1.789 0.283
δ_{11}	YY	-0.087 0.051	-0.103 0.005
δ_{12}	TY	-7.650 0.088	na na

Table 39A: Cost Function Coefficients, Bond Price Method*

Coefficient	Variable 1 Variable 2 (p)	Model Version	
		State Effects, Time Counter	State, Year Effects
δ_{13}	EY	0.007	0.010
		0.416	0.127
δ_{22}	TT	4785.141	na
		0.002	na
δ_{23}	TE	0.083	na
		0.973	na
δ_{33}	EE	0.001	0.002
		0.884	0.849
κ_{11}	F1Y	0.486	0.160
		0.120	0.395
κ_{12}	F1T	20.625	na
		0.579	na
κ_{13}	F1E	-0.054	-0.072
		0.693	0.390
κ_{21}	F2Y	0.129	-0.077
		0.734	0.802
κ_{22}	F2T	55.215	na
		0.395	na
κ_{23}	F2E	0.001	0.011
		0.996	0.877
κ_{41}	F4Y	0.376	0.259
		0.153	0.225
κ_{42}	F4T	-39.177	na
		0.208	na
κ_{43}	F4E	-0.042	-0.077
		0.724	0.377
	1904	0.000	-0.009
		0.000	0.549
	1909	0.000	0.076
		0.000	0.000
	1914	0.000	0.098
		0.000	0.001

Table 39A: Cost Function Coefficients, Bond Price Method*

Coefficient	Variable 1 Variable 2 (p)	Model Version	
		State Effects, Time Counter	State, Year Effects
	1919	0.000	0.383
		0.000	<.0001
	AL	0.021	0.189
		0.791	0.004
	AR	0.034	0.147
		0.566	0.002
	AZ	-0.053	0.102
		0.444	0.117
	CA	0.017	0.124
		0.885	0.095
	CO	-0.014	0.130
		0.844	0.036
	CT	0.181	0.305
		0.059	0.000
	DE	0.139	0.277
		0.030	<.0001
	FL	0.136	0.195
		0.015	0.001
	GA	-0.024	0.200
		0.748	0.002
	IA	-0.032	0.189
		0.716	0.008
	ID	-0.003	0.020
		0.924	0.473
	IL	-0.033	0.196
		0.706	0.033
	IN	0.038	0.201
		0.569	0.000
	KS	-0.058	0.229
		0.467	0.001
	KY	-0.077	0.116
		0.263	0.045

Table 39A: Cost Function Coefficients, Bond Price Method*

Coefficient	Variable 1 Variable 2 (p)	Model Version	
		State Effects, Time Counter	State, Year Effects
	LA	0.081 0.380	0.291 <.0001
	MA	0.145 0.371	0.248 0.009
	MD	0.045 0.508	0.247 <.0001
	ME	0.102 0.211	0.221 0.008
	MI	0.035 0.678	0.195 0.003
	MN	-0.089 0.363	0.163 0.043
	MO	-0.032 0.777	0.183 0.017
	MS	0.028 0.666	0.168 0.004
	MT	-0.084 0.189	0.049 0.298
	NC	-0.044 0.498	0.173 0.001
	ND	-0.183 0.042	0.062 0.394
	NE	-0.091 0.318	0.199 0.002
	NH	0.120 0.277	0.271 0.000
	NJ	0.104 0.300	0.293 0.000
	NM	0.073 0.052	0.113 0.008
	NV	-0.034 0.578	0.041 0.404

Table 39A: Cost Function Coefficients, Bond Price Method*

Coefficient	Variable 1 Variable 2 (p)	Model Version	
		State Effects, Time Counter	State, Year Effects
	NY	0.038 0.730	0.167 0.031
	OH	0.080 0.353	0.221 0.000
	OK	-0.154 0.032	0.092 0.093
	OR	-0.019 0.772	0.093 0.048
	PA	0.067 0.580	0.179 0.030
	RI	0.109 0.182	0.271 <.0001
	SC	0.130 0.036	0.319 <.0001
	SD	-0.177 0.031	0.056 0.427
	TN	0.023 0.740	0.225 0.000
	TX	-0.092 0.269	0.138 0.073
	UT	-0.053 0.262	0.095 0.046
	VA	0.042 0.536	0.219 0.000
	VT	0.044 0.496	0.166 0.003
	WA	0.017 0.749	0.090 0.029
	WI	0.030 0.705	0.174 0.007
	WV	0.047 0.314	0.156 0.001
*Coefficients not present in share equations			

Table 40A: Elasticity of Demand, Bond Price Method

Input	State Effects, Time Counter	State, Year Effects
Materials	-0.499	-0.366
p	0.000	0.000
Salary	-0.711	-1.055
p	0.000	0.000
Wage	-0.994	-0.661
p	0.000	0.000
Capital	-0.803	-0.823
p	0.000	0.000
Elasticities and standard errors are calculated according to Binswanger, page 380-383 as:		
$\hat{e}_{ii} = \frac{\hat{\alpha}_{ii} + s_i^2 - s_i}{s_i}; \quad SE(\hat{e}_{ii}) = \frac{SE(\hat{\alpha}_{ii})}{s_i};$		
where s_i $i=1..4$ is the i^{th} estimated share. Elasticities are evaluated at the mean of the years in the sample.		

Table 41A: Elasticity of Substitution, Bond Price Method

Input 1	Input 2	State Effects, Time Counter	State, Year Effects
Capital	Salary	0.724	1.565
	p	0.043	0.000
Capital	Wage	-0.347	0.225
	p	0.219	0.434
Capital	Material	1.298	1.099
	p	0.000	0.000
Wage	Material	1.588	0.962
	p	0.000	0.000
Wage	Salary	0.097	0.325
	p	0.880	0.564

Table 41A: Elasticity of Substitution, Bond Price Method

Input 1	Input 2	State Effects, Time Counter	State, Year Effects
Materials	Salary	0.944	1.262
	p	0.000	0.000
<p>Elasticities are symmetric and are best used to evaluate substitute-complement relationships between inputs. Elasticities and standard errors are calculated according to Binswanger, page 380-383 as:</p> $\hat{e}_{ij} = \frac{\hat{\alpha}_{ij} + s_i s_j}{s_i s_j}; \quad SE(\hat{e}_{ij}) = \frac{SE(\hat{\alpha}_{ij})}{s_i s_j};$ <p>where s_i $i=1..4$ is the i^{th} estimated share. Elasticities are evaluated at the mean of the years in the sample.</p>			

Table 42A: Partial Elasticities of Demand, Bond Price Method

Inputs		State Effects, Time Counter	State, Year Effects
Wage	Materials	1.030	0.624
p		0.000	0.000
Wage	Salary	0.004	0.014
p		0.880	0.564
Wage	Capital	-0.039	0.025
p		0.219	0.434
Salary	Materials	0.612	0.818
p		0.000	0.000
Salary	Capital	0.080	0.174
p		0.043	0.000
Salary	Wage	0.019	0.065
p		0.880	0.564
Materials	Salary	0.040	0.053
p		0.000	0.000
Materials	Wage	0.315	0.191
p		0.000	0.000
Materials	Capital	0.144	0.122
p		0.000	0.000
Capital	Wage	-0.069	0.045
p		0.219	0.434
Capital	Materials	0.842	0.713
p		0.000	0.000

Table 42A: Partial Elasticities of Demand, Bond Price Method

Inputs		State Effects, Time Counter	State, Year Effects
Capital	Salary	0.031	0.066
p		0.043	0.000
<p>These elasticities are not symmetric and should be interpreted as the elasticity of demand for the first column (ith) input after a price change in the second column (jth) input. Elasticities and standard errors are calculated according to Binswanger, page 380-383 as:</p> $\hat{e}_{ij} = \frac{\hat{\alpha}_{ij} + s_i s_j}{s_i}; \quad SE(\hat{e}_{ij}) = \frac{SE(\hat{\alpha}_{ij})}{s_i};$ <p>where s_i $i=1..4$ is the ith estimated share. Elasticities are evaluated at the mean of the years in the sample.</p>			

Table 43A: Partial Elasticities of Demand, Labor Laws, Bond Price Method

Inputs		State Effects, Time Counter	State, Year Effects
Wage	Factor 1	-0.372	-0.464
p		0.444	0.265
Capital	Factor 1	-0.376	-0.147
p		0.195	0.599
Salary	Factor 1	1.161	1.258
p		0.001	0.000
Materials	Factor 1	-0.412	-0.316
p		0.022	0.033
Wage	Factor 2	0.024	-0.577
p		0.962	0.153
Capital	Factor 2	0.061	0.125
p		0.849	0.644
Salary	Factor 2	0.231	0.597
p		0.648	0.197
Materials	Factor 2	0.006	0.430
p		0.974	0.002
Wage	Factor 4	-0.187	-0.332
p		0.615	0.308
Capital	Factor 4	0.130	0.026
p		0.605	0.905
Salary	Factor 4	0.234	0.090
p		0.317	0.698

Table 43A: Partial Elasticities of Demand, Labor Laws, Bond Price Method			
Inputs		State Effects, Time Counter	State, Year Effects
p		0.317	0.698
Materials	Factor 4	0.759	0.399
p		0.000	0.001
Wage	Spending	0.001	-0.018
p		0.967	0.368
Capital	Spending	0.007	0.004
p		0.694	0.822
Salary	Spending	-0.015	-0.004
p		0.484	0.850
Materials	Spending	0.000	0.022
p		0.965	0.003
Wage	Output	0.791	0.787
p		0.000	0.000
Capital	Output	0.973	0.938
p		0.000	0.000
Salary	Output	0.751	0.779
p		0.000	0.000
Materials	Output	1.054	0.977
p		0.000	0.000

These elasticities are not symmetric and should be interpreted as the elasticity of demand for the first column (i^{th}) input after a price change in the second column (j^{th}) input. Elasticities and standard errors are adapted from Binswanger, page 380-383 as:

$$\hat{e}_{if} = \frac{\hat{\alpha}_{if} + s_i \hat{s}_f}{s_i}; \quad SE(\hat{e}_{if}) = \frac{SE(\hat{\alpha}_{if})}{s_i};$$

where s_i $i=1..4$ is the i^{th} estimated share, and s_f $f=1..4$ is the f^{th} estimated factor or output share. Elasticities are evaluated at the mean of the years in the sample.

Table 44A: Output Elasticities With Respect to Labor Laws, Bond Price Method			
Inputs		State Effects, Time Counter	State, Year Effects
Cost	Factor 1	-0.334	-0.260
Cost	Factor 2	0.026	0.204
Cost	Factor 4	0.479	0.199
Cost	Spending	0.000	0.011

Table 45A: Impact Analysis: Predicted Change in Cost Share Attributable to Empirical Change in Exogenous Variables

Variable	Change 1899- 1919	Impact of Observed Change in Variable*			
		Materials	Wage Labor	Salary Labor	Capital
Non-Labor Variables					
Materials Price	97.2%	-44.8%	70.3%	64.0%	58.0%
Wage Price	16.9%	3.7%	-10.4%		-1.9%
Salary Price	-13.4%	-0.6%		12.6%	-0.5%
Capital Price	-48.8%	-9.7%	6.0%	-9.7%	25.5%
Real Value of Products per Establishment	52.7%	52.4%	40.6%	39.7%	53.6%
Time	1.0%				
Total Change: Non-labor Variables		1.0%	106.5%	106.6%	134.7%
First Wave Laws	9.8%			20.1%	
Second Wave Laws	11.3%	5.5%	-8.3%	9.5%	
Anti-union Factor	3.9%	1.4%			
Labor Law Expenditures/000 Workers	38.5%	0.6%			
Total Change: Labor Variables		7.5%	-8.3%	29.6%	0.0%
Total Change		8.5%	98.2%	136.2%	134.7%
Empirical Change		40.1%	29.7%	101.8%	120.2%
*Impact is percentage point change in each share from the empirically observed percentage change in each variable from 1899-1919. Uses elasticities from run using output, state spending on labor, three factors, and state and year fixed effects.					

Table 46A: Labor Law Elasticities Over Time, Bond Price Method

Input Combination		Avg.	1899	1904	1909	1914	1919
Wage p	Factor 1	-0.464	-0.385	-0.394	-0.472	-0.528	-0.546
		0.265	0.321	0.317	0.266	0.238	0.212
Capital p	Factor 1	-0.147	-0.069	-0.090	-0.158	-0.209	-0.207
		0.599	0.824	0.746	0.548	0.402	0.506
Salary p	Factor 1	1.258	1.726	1.394	1.146	0.986	1.175
		0.000	0.000	0.000	0.000	0.000	0.000

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